Coordination Efforts
Arkansas has not entered into any interstate compacts or MOAs.

Policy Review and Citizen Participation
Information is provided to the public upon request. Monthly meetings are also held by the lead agency to provide public information on oil spill management.

CALIFORNIA

State Legislation
Title 14 of the California Code of Regulations establishes the state’s rules and regulations for oil spill management under the administration of the Office of Oil Spill Prevention and Response (OSPR) in the Department of Fish and Game. State contingency plan requirements have been updated to reflect an emphasis on prevention planning.

Prevention
A voluntary compliance agreement exists between the state and any party importing crude oil. The agreement stipulates that tankers carrying crude oil will remain 50 miles off the California coastline unless engaged in transferring operations.

California contingency plan regulations specify that when transferring oil, the loading rate must be reduced to 25% of the normal rate during the first and last 10% of anticipated volume; alcohol and drug awareness programs, treatment opportunities, and provisions for screening key employees must also be described; tug escorts for some vessels are required, however, information on the conditions under which tug escorts are required was not provided. All regulated oil facilities and vessels that are required to submit a contingency plan must also conduct full scale drills and exercises every three years. A state representative must also conduct an on-site inspection every three years.

The first citywide used engine oil collection program in California began in Los Angeles in May 1994. The program was established by a $1.1 million grant from the Integrated Waste Management Board. Consumers are offered $0.04 per quart at 42 Unocal service stations throughout the city with a limit of 20 gallons per day per customer.

Response
Contingency plans for vessels and marine facilities must be submitted to the Planning Branch of the Office of Oil Spill Prevention and Response within the Department of Fish and Game. The following components must be submitted as part of a contingency plan: (1) availability of response equipment, (2) booming strategies, (3) disposition plans for spilled material, (4) a schedule of drills and exercises, (5) maps showing the location of economically and environmentally sensitive areas, (6) information on contractual arrangements for response and cleanup, (7) an incident command structure, (8) maps and proposed shoreline countermeasure plans, (9) notification procedures, (10) guidance for oiled wildlife care providers to meet requirements, (11) plans to provide public information, (12) a list of qualified individuals, (13) work force safety training plans, and (14) information on the type and location of vessels of opportunity used to meet minimum equipment requirements.

As of January 1, 1992, marine terminals and facilities were required to demonstrate financial ability to pay for any damages resulting from the operations of the facility during a “reasonable worst-case oil spill.”
Funding

The Oil Spill Response Trust Fund is supported by a $0.25 per barrel fee on all petroleum products received via marine terminals. Currently this fund is at capacity ($15 million) and therefore the fee is not being collected.

Coordination Efforts

There are over 25 MOAs between the state and counties that have oil spill response capabilities. There also are MOAs between the California OSPR and counterpart agencies in surrounding states. MOAs between the USCG and the USEPA currently exist, and agreements with two other federal agencies are in the process of being established. In addition, the USCG has also taken on the role of monitoring compliance with the voluntary agreement that all tankers will remain a minimum of 50 miles off the California coast when transporting crude oil.

Wardens of the Department of Fish and Game conduct announced and unannounced inspections of regulated facilities to monitor compliance with rules and regulations, while the oil industry also is monitored by the general public. It also is not uncommon for private citizens to report an act of non-compliance.

The Registered Environmental Assessor Program also establishes a program for voluntary registration of environmental professionals. The listing provides potentially responsible parties with a pool of certified professionals who possess various specialties for oil spill response. Certified professionals are required to have a minimum of five years full-time experience in the field of environmental emergency response.

Policy Review and Citizen Participation

Volunteer and educational outreach programs exist in California, although no details were provided in the survey responses.

CONNECTICUT

State Legislation

The Water Pollution Control Act governs oil spill response and prevention in Connecticut, and it is administered by the Department of Environmental Protection (DEP), Division of Oil and Chemical Spill Response.

Prevention

All facilities that load or unload petroleum products are required to register with the DEP. Criteria for registration include the submission of an operating manual and a specific prevention plan prior to licensing approval. Failure to comply with all requirements under the law is grounds for refusing license renewal.

All commercial vessels off-loading oil or chemicals in Connecticut are required to file a $50,000 bond prior to off-loading. There also is a mandatory booming policy that requires all off-loading vessels to surround the vessel with a containment device during the transfer. Owners/operators are liable for damages should a spill occur regardless of who is at fault. According to the survey response, this policy has worked well.

Used engine oil is collected for recycling by service stations and specified collection centers. Individual towns may also have a specified household hazardous waste collection day. A hotline has been set up to answer any questions the public may have regarding the appropriate disposal method for used engine oil. The state has provided printed information to local governments and towns for local distribution.

Response

A list of available response equipment is required as part of the facility licensing application. All state response organizations are required to be licensed by the state.
Funding

Connecticut collects $0.10 per gallon on all hazardous waste generated to support the Emergency Spill Response Fund. The fund capacity is $20 million; however, the fund limit has yet to be reached. As of July, 1994 there was approximately $10 million in the fund.

Coordination Efforts

The Long Island Sound Multi Agency Response Group is funded by New York, Connecticut, Rhode Island, the USCG, the USEPA, the National Oceanic and Atmospheric Administration (NOAA), and the Regional Response Team. The state also participates in the Long Island Sound Area Committee.

Policy Review and Citizen Participation

The Department of Environmental Protection is the coordinating agency for all policy reviews for the state and its agencies.

DELAWARE

State Legislation

The Department of Natural Resources and Environmental Control (DNREC) is responsible for implementing the state's Oil Pollution Liability Code and has jurisdiction over all oil spill prevention and response activities.

Prevention

Used engine oil is collected at recycling centers and selected service stations. The DNREC and the Solid Waste Authority promote used engine oil recycling in the local press.

Response

The Delaware Oil Spill Response Contingency Plan is used by the state and any other organization responding to an oil spill. Appendices to the contingency plan includes lists of contacts to notify during a spill, oil removal contractors; information on tide gates, archaeological sites, water intakes, topographical maps, and other logistical support information required during a spill.

Delaware and the National Oceanic and Atmospheric Administration (NOAA) completed a desktop computer oil spill response management program in July of 1994. The program is used to map sensitive areas, plot booming strategies, monitor current weather patterns and keep data sets current during oil spill emergencies. NOAA subsequently has assisted Texas, Florida, and Oregon in the development of similar computer systems. In Delaware's case, the program was funded by the local oil spill cooperative.

A highlight in the response and preparedness program has been the Shoreline Countermeasures Management Study, which identifies 10 major shoreline types and provides a framework for remediation decisions when oil has affected a shoreline environment. One outcome of the study was the development of a three phase shoreline evaluation and response model for the On-Scene Coordinator (OSC). In the first phase, a group of trained personnel is sent to the site to determine the extent of oil released on the shoreline and recommend possible countermeasures. In phase two a quality assurance team double checks the outcome of phase one to ensure that the information is accurate and gathered consistently. In phase three the quality assurance team recommends treatment and specific countermeasures to the OSC.

Funding

Delaware collects a 0.9% tax on petroleum products (about $3.9 million per year) that goes into the Hazardous Substance Cleanup Fund (the Delaware Superfund Program). The fund is used to clean up all hazardous waste
sites, as well as pay for administrative costs. A cost recovery fund, which currently holds $300,000, is also supplied by reimbursements from previous spills.

Coordination Efforts

One of the more impressive parts of Delaware's oil spill response and prevention strategy has been the extensive level of coordination between neighboring states as well as with federal agencies. A recently developed MOA for response is pending final approval between the USCG, USEPA, NOAA, Department of the Interior, New Jersey, Pennsylvania, and Delaware. Delaware also is in the process of rewriting an intergovernmental MOA with local governments and agencies.

Policy Review and Citizen Participation

A self-critique of incidents is conducted by the Department of Natural Resources and Environmental Control, and multi-agency critiques are done on an incident-specific basis. When a spill occurs, information is provided to the public through the Unified Command Joint Information Center which is made up of the USCG, states affected by the spill, and the responsible party. Daily oil spill information is available through the DNREC Office of Information and Education.

The Department of Natural Resources and Environmental Control in conjunction with the USEPA is conducting an oil spill bioremediation study along the Delaware Bay. In the study, crude oil was applied to test plots to evaluate how the environment remediates itself under varying conditions. The study was scheduled for completion in October 1994.

FLORIDA

State Legislation

The Department of Natural Resources is responsible for implementing the requirements of the Pollutant Discharge Prevention and Control Act. The act was previously called the Pollutant Discharge Prevention and Removal Act and was revised in 1991 following OPA 90.

Prevention

Training programs are encouraged for personnel involved in pollution prevention and cleanup activities. The Department of Natural Resources is working with community colleges, technical centers, universities, and private institutions to develop educational materials. Those materials will then be made available for training personnel involved in pollution prevention and cleanup activities. In addition to the development of training programs, all new and/or reconstructed above and below ground storage tanks must be made of corrosive resistant materials, and must have secondary containment systems.

Response

A prevention and response certificate is required for all operating facilities. Information on the capacity of the terminal, availability of response equipment, and existing agreements with approved cleanup organization(s) must be submitted in order to receive a certificate. Proof of immediate access to containment equipment five times the length of the largest vessel at the facility is also required by the state. All facilities must register with the Department of Natural Resources. Vessels carrying 10,000 gallons or more of fuel must maintain an adequate written ship specific discharge prevention and control contingency plan.

Funding

The Florida Coastal Protection Trust Fund is credited with all fees, penalties, judgments, and recovered damages as well as excise tax revenues. Monies from the fund can be used for administrative expenses, prevention, cleanup, and restoration. When the balance of the fund exceeds $30 million, the interest is
transferred to the Save Our State Environmental Education Trust Fund. Transferred funds cannot exceed $1.5 million annually. Up to $1 million per year may also be spent to acquire, design, train, and maintain emergency cleanup response teams and equipment.

**Coordination Efforts**

Florida is not involved in any formal interstate compacts. However, Florida participates in the Gulf States Working Group which consists of lead agency managers from the states of Texas, Louisiana, Alabama, Mississippi, and Florida. This ad hoc group meets informally 2–3 times a year to discuss issues relevant to their respective states and the Gulf area as a whole.

**Policy Review and Citizen Participation**

A Spill Response Task Force was created in 1989 by the legislature to determine the need for a coordinated prevention plan. Task force members include representatives from the Department of Natural Resources, Department of Environmental Regulation, USCG, Florida Ports and Spillage Cooperatives, the petroleum industry, and various other environmental groups.

**Hawaii**

**State Legislation**

Act 50 of the 1971 Hawaii State Legislature authorized the state’s Civil Defense to prepare for and respond to manmade disasters such as “massive oil spills.” In 1988, the Legislature also gave oil spill response authority to the Department of Health (DOH) by enacting the Environmental Emergency Response Law, Hawaii Revised Statutes (HRS) Chapter 128D. DOH’s authority was made more explicit with the passage of amended versions of the Environmental Response Law in 1991 and 1993. In these amended versions the Legislature specifically granted the Department of Health the authority to prepare for and prevent oil spills. The Department of Health’s Office of Hazard Evaluation and Emergency Response (HEER) is the state’s lead agency for oil spill management under HRS Chapter 128D.

HRS Chapter 128D also subjects those who spill oil to unlimited and strict liability, although Act 130, 1991 Session Laws caps liability for inter-island tankers carrying not more than 60,000 barrels of heavy fuel oil to $700 million. Cost recovery mechanisms are also included under HRS Chapter 128D, but have been ineffective due to problems with regulations and enforcement.

**Prevention**

In 1993, the Legislature explicitly gave the HEER office the authority to prepare for and prevent oil spills. This also included the mandate to develop a used oil recycling program through the counties. Funding has only recently allowed DOH to begin its prevention activities including the commissioning of this study. In addition, the DOH is attempting to address releases from underground storage tanks with new regulations and inspections.

Oil facilities at all states are required by federal law (OPA 90) to prepare a Spill Prevention, Containment and Countermeasure plan (SPCC). Inland facilities and plans are inspected by the USEPA through its Region 9 office in San Francisco. The State of Hawaii does not have any additional requirements for prevention plans beyond those required by federal law.

**Response**

The U.S. Coast Guard and the USEPA are the lead federal agencies responsible for coordinating oil spill response, and are mandated to act as the Federal On-Scene Coordinators (FOSC). The USEPA is legally responsible for coordinating responses to oil spills on land under OPA 90, but does not have adequate staffing
in Hawaii to coordinate response actions. A Memorandum of Understanding between the U.S. Coast Guard and the USEPA states that the U.S. Coast Guard will act as the FOSC on behalf of the USEPA in the event of a major oil spill until response personnel arrive from the USEPA Region 9 office in San Francisco. However, for most on-land oil spills and other hazardous releases, the state HEER office assumes responsibility for coordinating the response. For coastal/marine oil spills, the state usually defers the coordination of response to the U.S. Coast Guard’s federal on-scene coordinator (FOSC), but shares the lead responsibility for oil spills that occur in harbors or on the shoreline.

