

***OIL
TRANSPORT
TECHNOLOGY***



Alaska State Legislature

HOUSE OF REPRESENTATIVES
COMMITTEE ON RESOURCES

POUCH V
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Tentative

HOUSE RESOURCES COMMITTEE, OIL SPILL HEARING

Tuesday, January 16, 1990
3:00 to 5:00 p.m.
Capitol Room 124

TECHNOLOGY OF THE TRANSPORTATION OF OIL

Virgil Keith - Engineering Computer Optecnomics Inc.
State of the art technology relating to tanker design, vessel traffic monitoring and clean up technology.

Tom Gillette - Regulatory Coordinator, Exxon Shipping Co.
Exxon's position on improving tanker design, vessel traffic monitoring in Prince William Sound and Cook Inlet.

Art McKenzie - Director, Tanker Advisory Center Inc.
Discussion of Double Hull Tankers.

Captain Bodron - Chief, Marine Safety Division
U.S. Coast Guard, Alaska
Coast Guard's present regulations as they relate to tanker design and vessel traffic monitoring in Alaska and proposed changes.

HOUSE RESOURCES COMMITTEE, OIL SPILL HEARING

Wednesday, January 17, 1990
3:00 to 5:00 p.m.
Capitol Room 124

SPILL RESPONSE AND CONTINGENCY PLANNING

Bob LeResche - Director, Alaska Oil Spill Coordinating Office
The State's response to the Exxon Valdez oil spill including
compensation, social and economic impact and recommendations
for better response systems for the future.

Frenchie Mallot - Department of Natural Resources, Forestry
Incident Command System and its utility for major oil spills.

Mike Williams - V.P. Environmental Planning and Control,
Alyeska Pipeline Service
Alyeska's proposed changes in both contingency planning and
response capability in Prince William Sound.

Robert Weatherford - Business Analysis Mgr.,
Exxon Shipping Co.
Contingency planning

Captain Bodron - Chief, Marine Safety Division
U.S. Coast Guard, Alaska
Regional Response Team and its role in response planning and
the Coast Guards On Scene Coordinator's report.

Larry Dietrick - Director Environmental Quality
Department of Environmental Conservation
Post spill response planning, use of ICS and review of
industry contingency plans.

HOUSE RESOURCES COMMITTEE, OIL SPILL HEARING

Thursday, January 18, 1990
3:00 to 5:00 p.m.
Capitol Room 124

EXISTING STATE AND PROPOSED FEDERAL LAW
STATE PRE-EMPTION
INTERSTATE COMPACTS

John Katz - Special Counsel, Federal State Relations,
Office of the Governor, Washington D.C.
Status of federal legislation, the conference committee and
the state's priorities for the legislation.

Dennis Kelso - Commissioner
Department of Environmental Conservation
Status of legislation passed last session, the B.C. task
force, the state's position on pre-emption as it relates to
state requirements and possible federal pre-emption.

- Attorney General's Office
SB 406 and reintroduction of legislation that may potentially
be pre-empted by federal law.

Zygmund Plotter - Harvard Law School Professor, SEA Grant
SEA Grant Project including Pre-emption and Interstate
compacts.

HOUSE RESOURCES COMMITTEE, OIL SPILL HEARING

Tuesday, January 23, 1990
3:00 to 5:00 p.m.
Capitol Room 124

REGULATORY OVERSIGHT AND ENFORCEMENT

Al Ewing - Environmental Protection Agency
Role in oversight and enforcement

Captain Bodron - Chief, Marine Safety Division
U.S. Coast Guard, Alaska
Role in tanker inspections, personnel, # of inspections a year
and ability to ensure compliance.

Dan Lawn - Department of Environmental Conservation
Difficulties as a field officer to gain access to the Pipeline
terminal and suggestions to make access and oversight more
effective. Inspections of facilities and tankers in order to
prevent oil spills or improve oil spill response.

Mike Williams - V.P. Environmental Planning and Control
Alyeska Pipeline Service Co.
Alyeska's view of appropriate oversight and enforcement of
environmental laws and regulatory requirements.

Michelle Brown - Assistant Attorney General
Office of the Attorney General
Methods for improving statutes to ensure proper oversight and
enforcement as well as incentives for compliance.

Mike Weniq - Staff Attorney, Trustees for Alaska
Proposals for improving oversight and enforcement

JOINT OIL SPILL HEARING
House Resources, Senate Oil and Gas, Senate Resources

Wednesday, January 24, 1990
1:00 to 5:00 p.m.
Location to be Announced

ALASKA OIL SPILL COMMISSION REPORT

1:00 to 3:30 - Alaska Oil Spill Commission

Walt Parker, Chair, AOSC
Esther Wunnicke, Vice Chair, ASOC
John Sund, Commission Member
John Havelock, Legal Counsel and Executive Director

3:30 - 5:00 - Administration testimony on Commission Report

Thursday, January 25, 1990
1:00 to 5:00 p.m.
Location to be Announced

1:00 to 2:30
Oil Industry testimony on Alaska Oil Spill Commission Report

2:30 to 5:00
Public testimony on Alaska Oil Spill Commission Report



**Report
to the
Premier**

**on Oil
Transportation
and Oil Spills**



by David Anderson, Special Advisor

November 1989

Chapter Three

Prevention

Reducing Oil Spills

Section 3.01. Introduction

One problem with using a public hearing process as a starting point for an examination of methods to improve the safety of shipping is that the many suggestions that come forward do so in an uncoordinated way. Further, there is absolutely no consensus as to what the word "safety" means, although just about everyone who gave me their views over the past six months used the word frequently. In this section I will attempt briefly to suggest a framework for the discussion, recommendations and suggestions that follow.

First, let me wrestle with the term safety. The dictionary defines it as freedom from danger or risks. The word is subjective and highly ambiguous. It is not a word that can be related to any mathematically precise figure. What is "safe" depends on who is speaking, at what time, and on their current perception of what is an acceptable level of risk. Complete freedom from danger or risk is an impossible goal.

The second problem with safety is the change that comes over people's perceptions before and after an accident. It is enormously difficult to predict what society regards as an acceptable level of risk or safety in advance of an accident. As an example of this, consider the views of Americans, particularly Alaskans, before and after the Exxon Valdez incident. Before the accident the level of risk was reasonably well known. Risk level predictions had been made as early as 1971, and had been refined considerably by 1973. In fact, such predictions have turned out to be unduly pessimistic. The total number of and damage done by the Exxon Valdez and all other incidents since the route was established has been below the predicted level when the 1973 decision was made to proceed with the construction of the pipeline and establish the terminal at Valdez. Thus, from the point of view of oil spills and damage to their coastline, Americans and specifically Alaskans have been luckier than they expected to be when they decided that the spill risk was acceptable and that the system should be established.

Writing six months after the Exxon Valdez spill, it is hardly necessary to comment on the change in the perception of Americans and in particular Alaskans as to what is an acceptable level of risk from tanker accidents. It is vastly different. Such changes in the public's perception of acceptable risk make the task of risk analysis by planners and governments extremely difficult.

A third and final point to note in connection with determining an acceptable level of risk is that risks are not equally borne. The parties who benefit from a tanker traffic may be very different from those who can expect to bear the risks. Alaskan oil no doubt benefits the people of the United States. Colin Richardson of Skidegate pointed out that much of the risk is elsewhere, and to other people, when he remarked at a meeting in Queen Charlotte City:

If a spill hits the Islands we will be finished...our future depends on fishing and tourism, and they depend on a clean environment.

Paddy Greene of the Prince Rupert Fisherman's Cooperative expressed the same concern when he said:

Environment is the lifeblood of our coastal communities

The extensive participation of coastal residents and particularly Native Peoples in the hearing process was in part by reason of this uneven burden of risk. They perceive, entirely correctly, that they and their lifestyles are subjected to a much greater risk from tanker traffic and oil spills than Americans, or indeed most British Columbians, the majority of whom are residents of the lower mainland. That others, elsewhere, benefit is hardly consolation.

Section 3.02. Ship Safety Structural and Mechanical

There are two major sources of crude oil tanker traffic passing near or through Canada's West Coast. The first is the tanker traffic from Valdez to the lower 48 states and the US Virgin Islands, and the other is traffic carrying Canadian exports of heavy crude to the US gulf ports, Japan, Korea, Taiwan, Malaysia and Thailand. In addition to tankers, there is an extensive distribution system by three small coastal tankers and an extensive tug and barge fleet.

In large measure due to the Exxon Valdez incident in Prince William Sound, various design features which might improve the safety of tankers were raised at the public hearings. Perhaps the most frequently called for construction features were double hulls or double bottoms, as are now required for chemical carriers.

It should be noted that such proposals have a long history. In 1972 in an effort to have the Alaska Pipeline Enabling Act passed by Congress, the then Secretary of the Interior, Rogers Morton, informed the Joint Economic Committee of Congress that double bottoms and segregated ballast systems would be required for all vessels on the Valdez run. In the following year in London at a meeting of the International Maritime Consultative Organization, the United States representative called for double bottoms to be required world-wide on all new tankers. Two years later, in 1975, the Coast Guard regulations for the Alaskan fleet were introduced. Surprisingly, they did not require the vessels to have double bottoms. At present, 18% of the 92 vessels registered for the Alaskan trade have double bottoms. A further 9% also have double sides.

