Resources

STATE OF CALIFORNIA—RESOURCES AGENCY

RONALD REAGAN, Governor

DEPARTMENT OF CONSERVATION

DIVISION OF FORESTRY
DIVISION OF MINES AND GEOLOGY
DIVISION OF OIL AND GAS
DIVISION OF SOIL CONSERVATION

SACRAMENTO, CALIFORNIA
1416 Ninth Street

June 18, 1969

Honorable Norman B. Livermore, Jr.
Secretary for Resources
The Resources Agency of California
Room 1311, Resources Building
1416 Ninth Street
Sacramento, California 95814

Dear Mr. Livermore:

It is a pleasure to send to you for review and further disposition the report of your Ad Hoc Committee, State Regulations and Practices, Oil and Gas Operations and Oil Pollution. Attached to and included in the report is a proposed "California Oil Spill Disaster Contingency Plan". This Committee was formed in late February at your request. The State Lands Commission requested a somewhat similar study by the State Lands Division. By participation on this Committee, the State Lands Division considers this to be, in part, a joint report.

In addition to the State agencies represented on the Committee (see below), the following State agencies have reviewed preliminary drafts of the report at various stages of the study:

Department of Water Resources
Department of Harbors and Watercraft
Interagency Council on Ocean Resources (ICOR)
Public Utilities Commission
Division of Industrial Safety

Review and comment was also solicited and received from the United States Geological Survey and the Western Oil and Gas Association.

It should be stressed that this has been a critical, comprehensive study with no punches pulled. It should be equally stressed that, due to the length of the study, many of the resultant recommendations have already been, or are being, implemented and therefore some criticisms contained in the report are no longer valid. The interagency dialogue generated by the study process itself has solved many of the problems discussed. Recommendations "A" and "B" provide a mechanism for implementing the other recommendations.

Despite the critical approach of this study, it is difficult to escape the conclusion that the State of California has done a generally excellent job in regulating oil and gas operations in the past. With the adoption of the recommendations made in this report and continued interagency coordination through the proposed "State Interagency Oil Spill Committee", it should be possible to maintain this excellent safety record in the continued development of the vital oil and gas resources of an increasingly urban, increasingly environmental quality conscious California.

Respectfully,

Ad Hoc Committee, State
Regulations and Practices,
Oil and Gas Operations
and Oil Pollution

John M. Mayfield, Deputy Director
Chairman

William C. Bailey	Division of Oil and Gas
Paul R. Bonderson	Water Resources Control Board
Wesley G. Bruer	Department of Conservation
Donald J. Everitts	State Lands Division
Charles E. Fullerton	Department of Fish and Game
Edward N. Gladish	Department of Conservation
George P. Gribkoff	Water Resources Control Board
Fred E. Kasline	Oil and Gas Supervisor
John F. Matthews, Jr.	Division of Oil and Gas
Loren Fields	California Disaster Office
F. W. Boone	Environmental Quality Study Council

Enclosure

cc: State Lands Commission
% Mr. Frank Hortig
Chief Executive Officer

REPORT OF THE AD HOC COMMITTEE
STATE REGULATIONS AND INSPECTION PRACTICES,
OIL AND GAS OPERATIONS AND OIL POLLUTION

CONTENTS

REPORT OF THE AD HOC COMMITTEE, STATE REGULATIONS AND INSPECTION PRACTICES, OIL AND GAS OPERATIONS AND OIL POLLUTION

Summary of Review and Conclusions

This study was requested by the California Resources Agency in the wake of the Santa Barbara Channel oil pollution incident of early 1969. Regulations and practices are reviewed and recommendations made to assure that public safety, property and environmental quality receive maximum protection consonant with economic development of the oil and gas resources of an increasingly urbanized California. Provision is made herein for implementation of these recommendations.

Under State regulation and supervision, the California oil industry has a generally excellent record in the prevention of major oil spills. State regulations are not so rigid as to preclude discretion. This approach has been successful and should be continued. Some legal restrictions on inter-agency exchange of offshore data should be removed.

State agencies have various responsibilities in regard to oil operations and oil pollution. The Division of Oil and Gas is responsible for the conservation and protection of oil, gas and fresh water. The State Lands Commission, operating through the State Lands Division, represents the State as a land and mineral owner, and protects the State's interest in the development of same. The State Water Resources Control Board and the Regional Water Quality Control Boards are responsible for water quality and control of water pollution. The Department of Fish and Game is responsible for fish and wildlife resources in California and, in carrying out its duties, also enforces State and Federal pollution laws. The Division of Industrial Safety is responsible for assuring safe working environments.

In general, State agencies have sufficient authority to enforce compliance with oil pollution prevention and abatement requirements, although there are some "gray" areas. The responsibilities of the Division of Oil and Gas should be expanded to include protection of public safety, property and natural resources in regard to oil and gas operations. The Division should accordingly expand its duties, require additional information from oil operators and conduct more inspections. There appears to be a serious void in State regulation and inspection of the pollution aspects of onshore pipelines, other than public utility pipelines. Also, there should be better control on the location, construction and operation of oil and waste water sumps, and on waste water disposal into ocean waters. Oil containment and removal devices should be quickly available to offshore oil operations.

There is a need for better coordination between State agencies in many activities related to oil and gas operations. For example, the State Lands Division should establish better coordination with other agencies, particularly the Regional Water Quality Control Boards. The latter Boards also need to work at this and, in addition, should maintain better liaison with the Division of Oil and Gas.

Ocean-going tankers are the most likely future source of disastrous oil spills. A study should be made of west coast tanker traffic and safety procedures. Lesser oil spills in harbors and old well abandonments are continuing nuisances which also require further study.

A new California Oil Spill Disaster Contingency Plan is proposed to provide for effective coordination of State efforts during any future major oil spill abatement operations, regardless of the source of the spill.

Recommendations and Implementation

Two primary recommendations are not in the body of the report; they are as follows:

(A) The head of each State agency mentioned herein shall on or before September 15, 1969 submit a report to this Ad Hoc Committee detailing the actions taken by his agency to implement the recommendations in this report which concern it, and suggesting the form of any legislation which may be needed to complete the implementation of these recommendations. Submittal of reports shall be expedited by the agency designated to coordinate each recommendation. These agency reports shall be evaluated by this committee and forwarded to the Resources Agency and the State Lands Commission, on or before October 15, 1969, with further recommendations including those for necessary legislation.

(B) The concerned departments shall put the needed legislation into required form and secure its introduction early in the 1970 session of the Legislature, as coordinated by the Resources Agency.

The other 38 recommendations are included and numbered in each section of the report. The "Recommendation Index", on the next page, summarizes them all by number, description, location in report, agencies concerned and method of implementation.

Most recommendations are for changes in, or additions to, present procedures and practices, and/or for better inter-agency coordination. These can be adopted administratively or effected by cooperation. In some instances, additional authority seems warranted and legislation may be required for achievement.

State Regulations and Inspection Practices, Oil and Gas Operations and Oil Pollution
Recommendation Index

No.	RECOMMENDATION BRIEF DESCRIPTION	PAGE	AGENCIES CONCERNED: DOG	SLD	WRCB & RWQCB	DFG	DNOD ** (or DMSM)	DIS	DWR	RA	PUC	CDO	D.C.	INDUSTRY	METHOD OF IMPLEMENTATION: LEGISLATION	ADMINISTRATIVE	COOPERATION
.	All agencies report back on recommendation implementation and legislative needs. Ad Hoc Committee Coordinate.	2	x	x	x	x	x	x	x	x	x	x	x		x?	x	x
.	Resources Agency coordinate preparation and introduction of legislation.	2	x	x	x	x	x	x	x	X	x	x	x		x	x	x
.	DOG access to offshore data available to SLD.	6	X	x												x	x
.	Explore offshore data exchange with USGS.	6	x	x									X				x
.	Expand DOG responsibilities to protection of life, property and natural resources.	9	x												x		
.	DOG require more data on proposals.	9	X	x												x	
.	DOG require drilling fluid-monitoring devices.	9	X	x												x	
.	Establish standard classification of BOPE.	10	X	x												x	x
.	Offshore casing, cementing and testing.	10	x													x	
.	Additional notice for producing well work.	10	x													x	
.	Form DOG offshore unit.	10	x													x	
0.	2-way radios in DOG vehicles.	10	x													x	
1.	Operator reporting of spills to DOG, mandatory.	10	x													x	
2.	DOG "Weekly Summaries" to RWQCB's.	11	X		x											x	x
3.	SLD send notices to RWQCB's.	11		X	x											x	x
4.	Analysis of geology and drilling conditions for RWQCB's.	11	x	X	x											x	x
5.	Shallow electrical logs for fresh water.	11	X	x	x				x							x	x
6.	Better liaison, RWQCB's, DOG, SLD, DFG.	11	x	x	x	x											x
7.	Mandatory weekly blow-out practice drills, offshore drilling crews.	12	x													x	
8.	DOG require injection well corrosion protection information.	14	X		x											x	
9.	Revise interagency procedural agreements, water quality.	14	x	x	X	x			x							x	x
0.	Detailed BOPE inspection for condition.	16	X					x								x	
1.	All State employee reporting of spills.	16	x	x	x	x	x	x	x	x	x	x	x				x
2.	DOG investigate suspected subsidence areas and seek remedial action.	17	x											x	x?	x	x
3.	Require additional data and conduct regular inspection, surface water disposal.	18	X		x	x										x	x
4.	Underwater facilities not to be fishing hazard.	19		X		x	x									x	x
5.	Flowing well "storm-chokes" in sensitive upland areas.	19	x													x	
6.	Annual inspection of producing areas.	20	x													x	
7.	Cooperative inspection of oil and waste water sumps.	20	X	x	x	x											x
8.	Review disposal of waste water in ocean.	21	x	x	X	x	x								x?		x
9.	Greater care in location of oil and waste water sumps.	21	x	x	X	x										x	x
0.	Pipeline study.	24	x	x	X	x		x	x	x	x			x	x?		x
1.	Review underwater pipeline locations.	24		x	x	X										x	x
2.	Cooperate in offshore pipeline corridor study.	24	x	X	x	x	x	x	x		x			x			x
3.	Tanker traffic study, spill hazard.	24					X							x		x	x
4.	CDO implement spill disaster contingency plan.	25	x	x	x	x	x	x	x	x	x	X	x	x		x	x
5.	Operator access to booms and skimmers.	26		X	x	x								x		x	x
6.	Plan dispersant testing and licensing.	27			X	x										x	x
7.	Ensure good condition of offshore loading facilities.	27		X	x	x	x	x								x	x
8.	Recommend funding source, deserted problem-well abandonments.	28	X	x						x				x	x?		x

* Some recommendations repeated in other sections of report.
** Proposed Department of Navigational and Oceanograph Development.
X Coordinating agency.

Ad Hoc Committee Members:

John M. Mayfield, Jr., Chairman, Deputy Director, Department of Conservation

William C. Bailey	Division of Oil and Gas
Paul R. Bonderson	Water Resources Control Board
Wesley G. Bruer	Department of Conservation
Donald J. Everitts	State Lands Division
Charles E. Fullerton	Department of Fish and Game
Edward N. Gladish	Department of Conservation
George P. Gribkoff	Water Resources Control Board
Fred E. Kasline	Oil and Gas Supervisor
John F. Matthews, Jr.	Division of Oil and Gas
Loren Fields	California Disaster Office
F. W. Boone	Environmental Quality Study Council

Introduction

As recently demonstrated by the uncontrolled oil discharge near Platform 402A in Federal waters off Santa Barbara, oil operation accidents can have a serious adverse affect on the environment. Members of this committee were appointed by their respective agency heads following the State Resources Agency request to do so dated February 27, 1969. The original charge of the committee was to critically assess current State of California offshore oil and gas regulations and inspection practices as they relate to public safety and the environment, and to develop recommendations for necessary or desirable improvements. During the review, questions arose concerning regulations and practices on the uplands; therefore, the study was expanded to include these.

From 1957 through 1968, 682 wells were drilled from platforms, piers, islands and fixed or floating structures on State offshore leases, under State regulations and jurisdiction; other offshore lands were slant-drilled from upland drillsites. In addition, 708 offshore coreholes were drilled under State regulation and supervision from May, 1956 through January, 1969; of these, 465 were drilled prior to the May, 1965 U.S. Supreme Court Opinion, in then-disputed areas which are now Federal O.C.S. lands. No significant oil spill has resulted from the drilling of any of these wells. This excellent record is not the result of simple good fortune. California began regulating oil operations in 1915; since that time, a vast background of experience has been gained from the drilling of approximately 90,000 wells in the State.

The State regulations and practices of the past have been satisfactory, as indicated above. However, the increasingly urban nature of California and the resultant growing concern for environmental quality dictate that additional precautions be taken in the future.

Well programs proposed by oil and gas operators are considered for approval by State agencies on an individual, well-by-well basis, taking into consideration the known (or unknown) geologic factors and other conditions which may be encountered. To quote from an April 17, 1969 report to Los Angeles City officials, prepared by Los Angeles City Petroleum Administrator, Arthur O. Spaulding: "---State officials are allowed to exercise their judgement as to what constitutes a safe drilling and casing program. To make such a program rigidly adhere to any given set of conditions is simply to invite disaster, for no longer would discretion be a factor in the approval which must be obtained".

Those most experienced in oil operations generally agree that regulations must retain flexibility to allow for discretion; each well is different from every other well, particularly in California. Therefore, while some legislative amendments are suggested by the Committee, there are herein no long lists of specifications recommended for inclusion in statutes or formal regulations. Individual agencies have such lists for their own internal use, to be sure, but these are used with judgement and amended internally when warranted. Most of the recommendations have to do with practices and with additional interagency coordination, and many of them are already being implemented by the affected agencies.

Coordination between State agencies in some areas covered by this report has been excellent; in other aspects, there appears to be considerable room for improvement. Cooperative efforts in making this study have already improved interagency communications. The continuation of this Ad Hoc Committee until its recommendations have been implemented should effect better coordination procedures. The formation and functioning of the recommended "State Interagency Oil Spill Committee" (see proposed "California Oil Spill Disaster Contingency Plan") should maintain better coordination in the future.

I. Prevention of Pollution from Oil Operations.

A. Release and Coordination of Geologic Data

1. Legal Restrictions, and Exchange Systems

Review: Section 6826, Public Resources Code, requires that permittees make available geologic and other physical data from their operations on State owned lands to the State Lands Commission; it further provides that it is a misdemeanor for any member or employee of the Commission to disclose this information to anyone other than fellow members or employees of the Commission without the written consent of the permittee. This prohibits sharing of some critical information developed on State owned lands with the Division of Oil and Gas. Since casing design and some other drilling practices are best considered on a well-for-well basis, taking geologic conditions into full account, this situation precludes full direct knowledge of some geologic information by DOG on and adjacent to State owned lands. DOG therefore relies to some extent on the judgement of State Lands Division personnel as to the adequacy of casing and other provisions proposed by the operators insofar as these are governed by geologic conditions in those areas.

DOG also requires submittal of certain records and provides that they remain confidential except by written consent of the operator. State Lands Division gains access to this information by including a waiver in the lease form to all data filed with the DOG on State owned lands.

The United States Geological Survey requires that data gathered by operations on Federal land be made available to it but this information is also confidential. Consequently, there is no official exchange of offshore geologic data between State and Federal agencies. This is not the case for upland wells drilled on Federal lands. The Division of Oil and Gas regulates and supervises these well operations in the same manner and is furnished the same data as for wells drilled on other lands in California, by tacit agreement with the USGS.

Recommendations:

(1) Division of Oil and Gas and State Lands Division

The DOG should prepare special forms of the Notice of Intention to Drill (Form 105) and notice of intention to rework (Form 107) for proposed operations on State owned lands, only, which include a clause constituting written consent for DOG to have access to all data available to the State Lands Commission. DOG coordinate.

(2) Department of Conservation, DOG, State Lands Division

A preliminary meeting has taken place between State personnel, and USGS and U.S. Department of Interior representatives. Further meetings should be arranged to explore means of establishing an offshore data exchange system in specific areas of mutual concern. Department of Conservation coordinate.

B. Drilling

1. Offshore and Tideland

a. Equipment and Methods

Review: The primary charge of the State Oil and Gas Supervisor and the DOG is to prevent loss of oil, gas or reservoir energy and damage to oil, gas or underground or surface fresh waters from oil and gas operations. This is to be liberally construed to meet its purposes; however Section 3203 of the Public Resources Code is specific as to the contents of drilling notices filed by operators, namely the following: well location, evaluation and designation; the method and estimated depth of water shut-off; size and weight of casing; and estimated productive depths. For offshore wells and for wells located in other sensitive areas, such as urban centers, high-use recreational areas and in or about other natural resources particularly susceptible to major damage from possible pollution resulting from oil or gas operations, additional information should be required.

Section 3203 also requires the filing of a notice with the DOG prior to deepening, redrilling, plugging or permanently altering casing in any well. No notice is currently required by DOG for downhole work not involving any of these operations, such as pulling rods or tubing. There should be some requirement for this for offshore wells and for wells in other sensitive areas, as determined by the District Deputy, so that DOG can ensure that adequate precautions are taken to prevent escape of fluids.

Current DOG answers to drilling and rework notices specify the following: adequate blow-out prevention equipment, hole to be kept full of drilling fluid at all times, subsurface fresh water protection, and casing and cementing requirements. DOG personnel witness the following: test of blow-out prevention equipment, water shut-offs including casing splices, and plugging operations for abandonment, partial abandonment or for redrilling. Some of these requirements should be more specific, some additional requirements should be made, and inspection, particularly of BOP equipment, should be more comprehensive.

Four of the six Oil and Gas Districts of the DOG include submerged land areas. Because of the specialized nature of offshore operations, a centralized offshore unit could do a more efficient and complete job of regulating these activities.