The state has an emergency contingency plan that calls for the HEER office to coordinate state and local activities with the Civil Defense in case of a major oil spill. The state employs four full-time emergency responders who act as the state’s On-Scene Coordinators (OSC) during oil spills on land and at sea. These positions are funded from state general funds. State OSCs coordinate oil spill response to marine oil spills with the federal OSC of the USCG under the Federal On-Scene Coordinator (FOSC) Honolulu Area Contingency Plan, otherwise known as the Area Plan. Since the USEPA does not have an oil spill response coordinator in Hawaii and the U.S. Coast Guard defers to the state for spills on land that are not likely to reach the coastal waters, the state OSC is in charge of coordinating response to oil spills on land. The state has the authority to hire private oil spill response contractors for marine and on-land spills if responsible parties do not take immediate action in response to an oil spill. The State of Hawaii does not have additional regulations for facilities and vessels beyond those established by federal law.

**Funding**

The state’s hazard evaluation and emergency response program and the underground storage tank program receive general revenues. In addition, the 1988 state legislature created the Emergency Response Revolving Fund (ERRF) to clean up releases of hazardous substances that implicitly included oil. Initially undercapitalized, the fund is now supplemented with the penalties collected from those who violate various environmental laws. In addition, a $0.05 tax is imposed on every barrel of petroleum product sold by a distributor. The ERRF is capped and collection of the tax stops at $7 million. Collection of the tax resumes after the fund is depleted to $3 million.

The ERRF monies generated from the tax also can be used for oil spill planning, prevention, preparedness, education, research, training, removal and remediation, county used oil recycling programs, and underground storage tank programs. In 1994, the state legislature further amended HRS Chapter 128D by authorizing the funding of the state’s safe drinking water program with monies from the Emergency Response Revolving Fund. The funding of non-oil programs like the safe drinking water program has threatened the reliability of state funds for oil spill management.

Authority for cost recovery of ERRF monies are included in HRS Chapter 128D; however, the HEER office has only attempted to recover costs in a few cases. The costs associated with investigating and filing cost recovery suits for smaller spills has precluded the HEER office from aggressively pursuing all responsible parties. In the event of a major spill, the HEER office would work with the state attorney general to recover any ERRF monies used for oil spill response.

**Coordination Efforts**

The state has a MOA establishing cooperative arrangements for oil spill management with the U.S. Coast Guard under the Area Plan and the Regional Response Team. The state Contingency Plan also stipulates that there should be coordination between the state Civil Defense, the DOH, the Department of Land and Natural Resources, and the county governments. However, there are no specific and formal coordination agreements exceeding those mandated in the state plan. County involvement is also coordinated through the Local Emergency Planning Committees (LEPCs).
Policy Review and Citizen Participation

There are no mechanisms for public review of state plans for oil spill management. There are, however, mechanisms for public participation in the area planning process in which the State of Hawaii is also a participant.

ILLINOIS

State Legislation

There is no specific state law that addresses oil spill response or prevention, but the Water Pollutant Discharge Act does establish some policies for oil spill regulation. The Water Pollutant Discharge Act sets general liability limits, defines responsible parties, and establishes general policies for cost recovery. The Illinois Environmental Protection Agency, Office of Chemical Safety and Emergency Response Unit coordinates state response to environmental emergencies including oil spills, while the state Department of Mines and Minerals regulates oil production sites.

Illinois is in the process of drafting laws that will require a state oil spill contingency fund. The current initiative is a result of a federal law that requires states seeking reimbursement from the OPA fund to have a state oil spill contingency fund.

Prevention

No specific prevention plans for oil pollution are required by the state. Used engine oil is collected by many service stations, and public service messages promote the state household hazardous waste collection program.

Response

Since OPA 90, Illinois has established policies to improve oil spill response and preparedness. Contingency plans have become more specific for individual waterways as more detailed geographic information has become available. This has enabled the state to plan the exact types and locations of response equipment along the Mississippi River, Ohio River, and Lake Michigan. The remote placement of oil sorbents also has improved the potential for rapid response.

Training is required for employees engaged in hazardous substance removal. All employees must receive a minimum of 40 hours of classroom instruction. In addition, workers must receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Managers and supervisors must receive the same amount of training as the employees, plus at least eight additional hours of specialized management training. Eight hours of annual refresher training are also required for employees, managers and supervisors. Topics covered include personal protective equipment, spill containment, and health hazard monitoring procedures and techniques.

Funding

See above discussion regarding state legislation.

Coordination Efforts

Interstate spill response coordination has been developed for the Illinois Boundary Waters area, which includes the Mississippi River, Ohio River, and Lake Michigan. Immediate notification and contingency plans have also been agreed upon between the states sharing responsibility for those waterways.

Policy Review and Citizen Participation

There is no review process or specific public outreach program. For specific spills, public meetings may be held, and press releases or fact sheets may be released.
LOUISIANA

State Legislation

Following the approval of OPA 90, the Louisiana Oil Spill Prevention and Response Act of 1991 (LOSPRA) was approved by the legislature specifically to “support and complement” OPA 90. With 26% of the nation’s commercial fisheries, significant wetland environments along the coast, and 15% of the U.S. crude oil imports received at Louisiana Offshore Oil Port, the Louisiana state legislature determined that significant state involvement in oil spill prevention and response activities was necessary. LOSPRA is administered by the Oil Spill Coordinator’s Office within the office of the governor. The primary responsibilities of the Coordinator’s Office include developing a statewide oil spill prevention and response plan; providing a coordinated response effort among appropriate agencies; providing clear delineation of jurisdictional authorities; implementation and maintenance of an oil spill prevention program; and administration of funding activities.

Generally, the LOSPRA follows OPA 90 closely, but authorization exists for the coordinator to adopt requirements that are different from OPA 90 provided “the state interests served by the requirements substantially outweigh the burdens imposed on those subject to the requirements.”

Prevention

A facility or vessel prevention plan is required to be submitted to state and federal agencies under both OPA 90 and LOSPRA. All terminal facilities operating in the state must have discharge prevention and response certificates. Certificate applicants must provide information on the capacity of the vessels, terminals or storage facilities handling oil; the type of oil stored, handled or transferred, and a discharge prevention plan. The regulations for prevention plans require information on the type of available response equipment, the necessary deployment time, available personnel, preventative measures employed, terms of cleanup plans, and financial conditions relating to cleanup.

The recycling of used engine oil is encouraged throughout the state. Service stations and garages collect used engine oil, and one county has a curbside collection program. A few of the large employers in the state also have employee collection programs. As of January 1, 1995, funding is expected to be available for a public awareness campaign. Upon receipt of funding, the state will sponsor local government programs to provide collection services. Bumper stickers and lists of public facilities collecting used engine oil will also be distributed. Collected engine oil is either re-refined, or reprocessed into a high grade marine diesel fuel. Since some of Louisiana’s drinking water comes from surface waters, there is great incentive to keep used engine oil from being dumped into streams and rivers.

Response

Response plans are required by state law and must include an inventory of public and private oil spill response equipment, command structure, plans for practice drills, determination of environmental and other priority zones for response and cleanup, plans for volunteer coordination and training, and procedures for disposal of hazardous wastes.

Funding

A fee of $0.02 per barrel is collected on crude oil transferred from a vessel to a marine terminal within Louisiana until the fund reaches $15 million. If the fund’s balance falls below $8 million, fee collection resumes at a rate of $0.04 per barrel until the fund is restored to $15 million. The actual limit of the Oil Spill Contingency Fund is $30 million. Additional monies may be in the fund above $15 million as a result of other income sources including penalties, reimbursements, interest, and federal funds. The fund may be used to cover administrative and personnel expenses, removal costs and damages, protection or restoration of natural resources, research grants, and operating costs for response and prevention. As of August 10, 1994, the fund contained $17 million.
Coordination Efforts

LOSPRA gives the Oil Spill Coordinator’s Office the authority to enter into interstate compacts or MOAs that support or facilitate oil spill response and prevention activities. Currently, Mississippi, Texas, Louisiana, Alabama, and Florida have formed a working group to share information on geographic information systems and their application in oil spill management. The state is also in the process of formulating a MOA with all state natural resource trustees, the USCG and the U.S. Minerals Management Services.

Policy Review and Citizen Participation

The formation of the Interagency Council and the appointment of its members is mandated by LOSPRA. Nine members are representatives from specified state agencies, and four members are appointed (one each) by the chairman of the Senate Committee on Natural Resources and Environmental Quality, the House Committee on Natural Resources, and the House Committee on Appropriations. The only stipulation is that the four appointees must not be legislators. The task of the council is to assist in the development of a statewide oil spill prevention and contingency plan, preparation and approval of an annual work plan, development of recommendations for additional legislation, and preparation and approval of a budget. LOSPRA also provides for audits, inspections, and drills to be conducted with assistance from the USCG. And, a development program is currently funding an Oil Spill Education Curriculum Development Project to increase public participation.

MAINE

State Legislation

The Department of Environmental Protection is responsible for implementing the Maine Oil Pollution Control and Damage Claims Regulations. There are no limits to liability in the event of an oil spill from either an oil terminal facility or vessel in state waters. In addition, terminal operator/owners are deemed vicariously responsible for spill from tanker vessels coming from or going to their facility.

Prevention

Rules governing terminals, vessels, and transfer activities are not expected to be promulgated in the near future, although they are currently being updated. Maine requires a pre-transfer conference between vessels and shore personnel that identifies responsible personnel, establishes the handling rate, and confirms the use of a specific communication system. Maine also requires testing of communication equipment, visual inspections of oil transfer equipment and pipelines, semi-annual pressure testing of hoses, use of drip pans, hose rigging to compensate for ship movements, hose protection, use of check valves to prevent overflow of oil, inspection of waters during transfer operations, draining of connecting devices upon completion of transfer operations, adequate illumination of transfer areas at night, closing of tank tops and hatch covers, and booming of vessels.

In the future when double-hulled tankers are required by federal law, Maine plans to require secondary containment systems for all existing facilities. New facilities are required to install secondary containment systems. Automatic closing valves as opposed to manual valves will also be required under the new rules.

Oil terminals and marine facilities with a capacity greater than 1,500 barrels that are receiving oil from tankers are required to have prevention plans. Monitoring is done through regular licensing inspection, and some random inspections are conducted. Violations are handled through the Attorney General’s office.

The state has compulsory piloting for all vessels drawing nine feet or more except fishing vessels, vessels powered by sail, or military and commercial ships navigating the Kennebec River to and from Bath Iron Works.

The state has limited public education programs on the appropriate disposal of used engine oil. Recent county recycling programs have encouraged individuals to deposit used oil for recycling. Most oil is reprocessed or burned.
Response
Maine requires that tank vessels, as defined in federal law, submit to the state a copy of their contingency plan prepared pursuant to OPA 90.

Funding
Maine collects a $0.03 per barrel transfer fee. The fee is collected until the fund reaches $6 million.

Coordination Efforts
The Department of Environmental Protection has a MOA with the U.S. Coast Guard (USCG) concerning oil spill response.

Policy Review and Citizen Participation
A State Oil Spill Advisory Committee and the Maine/New Hampshire Port Safety Forum participate in the policy review process. Low levels of citizen participation make it difficult for the Department of Environmental Protection to gain support and approval for updating and increasing oil spill related policies.

In 1992, a port safety forum asked pilots to identify navigation hazards and develop recommendations to promote marine safety. The recommendations were useful and included visibility and speed restrictions, rules for towing under bridges, and early tug escorts for crude carrying vessels. Compliance has been voluntary.

MARYLAND

State Legislation
Statutory provisions concerning oil discharge and cleanup are located in the Water Pollution Control and Abatement section (Subtitle 4) of the Environment Code. The law sets up a license requirement and fee for oil transfers, and a prerequisite for obtaining a license is a showing that the applicant has implemented or is implementing state and federal plans and regulations to control oil pollution. The state's Hazardous Substance Response Plan, a subchapter of the Code of Maryland Regulations, is administered by the Department of the Environment and establishes guidelines for the state's response to spills, although the state does not consider oil a hazardous substance.

Prevention
The state does not require specific prevention plans for oil facilities or vessels. However, oil storage facilities over 10,000 gallons must obtain a permit from the state. The state also employs 19 enforcement inspectors in its oil program, who conduct announced and unannounced facility inspections.

Information on the appropriate methods of disposing of used engine oil is provided through an 800 telephone number and informational handouts. County governments also are empowered to establish their own used engine oil disposal programs to prevent small scale oil releases.

Response
The state has formally promulgated rules requiring vessel response plans. These rules are expected to be adopted by the end of 1995. Inland facilities are already required to have spill containment measures and cleanup plans in place as part of the state license procedures.