This about face on tanker safety by the US Coast Guard in support of the position of the industry it was charged with regulating has never been satisfactorily explained. As recently as October 15, 1989 this fourteen year old omission was the subject of a highly critical series of investigative articles by the Anchorage Daily News.

From time to time since 1975, the issue of double bottoms for US ships on the Alaska run resurfaced. In early 1977, following a number of tanker accidents in US waters, the Secretary of Transportation, Samuel K. Skinner, was asked by President Carter to develop new tanker regulations for new construction. In May of 1977 proposed regulations were issued by the Coast Guard. These regulations called for double bottoms. Once again, in February of 1978, the issue was taken to the IMO, and once again it was rejected. Again, as in the mid 70s, the US then abandoned it's efforts. In effect, the 1977-1978 exercise was a carbon copy of the early 1973-1975 experience.

Early in the summer of 1989 Senator Brock Adams of Washington State introduced a bill to require new US tankers over a certain size to have double bottoms. On August 4th this bill was defeated, 51-48. Instead, the Secretary of Transportation has been asked to conduct yet another study of the issue. The purpose of this new study by the Secretary of Transportation is to consider the potential frequency of those accident situations in which a double bottom or double hull may increase, rather than reduce, the spill resulting from the tanker involved in the incident. This study, and another to be done by the National Academy of Science for the American Petroleum Institute on increased use of ballast sides and reduced tank size, are due next summer.

In most situations, double bottoms can be expected to reduce the oil spilled from a tanker involved in a grounding. In a 1975 study by naval architect James Card, done for the US Coast Guard for 30 spills in US waters from tankers for the years 1969 to 1973, it is concluded that some 90% of the oil spilled would not have been released had the vessels been constructed with double bottoms. A report in the Seattle Post Intelligencer of August 5th, 1989 of a US Coast Guard study of the Exxon Valdez incident suggest that from 25 to 60% of the oil released might have been contained on board had the vessel been constructed

The most frequently mentioned was twin screw tankers. Almost all large tankers, (with the exception of a small number of Ultra Large Crude Carriers which are unable to obtain a single engine capable of delivering the power required to move their 400 thousand dead weight tons) are single boiler, single screw vessels. Thus a failure of a boiler, or a shaft, or a propeller, results in a vessel at the mercy of wind and waves. The problem was illustrated by the Exxon Philadelphia which, a month after the Exxon Valdez incident, was adrift without propulsion or steerage some miles north of Cape Flattery. A similar incident occurred some five years previously in the Gulf of Alaska, where a disabled tanker, the "Prince Williams Sound", was within an hour of breaking up on the shore of the Sound from which it took its name. Fortunately, in the Exxon Philadelphia case a tug was able to take the stricken vessel in tow, and in the earlier mishap the engine was restarted and the vessel was able to proceed under its own power.

Despite these two incidents, I do not believe that a requirement for a complete and independent second propulsion system is justified on a cost/benefit basis. The cost of the second propulsion system is approximately 10 - 15 % of the overall cost of the vessel. More safety is achieved by spending equivalent amounts of money elsewhere, particularly on emergency escort and response vessels discussed below. A single screw, single shaft, double boiler vessel, is a different matter. The Atlantic Richfield Company 120,000 GWT vessels coming into Cherry Point from Valdez are of the type. If one boiler is unserviceable the other is still capable of providing 10-11 knots. This is an important safety feature, and Atlantic Richfield is to be commended for incurring the extra cost that this represents.

Another frequently mentioned structural modification or addition is the bow thruster. Bow thrusters are valuable at low speeds, and in confined waters, particularly when a vessel is manoeuvring without tug escort in confined waters. After examining the literature on the matter and discussing this with experienced mariners, it is my considered opinion that an escort vessel system is a great deal more cost effective than bow thrusters. Provided adequate escort vessel services are available, bow thrusters do not provide substantial increases in safety.

Recommendation: That a technical examination be undertaken to determine whether the emergency use of backup power systems for propulsion to provide steerage is feasible for existing tankers on the Puget Sound or on the Vancouver routes.

Recommendation: That all tankers over 25,000 tons entering the Strait of Juan de Fuca be double boiler vessels.

Section 3.03. Ship Safety Fleet Reductions

The environmental advantages of reducing the number of tankers delivering oil to west coast ports or loading oil at the Port of Vancouver have been discussed in the preceding chapter. In addition, even without the reduction in oil deliveries contemplated by that chapter, reductions in risk can be achieved by altering the composition and quality of the Alaskan fleet. The Alaskan service, by reason of weather and sea conditions in the northeast Pacific, and the angle at which the prevailing ocean waves hit the tanker hull when southbound on the Valdez run, is particularly hard on ships. Indeed, I believe there is no more punishing major tanker route in the world. This was known in 1973, when the decision to proceed with the route was given, and at that time the best vessels, of new construction, was promised by the United States administration. The extraordinary and unexplained failure of the United States Coast Guard in 1975 to establish the level of ship standards for vessels on the route which the public was led to expect by the statements of the United States government two years earlier is becoming the subject of an extensive literature, beyond the scope of this report.

There are ninety two vessels currently with permits that allow them to engage in the Alaskan trade. These range in size from three 265,000 dead weight ton vessels, the Eastern Lion, Southern Lion and Western Lion, to the 16,000 dead weight ton Lion of California. The age of the vessels in the fleet also varies considerably, ranging from the 46 year old Texaco Minnesota to the sister ship of the Exxon Valdez, the Exxon Long Beach, which was completed three years ago. The average age of the fleet is 18 years. The vessels are owned by eighteen different companies, some with one ship licensed for service in Alaska, while Exxon has the largest number, seventeen.

The composition of the fleet is complicated by the fact that American law does not allow the largest oil company of the North Slope, British Petroleum, to own vessels directly. As a foreign owned corporation, it uses a complicated system of chartering and minority interest control. This is particularly unfortunate, as BP has a deservedly fine reputation for its world wide tanker fleet, and the company over the years has provided some highly trained and competent personnel to the Valdez operations of the Alyeska Service Company, particularly in the early years of the operation.

The fleet has been rated by the Tanker Advisory Centre of New York, run by a former Exxon tanker officer with some 45 years of experience, Captain Arthur McKenzie. His ratings are used by insurance companies and others interested in determining what risks these ships represent. The ratings are based on age, flag, owner, size of the owners fleet, and the number, type, and frequency of reported casualties, incidents or near incidents. A casualty is an accident that leads to an insurance claim, or a fine or detention by local port authorities. Fourteen vessels in the fleet are rated as "low". Another 9 are rated as "fair", while 45 are rated as "good". The remainder are classified as "very good" or "high". Appendix J lists the vessels in the first two categories.

The Exxon Valdez incident has demonstrated that accidents come to good ships (it was rated by the Tanker Advisory Centre as "high"), and that structural or mechanical problems are not the only cause of accidents. However structural and mechanical failure are an important source of accidents, both directly and as a contributory cause. An important objective for increased safety would be to require the entire Alaskan fleet to be in the "good" category or better. This was the commitment of the United States government in 1973, and it should be the objective today. For other vessels not on the Alaskan route, a similar approach should be adopted. As there are no tankers dedicated to the Vancouver traffic, higher classifications, "very good" and "high" can be adopted without disrupting existing arrangements.

Recommendation: That tankers which are classified below the "good" category of the Tanker Advisory Centre of New York, or some similar reputable advisory service be decertified for the Alaskan trade.

Recommendation: That no tanker be permitted to load crude oil in Vancouver unless it has been rated by the Tanker Advisory Centre of New York, and has received a "very good" or "high" rating.

Section 3.04. **Ship Safety**
 The Swedish Vacuum System

Among the encouraging experiences of the public hearings was the perseverance, ingenuity and enterprise of many of the participants in seeking out information on new developments in tanker and barge safety. A good example of this work was the research done by Mr. Tony Holland of Vancouver on the Swedish vacuum system of retaining oil in the tanks of a holed tanker. After numerous telephone calls to Sweden, London, and U.S. Coast Guard establishments in the United States, involving the expenditure of considerable time and money, details of this system and supporting literature were assembled and presented at the public hearing in Vancouver in mid June. His contribution, and similar contributions of many others on a wide variety of topics, made the hearing process a very informative experience.

The theory behind the vacuum system is simple. If air cannot enter the top of a tank holed at the bottom, the fluid in that tank will not escape. This is by reason of the hydrostatic underpressure at the top of the fluid which holds the column of fluid in place. School children with a glass of water inverted over a saucer, or those who lift a straw full of a soft drink after placing a finger on top of the straw, are applying the same principle. If this principle can be successfully applied to the internal tanks of tankers, in the case of an accident the amount of oil that might escape from the vessel and enter the sea would be dramatically reduced. To apply it will require modifications to all vents on the tanks of the vessel, and possibly deck or hull strengthening. Such modifications would be inexpensive in comparison with other proposed design changes with similar objectives. Officials of the Swedish Maritime Administration believe that it would cost from 1 to 3 percent of the total cost of the construction of a new vessel. To retrofit existing vessels with the system would present few difficulties.