The Subsidence Control Act provides a means for repressuring oil and gas pools to arrest subsidence provided there is a threat of inundation by the sea. This may be done through unitization which may be voluntary or which can be compulsory if 65% of the working interest owners agree. There may be a need for subsidence control measures in some additional near shore and other upland areas.

Division 6 of the Public Resources Code gives the State Lands Commission jurisdiction over all ungranted tide and submerged lands owned by the State and full authority to lease and administer those lands. The State Lands Commission therefore operates, through the State Lands Division, as the representative of the State as a land and mineral owner. Lands are leased to the oil industry for drilling and producing oil and gas and for constructing and operating submarine pipelines, cables and tanker moorings. These properties are managed so as to obtain maximum revenue consistent with the basic concepts of conservation and multiple use. Oil and gas leases must contain provisions specifying methods of operation and standard requirements for operating in a proper and workmanlike manner, for the prevention of waste and pollution, for the protection of the safety and health of workman, and for the liability of the lessee for personal injuries and property damage. All valid Federal, State and local laws applicable to lessee's operations must be observed.

Before offering State owned lands for lease, any affected city or county may request a hearing at which to present objections. The Commission makes a determination to lease or not, considering the affect on adjacent developed shoreline or recreational areas, only after any such hearing.

The State Lands Division has comprehensive requirements covering oil and gas operations including: erection of permanent structures, well location and drilling course, size, strength and setting depths of casing, casing tests, cementing, mud specifications, blow-out prevention equipment, completion procedure, fire equipment, abandonment, and site clearance. Drilling proposals are reviewed, including a check of the casing design by computer, and approvals are granted on an individual well basis. DOG approval is a prerequisite to approval by the State Lands Division. Continuous use of gas detection and mud-logging equipment is required by the SLD on all exploratory coreholes drilled on State owned offshore areas.

Although both the State Lands Division and the Division of Oil and Gas have responsibilities related to oil and gas operations on State-owned lands, non-conflicting roles have developed through the years. There are no significant overlaps or voids in the operation of these two agencies on State lands with regard to oil operations; on the contrary, their activities in areas of mutual concern are complementary.

The Division of Oil and Gas makes available copies of its "Weekly Summary" to all Regional Water Quality Control Boards. This summary shows all notices received during the week to drill, rework or abandon wells in California. The State Lands Commission furnishes notices to the appropriate Regional Water Quality Control Boards of the location of all leases issued. The Regional Boards should receive specific notification sufficiently in advance to allow considered comment prior to a decision by the Commission as to whether or not to lease.

Oil and gas operators occasionally do not run electrical logs through the uncased shallow part of boreholes. In the interest of delineating possible fresh water aquifers and assuring their protection, it should be mandatory for offshore operators to run an electrical or other acceptable survey of the entire borehole up to the shoe of the conductor casing string in designated wells.

Recommendations:

Division of Oil and Gas

(3) There should be an amendment of the Public Resources Code, Section 3106, to include prevention of damage to life, health, property and natural resources, in addition to oil, gas and fresh water. (requires legislation) Sections 3220 and 3224 should be similarly amended, as should Section 3714 (Geothermal Resources Act)

(4) The Division should require that additional information be submitted on or with notices of intention to drill and to rework, such as depth of first competent strata, estimated depth of fresh water, expected pressures, programs for drilling fluid and casing, cementing, and detail of BOP equipment to be used for each casing string. If the well is to be directionally drilled, the proposed course and bottomhole coordinates should be stated. (The Oil and Gas Supervisor has authority under Sections 3013 and 3106 to require this information) DOG coordinate (with SLD).

(5) The DOG should require use of additional drilling fluid system safety devices, such as: (a) mud pit-level indicator in full view of the driller and equipped with a warning device; (b) mud volume measuring device to determine volume required to fill the hole when running in or out of the hole. DOG coordinate (with SLD).

(6) A standard classification for blow-out prevention equipment should be established for internal use by all districts. This should be regularly reviewed and updated. Coordinate with SLD.

(7) The following policy on casing requirements should be continued: sufficient and adequate surface casing strings should be run and solidly cemented so as to provide containment of fluids within the well under all conditions. Setting depths should continue to be determined on a well- by-well basis taking into account: (a) geologic conditions, (b) ocean depth, (c) formation fracture gradients, (d) pressures to be contained within the well bore, (e) protection of fresh water zones, and (f) provision for adequate well control until the next string of casing is set.

A minimum of two strings of surface casing was required in the past. The above design criteria may require a third string. The previous requirement that conductor casing (first surface casing) string be set at not less than 300 nor more than 350 feet below the ocean floor should be observed as a guide. In all cases, the surface casing should extend into competent formation. Each casing string should be solidly cemented and have BOP equipment installed, inspected and pressure-tested, with test to be witnessed by DOG or State Lands Division, before drilling below the shoe. Height of cement in the casing-borehold annulus should, in some cases, be determined by appropriate down-hole surveys.

(8) At the discretion of the District Deputy, a notice and approval may be required for any down-hole work during which a well capable of production is not under mechanical containment at all times, including operations not specified in Section 3203. (This is within the authority of the Oil and Gas Supervisor)

(9) An offshore unit within the DOG should be promptly formed for centralized supervision of all offshore activities of the Division.

(10) The DOG, for each district, should immediately make a cost effectiveness study of installation of two-way radios in vehicles used for inspections, if this study has not already been made, and install same as warranted for more efficient deployment of personnel engaged in expanded inspection practices.

(11) As a condition of approval for all operations, the DOG should require operators to promptly report to the DOG office in the affected district all spills which endanger life, property or the environment. DOG shall relay such reports to any other appropriate State agencies.

(12) DOG should specifically send copies of its "Weekly Summary" to each Regional Water Quality Control Board.

State Lands Division

(13) The SLD should specifically direct copies of Notices of Intention to Lease and notices of hearings to all affected Regional Water Quality Control Boards sufficiently in advance to allow considered comment prior to a decision by the Commission.

(14) Along with the copy of Notice of Intention to Lease, SLD should send to the affected Regional Water Quality Control Board a brief report on the expected geologic and drilling conditions in the area and note any unusual factors which could be of special interest to the Board. DOG should review such reports if specifically requested by the Board, in writing, to do so.

SLD, DOG, Department of Water Resources and SWRCB

(15) In the first well drilled on any State lease and in subsequent wells as may be reasonably necessary, the SLD should require electrical or other acceptable surveys to be run through all parts of the borehole up to the shoe of the first surface (conductor) casing for the purposes of delineating possible fresh water aquifers and assuring maintenance of water quality in such aquifers. In special cases, where any State agency can present reasonable evidence of valuable fresh water deposits at shallower depths, SLD should consider requiring that such surveys be made of such shallower parts of the hole also. DOG coordinate joint discussion with other agencies to establish procedures.

Water Resources Control Board and DFG

(16) Chairmen of Regional Water Quality Control Boards, or their representatives, should personally visist district offices of the DOG and SLD in their respective regions at least twice annually for purposes of mutual information and coordination. The Department of Fish and Game should make similar periodic visits.

b. Personnel and Supervision

Review: Operators generally require weekly practice drills for each offshore drilling crew to insure proper training for emergency duties to prevent or contain blow-outs.

State Lands Commission leases require that all operations be carried on in a proper and workmanlike manner in accordance with good oil field practice and with due regard for the safety and health of workmen.

Oil and gas operators are required to comply with the safety orders of the Division of Industrial Safety which is charged with assuring safe working environments. This includes safety features in offshore structure designs, and safety practices during construction and operation of the structures.

Recommendation:

Division of Oil and Gas

(17) DOG should make weekly blow out practice drills mandatory for each offshore drilling crew.

c. Aesthetics

(i.) During Operations

Review: Aesthetics is largely a matter of personal preference. Local and special interest emphasis on recreational and scenic aspects sometimes tends to override the broader State and national benefits to be derived from resource development.

State Lands Commission leases provide for the following: removal of derricks within 60 days after cessation of use; landscaping and/or fencing at the discretion of the Commission; waste disposal in conformance with local regulations; sanitary and washing facilities; minimizing dust, noise, vibrations and noxious odors; prohibition of pollution; not less than 20 wells from each permanent structure unless the entire facility is hidden from view; and removal of such structures and facilities within 90 days after becoming non-operative.

Recommendations: No change in State requirements. Because of increasing public concern for "scenic pollution" and because of other factors, industry will continue research on ocean-floor completion and other exotic techniques, and on further landscaping and camouflage innovations.

(ii) Site Restoration

Review: DOG requires plug at ocean floor or at the surface of an island. For wells drilled from floating vessels, casing must be cut off at least 5 feet below the ocean floor.

State leases require that all permanent improvements be surrendered in good condition or, at the option of the Commission, that all structures and facilities be removed at lessee's cost upon termination of the lease.

Recommendations: No change.

d. Waste Containment and Disposal

Review: Regional Water Quality Control Boards have the authority to set waste discharge requirements. The State Water Resources Control Board and the Regional Water Quality Control Boards have mutual agreements on procedures with both the DOG and the State Lands Commission. The Department of Fish and Game and the State Lands Division also have a procedural agreement for pollution incidents.

For disposal of waste water by injection into formations of porous media not containing fresh water, the DOG requires the operator to submit his proposal with the following information: structural cross-section through the proposed injection well, structural contour map on the injection zone, source and analysis of injection water, analysis of water presently in injection zone, top and bottom depths and formation name and age of injection zone, method of injection, daily expected amount of water to be injected and maximum expected pressure of injection, base of fresh water, treatment of water before injection, condition of old or abandoned wells in the area, precautions to be taken to insure confinement of injected water to intended injection zone, and reasonable proof that no damage will occur or that oil recovery will not be adversely affected. DOG also requires the following:

copies of letters to offsetting operators informing them of the operator's intention to inject, monthly reports from operator stating amount of water injected and pressures required to do so, data confirming that injection water is confined to the intended zone, notification of any anomalies in any injection well, and that all project records be open to inspection by DOG. DOG engineers review projects in person semi-annually. Special casing integrity tests are ordered and witnessed on a periodic basis. DOG forwards copies of answers to injection or disposal proposals to the appropriate Regional Water Quality Control Board and to the Department of Water Resources. The Board may concur or prescribe additional requirements; the latter seldom occurs.

For disposal of waste water from oil and gas operations by other methods, the operator submits his proposal directly to the Regional Water Quality Control Board. The Board and other State and local agencies jointly consult. Personnel of the Regional Board or other agencies make a field investigation and report to the Board which then prescribes requirements.

Lessees of State owned lands are required to immediately suspend operations (other than mitigative) in the event of pollution or contamination resulting from those operations, and are not allowed to resume until the condition is corrected and resumption authorized by the State Lands Commission.

Offshore structures on State leases must be designed to prevent contamination of ocean water; decking must be drip-proof, sloped for drainage, protected on all sides, and fitted for drainage to a sump for clean-up or shipment to shore with all other contaminants. An approved disposal system may be built on the platform and water which meets discharge requirements of the Regional Water Quality Control Board may be disposed in the ocean. Regional Water Quality Control Boards, the Department of Fish and Game and the Department of Water Resources are notified quarterly of all new State leases issued.

Under California law, clean drill cuttings may be deposited beneath a platform unless the created fill will be adverse to the marine environment, as determined by the Department of Fish and Game, or to navigation. Generally, cuttings carried by water base mud may be deposited on the ocean floor, but those carried by oil base mud must be brought ashore for disposal. The THUMS Long Beach Company is satisfactorily disposing of drill cuttings in a deep, oxygen-depleted offshore basin jointly selected by the Department of Fish and Game and the U.S. Bureau of Commercial Fisheries.

Recommendations:

Division of Oil and Gas

(18) DOG should specifically require information from operators on proposed corrosion protection method for injection and disposal wells and facilities.

DOG, State Land Division, State and Regional Water Control Boards

(19) These agencies should jointly review and if necessary, revise their existing procedural agreements for reporting and controlling discharges and pollution. The Departments of Fish and Game and Water Resources should be consulted prior to final revision. State Water Resources Control Board coordinate.

e. Inspection Processes

Review: The DOG witnesses tests of blow-out prevention equipment, water shut-off tests and plugging operations for drilling and abandonment operations. Injection projects are inspected at least semiannually and casing integrity tests of disposal and injection wells are witnessed. Other inspections of drilling, operating and abandonment procedures, and of oil operation-related nuisances are made when and where needed.

The State Lands Division makes on-site inspections of all drilling operations on State leases for examination of equipment, materials and procedures. Offshore and onshore production facilities are also inspected. Any spills in the area of operations on State owned lands are investigated. Exploratory core-holes drilled under SLD Geological Survey Permits are under the continuous on-site surveillance of a State Inspector from the time the drill site location is determined through abandonment. Surface waste water disposal facilities are investigated by SLD prior to approval for operation.

The Department of Fish and Game regulates use of explosives in offshore seismic geophysical exploration. This Department and SLD have had observors on each seismic survey boat during these operations. The expense of these observors is paid by industry. These regulations in regard to protection of marine life extend to cover the Federal outer continental shelf by Memorandum of Understanding between DFG and the Secretary of the Interior. DFG also investigates pollution incidents in or endangering any State Waters. These investigations are normally conducted after the fact; however, in those areas where repeated violations are noted, DFG will make uannounced inspections.

Regional Water Quality Control Boards are the primary agencies empowered to investigate pollution sources. Upon notification of offshore violations by other agencies, Board staff personnel inspect the facilities for compliance with waste discharge requirements.

The Division of Industrial Safety inspects drilling structures during construction to observe safety practices or to advise on safety procedures and regulations. Electrical equipment and pressure vessels are inspected during installation. During drilling operations, DIS inspects BOP equipment and other safety equipment insofar as it affects the safety of the workmen and the equipment with which they work. During drilling operations, drilling structures are inspected at least monthly; drilling vessels are usually inspected at the beginning of a well and once thereafter. During the production period, structures are inspected at least once yearly or more often if warranted.

Recommendations:

Division of Oil and Gas

(20) DOG should make inspections of BOP equipment in sufficient detail so as to be assured of satisfactory condition as well as adequate design.

All State Agencies

(21) All State employees who are not themselves empowered to take direct action in regard to pollution should promptly notify the appropriate Regional Water Quality Control Board, either directly or through DOG, SLD or DFG, of any observed pollution violation.

f. Enforcement Procedures

Review: Division 3 of the Public Resources Code governs oil and gas operations supervised by the DOG. Violations of Chapter 1 (Oil and Gas Conservation) and Chapter 2 (Wasting of Natural Gas) are misdemeanors and punishable by fine and/or imprisonment. Any well drilled for oil and gas in violation of Chapter 3 (Spacing of Wells and Community Leases) is declared to be a public nuisance. In addition an operator is required to post a $5,000 bond prior to drilling, redrilling or deepening any well (or $25,000 for multiple wells) as surety that he will comply with the provisions of Chapter 1 of Division 3.

A State lease may be terminated for failure of lessee to comply with the lease terms including applicable State and local laws, and rules and regulations of the State Lands Commission. State oil and gas offshore leases further require two additional bonds, one bond, in an amount fixed by the Commission, to assure performance in accordance with the terms of the lease; and a second bond to assure performance of lessee in the placement, maintenance and removal of structures, and in site restoration. The amount of this second bond is not to exceed 50% of the cost of the structure.

Sections 13060, 13063 and 13064 of the State Water Code provide Regional Water Quality Control Boards with enforcement authority when waste discharge requirements are violated. This includes the power of injunction.

Section 5650 of the Fish and Game Code declares it to be unlawful to pollute the waters of the State. Section 851 provides that a deputy appointed to enforce the Fish and Game Code is a public officer and has all the powers and authority of a peace officer to make arrests for violations of the code.

The Division of Industrial Safety, under Division 5, Part 1 of the Labor Code, has authority to, among other things, prepare safety orders and to enforce all laws and lawful orders requiring work and work places to be safe.

Recommendations:

Same as (3).

2. Upland

a. Equipment and Methods

Review: Essentially included in B.I. a. "Drilling, Offshore and Tideland, Equipment and Methods" (page 6). Sensitive areas, such as those in or adjacent to urban development or natural resources particularly susceptible to major damage from possible pollution resulting from oil or gas operations, should require precautions similar to those taken in offshore operations.

State leases require that drilling rigs be sound-proofed in urban or other areas where noise is objectionable.

Recommendations:

Same as (3), (6), (10), (11), and (16)

For "sensitive" upland areas, same as (4), (5), and (7); and

Division of Oil and Gas

(22) DOG should actively investigate additional areas in which subsidence due to oil operations are suspected of becoming a problem. DOG should actively encourage the undertaking of subsidence programs in any identified problem areas; if voluntary programs are not undertaken in any identified problem areas within a reasonable time, DOG should request amendment of the Subsidence Act by legislation, if this is required to initiate corrective measures. If it is determined by DOG that areas are subsiding due to causes other than oil operations, the appropriate State agency should be so informed.

b. Personnel and Supervision

Review: Included in B.1.b., "Drilling, Offshore and Tideland, Personnel and Supervision" (page 11).

Recommendation: (17) should also apply in "sensitive" areas.

c. Aesthetics

Review: Partly covered in B.1.c., "Drilling, Offshore and Tideland, Aesthetics" (page 12). Aesthetic considerations are governed by local authorities in areas in which this has been a serious concern. Requirements for site restoration, landscaping, dust abatement, traffic and sign restrictions, minimizing noise, fumes and vibrations etc., may be included either in City or County ordinances or in the provisions of local drilling and/or producing permits. This has been a prerogative of local government and should not be pre-empted by the State.

Site restoration is a common provision of oil and gas leases between private parties.

No recommendation.

d. Waste Containment and Disposal

Review: Partially covered under B.1.d. "Drilling, Offshore and Tideland, Waste Containment and Disposal" (page 12). There appears to be generally satisfactory information, inspection and control on subsurface disposal and/or injection wells on uplands. While major surface disposal projects are monitored by Regional Water Quality Control Boards, there appears to be scanty preliminary information and little follow-up inspection of most of these facilities on a periodic basis.