The Department of the Environment responds to oil spills depending on the size and location of the spill. It is also empowered to contract with private environmental response contractors, while it serves in a technical and administrative oversight role.
Funding
Maryland collects $0.0075 per barrel for all petroleum products brought into the state. The state Department of the Environment administers the Maryland Oil Disaster Containment, Cleanup, and Contingency Fund. This fund can be used for the contracting of oil spill responders and reimbursement of county emergency response assistance.

Coordination Efforts
While no formal interstate compacts are in place, Maryland spill response teams have responded to all requests for assistance from neighboring states and Washington, DC.

The Department of the Environment has a MOA with the USCG covering notification of oil and hazardous substance spills, and establishing guidelines for reimbursement from the Federal Oil Spill Liability Trust Fund. It also has an agreement with the Board of County Commissioners in Washington County setting conditions under which the Board may seek reimbursement from the state Hazardous Substance Control Fund.

Policy Review and Citizen Participation
Review committees are formed as needed and no formal public information system is in place.

MASSACHUSETTS

State Legislation
The Massachusetts Oil and Hazardous Material Release Prevention and Response Act (Chapter 21E) is administered by the Department of Environmental Protection (DEP). In accordance with Chapter 21E, the DEP has established regulations for assessing and cleaning of oil and hazardous material releases. These regulations are set forth in the Massachusetts Contingency Plan. The Massachusetts Plan is not specifically targeted at oil spill management, but includes oil along with other hazardous materials.

Prevention
Contingency plans are required of facilities to prevent the release of oil or other hazardous materials. These plans are maintained by the State Emergency Response Commission, which is a coalition of state agencies including the DEP, state Police, Public Health, Civil Defense, and the Fire Department.

Permits are required for all regulated oil facilities. Inspections are conducted to ensure compliance upon renewal of each permit.

Massachusetts law requires all retailers selling motor oil to collect used engine oil in containers for recycling. Retailers usually require customers to present a store receipt in order to deposit used oil. A hotline also was established by the state to answer any questions regarding used engine oil disposal.

Response
The Massachusetts Contingency Plan (MCP)\(^2\) was revised in 1993 to reflect the growing responsibilities of the DEP. The new plan establishes a program for the licensing of expert site professionals who are responsible for the assessment and clean-up of the many hazardous spill sites around the state. Licensed Site Professionals (LSPs) oversee response and cleanup activities to ensure that actions are performed in compliance with the Massachusetts Contingency Plan. The program also includes the certification of a LSP for oil spill cleanup and response. Twenty percent of the cleanup sites administered by the LSPs must be audited by the staff of the DEP. DEP staff also oversee state funded sites, state Superfund sites and Tier I (severely contaminated) sites.

\(^2\) The MCP has been significantly modified as of February 1995. The changes are not reflected in this report.
The MCP also was amended to include the addition of a Best Response Action Management Approach that sets performance standard requirements for response actions. Under this program, response actions are required to adequately protect public health and the environment and must use standard professional engineering and scientific practices.

Funding
The Massachusetts Underground Storage Petroleum Product Cleanup Fund is supported by a $50 fee for each delivery of petroleum products at a dispensing facility. The fee is no longer collected after the fund reaches $30 million, and collection is resumed after it is depleted to $10 million.

Coordination Efforts
Massachusetts has not entered into any interstate compacts or MOA at this time.

Policy Review and Citizen Participation
Regulations regarding prevention and response were developed with the assistance of an advisory committee composed of industry representatives, consultants, attorneys, environmentalists, public health advocates, and local officials. All proposed changes to the MCP are reviewed by the Waste Site Cleanup Program Advisory Committee and comments are welcomed from any interested party.

MICHIGAN

State Legislation
The State of Michigan has few policies and programs directly related to oil spill management and is in the process of evaluating its role under OPA 90. The Michigan Department of Natural Resources (MDNR) is the state’s lead agency for oil spill management.

Prevention
Oil spill prevention plans are not required by state law. State level prevention efforts include training, participation in federal Regional Response Team meetings, and other oil spill related conferences and meetings.

Response
The MDNR primarily relies on the responsible party for remedial response action and is empowered to contract private response companies. MDNR conducts environmental assessments of resource injuries following spills.

Funding
No state level contingency fund exists for oil spill cleanup.

Coordination Efforts
A response coordination agreement exists between Michigan and Ontario, Canada. The Great Lakes Spill Protection Initiative and Regional Response Team are the only coordinated interstate response groups.

The MDNR also coordinates the actions of other state agencies and departments during an emergency spill under the Pollution Emergency Alert System.

Policy Review and Citizen Participation
A public policy analyst assigned to the Executive Division of the Office of the Great Lakes is currently conducting a policy review.
MISSOURI

State Legislation

Missouri "Spill Bill" regulations are implemented by the Department of Natural Resources. Since OPA 90, Missouri passed the Emergency Planning and Community Right-to-Know Act, as well as regulations requiring contingency plans for all facilities handling hazardous waste.

Prevention

Prevention plans are required for commercial above ground storage tanks with capacities greater than 600 gallons and underground storage tanks with capacities greater than 110 gallons. Spot checks by field personnel and inspections in response to public complaints are used to monitor compliance. Thus far, the state-initiated program on prevention has focused on pipelines; however, few details were provided to our survey questionnaire concerning prevention measures.

Response

Spill Bill regulations require the development of an emergency response plan that outlines the respective responsibilities of each agency. As a result of this requirement, a statewide telephone number was established for oil spill notification.

Funding

Missouri's Hazardous Waste Remediation Fund currently holds approximately $1 million. Funding is derived from registration fees collected on pipelines, storage, and retail facilities. If the annual collection of fees is over $1 million, the portion above $1 million is credited to the following year's fees. A regulated company can not be charged over $10,000 per year in fees.

Coordination Efforts

The Metropolitan Statistical area (e.g., St. Louis Metropolitan area) response plans are developed and maintained by local officials from Missouri and Illinois with the support of Region VII and V Regional Response Teams.

Policy Review and Citizen Participation

A USEPA representative for Region VII of the Regional Response Team is responsible for reviewing policies.

NEW HAMPSHIRE

State Legislation

The New Hampshire Department of Environmental Services is responsible for coordinating oil spill response and prevention programs at the state level. However, New Hampshire primarily relies on OPA 90 and the USCG and USEPA.

Prevention

The Underground Storage Tank Compliance Program monitors compliance for new and existing underground storage tanks. All facilities are tracked on a database and inspected when information appears inadequate or incomplete. New facilities under construction are also inspected to ensure compliance. No prevention plans are required by the state.
Response

No information on response policies or procedures was provided in the reply to the survey.

Funding

The state contingency fund is supplied by a fee on all imported oil and is approximately $5 million.

Coordination Efforts

New Hampshire is not involved in any interstate compacts or MOAs.

Policy Review and Citizen Participation

The Public Information Office within the Department of Environmental Services coordinates reviews.

NEW JERSEY

State Legislation

In response to a noted escalation in the frequency of oil spills worldwide, New Jersey enacted a number of amendments to the Spill Compensation and Control Act of 1980. Effective September 12, 1991, the Department of Environmental Protection and Energy (DEPE) adopted rules that set standards for discharge prevention and emergency response. The additional rules relate to facility discharge prevention and control, registration and contingency plan requirements, and pipeline regulations. The 1991 amendments to the Spill Compensation and Control Act also contain a schedule of financial penalties for non-compliance with the act or for causing a discharge.

Prevention

There are a number of requirements designed to reduce the probability of an oil spill and mitigate its potential impacts. New and reconstructed storage tanks are required to have an impermeable base and secondary containment system that can accommodate the entire storage capacity plus six inches of rainwater. Integrity testing must also be conducted every five years depending on the age of the tank, proximity to surface water, and leak record. Marine transfer facilities are required to deploy a containment device sufficient to totally enclose a vessel while engaging in the transfer of material from vessel to facility, or vice versa.

Leak detection and monitoring regulations mandate visual inspections of equipment, facilities, and containment systems pursuant to a predetermined schedule. Training also is required for all employees handling hazardous substances. Minimum training requirements include a general orientation, as well as classroom, on the job, and annual refresher training.

All response or cleanup organizations must register with the DEPE to enable the department to have a clear understanding of the purpose and capabilities of all companies or organizations operating within the state. Potentially responsible parties are provided with an inventory of registered organizations and environmental professionals.

According to federal and state law, oil handling facilities must submit a Discharge Prevention, Containment and Countermeasure (DPCC) plan. The plan must include historical information about the facility, a site plan, a drainage and land use map, a topographical map as well as information on storage areas, loading/unloading areas, secondary containment systems, flood hazard areas, leak detection procedures, personnel training, security, and equipment upgrade scheduling. Maps submitted as part of a plan must also adhere to the specific criteria established through legislation.

All stations performing motor vehicle inspections are required to accept used engine oil for recycling.
Response

In addition to the DPCC plans, the state mandates the development of Discharge Cleanup and Removal (DCR) plans that outline facility actions in response to a discharge. The DCR plan must include a summary of the facility’s action plans, a list of available equipment and personnel, a protection plan for environmentally sensitive areas, an agreement with the local emergency planning committee, and proof of financial responsibility. Both the DPCC and the DCR plans must be submitted to the Department of Environmental Protection and Energy, which has 60 days to review them for comprehensiveness. If the plans are determined to be complete, the DEPE has 180 days to conduct a technical review of their plans and determine their acceptability.

The state also sponsors a Voluntary Cleanup Program for hazardous waste sites, because of the large number of such sites across the state. The DEPE focuses its cleanup efforts on high priority hazardous waste sites and encourages responsible parties to undertake remedial action on lower priority sites. The Voluntary Cleanup Program allows for the establishment of a MOA between the party requesting cleanup approval and the DEPE that stipulates the terms of the cleanup process. This program removes some of the bureaucratic barriers inhibiting responsible parties from initiating the cleanup process. The Voluntary Cleanup program is currently used in about 50% of the incidents. The voluntary program has been effective, according to the director of the DEPE.

The New Jersey Motor Vehicle Accident Generated Waste Program is designed to address issues of remediation, storage, disposal, and any community financial burdens associated with waste discharges from motor vehicle accidents. This program established rules governing the discharge of oil and other wastes from motor vehicles involved in accidents. It places all responsibility on the discharger for remediation and outlines distinctions between privately owned vehicles, in-state, or out-of-state trucks and tractors. These rules are generally enforced by police officers who frequently are the first responders to an accident.

Funding

New Jersey established a $50 million Emergency Spill Fund to support the Emergency Response program. The fund is financed by a tax on the transportation of hazardous materials through the state and is used to clean-up unreported spills, abandoned drums of potentially hazardous materials or fuels, and spills that have not been remediated by responsible parties.

New Jersey has also availed itself of OPA 90’s Oil Spill Liability Trust Fund. Between 1991 and 1993, over $1.1 million was allocated from the federal fund to different states with New Jersey receiving approximately half.

Coordination Efforts

The DEPE's Emergency Response Program works in cooperation with the police and Office of Emergency Management through a memorandum of agreement. MOAs also have been established with the Regional Response Team, the federal Multi Agency Local Response Team, and the counties through the County Environmental Health Act (CEHA). According to the survey responses, the CEHA is effective in promoting improved and more rapid county response to oil spills.

Policy Review and Citizen Participation

DPCC plans are reviewed annually by the Bureau of Emergency Response (BER). The BER also inspects all facilities where an incident occurred. The DEPE Office of Emergency Response Preparedness also coordinates personnel training and establishes incident response procedures with industry and volunteers from the American Red Cross, the New Jersey State Safety Council, the New Jersey Fire College, and the New Jersey First Aid Council.
Public involvement also is solicited through county meetings. Meetings include discussions on the Emergency Response Program and state assistance during emergency spill situations. Bumper stickers with a 24-hour hotline telephone number are distributed to the public at the county meetings.

NORTH CAROLINA

State Legislation

The Department of Environment, Health and Natural Resources is responsible for implementing the Oil Pollution and Hazardous Substances Control Act, which prohibits the discharge of oil or other hazardous substances into or upon any waters, tidal flats, beaches, or land. The Department is mandated to establish an oil pollution control program under the provisions of the law.

Prevention

Contingency plans are being developed within government and by private industry for oil spill prevention and response. While the state is authorized to inspect facilities, the local office of the USEPA assumes responsibility for performing inspections.

Used engine oil collected for recycling is land farmed by private contractors or used to make bricks. Land farming entails plowing the oil into the soil to allow bacteria to naturally break down the material.

Response

All oil spills and hazardous waste spills are required to be reported to the Division of Environmental Management (DEM), while the regional offices of DEM monitor the cleanup process.

Funding

North Carolina’s Oil or Other Hazardous Substances Pollution Protection Fund is used on an emergency basis only. Funding is derived from oil spill enforcement fines and civil penalties. Responsible parties are required to assume all costs for remedial action.