Since it was first proposed in 1985, marine architects have raised a number of practical problems, the most important being related to the extra stress that can be expected on the vessel from the vacuum or underpressure created between the top of the oil and the underside of the deck. Tanker accidents often occur in bad weather, when major stresses are already on the vessel. Further, the grounding itself may have placed stresses on the hull and decks for which it was in no way designed and constructed. Critics of the proposal fear that under such circumstances the system could lead to buckling of the hull and the loss of even more oil, if not the ship itself.

In 1987 this concept was presented by Sweden to the International Maritime Organization. In the following year it was discussed at that the IMO's Maritime Environment Protection Committee. It is on the agenda for next year's meeting as well. Unfortunately, full engineering studies and testing of it have not taken place, so the discussion is theoretical rather than based on the observations of actual experiments.

Recommendation: That Canada offer to share with Sweden and other interested countries the engineering costs of testing the vacuum method of reducing the outflow of oil from a tank vessel in the event of a grounding or similar accident.

Recommendation: That Canada assist Sweden in its efforts to have the International Maritime Organization consider the merits of the vacuum system of oil retention.

**Section 3.05. Ship Safety
On Board Equipment
Autopilot**

An examination of pages 25 to 29 of the Report on the Probable Cause, Findings and Recommendations of the State of Alaska to the National Transportation Safety Board concerning the Exxon Valdez Oil Spill,¹ and other material dealing with the testimony of the two helmsmen of the Exxon Valdez on the night of the incident, Helmsman Claar and Helmsman Kagan, suggest that uncertainty as to the status of the automatic pilot may have played a part in the Exxon Valdez spill. In the light of the possible importance of this issue the Exxon Valdez incident, it can be expected that the United States' authorities will take steps to rectify the problem on United States vessels, and no recommendation in this regard is necessary. However the problem is in all probability generic to existing automatic pilots, particularly older models, on the merchant vessels of other nations.

Recommendation: That Canada require that alarm systems be retrofitted in all Canadian vessels to ensure that a helmsman who attempts to manually steer a vessel when the automatic pilot is engaged is immediately made aware of the need to switch off the automatic pilot.

Recommendation: That Canada raise this issue with the International Maritime Consultative Organization with the object of having such alarm systems retrofitted to all merchant vessels world wide.

¹ Dated 17 July 1989, and prepared by Robert Leresche, Oil Spill Coordinator for the State of Alaska.

**Section 3.06. Ship Safety
Prince William Sound Towing Package**

Attaching a tow cable to a disabled tanker can be a difficult and dangerous proposition. Three lines were attached to the Amoco Cadiz off the Brittany coast in 1978; in each case the attempt to tow the vessel head to wind and reduce its drift toward the rocks failed. Many factors can contribute to the success or failure of a tow line attachment operation. Crew training and preparation are very important. However even more basic is to have equipment on board the tanker which is adequate for the task, and which can be easily deployed.

The International Maritime Organization has standards for such equipment. However the Prince William Sound towing package is superior. It is described in Appendix C. This equipment is already on most of the tankers that enter the Strait of Juan de Fuca, by reason of it being a requirement for Prince William Sound waters. The safety of our own area would therefore be enhanced if this requirement were extended to other tankers coming to our coast. Were this a requirement, adequate equipment would be available, standardized gear would be on board, and training effectiveness would be maximized.

Recommendation: That the Prince William Sound Towing Package be mandatory equipment for all ocean tankers entering the Strait of Juan de Fuca.

**Section 3.07. Ship Safety
On Shore
Charts and Hydrographic Surveys**

Canadian charts are of high quality and enjoy an excellent reputation. Similarly current information for the coast exists in considerable quantities and is easily available. However, a number of participants, particularly fishermen and tug boat crews, claimed experience of currents and tidal movements which were not on the charts. Other participants were critical of the apparent lack of knowledge of the government authorities as to where the Nestucca oil would likely end up.

In my opinion, such criticisms of the personnel of the Department of Fisheries and Oceans are wide of the mark. The problem of Nestucca was not that the personnel of DFO did not know where currents might take oil; the problem was the misinformation that they were given by the American authorities, particularly the National Oceans and Atmospheric Administration about the extended, fan shaped arc of the oil spilled, compounded by further misinformation as to whether it had been swept out to sea by winds. The major problem of Nestucca was not a lack of information on currents by Canadian DFO, but rather misinformation from the U.S. about both the location and the size of the spill.

Nevertheless the Nestucca spill did raise the question of the extent of knowledge about currents off our shores, particularly currents at the mouth of the Strait of Juan de Fuca. Much is known about currents in that area at certain times of year; but not at other times of year.

A knowledge of currents, their locations and strengths, are vital in spill response. As is indicated elsewhere in this report, the abilities of oil retaining booms to hold oil in conditions in excess of a one knot current is not great. At a knot and a half, no oil retention can be expected. It is therefore very important, both for defensive booming and for containment of a spill, to have precise knowledge of the currents that can be expected at all times of the year.

Recommendation: That the Oil Spill Response Agency establish a committee of industry, university, and government personnel to develop priorities of oceanographic research on the west coast.

Recommendation: That funds be made available to the DFO complete the oceanographic work necessary to plug the knowledge gaps in current patterns in the Strait of Juan de Fuca, in Dixon Entrance, and on the West Coast of the Queen Charlottes.

**Section 3.08. Ship Safety
On Board Equipment
Electronic Chart Display Systems**

In recent years the application of computer technology to navigation has resulted in dramatic advances. Various companies have been involved, one of which, Offshore Systems Limited of North Vancouver, made a presentation at the public hearing in Vancouver in June. Its presentation indicated how the Exxon Valdez incident might have had a different and much happier result had that ship been equipped with OSL's Precise Internal Navigation System. This system is in use on Canadian Coast Guard vessels in Atlantic Canada, and is expected to be introduced this winter on a trial basis on Atlantic Richfield Company vessels on the Valdez to Cherry Point run.

It is beyond the scope of this report to comment on whether OSL's equipment is superior to competing electronic chart display systems produced elsewhere, or to comment on how it complements the Loran-C System already in place. Also, I should at this time repeat the cautions of a number of British Columbia Coast pilots and other experienced mariners with whom I have discussed this type of equipment. First, such equipment is no substitute for prudent seamanship. Second, despite redundancy and back up systems, all equipment may breakdown at some point or another, and reliance on such equipment should not cause the navigator to find himself in situations where the vessel would be at risk if the equipment failed. Third, assuming that electronic charting and position plotting has demonstrated advantages, experience suggests that there will be greater risk of accidents during the overlap period in which the old system is phased out and the new system is phased in. Nevertheless, the equipment of which this system is an example can be a valuable navigational aid in adverse weather conditions in situations where precise positioning is important.

Recommendation: That the ARCO trials with the Precise Internal Navigation System on the Valdez to Cherry Point route be monitored, with a view to determining whether it should be extended to other vessels in the Alaskan trade.

Recommendation: That ARCO trials with the Precise Internal Navigation System on the Valdez to Cherry Point route be monitored, with a view to determining whether it use should be extended to other vessels entering the west coast waters of Canada.

Recommendation: That if ARCO trials with the Precise Internal Navigation System prove satisfactory, shore based radar reflectors required to perfect the system be installed in the Strait of Juan de Fuca and in Prince William Sound.

**Section 3.09. Ship Safety
On Board Equipment
Voyage Data Recorder**

Some vessels on the Alaskan run have voyage data recorders, similar to the "black box" flight information recorders of commercial airlines, which indicate acceleration forces of surge and sway, hull stresses at various points on the hull, roll and pitch angles of the vessel, draft, rudder angles and the times at which rudder movements took place, and other such information.

These recorders would be extremely helpful in accident inquiries such as that conducted by the US National Transportation Safety Board on the Exxon Valdez incident. The cost is probably less than US 100,000 dollars per unit.

Recommendation: That all tankers on the Valdez run, and all tankers entering Canadian waters be required to have functioning voyage data recorders.

Recommendation: That Canada, through the International Maritime Organization, work to have voyage data recorders installed on all merchant vessels worldwide.

**Section 3.10. Ship Safety
On Shore Equipment
Vessel Traffic Service**

More and better radar services on the west coast and in Vancouver Harbour was a constant refrain at the public hearings. This call was frequently based on the misconception that merchant vessels when in contact with Vessel Traffic Services are in the same position as aircraft when following the instructions of ground controllers. In other words, it was widely believed that the VTS is an "active" system of control, rather than the "passive" system of providing information and advice. Participants who were aware of the parameters of the existing system nevertheless were firm in their belief that the present VTServices are not adequate, and that they should be upgraded.

The present radar systems at Ucluelet and Vancouver Harbour were installed in the mid 1970s, at the time the Alaskan tanker route commenced. Canadian concern over the establishment of the route, in addition to concern over accidents such as the "Vanlene", grounding were the cause of the systems being set up. At present the radar equipment is reaching the end of its useful life. The technical improvements of the equipment available today would result in better range and resolution, were it to be installed. There are in addition some gaps in the system which are of concern, particularly on the north shore of Vancouver Harbour and to the east of Second Narrows. At present, there is no VTS coverage towards the northern end of Vancouver Island. This is not, however a major problem area, and the Coast Guard decision that the costs of such an extension are not justified at the present time is probably correct.