Recommendation: Same as (18), and

Regional Water Quality Control Boards, DOG and DFG

(23) These agencies should discuss means of augmenting initial and subsequent data, regular inspection during use, and control of surface waste water disposal facilities; and mutually agree on agency responsibilities. DOG coordinate.

e. Inspection Processes

Review: Included in B.1.e., "Drilling Offshore and Tideland, Inspection Processes" (page 14).

Recommendations: Same as (21). For "sensitive" upland areas, same as (20).

f. Enforcement Procedures

Review: Included in B.1.f., "Drilling, Offshore and Tideland, Enforcement Procedures" (page 15).

No Recommendation.

C. Production (Offshore and Upland)

1. Production Facilities

a. Offshore

Review: All producing wells, production vessels, tanks, and other facilities on State offshore leases must be equipped with safety devices which shut down all producing operations in the event of a failure.

Remainder previously covered under B., "Drilling".

Recommendation:

State Lands Division and DFG

(24) Underwater well heads and other underwater facilities, whenever possible, should be located, designed and constructed so as to not interfere with commerical fishing practices, i.e., cause damage to trawl nets. SLD coordinate.

b. Upland

Review: The Division of Industrial Safety prescribes safety features for production facilities basically for the protection of workmen.

State Lands Division requires that all production and processing facilities on State leases be designed and operated so as to minimize dust, noise, vibration, or noxious odors. Facilities must be equipped with fire prevention and fire fighting equipment. In sensitive areas, unattended facilities must be equipped with safety devices which shut down all operations in the event of a failure.

The other regulations and practices of the State Lands Commission and Division, and those of the Division of Oil and Gas, Department of Fish and Game, and State and Regional Water Quality Control Boards are essentially covered in B.1., "Drilling, Offshore and Tideland" (page 6) and B.2., "Drilling, Upland" (page 16).

It should be noted that, except for Division of Industrial Safety inspections which are limited primarily to safety, and DOG inspection of Subsidence Units, there is no systematic inspection of upland producing properties in general.

Recommendations:

Same as (3), (6), (8), (10), (11), (12), (16), (18, 19), (21), and (23); and,

DOG

(25) Installation of "storm chokes" and/or other safety precautions should be a condition of approval for flowing well completions in particularly "sensitive" areas, in areas of known earth-slides and active faults, and in any other area in which there is a high risk of accidental well-head damage to flowing wells (e.g., adjacent to airports and freeways).

(26) District personnel should make an on-site inspection of all producing and unrestored abandoned production areas in the district including geothermal, not less than once yearly, and more often as conditions require and manpower allows.

2. Oil and Waste Water Sumps and Other Surface Disposal

Review: Mostly covered under B.1.d., "Drilling, Offshore and Tideland, Waste Containment and Disposal" (page 12).

Water pollution aspects of sumps are governed by Regional Water Quality Control Boards under authority provided by Sections 13053 and 13054 of the Water Code. DFG may order immediate clean up when fish and wildlife are damaged or endangered.

Sumps constructed so that rains, runoff or other conditions result in overflow or rupturing can cause considerable damage to property, wildlife and other resources.

Sumps so constructed as to attract birds or allow easy entry by animals have caused a problem in the San Joaquin Valley.

The increasing volume of oil-field waste waters being disposed into maritime waters presents a threat to marine life.

Recommendations: Same as (3), (10), (11), (12), (16), (19), (21), and (26); and

State and Regional Water Quality Control Boards, DOG, DFG & SLD

(27) These agencies should cooperatively inspect all existing oil and waste water sumps prior to the next rainy season. Owners of precariously located or constructed sumps should be requested to (1) relocate, reinforce or take whatever measures necessary to prevent the likelihood of overflow or rupture, (2) correct any other existing or potential cause of pollution from such sumps, and (3) take measures to correct features which allow the easy entry of wildlife. Owners should be given a reasonable time to conduct remedial work voluntarily; appropriate legal action should be taken to ensure correction when other means have been exhausted. DOG coordinate.

(28) Waste water discharge requirements, and practices of waste water disposal into ocean waters should be jointly reviewed by these agencies. Recommendations for improvement should be made to oil operators using this method of disposal. If adverse practices are not voluntarily corrected, all available legal authority should be used. If existing legal authority is not adequate to effect compliance, additional legislation should be sought. SWRCB coordinate.

State and Regional Water Quality Control Boards, DFG, DOG & SLD.

(29) These agencies should exercise particular care in the investigation of proposed oil and waste water sump locations. These should not be located in existing drainages unless effective precautions are taken to exclude run-off water and to prevent damage by floods. SWRCB coordinate.

3. Transportation

a. Pipelines

(i) Offshore

Review:

Pipelines serving State oil and gas leases are permitted under terms of the lease. Easements for lines crossing State lands and serving Federal Outer Continental Shelf leases are granted by the State Lands Commission. Agreements are also entered into for piers and tanker loading facilities. For the purposes of discussion, all of the following are considered to be pipelines:

1) Individual well flowlines, injection and service lines.

2) Oil and gas gathering and shipping lines.

3) Waste water lines.

4) Gas, water and electrical supply lines (offshore).

The Lessee is required to furnish:

(a) Maps and drawings of all development work, improvements, and other related operations on the leased lands, including all buildings, structures, or other works placed in or upon them.

(b) Maps and drawings of all development work related to the surface location of any producing well under a lease, including oil lines, gas lines, tankage, shipping points, facilities for shipping, dehydration piping and all lines connecting into any of the foregoing.

Any proposed change in, or addition to, pipe line systems or any proposed installation or removal of equipment which would result in a different routing of production to or from the gauge tanks must be reported to the State inspector giving the reason for such proposed change, addition, installation or removal at least 24 hours prior thereto. Plats and drawings showing the change must be furnished to the State Lands Division upon request.

All pipelines must be designed, installed, protected and inspected in accordance with good engineering practices. The design must meet the safety requirements of the State of California, Department of Industrial Relations, as well as the valid regulations of the United States, and valid ordinances of the cities and counties which are applicable to the Lessee's operations. The lines must be protected from corrosion. They must be protected with acceptable safety devices and alarms to cause shut-down of the system if the pipeline is severed (low-pressure shut-down device) or accidentally or otherwise shut-in downstream (high-pressure shut-down device). In cases where the pipeline services a continuously operated facility or producing wells, the pipeline safety system should cause shut-in of the facility or the producing wells. All ocean-floor pipelines must be completely tested and inspected upon installation and inspected annually thereafter. A cathodic protection system should be checked at least monthly. The pipeline and facility safety systems should be inspected and tested at least monthly.

Offshore pipelines, because of their inaccessibility and ocean environment, warrant special design considerations. For these reasons it has been the practice of the operators to incorporate greater factors of safety in the design of offshore piping than used in comparable onshore piping. Although the design factors used vary somewhat among operators, they all exceed those recommended by A.S.A. Codes B-31.4 and B-31.8 for oil and gas transportation piping in the most restrictive locations and uses onshore.

All pipelines are welded and inspected in accordance with the applicable pipeline codes and are hydrostatically tested upon installation. Because of the overdesign of the lines in respect to their use, they have been hydrostatically tested to a pressure many times that of their expected operating pressures. This is especially true for low pressure lines as they have been tested from 9 to 35 times their expected operating pressures. High pressure lines (500 psi and above) have been tested from 1.5 to 3.5 times their anticipated operating pressures. Subsequent testing is infrequent, but all are monitored or equipped with pressure safety devices.

All pipelines are buried through the surf zone and are anchored at the shore line. They are externally coated in their entirety; larger lines are weight coated with cement, and a few are internally plastic coated.

The State Lands Division has for some time felt the need to establish fixed corridor routes for the confined placement of pipelines on State-owned offshore submerged lands. The need for fixed corridors arises from expressed demands for other uses of the ocean floor. These uses are often incompatible with pipeline construction and occupancy. Examples of these other possibly incompatible uses for offshore lands include marine ecological reserves, scientific research areas (for instrument testing and development undisturbed by artificial metallic or electro-magnetic influences), and underwater parks and recreation preserves. It is possible unplanned and indiscriminate pipeline crossings of the offshore submerged lands would leave little land remaining useful for other purposes.

As a means to satisfying these multiple-use demands, a series of meetings have been held with industry and interested State and conservation groups. The "real-estate" aspects of the study have been essentially completed, and it is now proposed to enter into a more technical engineering and quality control review of design principles.

(ii) Upland

Review: The Public Utilities Commission has jurisdiction of gas transmission lines. The Division of Industrial Safety prescribes safety rules for working on pipelines and that pipelines be so constructed as to withstand necessary stresses. The State Lands Commission has jurisdiction over pipelines crossing State owned lands. There appears to be no State agency otherwise responsible for systematic approval or inspection of onshore crude oil, petroleum products or chemical pipelines.

Line ruptures are a real problem. The Department of Fish and Game investigates from 25 to 50 line ruptures each year in the Los Angeles Basin alone, and these are only ruptures in that area which could possibly flow into State waters.

Recommendations:

Resources Agency, Business and Transportation Agency, Human Relations Agency, State and Regional Water Quality Control Boards, DOG, PUC, Division of Industrial Safety, DFG, State Lands Division, DWR.

(30) From the above agencies, and any others with possible jurisdiction or expertise, and respresentatives of the pipeline industry, an ad hoc committee should be formed for these purposes; (1) recommending means to correct this critical jurisdictional gap in regulation and control of a major pollution source; and (2) making preliminary recommendations for minimum standards of construction, types and spacing of high and low pressure safety valves and other controls, corrosion prevention, expansion provisions to be incorporated for normal and abnormal conditions, inspection and monitoring methods and means, and such other criteria as may be needed. SWRCB coordinate.

Regional Water Quality Control Boards, State Lands Division & DFG.

(31) These agencies should confer on the location of present underwater or overwater pipelines and also confer prior to construction of such future lines. DFG coordinate.

All Agencies and Industry

(32) Should offer full cooperation to the State Lands Division and others involved in the continuation of the offshore fixed pipeline corridor study. SLD coordinate.

b. Tankers

The oil spill hazard presented by tankers is generally beyond the scope of this report. However, the increased size of tankers, their lessened maneuverability, and the density of waterborne traffic aggravate the already serious threat of a disastrous spill from this source. The volume of oil discharged by the "Torrey Canyon" off southern England exceeded that released from the Santa Barbara Channel rupture by a factor of hundreds.

Recommendation:

Proposed Department of Navigational and Oceanographic Development (or Department of Harbors and Watercraft).

(33) If and when this department is established, one of its first studies should be of tanker traffic in and about California waters in the interest of reducing the hazard of disasterous oil spills. The study should include aids to navigation, navigational equipment, defined and/or restricted sea lanes, shore guidance, speed restrictions and officer and crew training. This study should be cooperative with appropriate Federal and private elements, and with other Pacific Coast states.

Methods and procedures adopted as a result of this study should be standardized for the entire Pacific Coast by cooperative action. Department of Harbors and Watercraft coordinate.

II. Abatement of Major Oil Spills

The foregoing section, I. "Prevention of Pollution from Oil Operations", is a review of present requirements and practices designed to prevent pollution from oil operations, and contains recommendations as to how these can be made even more effective. The oil industry, working under State regulation and supervision, has been very successful in preventing major oil spills in California. Continuation of this excellent record is anticipated. However, when men work with equipment, in any industry, there are bound to be occasional accidents in spite of the most sophisticated precautions.

The most likely source of future disasterous oil spills will continue to be ocean-going tankers. Pipelines are a potential source of serious spills on land as well as in water.

Whatever the source, major oil spills (except far at sea) require abatement efforts. Such operations are occasioned only rarely and, when required, involve many governmental agencies and private groups. A pre-existing plan for organizing these many elements and coordinating their efforts in such an emergency can greatly expedite operations, particularly in the critical early stages. The State of California developed such a plan, the "Marine Chemical Spill Disaster Plan", in early 1968. However, the adoption of the "National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan", in the fall of 1968 by various Federal agencies, partially nullified the State plan. Attached is a draft of a proposed new State plan designed to either function independently, or to complement U.S. Coast Guard efforts or the national plan, if activated.

This proposed plan, titled "California Oil Spill Disaster Contingency Plan", would also create a standing State Interagency Oil Spill Committee to maintain the plan and to serve as a coordinating body for State agencies which deal with oil operations on a more or less routine basis.

Recommendation:

(34) California Disaster Office

CDO should seek review of the proposed contingency plan by the California Attorney General's Office and appropriate Federal agencies; CDO should then implement the plan as soon as possible.

A. Controlling the Source

Review: Federal and State laws and regulations governing operations on offshore leases hold the lessee liable for pollution damages. State bonding requirements provide additional assurance that offshore oil operators on State leases will use every effort to shut off any source of pollution from their operations. Normally, the oil operator is the one best suited for this task, having the necessary equipment and experience in its use, and being able to readily obtain specialized services and equipment if needed.

Various State and Federal agencies have the enforcement authority to halt wilful and/or negligent discharges from vessels. Direct operations to shut off the source of oil pollution from a damaged tanker would likely require outside help from the outset.

Legal incentive for an owner or operator to shut off the source of oil pollution onshore would be the enforcement authority of the Regional Water Quality Control Board, if water quality is endangered, or of the Department of Fish and Game if fish or wildlife were damaged or threatened. Cessation of oil pollution affecting environmental features not involving water use or wildlife can be enforced by the DOG under provisions for the prevention of waste. Local authorities can order abatement of a public nuisance. However, the owner or operator of such a pollution source can normally be expected to take all necessary measures to halt the discharge without the necessity of a legal order being given.

Recommendation: Same as (3).

B. Containment and Removal

Review: Partially covered under II A, "Controlling the Source". Outer Continental Shelf (OCS) Order No. 10 of the U.S. Geological Survey, Branch of Oil and Gas Operations Pacific Region, requires that offshore operators on the Federal OCS maintain standby pollution control, containment and removal equipment, as approved by the USGS, on or immediately available to each drilling platform or drilling vessel. This has stimulated development of this type of equipment by industry. The State does not now require such equipment.

Recommendation:

State Lands Division, State and Regional Water Quality Control Boards, DFG and DOG

(35) SLD should require that operators of offshore State oil and gas leases have ready access to acceptable booms and skimming devices during operations. If apparatus approved by the USGS is also acceptable to SLD and is available to State lessees on reasonably short notice, this would probably not require more equipment than would ordinarily be available for operations on the Federal OCS.

All four agencies and the U.S. Coast Guard should jointly work out a cooperative agreement with the owners and/or operators of such equipment for its employment in the event of a spill disaster not directly involving oil operations, such as tanker or pipeline damage. State Lands Division coordinate.

State Water Resources Control Board and DFG

(36) These agencies should proceed with plans for testing and licensing oil dispersants and oil removal substances in anticipation of enactment of pending State legislation authorizing same. SWRCB coordinate.

III. Lesser Spills and Nuisances

A. Harbor Spills

Review: Day-to-day spills are normally cleaned up by the party responsible for the spill. The actual work is usually done by a contractor. The Department of Fish and Game, the U.S. Coast Guard, or local port authorities can order such clean-up. Criminal proceedings are brought against offenders by DFG if the situation warrants such action.

Offshore loading facilities, when in poor condition or carelessly operated, cause some spill problems.

Port officials report that deliberate oil spill pollution is practically non-existent.

Recommendation: Same as (21); and

State Lands Division, Department of Fish and Game, Division of Industrial Safety and Regional Water Quality Control Boards.

(37) Offshore loading facilities located on State lands should be required to be kept in good condition by SLD. Enforcement authority of DFG, DIS and/or Regional Boards should be used if necessary to see that facilities on other property be maintained in good condition so as to prevent pollution. SLD coordinate.

B. Old Well Abandoments

Review: Structural and other remnants from oil operations conducted prior to the 1921 State Mineral Leasing Act exist in several areas along the California coast. These consist of improperly abandoned oil well casings, pilings and portions of old wharves which project up from the ocean floor or beach. A relatively few additional obstructions from subsequent operations have also been reported. Due to coastal erosion, some casing remnants formerly located on upland areas now constitute obstructions on State tidelands. The State Legislature appropriated funds in 1966 for removal of such obstructions near Summerland. Legislation for additional funds to remove remaining obstructions is now pending.

A drilling bond has been required by the State since 1931. Such bonds are not released until the Oil and Gas Supervisor is satisfied that the bonded well is properly completed or abandoned. Problems occasionally arise due to leakage from abandoned wells drilled prior to 1931 by operators no longer in business and/or from wells which have been illegally re-entered after abandonment. There is no established source of funds for financing proper re-abandonment of such wells.

Recommendations:

Division of Oil and Gas, SLD and Industry

(38) DOG and SLD should meet with oil industry representatives to study reabandonment funding for deserted problem wells. DOG and SLD should then prepare joint recommendations for the RA and State Lands Commission regarding abatement of these problems on both State and other lands. DOG coordinate.

C. Natural Oil Seeps

Review: Natural oil seeps in upland areas generally create no serious problems.

There are a number of known active seeps off the coast of California. At least 40 offshore oil seeps exist between Point Conception and the Mexican border. Eleven of these are classified as major seeps, emitting significant daily quantities of oil. Tarry oil from ocean bottom seeps creates a nuisance on bathing beaches. Its presence there is sometimes blamed on ships or offshore oil operations. However, tarry oil was present and utilized by the Indians hundreds of years ago, and was noted as early as 1776, by Father Pedro Font, near Goleta.

Recommendations: None. Oil spill containment devices and fissure sealing methods under development by industry (accelerated by the Santa Barbara incident), may make entrapment of oil from ocean bottom seeps worthwhile or may provide a practical means of sealing the seeps.