Coordination Efforts

North Carolina is in the process of revising its inter-governmental MOAs. Previous MOAs included an agreement with the Department of Transportation and the USCG. The agreement with the state Department of Transportation addressed the use of vehicles for spill response, whereas the agreement with the USCG covered marine environmental protection and response to marine pollution.

The Board of Transportation, the Wildlife Resources Commission, the Division of Marine Fisheries, and any other state or local agency may be called upon at any time to provide assistance in the response effort.

Policy Review and Citizen Participation

Interdepartmental reviews, interagency reviews, public notices, and appointed commissioners are all part of the review process.

OREGON

State Legislation

Oregon’s Department of Environmental Quality (DEQ) is the lead agency for oil spill management. The Regulations Pertaining to Oil Spills into Public Waters were updated in January 1993 to establish requirements for spill response, use of dispersants, disposal of cleanup waste, administration fees, prevention, and mitigation. The state holds both the transporter and owner of oil liable in comparison to most states that only extend liability to the party transporting oil.
Prevention

State regulations require contingency plans for all cargo and passenger vessels over 300 gross tons. Tank vessels and oil facilities are required to have response equipment in excess of that required at the federal level. Prevention rules for oil facilities have been completed, while more specific prevention rules for pipelines and vessels are currently being developed. Facility prevention plans are required to include the following information: (1) the types and frequency of spill prevention personnel training, (2) evidence of a facility operations manual, (3) a description of a drug and alcohol awareness program which provides training and information to all employees, (4) a summary of the frequency and type of inspections and preventative maintenance procedures, (5) a description of the use of containment booms during the transfer of heavy oil, (6) identification of spill prevention technology currently in use, (7) a description of facility security systems, (8) a history of discharges exceeding 25 barrels over the last five year period, and (9) a detailed risk assessment analysis.

The DEQ is responsible for evaluating the plan, and all parties interested in reviewing the plans are given the opportunity to comment within 30 days. This includes the general public as well as concerned interest groups. The DEQ may approve a plan conditionally by requiring a facility or vessel to operate with specific precautionary measures until unacceptable components of the plan are resubmitted and approved. Any plan holder may be required to participate in one unannounced full or limited deployment drill annually.

Collection of used engine oil is done through curbside pick-up and community drop off facilities. The collected oil is reprocessed and reused.

Response

Prevention and response plans are required for facilities and pipelines, while response plans are required for vessels and agencies handling oil. All plans must include (1) a list of equipment and personnel available, (2) a description of spill detection procedures, (3) a signed letter of intent from a spill response contractor, (4) a description of containment methods, (5) estimated response times for certain volumes, (6) guidelines under which in-situ burning will be used, (7) an environmental protection plan, (8) methods for interim storage of cleanup waste, and, (9) a schedule of drills and exercises. Use of chemical dispersants is not permitted except when extreme fire danger or other hazardous circumstances warrant their use.

Response plans for specific geographic areas have been developed outlining exact equipment requirements and booming strategies. This response strategy has worked well, according to the responses from the survey.

Funding

Oregon’s Hazardous Substance Remedial Action Fund currently holds approximately $8 million. Permitting fees are collected from all facilities on an annual basis, and from each tank vessel on a per trip basis. Those fees are deposited in the Oil Spill Prevention Fund and are used by the DEQ to fund reviews of prevention plans, and to conduct compliance inspections, exercises, and training.

Coordination Efforts

The States/B.C. Oil Spill Task Force is jointly funded by Alaska, Washington, British Columbia, California, and Oregon. Oregon also has interagency agreements with the USCG for the use of volunteers and with the Office of Marine Safety regarding a joint inspection office.

Policy Review and Citizen Participation

Advisory committees are created to review all policy developments. With input from local governments and grass-roots organizations throughout the state, the DEQ has developed an education and promotion handbook for local governments and educators on waste reduction and recycling programs entitled, “Getting the Word Out.” The book is a step-by-step outline of how to promote recycling at the community level based on a
calendar of suggested events. It also includes advice on fund raising, public relations, school recycling programs, household hazardous waste collection events, composting demonstrations, and holiday specific events. Oregon also has a training program for volunteers interested in performing cleanup and rehabilitation of wildlife following oil spills. Approximately 300 volunteers have been trained.

RHODE ISLAND

State Legislation
The Rhode Island Department of Environmental Management (DEM) is the lead agency for oil spill response and implements the state’s Oil Pollution Control Regulations. The regulations are intended to “prevent the discharge, escape or release of oil into the waters of the state.”

Prevention
Facilities are required to prepare contingency plans according to a number of specific rules designed to prevent oil spills. These rules specifically govern the transfer of oil between vessels and terminals and require that (1) the pressure in hoses be tested above the expected use, (2) drip pans be placed under all connections, (3) hoses be supported so that they cannot be crushed or dislodged, (4) a person must monitor each connection throughout the transfer operation, (5) communication equipment must be tested prior to transfer operations, (6) loading must be started at a slow rate and inspected before increasing to desired rate, and (7) backflow valves must be located in the discharge line. Safety precautions for on-loading and off-loading of ballast water and requirements for boiler room oil traps or drain valves are also outlined in the regulations.

Storage tanks with capacities greater than 500 gallons are required to have spill containment around the fill areas, dispensers with backflow valves, volume gauges, and secondary containment systems capable of handling 110% of the tank capacity. All newly constructed tanks are subject to different standards including regulation of construction materials and the requirement for an underlying impervious barrier.

Monthly facility inspections and more detailed 10 year inspections are required to be conducted by the owner/operator. A report must be made available to the DEM on each monthly and 10 year inspection. Furthermore, the local Emergency Planning Commission also conducts spill simulations.

Individuals can dispose of used engine oil at town designated drop-off sites. The Office of Environmental Coordination answers questions by phone and provides packets of information upon request.

Response
Most of the oil spill response is handled by the Coast Guard with assistance from the DEM.

Funding
There is no state level contingency fund.

Coordination Efforts
Rhode Island has not entered into any interstate compacts or MOAs.

Policy Review and Citizen Participation
State files are available for public review at any time, and no formal public outreach program exists.
SOUTH CAROLINA

State Legislation
The South Carolina Department of Health and Environmental Control (DHEC) is the state’s lead agency and administers the South Carolina Hazardous Waste Management Act and the Pollution Control Act.

Prevention
Oil and gas terminal facilities are required to have spill prevention plans, and plans generally follow federal guidelines. Terminal facilities are required to obtain registration certificates. To obtain certification, a facility is required to provide proof of compliance with federal requirements, information of the type and location of response equipment, copies of all agreements with cleanup organizations, and a registration fee.

Oil spill prevention programs in South Carolina have been limited to participation with the USEPA in the Spill Prevention Containment and Countermeasure (SPCC) Program. DHEC personnel are responsible, through a mutual voluntary agreement, for the inspection of bulk terminals, wholesale and retail petroleum distributors, and industries that meet SPCC requirements in South Carolina.

Although this program involves a limited universe of petroleum handlers/processors, participation in the program has left the state better prepared for preventing petroleum releases from potentially large reservoirs of products. Active inspection of petroleum storage facilities has made the department more cognizant of the location and condition of petroleum facilities and has made the regulated public aware of local and state resources for emergency assistance.

In 1992 the Used Oil Partnership, comprised of the electric utility, the Department of Transportation, and the South Carolina Petroleum Council, was formed to promote public awareness of the proper disposal of used oil. In South Carolina used oil can only be legally disposed of at one of the 320 collection sites throughout the state. Information regarding the location of these drop-off sites is made available through a toll free number. As of January 1, 1994, the DHEC has made $600,000 available to local governments for public relations programs and used oil collection sites. Brochures, posters, newsletters, radio, television, and billboard announcements are used to educate the public about oil spill prevention and recycling. Presentations are also made to schools and local governments using a video, while the state has also developed a six lesson activity-based curriculum. This program has been very effective, according to the survey responses.

Response
DHEC routinely coordinates with commercial response teams on petroleum spills that range from small vehicle tank ruptures to large petroleum pipeline ruptures. In general, spill response contractors that are associated with larger diversified organizations are more reliable and prepared for a rapid response, according to the survey. Smaller, locally owned companies have not had the fiscal ability to withstand periods of inactivity between spills.

The South Carolina Contingency Plan requires emergency response personnel to undergo continuous training to stay abreast of new methods of containment, neutralization, decontamination, cleanup, and removal.

Funding
Funding for oil spill response and waste management research is derived from two primary sources: a $25 fee for each ton of hazardous waste generated, and registration fees for facilities handling any hazardous materials. South Carolina’s contingency fund currently holds approximately $12 million.
Coordination Efforts

South Carolina is not involved in any interstate compacts, but is in the process of establishing a MOA with the USCG offices in Savannah, Georgia and Charleston, South Carolina on the pre-approved use of dispersants and in-situ burning.

The Department of Highways and Public Transportation, the Water Resources Commission, and the Wildlife and Marine Resources Department have agreed to cooperate with the DHEC and lend assistance in the event of an oil spill.

Policy Review and Citizen Participation

There is no established review process for policies regarding oil spill prevention and response. All contingency plans are required to include detailed guidelines concerning media relations and the availability of factual public information. The on-scene coordinator is responsible for coordinating with special interest groups interested in oil spill prevention and response planning under provisions in the State Contingency Plan.

TEXAS

State Legislation

The Texas General Land Office (GLO), Texas Natural Resource Conservation Commission (TNRCC), and the Railroad Commission (RRC) have jurisdiction over oil spills as stated in the state’s Oil Spill Prevention and Response Act (OSPRA). The GLO is the lead agency for oil spill response, with TNRCC and the RRC holding supportive authority. The legislature restructured the program in 1991 in response to criticism that oil spill response systems were inadequate.

Mandates under OSPRA include the formation of an Interagency Council, a state level response effort, registration of terminal facilities, contingency plans for vessels, audits, inspections or drills, penalty schedules, cost recovery, the ability to enter into interstate compacts, support for related research, the establishment of an Oil Spill Oversight Council, and the development of an education program.

Prevention

Oil spill prevention plans are not required in Texas. The GLO is in the process of reviewing spill files for 1992 and 1993 to ascertain root causes of discharges. Upon completion of this task, if it is determined that regulations are needed for specific industries and/or operations, additional regulations may be drafted. According to the survey response, the current consensus is that there are probably enough regulations.

The state’s focus presently is on heightening awareness of the rules and regulations for both personnel and management. It appears that the best achievable management practices need to be updated and further stressed. This has been facilitated through a requirement for documented discharge incidence reports. The reports must identify the cause of the spill and identify remedial actions to stem a reoccurrence. Response officers verify that the corrective actions have been taken once the report is received by the GLO.

As of January 1, 1993, all facilities involved in the storage or transfer of oil must have a discharge prevention and response certificate. The application for the certificate requires (1) information on the type, location, and capacity of the facility; (2) a site plan; (3) aerial photos; (4) information on personnel qualifications; (5) a copy of the prevention and response plan; (6) proof of financial responsibility; (7) evidence of an agreement with a discharge cleanup organization; (8) the estimated worst case discharge; (9) a list of all discharges occurring at the facility the previous year; and (10) a copy of all necessary environmental permits. After all the information is received by the GLO, a certificate is issued unless there is evidence that the applicant lacks the ability to respond adequately to a worst case discharge. Certificates are issued for a period of five to 10 years.
Training of personnel is required under OSPRA. The GLO interprets this to be completion of an oil spill training program, participation in drills and exercises, and an appropriate level of on the job training.

Used engine oil is collected through curbside recycling programs, designated drop-off facilities, and some gas stations. A toll free number was also set up to provide information on the location of the nearest drop-off center. Most used engine oil in Texas is re-refined into lubricants, asphalt extenders, and flotation oils. The oil spill division is currently looking into used oil reception sites for commercial fishing and shrimp fleets.

**Response**

State liability limits are more stringent than those required by OPA 90. While OPA 90 liability limits for response costs, damages, and natural resource damages are only covered under one amount, these amounts are cumulative in Texas depending on the size of the vessel or facility. While the liability limits may be different, the GLO can only require financial responsibility to the amount established by federal law. The GLO accepts federal response plans as meeting state requirements, and no separate prevention plan is required.

Vessel response plan requirements under state law are more stringent than OPA 90 because Texas requires response plans from any vessel capable of carrying 10,000 gallons or more of oil as fuel or cargo. OPA 90 requires response plans from tank vessels only.

All discharge cleanup organizations must be certified by the GLO. Owners and operators are required to list their certified discharge contractor in their prevention and response certificate application.

**Funding**

The Oil Spill Prevention and Response Act (OSPRA) provides for funding through the Coastal Protection Fund. Funding is provided by a $0.02 per barrel tax on all crude oil loaded or off-loaded by vessel in the state. A maximum of $25 million is deposited into the fund at which time the tax is suspended until the fund falls below $14 million. If an incident occurs that is expected to substantially deplete the fund, and if a discharge in excess of 10,000 gallons has occurred within the previous 30 days, the tax may be raised to $0.04 per gallon. Currently, the tax has been suspended since November 1, 1993. Other fees, penalties, judgments, and reimbursements are also credited to the fund with an overall fund limit of $50 million. The Coastal Protection Fund may be used for administrative expenses, response related costs, restoration or mitigation, related research ($1.25 million annually), and other costs or damages upon authorization.