Recommendations reflecting these views are listed below. In the light of the confidence that the public has in VTServices, a note of caution is needed, however. First, the area off the west coast of Vancouver Island is a heavily used fishing area. There are hundreds of small fishing vessels on the west coast banks in summer. VTServices, no matter how sophisticated the radar, and well trained the personnel, is no substitute for effective lookouts and watchkeeping. Second, while logic suggests that VTServices improve accident records, some of the before and after data on such systems suggests that the improvements are not great. A paper presented at a Royal Institute of Navigation and the Royal Institute of Naval Architects seminar in London in 1973 by J.H.W. Wheatley, entitled "Traffic in the English Channel and Dover Straits", quoted in Professor Edward Wenk's 1982 study entitled "Improving Maritime Traffic Safety on Puget Sound--A Technology Assessment", is most interesting in this regard. In the English Channel, the numbers of incidents before and after the installation of the VTS were much the same. Third, as noted above, our VTServices are essentially passive. Unless experienced merchant marine officers can be recruited to staff such centres, it is highly unlikely that captains and officers of the watch on the merchant vessels in their zone will be willing to surrender any substantial degree of control of their vessel to the VTS operators.

The unwillingness of mariners to put their trust in unknown radar operators on shore appears based on the belief that such operators know little of the sea or of seafaring. Efforts to dispel such distrust appears worthwhile. By contrast, the effective "active" VTServices of Rotterdam and Hamburg are staffed by experienced merchant marine officers or pilots. In these ports active control means that vessels with hazardous cargoes, such as gas, transit the harbour in a moving safety zone, a "safety bubble" or "space capsule", in which no other vessel may enter. For the reasons noted above without an "active" VTSERVICE system, such a system is unlikely to be feasible in the Strait of Juan de Fuca or Strait of Georgia area.

Recommendation: That the Ucluelet and Vancouver radar units be replaced with more modern and effective equipment, with greater capability in adverse weather and with better resolution.

Recommendation: That the Vancouver harbour radar system be extended to the current blind spots on the north shore of the harbour and to the east of Second Narrows.

Recommendation: That the question of extending radar coverage to the northern part of Vancouver Island be left to the technical staff of the Coast Guard.

Recommendation: That BC pilots and other experienced local mariners be involved in decisions affecting the operations of the VTS centres on the coast, through a standing advisory body.

Section 3.11. Ship Safety Inspection and Regulation

By reason of the many possible marine sources of oil pollution, regulation and inspection systems vary considerably. US tankers on the Valdez route are subjected to US Coast Guard inspection, the level of which was increased eighteen months ago. At that time the Coast Guard recognized that the Valdez fleet was experiencing a high number of structural and mechanical problems by reason of the extreme weather and sea conditions encountered by vessels on that route. Vessel inspection of the Valdez fleet is considered adequate at this time.

Tankers entering Canadian waters are generally subjected to an inspection by the Ship Safety Branch of the Canadian Coast Guard on their first visit, and are inspected from time to time thereafter. Other merchant vessels are inspected on a random basis. The total inspection figure is approximately 8% of the visiting vessels. However it should be noted that this figure includes the disproportionately high level of inspection of tankers. Thus the level of inspection of other merchant vessels is below 8%. By contrast, while the European countries have an inspection rate of 25%, the actual figure for foreign vessels is probably higher due to trips between European ports by these ships.

The Ship Safety Branch does not have access to full incident or accident histories of the vessels, nor full maintenance and repair records of the vessels it inspects. Further, while the numbers of officers and crewmen in various categories are checked against the manning levels required by the licensing country for that class of vessels, the qualifications of the licensing country and the manning levels, accepted by the Coast Guard are those of the flag state or those of the International Maritime Organization. As far as I am aware, no merchant vessel has been refused entry into Canadian west coast territorial waters by reason of deficiencies of vessel or crew, although vessels are from time to time denied permission to leave our waters until a deficiency of vessel or crew is rectified, and sometimes have been directed to a port closer to the entrance to the Strait of Juan de Fuca than the one for which they were destined, (ie. to Victoria or Esquimalt, instead of the intended destination of Vancouver or another port in the Strait of Georgia). This is of little comfort to the residents of Greater Victoria.

The deficiencies noted by the Canadian inspectors vary considerably in importance. Some are relatively minor. Nevertheless the frequent deficiencies discovered by these inspections strongly suggest that the overall quality of vessels, equipment and crews entering Canadian ports is well below what is required to protect our waters.

Improving the situation requires more than additional ship inspection by the Ship Safety Branch. Needed is access to the information on the history of the vessel, of the deficiencies that have been previously discovered and hopefully rectified, and of the problems with the company that have been encountered elsewhere. An intelligence unit in the Ship Safety Branch should be established to acquire such information.

Much of this information may be available in the files of the various ship classification societies. The purpose of the classification societies, of which there are about twenty world wide, is described by the constitution of Lloyd's Register as:

...to secure...high technical standards of design, manufacture, construction, maintenance, operation and performance for the purposes of enhancing the safety of both life and property at sea.¹

¹ Quoted in "Arctic Marine Risks-The Interaction of Marine Insurance and Arctic Shipping, a Transportation Research Report by K. Joseph Spears, May 1986.

The society thus establishes classification standards for design and construction of vessels, and verifies that the construction standards have been met before the vessel in question is certified as being 'in class'. From time to time thereafter it re-examines the vessel to determine whether it is up to the standards of the class, or whether, from the structural or mechanical point of view, it is fit for service in a particular trade. Further, the classification societies survey and issue certificates of compliance to such international conventions as the International Convention for the Safety of Life at Sea (SOLAS), the International Convention for the Prevention of Pollution from Ships (MARPOL), and the International Convention on Load Lines. The problem with the work of the classification societies is that, generally speaking, this work is done for the owner, and the information obtained is not available to other parties. Also, it must be noted that not all classification societies are as objective in their work as others. There is a justifiable suspicion that some allow the owner's financial interests to affect their reports.

The Ship Safety Branch relies on a relatively brief visual inspection and a check of a relatively small number of factors. Some information is available from St Malo, France, where the 14 signatory countries to the Paris Memorandum of Understanding have established a data bank, but the information available from St. Malo is not extensive, and suggests problem areas for inspectors to look into, rather than giving details on what the problems actually are. An effective intelligence unit to obtain background information on vessels that visit our ports would therefore substantially improve the level of our existing ship inspections.

Improving inspection is but a means to an end, the end of improving the safety of vessels visiting our ports. The knowledge gained from the intelligence unit, and from the on board inspections should be matched by increased penalties for vessels with poor records. Vessels of high risk should be barred from future visits to Canadian ports, and companies with a record of poor ships should similarly not be permitted access to Canadian ports. Finally, if the vessel intelligence unit and ship inspection records indicate that certain countries are not effectively inspecting and regulating the vessels or the crews sailing under their flag, vessels registered in those countries should be specifically prohibited from entry into Canadian ports until such time as the quality of vessels and crews improve.

It is recognized that the recommendations below to bar individual ships, the ships of certain companies, or ships flying certain flags from Canadian ports is a departure from current world practice. Increasing the role of the port state, as opposed to the existing practice of relying on the ship state, for regulation, inspection, and control of vessels can be expected to be a controversial move. It will lead to the criticism that Canada is departing from an internationalist approach to shipping problems. However, the system of ship inspection in this country which we now have is itself a recognition of the limitations of reliance on the flag state and on the international shipping system: to protect not only our coast from pollution damage, but also to protect other ships and the lives of seamen from careless or inadequate supervision and regulation. Further, we would not be alone. The 14 Signatory nations to the Paris Memorandum of Understanding are moving in the direction of increasing port state supervision. It is expected that in the long run a more active port state role in this area by trading nations such as Canada will have a salutary effect in raising world standards and ultimately the effectiveness of international systems and organizations.

Recommendation: That a Merchant Vessel Intelligence Unit be established to obtain full information on vessels likely to enter Canadian waters.

Recommendation: That by 1991 inspection of foreign vessels entering Canadian waters be increased from the current 8% to the 25% target of the Coast Guard, and that by 1993 this be increased to 40%.

Recommendation: That vessels with records indicating poor quality and higher hazards be subjected to more searching inspections, and that vessel which fail inspections on major

items be barred from Canadian ports for the next two years, regardless of whether the deficiency is rectified.

Recommendation: That if the Vessel Intelligence Unit and ship inspection records indicate that certain ships can be expected to be in poor condition, inadequately maintained or inadequately manned, such ships be barred from Canadian ports regardless of the existence of any individual deficiency.

Recommendation: That if the Vessel Intelligence Unit and the ship inspection records indicate that ships of a particular company can be expected to be inadequately maintained, or to be inadequately manned, or otherwise can reasonably be expected to be higher risk vessels, all the ships of that company and of affiliated companies be barred from Canadian ports.

Recommendation: That if the Vessel Intelligence Unit and the ship inspection records indicate that ships flying the flag of a particular country can be expected to be higher risk vessels, all ships registered in that country be barred from entering Canadian ports.

**Section 3.12. Ship Crew
Alcohol and Drugs Inspection**

Definitive conclusions as to whether alcohol or alcoholism contributed to the Exxon Valdez accident must await the report of the National Transportation Safety Board and the results of Captain Joseph Hazlewood's trial later this year on the misdemeanour charges of operating a vehicle when impaired. For the purposes of this report, definitive conclusions are not important. The testimony before the National Transportation Board has made clear that, whatever the impact of alcohol on the Exxon Valdez incident, alcohol and alcoholism are serious problems on the Alaska run, and in all probability are problems on other shipping routes as well.