Ad Hoc Committee
State Regulations and Inspection Practices
Oil and Gas Operations and Oil Pollution

John M. Mayfield, Jr.
Chairman

June 17, 1969

June 17,1969

CALIFORNIA OIL SPILL DISASTER CONTINGENCY PLAN

CONTENTS

I.

Introduction and Objectives

The principal objective of this "California Oil Spill Disaster Contingency Plan" is to reestablish an integrated and effective State organization to combat massive oil spills in and about the State of California. Included are all major elements, public and private, which have significant resources and technical knowledge which may be required or utilized in the public interest to combat such a spill. Operations under the plan will be directed toward the preservation of the lives and health of the civil populace, the protection of public and private property and the preservation of natural resources.

The plan will replace the "Marine Chemical Spill Disaster Plan" (1968), insofar as oil spills are concerned. This earlier State plan was a positive forward step and contained many excellent features which have been incorporated herein; however, it relied on the U.S. Coast Guard for centralized coordination of State agency efforts. The subsequently-issued "National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan" for coordinating the Federal response to spill disasters necessarily took precedence with the Coast Guard and governed that agency's response during the Santa Barbara incident of early 1969. With the Coast Guard committed to the national plan, State efforts were left without pre-designated central coordination during this incident. This plan is designed to correct that deficiency so that the State contingency organization can either function independently or function more effectively with the Coast Guard and/or within the national contingency plan organization.

II.

Definitions, Duties and Organization

A. Disaster: A calamity from any cause, natural or man-made, of such extent and severity that large numbers of persons are imperiled and/or vast quantities of property or natural resources are threatened, damaged or destroyed. Implicit in the term is the requirement to marshal and employ the resources of numerous organizations, public and private, civil and military, to minimize and recover from its effects.

B. Oil: For the purposes hereof, this includes petroleum, petroleum products, sludge oil refuse and any other oil-like substance which when spilled or discharged in large quantities presents an imminent or immediate substantial hazard to public health, safety or welfare, to natural resources, or to public or private property.

C. Oil Spill Disaster: The discharge of large quantities of oil which presents an imminent or immediate hazard to public health, safety or welfare, to natural resources, or to public or private property, of a magnitude greater than the mitigative capabilities of local organizations.

This term does not include small oil discharges which cause only minor pollution of a local nature and which constitute no major hazard. Such discharges are of interest primarily from the law enforcement aspect by the local, State or Federal agency or agencies having jurisdiction.

D. Support: The furnishing of resources such as: technical expertise including legal counsel; personnel; equipment and material; and the delegation of the authority necessary to direct the effective utilization thereof.

E. On-Scene Commander (OSC): That person or organization charged with the responsibility and delegated commensurate authority for planning and directing the overall operations of all organizations engaged in combating an oil spill disaster; specific operations, however, will be conducted under the supervision of the respective organizations.

For spill disasters affecting navigable waters, the U.S. Coast Guard will normally be the OSC. If a Regional Operating Team is activated under the provisions of the national contingency plan, the Regional Operating Team will be advisory to OSC. Under the leadership of the OSC, the State Operating Authority shall direct all State and local government agency oil spill disaster operations.

For all other oil spill disasters, the State Operating Authority shall be the OSC.

F. State Operating Authority (SOA): That person charged with the responsibility and delegated commensurate authority for planning and directing the coordinated overall operations of all State and local government agencies engaged in combating an oil spill disaster, and to coordinate these operations with those of Federal agencies and private organizations. He shall be delegated such authority as may be necessary to effectively carry out this responsibility by, and shall serve at the pleasure of, the State Support Team.

The SOA shall be a department director, deputy director or equivalent. He shall be designated for the ensuing calendar year on or before each January 1 by the State Support Team which, however, may designate a new SOA at any time subject to giving thirty (30) days notice to the parties signatory to this plan whenever a new SOA is designated. A designated SOA shall serve until replaced. He shall have a First and Second Alternate all of whose names and telephone numbers shall be included on any notices provided hereinabove.

Either the SOA or one of his alternates shall be available for immediate communications contact at all times.

The Director of the Department of Conservation shall be acting SOA until January 1, 1970 unless otherwise designated prior to that time.

G. State Support Team (SST): This team consists of: the Secretary for Resources, who shall be chairman; the Secretary for Agriculture and Services; the Secretary for Business and Transportation; the Secretary for Human Relations; the Attorney General; the Director of the California Disaster Office; State Adjutant General;and the Director of the Department of Finance.

The State Support Team shall designate the SOA from time to time as specified above, and shall provide him with such support, including authority, as he may properly need to meet his responsibilities.

H. State Operating Team (SOT): This on-scene team shall provide technical advice, operating personnel and equipment, and general counsel to the SOA during oil spill disasters. Within SOT there will be an operational element consisting of one respresentative from each of the following agencies or organizations: State Water Resources Control Board, Department of Fish and Game, Department of Conservation, State Lands Division, and local government.

Such additional support from other State agencies as the SOA may properly require shall be provided through the SST.

When the SOA is also the On-Scene Commander, a representative of the industry most closely affected by the oil spill (preferrably from the company involved, if any) shall also be a member of the operational element of the SOT.

A representative of the California Disaster Office, as a member of the SOT, shall work directly with the SOA and provide for early alerting, other communications services, public information and public relations services and progress reports to the Governor's Office.

State agency members of the SOT shall be designated by their respective agency heads. The local government member shall be as specified by the local contingency plan or as otherwise designated by local authorities. The industry member shall be designated by the company involved or otherwise by the industry association deemed most appropriate by the SOA.

I. Operations Center (OC): The Operations Center shall be oil spill disaster headquarters for the SOA and the State Operating Team. The SOA, in cooperation with the California Disaster Office, shall select facilities as near as practicable to the spill site considering such factors as accessibility, communications facilities, location of operational units and safety.

The Operations Center may be relocated at any time by the SOA after 24 hours notice (if possible) to all organizations directly concerned.

J. State Interagency Oil Spill Committee (SIOSC): This standing committee is hereby created and shall function until dissolved by the State Support Team.

SIOSC shall be responsible for the following:

(1) Establishing and maintaining liaison with Federal, local, and regional public and private organizations engaged in oil pollution prevention and control;

(2) Coordination between State agencies and other organization in day-to-day procedures and practices relative to the prevention and mitigation of pollution from oil discharges;

(3) Reviewing this plan at least once yearly to consider the affect of newly enacted legislation, for consideration of suggested amendments and additions, and for circulation of recommendations for same to the parties hereto;

(4) Reviewing contingency plans of other organizations; and

(5) Recommending necessary research, development and testing by the appropriate organizations of materials, equipment and methods related to oil spill prevention and control.

The SIOSC shall consist of the SOA, as Chairman, and as regular members, a representative and alternate from, and appointed by the head of, each of the following agencies: Department of Fish and Game, Department of Conservation, Water Resource Control Board and State Lands Division. A California Disaster Office representative shall participate in all contingency plan considerations. In addition, the SOA may request other agencies to be represented from time to time as appropriate.

SIOSC shall meet annually in October at the call of the Chairman and at any other time at the request of the Chairman or of any two regular Committee members.

III.

Operational Responsibilities

A. Local Authorities: Action to abate oil spills on uplands or on non-navigable inland waters, unless otherwise governed by statute, is the primary responsibility of local government. Local authorities must take all necessary action to rescue and evacuate endangered citizens; secure, contain and abate the spill; alert the SOA and/or Coast Guard; and enforce the security of the affected area. Personnel from the industry involved in the spill can be expected (or may be required by law) to exert all possible efforts to mitigate the spill; local authorities may need to support industry efforts with personnel and equipment, particularly from fire departments and law enforcement agencies. The existence of a local or regional oil spill contingency plan will expedite operations. Establishment of a central operations and communications center will greatly aid coordination of the various operational elements which may be employed, including State and Federal agencies.

B. U.S. Coast Guard: In the event of oil spills on navigable waters, the Coast Guard has a primary responsibility to take mitigative action in accordance with standard operating procedures. Local authorities and the SOA should be alerted and prepared to provide assistance as requested. Local authorities should take all possible steps to abate the affects of oil and oil contaminated materials which reach shore regardless of the origin of the spill.

C. State of California: Upon notification of an oil spill (see part IV), the State Operating Authority will ascertain all available facts regarding the spill by communication with local authorities, State personnel on the scene or in the area, the Coast Guard if involved, and by any other available means. If it appears that State assistance is or may become needed, he shall alert the State Operating Team and the Chairman of the State Support Team and proceed, or dispatch a representative, to the scene. The SOA or his representative will then establish an on-scene communications base, monitor operations at the spill site, and furnish technical assistance from State agencies as required.

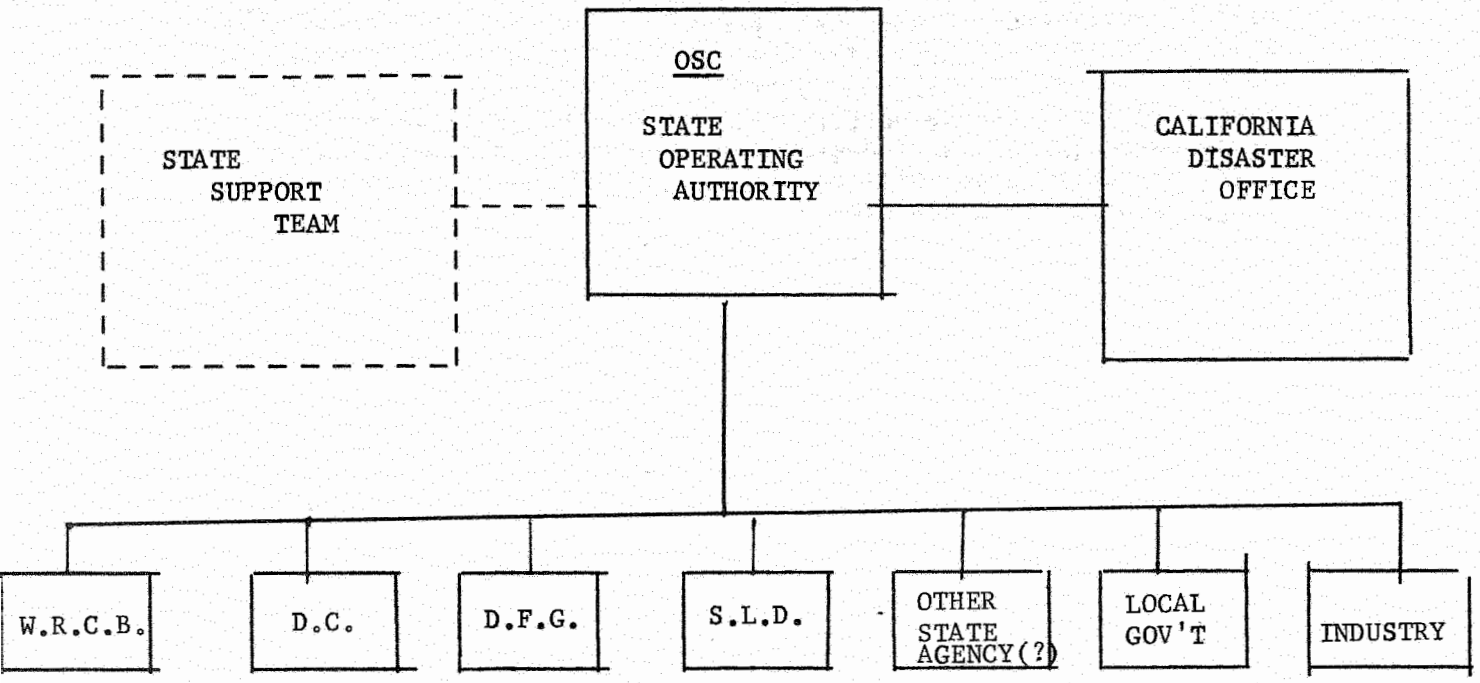
At his discretion, the SOA may partially activate the State Operating Team to act in an advisory capacity. If a need for major State efforts is indicated, he shall, with the approval of the State Support Team, declare the existence of an "oil spill disaster" and fully activate the State Operating Team. At this point, if the Coast Guard is not already actively involved, the SOA becomes the On-Scene Commander for all spill-related operations. Otherwise, he shall direct State and local agency operations under the leadership of the Coast Guard On-Scene Commander. Depending upon the gravity of the situation, he may recommend that the State Support Team request the Governor to proclaim a State of Disaster.

D. Federal Regional Operations Team: If, in the judgement of Federal authorities, the magnitude of the spill disaster exceeds the mitigative capabilities of the otherwise available forces, or if the spill originates in an area under Federal jurisdiction, the "National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan" will be activated. A Regional Operations Team will be formed which will be advisory to OSC. The SOA will function directly under the On-Scene Commander with the continued responsibility of directing State and local agency operations. Unless the spill is primarily on State-owned lands, the industry representative, otherwise on the State Operating Team, will at the request of the On-Scene Commander function directly under him.

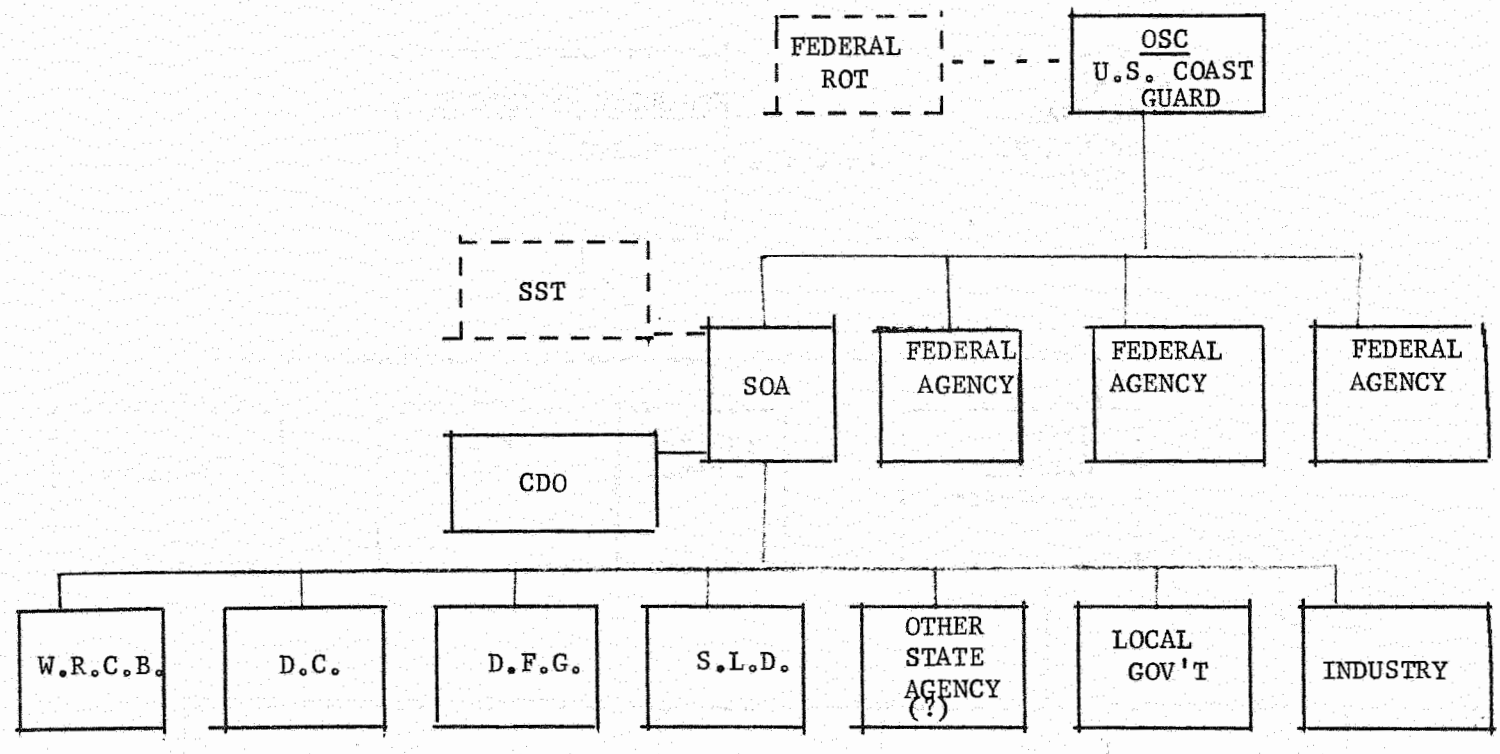
E. Organization Charts:

(1) State Operating Team

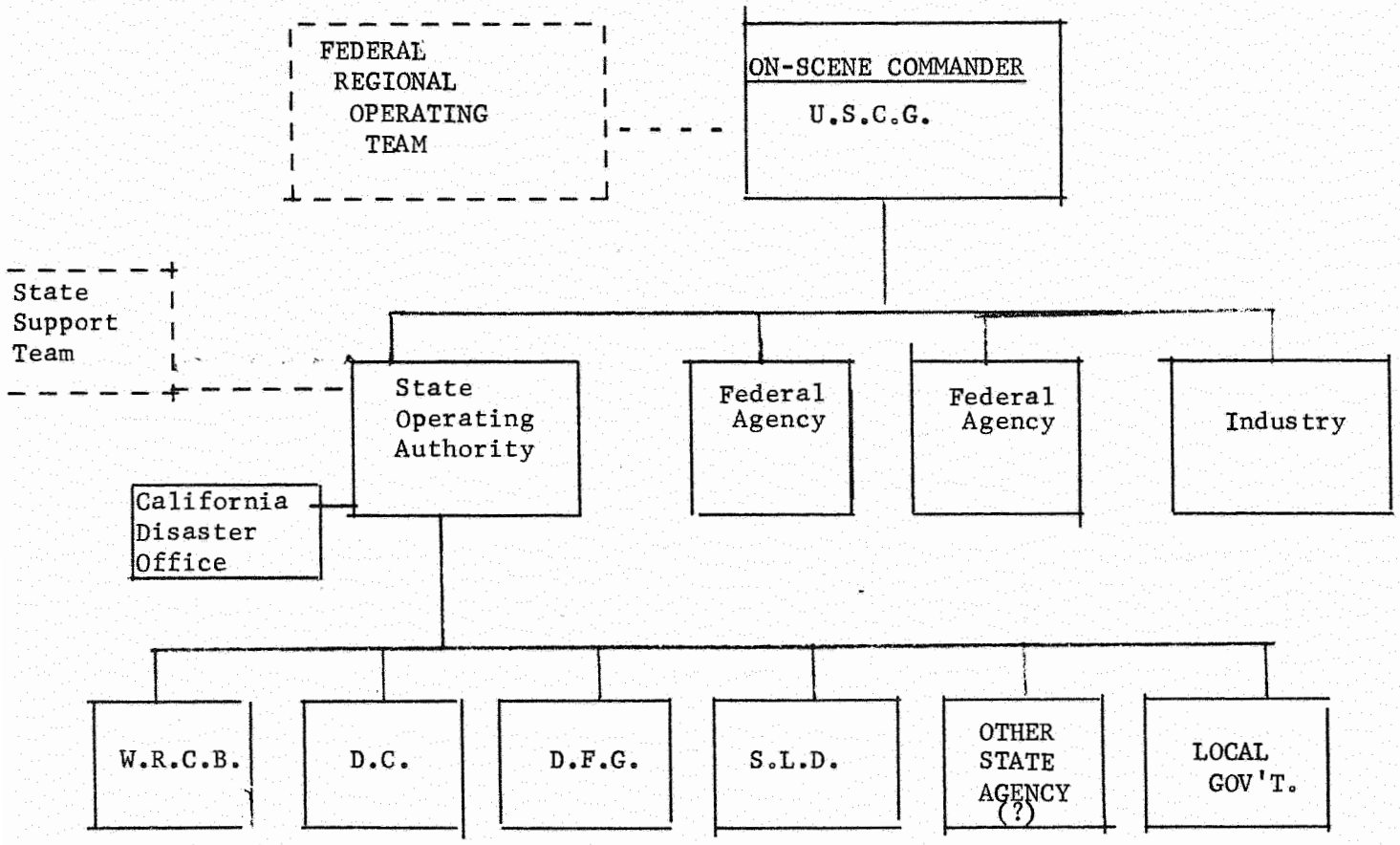
SOA as On-Scene Commander. (Spill not on navigable waters, national contingency plan not activated.)



