CHAPTER 5

AN EVALUATION OF STATE AND FEDERAL STATUTES ON OIL SPILL RESPONSE AND HAWAII’S RESPONSE PREPAREDNESS

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Introduction

The state’s policy on oil spill prevention and cleanup was examined to assess its adequacy in addressing the need to protect Hawaii’s environment and its resources from the threat of oil spills. Hawaii’s Environmental Response Act, Chapter 128 D, Hawaii Revised Statutes, was compared with the Oil Pollution Act of 1990 (OPA) to determine how they complement each other and to identify gaps in the federal and state laws. Hawaii’s oil spill response law was also compared with appropriate laws of Louisiana, Florida, and Washington to determine how other states have addressed perceived shortfalls in OPA as well as their own priorities and perceptions of risks and methods for mitigating the impacts of oil spills.

Legislative Comparison

Oil Pollution Act of 1990

OPA “addresses wide-ranging problems associated with preventing, responding to, and paying for oil spills through one comprehensive regime,” according to President Bush (Anonymous, 1990). The act, passed in the wake of the 1989 Exxon Valdez oil spill, ended 15 years of unsuccessful attempts by Congress to address the issue of oil spill cleanup. OPA has four basic provisions: 1) limits liability for tanker and other type vessels and offshore and on-shore facilities, 2) expands federal role in responding to oil spills, 3) establishes a $1 billion oil spill trust fund, and 4) places emphasis on preventative measures to reduce the risk of oil spills, including a requirement for double hulls on all U.S. oil tankers after the year 2015 (Grumbles, 1990).

OPA also allows the states to set standards that are more stringent than those set by the federal government and gives the states the option to retain their pre-Exxon Valdez legislation, if none is in place.

Louisiana’s Oil Spill Prevention and Response Act

Louisiana’s comprehensive oil spill legislation, the Oil Spill Prevention and Response Act, was passed in April 1991. The act creates a new chapter in Louisiana’s Revised Statutes, Chapter 19, Title 30 and establishes the Oil Spill Coordinator’s office. Its focus on jurisdictional boundaries among state and county agencies for the response to oil spill led the Southern Legislative Conference to consider it to be the model legislation for oil spill prevention and control (OSLR, 1991).

Washington’s Oil Spill Prevention and Response Act

Washington’s comprehensive oil spill prevention and control legislation was passed by the state legislature in May 1991. The Oil Spill Prevention and Response Act (OSPRA) is codified in Washington’s public laws as Chapter 82 and Sections 88.16, 88.40, and 88.44. OSPRA establishes a new state policy which emphasizes oil spill prevention rather than response and cleanup. The legislation requires the submission of oil spill prevention plans by both vessel and facility operators in addition to the spill cleanup contingency plans required under federal legislation. The act sets up Regional Marine Safety Committees for Puget Sound and the Pacific Coast. It also recommends that one be set up jointly with Oregon for the Columbia River to identify hazards to navigation, and to set up vessel traffic control systems and operational standards that would prevent spills from occurring.

Florida’s Pollution Spill Prevention and Control Act

Florida’s Pollution Spill Prevention and Control Act was passed in June 1990. It has been codified as Chapter 90-54 of the Laws of Florida. The act emphasizes protection of natural resources. Because Florida, like Hawaii,
relied on its natural environment to attract tourists, its oil spill legislation reflects a natural resource protection bias. One section of the law, Section 376.121, is devoted to outlining the liability of damages to natural resources. The section calls for all natural resources to be mitigated to their pre-spill state where feasible and to recover the cost of all damages in cases where restoration is impossible. The amount of compensation paid can be as high as $1000 per square foot of impacted habitat.

Hawaii's Environmental Response Law

Hawaii's Environmental Emergency Response Act was enacted in June 1988 designating the State Department of Health as the lead agency for cleaning up spills of any toxic or hazardous waste. It was amended in 1990 by the Environmental Response Act which created the Hawaii "Superfund" for emergency response to spills of hazardous or toxic substances and waste disposal dumps. An amendment in 1991 added oil to the list of substances covered by the Act. The Environmental Response Act was codified as Chapter 128D, Hawaii Revised Statutes (HRS).

Hawaii's oil spill response planning is carried out in the Office of Hazard Evaluation and Emergency Response of the Department of Health. They are responsible for writing and enforcing the state's oil spill contingency plan, as well as for promulgating administrative rules for HRS Chapter 128D.

Hawaii statute on oil spills was compared to OPA and the statutes of Washington, Louisiana, and Florida, using categories given in Table 5.1 (See Appendix B for a summary of these statutes).

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Note: These were developed by the Washington State Department of Ecology, 1991.

Discussion

Hawaii's legislation on oil spill prevention and control is far less comprehensive than those of the other states and OPA. OPA and Louisiana, Washington, and Florida's statutes primarily address oil spills, while Hawaii's statute primarily addresses releases of hazardous substances on land. However, the comparison is useful in determining where Hawaii's oil spill response policy differs significantly from those of the other three states, especially in addressing areas not adequately covered by the OPA.
Entities Subject to Provisions of OPA and State Laws

OPA applies to all bulk oil carriers, on-shore and offshore oil processing and terminal facilities, and all large vessels such as cargo and passenger vessels, which carry substantial quantities of oil as fuel. Washington, Louisiana, and Florida extend coverage of their oil spill legislation to all vessels carrying large quantities of oil as well as on-shore and offshore facilities. The Washington statute includes all vessels over 300 gross tons and Florida’s law applies to vessels carrying over 10,000 gallons of oil as fuel or cargo. Hawaii’s Chapter 128D applies to any vessel or any artificial means of transportation on the water without limitation on cargo capacity or gross tonnage. The provisions of Hawaii’s law can apply to any vessel regardless of size or purpose because the definition of “vessel” lacks the specificity found in OPA and the other three states’ statutes.

Coordination of State and Federal Responsibilities

Hawaii’s Chapter 128D requires that the state oil spill contingency plan complement the National Contingency Plan (NCP). NCP is a plan required under section 301(c) of the Clean Water Act as revised by section 105 of CERCLA, as amended by OPA, that sets out the duties and responsibilities of federal, state, local, and private sector responders to an oil spill. In addition to NCP, each Coast Guard District with jurisdiction in the coastal zone (as defined in 40 CFR 300.5) will form an Area Committee consisting of federal, state, and local government agencies. The Area Committee’s chief responsibility will be the preparations of an Area Contingency Plan for its geographic area (U.S. Federal Register, 1992).

Prevention (Including Plans)

OPA focuses on regulating vessel structure and shipping procedures such as the use of autopilot and requirements for tugboat escorts. It also provides substantial requirements for port and oil handling facilities contingency plans. Washington, Florida, and Louisiana require vessels and facilities to have state-approved prevention plans. Louisiana requires operators of facilities to obtain a discharge prevention and response certificate. Florida requires that vessels have one person who is designated as an oil spill response officer if the vessel uses its ports. Washington mandates Regional Marine Safety Committees to examine ways to create regional safety plans and a Marine Oversight Board to make recommendations on safety measures and other actions.

Hawaii’s Environmental Response Law does not adequately address the subject of prevention. Because oil spill prevention is likely to be less costly than cleanup, it requires careful consideration in the state’s policy. Issues related to prevention are addressed in Chapter 6.

Contingency Plans

In addition to the requirement under the federal clean water legislation (CERCLA) that requires the development of a national contingency plan for responding to oil spills, OPA added requirements for area spill response plans and encourages states to develop local contingency plans that complement the federal plan. Hawaii is developing an oil spill contingency plan (the State Oil and Hazardous Substances Emergency Response Plan) that delineates the duties of the state and federal governments. An early version of this draft plan was used for this comparison. The U.S. Coast Guard has primary responsibility for responding to all spills in the marine environment and the state for responding to all land-based spills. The federal contingency plan includes an agreement on the use of chemical dispersants.

Both the federal and the draft Hawaii state plans require additional clarity on several issues. One is the determining when a spill cleanup is complete. Under OPA, the U.S. Coast Guard is given the responsibility for directing the cleanup effort, but consultation is required with the state’s on-scene coordinator in determining when the cleanup is completed. However, there is no process in the federal plan on the consultation procedure.
Another issue is protection of sensitive areas. The state needs to identify areas that require maximum protection in the event of a spill. The location and description of the areas need to be clearly delineated on a map so that the federal on-scene coordinator can take appropriate steps to protect those areas. The Area Committee, established under OPA, is currently developing sensitivity maps which identify sites that are economically and ecologically important. High use recreational sites are also being identified.

**Vessel and Facility Contingency Plans**

OPA requires tankers and facilities to have response plans for addressing a worst case oil spill. Louisiana, Washington, and Florida each has specific requirements for vessel and facilities to develop oil spill response contingency plans. When possible, plans required by OPA can be substituted for plans required by the states. However, states can require more detailed plans than OPA. States may extend the requirement for contingency plans to vessels that are not covered under OPA. For example, Florida requires vessels carrying 10,000 gallons or more of oil as cargo or fuel, to prepare an oil spill response contingency plan. Hawaii has no specific requirements for vessel or facility oil spill response contingency plans.

**Response Planning Organizations**

OPA has established a national response unit in North Carolina and regional response units around the country. The federal law also requires the formation of regional response teams made up of federal, state, and local governments and others, including oil company officials, private cleanup experts, special interest groups and researchers to develop area contingency plans. Louisiana, Florida, Washington and Hawaii each require statewide advisory groups. Louisiana has also created an Oil Spill Coordinator in the Governor’s office to coordinate state and local planning for oil spill prevention and response. Washington has created the Washington State Maritime Commission to provide assistance to vessels and to formulate a state approved response plan.

Hawaii is part of the Oceania Regional Response Team (RRT). The team has 36 members including representatives of federal, Hawaii, Guam, American Samoa, and the Commonwealth of Northern Mariana Islands governments. The state’s oil spill response planning is carried out in the Office of Hazard Evaluation and Emergency Response of the Department of Health. The office is responsible for writing, coordinating, and maintaining the state’s oil spill contingency plan and for promulgating administrative rules for HRS Chapter 128D.

In addition to federal and state-mandated advisory groups in Hawaii, there is also the local industry-sponsored cooperative, Clean Islands Council. Their primary responsibility is to respond to local spills on behalf of their members.

**Liability**

OPA limits liabilities for vessels and on-shore and offshore facilities except in cases of gross negligence. The federal liability limit is set at the greater of $1,200 per gross ton or $10 million for tankers over 3,000 tons, the greater of $1,200 per gross ton or $2 million for tankers under 3,000 tons, and the greater of $600 per ton or $500,000 for non-tanker vessels. OPA does not restrict states from passing more stringent requirements than contained in the federal legislation. Florida, for example, has set a $50-million dollar limit for vessel liability for cleanup cost and an unlimited liability for damage to natural resources. Hawaii has no limits with the exception of interisland barges. (See Chapter 6 discussion under subsection on “Provisions under OPA that define state authority.”) Washington has no limits on liability for cleanup or damage.

Liability is one of the most important considerations for oil spill legislation. Without liability caps, the oil and shipping industries will find it difficult to obtain the insurance coverage they need in order to operate in state
waters. Few shipping companies may be able or willing to deliver oil to ports in states that have unlimited liability. ARCO Marine no longer delivers oil to Hawaii and PRI and Chevron, USA announced the cessation of their inter-island tanker barge operations for delivering No. 6 fuel oil in March 1992 due to unlimited liability. Logically, liability limits should be in line with levels that will pay for the cost of cleanup and compensation for damages in a worst case scenario. That amount may be difficult to determine because of the uncertainties associated with less than perfect cleanup technologies and with determining the value of damages incurred by natural resources and the compensation to wage earners who would be negatively impacted by a large oil spill. However, the Hawaii State Legislature has begun grappling with the issue of liability caps by setting a limit for interisland tank barges. Act 130, signed into law in July 1992, sets a limit of $700 million for clean up and damages for any oil spills caused by interisland tank barges carrying less than 60,000 gallons of heavy fuel oil (Number 6 grade).

The federal limits imposed by OPA may be too low for tankers calling on Hawaii's ports. A catastrophic spill that could impact Waikiki, the heart of the state's tourist industry, may be far costlier than the federal limit of $1,200 per gross ton per vessel. A tank vessel calling at Hawaii's port that weigh 80,000 tons would have a maximum liability of $96 million. Estimates of damages from a large oil spill could exceed $300 million, based on our analysis of the economic impact (see Chapter 2). Somewhere between the federal limit and the unlimited amount of liability, lies a reasonable level of financial responsibility that can be imposed on vessels operating in Hawaiian waters.

Another issue concerning liability is who should be liable in the event of an oil spill. The responsible party, under OPA and most state legislation, including Hawaii's, is the vessel or facility owner or lessee. Washington's statutes extend liability to the owner of the product. Florida makes the owner of the product liable to the extent that the vessel or facility owner cannot meet the liability requirements.