Designing an effective policy is not an easy task. Many companies with excellent safety records have liberal policies with respect to off duty drinking. Many regard off duty socializing over a drink to be an important part of efforts to establish the crew or team spirit necessary for effective and safe operation of their vessels. Officers and crews spend long periods at sea. Their place of work is, to a degree, also their home.

Measures to combat drug abuse and alcoholism on American vessels have been taken and further action is contemplated. There is thus no need for recommendations in this regard, other than to point out that the announced American policy of zero tolerance for illegal drug use and for alcohol abuse should be the goal for Canadian vessels, and for foreign vessels in our waters, as well. This is not uniquely American problem. In my hearings throughout the province I frequently heard comments regarding alcohol impairment on Canadian vessels, particularly tugs. While such comments cannot be verified, the frequency with which they were made suggests that there may be validity to the reports.

Recommendation: That a zero tolerance policy for illegal drug use and for alcohol abuse be adopted on Canadian vessels.

Recommendation: That random alcohol and drug testing be instituted for on duty officers and crew of foreign vessels entering Canadian waters.

Recommendation: That Canadian and US regulations regarding what level of alcohol constitutes impairment be standardized.

Recommendation: That vessel searches for drugs be increased to the point where every other vessel entering Canadian waters can expect to have a thorough dog-assisted drugs search.

Recommendation: That with Coast Guard assistance Canadian vessel operators, including the operators of tugs of all sizes, prepare non-medical drug use and alcohol abuse policies, and that these policies be read and signed by all crew members annually.

Section 3.13. Ship Crew Size and Training

The human element in accident reduction is of overwhelming importance. Human error is by far the greatest cause of all transportation accidents, and maritime accidents that lead to oil spills are no exception. Human error includes a number of factors, such as inattention, misuse of radar, navigation error, communications failures, excessive or inadequate speed, lack of knowledge or incorrect knowledge of the rules of the road, or inadequate lookout. Professor Edward Wenk of the University of Washington points out in his 1982 study "Improving Maritime Traffic Safety on Puget Sound Waterways", that US Coast Guard figures for the decade 1970 to 1979 indicate fully two thirds of US collisions were the result of human error. Collisions between vessels increased by roughly 7% annually during this period, despite the introduction of a number of safety measures. In short, if the accident record of ships is to be reduced, improved staffing, training and crew utilization must be considered a matter of the highest priority.

In the light of the Exxon Valdez incident and the evidence before the National Transportation Safety Board hearings of Exxon Shipping Company's failure to adequately train and supervise the vessel's master and crew, it is ironic to note that the company, on March 9th, 1973, in its efforts to avoid regulations requiring double bottoms for tankers, stressed that more stringent regulations for training, licensing and relicensing were the "most important" elements in preventing accidents and spills. In this at least, Exxon Shipping was correct.

At the public hearings, many suggestions were made to improve the training of mariners in Canadian waters or to increase the training of personnel on tanker and tank vessels of other states. Some of the more imaginative participants proposed the wide use of simulators, similar to those used in training airline pilots, for the training of mariners. These proposals for upgrading crew training were often coupled with proposals for greater career testing of competence, and for a greater use of special equipment licensing. Communications problems with foreign ships due to language differences, and better bridge to bridge communications generally, were also the subjects of extensive comment.

In any discussion of staffing, the question of size of the crew comes up. Crews of merchant vessels have declined in size in recent years. Indeed, the Exxon Valdez crew in 1989 was only about half the size of crew that would have been found on a tanker of one tenth her tonnage in 1945.

There are two schools of thought, neither of which should be taken to extremes. Some regard this increasing use of automation as desirable from a safety point of view. Briefly their argument is that as most accidents are the result of human error, the less the human element involved, the less the error. Captain Andrew McKenzie of the Tanker Advisory Centre is of this view. Those who are of the opposing school point to the extra fatigue and stress that follow crew reductions, which in their opinion can only lead to accidents. Harry Keefe, the vice chairman of the American Institute of Marine Underwriters, reflects this position.

There is no final answer, and it must be noted that other interests may colour the participants views in this debate. On the one hand, companies are engaged in a determined battle to reduce costs by using smaller crews. On the other hand, seafarers unions and merchant officer guilds are equally determined to protect the jobs of their members. The Coast Guard certificate of the Exxon Valdez in 1985, for example, required a crew of twenty. On its maiden voyage it had a crew of 24. In 1989 the certificate was for a crew of sixteen. Reportedly, a recent automobile carrier has been designed for a crew of eight persons.

On the night of the 23/24 March there is little question that another officer on the bridge might well have prevented the incident on Bligh Reef. However, under the existing

regulations another officer should have been there, and he should have been Captain Hazlewood; only he had the necessary pilot's certification for that leg of the voyage. Thus the small crew size did not, in fact, result in the lack of another officer on the bridge. The lack of another officer was for a different cause.

Crew size has other important aspects however. Two in particular are important to mention, namely the effect of crew size on crew fatigue, and the effect on emergency response capability. There is a great deal of information on these subjects, including well researched U.S. Coast Guard studies, which can be reduced to a general rule that small crew size does mean less emergency response capability and increased crew fatigue in abnormal situations. The conclusions of the National Transportation Safety Board on the Exxon Valdez incident in this regard, due next year will be of great interest. Until they are made public, recommendation in this area can only be speculative.

In any discussion of manning ships in Canadian waters the question of pilotage comes up. A number of pilots were interviewed privately. Others took part in the hearing process in one way or another. Canadian west coast pilots have a high degree of professionalism and competence, and a matching pride in their abilities. As to be expected when the reputation of the pilot may suffer from the way a ship is equipped, maintained or staffed, pilots appear to be excellent observers of the shortcomings of the vessels on which they carry out their duties. As a group, those contacted appeared to be suspicious of change to the existing system, and to be suspicious of the competence of others, including mariners of other nationalities, and of VTS operators. I received no clear answers on the questions of whether the current process for training, evaluating or disciplining pilots could be improved, and make no recommendations on these questions.

Recommendation: That the Coast Guard, in consultation with industry, study the use of simulators for the training of tug and barge crews, particularly the use of simulators for potential accident scenarios.

Recommendation: That the Coast Guard consider reducing the period of validity of mariners certificates, and of increasing the examination requirements prior to re-certification.

Recommendation: That the tug and barge industry, with the assistance of the Coast Guard and the Pacific Marine Training Institute, establish mandatory training programs, similar to that in place in the larger companies on the Coast, for all crews of tugs and tank barges.

Recommendation: That the oil spill response training be mandatory for all tug crews involved in tank barge operations.

Recommendation: That the Coast Guard increase penalties for mariners who conduct vessels in an unsafe manner, and revoke the licenses of those with a record of unsatisfactory behaviour.

Recommendation: That foreign certificates which may be issued without the mariner being required to undergo effective training or professional development programs not be recognized as valid in Canadian internal or territorial waters.

Recommendation: That no reduction of vessel manning requirements for Canadian vessels be permitted until the National Transportation Safety Board report on the Exxon Valdez incident.

Recommendation: That the Canadian Coast Guard inquire of foreign flag authorities the rationale for crew sizes substantially below those of Canadian regulations.

Recommendation: That failing a satisfactory rationale of small crew size, the flag state be informed that a crew that meets Canadian crew size requirements will be required for future entry into Canadian waters.

Recommendation: That Canada ratify the International Labour Organization Convention 147 on merchant vessel living standards for ships' crews.

Recommendation: That west coast pilots be asked to provide comment to the Coast Guard Intelligence Unit on the competence of merchant officers on whose vessels they carry out their pilotage duties.

Section 3.14. Tanker Exclusion Zone

When the Valdez tanker route was established in the mid seventies an Alaskan tanker routing system was established to the west of the Alaskan Panhandle and the British Columbia coast. Within the last few years a tanker exclusion zone system was established and the TAPS routes cancelled. The width of the exclusion zone was designed to allow a tug dispatched from either Valdez or Anacortes, Washington, to come to the aid of a laden tanker in difficulties. Thus the width is related to the expected drift of a disabled tanker, and the expected response time of the tug. The zone is a minimum of seventy miles from the Queen Charlotte Islands, and fifty miles from the northern half of Vancouver Island. From there it angles towards the entrance to the Strait of Juan de Fuca.

The nature of the problem was illustrated by the loss of power of the Exxon Philadelphia about a month after the Exxon Valdez incident. This vessel lost power some miles to the north of Cape Flattery. It drifted for some hours before tugs were able to take it in tow. Fortunately, this took place in good weather, and mostly in daylight hours. A similar incident took place in Alaska at the entrance to Prince William Sound some years earlier.

Problems arise at the southern end of the zone. As laden tankers to the west of Tofino head for the entrance to the Strait, they cut across the fishing grounds of the west coast banks, where in summer many hundreds of fishing vessels are moving in slow and erratic patterns. Particularly dangerous in this regard are the large steel foreign vessels that operate under licence within the two hundred mile Exclusive Canadian Fishing Zone.

Another problem of traffic in this area is that the great circle route from the Far East to the Strait of Juan de Fuca ends in these waters. The convergence of vessels, both inbound and outbound, from time to time creates difficulties. With respect to tankers, these problems were less when the former inbound route system was in effect, prior to the changes earlier this year.