(2) U.S. Coast Guard as On-Scene Commander. (Spill primarily on navigable waters of the State of California, national contingency plan activated.)



(3) U.S. Coast Guard as On-Scene Commander. (Spill primarily on Federal navigable waters, national contingency plan activated.)

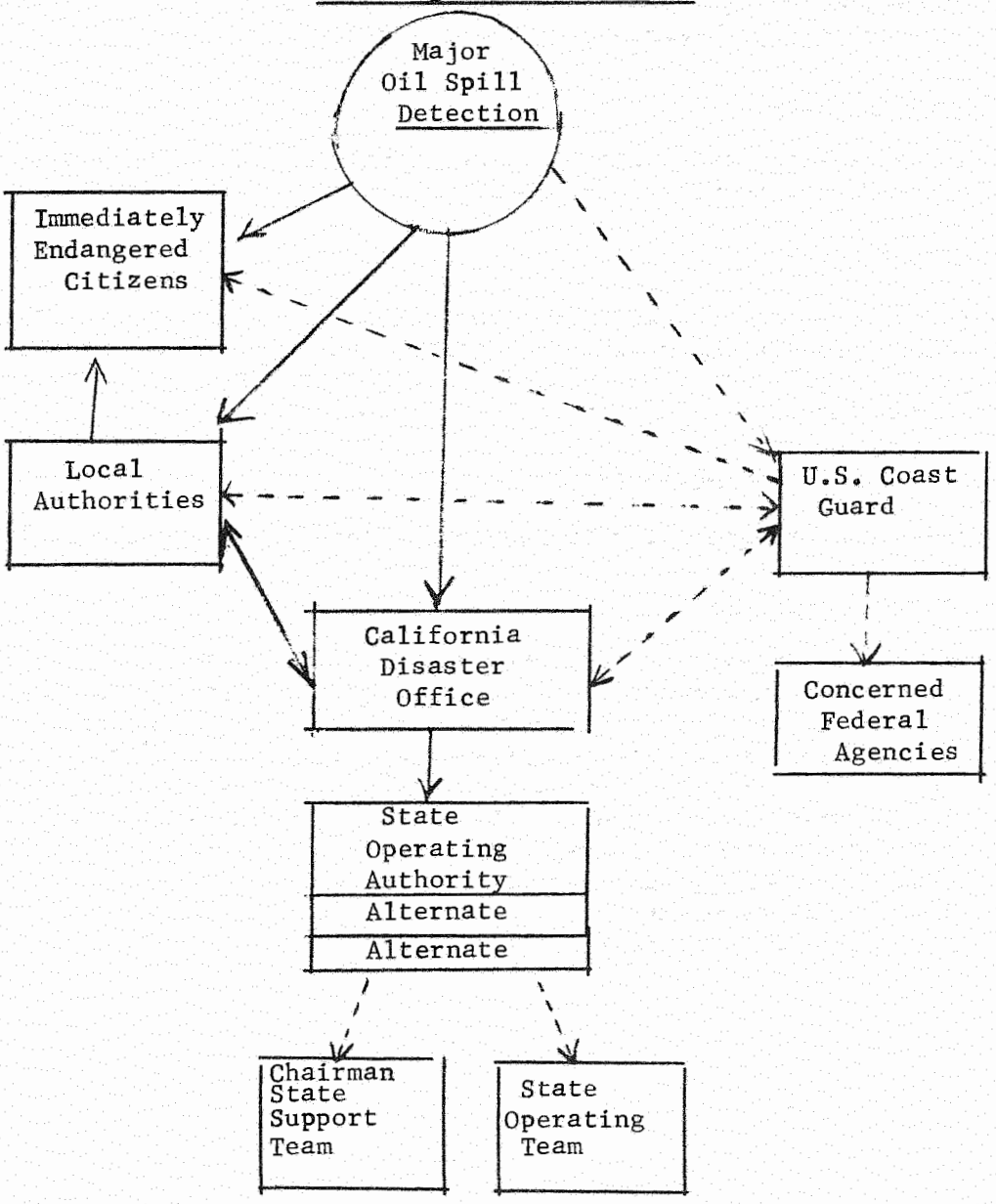


Alerting Procedures (see diagram)

In the event of a major oil spill or serious threat of such spill in or about the State, those who first become aware of same should immediately warn any endangered persons in the affected area and notify the local authorities, the California Disaster Office and/or the nearest U.S.Coast Guard Station.

If alerted first, local authorities should immediately notify the State Disaster Office, Sacramento (916) 485-6231 or 421-4990 and, if the spill is in or near navigable waters, also notify the nearest U.S. Coast Guard station. Local authorities will disseminate additional warnings to the general public in the area. The State Disaster Office, however notified, will immediately alert the State Operating Authority or one of his pre-designated alternates, in accordance with the standard operating procedure.

A. Alerting Procedure Chart



V.

Operations

Regardless of the make-up of the organization or the type or location of the oil spill, certain basic operations will need to be carried out. The employment of any or a combination of the suggested measures will be undertaken only after technical advice has been sought and all considerations of safety, feasibility, availability of material and equipment, side effects and consequences have been made. Some of the following operations may be conducted a step at a time, but many will of necessity be carried out simultaneously.

A. Warnings and Patrols

Issue warnings to threatened areas and establish spill perimeter patrols. In the case of a major spill, new areas may be imperiled from time to time as the pollutant spreads or changes course.

B. Operations Center

Select, establish, staff and equip an Operations Center as a base of operations and communications center.

C. Gather Information

Continuously gather the maximum information concerning the spill: source and cause, present and potential volumes and rates of discharge, chemical and physical properties of the pollutant and its present and probable directions and rates of movement.

D. Secure, Contain and Abate Spill

Formulate and execute plans to secure, contain and abate the spill.

(1) Securing Source:

The more quickly and effectively the source is secured, the less will be the magnitude of all other required operations. This may require expert technical knowledge in one or more fields such as engineering, ship salvage, pipelines, oil well drilling or producing, refineries, chemistry, geology, water quality or demolition. It may also require considerable special equipment and materials, and trained crews. Industry representatives will normally know where these can be obtained. In cases where the source cannot be immediately secured, an alternative may be to transfer pollutants from a damaged enclosure to other facilities.

(2) Containment:

The spilled pollutant should be contained in the smallest possible area to reduce contamination and more easily facilitate removal. In water areas, this will probably involve the use of booms or caissons, and/or absorbents; on land this may involve the use of levees, ditches, pits and/or absorbents.

(3) Removal:

Gross quantities of the pollutant will need to be removed or dispersed. On water, this may require skimming and/or pumping equipment and storage vessels (these may require towing); dispersant, solvent, chemicals, absorbents, or biological cultures (these will all require application equipment). On land, this may require pumping, scraping, earthmoving, steaming or flushing equipment; solvent, chemicals; or absorbents and raking or scooping equipment. Burning may or may not be practical or acceptable either on water or land areas, depending on the composition and location of the material and local air pollution regulations.

(4) Disposal:

The oil and contaminated materials will require safe disposal. Some liquids may be treated and reclaimed if facilities are near at hand; some may require burial or subsurface disposal with or without prior treatment. Established disposal sites such as county or city dumps may or may not accept contaminated material, particularly if it is saturated or super-saturated; under-saturated material will generally be more acceptable. Disposal and/or treatment sites can become a severe problem. Disposal sites should be pre-determined by local contingency plans if at all possible. Burning may or may not be practical or acceptable depending on the composition and location of the material and local air pollution regulations. On-site burial by discing or other methods may or may not be feasible. Most disposal methods will require hauling, loading and other heavy equipment. Care must be taken to avoid polluting underground or surface water supplies.

(5) Cleanup and Rehabilitation:

The final operational phase will be clean up and rehabilitation of the affected area. Depending on the effects of the spill, this may involve steam-cleaning, re-soiling, re-vegetation, re-seeding oyster beds, leveling or reconstruction of buildings and engineering works, re-establishment of kelp beds, etc.

All of the above operations will require logistic support such as: provisions, materials and equipment, transportation, loading, unloading and storage facilities, and security provisions for same; communications; personnel, and messing and berthing facilities for same; semi-continuous surveillance of the spill and its movements by aircraft, vehicles and/or boats; sampling and analysis; equipment maintenance; weather and sea forecasting for spill plotting and drift prediction; medical services; collection and recordation of data (including photography) on a day-to-day basis; legal counsel; and administration, record keeping, funding and accounting.

E. Information Center

As soon as practicable, a separate information center should be established near the Operations Center. The staff of the information center should compile a factual, detailed chronology of the disaster, mitigative actions taken and related events and circumstances. It should file daily situation reports to higher authority and interested agencies, and disseminate evaluated information to the news media and the general public. During State spill disaster operations, the information center will be under the direction of the California Disaster Office, a representative of which is a member of the State Operating Team.

F. Evaluation Center

In the judgement of the State Operating Authority, it may be advisable to establish a separate evaluation center. Abatement methods, materials and equipment submitted by various companies and the public can receive preliminary evaluation here. Evaluation Center activities should be directed by a member of the State Interagency Oil Spill Committee.

APPENDIX A

TO

"CALIFORNIA OIL SPILL DISASTER CONTINGENCY PLAN"

APPENDIX "A"

Cooperative Agreement to Establish
The
"California Oil Spill Disaster Contingency Plan"

THIS AGREEMENT by and between the undersigned agencies of the State of California, and acknowledged by other signatory organizations, will establish contingency operating and supporting organizations for the coordination of activities to effectively secure, contain and abate disasterous spills of petroleum, petroleum products and other oil-like materials (hereinafter collectively referred to as "oil") in and about the State of California, said plan to be entitled "California Oil Spill Disaster Contingency Plan".

WITNESSETH: Each of the parties hereto has interest, authority and/or responsibility concerning the effects of a massive oil spill in and about the State of California, and each desires to cooperate in the employment of the forces, equipment, material and expertise in their various establishments, districts, regions and agencies in the event of a massive oil spill which constitutes a disaster.

The land, districts or regions of the parties hereto are concurrent, adjacent or contiguous so that cooperative action in an oil spill disaster is feasible, and the jurisdiction and authority of some of the parties over certain areas is concurrent.

In the interest of the safety and well-being of the citizens of California, it is the policy of the parties hereto and of their governing bodies to conclude such agreements whenever practicable, and it is mutually deemed sound, desirable, practicable and beneficial for the parties to this agreement to act in cooperation with one another in accordance with these terms.

THEREFORE BE IT AGREED THAT:

1. Whenever an uncontrolled discharge of large quantities of oil occurs in and about the State of California such that there is created or threatened a widespread hazard to human life, natural resources, or public or private property, each of the parties hereto will proceed in accordance with the "California Oil Spill Disaster Contingency Plan" attached hereto.

2. In taking coordinated or cooperative action in accordance with the Plan, the parties assume no responsibility for failure of equipment or personnel in any particular instance where action is taken.

3. Unless funding arrangements have been stipulated between parties, the costs incurred by a party in responding to any actual or potential oil spill disaster for or on behalf of another party shall be borne by the responding party.

4. The obligations of the parties hereto shall be subject to statutory limitations on their authority and the availability of funds, personnel, equipment and material.

5. The organizations, agencies or forces of the parties to this agreement are invited and encouraged, on a reciprocal basis, to exchange information and to witness, participate in, or jointly conduct tests and demonstrations of procedures and techniques for the development, application and use of products and equipment which may be employed in response to an oil spill disaster.

6. Each of the parties hereto shall review this plan at least once each year. Suggested changes thereto or supplementary detailed plans and procedures of operations necessary to more effectively implement the purposes of this agreement shall be submitted to the State Operating Authority for the consideration of the State Interagency Oil Spill Committee. Amendments or additions to the plan as recommended by the committee shall be circulated and become effective upon ratification by the signatory parties.

7. State agencies party hereto shall assist in planning and conducting such exercises designed to test this Contingency Plan as the State Operating Authority may, with the approval of the State Support Team, request. Other organizations signatory hereto shall cooperate in such exercises to the extent permitted by their regular duties and other obligations.

8. This agreement shall remain in full force and effect until cancelled by mutual agreement of the parties hereto or by written notice by one party to the other parties, giving thirty (30) days notice of said cancellation.

9. This agreement may be executed in any number of counterparts and, for all practical purposes hereof, all such counterparts shall be considered as one agreement.

IN WITNESS WHEREOF, the undersigned State agencies have executed and are bound by this agreement subject to the provisions hereinabove; the Federal agencies signatory hereto hereby acknowledge this plan, approve its purposes and agree to cooperate in its implementation to the extent that their respective authorities and other obligations may, from time-to-time, permit; and the Associations signatory hereto hereby acknowledge this plan, approve its purposes and agree to distribute copies hereof to their respective members with the request that each member, or regional groups of members, prepare its or their local contingency plan, compatible herewith, and forward a copy thereof to the State Operating Authority on or before December 1, 1969.

STATE AGENCIES:

California Disaster Office

by:_____

Title:_____ Date:_____

Department of Finance

by:_____

Title:_____ Date:_____

Military Department

by:_____

Title:_____ Date:_____

Department of Justice

by:_____

Title:_____ Date:_____

Attorney General

by:_____

Title:_____ Date:_____

Resources Agency

by:_____

Title:_____ Date:_____

Air Resources Board

by:_____

Title:_____ Date:_____

Department of Conservation

by:_____

Title:_____ Date:_____

State Environmental Quality Council

by:_____

Title:_____ Date:_____

Department of Harbors and Watercraft

by:_____

Title:_____ Date:_____

Department of Parks and Recreation

by:_____

Title:_____ Date:_____

Department of Water Resources

by:_____

Title:_____ Date:_____

State Lands Commission

by:_____

Title:_____ Date:_____

Water Resources Control Board

by:_____

Title:_____ Date:_____

Department of Fish & Game

by:_____

Title:_____ Date:_____

Agriculture and Services Agency

by:_____

Title:_____Date:_____

Department of Agriculture

by:_____

Title:_____Date:_____

Office of the Fire Marshal

by:_____

Title:_____Date:_____

Department of General Services

by:_____

Title:_____Date:_____

Business and Transportation Agency

by:_____

Title:_____Date:_____

California Highway Patrol

by:_____

Title:_____Date:_____

Department of Public Works

by:_____

Title:_____Date:_____

Public Utilities Commission

by:_____

Title:_____Date:_____

Human Relations Agency

by:_____

Title:_____Date:_____

Department of Industrial Relations

by:_____

Title:_____Date:_____

Department of Public Health

by:_____

Title:_____Date:_____

FEDERAL AGENCIES:

Office of Emergency Planning

by:_____

Title:_____ Date:_____

Office of Science and Technology

by:_____

Title;_____ Date:_____

Office of Civil Defense

by:_____

Title:_____ Date;_____

Dept. of Defense

by:_____

Title:_____ Date:_____

Corps of Engineers

by:_____

Title:_____ Date:_____

Sixth U.S. Army

by:_____

Title:_____ Date:_____

Eleventh Naval District

by:_____

Title:_____ Date:_____

Twelfth Naval District

by:_____

Title:_____ Date:_____

Dept. of Transportation

by:_____

Title:_____ Date:_____

Eleventh Coast Guard District

by:_____

Title:_____ Date:_____

Twelfth Coast Guard District

by:_____

Title:_____ Date:_____

Dept. of Interior

by:_____

Title:_____ Date:_____

Federal Water Pollution
Control Administration

by:_____

Title:_____ Date:_____

Federal Water Pollution
Control Administration,
Southwest Region

by:_____

Title:_____ Date:_____

U.S. Geological Survey

by:_____

Title:_____Date:_____

USGS, Conservation Division, Branch of Oil and Gas Operations - Pacific Region

by:_____

Title:_____Date:_____

Fish and Wildlife Service

by:_____

Title:_____Date:_____

Bureau of Land Management

by:_____

Title:_____Date:_____

Bureau of Reclamation

by:_____

Title:_____Date:_____

National Park Service

by:_____

Title:_____Date:_____

Department of State

by:_____

Title:_____Date:_____

Department of Health Education and Welfare

by:_____

Title:_____Date:_____

Public Health Service

by:_____

Title:_____Date:_____

Department of Agriculture

by:_____

Title:_____Date:_____

Forest Service

by:_____

Title:_____Date:_____

Department of Commerce

by:_____

Title:_____Date:_____

Weather Bureau

by:_____

Title:_____Date:_____

Environmental Science Services Administration

by:_____

Title:_____Date:_____

ASSOCIATIONS:

County Supervisors Association of California

by: _____

Title:_____Date:_____

League of California Cities

by:_____

Title:_____Date:_____

Western Oil and Gas Association

by:_____

Title:_____Date:_____

APPENDIX "B"

Emergency Telephone Numbers:

(To be completed on implemention of plan)

APPENDIX "C"

OIL SPILLAGE CONTROL

W. H. Swift, C. J. Touhill and P. L. Peterson
Battelle-Northwest, Richland, Washington

Preprint 50 A

Presented at the

Symposium on Water Conservation and Pollution Control—Part II

SIXTY-FOURTH NATIONAL MEETING

New Orleans, Louisiana

March 16-20, 1969

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS
345 East 47 Street, New York, New York 10017

INTRODUCTION

A great deal of attention recently has been focused on the growing potential of major oil spillage. Increased size of oil tankers, density of waterborne traffic, and offshore petroleum production operations all indicate the need for advanced planning for prevention and control of oil spillage accidents, and for the development of defensive measures in the event accidents do occur.