**Coordination Efforts**

Texas has not entered into any formal interstate compacts; however, it does participate in the Gulf States Working Group. The group consists of pollution division heads from the states of Texas, Louisiana, Alabama, Mississippi, and Florida. This ad hoc group meets informally 2–3 times a year to discuss issues relevant to their respective states and the Gulf area as a whole. Recently, staff members attended meetings of the States/B.C. Task Force. Based on those meetings, the GLO intends to remain active with the States/B.C. Task Force.

A MOA is currently being drawn up between the GLO and the USCG concerning many spill prevention and response issues. In May 1994, a MOA with the U.S. Department of Interior’s Minerals Management Service was signed, which covers cooperation for spill response drills, investigations, development of requirements for offshore facility financial responsibility, facility inspection, training of personnel, technology transfer, and research. In addition, a working group is being established to address royalty management. The working group will identify the potential for new coordinated approaches to maximize benefits from the mineral resources of both federal and state agencies.

**Policy Review and Citizen Participation**

OSRPA created the Interagency Council which is chaired by the GLO. The Council includes representatives from the Department of Health, the Division of Emergency Management, Department of Parks and Wildlife,
Natural Resource Conservation Commission, Department of Transportation, Office of the Attorney General, and the Higher Education Coordinating Board. A Governor's Oversight Council was created to provide general oversight of the Oil Spill Program. There also is a five person commission that studies the relative operational and environmental risks posed by the transportation of oil by vessels and the handling of oil at terminal facilities.

A period for public review and comment is allowed for any new regulatory proposals. All proposed regulations are published in the Texas Register. Any comments received must be addressed in the adoption of the new rule. A tri-annual OSPRA newsletter is also published describing current initiatives and activities within the Oil Spill Division of the GLO. The names of individuals or groups interested in specific information can also be included on a distribution list for available information.

WASHINGTON

State Legislation

The Department of Ecology (DOE) manages spill prevention and response activities for oil handling facilities and is the lead agency for response to environmental emergencies statewide. The state Office of Marine Safety (OMS) is responsible for oil spill planning and prevention. These responsibilities are mandated by the 1990 Oil and Hazardous Substance Spills Act and the 1991 Oil Prevention and Response Act. The Office of Marine Safety will be merged within the Department of Ecology in 1996.

In addition to federal requirements under OPA 90, Washington state laws include the following requirements for vessels and facilities: (1) oil spill prevention training and certification of all operations personnel; (2) preparation of an operations manual documenting procedures for oil transfer, storage, and monitoring; and (3) development of a definition of “best achievable protection” from oil spills that establishes minimum planning standards for facility transfer, storage, and monitoring. The state also established adequacy standards for prevention plans and minimum standards for facility oil spill contingency plans and spill response capabilities. Rules for primary response contracting were developed by the DOE, as well as rules for the documentation of financial responsibility for oil spill clean-up costs and damages (originally scheduled to become effective April 30, 1993, but currently on hold indefinitely).

Prevention

Washington requires prevention plans from all facilities involved in the transfer of oil to or from a pipeline. Plans must include: a comprehensive analysis of facility spill risk; information on alcohol and drug awareness programs; maintenance and inspection programs; spill prevention technology currently in use; measures taken to ensure facility security; a description of any spills over 25 barrels; and plans to incorporate measures for the best achievable protection. Facility plans initially are reviewed by the Department of Ecology for completeness and subsequently are distributed for a 65 day public review. Every five years the plan must undergo a full review by the department. Announced and unannounced site inspections are used to verify compliance.

The state Office of Marine Safety (OMS) has established progressive safety standards for oil tankers and barges in state waters and has a screening program for other ships, including container ships, bulk carriers, fishing boats, and passenger vessels. The OMS conducts inspections of vessels and identifies high-risk carriers with a computer matrix. Vessels are notified by the OMS of their safety deficiencies.

Response

Contingency plans are required that establish criteria for primary oil spill response contractors in Washington. The Department of Ecology is authorized to require oil spill contingency plan holders to conduct oil spill drills. Enforcement policies also allow for fines of up to $100,000 per day for operating without a contingency plan or for the reckless/intentional discharge of oil.
A Facility Personnel Oil Handling Training and Certification rule was included as a requirement under the 1991 Oil Spill Prevention and Response Act to reduce the probability of human error contributing to the occurrence of spills. A minimum number of hours of classroom instruction, on-the-job training, and a continuing education program are required in facility plans. Certain core training topics must be covered specific to management, supervisory, maintenance, and indirect operations personnel. In addition, the training program must be certified every three years with on-site inspections by the Department of Ecology.

Funding

Washington charges a $0.05 per barrel tax on all oil delivered to terminals on state navigable waters. Of that $0.05, $0.02 is allocated to the Oil Spill Response Account (OSRA) to pay for cleanup and response efforts above $30,000. The OSRA is intended to be maintained at $25 million, but currently contains $8 million. The remaining $0.03 is put into the Oil Spill Administration Account.

Coordination Efforts

The States/B.C. Oil Spill Task Force is jointly funded by Alaska, British Columbia, Washington, California, and Oregon. The Department of Ecology has a MOA with the Office of Marine Safety and is working on an agreement with the USCG. Washington is also involved in the Northwest Area Contingency Plan which consolidates the efforts of the USEPA, USCG, and the states of Oregon, Idaho, and Washington.

Policy Review and Citizen Participation

The five-member Marine Oversight Board provides independent oversight of the actions of the federal government, industry, and state agencies regarding oil spill prevention and response on the navigable waters of Washington. Oversight is extended to vessels and onshore and offshore facilities as defined by statute.

In 1993, the Department of Ecology held a public forum to discuss the use of volunteers during oil spills and plans were established for the development of a two phase Statewide Volunteer Management Plan. Phase one was developed by the Wildlife Rescue Coalition and completed in January of 1994. The Department of Ecology is responsible for the development of phase two by April 1994, which addresses the use of volunteers in non-wildlife rescue activities. A work group was formed to review the completed work and make recommendations to the Department of Ecology. Following completion, the Statewide Volunteer Management Plan will be incorporated into the Northwest Area Contingency Plan.

A number of education efforts have been implemented to increase public awareness about oil spill prevention. These programs include spill prevention educational campaigns, coordination with the Washington Sea Grant Program's spill prevention education program, a bimonthly newsletter entitled Spill News, public involvement and outreach strategies, and educational presentations to community organizations. Public involvement is also solicited for different advisory committees. In 1993, these committees included an oil spill prevention work group, a technical subcommittee, a scientific advisory board, an in-situ burning working group, and a volunteer management work group.

WISCONSIN

State Legislation

The Wisconsin Department of Natural Resources (WDNR) is the primary response authority for all hazardous substance spills. State laws and regulations have not been changed in response to OPA 90.

Prevention

The Petroleum Tank Inspection Program is conducted by the Department of Industry Labor and Human Relations. Monitoring is geared more towards fire prevention strategies than environmental protection.
Response
Wisconsin requires a state level contingency plan that addresses cleanup procedures, provides for environmental restoration, establishes maintenance and procurement procedures for necessary equipment, and divides specific responsibilities among state and local agencies.

Funding
Wisconsin has an oil spill contingency fund, however, no details as to the source or amount of the fund were provided.

Coordination Efforts
Wisconsin is not involved in any interstate compacts.

Policy Review and Citizen Participation
There is no formal review process for policies relating to oil spill response and prevention.

WYOMING

State Legislation
The Department of Environmental Quality and the Wyoming Oil and Gas Conservation Commission have jurisdiction over oil spill response and prevention.

Prevention
No spill prevention program exists and prevention plans are not required.

Response
Minimal spill response plans exist in Wyoming. Existing plans are based on protecting surface and ground waters.

Funding
Wyoming does not have a state level oil spill contingency fund.

Coordination Efforts
Wyoming has not entered into any interstate compacts or MOAs at this time.

Policy Review and Citizen Participation
The Water Quality Advisory Board is responsible for reviewing policies regarding oil spill response.
OIL SPILL PREVENTION AND RESPONSE SURVEY

Agency: ____________________________________________
Address: ___________________________________________
Contact Person: _______________________________________
Phone Number: __________________ Fax Number: ___________

1. Does your state, county, or municipal government have any regulations or ordinances regarding oil spill response or prevention? Please circle the ones that apply:
   state    county    municipal    none
   If state, county or municipal regulations exist, please include a copy(s) with the completed response, or the name of the agency from which copies can be obtained. Within your state, what agency(s) has jurisdiction regarding oil spill prevention or response regulations?

2. Does your state have Oil Pollution Act (OPA) type provisions which are more strict than OPA? What are those provisions?

3. Since OPA 90, have your management strategies become more focused regarding oil spill response or prevention (e.g. additional training requirements, back-flow valve installation requirements)? Yes No
   Please list major strategies.

4. Are oil spill prevention plans required in your state? Yes No
   If so, please list all government agencies, types of corporations or other groups or individuals required to submit prevention plans, as well as those involved in the planning process (use a separate page if necessary).

5. If oil spill prevention standards or regulations exist, are they monitored to confirm compliance? Yes No
   If yes, how are they monitored? How are they enforced?
6. Is your state involved in any interstate compacts related to oil spill response or prevention?  Yes  No
   If yes, please provide information on the nature of the compact, the states and agencies involved, and the source(s) of funding.

7. Are there any memorandums of agreement regarding oil spill response within your state (e.g. between the Coast Guard and state or county agencies)?  Yes  No
   If yes, please list cooperating agencies or departments and include a copy of the agreement.

8. Please provide information on the specific types and locations of equipment and facilities available to respond to an oil spill occurring in the state (use a separate page if necessary).

9. Is a state-created contingency fund available for oil spill clean-up?  Yes  No
   If yes, how is it funded and how much is in the fund?

10. If state laws or compacts apply to oil spill response plans, how are they triggered? Is there a minimum size spill that triggers a response? If so, what is that minimum?

11. Over the past five years, how many oil spills has your office been involved in?

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<tr>
<th>On Land</th>
<th>At Sea</th>
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<td>Small Spills (&lt;10,000 gallons)</td>
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<td>Medium Spills (10,000-100,000 gallons)</td>
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<tr>
<td>Large Spills (&gt;100,000 gallons)</td>
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</table>
12. Is there a review process for policies regarding oil spill prevention or response?
   Yes  No
   If yes, please provide names and affiliations of all parties involved in the review process, including any
citizen oversight or advisory groups.

13. Is proof of insurance required above or beyond the levels established by OPA 90?   Yes  No
   If so, please provide a description of the policy.

14. Regarding public involvement related to oil spills, what type of information is available to the public and
what mechanisms exist to make that information available?

15. Please provide information on the appropriate method for disposing of used engine oil. How is that
information conveyed to the public?

16. Please provide a description of the general concerns and experiences your office has had with oil spill
prevention and response programs. What policies or programs have you found it difficult to monitor or
achieve compliance with? What programs have worked well?

17. Have there been any state funded studies on oil spill prevention or response? If so, please list the titles and
provide information on where a copy of the document(s) may be obtained.
Hawaii's Readiness to Prevent and Respond to Oil Spills

EVALUATION OF SPILL PREVENTION AND RESPONSE PREPAREDNESS IN HAWAII

Appendix 4

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University of Alaska Marine Advisory Program
Cordova, Alaska
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February 1997
EVALUATION OF SPILL PREVENTION AND RESPONSE PREPAREDNESS IN HAWAII

At the request of the University of Hawaii Sea Grant Program, the authors visited Hawaii in December 1994 in order to conduct a general, independent assessment of oil spill prevention and response preparedness in Hawaii. Our assessment was part of a larger study being conducted by Hawaii Sea Grant under contract to the State of Hawaii Hazard Evaluation and Emergency Response (HEER) office. We were asked to make a brief assessment of the spill prevention and response system and identify concerns that the State of Hawaii should address in order to further improve the system. We decided that, although there are numerous, small spills occurring from fishing vessels, and recreational vessels, clearly the greatest risk to Hawaii was from a catastrophic loss of cargo from a tanker or tank barge. It is the large spill — over 100,000 gallons — that could most seriously impact the ecology and economy of Hawaii, and thus we focused on the prevention and response preparedness for such an incident.

In observing an oil transport and spill response system for a few weeks, it is clearly impossible to provide a detailed evaluation. Our focus, thus, became one of forming a general impression of the system and paying attention to symptoms of problems that might pre-dispose the system to failure. The product of our observations — this report — is intended simply to be a constructive guide for the state in improving the safety of the oil transport system in Hawaii.