Financial Responsibility

OPA requires vessel and facility owners to have coverage that meets the maximum federal liability. Florida and Louisiana likewise require vessels to have sufficient coverage to meet the maximum requirement and furnish proof of coverage. Washington has no limits on liability and requires tankers to have $500 million in liability coverage and other vessels to have a minimum of $500,000. The amount of coverage needed for onshore and offshore facilities has not been determined.

At present, Hawaii does not require any proof of financial responsibility nor has it established the minimum level of insurance coverage other than what is required under federal law. Under OPA, vessels and facilities would have to furnish proof that they can meet the liability limits set forth in federal legislation. Since there is no limit on liability for damages under Hawaii state statutes, it seems reasonable that some level of insurance coverage is required over the limits set under OPA.

Funding

Each of the four states and OPA include a special fund for cleanup and compensation of damages. The state funds vary in amount and the federal Oil Spill Liability Trust Fund, under OPA, is set at $1 billion. The Hawaii fund differs significantly from those set up by the other states and the federal government in that it does not collect a fee from oil companies to provide income to the fund. Hawaii's "Superfund," mandated by Chapter 128D, relies on penalties and fines collected by the state from violators and monies from the general fund. The fund is limited to receiving only $3 million in fines but no upper limits are placed on funding from other sources.

Washington and Louisiana allow part of their oil spill funds to be used for the administration of their oil spill program. Louisiana also allows up to $750,000 a year to be used for oil spill prevention and cleanup related
research. The Hawaii fund can not be used for administration or research. The primary difference between Hawaii's fund and those of Louisiana, Washington, and Florida is the imposition of a fee on petroleum products to provide revenue for the fund. Such a fee on petroleum products shifts the burden of providing funding to those that profit from the trade — the oil companies. Since Hawaii imports nearly 160,000 barrels a day of oil and oil products (Department of Business and Economic Development, 1991) a substantial revenue base exists. If, for example, a fee of $0.05 per barrel was levied, it would generate an annual revenue of approximately $3 million dollars.

**Natural Resource Damages**

Most states have similar language in their oil spill legislation requiring the states' natural resource agency to assess damages to natural resources. Reimbursements to those suffering damages can be made from the federal fund (up to $500 million dollars) or from state funds, depending on the nature and magnitude of damages. Up to $50 million of the trust fund may be used to conduct the assessment, but the states require that this cost be recovered from the responsible party. Florida and Washington require a screening process to determine compensation payments. Hawaii and Louisiana leave the process of compensation to rulemaking.

**On-Board Response Equipment**

By 1993, OPA regulations will require all tank vessels to carry appropriate oil removal equipment. Louisiana, Florida, and Washington have additional requirements. Louisiana requires proof that equipment is available, and that personnel are trained in prevention and control techniques prior to the vessel's entry into port. Florida and Washington require: 1) containment and recovery equipment to be available during unloading operations, 2) ships unloading or refueling to be surrounded by an oil containment boom, and 3) an oil spill officer must be available during unloading and refueling operations. Hawaii has no special provision for on-board equipment or availability of trained personnel beyond the OPA requirements.

**Drug and Alcohol Abuse (Programs)**

OPA requires mariners license applicants to provide data from the National Drivers Register to determine whether the applicant has ever been convicted of driving under the influence (DUI) or driving while intoxicated (DWI). The mariner's license may be revoked for conviction of a serious driving violation or if found to be operating a vessel while under the influence.

Washington requires vessel and facility prevention plans to describe alcohol and drug awareness programs that have been instituted. It has also made the operation of a vessel under the influence a felony, setting the legal limit of blood alcohol at 0.06 percent (which is 0.04 percent lower than the standard for automobiles in Hawaii). Hawaii, Louisiana, and Florida have no additional requirements.

**Enforcement — Penalties**

Each state has roughly similar civil and criminal penalties in line with federal penalties. These are presented in Appendix A.

**Hawaii’s Preparedness for Major Oil Spills**

In accordance with Title III of the Superfund Amendments and Reauthorization Act of 1986, the Hawaii State Emergency Response Commission (HSERC) (comprised of government officials, civil defense, fire department, and university personnel) has prepared the Oil and Hazardous Substances Emergency Response Plan,
which outlines the projected response actions of various state agencies in the event of an oil or hazardous material spill. The plan outlines the official state policy on oil spill preparedness.

There are two other contingency plans which deal with oil spill preparedness in the state: the Oceania Region Oil and Hazardous Substances Pollution Contingency Plan and the U.S. Coast Guard Marine Safety Office, Honolulu Oil and Hazardous Substance Pollution Contingency Plan. Furthermore, under the provisions of the OPA, oil transfer facilities and vessels will be required to draw up their own individual contingency plans. However, having a plan and being able to implement it efficiently are two different things. In the absence of any practical large scale experience, it is difficult to predict how well these plans translate into action in the event of a major oil spill.

The U.S. Coast Guard Plan

The U.S. Coast Guard is the primary agency for emergency oil spill response in Hawaiian waters. As such, they have put considerable energy into planning for oil spills. The U.S. Coast Guard contingency plan has the stated purpose of:

1. Providing a framework for a coordinated and integrated response by the U.S. Coast Guard and other federal, state, territorial, local, and civilian forces to actual or potential discharges of oil and releases of hazardous substances with the purpose of:
   1. Developing appropriate preventive and preparedness measures and effective systems for discovering and reporting the existence of a polluting discharge;
   2. Instituting prompt and effective actions to restrict the further spread of the pollutant;
   3. Insuring that the public health and welfare are provided adequate protection from such discharges;
   4. Minimizing damage to wildlife and the marine environment from oil and hazardous substance discharges;
   5. Providing techniques for removal and locations for the disposal of collected pollutants;
   6. Providing a list of trained personnel capable of responding to major discharges and lending expertise to the Federal On-Scene Coordinator (FOSC) in specific areas;
   7. Providing lists of available equipment for removal operations and sources of logistical support;
   8. Initiating actions for the recovery of cleanup costs and conduct enforcement actions as necessary.

The Plan outlines the duties and responsibilities of the on-scene forces and provides for standard policy and procedures among them. It is designed to encourage the development of response capabilities by both local governments and private interests. It contains much information vital to an appropriate response, including directories of potential spill sources, areas to be protected, sources of services and supplies, and agencies which have a responsibility or interest in response operations.” (Marine Safety Office Honolulu Oil and Hazardous Substance Pollution Contingency Plan, 1990, pp. 100-101).

The U.S. Coast Guard plan also includes a “worst-case scenario” of a catastrophic oil spill, and outlines the steps that would be taken in the event of such a spill. The strategy for dealing with a catastrophic spill is found in Section 934 of the U.S. Coast Guard plan.

The State Plan

Hawaii lacks the resources and capability to investigate or respond to offshore oil spills. The state has neither the vessels, nor the trained manpower to respond to at-sea spills. Under the state plan, the state’s role in oil spill response is essentially limited to regulatory activities: notification, evaluation, assessment, coordination, and determination of responsibility.
All reports of ocean oil spills received by state and local agencies are reported to the Marine Safety Office (MSO) of the U.S. Coast Guard. When a spill report is received, the U.S. Coast Guard MSO determines the seriousness of the spill and what, if any, action should be taken. The party responsible for the spill is legally responsible for cleaning it up. The local oil companies have some capacity to perform small cleanup operations through the Clean Islands Council (CIC) which is a cooperative of oil companies operating in Hawaii. If the oil is spilled from a ship not belonging to one of the oil companies, the responsibility falls on the owner of the vessel, who will most likely have to rely on local contractors to clean up a spill. The CIC does respond to spills originating from non-member ships.

If, in the opinion of the U.S. Coast Guard investigators, appropriate action is not being taken by the legally responsible party or by non-federal agencies, the FOSC will take control and federalize the response activity. This individual (the Commanding Officer of the MSO) has the ultimate authority to direct response and cleanup actions. The U.S. Coast Guard plan prescribes notification of the Oceanía Regional Response Team (RRT), a group composed of regional personnel from 14 federal agencies and representatives of state agencies with emergency responsibilities, within one hour if a spill has the potential of being medium or major (>10,000 gallons) or for smaller spills under certain circumstances. The RRT’s duties include providing coordination, support, and advice to the FOSC in responding to an oil spill. In addition, the RRT provides a mechanism whereby the resources of various federal agencies, such as the Navy, can be brought to bear on an emergency situation. The membership of the Oceanía RRT can be found in Annex II of the Oceanía Region Oil and Hazardous Substances Pollution Contingency Plan.

In the event of a large spill, a unified incident command post would be set up where representatives from federal, state, and county governments meet to plan and coordinate response strategies. One of the state’s roles would be to send an on-scene coordinator (OSC) to this command center, to direct state activities at the site and work in cooperation with the FOSC who would have the ultimate authority in most matters; however, he would seek the advice and input of the state OSC and other state and county representatives.

State Agencies Responsibilities Under the State Oil and Hazardous Substances Emergency Response Plan

Several state agencies have duties and roles to play according to the state contingency plan. These are summarized below.

Department of Health (DOH):

- acts as lead state agency in the event of a spill. The DOH has been appointed the state’s representative agency in the event of an oil spill. The Office of Hazard Evaluation and Emergency Response is the DOH office that responds to oil spills.
- notifies affected Local Emergency Planning Committees (LEPCs)
- notifies other affected state agencies
- sends a state on-scene coordinator who oversees state response activities and consults with U.S. Coast Guard personnel and state agency representatives
- provides technical assistance and advice on protective actions
- provides assistance in hazard determination, evaluates environmental implications of a spill
- evaluates possible public-health effects of a spill
- coordinates state on-scene support in cooperation with Civil Defense
- investigates the cause of the spill and pursues enforcement actions
- collects environmental samples
• coordinates with the governor’s office to exercise the governor’s authority to protect the public’s health and the environment
• identifies clean-up requirements and works with government and private agencies to ensure that clean-up/ restoration is done to standards to be determined by the DOH in cooperation with other state agencies and the FOSC
• insures that collected oil is disposed of in an appropriate manner
• collects and maintains data on oil and hazmat response incident for evaluation and planning
• under CERCLA, the DOH Director was appointed to be the Natural Resources Trustee
• under OPA, the DOH Director shares the responsibility of being the Natural Resources Trustee with the Director of DLNR

Department of Transportation (DOT):
• notifies State Emergency Response Commission and local emergency response personnel if first on scene
• closes state harbors and re-routes traffic if necessary
• provides technical assistance regarding oil and hazardous substances transportation incidents
• coordinates the clean-up operations for spills that occur in state harbors in cooperation with the DOH

Department of Land and Natural Resources (DLNR):
• notifies State Emergency Response Commission and local emergency response personnel if first on scene
• provides advice and guidance
• assists with responder support, such as communications, provision of food, etc., if requested by state on-scene coordinator
• responds to incidents that could degrade state parks, land, or waters and/or threatens fish, wildlife, or their habitats
• coordinates the clean-up operations for spills that occur on DLNR lands and waters in cooperation with the DOH
• under OPA, co-trusteeship (with the DOH Director) for natural resources

Office of State Planning (OSP):
• provides support for information and expertise on coastal resources and accesses through the coastal zone management program

State Civil Defense:
• provides and/or coordinates statewide emergency communications and data systems
• coordinates all state disaster and emergency actions, in the event that a State Disaster Proclamation is made by the Governor, and disaster response and relief with and through the Federal Emergency Measures Act (FEMA), in those disasters covered by a Presidential Disaster Declaration.
Labor and Industrial Relations:

- provides support for air monitoring to emergency responders and ensures that occupational safety and health are not compromised

Department of Business, and Economic Development and Tourism (DBED):

- provides support for information on economic impacts of an incident and remedial actions

In addition to outlining the roles of these state agencies, the plan contains further provisions to ensure the readiness of the state to respond to an oil spill, including the following:

- each person occupying a position identified in the plan must have appropriate training
- each department specified in the plan shall develop supplemental procedures to implement the plan; DOH will coordinate with the other response agencies to ensure that the procedures are compatible
- the plan should be evaluated through exercises to see if the required activities are effective in practice
- HSERC shall develop minimum equipment usage and maintenance standards
- HSERC shall review and revise the plan annually
- exercises will be held to evaluate the efficacy of the plan

The latest draft of the state plan was formulated in 1989, and as of May 1992, was undergoing review and revision. While the plan is fairly inclusive in its descriptions of the various agencies' roles, it appears that many of the provisions of the plan have not been implemented, primarily because of a lack of resources. The implementation of some of these provisions (such as training exercises) is crucial to ensure preparedness. If its provisions are not implemented the state contingency plan is of little value.