A fairly substantial body of knowledge has been accumulated in the area of oil spillage control, both as a result of recent experience with major spills and accelerated efforts to dpply existing and developing technology. This paper is intended as a statement of the current state of the art of oil spillage control from which recommendations for research and development can be formulated.

SURVEILLANCE AND PREDICTION OF SLICK BEHAVIOR

One can readily appreciate the critical need for surveillance and prediction of slick movement of major oil spills. The rate and direction of movement of the slick as well as the extent of the affected area must be rapidly and effectively determined if appropriate action is to be taken to control the spill. In addition, surveillaoce is essential if the effectiveness of treatment methods is to be assessed. Aerial reconnaissance techniques appear to be the most practical for collecting the type of data needed to make judgments on the rates and direction of slick movements, control measures, and

the effectiveness of control. These techniques offer greatest promise because large areas can be surveyed at near real time.

Presently, aerial photography, despite its obvious cloud-cover limitations, is the tool which can be most rapidly pressed into service. Black and white, color, and camouflage film are all readily at hand, and the methodology of their use does not require highly skilled scientific assistance. However, such assistance might be necessary in the interpretation of data.

More sophisticated techniques such as spectrophotometric, infrared, ultraviolet, radar, and microwave imaging are also available, but the higher level of sophistication requires the attention of skilled personnel for both operation and data interpretation. Microwave and radar imaging techniques appear to offer the best outlook for all-weather surveillance, particularly for large spills. Spectroscopic and photographic methods are more useful in low-level, thin film oil pollution situations. When meteorological data are added to this capability, accurate judgments should be possible.

The ability to predict the direction, rate of movement, and spreading of an oil slick in the event of a major release of oil is important in planning the deployment of defensive forces. This is important both in connection with actions to be taken immediately following a major oil release and based on real-time or short-range prediction of environmental conditions, and also in thorough contingency planning based on seasonal data.

The rate and direction of movement and spread of an oil slick from a point source is dependent on a number of variables. These

include the following in estimated order of importance:

1. Wind direction and speed
2. Sea state
3. Surface currents
4. Latitude
5. Surface temperature
6. Oil density and viscosity at temperature
7. Volatility
8. Inherent tendency toward emulsification with sea water
9. Volume-rate of discharge at source
10. Interfacial and surface tension: spreading pressure.

All these variables are, or can be, time dependent.

In general, slicks will be most strongly affected by wind conditions and can be expected to move at a speed on the order of 2 to 4% of the wind velocity and, in the northern hemisphere, slightly to the right of the wind vector. Little comparative information is available on the relative emulsification behavior with sea water of various crude oils and refined products, although this factor is important in predicting slick behavior.

CHEMICAL TREATMENT - COLLECTION AND SINKING

Chemical Treatment -- Absorption and Sinking Agents

The literature has revealed that there are numerous compounds and materials available to collect or to sink oil slicks. Four types of collecting agents have been identified as having been either demonstrated or suggested for oil slick recovery. These are: 1) floating absorbents such as straw and sawdust, 2) plastic or other polymeric

materials such as polyurethane foam, 3) gelling agents, and 4) demulsifiers.

The literature shows that the following materials have been employed in actual field situations or in the laboratory with varying degrees of success:

Collection Agents

Absorbents

Straw
Sawdust
Rope
Bark
"Ekoperl"
Chrome leather
Polyurethane foam
Polypropylene fiber
Copolymer PVC/PVA
Cotton waste
Absorbent felt paper
Waste paper
Peat
Rock wool sheets
Glass wool
Rayon floss
Sisal string

Congealing Agents

Plastic foam
Plastic film
Nylon agglutinants

Gelling Agents

Molten wax
Soaps

Demulsifying Agents
(unspecified)

Most of the floating absorbents are inexpensive and can be readily disposed of by either burning or burial. However, recovery of oil values from these absorbents is not easily accomplished. The use of plastics or other polymeric materials, polyurethane in particular,

although rather expensive, offers an excellent solution to the problem, since no residues are left on the ocean bottom and large quantities of oil can be reclaimed for subsequent use.

Gelling agents that can solidify petroleum materials are in the development stage and may prove helpful in collecting spilled oil.

Demulsifiers are commonly used in shipboard systems to break emulsions in ballast water so that wastewater cleanup can be effected. Demulsifiers are generally proprietary and are usually compounded by Edisonian techniques to meet field conditions at the use site.

The function of collection agents is to cause the oil either to adhere to a solid surface or to react chemically with another liquid, thus forming a collectable mass. The selection of the type of collecting agent is based upon the desired objectives of the cleanup program, e.g., efficient oil recovery for reuse, combustion of recovered residues, or economical and rapid action.

Numerous solid absorbents for sinking oil are available. Some of these are:

Sinking Agents

Sand
Brickdust
Fly ash
Cement
China clay
"Omya" clay
Volcanic ash
Silicone mixtures
Carbonized sand
Vermiculite
Crushed stone
Slaked lime
"Stucco"

The weight of material required per unit of oil and the attendant logistics problem present practical difficulties. Demersal fish species may be adversely affected, and resurfacing of the oil mass is generally probable although it is delayed and slow. The method can be applied effectively in deep water, e.g., beyond the continental shelf and particularly in areas not involving commercial fisheries. It is doubtful, however, that it can be completely effective and probably will require back-up by other methods such as recoverable absorbents. The method cannot be recommended in shallow waters or in estuaries, particularly since the collection option can be readily applied in these instances.

In all cases, the spreading of absorbents, polymeric materials, gelling agents, etc., is materially aided when it can be accomplished by aircraft. However, experience has shown that greater degrees of success are apparent when the spill area is confined.

CHEMICAL TREATMENT -- DISPERSION

A large number of dispersants and emulsifiers are available, although little quantitative and comparative information exists. All such agents are toxic to aquatic life in some degree, but again, comparative data are scarce. The aromatic diluent solvent used with the majority of these agents may be the principal toxic agent.

Based on review of the aftermath of the TORREY CANYON incident, the majority opinion is against the general use of emulsifiers, either at sea or in restoration of the shoreline. This conclusion derives not only from the ecological considerations but also from practical experience with detergents in the United Kingdom and France. However, this is a general

conclusion, and specific instances may occur where detergents may be the best defensive measure. This may be particularly true in harbors where aquatic life is not a factor and where detergents can be employed under controlled conditions. Provision of effective agitation is a key factor in the efficiency and effectiveness of detergent emulsifiers. In general, physical collection is preferred if possible.

BIOLOGICAL DEGRADATION OF CRUDE OIL AND OIL FRACTIONS IN THE OCEAN

A significant question posed as the result of the TORREY CANYON incident is the following: If no measures were taken to remove oil spilled on the surface of the ocean, how long would oil persist? In particular, could the microbiological life in the sea metabolize oil, and if so, at what rate? ZoBell[1] has concluded that, "Virtually all kinds of oil are susceptible to microbial oxidation. The rate of such oxidation is influenced by the kinds and abundance of microorganisms present, the availability of oxygen, temperature, and the dispersion of the oil in water. Microbial oxidation is most rapid when the hydrocarbon molecule is in intimate contact with water and at temperatures ranging from 15 to 35°C; some oxidation occurs at temperatures as low as 0°C. An average of one-third of the hydrocarbon may be converted into bacterial cells, which provide food for many animals. The remaining two-thirds of the hydrocarbon is oxidized largely to CO_2 and H_2O. In the marine environment, oil persists only when protected from bacterial action.

"Based upon rates at which marine bacteria have been observed to oxidize various kinds of mineral oils under controlled laboratory conditions and upon information on the abundance of bacteria in the sea, it is

estimated that oil might be oxidized in the sea at rates as high as 100 to 960 mg/m^3 day or 36 to 350 g/m^3 year."

Smith[2] has taken issue with the rates of oxidation of oil estimated by ZoBell. Smith claimed that laboratory experiments showed that the rates may be a high estimate. Nevertheless, it is widely recognized that oil can be metabolized in the ocean. Even if ZoBell's estimates are accurate, it is evident that oxidation rates are slow.

In summary, if environmental conditions, (nutrients, temperature, oxygen availability) are satisfactory, and if suitable microbial populations are present, oil will be degraded in the ocean. However, the rates of hydrocarbon degradation are slow when compared with those of the oxygenated derivatives. There has been much speculation recently about the ability of highly specific cultures to rapidly degrade oil spills, yet a dearth of specific information is evident.

BOOMING

There are three general classes of barriers that can be used to prevent the spread of oil on the surface of the water. These include floating booms, underwater bubble barriers, and chemical booms. In their present state of development, all types will at best retain or stop the spread of oil only in relatively calm waters with little current.

The ability to confine a spill in the area immediately surrounding the source is principally a function of time, availability of equipment, and prevailing environmental conditions. An incident that essentially opened an entire vessel to the sea would involve rapid spreading of the oil, and there would be little chance of containment equipment being effective unless it was in the immediate area and ready for use when the

incident occurred. In a more probable case, where the oil release occurs over several days, the ability to confine the oil to the immediate area would depend largely upon the prevailing sea conditions. Booming in waters with a sea state greater than 3 is impractical with presently existing boom designs and even this is suspect if wind conditions are adverse.

For harbors and relatively calm waters, there are several commercially available booms which can contain a spill. Currents in excess of 1 1/2 to 2 knots make booming difficult without extensive skirts and anchoring systems. Supplementary means of confinement including coagulating the oil with such absorbing materials as straw, bark, or foamed plastics to prevent spreading.

Mechanical Booms

Floating booms are presently in common use for the control of oil spillage in many harbors where transfer operations take place. There are several commercial designs available as well as makeshift methods such as inflated fire hoses. In general, all mechanical booms have a floating section consisting of either an inflatable bladder or a buoyant filler material such as foamed plastic. Below the floating section is some form of skirt to which ballast or anchors are attached. The floating booms are used for such operations as confining oil within an area, preventing the spread or passage of oil, sweeping oil from a particular area, or condensing a slick into a smaller area.

Oil slicks on the water have a mean surface elevation that is higher than the elevation of the water surface outside of the slick.

A floating slick will have a difference in elevation, or freeboard, with respect to the surrounding water surface according to the equation:

$$FBD = \left(1 - \frac{\rho_o}{\rho_w}\right) T$$

where,

FBD = difference in elevation, freeboard

ρ_w = density of water

ρ_o = density of oil

T = thickness of oil slick.

Similarly, the oil-water interface will be depressed below the surrounding surface to a draft equivalent of:

$$D = \rho_o/\rho_w \quad T$$

For the case of a typical United States crude oil floating in sea-water, $\rho_w = 1.035$ gm/cm^3, $\rho_o = 0.855$ gm/cm^3 .

Therefore,

$$FBD = \left(1 - \frac{0.855}{1.035}\right) T,$$

or FBD = 0.17 T

and the draft of the slick,

D = 0.83 T

This means that the boom will require a minimum freeboard of approximately 1/5 and a minimum draft of about 4/5 of the thickness of the slick to contain the oil in calm conditions. It can easily be seen why so many makeshift booms without skirts fail by passing the oil underneath.

Commercial and make-shift booms are now in usage at practically all marine terminals of the United States and Europe, particularly where oil transfer operations take place. They are either placed around ships during cargo transfer routinely to prevent spread if a spill occurs or are quickly available in the event of an emergency.

The most satisfactory are those which can be stored compactly on the water and are self-buoyant.

Bubble Curtain Barriers

Compressed air distributed from a submerged pipe causes local upwelling with a resultant surface current flowing in both directions normal to the bubble curtain. As long as this net flow toward the oil is not exceeded by the free stream current or overcome by the wind force on the oil, the barrier will contain a spill.

Underwater bubbles barriers are a relatively recent development and presently in use in the harbors of Hamburg, Germany and Tobruk, Libya[3] to help prevent the spread of oil from routine loading and unloading operations. Following the TORREY CANYON incident, a 1200 ft-long bubble barrier was placed across the mouth of the Helford River to try to prevent incoming oil. Performance is unknown as oil never reached this boom.[4] The present units use air up to 100 psi supplied by a compressor which makes the unit somewhat susceptible to mechanical failure. A rapidly deployable system could be developed employing a submerged, perforated, flexible base buoyed at the surface and supplied with air at a pressure sufficient to create critical flow through the perforations.

This type of barrier appears to have considerable merit for fixed installations in sheltered waters and has the advantage that entry and egress of ships is unimpaired.

Chemical Booming

There has been relatively little study on the possibility of enhancing or preventing the spread of oil on the water surface by use of wetting or spreading agents. Ambrose[5] states, "Langmuir showed that hydrophobic (water-hating) hydrocarbons do not spread well on water, but that hydrophilic (water-loving) hydrocarbon derivatives spread well. This principle is used in putting cetyl alcohol on reservoir water to retard evaporation. The cetyl alcohol is hydrophilic and forms a continuous, thin, nonvolatile film on the surface of quiet water. Wind and wave action may disrupt the film and push it down wind, however.

"Addition of relatively small proportions of a hydrophilic compound (stearic acid, or oleic acid or other hydrophilic compound) to oil may cause the oil spill to spread over a vast area. Oxidation and bacteria action will be enhanced by such dispersal.

"On the other hand, if fatty acid is spread at the periphery of an oil spill the spreading force of the fatty material will repel the nonpolar petroleum oil and push it into a smaller area."

Some experimental work by the Naval Research Laboratory was reported by Zisman and Pickett[6] on tests made on wetting agents as well as spreading agents to aid in removing oil films from the surface of the water. The objective of the work was to find spreading agents to reduce the thickness of a burning oil film to the point that it would not

sustain combustion or to use these spreading agents to push burning oil away from a ship. The results showed that the agents were incapable of spreading burning oil, although they would spread oil films not on fire. The spreading agents were ineffective against the wind and could not theoretically push back a layer of oil over about one inch thick. Such spreading agents as oleic acid and stearic acid could be used perhaps in calm harbors where the quantity of oil was fairly small and a thick film would not develop.

BURNING

Burning at Sea

If a ship or its cargo cannot be salvaged after a stranding, and if a large spill is imminent, possibly the most desirable method of control will be destruction by burning. Preferably this should be done while the oil is still contained aboard ship. Once oil is on the sea, burning becomes increasingly more difficult due to evaporation of the more volatile components, rapid heat transfer to the water (decreasing the oil temperature to below the flash point), and to the lack of oxygen supply to all but the edges of the slick.

Following the stranding of the TORREY CANYON and after salvage attempts had failed, attempts were made to ignite the oil slicks surrounding the ship and to open the decks of the ship and ignite the oil remaining in the holds. Four unsuccessful attempts were made to ignite small slicks which were believed to be reasonably thick in the waters around the TORREY CANYON. Pyrotechnic devices containing sodium chlorate were employed in these attempts with no sign of ignition of the oil.

With regard to burning the oil aboard ship, heavy oils and crudes tend to burn very slowly if the cargo tanks are not opened to the atmosphere. A tanker fire in the Persian Gulf burned for over two months, after which one half of the cargo remained plus an obnoxious residue.[7]

In the case of the TORREY CANYON, estimates place the amount of oil destroyed by burning *in situ* at between 40,000 and 50,000 tons (British), or over one-third of the cargo.[8]

The fire had to be reignited several times. Beynon[9] estimated that in the three days of attacks..."160,000 lb of high explosives, 10,000 gal of aviation kerosene, 3000 gal of napalm and several rockets had been dropped on the ship." It is pointed out that several of the bombs failed to detonate and will continue to present a hazard in the area.[7]

In summary, it was concluded that destruction of the oil by burning can only be achieved before it is discharged to the sea. Development of improved demolition devices for opening the tanker deck to expose the cargo should be explored.