As noted elsewhere in this report, in addition to tankers inbound to the refineries of the Gulf of Georgia and Puget Sound there are laden tankers carrying heavy crude oil outbound from Vancouver. For reasons that I have yet to discover, these vessels have not been subjected to the requirement of remaining outside the West Coast Tanker Exclusion Zone. This is but another example of how the rapid and unpublicized growth of this traffic has resulted in a failure to properly analyze the risk and safety factors associated with it. It also should be noted how destructive this situation is for effective discussion on tanker safety issues with Americans. Canadians can hardly ask Americans to do more to achieve safety on tankers when we have not been willing to do what they have been doing over the past 12 years.

Recommendation: That the Tanker Exclusion Zone be extended at its southern end to require laden tankers to approach the buoy marking the entrance to the Strait from a more westerly position, on a course that passes to the west and south of, or between, the west coast fishing banks.

Recommendation: That consideration be given to extending the routing system some more miles to seaward of the entrance of the Strait of Juan de Fuca, so as to increase separation and to move the Far Eastern traffic route more to the west.

Recommendation: That tankers outbound from Vancouver be required to respect the West Coast Tanker Exclusion Zone.

Section 3.15. Fishing Vessels and Pleasure Craft

Although the Nestucca and Exxon Valdez spill have dominated public attention for the past few months, at the public hearings participants frequently mentioned smaller but nevertheless important spills of oil products that come from fishing vessels and pleasure craft. Facilities for disposing of waste lubricating oil from marine engines are not extensive, particularly in the smaller coastal communities. The waste oil barrels found on both public and private docks in the province are not always collected on a regular basis, and sometimes when collected the contents is dumped in local land fill sites, leading to the oil in question finding its way into both fresh and salt water. It was further pointed out that penalties for deliberate oil spills are not great, that the existing law is not well known, and that enforcement is rare.

Public comments in this regard were encouraging, inasmuch as they demonstrated the understanding that the problems of oil pollution are as much an individual responsibility of ordinary citizens as they are the responsibility of large organizations, whether shipping companies, oil companies, or governments. Further, there was a clear indication that this local concern and desire to help deal with the problem was widespread. One participant at Masset, commenting on this new public awareness, said:

Times have changed. Now, if someone dumps oil off the dock, there is a fight.

Also encouraging is the response of B.C.'s coastal petroleum distributors. Conversations with petroleum companies on this issue suggest that very positive response can be expected to practical proposals to deal with this problem.

Recommendation: That the system of waste oil deposit barrels on government and private docks on the west coast be upgraded.

Recommendation: That waste oil deposit barrels on docks be in covered locations, to prevent contamination of the oil by rainwater and rust, and to prevent rain from filling the barrels with consequent overflow and oil spills.

Recommendation: That agreements be entered into with the coastal distributors of petroleum products to return full barrels of waste oil from coastal communities to their docks in the lower mainland, for onward transmission to Mohawk Oil Company's re-refining facilities.

Recommendation: That all fishing and pleasure craft be required to have displayed on board a decal similar to a capacity plate outlining the penalties for the discharge of an oil product into Canadian waters.

Recommendation: That penalties for the discharge of oil into Canadian waters be increased.

Section 3.16. The Vancouver Port Corporation

In terms of foreign tonnage, the Port of Vancouver was the leading North American port in 1988, with 65 million tons of exports and imports. By contrast, the Port of New York had a total of 58.5 million tons. While geographic location is no doubt the critical factor in the growth of the port, promotion has played an important role in the port's development, and in its ability to outperform competing US ports in the region. Indeed, the published objectives of the Port of Vancouver Corporation stress promotion of the port, and the corporation deserves congratulations for its obvious success in this regard.

Safety matters in the port of Vancouver and the promotion of the traffic of the port are in the hands of the same agency, the Port of Vancouver Corporation. Some suggested that this creates a conflict of interest, and that the safety function should be the responsibility of the Coast Guard, rather than the Port of Vancouver Corporation. In the United States, port promotion and safety are considered to be entirely separate functions, and the two roles are handled by different agencies.

This matter was discussed in my conversations with Port of Vancouver Authority personnel. They are aware of the potential for conflict of interest, and indicated that the harbour master has complete autonomy with respect to vessel safety in the harbour. On the strength of their assurances, it appears to be unnecessary to adopt the American system of further separating out the safety function from the economic promotion aspects in the port management structure.

There is one other matter with respect to port promotion that deserves brief comment. Having the economic promotion of the port of Vancouver separate from safety activities runs the risk of the promotion of the port becoming a single issue objective, done without wider environmental, or economic concerns being taken into account. Some eight years ago the issue was raised with respect to propane exports from the port. Today, with respect to the export of crude oil, the situation is similar. The agency that promotes the port has no direct responsibility for the risks, either environmental or economic, that such promotion might create in the Strait of Juan de Fuca, or the Strait of Georgia or among the Gulf Islands. It has no direct responsibility for the fishing industry, or for tourism in the province. To consider two examples, when the Port of Vancouver Authority is promoting Vancouver to overseas shippers, it has no direct responsibility for the increased risks to the Songhees Indian Band's reserves on Chatham and Discovery Islands, or to the aquaculture industry of the Sunshine Coast, that the port promotion might result in.

This is another example of how the burdens of risk, and the economic benefits of marine traffic, are unevenly distributed, commented on above. It is also an example of how those involved in economic decisions are often unaware of the full social, economic and environmental costs of their decisions.

The recommendations above to introduce higher levels of inspection, to bar higher risk vessels, or companies with higher risk vessels, or to ban all vessels with high risk flags from Canadian ports naturally will be of concern to the Port of Vancouver Corporation, and their views should be sought and given appropriate weight. However the narrow perspective of port promotion must be placed in the wider context of the interests of the Pacific west coast as a whole.

Recommendation: That once a year the Spill Prevention Agency members from Environment Canada, the BC Ministry of the Environment, and the Department of Fisheries and Oceans meet with the Port of Vancouver Corporation to discuss the environmental implications of current and future ship traffic trends.

BLUEPRINT**FOR DISASTER**

The oil spill that didn't have to happen

The Coast Guard talked tough in the 1970s about its role in preventing oil spills, but over the years those words never translated into action as the service grew closer to the industry it was supposed to regulate.

EMPTY PROMISES



The Coast Guard cutter Rush was on hand when the Exxon Valdez was moved off Bligh Reef in April.

Anchorage Daily News photo file

Coast Guard bowed to industry pressure

By STAN JONES

Daily News reporter

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In the 1970s, the oil industry and its friends in government were ready to promise almost anything in return for permission to turn on the pumps at Prudhoe Bay.

One of those promises was that, under tough U.S. Coast Guard oversight, tankers that would haul up to 2 million barrels of oil a day through Prince William Sound would be the safest in the world.

"I consider our primary concern with regard to Valdez-Prince William Sound to be the prevention of a catastrophic oil spill," said Coast Guard Rear Adm. John B. Hayes to a fishermen's convention in Cordova in April 1977.

Hayes said the Coast Guard

■ **TOO COZY:** Many agencies and up serving the industries they are supposed to regulate. A-10

would — among other things — propose that double bottoms be required on tankers to reduce the chances of their poisonous cargo fouling the Sound in a grounding.

Lt. Cmdr. Ken Thompson, a Hayes subordinate, told the conference that a Coast Guard traffic system would ensure the tankers didn't collide with each other or with the rocks and reefs lining the route into the Gulf of Alaska.

"Valdez Narrows and Arm will be covered by a radar at Potato Point," Thompson said. "The radar to be installed is among the most sophisticated available."

But these and other Coast Guard commitments were abandoned soon after oil began flowing through the pipeline in August 1977.

When the Exxon Valdez hit Bligh Reef on March 24 it had one bottom, not two. The resulting 11-million-gallon spill, the Coast Guard itself recently estimated, was up to 2½ times larger than it would have been if the ship had had a double bottom.

And the operators on duty in the Coast Guard's Valdez Vessel Traffic Center said the 987-foot vessel didn't even register on their radar screens as it plowed toward disaster, although Bligh Reef is only 13 miles from the "sophisticated" radar at Potato Point.

The Coast Guard's mission is to protect the safety of ships and

sailors, and to prevent pollution of the oceans. To do so, it regulates ship design, manning standards, crew qualifications and vessel operating practices.

The agency portrays itself as chronically underfunded but heroically dedicated, willing to tackle almost any job with almost no money, but a Daily News investigation suggests that failure to prevent or lessen the severity of last spring's catastrophe stemmed more from its coziness with the oil industry than from any lack of resources.

Judged on its record, the Coast Guard is more often partner than policeman to the shipping companies it is supposed to regulate.

Please see Page A-8. COAST GUARD

SPECIAL REPORT

COAST GUARD

Continued from Page A-1

Single bottoms and a feeble Vessel Traffic Service are only two of many examples of how the Coast Guard sliced away at the safety net that had been promised for the Sound.

Usually, as in the matter of double bottoms, it was because the Coast Guard bowed to industry pressure.

Less often, as in the case of the Vessel Traffic Service, it was because the Coast Guard lacked — or didn't want to spend — the money to do its job properly.