Training:

- all parties identified in the Contingency Plan must be aware of their responsibilities under the plan
- the dates by which these persons shall be trained should be specified
- name of staff to receive training at each state and county agency should be specified
- the oil spill response training curriculum should be specified and standardized; refresher training should be scheduled at regular intervals in order to keep staff up-to-date with advances in technology
- exercises and drills should be held regularly to meet the requirements of the plan
- the dates by which training exercises and drills will be completed should be specified
- during an oil spill, large numbers of persons may be required for non-specialized response duties requiring no special training (e.g. posting beaches). Procedures for utilizing state and county employees should be developed

Planning:

- state agencies should be required to produce their supplemental procedures which complement the state contingency plan by a specified date
- the dates and procedures by which the state plan will be reviewed and revised should likewise be specified
- on all matters which may require cooperation between federal, state, and city and county agencies, memoranda of understanding (MOU) should be developed so that there will be no delays when prompt action is required. Specifically, it is recommended that such memoranda be developed to facilitate:
1. Burning of oily wastes at H-power or other incinerators
2. Disposal of non-burnable oily waste at county landfills
3. Storage of oily materials which may or may not be classified as hazardous
4. Use of City and County Public Works Department machinery for cleanup operations
5. Authorization to remove sand from beaches when oil contamination of beaches is imminent
6. Use of U.S. Navy resources for in situ burning operations

Although it may be assumed that there would be cooperation between agencies during the crisis, it may also be assumed that there would be confusion. During the Exxon Valdez oil spill in Alaska, much time was lost from attempts by various state and federal agencies trying to take control of the response activities. Political and media pressure is expected to be high during an oil spill. Therefore, roles must be very well defined prior to the event. Legally binding pre-agreements will minimize difficulties when the crisis comes. Such agreements can be included as annexes to the contingency plan for Hawaii that is being prepared currently by the Area Committee.

One of DOH’s responsibilities under OPA is to advise the FOSC on protective actions during an oil spill. While no separate prioritization has yet been done for protection of the shoreline, a response prioritization scheme will be established in the Regional Response Team’s, established under OPA, contingency plan for Hawaii.

The State Contingency Plan needs to clarify the decisionmaker or decision process for declaring cleanup sufficiency and the criteria for determining clean-up sufficiency. At present, the determination of cleanup sufficiency is officially made by the DOH, however, as the overall supervisor of cleanup operations, the FOSC would have a large say in deciding when a spill has been sufficiently cleaned up. Because no legally mandated guidelines exist for oil spill cleanup levels or standards, suspension of cleanup operations will necessarily be a judgment call. The decision will probably be made by the FOSC with the input of DOH. This seems to be understood by both parties. In the event of a dispute over cleanup sufficiency, the FOSC, as the ultimate authority in an oil spill response, would have the final say.

The state plan specifies no preventive measures over and above those prescribed by the U.S. Coast Guard, which will be amended when administrative rule-making is completed under OPA. There are many areas in which the state could exercise its influence to lessen the likelihood of spills. It may be prudent for the state to do so since all of the provisions of OPA will not be implemented for some years. The state could be looking at accelerating the adoption of some of the simpler strategies where feasible, such as adopting a more active policy aimed at reducing the large number of small spills through regulation of fuel transfer activities. Periodic review of the state plan with input from other states, oil industry personnel, and the U.S. Coast Guard would be useful.

**Cleanup Equipment and Resources Assessment of Oil Spill Cleanup Capability in Hawaii**

While the state has no cleanup responsibilities under OPA, it must still be concerned as the trustee of its resources. The U.S. Coast Guard Plan identifies the material and manpower that it anticipates would be required to respond to a catastrophic spill, and points out that extreme shortfalls that would exist for most types of equipment in the islands. Although it is an attractive concept to think that the state can prepare for an oil spill simply by having plenty of equipment and manpower around to clean it up, this is not the case. Even given
unlimited amounts of equipment, cleaning up oil spills is very difficult. Moreover, there are limits to the amount of equipment that can be reasonably stockpiled for an event that may never occur.

Moreover, state of the art in at-sea oil recovery technology is not very good. Optimistic estimates of oil spill cleanup efficiency range from 10-15 percent recovery of spilled oil under ideal conditions. Conditions around the Hawaiian Islands are seldom ideal and cleanup efforts are likely to be mostly futile in the event of a large spill. Cleanup efficacy is highly dependent on the ability to respond without delay. Therefore, although much equipment is ostensibly available to be flown in from the west coast for use in Hawaii, it is likely to be of questionable value by the time it arrives here 24-48 hours after the oil spill. Similarly, the transport of the in-state cleanup materials from one island to another may encounter delays.

Nevertheless, there is a considerable amount of material stockpiled around the islands (mostly on Oahu) which may be useful in containing the frequent small spills which result from fuel loading mishaps in calm nearshore waters. More equipment is being stockpiled by the Marine Spill Response Corporation and others. The U.S. Coast Guard has prepared an inventory of available equipment in the islands, based in part on the list compiled by Sea Grant researchers (Appendix C), to be included in the MEO Honolulu Oil and Hazardous Substance Pollution Contingency Plan. Agencies in the state having stocks of material which could be used to cleanup an oil spill include:

- the Clean Islands Council
- the oil companies
- the U.S. Navy
- Pacific Environmental Corporation (PENCO)
- Unitek Environmental Services
- P&S Pacific, Industrial Technologies
- Industrial Purifications
- Smith Services

In the absence of any experience of large scale cleanup efforts in Hawaiian waters, it is difficult to estimate how effective such efforts might be. After a certain amount of equipment has been stockpiled, the efficacy of cleanup actions depends more on a large number of variable factors and less on the amount of available sorbent materials and workers. Such determining factors include weather and tidal conditions, type of product spilled, the location of the spill, time of day, etc. Each spill is different. There is no way of estimating precisely the magnitude of spill that can be effectively responded to with the existing resources.

It can be assumed that there would be extensive oiling of beaches in the event of a large spill. Response would then become a matter of trying to remove the oil and contaminated material and dispose of it. Small to medium spills (under 40,000 gallons) can probably be dealt with fairly well with the resources available in the state, under favorable conditions. However, the state could consider setting a target level of cleanup resources to be stored in the islands. A policy of “more is always better” may result in the acquisition of material that would have marginal utility in the event of a spill.

**Oily Waste Disposal**

The issue of oily waste disposal is not adequately addressed in the state contingency plan. It is unlikely that more than a small fraction of the oil recovered from the ocean would be suitable for recycling. The remainder will have to be disposed of in some manner. Several possible options for dealing with the large amount of oily waste that could be generated have been mentioned; among these are: landfilling, stockpiling, burning at incinerators, and shipping to a site away from Hawaii for disposal.
A critical look at these options reveals that they all have restrictive shortcomings, which are likely to limit their usefulness in an actual large oil spill. DOH has indicated that landfilling is the least favorable option while incineration is the most preferred. Unfortunately, no agreement exists between the state and the City and County of Honolulu to permit either the landfilling or the incineration of oily materials and sand at the city facilities.

From discussions with City and County of Honolulu Refuse Collection and Disposal administrators, it has become clear that burning the volume of oily waste that would be generated by a large oil spill, would be problematic at both the H-Power plant and the Waipahu incinerator on Oahu. Problems cited include: disruption of processing regular municipal waste; difficulties in handling fine grained material such as sand, which would be sieved out of the present systems; difficulties in handling liquid materials; difficulties disposing of the large quantities of ash that burning sand would generate; ropes, nets, and similar stringy materials may clog up the flail mills which process the refuse prior to burning; possible pre-ignition of oily materials in the blower manifolds of the H-Power plant; and the necessity to feed the oiled material into the furnaces gradually, with the stream of refuse, in order to keep burning temperatures stable. Extensive modifications to the existing incinerators would be required to permit the burning of such oily wastes as would be generated by a large oil spill. If incineration of oily sand and other wastes is to be considered as a viable disposal option, a considerable amount of pre-planning is required.

Landfilling of oil and oily wastes is a very unfavorable option for several reasons. The potential for leaching of hydrocarbons into the underlying aquifers and the use of increasingly scarce landfill space are the principal problems with landfilling.

If the wastes are to be shipped away for disposal, this must be pre-planned. Arrangements should be made to contract shipping companies or find some other way to transport the wastes to their destination. Possible disposal sites should be identified and arrangements made for the acceptance of the oily wastes. Shipping the waste to the mainland would be an expensive option that would add significantly to the cost of cleanup operations. Interim in-state holding sites for oily waste should be identified and prepared.

While in situ burning of oil has been suggested as a possible response action, the applicability of this technique has not been extensively researched and it has not been tried in Hawaii. As the ignition of spilled petroleum on the ocean will be seen as a rather drastic step that could result in a considerable amount of air pollution, it is probable that there will be some opposition to its adoption as a response option. The adoption of in situ burning would require that more research be done, particularly in Hawaiian waters, personnel be trained in the techniques, and needed materials be acquired. In order to be effective, in situ burning must be initiated while the petroleum product is concentrated enough to ignite. Because burning must take place soon after the spill has occurred, interagency/intergovernmental agreements should be in place (e.g., MOU) with the U.S. Coast Guard and possibly the U.S. Navy for use of its equipment. It may be appropriate for the state to develop a policy of where and under what circumstances in situ burning would be permitted.

Regardless of the disposal option(s) chosen, a large oil spill would generate large volumes of oily waste material which will overwhelm the capabilities of the incinerators, landfills, and shipping companies. Clearly, provisions for the safe on-shore storage of this material while awaiting disposal are required. Once the material is safely sequestered, the disposal options can be evaluated under more relaxed circumstances.

**Letter of Agreement Regarding Dispersants**

This letter was promulgated with the intent of allowing the FOSC to use dispersants with discretion; however, it sets a number of conditions and guidelines which must be followed in using dispersants. Unless their use will prevent damage to human life, pre-approval of dispersant use is not given in areas:

- where the water is less than 60-feet deep
• in any location where the dispersed oil may reach a shoreline, marine sanctuary, national or state wildlife refuge, state marine life conservation district, or estuarine sanctuary
• over shellfish propagation or harvesting waters
• waters over reefs
• waters designated as aquatic preserves
• waters over nursery areas of indigenous aquatic species
• waters in coastal marshes or waters in mangrove forests

Therefore, the use of dispersants is not pre-approved for most inshore waters in Hawaii, and would be limited, for the most part, to areas of deep water away from shore where their negative impacts would be minimized. The improper use of dispersants may cause considerable environmental damage because the dispersants are oftentimes more toxic than the petroleum product they are intended to disperse.

Conclusions

Federal laws and Hawaii laws differ somewhat on the entities subject to the provisions of each. OPA focuses on vessels transporting crude or refined petroleum products and on-shore and offshore facilities. HRS, Chapter 128D includes on-shore and offshore facilities and all vessels fitting a broadly drawn definition. Hawaii’s statutes do not have specific requirements for vessels to meet other than to report spills of hazardous substances covered in HRS, Chapter 128D. However, if Hawaii is to require safety and prevention measures similar to requirements imposed in other states, a more precise definition of “vessel” would be needed. For example, if the state were to require vessel contingency plans for response to oil spills, it would have to define the type of vessel(s) that are subject to that requirement.

If vessels and facilities not covered by OPA are required to develop oil spill response plans by state law, the industry co-op, the CIC, could be an important source of expertise for assisting local vessel owners to develop oil spill response contingency plans. The CIC could charge a fee for this service or require membership in the co-op as a condition for their assistance in preparing contingency plans.

Both federal and state agencies appear to understand their roles in an event of an oil spill, and their responsibility for the subsequent cleanup. In determining sufficiency of a cleanup effort, state and federal agencies should determine the process for making that decision and formalizing it in a memorandum of understanding or as an addendum to the federal contingency plan.

Hawaii’s policy differs significantly from that of the federal policy and other states in the lack of emphasis on prevention of oil spills. OPA and the laws of Washington, Florida, and Louisiana all contain language addressing oil spill prevention. The state would be wise to consider mandating prevention schemes in order to reduce the potential of a major oil spill. Prevention issues are discussed in Chapter 6.

Another area where Hawaii differs significantly with the three states, is the source of revenue for their oil spill cleanup fund. Washington, Louisiana, and Florida derive revenue for their funds from a fee levied on all petroleum products brought into the state and from fines collected for violations. Hawaii’s “Superfund” revenue comes from legislative appropriation as well as fines and penalties levied.

Hawaii also prohibits the use of revenue in its “Superfund” for any other purpose but hazardous waste and oil cleanup. Louisiana and Florida allow a portion of their oil spill cleanup fund to be used for research, training, education, and administrative costs. Washington created a second fund to handle these costs.
Recommendations

Policy Recommendations

Editor's note: The recommendations that follow are based on the findings of our research. As indicated in italics, the DOH notes that some of the recommendations are already in the process of being implemented by the appropriate agencies.