We simultaneously used three methods of data and information gathering for this project. The first consisted of numerous interviews with individuals responsible for some aspects of oil spill prevention and response. These included federal, state, and local governmental officials, petroleum industry personnel, and maritime industry personnel.

The second involved both planned and opportunistic observations of facilities, equipment, and operations at various sites. This included observations at both offshore moorings off Barbers Point, Barbers Point Harbor, Honolulu Harbor, Kahului Harbor, and offshore observations of inter-island barges.

The third involved a review of relevant documents. These included the State of Hawaii’s oil spill contingency plan, the Coast Guard’s area contingency plan, official and unofficial reports on past spills, and a host of other documents. Where relevant, these are referenced in the body of the report.

Can Spills Occur in Hawaii?

In the closing of his book Tankers Full of Trouble, Eric Nulder (1994) relates a brief conversation with a seasoned tanker crewman as follows:

“He says it doesn’t much matter whether you build ships with double hulls, put in more steel, stick on double propellers, and install ‘all kinds of other good stuff.’ It doesn’t matter whether the sun is shining or the wind is blowing. The difference between an uneventful trip and a disaster is attitude. ‘Our real enemy isn’t the elements or anything like that. It’s complacency, indifference, and arrogance.’”

We detected all three of these problems – complacency, indifference, and arrogance – among some government regulators, the public, and oil industry officials in Hawaii.

In fact, the predominant attitude toward spill prevention and response in Hawaii at present reminds us to some extent of the attitude that existed in Alaska prior to the disastrous Exxon Valdez spill in 1989. For instance, while discussing the possibility of a catastrophic spill with an oil industry official, the official stated that “it’s just never going to happen here.” This view was echoed by an official with the Coast Guard who stated, “there is just not a problem here.” Another industry official pleaded that “there is no need for more regulations.” This was precisely the attitude of government, industry, and much of the public that led to the Exxon Valdez spill.
By way of background, Addendum 1 gives the case histories of five famous tanker disasters—Torrey Canyon, Argo Merchant, Amoco Cadiz, Exxon Valdez, and Braer. All of these disasters occurred in what had previously been thought of as relatively fail-safe systems. They all resulted from a cascade of relatively simple errors and/or equipment failure. They are, in a very real sense, symptomatic of the increasing tendency for certain complex technological systems whose failure can be caused quite easily by one or two very simple mistakes and can have enormous consequences—the Space Shuttle Challenger, Chernobyl, Bhopal, etc. Such disasters are usually considered to be aberrations.

A recent statistical projection of spill risk in Hawaii put the risk of an Exxon Valdez-size spill at once in 135 years (Lee 1992). Similarly, the pre-Exxon Valdez statistical risk of such a spill in Alaska was put at once in 241 years—it took only 12 years.

The current Area Contingency Plan for the Captain of the Port (COTP) Hawaii Zones—Hawaiian Islands, American Samoa, Midway Island, Wake Island, Johnson Island, Howland Island, Baker Island, and Palmyra Atoll—states that “there have been no historical catastrophic discharges in the COTP Hawaii Zones since the Japanese attack on Pearl Harbor December 7, 1941.” This is not true. On January 17, 1977, the Irene Challenge lost 237,600 barrels of crude oil 50 miles north of Lisianski Island, and on February 25 the same year, the Hawaiian Patriot exploded and became a total loss with 715,000 barrels of crude oil 120 miles south of Necker Island (Honolulu Advertiser).

Other significant tanker casualties that could have resulted in catastrophic discharges include the following:

- **Austin**—grounding February 6, 1976 on approach to Honolulu Harbor after losing power, carrying 9.5 million gallons product on board—spilled only “a small amount.”
- **Omni Yukon**—explosion and loss October 28, 1986 southeast of Midway after having just offloaded 550,000 barrels at Barbers Point three days before.
- **Exxon Houston**—grounding March 2, 1989, off Barbers Point when it broke from the SPM during heavy weather. While it only spilled 16,800 gallons of crude from the damaged SPM hose and 8,400 gallons of fuel from a ruptured fuel tank, it easily could have lost its remaining cargo.
- **Star Connecticut**—grounding November 6, 1990, one mile off Barbers Point Light loaded with 250,000 barrels of product. The vessel was refloated without spilling any of its cargo.

A more detailed history of spills in Hawaii is included in the Response Preparedness section.

The Irene Challenge and the Hawaiian Patriot caused major spills. The Austin, the Omni Yukon, the Exxon Houston, and the Star Connecticut could have easily caused major spills also. Within the past 20 years, there have been at least six serious tanker casualties in Hawaii resulting in two major spills and four very close calls. Clearly, estimates that this will occur “once in 135 years” are not only worthless, they also contribute to complacency by creating a very false sense of security.

Many of the people we spoke with in Hawaii told us they felt the oil transport system was presently as safe as it needs to be. This is an understandable attitude among people who have never directly experienced a major spill.

In reviewing the system, we agree that substantial progress has been made by industry/government since 1989. Safety conditions at the Barbers Point Marine Terminal (BPMT) have been improved, tankers now avoid the Kaiwi Channel, and there is more spill response equipment available. Both the Exxon Houston incident in Hawaii and the catastrophic Exxon Valdez oil spill in Alaska served as a potent wake-up call for industry, government, and the public as to the potential magnitude of ecological, economic, and social upheaval that can result from a major spill. The Oil Pollution Act of 1990 (OPA 90), particularly its liability provisions, has been an obvious motivation to improve safety. However, as is typical after technological and natural disasters, once the political outcry is quelled by some amount of reform, then government, industry, and “we, the people” often simply lose interest until the next occurrence. As we discuss in this report, significant problems still exist in the spill prevention and response preparedness system in Hawaii. It worries us a great deal that industry and
government seem far more interested in preserving the status quo than they do in dedicating the resources and vigilance necessary to continually improve the safety of the oil transport system.

We consider this an extremely dangerous attitude. As NUMAST (1993), the United Kingdom’s Seafarer’s Union said concerning the standards in today’s shipping industry:

“We cannot expect acceptable safety records when the industry is still governed by archaic rules and ways of thinking. As the 21st century approaches, it is time to shed these 19th century shackles.”

In this spirit, we appreciate the State of Hawai’i’s request for an outside evaluation of the present system and we look forward to working with government, industry, and the public in improving it.

It should be acknowledged that there are several significant factors inherent to oil transport in Hawai’i, relative to other oil ports, that could reduce the risk and impact of major marine spills. They include the following:

- The deep water, open ocean approach to Barbers Point Marine Terminal (BPMT) where most of the crude is delivered allows less chance of a navigational error leading to grounding
- The weather and sea conditions are generally moderate, with good visibility
- Shoreline extent and configuration and ocean current dynamics could reduce shoreline oiling. A large spill in Hawai’i would probably encounter fewer miles of shoreline than a comparable spill, for instance, in Prince William Sound, Alaska, where the Gulf of Alaska coastal current vectors directly along and into several thousand miles of shoreline before spreading away from shore, or in other, more enclosed waterbodies, such as Puget Sound, San Francisco Bay, or Chesapeake Bay.
- Tidal variation is relatively small in Hawai’i, (3.5 feet maximum) which could reduce the hydrostatic oil outflow in a grounding situation
- Warm air and sea temperatures and high solar insolation in tropical climates are much more conducive to oil degradation than in colder climates
- Some harbors (i.e., Barbers Point, Pearl, and Honolulu), have relatively narrow entrances that might make it easier to contain spills within them.

However, as is discussed below, the risk of a major spill in Hawai’i is very real, its probable consequence would be catastrophic, and thus this risk must be treated seriously (see Pfund et. al. 1992).

**PREVENTION**

**The Key to Environmental Protection**

By looking into the case histories of major oil spills at sea, it can be concluded that in virtually all cases, once the oil is in the water, it is difficult, if not impossible, to

- contain
- recover
- clean shorelines effectively
- prevent injury to wildlife
- rehabilitate injured wildlife
- restore spill-injured ecosystems, or
- stabilize spill-injured social and economic systems

There has been a dangerously false impression perpetrated that human technology can effectively respond to catastrophic oil spills. This has never occurred and perhaps never will. While it is clearly in the public interest to be as prepared as possible to respond to such events, prevention is the key to protecting ecosystems, economies, and society from the extraordinary damage possible in catastrophic spills. It is frustrating that while most discussions of oil spills correctly acknowledge the overriding importance of prevention, they then invariably proceed to devote the vast majority of the remaining discussion to response planning.
Likely Scenarios for Major Spills in Hawaii

The likely situations for major marine spills in Hawaii are as follows:

- **Collision** between a loaded tanker or tank barge with another vessel – cruise ship, cargo ship, naval vessel, another tanker, fishing vessel
- **Grounding** of a disabled (power/steering failure) fully laden tanker en route to Barbers Point Marine Terminal, carried by wind and current onto the south or west shore of Oahu, or the south or east shore of Kauai
- **Grounding** of a disabled “Vessel of Innocent Passage” while transiting the Hawaiian Islands
- **Grounding** of tank barge either en route to or on approach to inter-island harbors, caused either by navigational error, power/steering failure, or losing tow
- **Human error, mechanical failure, or weather-induced casualty** while bunkering offshore or within Honolulu Harbor
- **Grounding** of product tanker on approach to Barbers Point Harbor or Honolulu Harbor
- **Grounding or collision** of container vessel (carrying up to one million gallons of fuel in double bottom) off south Oahu or on approach to Honolulu Harbor
- **Fire/explosion** of tanker or tank barge while loading/offloading, such as through an IGS failure
- **Grounding** of product tanker after anchor failure off Honolulu Harbor, drifting onto reef off Reef Runway
- **Rupture** of pipeline at BPMT or product pipeline to Honolulu Harbor or Barbers Point Harbor
- **Collision** between product tanker or tank barge with pier

Vessel Casualty Risk

U.S. Coast Guard Tanker Safety Study Group

After the Exxon Valdez spill in 1989, the U.S. Coast Guard convened the Tanker Safety Study Group to assess the principal factors that predispose tankers to casualty risk. Regarding the material/structural condition of tankers, the study group found the following factors to be significant: age, length, classification society, quality of surveys and inspections, operating routes, maintenance policies, and economic/scheduling pressures exerted by owners/charterers. Some salient conclusions of their study (U.S. Coast Guard 1989) are as follows:

**Age** – All other things being equal, the older a tanker is, the more likely it is to suffer a structural casualty. Over its years of service, a tanker is subjected to a variety of forces acting cumulatively to fatigue the steel hull, primarily corrosion and bending and flexing of its hull at sea and while loading and off-loading cargo. Worldwide, more than three-fourths of all tanker accidents involve ships over 15 years of age (Numast 1993). However, TransAlaska Pipeline Service (TAPS) tankers were found to have three times more failures in vessels built since the mid 70s, which is when classification societies began reducing the thickness of steel, or “scantlings,” used in tankers constructed with high tensile steel. Because of the oversupply of world shipping tonnage, its consequent depression of charter markets, and the escalating cost of new construction, there is increasing incentive to extend the service of existing vessels beyond their designed life expectancy. Proper maintenance is critical to ensure structural adequacy of these older vessels.

**Flag, Classification Society** – Vessels not classed by one of the recognized societies (International Association of Classification Societies - IACS) such as DNV, NKK, ABS, Lloyd’s, and flagged in an open registry nation, should be viewed with more caution.

**Length, Economic Pressures** – An analysis of TransAlaska Pipeline System (TAPS) tankers found that vessels in the 700–900 foot range have more reported structural failures than those of shorter length. And while this could be related to reduced scantlings used in these larger, younger ships, or to stresses caused by improper loading/unloading procedures, it was concluded to be more likely a result of the masters driving the ships too
hard, exceeding the design stress levels. These larger ships don’t respond to seas in familiar ways (vibration, shuddering, pounding) that alert the master to the need to take corrective action — speed/heading change — to relieve the working or strain of the hull. And, even when a master detects the need to slow down, the scheduled ETA imposed by owners/charterers and threats of penalties for being late may contribute to masters maintaining maximum speed, vessels being driven too hard, and consequently, more structural failures.

*Quality of Construction* — It was concluded that the overall quality of workmanship in U.S. shipyards has declined dramatically during the last 20 years primarily because so few ships are built here. Stress fractures were found to result mostly from improper design, welding, fit-up, edge preparation, workmanship, discontinuities, and so forth.