Over the years the Coast Guard has also:

- Routinely approved reductions in the number of sailors required on oil tankers, to the point that crew fatigue apparently played a part in the Exxon Valdez disaster;
- Reduced the level of experience required to drive oil tankers through the Sound, allowing oil shippers — including Exxon — to cut costs by not sending crew members to training courses in which they "sailed" a tanker simulator in and out of the Sound for practice;
- Turned an Alyeska Pipeline Service Co. whistleblower in to his boss after the whistleblower informed Coast Guard officials in Valdez about possible pollution violations at the Alyeska tanker terminal there; and
- Allowed a well-trodden career path to develop from itself to the industry it purports to regulate.

Citing these and other actions, Coast Guard critics contend it set up Alaska for a spill like the Exxon Valdez.

One of those critics is Canadian David Anderson. In the 1970s, as the transportation system through the Sound was being designed, Anderson was a member of the Canadian parliament and served in the British Columbia Legislature.

Eventually, Anderson joined a group of environmental organizations in a lawsuit that held up the trans-Alaska pipeline until Congress passed a special law to get it going.

Today, Anderson is a consultant on the Valdez spill to the British Columbia government.

In his view, the Exxon Valdez crash wasn't so much an accident as a conscious choice made long ago.

"In this area, there's a systems failure of the regulatory agency," Anderson said. "We must face the fact that those who made those decisions deliberately chose to have an accident."

"It's all very well for Coast Guard admirals in splendid uniforms to turn up in helicopters and say, 'We're going to get to the bottom of this; we're going to go after that rascal Hazelwood,'" Anderson said. "But he's the goat. It's the system that's at fault."

DOUBLE-BOTTOM DEBATE

Hayes was not the first federal official to lead the public to believe that tankers traversing the Sound would have double bottoms. The discussion had gone on for years.

"Newly constructed American flag vessels carrying oil from Port Valdez to United States ports will be required to have segregated ballast systems incorporating double bottoms," Interior Secretary Rogers Morton told Congress in 1972.

Morton appears to have been sincere, but within a year the Coast Guard was backing away from that commitment.

Other countries opposed double bottoms at a 1973 convention of the Inter-Governmental Maritime Consultative Organization, a United Nations agency set up to promote marine safety and international cooperation on technical shipping matters.

The Coast Guard soon dropped its proposal to require double bottoms, saying it wouldn't impose standards on U.S. vessels that weren't accepted internationally.

The Coast Guard's about-face drew squawks from Morton, from the Environmental Protection Agency, from environmentalists, from the governors of Washington and Alaska, and from Sens. Edmund Muskie of Maine and Warren Magnuson of Washington.

The new regulations had been formulated with the help of a study group organized by the American Petroleum Institute, an oil industry trade association, formed without public notice, chaired by an opponent of double bottoms, and meeting in secret, according to an article in Audubon magazine.

The Coast Guard wouldn't budge.

"We collected new data, and we changed our mind," Rear Adm. William Benkert told the National Observer in early 1975. "We don't think groundings are as serious a problem as we once thought, and ... they cost a hell of a lot more money."

But double bottoms cost only a little more money, according to a report published by the congressional Office of Technology Assessment in mid-1975.

The technology office examined the figures on double-bottom tankers built in the early 1970s and concluded they cost 2½ to 4 percent more than single bottoms.

A more recent study, done by the Coast Guard after the Exxon Valdez spill, concluded that double bottoms might add 5 percent to the cost of a tanker — in the case of the Exxon Valdez, about \$6 million.

Exxon has estimated the disaster in Prince William Sound will cost it \$1.3 billion, enough to put double bottoms on more than 200 tankers like the Valdez.

Although the Coast Guard scuttled double bottoms in 1974, the issue quickly resurfaced.

In December 1976, the tanker Argo Merchant ran aground off Massachusetts and dumped 7.6 million gallons of fuel oil into the sea. In less than four months, there were 14 more tanker spills off U.S. coasts.

In March 1977, newly elected President

Jimmy Carter proposed a host of tanker reforms, including double bottoms. It was that position that Hayes reported to the Cordova conference in 1977.

As before, though, the Coast Guard soon fell back into line with industry. After another meeting of the Inter-Governmental Maritime Consultative Organization in 1978, the Coast Guard dropped double bottoms again, and tankers — including the Exxon Valdez, built in 1986 — were allowed to sail in and out of Valdez without them.

"It was commonly accepted by those who worked on the problem that when you go up against the industry, you go up against the Coast Guard," said Walt Parker, an Alaskan who has been deep in the oil policy debate for more than a decade.

Parker, now chairman of a state commission investigating the Valdez spill, worked for the state in planning the pipeline system in the 1970s and was an observer at the 1978 maritime organization meeting at which double bottoms went down for the second time.

The Coast Guard's abandonment of double bottoms came despite studies confirming their effectiveness in limiting spills.

In early 1975, Lt. Cmdr. James Card — who worked under Benkert in the Coast Guard's Office of Merchant Marine Safety — published an analysis of 30 tanker groundings from 1969 to 1973 in which oil leaked into U.S. waters.

He concluded that in 27 of the cases, double bottoms would have prevented any oil loss, because the ships weren't penetrated far enough to have reached the inner bottom.

In the other three cases, Card concluded, double bottoms would have reduced oil loss by 30 percent.

Shippers — including Exxon — had mentioned generally that under some circumstances double bottoms might endanger a ship in an accident but produced little hard data to back up their claims.

Both the Office of Technology Assessment study in 1975 and the post-Valdez study this spring concluded there was no reason to believe double bottoms threaten ship safety.

Even in the mid-1970s, double bottoms were required on tankers carrying liquefied natural gas and other chemicals deemed more hazardous than oil. The technology office study found that their double bottoms had caused no safety problems.

The agency reported that ships carrying bulk flammable liquids above a double bottom void had not "exhibited any explosion record in these spaces."

The technology office did look at 13 tanker explosions in 1973 and 1974; none involved a double bottom.

The OTA also studied the claim that a double bottom might cause a ship to sink in a grounding and found that the opposite was true.

"In fact, sinking rates due to groundings are less for these types of ships," the technology office reported.

Despite the conclusions of double-bottom studies going back more than a decade, Coast Guard Commandant Paul Yost still offers the same anti-double bottom arguments the industry and Coast Guard made in the mid-1970s.

In an interview a few weeks ago, he said the Coast Guard is having another study done.

Then he cited the higher cost of double bottoms, repeated industry claims that double bottoms might somehow jeopardize ship safety, and maintained the U.S. shouldn't pass tanker requirements unacceptable to shippers in other countries.

"It is a great idea as long as you've got guys like Stan Jones and Paul Yost who don't mind paying for it at the gas pump," Yost said. "Everything you do in this regard adds cost to the transportation. As you add cost to it, you have a little more trouble getting the international community to accept it."

"For thousands of voyages, they shipped oil in and out of there when those double bottoms would have been a waste of money," said Jim Simpson, Yost's press aide.

Double bottoms would cost the public somewhere between half a cent and a cent per gallon — as much as \$1.5 billion a year — according to estimates from marine consultants.

Clyde Robbins, the Coast Guard vice admiral overseeing this summer's effort to clean up the Exxon Valdez spill, said much of the pressure on the agency comes from inside the federal government, not just from officials of the affected industry.

Members of Congress get pressure from their constituents and pass it along to the Coast Guard, he said. The state department, juggling a host of diplomatic issues, worries about how other countries will react to U.S. maritime regulations.

And the Office of Management and Budget demands that regulators show that the benefits of new regulations exceed the cost.

"You have to react to all of those pressures to meet some sort of compromise in your regulations," he said. "One of the largest pressures is from OMB. That economic analysis that has to go on is crucial to a regulatory process."

'SERVICE REVOLVERS'

After the Coast Guard's second about-face on double bottoms, in 1978, a New York maritime consultant and arbitrator named George Reinhard wrote an indignant letter to Benkert, the head of the Coast Guard's Office of Marine Safety.

Reinhard demanded to know if the Coast Guard was "really a subsidiary of the oil industry."

An equally indignant Benkert wrote back that Reinhard was "ill informed and completely out of line" to even suggest such a thing.

Coast Guard policies and people, Benkert informed Reinhard, were directed only toward accomplishing "the very best we can for our country insofar as vessel safety and pollution prevention are concerned."

Five months later, Benkert had retired from the Coast Guard and become president of the American Institute of Merchant Shipping, an advocacy group representing tanker owners. He did not respond to a recent request for an interview passed through the Coast Guard's retirement office.

Benkert's case may be extreme, but it is only one of many examples of the ease and apparent lack of misgivings with which Coast Guard officials, often from the service's top echelons, move into jobs with the companies and industries the public had been paying them to regulate.

Indeed, the industry is liberally sprinkled with former Coast Guard employees, sometimes called "service revolvers" by critics of the Coast Guard.

Among the revolvers is Exxon Shipping Co. President Frank Iarossi.

Iarossi graduated from the Coast Guard academy and spent eight years in the Coast Guard, four of them as head of the marine engineering section. In 1968, he left the Coast Guard and joined Exxon.

Jim Woodle, who commanded the Valdez Coast Guard station from 1979-82, recalls several former subordinates who resigned and went to work at the Alyeska tanker terminal.

In 1982, Woodle crossed over himself. When he took a job as Alyeska's marine superintendent, his pay leaped from about \$40,000 a year to more than \$80,000.

"Certainly, at that time a job with Alyeska was considered the plum," Woodle said.