Departmental action in terms of oil spill prevention and cleanup is dictated by state statute and regulations. OPA provides the framework for oil spill prevention and cleanup but leaves room for states to address areas of their particular concern, which may not be covered under the federal statute. Hawaii has moved cautiously in defining a new policy regime as compared to other states. This has given Hawaii the advantage of being able to evaluate its needs and to examine innovative state legislation proposed elsewhere. However, the state should examine existing policies in several areas, including closer consultation with county agencies and instituting fees on oil imports. Foremost among our recommendations is the need for the state to move more aggressively in the area of oil spill prevention. State policy is based on the notion of being able to respond adequately to oil spills. A sound oil spill policy is one that is geared both to prevention and response.

Overall, the following policy adjustments are recommended:

1. Amend state statutes to reflect a greater emphasis on planning for oil spill prevention rather than cleanup. The state should require the petroleum and marine transportation industry to prepare oil spill prevention plans that reduce the risk of a spill. The plans should consider the cost and benefits of various levels of environmental protection and outline a list of prevention measures that will be implemented. The state should consider offering incentives for the development and implementation of prevention measures.

   OPA 90 and existing regulations address oil spill prevention. The state is authorized to be more stringent. The recommendations should be more explicit as to how the state should be more aggressive.

   33 CFR 156 addresses spill prevention requirements. I am unsure that “plans” will accomplish any additional preventative measures.

2. Impose a fee on all oil brought into the state to help build the state superfund up to an established ceiling. A fee of $0.05 per barrel on petroleum places the burden of paying for future oil spill cleanups on those profiting from the sale of petroleum products and would raise approximately $3 million per year. The fee should also have minimal impact on consumers since it amounts to $0.0012 per gallon of petroleum crude or product. A percentage of the fee, perhaps 5–10%, should be used for personnel education, training, monitoring, oil spill planning, and administration of an environmental response capability. This could be accomplished by amending section 128D2-4 to allow for expenditures from the fund for these purposes. The amount used in any one year may be limited by a cap on the use of the fund for administrative purposes.

3. Define mechanisms for working with the counties and the federal government in deciding how to certify the end of a cleanup effort. An interagency memorandum of understanding (MOU) between the state of Hawaii and U.S. Coast Guard could outline the process for determining when an oil spill cleanup effort can be discontinued. The MOU can be made a part of the regional response plan. County governments must also be represented in the cleanup decisionmaking process.

   Law states that the Federal On-Scene Coordinator (FOSC) can make the call. Regulations are being developed to address state access to the fund in cases where the state does not agree with the FOSC.

4. Institute liability limits in line with the cost of cleanup and damage reimbursement in a worst case oil spill. The vessel liability should be higher than the federal level now in place, since it is likely that the damage resulting from a catastrophic oil spill will be greater than the limits imposed by the
federal government. Liability limits in line with those applying to interisland barges under Act 130 1992 may be a guide to setting limits for all types of vessels.

5. Redefine the term “vessel” in the definition section of Chapter 128D, HRS. The extant definition subjects all vessels to the act whether the vessel is an ocean liner, or a motorized dinghy. If additional requirements were added requiring vessel contingency plans and cleanup equipment on-board, the inclusion of all vessels would adversely impact small vessel owners. The full impact of the law should fall on large vessels with large fuel or cargo capacity.

6. Require tankers, large vessels and facilities prevention plans, and vessels not specifically covered by federal law, to prepare prevention plans. Large vessels such as cargo ships and passenger liners carry great quantities of oil as fuel and could cause a substantial spill were an accident to occur. Where federal law and regulation requires these plans to be prepared, they can be substituted for those mandated by the state. All other vessels could be made to follow federal guidelines.

*Federal law covers vessels or facilities which have the capacity for an oil spill that could cause “substantial harm” or “significant and substantial harm.” The state can be more stringent; however, the economic impact on small boat owners may be too onerous.*

7. State should wait until Coast Guard formulate regulations for contingency planning and documentation for vessel financial responsibility before requiring its own contingency plans or documentation.

**Preparedness Recommendations:**

1. MOU’s should be drafted on all matters that will require cooperation between the different levels of government.

*The U.S. Coast Guard and the state are currently working on a MOA [MOU] for marine protection. As specific issues arise which need additional MOAs [MOUs], they will be developed. In addition, the Area Planning Committee is working to identify these issues.*

2. The state contingency plan should be reviewed periodically. Input from other states, the oil industry, and the U.S. Coast Guard should be sought.

*The State Contingency Plan (I am assuming the “Oil and Hazardous Substances Emergency Response Plan”) is reviewed periodically by the Hawaii State Emergency Response Commission.*

3. It should be the specific duty of someone in the state government to keep abreast of the state-of-the-art in oil spill cleanup and prevention technology. This person should have a part in reviewing and updating the state plan. If at present, the state lacks a position to fulfill this role, additional personnel should be hired.

4. The Department of Health requires additional staffing to take a more active role in ensuring that the provisions of the contingency plan are followed. There are areas in which greater commitment to the plan and a more positive direction might be appropriate. An operations manual covering procedures for handling problems in training, planning, and communication could serve as a guidebook for ensuring readiness and coordination of all state/county agencies.

**Response Recommendations**

1. Exercises and drills should be held regularly.

*OPA 90 requires exercises and drills be held regularly. Additional drills may not accomplish any additional prevention.*

2. A MOU should be drafted with the counties to permit the use of their earth-moving machinery in response to a spill incident.

*The U.S. Coast Guard is working with the counties to access their equipment.*
3. A MOU should be drafted with the counties to permit the removal of sand when oil contamination of beaches is imminent.

*Law states that the Federal On-Scene Coordinator (FOSC) can make the call. Regulations are being developed to address state access to the fund in cases where the state does not agree with the FOSC.*

4. It should be decided and clearly stated who has the final responsibility for declaring cleanup sufficiency.

*Law states that the Federal On-Scene Coordinator (FOSC) can make the call. Regulations are being developed to address state access to the fund in cases where the state does not agree with the FOSC.*

### Waste Disposal Recommendations

1. A strategy for oily waste disposal should be formulated.

   *The Subcommittee on the disposal of oily waste is addressing this issue.*

2. A MOU should be drafted with the counties regarding the use of their landfills for disposal of oily waste.

   *This is being investigated by one of the Subcommittees. In fact, OPA mandates that there will be a storage and disposal plan.*

3. A MOU should be drafted with the counties regarding the incineration of oily wastes at their facilities.

   *This is being investigated by one of the Subcommittees. In fact, OPA mandates that there will be a storage and disposal plan.*

4. The technical aspects of oily waste incineration at City and County of Honolulu facilities should be addressed.

   *This is being investigated by one of the Subcommittees. In fact, OPA mandates that there will be a storage and disposal plan.*

5. A memorandum of understanding should be drafted with the federal authorities to permit the indefinite storage of oily waste.

   *This recommendation is too specific. We do not necessarily need a MOA [MOU] with the federal authorities. What we need is a place to store oily waste. This could be state land, private land, county land, or federal land. This problem is being addressed.*

6. Interim storage sites for oily waste should be identified and prepared.

   *This recommendation is too specific. We do not necessarily need a MOA [MOU] with the federal authorities. What we need is a place to store oily waste. This could be state land, private land, county land, or federal land. This problem is being addressed.*

### References


CHAPTER 6

ANALYSIS OF THE CAUSES AND PREVENTION OF OIL SPILLS

Rose T. Pfund, Ph.D.
Introduction

The seemingly insatiable corporate and individual demand of industrialized nations for fuel is met by the daily transport of 31.5 billion gallons of oil by ship from oil producing regions to oil consumers (Etkin, 1990). Hawaii’s portion of this global pool of oil-in-transit is a daily average of about seven million gallons destined for terminals or ports on Oahu, Maui, Kauai, Molokai, and Hawaii. While petroleum has the potential for fuelling explosive fires, the use of tankers and supertankers with cargo capacity in the tens of millions of gallons, introduces a human-generated destructive force of fearsome magnitude that can pollute hundreds of miles of coastline in a single catastrophic oil spill. However, the volume of oil and oily waste being dumped into the ocean from municipal sources, ship operations, and natural seeps exceeds the amount that is introduced into the marine environment by tanker accidents (M’Gonigle and Zacher, 1979). The difference in the level of public outrage between frequent low-volume spills and an infrequent large spill lies in the visibility of a catastrophic oil spill. The public’s perception of frequent low-level oil spills and a single large spill is similar to its acceptance of the annual national mortality of more than 25,000 from highway accidents, but its outrage when an airliner crashes and kills 250 passengers, which is only one percent of the highway mortality.

William O’Keefe, vice-president and chief operating officer of the American Petroleum Institute, observed that “despite the best preventative measures, tanker transport of oil is always subject to the vagaries of weather and human error” (Etkin, 1990). This view was taken as a challenge in designing this study. Interestingly, our statistical analysis found that the frequency distribution of oil spill accidents is spread randomly throughout the year, rather than in high concentration during winter months when storms are common. Weather, therefore, is a contributing factor, but it is not a statistically significant cause of oil spills. What is a statistically significant cause of oil spills worldwide is human error. However, when Hawaii’s historical record of oil spills was analyzed, it showed that oil spills caused by human error were overshadowed by those caused by mechanical and structural failures.

For Hawaii, where so much of the state’s well-being rides on a pristine environment, any oil spill is bad news, particularly because of two conditions: 1) environmental damage; and 2) ineffective oil spill response technology. When an at-sea oil spill occurs, damage to coastal and intertidal zones and bottom sediments is inevitable. John Bennett, Bennett Environmental Consultants, Ltd., summarizes the ineffectiveness of known response technology (Etkin, 1990):

...[E]very time there’s a spill, it’s a major disaster... It’s very rare that we ever collect even 10 percent of the oil — I think we’ve reached our limit on what we can do with equipment.

These conditions and the potential catastrophic economic impact of a major oil spill added a sense of urgency and provided the motivation for exploring all possible prevention measures. It is well known, though not well-documented, that the cost of oiled beaches is particularly high for tourism-related activities. There are some historical anecdotal observations, e.g., a temporary 20 percent drop was reported in Santa Barbara (leakage from an offshore well) and an undesignated level of tourism revenue losses lasted for a year along the United Kingdom’s southern coast (Torrey Canyon oil spill) (M’Gonigle and Zacher, 1979). For Hawaii, as discussed elsewhere in this report, the magnitude of the economic impact of a major oil spill on tourism revenues, based on the U.S. Coast Guard’s worst case scenario, could be catastrophic.

Research Methodology

In developing the strategy for studying the prevention of oil spills, one of the assumptions made was that given the volume of oil shipments, oil spills are inevitable, but they could be minimized. The 1989–1990 data on major oil spills worldwide >10,000 gallons, obtained from the Oil Spill Intelligence Report (1991a), were statistically analyzed to determine the frequency, causes, and location of these spills which dumped more than
77 million gallons of oil into the oceans of the world. The Hawaii oil spill data, obtained from the U.S. Coast Guard headquarters in Washington D.C., were also statistically analyzed to ascertain frequency, cause, and location of the reported oil spills. Additionally, the Hawaii Revised Statutes and institutional infrastructure and the implications of OPA on the state's role for responding to and/or mitigating oil spill accidents were examined to identify avenues which could be used to implement preventive measures.

A caveat needs to be added here on the Hawaii oil spill data. When several discrepancies were found, we verified, to the extent possible, the major entries in the database we used. We were unable to locate an agency that keeps a consistent and verified record of historical oil spills in Hawaiian waters. It is only within the last two or three years that record keeping by the U.S. Coast Guard, Honolulu Office, appears to have become more comprehensive, but even today, records are largely based on the spiller's report, except when there is a major oil spill. As the Federal On-Scene Coordinator, the Captain of the Port, U.S. Coast Guard, 14th District, prepares a report of all large oil spills.

This section begins with an assessment of what can be called the anatomy of an oil spill. The two sets of data on oil spills, worldwide and Hawaii accidents, were examined to identify and characterize frequency, causes, and location of oil spills.

Causes of Major Oil Spills Worldwide

In determining the influence of weather on oil spill accidents, it was assumed that adverse weather would be more prevalent in the winter and consequently there would be a higher frequency of accidents during the winter months (December–February). When the 1989 and 1990 data were plotted, the randomness of the frequency distribution for the two seasonal cycles negated statistical significance of weather as a cause of oil spills (Figure 6.1). However, weather had a significant impact on shipboard fatalities. Of the six fatalities that were recorded for the two years, five occurred during the winter months.

One of the more significant aspects of the oil spill data, shown in Table 6.1, was the location of accidents. The surprising finding is that more than half of the major accidents occurred away from loading and offloading facilities. (However, judging from other statistics, e.g., those for Hawaii, numerous small spills, which were not included in the worldwide oil spill data, are likely to occur at ports and terminals.) In other words, these statistics indicate that 56 percent or one out of two major accidents occurred on the open ocean and one out of ten accidents occurred in the congested terminals and ports. A related aspect of these statistics, the effect of fatigue on open-ocean accidents is discussed below in the section on OPA, Title IV.