Burning Oil Washed Ashore

The oil coming ashore from the TORREY CANYON proved to be very hard, if not impossible, to burn in most situations where it was tried. Some success was reported in burning where there were pools of unemulsified oil between rocks.[10] Beynon noted: "In places, black oil was present on rocks and in pools between rocks. The pools were sometimes of 'neat' oil and sometimes of oil floating on water. It was possible to ignite

these pools by flame gunning, but an equally successful and more convenient method was to pour a little flame-thrower fuel into a pool, mix it a little with the oil, and then apply a lighted match. Pools of 'neat' oil burned virtually to completion, but oil burning on water eventually generated enough steam to extinguish the flame and the fire had to be re-ignited on several occasions after first allowing the water to cool. Brown oil in pools only burned so long as the flame-thrower was present and this applied also to the 'chocolate mousse' on the beaches. Even when an 'oxygen tile' was used to effect ignition and wood shavings were mixed with the oil, combustion could not be maintained. It was possible during these tests to watch water boiling out of the 'chocolate mousse' but they effected little beyond producing a thick black skin on the surface. An attempt was also made to burn 'chocolate mousse' by spreading magnesium powder on it and igniting by means of a high temperature flare. This was spectactular but equally as ineffective as using flame-thrower fuel."

A small portable incinerator was effective in disposing of contaminated debris on the beaches of Cornwall. It consists of a 40 gal open-topped steel drum into which a compressed air line enters tangentially and sloping downward near the top. This air path forms a cyclone on top of the material and the low pressure region near the center tends to hold the flame in contact with the fuel.

SKIMMING

Several mechanical devices are presently being routinely used to remove surface oil from calm water in harbors and waterways. The working

principles differ according to usage but generally incorporate either rotating drums, suction devices, or weirs. Several of these devices are self-propelled recovery barges that can traverse a slick until the oil film is picked up.

An example of the rotating drum principal is an oil recovery barge used in the harbor of Baltimore, Maryland, which is based upon oil adhering to a rotating drum. Because oil and water are relatively immiscible, only the oil adheres to the drum and is removed by a wiper blade. The system is similar to that used in offset printing: it relies upon the adhesion, cohesion, viscosity, and surface tension of oils and their repulsion to water.

It seems likely that the oil recovery rate of such a system could be improved by applying a hydrophobic plastic foam "sock" or sleeve to the primary oil rotary pickup drum. A "wringer" roller would squeeze the recovered oil from the primary drum.

A recovery barge incorporating the weir principle for oil recovery uses an adjustable weir mounted on the forward end to induce the surface oil to flow into a sump from where it is pumped into gravity decanting tanks with large holes on the bottom to allow passage of the water out following separation. Recovery is approximately 600 gal /hr under optimum conditions.

Another recovery barge that incorporated the weir principle, skims oil from the surface of the water by means of a moving barge having rigid floating booms hinged on both sides of the barge. These booms open automatically when the barge moves forward. All floating oil entering between the booms will collect where the boom hinges to the barge. From this

position it is sucked into the barge through a vertical slot extending below the water surface. In the hold the oil-water mixture is separated by decanting and the oil is stored. The oil-free water is then pumped overboard. It has a storage capacity of 20 tons and a pumping capacity of 100 tons/hr. The water pump can also be used for pumping oil to shore or into another vessel.

In recovery barges using suction devices the oil is picked up from the water with a pump-driven suction apparatus and is pumped to a settling barge. The water which settles out is automatically siphoned overboard. Capacity is 30 tons/hr.

All of the present recovery barges have, at best, a capacity of a few tons per hour under ideal conditions. The efficiency of all types falls off rather rapidly with increasing wave height, although the rotating drum device probably suffers the least loss of efficiency when compared to the others.

TREATMENT AND DISPOSAL OF RECOVERED SLICKS

Technology presently exists whereby recovered oil slicks can be treated to any degree desired. Although such treatment is possible, the limiting constraint is either economics or environmental disposal standards. Improved techniques will evolve mainly through the economic incentives. For example, oil reclamation from recovered slicks has not been exploited. Reclamation is presently merely a function of expediency.

Treatment of recovered oil is likely to use techniques now employed by the petroleum industry in effectively dealing with wastewater effluents. These techniques are summarized below as sequential unit

operations. The primary stage of treatment most often employed for oil-water mixtures is gravity separation where the lighter-than-water oils float to the surface and the larger solids settle. The most common device used is the API separator. Improvements that have been suggested are those that modify the skimming or oil collection system.

Most treatment plants which strive for a high degree of efficiency in the secondary stage of treatment of oil-water employ the following sequence of unit operations. First, alum or ferric salts are added to the wastewater. Lime is added when sufficient alkalinity for precipitation of the iron is not present. The wastewater is then gently agitated or flocculated to promote interparticle collisions for agglomeration. The resultant suspension is then allowed to settle in a sedimentation basin. In some cases where the oil content of the floc is high, flotation is used. This step is followed by filtration through a rapid sand-filter or through a multimedia filter.

While the secondary stage process described above is most often used, coalescence appears to be gaining greater acceptance for similar applications.

Biological treatment processes, such as activated sludge, trickling filters, aerated ponds, and cooling towers, are highly effective as a third or polishing stage of treatment. Experience has shown that the function of biological treatment as the last step prior to environmental discharge is highly appropriate.

Techniques for sludge disposal are few. The most common technique employed is to dewater the sludge by gravity drainage in soil, filtration,

or centrifugation. However, care must be taken to avoid ground water contamination. The residue is either used as fill or it is incinerated.

In actual practice, many combinations of processes have been used. Once again, the degree of treatment is dictated either by economics or environmental disposal standards.

RECOMMENDATIONS FOR RESEARCH AND DEVELOPMENT

Surveillance

The potential of aerial photography and more especially infrared, ultraviolet, and microwave imagery in surveillance and oil slick detection should be evaluated in detail. These techniques are all dependent on collecting reflected or emitted electromagnetic radiation from the surface and recording the intensity variations which are due to the reflective quality of the surface, temperature, and type of materials being observed. Various filtering systems should be evaluated to determine which portions of the ultraviolet and infrared spectrum would give the greatest oil-water contrast.

Because microwave imagery has all-weather capability, particular emphasis should be given to the development of this type of surveillance system. The first step would be an investigation of the response of the microwave imaging system to the oil-water surfaces. The microwave data which are collected on magnetic tape may be processed by techniques used on ultraviolet and infrared imagery which should enhance the microwave radiation intensity variations.

FM-CW radar has similar all-weather capability and should be evaluated along with the microwave imagery approach, but the latter should

be given first priority.

Aerial reconnaissance techniques should also be considered for tracing surface buoys which could be released near the oil spill to determine the rates of surface currents. A combination with photographic, ultraviolet, infrared, and microwave imaging techniques should permit surface current measurements to be made under almost any weather condition and in a short period of time.

Prediction of Oil Slick Behavior

The behavior and rate of movement of oil slicks on water is rather poorly understood despite the importance in deploying defensive measures. Transport and dissipation are the two pertinent problems.

The direction and speed of an oil slick is expected to yield more to the wind than to the influence of the ocean current. This is because of the greater momentum transported to the oil slick by the wind. The wind and currents are very likely not in the same direction. Water currents near the surface which are under the influence of the wind are expected to follow the mathematical representation of the Ekman spiral. The wind created currents thus flow slightly to the right of the wind direction in the Northern Hemisphere. Mechanically and thermally induced ocean currents (i.e., Gulf Stream) would affect the motion of an oil slick as well. As an oil slick approaches a land mass, a variation in the motion of an oil slick is also expected.

The dissipation of oil slicks would primarily rely on "storm" conditions. During periods of high wave and strong wind, the edges of the oil slick would be broken up and carried away. Water and atmospheric

conditions could be related to this breakup. The area of initial breakup could be pin-pointed by using Eulerian coordinates or other suitable coordinate systems. The size of the oil slick and thickness at the center point may have additional bearing on the rate that an oil slick will break up, as well as the age of the oil slick.

It is proposed that a correlation of mean wind velocity at the surface and the mean velocity of the ocean current for various sizes of oil slicks could be related to the movement of the oil slick. Such a study could start with relatively small oil slicks. The resulting hypothesis could be extended to larger oil slicks. Assumptions that are made as the experiments progress (to larger oil slicks) could be tested.

An initial study of the breakup of oil slicks could be done by relating the breakup of small oil slicks to mean wind speed and wave size. This relationship could be extended to include fluctuations in the downwind and crosswind components of wind speed, and the changing characteristics of waves related to fetch length. Through photographs and/or infrared scanning of the oil slick taken by an aircraft flying over the test area, a study could be made on the rate of breakup and to determine the edge of the oil slick that breaks up first. Such studies could then be extended to the concurrent consideration of the parameters of net radiation; temperatures of the atmosphere, the oil, and the ocean; measurements of turbulence; and measurements of wave heights and character. Once the relation between these parameters and oil slick breakup is established, determination of a portion or all of these parameters could provide additional information on the weakest area of an oil slick. Knowing this weak area, one could establish where the application of a detergent, and/or other additives

or influences could be applied to permit natural forces to act to the best advantage in dispersion of an oil slick.

Chemical Treatment - Absorption

The use of absorbents in cleaning up oil spills should be carefully examined from the standpoint of objectives. For example, if the primary objective is economy without regard to potential oil reclamation, then it is very likely that a different absorbent would be used than if reclamation was the prime objective. The requirement of cleanup time should be factored into the formulation of objectives. If a relatively long period of time is available in which to undertake control measures, then a specific absorbent type might be more apparent.

The areas in which sunken oil-absorbent masses would create grave ecological problems should be defined so that appropriate control decisions can readily be made. The consequences of sunken oil-absorbent masses should be documented by a detailed research program.

Absorbent dispersal techniques should be examined. Priority should be given to those control methods which will be most effective when quick action is critical because of the limited extent of the affected area: i.e., aerial dispersal techniques.

It is also recommended that a test and evaluation program using standardized procedures be initiated to create some order out of the currently chaotic body of information.

Increased attention should also be given to the development of economical absorbents which meet predetermined criteria such as ease of spreading, ease of collection, and ease of oil reclamation or disposal.

Chemical Treatment - Dispersion

Although the general use of detergents is not recommended in this paper, there are situations where such use is warranted. The major need at present is a test and evaluation program similar to that recommended for absorbents. In addition, standardized screening for biological toxicity and for biodegradability will be required.

The possibility of developing a nontoxic emulsifying agent should be explored from the biochemical standpoint as should the development of a detergent with shorter biodegradation half-life. These latter suggestions represent long-range goals.

Biological Degradation

The use of specific cultures of microbiological species which can rapidly metabolize oil should be investigated. Despite the fact that this has been suggested by numerous sources, there has been no field experimentation to demonstrate the practical application for oil spills. In any case, it is doubtful that this measure could be relied upon as the sole method for dissipating oil slicks which threaten land masses.

Methods for enhancing oxygen availability and nutrient supplies for accelerated microbial metabolism should be explored. Dispersal of nutrient materials and/or the mechanical or chemical addition of oxygen to the slick area should be examined in detail.

The mechanisms of anaerobic degradation of sunken oil masses should be investigated along with an assessment of potential toxicity of intermediate products of degradation. Likewise the effects of intermediate products from aerobic environments should be evaluated.

Booming

Booming of oil spills has been a very effective method for containment of oil slicks in sheltered and relatively current-free waters. With the exception of a few commercial designs, the majority of booms have been of makeshift design using materials readily at hand. These have been generally ineffective largely due to lack of understanding of the hydraulics and dynamics involved.

It seems likely that by approaching boom design through careful consideration of the hydrodynamics and aerodynamics involved, it should be possible to develop the critical design criteria for a boom to be effective in comparatively high sea states. As a minimum, such criteria would include draft, freeboard, shape, particularly above the waterline, linear stresses, flexibility needs, inertia, and mooring forces. From this basis, several candidate designs could then be evolved, screened for feasibility in terms of materials, costs, and deployability, and the more promising designs evaluated in model basin tests. Should results prove favorable, one or more prototype booms could then be evaluated in field tests.

The bubble curtain barrier warrants further evaluation and optimization. At the present time the limitations on its utility as a result of current and wave action are not known despite its mechanical simplicity and apparent merit. Should tests confirm its effectiveness, the design of a bubble curtain system capable of rapid deployment should be undertaken. There is an excellent possibility that improved performance can be achieved by optimizing submergence, air distribution, and bubble size to achieve maximum local upwelling of water and foam with a minimum of

air supply. The addition of surfactants to the air supply, as is done in ore flotation processes, may greatly increase the air utilization efficiency, and this potential should be investigated.

Chemical booming, that is, the use of spreading agents, warrants further evaluation.

Skimming

All presently employed skimming vessels currently suffer from low rates of oil removal coverage or from inability to operate effectively in rough water. It appears likely, however, that an improved skimming device could be designed based on incorporation of several improvements. For example, the rotary drum skimmer is relatively insensitive to wave action, but it is deficient in rate of removal. This latter drawback could possibly be overcome by (1) using a series of spaced discus rotating around a horizontal axis and (2) covering the surfaces of the discs with a hydrophobic oil absorbent foam. Roller type wringers would remove the absorbed and adherent oil from the disc surfaces with each revolution. Disc diameter would be dictated by the wave heights in which operation would be desired. Preliminary design of such a device is recommended.

Disposal of Recovered Slicks

It is readily apparent that the present methodologies used in treating recovered oil slicks could be materially aided by an information interchange with other areas of the total problem. For example, oil reclamation is a topic which deserves far greater emphasis in the treatment of recovered slicks, yet methods have been developed by those interested in removing slicks from the sea which could be directly

applied to the recovery problem. If efforts are successful for enhancing biological degradation in the ocean, then similar techniques could be used for recovered slicks.

The weakest area in the disposal of recovered slicks is that of sludge disposal. Increased emphasis on environmental quality will dictate that improved sludge disposal techniques be developed.

Increased emphasis should also be placed on more effective oil reclamation throughout the treatment process. Improved primary separation offers the best possibility for such research.

ACKNOWLEDGMENTS

This paper summarizes research conducted by Battelle-Northwest for the United States Coast Guard under Contract No. TCG-15560-A. In addition to the authors, the following individuals contributed significantly to the results: G. J. Alkire, C. D. Becker, M. W. Cook, Diana Davis, C. E. Leach, G. B. Pauley, W. L. Templeton and W. A. Snyder.

References

1. ZoBell, C. E., "The Occurrence, Effects and Fate of Oil Polluting the Sea," Int. J. Air Wat. Poll., vol. 7, pp. 173-198. 1963.

2. Smith, J. W., "The TORREY CANYON Disaster," Annual Meeting, 1967, British Association for the Advancement of Science. September 6, 1967.

3. "Clearing-up the Oil," Petroleum, p. 95. May/June 1967.

4. Dudley, B. L. Harbourmaster's Visit to Cornwall to Study Anti-Oil Pollution Measures, Milford Haven Conservancy Board. April 25, 1967.

5. Ambrose, H. A. Oil Pollution of Seas, Coasts and Harbors, Gulf Research and Development Company Report No. 700R7001. September 1967.

6. Sigwalt, R. "The Forces Causing Spreading of Petroleum Products on Water and Their Neutralization by Fatty Oils," Compte Rend., 259(3), pp. 561-64. July 20, 1964.

7. The TORREY CANYON, report presented to Parliament by the Secretary of State for the Home Department by Command of Her Majesty. London, Cmnd 3246. April 1967.

8. Smith, J. W. The TORREY CANYON Disaster. Paper given to Annual Meeting of British Association for the Advancement of Science, Leeds, England. September 6, 1967.

9. Beynon, L. R. The TORREY CANYON Incident. September 1967.

10. The Removal of Oil from Contaminated Beaches. Report prepared for I.M.C.O. by the Warren Springs Laboratory. Report number RR/ES/39. April 1963.

APPENDIX "D"

CALIFORNIA OIL SPILL DISASTER CONTINGENCY PLAN

D. Summary of State Legal Capabilities (Spill prevention and abatement)

Administrative Code.

Section 2121: Suspension of Operations. The Lessee shall suspend any drilling and production operations, except those which are corrective, protective, or mitigative, immediately in the event of any disaster or of contamination or pollution caused in any manner or resulting from operations under a lease. Such drilling and production operations shall not be resumed until adequate corrective measures have been taken and authorization of resumption of operations has been made by the Commission. (State leases only.)

Fish and Game Code.

Section 851: A deputy appointed to enforce the provisions of this code is a public officer. He has all the powers and authority of a peace officer to make arrests for violations of this code, and may serve all processes and notices throughout the State.

Section 856: All members of the Wildlife Protection Branch designated by the director as deputized law enforcement officers shall have the power of peace officers provided that their primary duty shall be the enforcement of the provisions of this code and the regulations made pursuant thereto. Such deputized law enforcement members shall not act as peace officers in enforcing any other law except to make arrests for crimes committed in their presence, or as requested by other law enforcement agencies, or upon request pursuant to Section 1509.7 of the Military and Veterans Code.

Section 878: The county fish and game warden shall enforce the state laws relating to the protection of fish and game. He has the powers of a peace officer to make arrests for the violation of such laws.

Section 2014: It is the policy of this State to conserve its natural resources and to prevent the wilful or negligent destruction of birds, mammals, fish, or amphibia.

The State may recover damages in a civil action against any person who unlawfully or negligently takes or destroys any bird, mammal, fish, or amphibian protected by the laws of this State.

The measure of damages is the amount which will compensate for all the detriment proximately caused by the destruction of such birds, mammals, fish, or amphibia.

An action to recover damages under this section shall be brought in the name of the people of the State, in a court of competent jurisdiction in the county in which the cause of action arose.

This section does not apply to persons engaged in agricultural pest control, to the destruction of fish in irrigation canals or works or irrigation drainages, or to the destruction of birds or mammals killed while damaging crops as provided by law.

Section 5650: It is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of this State any of the following:

(a) Any petroleum, acid, coal or oil tar, lampblack, aniline, asphalt, bitumen, or residuary product of petroleum, or carbonaceous material or substance.