**Tanker Advisory Center — McKenzie Ratings**

Another system that attempts to assess tanker casualty risk is Art McKenzie’s (1995) at the Tanker Advisory Center in New York. The Tanker Advisory Center’s annual *Guide for the Selection of Tankers*, now in its 13th year of publication, is designed to give tanker charterers, cargo owners, and insurers, information to assist them in selecting tankers over 10,000 DWT to minimize potential casualties. The rating system includes information on a vessel’s casualty history, age, detentions, name and/or management changes, owner’s total losses and oil spills, owner’s length of time in ship owning, number of tankers owned by owner, fleet average rating, and time in lay-up. The general accuracy of the ratings as predictors of casualties is shown below:

**TABLE 1. Casualties as % of Tanker Ratings at Start of Year**

<table>
<thead>
<tr>
<th>Year</th>
<th>5-High</th>
<th>4-Very Good</th>
<th>3-Good</th>
<th>2-Fair</th>
<th>1-Low</th>
<th>Average Overall</th>
<th>Total # of Casualties</th>
<th>Total # of Tankers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>6.8</td>
<td>5.7</td>
<td>6.3</td>
<td>10.7</td>
<td>15.3</td>
<td>7.9</td>
<td>270</td>
<td>3,428</td>
</tr>
<tr>
<td>1993</td>
<td>6.2</td>
<td>7.5</td>
<td>9.8</td>
<td>9.4</td>
<td>15.0</td>
<td>9.2</td>
<td>314</td>
<td>3,426</td>
</tr>
<tr>
<td>1992</td>
<td>5.9</td>
<td>8.0</td>
<td>10.1</td>
<td>13.1</td>
<td>28.2</td>
<td>11.6</td>
<td>396</td>
<td>3,422</td>
</tr>
<tr>
<td>1991</td>
<td>5.1</td>
<td>11.4</td>
<td>14.3</td>
<td>14.5</td>
<td>38.6</td>
<td>15.0</td>
<td>507</td>
<td>3,379</td>
</tr>
<tr>
<td>1990</td>
<td>7.5</td>
<td>11.6</td>
<td>12.9</td>
<td>19.0</td>
<td>40.5</td>
<td>16.4</td>
<td>541</td>
<td>3,305</td>
</tr>
</tbody>
</table>

Source: 1995 *Guide for the Selection of Tankers*

The reason the total number of reported tanker casualties has declined is due primarily, says McKenzie, to the fact that “the Salvage Association, responding to owner’s requests, has been reporting to Lloyd’s fewer and fewer casualties in recent years” and recently the Association announced that they would no longer report casualties to Lloyd’s. It does not, then, reflect an actual reduction in casualties.

**Washington State Vessel Casualty Risk Matrix**

Building upon the Tanker Safety Study Group findings and the Tanker Advisory Center’s rating system, a general conceptual model for vessel casualty and spill risk was developed by the Washington State Office of Marine Safety (OMS) as a collaborative project with the National Ports and Waterways Institute, the George Washington University, Rensselaer Polytechnic University, Louisiana State University, and other maritime experts representing the Coast Guard, pilots, the shippers, towboat industry, and environmental groups (Herman 1995). As a backdrop to our discussion of risk in Hawaii, it should be helpful to provide a short summary, from Herman 1995, of the risk matrix that they developed and use in screening oil, cargo, and passenger vessels over 300 tons in Washington waters.

The OMS risk matrix consists of 11 statistically weighted risk elements. These elements were chosen by the experts as relevant indicators of risk. The elements were also chosen because the data required are available in maritime publications and existing databases.
1. Vessel Age

Vessel age is divided into three increments: 0–15 years, 16–25 years, and 25 years or older. Older ships are assigned higher weights. The 16–25 year increment coincides closely with protection and indemnity (P&I) club data indicating ships in the 15–20 year age range generally submit a disproportionate number of structural failure claims. Beyond 15 years, even well-maintained ships begin to suffer from metal fatigue and the cumulative effects of shear and bending stresses on the hull. Beyond 25 years an increasingly heavy maintenance burden increases risk.

2. Vessel Type

Vessel type is divided into six subcategories: (1) uninspected vessel, (2) tug with tank barge, (3) ferry, (4) tanker, (5) dry/log carrier, and (6) container. OMS regulates cargo and passenger vessels of 300 gross tons or greater, so most private yachts, small fishing boats, and other small craft are not represented in the vessel type category. According to expert opinion, uninspected vessels, which include fishing vessels, pose the greatest risk and accordingly receive the highest weighting. American flag fishing vessels are often uninspected and are exempt from pilotage.

Oil tankers receive the third highest risk weight due to the potential for a catastrophic spill. Bulk carriers, general cargo ships, and log carriers are allocated the fourth highest level of risk. P&I club data shows a relatively high percentage of structural failure and pollution claims for these vessels.

Container ships, car carriers, and roll-on/roll-off ships are in the lowest risk group. These ships tend to be more professionally operated, cleaner, and newer than other vessel types. Container ships and car carriers are in the business of transporting high value cargo and are almost always in the liner trade. These and other favorable factors contribute to a low risk weight.

3. Redundancy of Systems

Redundancy of mechanical, navigation, and electrical generation systems on board ships is divided into three subcategories: (1) no redundant system, (2) partial, and (3) total. Total redundancy receives the lowest risk weighting. To qualify for total redundancy, a ship must have twin screws, two independent sources of electrical generation, two steering systems, and two radars. With the exception of many passenger vessels, most vessels receive the partial redundancy risk weight due to being a single screw vessel. A vessel with no redundancy is rarely encountered and usually involves a ship with impairments.

4. Class Society

Class society has three subgroups: (1) International Association of Classification Societies (IACS), (2) IACS/associate, and (3) non-IACS. A vessel which is classed by a classification society that belongs to IACS receives the lowest risk weight due to high standards required by IACS. Eleven classification societies are IACS members. Four classification societies hold IACS associate status, which receives the next highest risk weight. Classification societies that are neither IACS nor IACS associates are labeled “other” and receive the highest risk weight. Approximately 30 other classification societies worldwide fall in the “other” group. Unclassed vessels such as fishing and ferry boats receive the “other” risk weight as a default value.

5. Owner Type

Owner type lists four owner subcategories: (1) shipping companies, (2) operating companies, (3) governments, and (4) single ship owners. The experts concluded that a ship owned by a shipping company poses the least risk. Shipping companies are generally well organized and staffed by maritime professionals. A shipping company is in the primary business of owning and operating ships. An operating company may be a bank or other financial institution with limited expertise as a ship owner or operator and is considered a higher risk.

Ships owned by governments receive the second lowest risk weight. National governments tend to be strongly regulatory and generally conscientious in shipboard management practices. The highest risk weight accrues to
single ship owners. Single ship owners historically hire lower paid crews, spend less on maintenance, and rely on minimal shoreside staffing.

Determining ship ownership can be difficult. Vessel ownership is often heavily veiled for legal or financial reasons. Because ownership type is a valid risk indicator, increased access to ownership information would improve screening capability.

6. **Pilotage**

The matrix assigns zero risk weight to vessels with a pilot on board and very high risk weight to vessels with no pilot. U.S. flag vessels of less than 1,600 gross tons do not require a pilot in Washington State. The “no pilot” risk weight is the highest single risk value in the matrix. The experts clearly view presence of a pilot as a major marine safety factor.

7. **Changes in Status**

The following are viewed as significant risk factors: (1) changes in ownership, (2) changes in flag, and (3) changes in classification society. The highest risk weight in this category is assigned to vessels with a recent ownership change. Changes of ownership almost always imply risk. When a ship changes owner, an array of unknowns is introduced. Management practices change, new crews are often hired, and organization can falter. For similar reasons, a change of flag receives the second highest risk weight in the change category.

Changes of class receive slightly lower risk weight than change of flag. When a ship changes from a non-IACS classification society, like the Croatian Classification Society, to an IACS member like Det Norske Veritas (the Norwegian Classification Society) or the American Bureau of Shipping, the class upgrade is not considered a “change” and no values are assessed. A switch between two IACS classification societies is similarly not considered a change. Class changes which are valued include changes from an IACS or IACS associate member to a non-IACS class society, changes between two non-IACS members, and multiple changes in a short time period even if the ship ultimately is classed by IACS class society.

8. **Flag**

Flag has five subcategories: (1) U.S./Canadian flag, (2) traditional maritime, (3) flag of convenience, (4) new offshore, and (5) other. The experts assigned low risk weightings to U.S./Canadian flags and traditional maritime flags (Japan, United Kingdom, Norway, Sweden, Denmark, France, Germany, Italy, Netherlands, and Finland). The flags listed in the three other groups each received similar and higher risk weights. The remaining categories are traditional flags of convenience (Liberia, Panama, Malta, Bermuda, Bahamas, Cyprus, Singapore, and Hong Kong); new offshore registries (Vanuatu, Marshall Islands, Cayman Islands, Honduras, Isle of Mann, Netherlands Antilles, Madeira, and Gibraltar); and “other,” which receives the highest risk weighting and includes all other flags.

9. **Violation History**

Violation history assigns weights to reportable marine violations: (1) no violation, (2) recent major violation, (3) recent minor violation, (4) repeated major violation, and (5) repeated minor violation. The highest risk weight is assigned to “repeated major violations” followed by “repeated minor violations” followed by “recent major violation” with the lowest risk assigned to “recent minor violation.”

10. **Vessel Casualty History**

Vessel casualty history refers to marine casualties including collisions, groundings, fires, and other accidents that result in damage to the vessel. Matrix subcategories are the same as for violation history and rely largely upon Coast Guard definitions of major and minor events: (1) no casualty, (2) recent major vessel, (3) recent minor vessel, (4) repeated major vessel, and (5) repeated minor vessel. Other casualties include serious injuries and loss of life.
11. Key Personnel History

Key personnel history lists personnel violations of senior officers on board the vessel, including the master, chief mate, chief engineer, and first assistant engineer. Subcategories are the same as those found under violation history: (1) no violation or casualty, (2) recent minor personnel, (3) recent major personnel, (4) repeated minor personnel, and (5) repeated major personnel. This human factors information is second only to “no pilot” as a high valued risk score. The difficulty of accessing reliable key personnel history is the single most significant obstacle to effective vessel screening.

Hawaii Tanker Fleet Analysis

With this as background, we attempted to compile information that would have allowed a thorough understanding of the trends in the quality of vessels used to haul crude oil to Hawaii. We asked the two companies that import crude to Hawaii — BHP and Chevron — in letters dated December 12, 1994, to provide the following information on all vessels they used in Hawaii since January 1989:

1. Vessel name
2. Age and where built
3. Length, beam, cargo capacity
4. Hull design (i.e., double hull, double bottom, segregated ballast, etc.)
5. Classification society and changes
6. Most recent status of class report
7. Flag and changes in flag
8. Owner and operator
9. Complete casualty history, with detailed investigation reports
10. Pollution history
11. Crew complement, nationalities, any alcohol or drug violations
12. Ports-of-call of vessel
13. Maintenance schedule, major repairs completed
14. History of any deficiencies and violations found by class society, flag state, and/or port state (i.e., USCG) inspections/examinations
15. History of detentions and/or refusals to enter port in vessel's history
16. Any other information assessed in your vetting process that might give us a better idea of the structural integrity, crew competence, and safe navigation of these vessels in Hawaii
17. Any future plans you have for your Hawaii fleet

Of this requested information, we received only the names of vessels calling at BPMT in 1993 and 1994 from BHP, and in 1994 from Chevron. We also requested from the U.S. Coast Guard MSO Honolulu in a letter dated December 5, 1994, information on violations and deficiencies found during tank vessel inspections, suspension and revocation actions issued to crew, casualty investigation reports, pollution incidents, detentions, etc. over the past 10 years, but were unable to obtain the information without submitting a Freedom of Information Act Request to Coast Guard Headquarters, a lengthy and costly process.