![Oil Spill Statistics (1989, 1990) By Month](image)

**Figure 6.1.** Worldwide oil spill statistics: 1989 and 1990
Table 6.1. Distribution of location of major oil spills worldwide (>10,000 gallons): 1989–90*

<table>
<thead>
<tr>
<th>Accident sites</th>
<th>Percent of all accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore locations</td>
<td>35</td>
</tr>
<tr>
<td>Nearshore locations</td>
<td>21</td>
</tr>
<tr>
<td>Rivers</td>
<td>10</td>
</tr>
<tr>
<td>Ports/harbors/terminals</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>25</td>
</tr>
</tbody>
</table>

*Data Source: Oil Spill Intelligence Report, 1991a

Analysis of the relationship of accident location and types of vessel indicated that tankers were involved in 65 percent of all offshore accidents, 50 percent of near-shore accidents, and 53 percent of ports/harbors/terminals accidents. Barges accounted for 71 percent of all accidents along rivers and 67 percent of the accidents in channels and waterways. When the data were analyzed to determine the cause of the accidents, there was no question as to the major cause of oil spills at sea. Human error and human error-related vessel guidance accidents — groundings and collisions — were responsible for 58 percent of oil spills in excess of 10,000 gallons that occurred worldwide during 1989 and 1990 (Table 6.2).

Table 6.2. Oil spills worldwide (>10,000 gallons): 1989–90*

<table>
<thead>
<tr>
<th>Type of accident</th>
<th>Percent of all accidents (avg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grounding</td>
<td>20</td>
</tr>
<tr>
<td>Collision</td>
<td>31</td>
</tr>
<tr>
<td>Human error</td>
<td>4</td>
</tr>
<tr>
<td>Spillage</td>
<td>1</td>
</tr>
<tr>
<td>Dumping</td>
<td>2</td>
</tr>
<tr>
<td>Undetermined sinkings</td>
<td>11</td>
</tr>
<tr>
<td>Mechanical/other</td>
<td>31</td>
</tr>
</tbody>
</table>

*Data Source: Oil Spill Intelligence Report, 1991a

Although it was not possible to ascertain the number of sinkings that were caused by human error, nevertheless, there is high probability that at least some of the 11 percent attributed to sinking could have resulted from human error. It is probable that human error was the cause of as much as two-thirds or more of all major oil spills in the world.

The large number of accidents caused by human error is substantiated by historical data. The statistics for the 1969–72 oil spills worldwide that occurred less than 50 miles from land indicate that 74 percent were caused by human error-related guidance accidents (Beyer and Painter, 1977):

- Collision: 33%
- Groundings: 33%
- Rammings: 8%
- Total: 74%
A comparison of the volume of spill per accident, tabulated for the two periods, shows an increase of more than three-fold over the 20-year period for collisions and groundings:

<table>
<thead>
<tr>
<th></th>
<th>1969–72</th>
<th>1989–90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallons/accident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collisions</td>
<td>424,008</td>
<td>1,533,947</td>
</tr>
<tr>
<td>Groundings</td>
<td>419,588</td>
<td>1,404,615</td>
</tr>
</tbody>
</table>

The increase in the size of oil spills is probably due to the increased usage of supertankers. Further corroboration of the relationship between larger tanker capacity and larger oil spills is evident in the doubling of the average size of oil spills during the 20-year interval:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallons/accident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969–72</td>
<td>426,216</td>
<td></td>
</tr>
<tr>
<td>1989–90</td>
<td>891,272</td>
<td></td>
</tr>
</tbody>
</table>

The 1989–90 data were averaged and analyzed to determine the types of vessels involved in human error-related accidents which accounted for about 57 percent of all accidents (Table 6.2):

<table>
<thead>
<tr>
<th></th>
<th>Collisions</th>
<th>Groundings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(% of all collisions)</td>
<td>(% of all groundings)</td>
</tr>
<tr>
<td>Tankers</td>
<td>51</td>
<td>55</td>
</tr>
<tr>
<td>Barges</td>
<td>30</td>
<td>16</td>
</tr>
</tbody>
</table>

Human error-related accidents caused more than half of all tanker accidents, i.e., one in two accidents. On the other hand, accident statistics for barges showed that they are more than twice as likely to be involved in collisions, which are multi-vessel accidents, than single-vessel accidents like grounding. This is probably explainable by the fact that barges mostly operate in channels, waterways, and rivers which tend to be narrow and constricted and congested. It is noteworthy that non-oil cargo carrying vessels caused 15 percent of the collisions and 35 percent of the groundings that resulted in spills of more than 10,000 gallons. This statistic should justify Hawaii’s consideration of requiring large passenger and fishing vessels that carry more than 10,000 gallons of fuel to develop contingency plans for oil spill response.

An interesting sidelight to oil spills is a study cited in *Oil Spill Intelligence Report* (1991) that found a higher number of oil spills occurred on Saturday than on other days. Eban Goodstein who analyzed listings of accidents in several sources found that oil spills were caused by what he calls the “Saturday effect.” Goodstein noted that accidents were more prevalent on Saturday than on other days and offers some explanations:

- Increased recreational traffic
- Alcohol abuse and late hours
- Reduced staffing as crew leaves ship

Goodstein states that if the “Saturday effect” could be eliminated, there would be a nine percent decrease in oil spills or about 163,000 gallons. He suggests imposing a harsh penalty for Saturday spills and levying a per-gallon tax on Friday night clearances and Saturday entrances and clearance.

### Causes of Oil Spills in Hawaii

As shown in Table 6.3, 11 oil spills larger than 5,000 gallons and four of the five oil spills larger than 25,000 gallons occurred off the south and southwestern coastline of Oahu that stretches from Honolulu Harbor to Barbers Point (Figure 6.2). Indeed, this strip of coastline accounts for 59 percent of the reported oil spills during the 9-year period covered by U.S. Coast Guard data which was used as the basis for the analysis of oil spills in Hawaii.

112
Figure 6.2. Detail of southern coast of Oahu
Table 6.3. Major oil spills in Hawaii (>5,000 gals): 1983–91

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount of Spill</th>
<th>Cause</th>
<th>Spill Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>120,000</td>
<td>Ruptured pipeline</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1984</td>
<td>48,000</td>
<td>Grounding</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1987</td>
<td>42,000</td>
<td>Equipment failure</td>
<td>Kalani Channel</td>
</tr>
<tr>
<td>1989</td>
<td>33,800</td>
<td>Grounding</td>
<td>Barbers Point</td>
</tr>
<tr>
<td>1989</td>
<td>26,000</td>
<td>Structural failure</td>
<td>Honolulu</td>
</tr>
<tr>
<td>1991</td>
<td>18,000</td>
<td>Tank overflow</td>
<td>Honolulu Harbor</td>
</tr>
<tr>
<td>1989</td>
<td>15,000</td>
<td>Structural failure</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1989</td>
<td>10,000</td>
<td>Structural failure</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1985</td>
<td>9,800</td>
<td>Structural failure</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1991</td>
<td>6,500</td>
<td>Spillage</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1990</td>
<td>5,000</td>
<td>Human error</td>
<td>Pearl Harbor</td>
</tr>
<tr>
<td>1989</td>
<td>5,000</td>
<td>Discharge</td>
<td>Honolulu Harbor</td>
</tr>
<tr>
<td>1989</td>
<td>5,000</td>
<td>Unknown</td>
<td>Molokai</td>
</tr>
</tbody>
</table>

Figure 6.3. Histogram of reported oil spills in Hawaii
(Data source: U.S. Coast Guard)

Figure 6.3 shows the dramatic increase in the number of spills reported to the U.S. Coast Guard. It is possible that the increase is an artifact of greater awareness of the need to report oil spills, but as noted in Chapter 1, more oil is imported today than 10 years ago. Of the known size of spills (the size of about 53 percent of the reported spills are unknown), more than 40 percent were under 1,000 gallons. However, over the nine-year period, there were 13 oil spills ranging in volume from 5,000 to 120,000 gallons with 11 of the large spills occurring during the last five years (1987–1991). Of these, only five (about one-third) were caused by human error-related accidents and seven by structural and equipment failure.

Statewide distribution of oil spills given in Table 6.4 shows that Oahu far outstrips the other islands as the site of oil spills, including major spills shown above in Table 6.3. The concentration of spills on Oahu is undoubtedly due to the location of major oil handling and refinery facilities along the island’s southern coast, including Honolulu Harbor, the state’s major port, Pearl Harbor, and the two refineries, Chevron, USA and Hawaiian Independent Refinery, Inc. (Figure 6.2).
Table 6.4. Frequency distribution of oil spills by island (1983–91)

<table>
<thead>
<tr>
<th>Island</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>9</td>
</tr>
<tr>
<td>Kauai</td>
<td>3</td>
</tr>
<tr>
<td>Maui</td>
<td>6</td>
</tr>
<tr>
<td>Molokai</td>
<td>1</td>
</tr>
<tr>
<td>Oahu</td>
<td>81</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
</tr>
</tbody>
</table>

*Total exceeds 100 due to rounding of the percentages

Data Source: U.S. Coast Guard

Honolulu Harbor and Pearl Harbor were the sites of about 30 percent of the reported oil spills in Hawaii. Nearly all oil products are received and/or shipped from 14 facilities within the Honolulu Harbor complex. Piers 29A, 30–34, 51A are interconnected by a pipeline system that extends to storage tanks. Bunkering service is also provided at these piers. The Chevron, USA facility and Pacific Resources, Inc. are connected by pipeline to their refineries at Barbers Point.

Pearl Harbor has been a major naval base and shipyard for the U.S. Navy’s Pacific fleet since the 1800s when it was a coaling station for the steam-powered U.S. North Pacific fleet. The wide array of structural/mechanical causes of oil spills suggests the existence of aged infrastructure that needs to be replaced or upgraded. The long-term effect of these continuous low-level oil spills on the indigenous birds and the nehu bait fishery in Pearl Harbor’s estuarine environment is unknown.

While only 11 percent of the reported spills were cited as human error or human error-related accidents (Table 6.5), the known volume of oil spill caused by these accidents (absolute number = 22) totalled 106,684 gallons or an average of 4,849 gallons per accident. What is striking, however, is the predominance of mechanical/structural failure-related accidents which account for nearly 40 percent of the accidents. While the total spill volume caused by structural and equipment failure is unknown, reported oil spills caused by such accidents totalled about 55,000 gallons in Honolulu Harbor and 154,800 gallons in Pearl Harbor over the nine-year period. The significant number of oil spills caused by structural and mechanical failure at these facilities points to a need for better facility maintenance and/or replacement of aged equipment and pipelines. Both Honolulu Harbor and Pearl Harbor still utilize old fuel lines and have a network of abandoned pipelines. Oil spills from structural and mechanical failure can be eliminated or reduced to very low levels if equipment and facilities are regularly maintained or replaced and rigorous risk management and loss prevention programs are instituted.
Table 6.5. Causes of oil spills in Hawaii: 1983–91

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percent of reported spills*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge**</td>
<td>4</td>
</tr>
<tr>
<td>Dumping**</td>
<td>3</td>
</tr>
<tr>
<td>Grounding**</td>
<td>1</td>
</tr>
<tr>
<td>Human error**</td>
<td>3</td>
</tr>
<tr>
<td>Collision**</td>
<td>(&lt;1)</td>
</tr>
<tr>
<td>Burping</td>
<td>1</td>
</tr>
<tr>
<td>Corrosion</td>
<td>4</td>
</tr>
<tr>
<td>Inclement weather</td>
<td></td>
</tr>
<tr>
<td>Leak</td>
<td>10</td>
</tr>
<tr>
<td>Mechanical failure</td>
<td></td>
</tr>
<tr>
<td>Pumping</td>
<td>4</td>
</tr>
<tr>
<td>Sinking</td>
<td>1</td>
</tr>
<tr>
<td>Structural failure</td>
<td></td>
</tr>
<tr>
<td>Overflow</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>47</td>
</tr>
</tbody>
</table>

* Total does not equal 100 due to rounding of percentages
** These are human error or human error-related causes

Data Source: U.S. Coast Guard

Based on the nine-year record of oil spills in Hawaii, the statistical probability of oil spill occurrence has been projected (Lee, 1992):

<table>
<thead>
<tr>
<th>Oil spill volume</th>
<th>Probability of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–20,000 gallons</td>
<td>once in 2.25 years</td>
</tr>
<tr>
<td>20–50,000 gallons</td>
<td>once in 4.5 years</td>
</tr>
<tr>
<td>10–11,000,000 gallons</td>
<td>once in 135 years</td>
</tr>
</tbody>
</table>

Based on simulated results using an optimization model, a trade-off can be made between prevention and response. Results indicate that response capability should be increased for each unit of reduction in prevention measures to maintain cost savings (Lee, 1992).