(b) Any refuse, liquid or solid, from any refinery, gas house, tannery, distillery, chemical works, mill or factory of any kind.

(c) Any sawdust, shavings, slabs, edgings.

(d) Any factory refuse, lime, or slag.

(e) Any cocculus indicus.

(f) Any substance or material deleterious to fish, plant life, or bird life.

Section 12015: In addition to any other penalty provided, anyone convicted of unlawfully polluting, contaminating, or obstructing waters to the detriment of fish life in such waters, shall either be required to remove any substance placed in the waters, which can be removed, that caused the prohibited condition or to pay the costs of such removal by the department.

Water Code.

Section 13052: Regional duties

Each regional board, with respect to its region, shall:

(a) Obtain coordinated action in water quality control and in the abatement, prevention and control of water pollution and nuisance by means of formal or informal meetings of the persons involved;

(b) Encourage and assist in self-policing waste disposal programs for industry, and upon application of any person shall advise the applicant of the condition to be maintained in any disposal area or receiving waters into which the waste is being discharged;

(c) Require any state or local agency to inspect and report on any technical factors involved in water pollution or nuisance;

(d) Request enforcement of laws concerning water pollution or nuisance by appropriate federal, state and local agencies;

(e) Formulate and adopt long-range plans and policies with respect to water pollution control and water quality control within the region in conformity with the policies set forth in Chapter 1 (commencing at Section 13000) and any water quality control policy adopted at any time by the state board;

(f) Recommend to the state board projects for the reduction of water pollution which the regional board considers eligible for any financial assistance which may be available through the state board;

(g) Report to the state board and appropriate local health officer any case of contamination in its region which is not being corrected.

(h) File with the state board, at its request, copies of any official action with respect to any particular case of actual or threatened pollution and with respect to the adoption of any water quality control policy.

(i) Have the power to require any state or local agency to obtain and submit analyses of well water.

Section 13053. Prescription of requirements. Each regional board shall prescribe requirements relative to any particular condition of pollution or nuisance, existing or threatened, in the region.

Section 13055. Investigation of source of water pollution or nuisance; appeal of regional board's determination.

A regional board may investigate any source of water pollution or nuisance within its region and may require that any person discharging sewage or other waste within the region furnish such technical or monitoring program reports as the board may specify.

Any person who has been required to make any such reports entailing a substantial expenditure of time or funds or which are not directly related to the appraisal of the existence or threat of pollution may, within 30 days of the determination of the regional board in the matter, appeal such determination to the state board. The state board shall determine the reasonableness and relationships of burdens and costs to benefit of such report and, within 60 days, shall affirm, modify, or annul the determination of the regional board. Pending such determination by the state board, the requirement to furnish the reports shall not be effective.

Section 13060. Cease and desist orders

When a regional board finds that the discharge of sewage or other waste within its region is taking place contrary to any requirements prescribed by the regional board under the provisions of Sections 13053, 13054, 13054.1, 13054.3 and 13055, and that such discharge is threatening to cause or is causing pollution or a nuisance, the board may issue an order to cease and desist and direct that those persons, firms or corporations not complying with the requirements, comply forthwith.

Section 13063. Failure to comply with board order; proceedings for injunction

Upon failure of any person or persons to comply with any such cease and desist order of the board, the board issuing the order may certify the facts to the district attorney for the county in which the discharge originates or to the Attorney General, as the case may be, shall petition the superior court in and for that county for the issuance of an injunction restraining such person or persons from continuing the discharge in violation of the requirements. The court shall thereupon issue an order directing the person to appear before the court and show cause why the injunction should not be issued. Thereafter the court shall have jurisdiction of the matter, and proceedings thereon shall be conducted in the same manner as in any other action brought for an injunction pursuant to Chapter 3 (commencing with Section 525), Title 7, Part 2 of the Code of Civil Procedure.

The court shall receive in evidence the order of the board, evidence as to the validity and reasonableness of the board's requirements as previously established, and such further evidence as the court in its discretion deems proper.

Section 13064. Manner of correcting pollution or nuisance; specification of details in board order. No order issued under the provisions of this article shall specify the design, location, type of construction or particular manner in which an operation causing or threatening to cause a condition of pollution or nuisance is to be corrected, and the person so ordered shall be permitted to correct the condition in any lawful manner.

Public Resources Code

Section 3013. Construction of chapter: Powers of director and supervisor generally. This chapter shall be liberally construed to meet its purposes, and the director and the supervisor shall have all powers which may be necessary to carry out the purposes of this chapter.

Section 3106. Duties of supervisor: Objectives: Increasing recovery of underground hydrocarbons. The supervisor shall so supervise the drilling, operation, maintenance, and abandonment of wells as to prevent, as far as possible, damage to underground oil and gas deposits from infiltrating water and other causes, loss of oil, gas, or reservoir energy and damage to underground and surface waters suitable for irrigation or domestic purposes by the infiltration of, or the addition of, detrimental substances, by reason of the drilling, operation, maintenance, or abandonment of wells.

Section 3204. Drilling, etc., bonds: Bond for single well: Amount of bond: Time for filing: Execution of bond: Condition. Every person who engages in the drilling, redrilling, or deepening of any well shall file with the supervisor an indemnity bond in the sum of five thousand dollars for each well drilled, redrilled, or deepened. The bond shall be filed with the supervisor at the time of the filing of the notice of intention to drill, redrill, or deepen provided for in section 3203. The bond shall be executed by such person, as principal, and by an authorized surety company, as surety, conditioned that the principal named in the bond shall faithfully comply with all the provisions of this chapter, in drilling, redrilling, or deepening any well or wells covered by the bond, and shall secure the State against all losses, charges, and expenses incurred by it to obtain such compliance by the principal named in the bond.

Section 3221. Order for shut-off test: Form of order: Manner of service: Compliance. Whenever it appears to the supervisor that water from any well is penetrating oil-bearing or gas-bearing strata or that detrimental substances are infiltrating into underground or surface water suitable for irrigation or domestic purposes, he may order a shut-off test and designate a day upon which the test shall be held. The order shall be in writing and served upon the owner or operator of the well at least ten days prior to the day designated before the test. Upon receipt of the order, the owner or operator shall hold the test in the manner and at the time prescribed.

Section 3224. Order for remedial work, etc.: Form and contents: Manner of service: Publication. The supervisor shall order such tests or remedial work as in his judgment are necessary to protect oil and gas deposits from damage by underground water, or to prevent the escape of water into underground formations, or to prevent the infiltration of detrimental substances into underground or surface water suitable for irrigation or domestic purposes, to the best interests of the neighboring property owners and the public.

The order shall be in writing, signed by the supervisor. It shall be served upon the owner of the well, or his local agent, either personally or by mailing a copy of the order to the post-office address given at the time the local agent is designated. If no local agent has been designated, the order shall be served by mailing a copy to the last known post-office address of the owner, or if the owner is unknown, by posting a copy in a conspicuous place upon the property, and publishing it once a week for two successive weeks in some newspaper of general circulation throughout the county in which the well is located. The order shall specify the conditions sought to be remedied and the work necessary to protect such deposits from damage from underground water.

Section 3225. Request for definite order after receipt of written direction: Delivery of order: Form. Whenever the supervisor or a district deputy makes or gives any written direction concerning the drilling, testing, or other operations in any well drilled, in process of drilling, or being abandoned, and the operator, owner, or representative of either, serves written notice, either personally or by mail, addressed to the supervisor, or to the district deputy at his office in the district, requesting that a definite order be made upon such subject, the supervisor or the district deputy shall, within five days after receipt of the notice, deliver a final written order on the subject matter in such manner and form that an appeal therefrom may be taken at once to the board of oil and gas commissioners of the district.

Section 3226. Time for commencement of remedial work, etc.: Procedure on owner's default: Payment of costs: Lien on property. Within thirty days after service of an order, pursuant to sections 3224 and 3225, or if there has been an appeal from the order to the board of district commissioners, within thirty days after service of the decision of the board, or if a review has been taken of the order of the board of district commissioners, within ten days after affirmance of the order, the owner shall commence in good faith the work ordered and continue it until completion. If the work has not been commenced and continued to completion, the supervisor shall appoint necessary agents who shall enter the premises and perform the work. An accurate account of the expenditures shall be kept, and the amounts shall be paid from petroleum and gas fund upon the warrant of the State Controller. Any amount so expended shall constitute a lien against the property upon which the work is done.

Section 3235. Investigation of complaints: Report and order: Delivery of copies of order: Contents and service.
Requisites of complaint: Investigation: Report and order. Upon receipt by the supervisor or by a district deputy of a written complaint, specifically setting forth the condition complained against, signed by a person owning land or operating wells within a radius of one mile of any well or group of wells complained against; or upon a written complaint specifically setting forth the condition complained against, signed by any one of the board of commissioners for the district in which the well or group of wells complained against is situated, the supervisor shall make an investigation of the well or wells and make a written report and order, stating the work required to repair the damage complained of, or stating that no work is required.

Delivery of copies of order. A copy of the order shall be delivered to the complainant, or if more than one, to each complainant, and, if the supervisor orders the damage repaired, a copy of the order shall be delivered to each of the owners, operators, or agents having in charge the well or wells upon which the work is to be done.

Contents and service of order. The order shall contain a statement of the conditions sought to be remedied or repaired and a statement of the work required by the supervisor to repair the condition. Service shall be made by mailing copies to such persons at the post-office address given.

Section 3236. Acts denounced as misdemeanors: Punishment. Any owner or operator, or employee thereof, who refuses to permit the supervisor or the district deputy, or his inspector, to inspect a well, or who wilfully hinders or delays the enforcement of the provisions of this chapter, and every person, whether as principal, agent, servant, employee, or otherwise, who violates, fails, neglects, or refuses to comply with any of the provisions of this chapter, or who fails or neglects or refuses to furnish any report or record which may be required pursuant to the provisions of this chapter, or who wilfully renders a false or fraudulent report, is guilty of a misdemeanor, punishable by a fine of not less than one hundred dollars, nor more than five hundred dollars, or by imprisonment for not exceeding six months, or by both such fine and imprisonment, for each such offense.

Section 4957. Use of camp inmates and wards in rescuing, and saving life and protecting property: Cooperation with local agencies. Conservation camp inmates and wards may be utilized in the rescue of lost or injured persons, and the saving of life and protection of property. The State Forester may cooperate with local agencies of government to accomplish this purpose.

Section 6829. Terms, conditions and provisions to be included. Every oil and gas lease executed under this chapter shall include the following:

(c) Provisions specifying methods of operation and standard requirements for carrying on operations in proper and workmanlike manner; the prevention of waste; the protection of the safety and health of workmen; and the liability of the lessee for personal injuries and property damage.

(d) Security for faithful performance by the lessee, including provisions for the forfeiture of the lease, as set forth in Section 6805, and the requirement that the lessee shall, at the time of execution of the lease, furnish and thereafter maintain a good and sufficient bond in such sum as may be specified by the commission, in favor of the State, guaranteeing faithful performance by the lessee of the terms, covenants, and conditions of the lease and of the provisions of this chapter. (State leases only.)

Section 6873. Form of lease: Preparation: Contents. When leasing tide or submerged lands, the commission shall prepare a form of lease which shall contain, in addition to other provisions deemed desirable and necessary by the commission, appropriate provisions contained in this chapter and the following:

(b) Pollution and contamination of the ocean and tidelands and all impairment of and interference with bathing, fishing or navigation in the waters of the ocean or any bay or inlet thereof is prohibited, and no oil, tar, residuary product of oil or any refuse of any kind from any well or works shall be permitted to be deposited on or pass into the waters of the ocean or any bay or inlet thereof; provided, however, that this subsection (b) shall not be deemed to apply to deposit on or passage into said waters of water not containing any hydrocarbons or vegetable or animal matter. (State leases only.)

APPENDIX "E"

Funding (State of California):

(To be completed by Department of Finance)

APPENDIX "F"

SHIP SALVAGE AUTHORITY OF THE U. S. NAVY

AS RELATED TO OIL SPILL EMERGENCIES

As set forth in Public Law 513 (80th Congress, 2nd Session 10 USC 7361, et.seq), the Secretary of the Navy is authorized to provide, by contract or otherwise, necessary salvage facilities for both public and private vessels upon such terms and conditions as he may, in his discretion, determine to be in the best interests of the United States. In addition to the responsibilities which the Navy would assume in applying salvage techniques to cope with a potential pollution problem involving a U. S. Navy vessel, Public Law 80-513 authorizes the use of Navy facilities for salving public and private vessels at the request of competent authority. The following examples are used to illustrate the responsiveness of Navy salvage forces to pollution incidents and to further delineate the relationships whereby Navy salvage forces would respond to assist other "competent authorities" in coping with potential pollution problems:

(a) U.S. Navy ship aground: pollution threat to surrounding environment. The Navy would acknowledge total responsibility for the operation. Acting in accordance with promulgated Naval directives, Navy salvage forces would automatically respond to cope with the salvage aspects of the problem. The Navy would seek USCG and FWPCA assistance to deal with a pollution threat which might exist during salvage efforts or which might develop should initial salvage efforts prove unsuccessful.

(b) Any vessel aground: pollution threat to U. S. Territorial waters. As provided for in Naval directives promulgated in response to Public Law 80-513, the Navy may, subject to the availability of forces, respond to a request from competent authority for salvage assistance to save the ship and cargo. Provided it has not been abandoned, arrested, or in some manner come under Governmental control, competent authority in the case of a merchant vessel will ordinarily be the ship's master, owner, agent, or authorized underwriter's representative. In such cases, the customer is the ship's master, owner, agent or underwriter and the Navy provides salvage services that are governed by the appropriate Naval directives. Due regard must, however, be given to the existence locally, or the reasonable availability, of privately owned salvage facilities.

On the other hand, if a competent Governmental agency, such as the USCG, FWPCA, Corps of Engineers, Office of Emergency Planning, or a federal court has stepped into the case, and acting in the public interest to prevent or minimize pollution, requests Navy salvage assistance as an evolution of the oil pollution control operation, and acknowledge that it is the "customer", Navy salvage assistance may be provided in consonance with the provisions of Public Law 80-513. In such cases, the operation will be considered to be one of cross-servicing within the Government and the existence of local salvage capability my be considered subordinated thereto.

If the ship has been abandoned it may be expected that some agency of the local, state, or federal Government will have assumed at least interim possession and will be in a position to act as competent authority to request salvage, and act as "customer". In such a case, the operation will again be considered as one of cross-servicing and it may proceed as above. Similarly, if the ship has been arrested, the salvage assistance will be governed by the directions of the competent court.

(c) Wrecked vessel of any flag blocking a U. S. Territory navigation channel. Under the Rivers and Harbors Act of 1889, the Army Corps of Engineers has the responsibility for wreck removal and can exercise this authority, if necessary, prior to abandonment of the vessel by the owners and underwriters. Accordingly, Naval salvage forces may respond to a request for salvage assistance from the Corps of Engineers which would act as the competent authority and "customer" in such a case.

Even though the Corps of Engineers can deal with the Navy or with commercial salvors for wreck removal as noted above, it does not have removal authority solely for the purposes of minimizing leakage of oil or potential oil leakage. Anti-pollution action must be taken by the USCG or the FWPCA.

(d) Wrecked vessel of any flag in navigable waters: pollution threat to U. S. Territorial waters; not blocking a channel. Although current legislation is imprecise in defining a territorial separation or overlap in the area responsibilities of the USCG and the FWPCA, both organizations have broad authorities (in effect and pending) under the provisions of the Federal Water Pollution Control Act and the Oil Pollution Act of 1924 to prevent, control, and correct the effects of oil pollution. Accordingly, it is the policy of the Navy to respond to requests for assistance from either of these organizations to provide salvage assistance in dealing with potential or actual oil pollution incidents.

Appendix To
California Oil Spill Disaster Contingency Plan

G. Recommendations for Local Contingency Plans:

1. The most important things that a plan can do are to: (1) pre-designate a local Operating Authority (and an alternate) to take over-all charge of any local major spill abatement operations, and (2) provide him with the authority to obtain and direct the personnel and equipment needed. This should be someone with experience in directing men and equipment, whether it be the Director of Public Works, Fire Chief, Road Commissioner, Sheriff, Police Chief or some other local official.

2. A valuable item to the local Operating Authority, particularly at the beginning of abatement operations, is a list of up-to-date telephone numbers: Police, Fire, Health, Road and Sanitation Departments; public utilities; owners and operators of heavy equipment including hay mulchers and blowers; U.S. Coast Guard; California Disaster Office; State Operating Authority, Corps of Engineers; Highway Patrol; local Civil Defense Office; Mayor; Board of Supervisors; and any other organization likely to be contacted on an emergency basis.

3. Disposal sites can become a real problem. It would be a great help if the local Coordinator could pre-determine how much of what kinds of contaminants can be disposed of at what sites in or near his area. Disposal site conditions change with time; therefore this information should be periodically up-dated. It should be kept in mind that contaminants can get into ground-water or surface water systems if the disposal site is improperly located. Regional Water Quality Control Boards or the State Department of Water Resources can provide technical advice on this aspect of disposal.

4. Uncooperative property owners may refuse access across their land for crews and/or equipment to reach areas affected by contaminants. This happened in some instances along the beach front in Santa Barbara. It would be most helpful if Cities and Counties, in the preparation of their contingency plans, would research the local law in this regard. If there is no local authority for such access rights, enactment of an ordinance to establish that authority should be recommended to the local governing body.

5. Local plans should be tailored to the type of contaminant spill which is most likely to occur in the locality, e.g., tankers, barges, pipelines, oil and gas operations, or railroad tank cars or tank trucks which transport oil, gasoline or chemicals.

6. Local spill contingency plans should be designed to either function independently or to mesh smoothly into the State spill disaster contingency organization, if activated, or into U.S. Coast Guard spill abatement operations if local assistance is needed.