To construct a general characterization of the Hawaii tanker fleet, we gathered information on those vessels that visited Barbers Point Marine Terminal in 1994 from the U.S. Coast Guard Marine Safety Information System (MSIS) through Marine Safety Office (MSO) Anchorage, the U.S. Coast Guard Port State Information Exchange (PSIX) through Prince William Sound Regional Citizens Advisory Council, Clarkson's Tanker Register (1994), and the American Bureau of Shipping Register both provided by Arco Marine in Anchorage, the Tanker Advisory Center Ratings provided by Art McKenzie (1995), and information provided directly by Teekay Shipping in Vancouver B.C.
The results of our tanker fleet analysis compiled in Figure 1 and Table 1 indicate that the overall quality of the Hawaii tanker fleet is above world averages. The Hawaii fleet is generally newer than the world fleet average; are classed by one of the four most reputable IACS Classification Societies; are mostly operated by just two shipping companies (Chevron and Teckay Canada); have a higher percentage of double hulls than world average; and are rated substantially higher than world average in the McKenzie Ratings. This quality standard in the Hawaii fleet is almost certainly a recent — post OPA 90 — phenomenon, and probably results from owner/charterer concerns about OPA 90 liability provisions. The owners/charterers deserve credit for the quality of most of the vessels they are using in Hawaii. Commenting on his ratings of the list of vessels we provided him, Art McKenzie said, “They’re doing a good job selecting vessels there.” (Art McKenzie, pers. comm. 1995)

Figure 1. Results of tanker fleet analysis.
<table>
<thead>
<tr>
<th>TANKER</th>
<th>FLAG</th>
<th>DWT</th>
<th>TANK</th>
<th>GRT</th>
<th>LOA</th>
<th>BMT</th>
<th>TRIM</th>
<th>CARGO</th>
<th>TOTAL</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td>Apache</td>
<td>US</td>
<td>163,494</td>
<td>1,032,000</td>
<td>149,748</td>
<td>270,000</td>
<td>Chevrot, Transport</td>
<td>Mitsubishi</td>
<td></td>
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<td>667,000</td>
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<td>163,494</td>
<td>1,032,000</td>
<td>149,748</td>
<td>270,000</td>
<td>Chevrot, Transport</td>
<td>Mitsubishi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alan B. Morehead</td>
<td>US</td>
<td>118,963</td>
<td>667,000</td>
<td>146,000</td>
<td>270,000</td>
<td>Chevrot, Transport</td>
<td>Mitsubishi</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
That being acknowledged, it cannot be concluded that the quality of the Hawaii fleet is as high as it should be. Our results point to several risk factors. Of the 55 vessels that called at Barbers Point in 1994, most are flagged by Flag of Convenience countries, most are in the size range of 700'-900' that the Coast Guard’s Tanker Safety Study Group found to have more reported structural failures than other sized vessels, most are single hulled, five are rated below average by McKenzie’s rating system, 16 are 15 years old or older, and many appear to be owned by single vessel companies and banks. Additionally, we were constrained by lack of adequate information to independently assess the quality of the fleet. Lastly, it must be remembered that this analysis pertains just to the tanker fleet in the Barbers Point trade. We made no attempt to identify and/or assess the general quality of other large vessels, particularly cargo vessels or oil tankers that are “vessels of innocent passage” through more remote island waters.

The most important limitation in concluding much from this information concerning casualty/spill risk is that all these analyses capture only a few easily quantifiable aspects of spill risk. The most poignant example of this is that the Exxon Valdez was considered to be one of the lowest risk vessels in the world. At the time of its grounding, the Exxon Valdez was only three years old, built by a reputable shipyard, owned by a large shipping company with a long history in the business, had no history of casualties or other violations, had state-of-the-art electronics, was flagged in the U.S. and classed by ABS, was under VTS surveillance, had never changed ownership or status, and had the highest McKenzie Rating. It was, in essence, the “Star of the Fleet.”

Casualty History for Lower Rated Vessels

The following is some limited casualty history information for some of the lower rated (McKenzie Ratings) tankers in the Hawaii trade as reported in the Coast Guard’s Port State Information Exchange (PSIX). It is by no means a complete casualty history. For instance, the Prince William Sound lost engine power in Prince William Sound in 1977 and drifted in a gale for 16 hours with over 850,000 barrels of crude on board. Tugs were unable to take the disabled vessel in tow because of the weather, and it is only because the tanker regained her own engine power within minutes of grounding that Alaska’s first catastrophic spill did not occur then. That this important incident is not reflected on this casualty list is indicative of the limited utility of such presently available casualty databases. It is interesting to note that all of the below average tankers calling at BPMT are those that are also in the Alaska (TAPS) trade and thus U.S. flagged. Also, three of the four vessels owned by Keystone Shipping in the Hawaii trade are rated below average. This company has a very low overall McKenzie rating for its fleet – 1.3 (Walder 1994).

**Chevron Mississippi**  
McKenzie Rating 3

- 2/73 Boiler trouble, return port, San Francisco, no details
- 1/74 Bad weather Gulf of Alaska, three dead
- 10/91 Casualty, equipment failure
- 1/92 Casualty, equipment failure
- 5/92 Casualty, equipment failure
- 11/92 Casualty, minor pollution
- 4/93 Casualty, structural failure

**Oversea New York**  
McKenzie Rating 2

- 9/88 Hit dock while berthing, Long Beach, one skin plate damaged, repaired Tampa, FL
- 12/88 Hit bottom laden, Mississippi River, repaired Tampa Bay
- 2/89 Hit bottom Sabine River, two plates and propeller damaged
- 1/90 Bad weather damage, repaired Tampa Bay
- 8/90 Hit bottom Mississippi River, repaired Tampa, FL 11/91
- 12/90 Sustained heavy weather damage while on voyage from Valdez, surveyed and repaired in Tampa, FL 11/91
- 11/91 Main Engine, high and low turbine, damage repaired Tampa, FL
Overseas Ohio  McKenzie Rating 2
4/78  Hit lock Panama Canal which damaged lock
1/92  Grounded Sabine Pass, TX, 10 hours, refloated with assistance, ladened, no damage or spill reported
7/92  Main engine high pressure and low pressure turbines and generator turbine damaged, repaired Tampa, FL
1/94  Struck ice approximately five miles west of Bligh Island, escorted to Valdez, tear in hull secured, bow ruptured and ballast tank holed, repaired Portland, OR

Prince William Sound  McKenzie Rating 2
4/77  Collision with bulk carrier “Ariana” while lightering in outer harbor at Alexandria, due to swell prevailing and rolling ships together, other ship damaged.
5/86  Engine room flooded due to valve malfunction in the cooling system, towed to Los Angeles, damage $3,000, repaired in Portland, OR
10/86  Main engine reduction gears damaged in Willamette River, damage $1,000,000
1/88  Tank cracks, repaired Victoria
5/93  Collision with tug “Hunter” while being escorted, San Francisco, CA

Tonsina  McKenzie Rating 2
10/87  Collision with tanker “Jussara” while on voyage to Chiriqui Grande, 1 skin plate damaged, $26,000
11/91  Bottom fractures repaired Portland, OR

Kenai  McKenzie Rating 2
10/88  Generator rotor and bearings damaged, repaired Tampa, FL 4/89
12/88  Sustained damage to No. 2 after turbo alternator off Chiriqui Grande
5/89  Stern tube bearing damage requiring replacement
6/89  Main engine high pressure turbine rotor damage on trials, towed back and repaired Tampa, FL
10/92  Sustained steering gear trouble in the Valdez Narrows, pushed back on course by “Sea Voyager” and proceeded to safe anchorage in Prince William Sound where repairs were made

Keystone Canyon  McKenzie Rating 1
7/88  Rudder stock and bearings damage, reported from Portland, OR
12/90  Surveyed afloat and on dry dock at Portland, OR in respect of shell plate fracture, repaired.
4/91  Propeller damage while on voyage from Valdez to Los Angeles, diverted to Anacortes for discharge, repairs in Portland, OR.
6/92  Caught fire while under repairs at Swan Island, Portland, OR, repaired
6/93  Put in Portland, OR for 24 days for repairs, tank fractures.
10/94  Struck bridge and grounded at Astoria, OR after breaking moorings in heavy weather, sustained 4’ gash, 15–20 feet above the water line and a 3’ fracture below the water line in No. 2 cargo hold. Water ingress pumped out. Refloated and repaired.

Overseas Chicago  McKenzie Rating 3
2/87  Sustained main switchboard damage at Tampa, FL while changing over from ship to shore power, minor explosion and fire, extinguished by crew, repaired.
12/91  Heavy weather damage while on voyage from Valdez to Long Beach, damage repaired Portland, OR 4/92

Overseas Juneau  McKenzie Rating 3
2/84  Rudder damage found at San Pedro, damage $20,000
8/89  Rudder arrangement damage found in drydock at Portland, OR
Crews and Human Factors

"All is Not Well on the Crewing Front" (NUMAST 1993)

Without question, the single most important factor in the prevention of large oil spills in Hawaii is the competency, vigilance, and alertness of the crews operating tankers, tank barges, and other large vessels. Although it was impossible within the scope of our evaluation to characterize the adequacy of these crews, some general observations can be made.

The U.S. Coast Guard Tanker Safety Study Group identified the most significant factors adversely affecting the operational safety of oil tankers. As human factors have been found to contribute to 90% of all groundings and collisions and about 75% of all fires and explosions, the Study Group reaffirmed the conventional wisdom in the merchant marine community that "the primary emphasis in preventing marine casualties should be on improving the ability of human beings to function effectively in the shipboard environment" (U.S. Coast Guard 1989).

The study group found that errors in ship control and operation resulting from human factors include the following:

- poor decision making due to lack of experience, practical skill, or procedural competence
- inaccurate use of radar and collision avoidance systems
- improper weighting or disregard of important information or unpredictable elements
- lack of adequate bridge information systems
- unfamiliarity with equipment
- ineffective or inadequate bridge system warning signals
- inadequate number of watchstanding personnel
- inadequate navigation charts and publications
- information overload, distractions, and confusion
- failure to make use of VHF-FM radio to confirm passing agreements
- faulty position keeping
- physical impairment, including drug and alcohol abuse
- inattention to duty
- inaccurate prediction of another vessel's action
- misunderstood or improper execution of orders
- excessive risk taking due to technological advances and management profit pressures

Errors resulting from human factors occur not only with the bridge crew, but also with the engine room and deck crews. Not examined by the TSSG, but consistent with its findings, is an extensive body of research on human performance in stressful/boring situations, such as that on the bridge of an oil tanker. Sleep deficit can cause irritability, impaired reasoning during complex decision making, over-confidence, attention lapses resulting in errors of omission (such as forgetting that the ship is on autopilot), and overall reduction in situational awareness. Adding to this, the other stressors in the shipboard environment such as noise, vibration, temperature and humidity extremes, heavy seas, boredom from low workload, and erratic performance during high workload periods. As a result, attention, vigilance, and performance all suffer. Mistakes made in reading charts, taking position fixes, reading intentions of other vessels, operating the autopilot, trimming a ship during loading or unloading, inverting the cargo holds, operating cargo valves, connecting loading/offloading arms, monitoring mooring lines, and tank cleaning, all could have and have had disastrous consequences.

To a real extent, all of this is symptomatic of a technological society in which we have built and become dependent upon automated systems that were designed for fairly simple operation by humans, provided no mistakes are made – 747s, nuclear plants, chemical plants, oil tankers. The problem, of course, is that humans
make mistakes, and when a mistake is made in operating one of these relatively new human-machine systems, enormous consequences can ensue.

**Human Factors**

In interviews concerning human factors with 40 members of the Alaska maritime community — tanker masters, chief engineers, chief mates, other deck and engine crew, company management, pilots, escort vessel personnel, etc. — Grabowski and Sanquist (1994) identified nine significant human factor concerns. Because each of these factors is important in assessing oil spill risk, a brief summary of the concerns expressed by mariners in the interviews follows:

1. **Personnel Skills, Resources, and Certification** — whether adequate crew resources were deployed on vessels, what manning levels, training, technical support, and certification would enhance safety

2. **Fatigue** — the impacts of seasonal variation in daylight, multiple time-zone crossings, and sleep disruption has on work patterns, and appropriate matching of skills/tasks to watch standing schedules

3. **Automation and Technology** — considerable concern about the utility and additional workload created by new technology — whether certain automated systems such as ECDIS, ADSS, automatic docking equipment, integrated bridge systems, and others actually enhance safety by reducing error-prone, repetitive tasks or place new and greater demands on crew that overload human abilities to process information

4. **Training** — concerns about the adequacy of training on automated systems (much of the training on new computer and automated systems is “on-the-job” while at sea), and desire for more team training for bridge resource management

5. **Changes in the Maritime Industry** — concern for the rapidity and direction of recent changes in the industry, new regulations and requirements, and the “brain-drain” as individuals leave for other employment and concern for migration of individuals within the industry and its effect on crew continuity, morale, decision making, etc.

6. **Individual and Organizational Behavior** — concerns about individual and organizational communication, information sharing, effective decision making, interfaces and interaction between ship management, officers, terminal operators, state and federal regulators, VTSs, escort vessels, pilots, the public, etc.

7. **Policies and Regulations** — concerns about overall system safety and system effectiveness — does increased regulation make the system safer?

8. **Facilities and Inland Marine Transport** — concerns about interfaces between terminals and vessels, about barge traffic safety, and about storage facilities

9. **Oil Spill Response** — interest in the contribution of aviation resources to spill exercises and response (i.e., decision making, communication, information sharing, and more user-friendly decision support systems)

NUMAST reports that “during the past two decades intense competition has dominated international shipping. Cost-cutting policies have produced the retrograde results of dramatically reduced seafarer training, cuts in crew numbers, increased use of flags of convenience, widespread use of low-cost seafarers from non-traditional maritime nations and severely curtailed investment programmes for new ships.” In 1989, the Institute of London Underwriters (ILU) issued the following warning: “Manning levels, and the quality and skills of officers and crew need the most careful monitoring — particularly where flagging out has taken place.” NUMAST goes on to say, “What is certain is that there is now a recognition within the international shipping industry that all is not well on the crewing front.” In addition to language problems, the increasing use of mixed nationality crews (as in Hawaii) probably has psychological and social implications for safe vessel operation. The state should conduct a thorough analysis of crew competency in the Hawaii fleet and develop a crew monitoring and enhancement program.