While it may be possible to strike a nice balance between response and prevention using cost savings as the motivation, questions can be raised on the utility of stockpiling equipment and supplies capable of responding to very large spills of a million gallons or more. Since the spiller, the facility owner or shipowner, is charged with the responsibility of responding to oil spills under OPA and not the state, the basic issue state government faces is defining the level of risk the public is willing to accept. Cost of response is not a factor to be entered into the state’s decision matrix, except indirectly. There are, however, costs associated with developing an institutional infrastructure to effectively manage the potential catastrophic disaster. The required institutional framework is yet to be developed. The Hazard Evaluation and Emergency Response Office under the Department of Health (DOH) currently serves as the agency that monitors releases of all hazardous substances and is responsible for developing and implementing relevant provisions under OPA.
There is already in place what is referred to as the Hawaii Superfund Law, enacted in 1991, that gives the state the power to order immediate cleanup of an oil spill and to pay for the cleanup costs and be reimbursed from the trust fund established under OPA (Section 4201(d)(H)). In addition, the law allows criminal penalties to be levied on the polluter and there are no liability limits. Since the provisions of the state’s superfund law that deviate from OPA may not be preempted by the federal law, unlimited liability under Hawaii’s statutes, therefore, prevails for all oil spills that occur in Hawaiian waters. There is a temporary ceiling of $700 million for inter-island barge shipments of No. 6 fuel oil provided in Act 130 (enacted in 1992).

Channel Waters

There apparently have been near collisions between "tug vessels" and recreational boats in the narrow channels between the four islands that comprise Maui County. As is shown in Figure 1.1 in Chapter 1, these channels — Pailolo, Kalohi, and Auau — are used as transit lanes by tanker barges and dry cargo barges to deliver oil and other goods to Molokai, Maui, Lanai, and Hawaii. The 1992 session of the Sixteenth Legislature adopted House Resolution 137, HD1, which requests a study of the conflict between recreational boaters and tug vessels particularly in the waters of Maui County. From the standpoint of overall safety, the designation of mandatory barge traffic lanes, passive radar reflection devices, appropriate communication equipment, and local traffic rules appears to be in order because of the high use of the channel waters by recreational boaters and tourist charter boats.

If the issue of safest possible transit time for tanker barges were to be considered solely on the potential for the occurrence of an accident, all night channel crossing should be prohibited. But given the volume of traffic in the channel waters and the narrow spaces that are being reported, the mandatory routing of all barge traffic to daylight hours would increase the probability for collision. The other extreme option is to designate the channels as tanker barge-free zones. Here again, what appears to be the logical answer does not stand up to the test of reality. The well-known turbulence of the open seas surrounding the islands constitute a greater hazard, according to mariners, than the occasional recreational boater at night.

Pilotage Waters and Pilotage

The designation of harbors and access channels as pilotage waters has a long standing. Pilotage waters are areas which can only be entered with a licensed pilot and/or tug assistance. The Sixteenth State Legislature adopted HB3049, HD1 which was signed into law by the Governor on April 22, 1992, as Act 25. It amends the HRS, Section 462A-17, by redefining boundaries of the pilotage waters near Barbers Point because "it is too confining, in that, it provides inadequate space for ships to anchor should they have to wait for entry into the harbor or should they call to obtain bunkers at anchor." The expanded waters will include the area within the northernmost refinery tower, 2503 true, to the intersection of a line drawn tangentially to Maile Point, 1653 true.

As a result of the Exxon Houston near-accident at Barbers Point in 1989, the refineries and the U.S. Coast Guard have jointly developed more stringent regulations aimed at preventing vessel guidance accidents. A standby tug assistance and live watch are required during offloading operations at the offshore mooring at Barbers Point. The state’s Harbor Master issued regulations shifting the anchorage of laden tankers offshore from off-port Honolulu to anchorage off Barbers Point Naval Air Station. In addition, all off-port bunkering is now confined to anchorages ewa (west) of Kalihi Channel and the offshore anchoring area was designated ewa of the Honolulu main channel, but clear of the Sand Island sewage outfall and Kalihi Channel (Figure 6.2).

Because pilots are critical to the safety of ships in shallow coastal waters and in congested harbors, the state’s requirements and procedures for licensing pilots were reviewed. Chapter 462A, HRS, gives the director of the
Department of Commerce and Consumer Affairs (DCCA) the power to grant licenses and to revoke licenses. The director may convene a panel of knowledgeable individuals to assist in evaluating credentials of applicants and port pilots and in matters related to pilotage (Admin. Rules 16-96-28.5). Currently, such a panel has not been appointed.

In general, the DCCA director is charged with the responsibility for “maximum efficiency in navigating vessels entering or leaving the waters of this State; maintain a pilotage system devoted to the preservation, and protection of lives, property and vessels entering or leaving waters of the state; and ensure an adequate supply of qualified pilots.” The director is also charged with investigating violations of “the rules” and “any provisions of this chapter [426A]” (HRS, Chapter 426A-3).

Pilot’s licenses expire on even-numbered years. Renewal of licenses cannot be denied as long as an application is submitted and the applicant or pilot follows “all applicable rules of the Department [DCCA] and remains in active service.” Licenses may be denied, suspended or revoked for the following causes by the DCCA director (HRS, Chapter 426A-8):

1. Violation of this Chapter [462A] or any rule adopted by the [DCCA] director;
2. Loss, damage, or injury due to negligent pilotage;
3. Habitual use of any substance rendering a pilot unfit to be entrusted with the charge of a vessel;
4. Inability to physically or mentally perform the duties of a pilot;
5. Failure to maintain active service as a pilot in the state;
6. Procurement of a license through fraudulent misrepresentation or deceit;
7. Participation in any unfair or deceptive act or practice as prohibited by section 480-2;
8. Violation of any law or regulation intended to promote marine safety or protect navigational waters;
9. Failure to report marine accidents in accordance with the rules of this chapter;
10. Failure to maintain a current and valid federal pilots license in accordance with Title 46, United States Code, Chapter 71.

In addition, a license or renewal of a license may be denied or revoked for: 1) incompetence, including but not limited to, solo piloting a vessel that is beyond the capability of the pilot; and 2) noncompliance with the statewide pilotage system.

The pilots are part of a central scheduling system established by the director under Administrative Rules 16-96-62 through contracts with the two pilots’ association — HPBS, Inc. and Hawaii Pilots Association. Section 462A-15 allows the pilots to form an independent non-profit association with each member explicitly excluded from sharing the liability that may be incurred by the association. Before any license can be revoked or denied, the applicant is given a hearing (Section 462A-20(a)). Any adverse action can be appealed to the circuit court (Section 462A-20(h)) within 60 days (Admin. Rules 16-96-29).

All vessels are required to take on a pilot while in the state’s pilotage waters, except vessels that are under the direction of a federally licensed pilot, public vessels, and fishing vessels with a fishing license or endorsed registry under federal laws (Section 462A-19).

There appears to be inadequate rules for the enforcement of substance abuse (HRS, Chapter 462A-8(3)) in Administrative Rules, Title 16, Chapter 96. While a physical examination is required, there is no requirement for obtaining certification that the pilot (or applicant) has no police DUI or DWI record. Moreover, under Administrative Rules 16-96-41, it is the pilot himself who must report that he is mentally or physically impaired. This procedure appears to be predicated on a rather naive assumption that the individual who is suffering from mental impairment will always recognize his/her disability. Physical impairment may be more easily recognized, but even here, there is still a question as to the level of impairment that would make it mandatory for the pilot to take a leave of absence.
A 60-day physical or mental impairment requires a physician's certification of fitness before resuming piloting. It is not clear as to who is to monitor the time taken off from piloting duties. Furthermore, there is no provision for the investigation of chronic absenteeism. Under the administrative rules, no physician's certification is required unless there is a continuous 60-day absence because of physical or mental impairment.

Although there is a mandatory requirement for participation in a training program (Administrative Rules 16-96-63), a clearly defined statement of purposes and criteria is absent.

Inadequacies of Response Technology

If this report has a bias, it is toward prevention of oil spills rather than response because of the ineffectiveness of currently known technologies to contain and/or recover oil at sea. A detailed evaluation of these technologies is given in Appendix B. Table 6.6 graphically illustrates the poor recovery rate for large oil spills, which ranges between 1.6 percent and 11 percent. Along with the poor technology, response efforts have been hampered by the "inability to mobilize people and equipment under the chaotic circumstances that surround a major emergency ... [and] sufficient response equipment is not always readily available and there are often not enough experienced people available to deploy it effectively" (Natural Resources Defense Council, undated).

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Spill date</th>
<th>Location</th>
<th>Spill amount (Million Gallons)</th>
<th>Amount Rec'd (Gallons)</th>
<th>Amount Rec'd (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Puerto Rican</em></td>
<td>10/84</td>
<td>San Francisco</td>
<td>1.50</td>
<td>63,000</td>
<td>&lt;5</td>
</tr>
<tr>
<td><em>Apex Houston</em></td>
<td>2/86</td>
<td>Cent. Calif.</td>
<td>2</td>
<td>420</td>
<td>1.6</td>
</tr>
<tr>
<td><em>Glacier Bay</em></td>
<td>7/87</td>
<td>Cook Inlet</td>
<td>.13</td>
<td>14,994</td>
<td>11</td>
</tr>
<tr>
<td><em>Pacific Baroness</em></td>
<td>9/87</td>
<td>St. Barbara Ch.</td>
<td>.38</td>
<td>14,700</td>
<td>3.9</td>
</tr>
<tr>
<td><em>Exxon Valdez</em></td>
<td>3/89</td>
<td>Prince Wm. Sd.</td>
<td>10.80</td>
<td>714,000</td>
<td>&lt;7</td>
</tr>
</tbody>
</table>


One of the critical issues related to response readiness is the amount of response equipment and number of trained personnel that need to be in a state of readiness. Most common response technologies for at-sea treatment include booms, skimmers, sorbents, and dispersants (a summary of response technologies is given in Appendix B). The effectiveness of all of these technologies diminish when wave heights reach more than three feet (Natural Resource Defense Council, undated; Etkin, 1990).

Mechanical Methods. Booms and skimmers are mechanical means of containing oil and removing oil. Special offshore booms are available to withstand waves up to about six feet and current speed of less than one knot. While most effective in calm waters, belt skimmers have been used in 10-foot waves. Because the effectiveness of skimmers and booms are limited to an optimal speed of .5 knot, no more than .5 square mile can be skimmed off in one day (National Resource Defense Council, undated).

Dispersants. Dispersants are most effective when applied to thick unweathered slicks in areas that are subject to vigorous wave action. Instead of removing oil, dispersants break up the oil into small droplets and transfer the oil from the surface to the water column (Natural Resource Defense Council, undated). None of the toxic elements in the oil is removed by this method. The potential impact of toxic elements in the oil as well as in the dispersants can damage wildlife and especially the sedentary fisheries. This fact is recognized in the memorandum of understanding between the Hawaii Department of Health and the U.S. Coast Guard by
prohibiting use of dispersants in nearshore waters less than 60-feet deep. The memorandum is an annex in the Oceanic Regional Contingency Plan for Hawaii.

Sorbents. There are several different types of sorbents, including organic materials such as straw and sawdust, polypropylene (synthetic organic sorbents), and mineral-based sorbents such as glass wool and volcanic rock. All have disposal problems because the sorbents become oil-soaked waste of major magnitude in a large oil spill that must be disposed of in some appropriate manner. Others become sinking agents and carry the oil to the sea floor. Sorbents are considered to be most useful for small cleanups or for doing the finish work after cleaning up a large spill.

In situ burning. In situ burning is a technology that falls in the category of at-sea response before the oil reaches land. The first large-scale deliberate burning of oil, about 20,000 tons, was done in 1967 when the cargo of the Torrey Canyon was burned (Wardley-Smith, 1983). This technology was discussed at a workshop sponsored by the U.S. Environmental Protection Agency on May 21–22, 1991 in Sacramento, California and at the Region IX Regional Response Team workshop held on November 13–15, 1991 in Honolulu (Pester, 1991; U.S. Coast Guard, Oceanic Regional Response Team, undated). While still in the testing stage, experiments under controlled conditions have shown that it is possible to remove 98–99 percent of the oil (Pester, 1991). Studies conducted by the Office of Technology Assessment and the National Institute of Standards and Technology noted that in situ burning becomes the more acceptable option, if the other is oil-coated beaches (Etting, 1990). (Indeed, this viewpoint was voiced by the tourism industry panel convened for the present research.) Ongoing studies include determination of the volume of toxic gases that are released in a black smoke. However, it should be noted here that toxic gases are released from the spilled oil through natural evaporation with or without burning.

Bioremediation. Bioremediation has been used at Prince William Sound and Galveston Bay and elsewhere with mixed results (U.S. Coast Guard, Oceanic Regional Response Team, 1991; Keeler, 1991). This technology includes cultivating in situ bacteria and/or importing bacteria from elsewhere. Perhaps least intrusive, there is still disruption and damage to the environment during the application process. Other negative aspects of bioremediation are the release of gases by the bacteria, the potential for production of PCBs/chlorophenyls (U.S. Coast Guard, Oceanic Regional Response Team, 1991), and the long period of time required for the bacteria to do their work. Unlike other oil spill response technologies, bioremediation actually removes some toxic compounds, particularly the aliphatic fraction (U.S. Coast Guard, Oceanic Regional Response Team, 1991). It is also simple to apply and is inexpensive.

Provisions Under OPA that Define State Authority

Prompted by the Exxon Valdez oil spill, OPA is Congress' response for preventing such accidents through punishment and regulatory control. It also addresses oil spill cleanup through a $1 billion trust fund and requirement for evidence of response capability and/or adequate liability insurance coverage. A history of major oil spills has put shipments of oil, the vital commodity that fuels all urban centers, on the list of potential high risk hazards. New meanings of "liability" have evolved to address the establishment of penalties and damages attributable to catastrophic oil spills through the courts. This makes several provisions of OPA important to the state in establishing local levels of acceptable risk and standards of sufficiency of response which could ultimately become factored in the definition of oil spill liability.

It is significant that state trial courts are given jurisdiction over claims for removal costs and damages (Title I, Section 1017(c)). This provision and the definition of "venue" as the district in which the injury or damages occurred (Title I, Section 1017(b)) provides windows for infusing local values, for example, on level of cleanup sufficiency, into judicial decisions that could become legally binding standards for the state, especially in establishing the level of recovery for environmental damages. Three other sections strengthen the state's authority in addressing the impacts of oil spills.
The first is the authority given the state and its sub-governments to impose additional liability or requirements beyond those established under OPA (Title I, Section 1018(c)(1)). The state under this section can impose a higher liability than the $1,200 per gross ton or $10 million per tanker (>3,000 gross tons), whichever is greater, imposed under OPA (Title I, Section 1004(a)(1)(A)(B)). In the event of gross negligence or willful misconduct or violation of applicable federal safety, construction, or operating regulation, the limits under Section 1004(a) will not apply. The responsible party will incur unlimited liability.

The second section authorizes the state to impose or determine additional fines or penalties for any spill violation (Title I, Section 1018(c)(2)). Locally set fines and penalties allow the state to weight options to reflect its values and to promote certain behavior through penalties.

The third section names the state and its political subdivisions as trustees of the natural resources under their jurisdiction (Title I, Section 1006(a)(2)). In the event of an oil spill, the state is required to assess natural resource damages and to develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent natural resources that suffered damages (Title I, Section 1006(c)(2)(A)(B)). These responsibilities are jointly shared by the state’s DOH and Department of Land and Natural Resources.

Whether it was deliberate or not, by including provisions in OPA that give the states the authority to exceed federal standards, Congress is allowing for regional and local differences in valuation of natural resources. These provisions on liability and fines, coupled with those which set the venue in the jurisdiction in which the damage was incurred, materially strengthen diversity in defining liability for setting monetary damage assessments against the polluter. OPA does not attempt to exercise federal pre-emption powers in setting liability limits and thereby standardize the definition of liability. Instead OPA promotes diversity by explicitly giving states the authority to exceed federal limits.

Since the state trial courts are given jurisdiction over claims for removal costs and damages, standards by which local valuation is affixed for natural resources, for example, would prevail. While the strength of the trial courts’ rulings could be tested in the appellate courts, the provisions in OPA that recognize state and local governments as trustees over their natural resources would appear to make it difficult for trial court judgments to be overturned nor would the Circuit Courts be in a position to overturn challenges of fines and standards that exceed those in OPA.

The 1992 session of the State Legislature has grappled with the issue of imposing liability caps on oil spills by amending its present “Superfund” law which imposes unlimited liability on the spiller. The required liability coverage set for OPA for tankers that transport crude oil to Barbers Point would range between $84 million and $180 million (70–150,000 DWT) and liability coverage for product tankers would range between $36 million and $72 million (30–60,000 DWT). In viewing oil spill liability costs as a “bottom line” issue, the projected cost of cleanup becomes important. The cost of oil spill clean- up is projected to range between $210 and $305 million, excluding costs for wildlife cleanup and damages to private coastal properties. It should be clearly stated here that the projections are based on expert opinion since there are no actual data on oil spills in Hawaii. If the high end of cost of $305 million were used as the cost of responding to a 10-million gallon oil spill, the limits imposed under OPA are not sufficient to cover cleanup costs. Act 130, enacted on June 8, 1992, provides relief specifically for inter-island tanker barge shipment of residual fuel oils by temporarily limiting liability to $70 million. Section 1 of Act 130 limits the liability cap only to “tank barges carrying heavy fuel oil interislands, which release is subject to the federal Oil Pollution Act of 1990, and which tank barge can carry not more than 60,000 barrels of heavy fuel oil...” Section 1 will expire on June 30, 1996 to allow the 1993 session of the Legislature to study the options available to utility companies now using residual fuel oils.

Finally, basic to the determination of liability are two principals of law: standard of duty or care and customary practice. Customary practice is a significant aspect of liability but not as critical as standard of care because “the reasonable man” principle kicks in to over-ride a negligent practice, even if it is used universally by the
industry. Since the potential danger of an oil spill is so great to the marine environment and its living resources and to humans, one of the policy issues that needs to be addressed either politically or judicially is "standard of care" to be imposed on the operation of a large tanker. Under OPA's strict liability principles, standard of care may only serve as ancillary defense against liability, but it is an important principle in promoting prevention. As such, should the standard of care be as high as that defined for common carriers? The potential for catastrophic economic impact that could be caused by human error is not unlike that affecting common carriers, for example, an airline crash could kill hundreds of passengers. Likewise, while not in terms of human life, an oil spill can kill thousands of wildlife and pollute miles of a coastline and ultimately cost the spiller as much or more than a major airline crash. There is good reason to support the view that the stringent human factors policies and regulations that govern common carriers might well be applied to personnel training and operation of tankers.

While falling far short of placing strict duty of care on tanker operators and operations, as a measure for eliciting a high level of control on all procedures, OPA attempts to minimize human error in several ways under Title IV A:

- Review of alcohol and drug abuse in issuing licenses, certificates of registry, and merchant mariners' documents (Sections 4101-4105)
- Manning standards for foreign tank vessels (Section 4106)
- Vessel traffic service systems (Section 4107)
- Great Lakes Pilotage (Section 4108)
- Overfill and tank level or pressure monitoring devices (Section 4110)
- Study on tanker navigation safety standards (Section 4111)
- Use of liners (Section 4113)
- Tank vessel manning (Section 4114)
- Establishment of double hull requirements (Section 4115)

Sections 4101-4105 attempt to control substance abuse, such as use of alcohol and controlled drugs. For example, Captain Hazelwood's intoxication was a contributing factor to the Exxon Valdez accident. OPA forbids the Secretary of Transportation to issue licenses or certificates of registry to an applicant who has a record or offenses in the National Driver Register for drug or alcohol abuse offenses. In addition, OPA also requires mandatory pre-employment, periodic, random, reasonable cause, and post-accident testing for the "use of dangerous drugs in violation of law or federal regulation."

Section 4106 requires foreign tankers to be manned by seamen who meet U.S. standards for licensing and certification. The standards for manning, training, qualification, and watchkeeping of a foreign country require periodic and post-accident evaluation.

Section 4114 establishes ceilings on the length of watches, a problem among ship officers and crew, particularly on modern supertankers with their automated instrumentation. However, the 15-hour per 24-hour ceiling established in OPA still does not appear to allow for sufficient number of hours of rest, even if the watch is divided into two segments. While vastly improving the accuracy of navigation, the use of the autopilot contributes to boredom since once the course is set, there is little for the crew to do. The human factors problems of fatigue and boredom are further exacerbated by the minimal crew operating tankers with little or no redundancy for backup. A 1990 report of the National Transportation Safety Board (NTSB) concluded that fatigue contributed to the inability of the third mate, who was in control of the Exxon Valdez when it ran aground, to maneuver the ship around a massive ice floe. The NTSB also noted that Exxon "manipulated" the overtime reports of crews who manned tankers with reduced crews. Deck officers of Exxon tankers routinely operated with inadequate rest (Briscoe, 1990).
The move to what they call "modernized ships" which are automated and manned by reduced crews has also been implemented in Japan. Under this management scheme, container ships and bulk carriers are manned by 11 crew members. Seamen did not complain of the reduced crew but indicated that they did not like the "modern ships" because of "considerable amount of on-board management from ashore" (Anonymous, 1992).

OPA attempts to control accidental spills by mandating the use of physical barriers such as liners and double hulls. Double hulls will be required for all single hull vessels after January 1, 2010 (Section 4115(c)(A)) and for all double bottom vessels after January 1, 2015 (Section 4115(c)(B)). A U.S. Coast Guard study found that there would have been a 25–60 percent reduction of the oil spill if the Exxon Valdez had been equipped with a double hull (Natural Resources Defense Council, undated).

Mechanical devices to prevent overfill are also an effort to augment human capability to avoid backflow accidents and to monitor tank pressure.

A 5.2 million gallon oil spill off the coast of Australia on July 21, 1991 has raised international concern on the adequacy of tanker inspection procedures, especially of older tankers. The owners of the Kirkki were in compliance of the MARPOL (the international convention for the prevention of pollution from ships) regulations and had all the required certificates. However, there were serious structural flaws and safety violations that were overlooked by the classification society, the owners, and the Australian Maritime Safety Authority. Closer to home, a 1990 New York Times article printed by Honolulu Star Bulletin indicates that an internal U.S. Coast Guard study, done after several major oil spills, reported on the severe shortage of trained inspectors. This situation allows the inspectors to make "barely adequate" inspections of tankers and "the quality of the inspections is suffering." The U.S. Coast Guard personnel were also suffering from the effects of an overloaded system which is not reducing oil spill risk from tanker operations in U.S. ports.

The Human Factor Dimension in Oil Spills:
The Prevention and Mitigation of Social Dysfunction

It is striking that in most emergency management responses to oil spills, little time and effort is devoted to the human dimension. And yet, this is probably where there can be the most sustained and long-term effects of a man-made or natural disaster. The prevention of human misery should be as much an area of legitimate concern of government in emergency response as the prevention of negative impacts on wildlife. It would be imprudent for government to focus solely on wildlife mitigation and ignore the human dimension in oil spill response planning.

The response of the National Academy of Science's Socioeconomic Panel on the impact of outer continental shelf oil and gas leasing and development has application for any emergency management planning purpose dealing with the coastal environment (Fallat and Scholl, 1991). These areas include:

1. The human environment including potentially affected systems
2. The activities producing socioeconomic impacts
3. The dimensions of potential socioeconomic impacts
4. The distribution of various impacts across human systems

The post-Exxon Valdez observations of the Alaska Oil Commission (1990) are particularly instructive. The Commission calls for the states to develop a system of emergency economic maintenance for persons impacted by a major oil spill. This program should include those who are not covered under workmen's compensation insurance and should be funded by spill impact funds. Many individuals whose lives were severely disrupted had no recourse for compensation because their cases were not legally recognized as having legitimate claims against Exxon.
In Hawaii, the projected layoff of over 60,000 tourism service workers, based on the U.S. Coast Guard’s worst case scenario, will severely impact state and county social services, public safety, and public welfare agencies. The unionized hotel workers have established channels for emergency services, but the impact of the hotel closures will spill over and affect the hundreds of small businesses that also rely on tourism. It is this sector that is most vulnerable because the workers are often not covered by workmen’s compensation or other forms of insurance for lost compensation. Even if this sector had the means to institute a lawsuit, it is unlikely that they could recover from the spiller. For many hotel workers, their employment as dishwasher or maid is a necessary second or third job. The impact of layoff on these workers is not known.

With proper pre-planning, the social dislocation and economic and psychological damage to affected individuals can be minimized or prevented. What is needed to effect a smooth transition to emergency operation is a well-conceived plan that is developed jointly by the state, county, and federal governments and the private sector. While the primary revenue sector to be affected by beach closures is tourism, which produces about 40 percent of the gross state product, over time, no one in the state is immune to the far-reaching negative impacts of an oil spill.

There is another category of individuals who will be effected by a major oil spill. These are private individual and corporate owners of waterfront properties. The plan for addressing human impacts needs to consider the methodology to be used for calculating compensation for damages to both physical and non-use or existence values of public vistas. This is a critical aspect too often overlooked until the courts are flooded with lawsuits totalling billions of dollars as has happened in Alaska in the wake of the Exxon Valdez oil spill. If done prior to disaster hysteria, there will be a greater chance for achieving consensus on damage and mitigation costs allocations without incurring the delays and costs of the legal system.

**Recommendations**

Editor’s note: The recommendations that follow are based on the findings of our research. As indicated in italics, the DOH notes that some of the recommendations are already in the process of being implemented by the appropriate agencies.

The purpose of this section is to recommend prevention measures that address the causes of oil spills that have been identified by a review of historical oil spills, OPA, and state statutes and administrative rules and regulations. This information can be used by the state, in its role as the trustee of its natural resources, to promulgate statutory and administrative rules for establishing public policies that could minimize the risk of oil spills in Hawaiian waters. The cost of prevention would not approach the projected $210–$305 million range of cleanup costs of a major oil spill. Perhaps, more damaging over the long term is the potential loss of the widely held image of Hawaii’s pristine environment — the critical element to Hawaii’s popularity as a resort destination. This “non-use” value, currently not factored in as a recoverable cost under OPA, may have the greatest impact on deterring the recovery of Hawaii’s economy. Media impact studies indicate that startling or emotion evoking imagery is retained for a long period after being viewed and may not be erasable from the viewers’ memory (Pfund, in preparation). Hawaii may forever lose its attractiveness and its mystique as an untainted tropical paradise.

**Tanker Liability**

It is interesting that marine insurance, once centered on safe arrival of cargo, was a hedge against acts of nature and possible piracy. The widespread use of sophisticated instrumentation and more accurate meteorological data that forewarn ship operators of storm fronts have minimized weather as a major cause of cargo loss. Although there are reported cases of piracy in southeast Asia, high seas hijacking of ships is not a common occurrence in other parts of the world. What oil companies and shippers now insure and will continue to insure under OPA’s coverage for the cost of damages, cleanup, and mitigation of oil spill accidents on the natural environment and wildlife.
The debate at the 1992 session of the State Legislature on putting a ceiling on interisland tanker barge liability is as much about insurance as it is about limiting the cost of private risk. In essence, the oil industry and barge owners are balking at the cost of the state's conservative zero risk policy and are demanding that the state change its no-risk policy. Since Hawaii lacks land-based oil transport options, it is held hostage by the willingness of the oil and shipping industries to internalize the cost of the risk of an oil spill. It is hard to fault Hawaii's refineries and interisland shippers for not being willing to assume the risks of an oil spill when such oil industry giants as the Royal Dutch Shell Group limits its crude shipments to only one U.S. port, a Louisiana offshore oil port (Sidel, 1990).

Should the state become the deep pocket? What are the risks? A framework for analyzing risks and benefits is provided for decisionmakers:

The facts:

- The ratio of vessel-related spills to equipment/structural failure is approximately 1:4
- By worldwide oil spill standards, Hawaii's historical vessel-related oil spills have been "small" — 48,000 gallons and 33,800 gallons
- The largest tanker calling at Barbers Point has a cargo capacity of 37,800,000 gallons (Chevron, USA) — nearly four times the oil spill in the U.S. Coast Guard's worst case scenario and more than three times the 11 million gallons spilled by the Exxon Valdez
- The largest barge in interisland service has a fuel oil carrying capacity of 2,226,000 gallons and the smallest has a cargo capacity of 1,344,000 gallons

Recommendations:

1. Routing tanker traffic from the U.S. mainland through the Kauai Channel will minimize at-sea oil spill damage and should reduce the high-end response cost of $305 million; the prevailing currents of the Kauai Channel cut crosswise across the channel and flow westward out to the open sea, with the exception of the Kauai Channel, all other channels of the Hawaiian Islands should be designated tanker-free channels

So are you saying that, by routing the tankers through the Kauai Channel, the cost of a catastrophic oil disaster is only $305 million? If this is so, then we could cap liability at $350 million. [Editor's note: The $305 million is not total liability. It is our projection of the response cost of a 9.8 million gallon oil spill.]

2. Rigorous risk management and loss prevention programs which can be instituted almost immediately will minimize structural and equipment failure accidents; (Existing pipelines in Honolulu Harbor and Pearl Harbor, valves, and couplings on all pipelines should be checked for leakage; unused pipelines should be checked for leakage and sealed.)

Existing U.S. Coast Guard regulation in 33 CFR 156 cover many preventative measures. In addition, response plans are required under OPA 90.

3. Tanker barges should undergo a complete check on towlines/cables/couplings, hatch covers, etc. prior to each sailing; loading and unloading operations should be routinized like airplane pre-flight checks

Existing regulations cover this area.

4. Coupling and uncoupling operations at the offshore mooring or during bunkering should be patterned after airline pre-flight check — no part of the operation should be left to the operator to "remember" (or forget)

The Operations Manual for offshore moorings cover this area.

5. Live watch and pilot on all laden tankers and during air transfer operations should be mandatory

Regulations are already in place requiring live watch.
6. Oil transfer operations in Honolulu Harbor should be boomed and be completely monitored by a mooring master. This type of operation is occurring within the harbor area. It would be too inefficient at the offshore mooring area.

7. A federally licensed pilot should be on board tankers at all times while they are in pilotage waters. It is inherent in the definition to have pilots in pilotage waters. [Editor’s note: Unfortunately, “federally-licensed” was inadvertently dropped.]

8. All submerged rocks, reefs, and other hazards should be clearly marked with a lighted buoy(s). For the most part all hazards in the nearshore are adequately marked. The large tankers do not enter waters with submerged hazards sufficient to cause any damage. [Editor’s note: The Exxon Houston was grounded and there was a near miss with the Star Connecticut. The latter could have been Hawaii’s Exxon Valdez oil spill.]

9. No offloading operations should be conducted during storm conditions or when swells pose a danger to oil transfer operations — decision to be made by the respective harbor master. This is already a part of the Operations Manuals and these manuals are reviewed by the U.S. Coast Guard.

10. Tanker barge transit lanes and local traffic plans should be designed cooperatively by all user groups in the Auaa, Kalahi, and Pilolo Channels; ongoing public education program on transit lanes and on tanker barges is needed; all recreational boats should have passive radar reflectors and appropriate communication equipment; all recreational boaters should be licensed. It is difficult to designate transit lanes due to changing weather conditions. I am assuming this is to avoid collision with recreation boats. It would be more appropriate to provide a good education program for recreational boaters so that they know about the dangers of crossing commercial boat traffic. International and inland law already requires lighting (COL Regs). [Editor’s note: Both barge operators and recreational boaters indicate that there is a problem.]

**Pilots and Pilotage**

The review of OPA and oil spill accidents caused by human error point to the wisdom of doing all that is possible to promulgate laws and regulations that will implement procedures to minimize the impact of fatigue and errors in judgment. The state has no control over the crew hiring practices of the shipowners. It can, however, ensure that properly licensed pilots and operators are aboard tankers during transit in state waters and while offloading the oil at the Barbers Point offshore moorings or Honolulu Harbor. In addition, the facility personnel who take charge of the oil transfer operation should be trained and certified to respond to an emergency oil spill.

The distinction between requirements imposed on pilotage of vessels in domestic and foreign trade should be ended. All vessels should have a federally licensed pilot onboard while in state pilotage waters. A federal pilot is required during mooring. A state pilot is required in state pilotage waters; I do not see the reason for having a federal pilot. [Editor’s note: The distinction between state and federal licensing should be eliminated. All pilots should be federally licensed.]

The state should establish a pilotage board that will actively participate in the licensing and disciplinary procedures. It is critical that relicensing and new applications for a pilot’s license include certification from the Police Department that the applicant has no DUI or DWI arrests during the previous two years. Routinely, a check should be made for DUI, DWI, and criminal offenses in the National Driver Register when applications for licensing and relicensing are received. All pilots should be required to take and pass appropriate “road tests” for the license they are seeking or for relicensing. Mandatory continuing education...
and refresher courses should be developed and attendance should be a requirement for obtaining a license or for relicensing. The content of the mandatory refresher courses should be standardized and regularly updated to include new technology, instrumentation, etc.

This is already required. [Editor's note: There is no pilotage board at present. It is important that a board be established. State regulations as of May 1992 have no specific requirements or standards spelled out for continuing education. The existing regulations do not call for a National Drivers Register check. There are no existing requirements for "road test" for relicensing.]

Interisland Tanker Barge Traffic

Data on global oil spills indicated that tanker barges are more likely to be involved in collision than grounding. Barge traffic is vulnerable to accidents because it traverses narrow waterways. Given these conditions, thought should be given to restricting tanker barge traffic during adverse weather (if not already being done by the barge owners) and controlling tanker barge traffic in the Aua, Kalohi, and Paliolo Channels of Maui County by designating barge transit lanes through the channels. Such designation should be developed jointly with recreational boaters and commercial charter vessel owners.

Although the very limited window of opportunity to address an oil spill should preclude the transit of the state's channel waters at night, such a policy needs to be weighed against the risk of daylight sailing among recreational boaters who may not be knowledgeable about the rules of the road. Because the risk of accidents increases with the number of boats, night channel crossings are probably safer than dodging boaters.

Additionally, recreational boat owners should be licensed and all boats should have appropriate communication equipment and passive radar reflector devices to allow the tug's radar to locate them.

Other Vessels

Passenger vessels and fishing vessels that carry more than 10,000 gallons of fuel should be required to post a liability insurance certificate. The volume of fuel they carry poses a threat in the event of an accident. Worldwide, these non-tanker vessels accounted for 15 percent of the collisions and 35 percent of the groundings that spilled more than 10,000 gallons per accident in 1989-90.

Oil Spill Database

This research was hampered by errors in the oil spill data obtained from the national headquarters of the U.S. Coast Guard. Verification of the data was difficult. We found that there is currently no easily accessible information on oil spills in Hawaii. The Honolulu District Marine Safety Office does keep records of reported oil spills, but the information is only accessible by their personnel. In other words, the only available oil spill information is held by the U.S. Coast Guard and this database is not designed to be used to support a management information system. Without historical data it is impossible to track accident trends and to evaluate the effects of mitigation programs.

If the state government is serious about promoting prevention, it is absolutely critical that an accurate database be developed as the core of the management information system for monitoring oil spills and the prevention programs that the oil shippers, refineries, and public and private facilities need to implement to reduce the number of oil spills. Perhaps even more important is that there be adequate human resources to analyze the data being collected so that they can be used by decision-makers.

In your discussion you mentioned the need for accurate data in relation to the 47 percent of unknown oil spills. If your concern is that almost half of the spills are from unknown sources and this represents inaccurate
Information, you must consider that every reported sheen is considered an oil spill. No matter how accurate your database is, it is impossible to identify the cause and source of every oil sheen. [Editor’s note: The present database is inadequate and hence inaccurate. The U.S. Coast Guard’s database is not accessible, nor is it accurate. There is need for a uniform terminology to describe oil spills.]

Unused Pipelines

Honolulu Harbor has extensive underground and underwater pipelines that are unused. They should be inspected for leakage and where there is leakage, the pipes should be slurried and sealed.

The Human Dimension

The development of an economic recovery contingency plan that can address not only oil spills but other disasters, including catastrophic natural disasters, is critical. There are, however, two ancillary plans that need to be developed to properly address the human factors aspect of disasters:

1. A plan for compensating workers who are laid off is needed to minimize economic disruptions that could affect a worker’s social and psychological well-being.

2. Joint state, county, and federal governments and private sector plans for mitigating the social and economic impact of mass layoffs and furloughs caused by a major oil spill are required to ensure equitable and prompt response to the people. Can existing agency and private sector staff be deployed to cover needed services? Who pays for additional staff? The emergency response plan for social services should include psychological and legal counselling.

A formula for damage compensation to private water/beachfront landowners should be developed to avoid costly lawsuits. The compensation algorithm should include existence or non-use values, if an acceptable method for establishing such values can be found. This should be of particular concern to beachfront resort owners because it is probable that Hawaii will lose its image of a pristine tropical paradise and the mystique that goes with that image. Hence, the impact of an oil spill on non-use value may well extend beyond the cleanup period.

The state should explore the possibility of developing a direct draw agreement with the federal government to enable the governor to obtain funds for responding to cleanup and other spill-related costs, including compensation for lost income.

Future Research

1. Information on the recreational and commercial use of the Aua, Kalahi, and Pailolo Channels is critical for decisionmaking on tanker barge traffic through the channels. Research on the potential hazard of high use by recreationists, fishermen, and charter operators on safe tanker barge transit is needed.

2. Research on existence and non-use valuation of Hawaii’s coastal resources is needed in addition to identifying and/or developing a damage assessment methodology that government agencies and the affected private sector can agree on. These data are needed to develop response plans and for socioeconomic and environmental mitigation.

3. A comprehensive study is needed on the liability issue that has been raised in relation to the tug-tanker barge operators’ objection to unlimited liability. Should the state place a limitation on all liabilities to $700 million? If liability is capped permanently at $700 million for all oil shipments, who pays for damages exceeding $700 million? Would it be cost effective for the state to become the shipper of fuel oil to the neighbor islands? Can the state waive its public trust responsibility under the constitution and OPA? These are only few of the legal and public policy questions that need to be resolved by the state’s decision-makers.
References


Pfund, R.T. (In preparation). Impact of Public Service Announcements as a Medium for Transmitting Environmental Information.