While federal laws and regulations are fairly tight for officials in positions to influence purchasing or contracting — Defense Department employees who order weapons systems, for example — there is little scrutiny of regulators who go to work for the industry they've been regulating, despite the fact that regulatory actions can cost or save an industry millions of dollars.

John Hillman, a member of the Exxon Seamen's Union governing board, thinks there should be a cooling-off period for ex-Coast Guard employees.

"We need to get some legislation down the road that says, 'Hey, you can't suck these people over into the shipping companies and give them jobs until they've been retired for a certain number of years.'" Hillman said.

Most Coast Guard officials interviewed for this story not only don't see any problem with all the traffic on the lucrative path from the Coast Guard to the shipping industry, they think it's desirable. Their theory is that having Coast Guard members enter the private sector will make industry cleaner, more careful and more competent.

"At the early onset, I was hoping to get some additional Coast Guard people over there," said Woodle of his time with Alyeska. "I recognized their talents."

Woodle lasted two years with Alyeska, eventually becoming a critic of the company's cutbacks in oil-spill response.

Steve McCall, who commanded the Valdez Coast Guard station at the time of the Exxon Valdez crash, said he doesn't think the prospect of someday applying for a job with industry leads Coast Guard personnel to go easy on regulators.

"If you're too easy with them, they're not going to hire you," McCall said. "They want somebody who's going to be a company man, whether it's your company or their company."

McCall's boss in Washington, Coast Guard Commandant Yost, said it's only natural for industry to want to hire experts from the Coast Guard.

"When a Coast Guard officer has been working in an area for a very long time, he

Please see Page A-10, COAST GUARD

COAST GUARD: Officers often move from service to industry

Continued from Page A-8

becomes one of the more knowledgeable people in that area," Yost said. "I don't see the conflict."

Simpson, Yost's aide, said the Coast Guard could be hurt by a ban on cross-overs.

"I would argue that's a pretty extreme position," Simpson said. "If you take that, you'll be hard-pressed to find regulators."

Hayes, the Coast Guard admiral who told the Cordova fishermen about double-bottom tankers in 1977, and who was commandant of the U.S. Coast Guard from 1978-82, is another revolver. This summer, Alyaska Pipeline Service Co. paid him to work with spill-affected communities.

Hayes said he's seen a few crossovers he disapproved of — though he wouldn't be specific — but basically agrees with Yost.

"There's just so much talent in government in all kinds of places," Hayes said. "It would be just be a shame if our nation could not take advantage of it in the next career that person might pursue."

NEARSIGHTED RADAR

In the 1970s, the Coast Guard seemed to be saying its Vessel Traffic Service in Valdez would be a kind of mother hen, watching over the tanker captains in case they went astray.

In a 1973 Environmental Impact Statement, the Coast Guard said the VTS would "monitor progress of participating vessels and give timely direction when needed, thus providing checks against error."

State officials thought that could best be achieved by combining radar with a system — called Loran-C retransmission — under which each tanker would continuously and automatically radio its position to the VTS.

The Coast Guard estimated retransmission would cost shipping companies \$3,000 a tanker and that its own cost, for equipping the VTS to receive that information, would be about \$38,000.

For a time, the Coast Guard supported retransmission as a cheaper alternative to building enough radar sites to cover the whole Sound, as demanded by fishermen.

"I believe that Loran-C retransmission may provide approximately the same level of protection to the environment as radar coverage and at far less expense to the taxpayer/consumer," Hayes told Sen. Ted Stevens in an April 1977 letter.

But nobody in the Valdez VTS was monitoring the Exxon Valdez on any system when it veered out of standard traffic

lanes and blundered into the reef only a few miles from a Coast Guard radar site.

The Loran-C retransmission system was never put in and neither was the full-coverage radar net the fishermen wanted. Gordon Taylor, the VTS watch stander who last saw the Exxon Valdez on radar before it hit Bligh Reef, said it faded from the screen when it was about nine miles from the radar site at Potato Point, possibly because a drizzling rain that night limited the radar's range.

Simpson, Yost's aide, said Loran-C retransmission was dropped because it wasn't effective in Valdez Narrows, which everybody then considered the likeliest spot for a tanker crash because of stone pinnacles called Middle Rock.

Yost said many things were discussed in the 1970s that didn't turn out to be feasible or economical, including Loran-C retransmission.

"A lot of practicality and realism crept into the original rather idealistic view of how we ought to treat this," Yost said.

But if Coast Guard higher-ups had listened to the advice of their own field personnel, the VTS might have been able to track the Exxon Valdez even without Loran-C retransmission.

In early 1984, Pat Levy was a civilian technician maintaining the Coast Guard's Valdez radars, manufactured by ALL/Eaton. He learned that the agency, in an effort to save money, planned to replace them with Raytheon radars he didn't consider as potent or reliable.

"I still can't help feeling that this is bringing an oil tanker disaster in the Sound closer to a reality," he wrote Congressman Don Young on Feb. 29, 1984.

Young passed on Levy's concerns to the Coast Guard. Its commandant, Adm. James Gracey, wrote back to say the new radar would be as good as the old, and safety wouldn't be compromised. A Coast Guard radar expert made the same claim this spring at a hearing on the Exxon Valdez disaster.

But, within a year of the Raytheon radar going in, the Coast Guard commandant in Valdez, Micheal Cavett, was complaining about poor reception in the bad weather common to the Sound and asking for an upgrade of the radar at Potato Point.

"The installation of a 10-centimeter radar system could improve tracking ability in rain, wind, and snow," Cavett wrote in April 1985. "I request one of the 3-centimeter radar systems at Potato Point be replaced with a 10-centimeter system."

Centimeters are used to measure the

length of the electromagnetic waves that make up radar signals, the longer the wavelength, the better the radar can "see" through rain and other precipitation.

Valdez never got its 10-centimeter radar, however, and the 3-centimeter system was still in use when the Exxon Valdez hit Bligh Reef.

Simpson said Cavett's request was turned down because the big concern in the Coast Guard was resolution, not range. Resolution refers to how small a target a radar beam can pick out, Simpson said, and how well it can distinguish different-size targets.

He said the radar operators in Valdez didn't want the 10-centimeter radar because of its poorer resolution, so Cavett's request was turned down by Coast Guard technicians without even estimating the cost.

"They went with the recommendation of the users over the commanding officer," Simpson said.

The failure to use Loran-C retransmission or ensure better radar coverage was not the only Coast Guard decision on the Vessel Traffic Service that may have contributed to the spill.

When the Valdez VTS began, three people stood watch at the radar scopes. By the time Steve McCall took over as commander in Valdez in 1985, staffing was down to two per watch.

Even that was too many, he decided. "The inefficiency I see here can be summed up simply: Too many people for the tasks to be performed," McCall wrote his Washington superiors in August 1988.

His bosses took him up on the suggestion and cut staffing. Valdez was still under his command and only one person was on duty when the tanker hit the reef.

While there's no guarantee that two heads would have been better than one, it is a fact that Bruce Blandford, the only watch stander on duty in the radar room at the time, said he was doing paperwork and other shift-change chores when the Exxon Valdez wrecked shortly after midnight.

Blandford also said that when he adjusted the radar and looked at the Bligh Reef area after learning of the crash by radio, the tanker, by that time broadside to the beams and presenting a larger target, was clearly visible.

All this suggests that, if a second watch stander had been on duty with Blandford and adjusting the settings of the radar, the Valdez might have been visible before the crash, in time for it to have warned off the reef.

"I'm not satisfied with the situation in

our VTS before this accident," said Yost, commandant of the Coast Guard. "I think it's at least possible that that ship could have been tracked out that far."

Since the crash, staffing at the radar scopes has been increased to two people.

"Perhaps if we'd tried a little harder for funds for the VTS's, perhaps if we would have kept after it, we would have had better control of the ships going in and out," said Robbins, the Coast Guard official who oversaw the cleanup effort. "We cut back on people here a few years ago — and perhaps we shouldn't have done that."

LESS PILOTING PRACTICE

In the 1970s, the Coast Guard seemed to be promising tough pilotage requirements for Prince William Sound, just as it seemed to be promising tough tanker design standards, a vigilant VTS and other safety measures.

"Properly trained pilots are probably the single most important factor in building a safe tanker transportation system for Prince William Sound," Hayes, the Coast Guard admiral, told Cordova fishermen at the 1977 conference. "To this end, we have implemented local qualification standards that represent a quantum step in upgrading Coast Guard pilotage requirements."

The standards that Hayes bragged about in 1977 required that a crewman who wanted certification to pilot a big tanker into the Sound have — in addition to detailed knowledge of the Sound's waters and hazards — experience on big ships. The standards set up a tiered system for obtaining that experience.

Sailors with experience on ships of 20,000 gross tons or less could become certified to pilot ships up to 20,000 tons, those with experience on ships of 20,000 to 40,000 tons could handle ships up to 40,000 tons, and so on.

The final tier was 60,000 tons — those with experience on ships larger than that could be certified to pilot vessels of any size, such as the Exxon Valdez at 95,000 gross tons.

Coast Guard standards allowed part of the experience to be obtained on tanker simulators. Because of the difficulty and expense of obtaining real experience on large ships, some of the companies running tankers through the Sound — including Exxon — employed the simulators.

Please see Page A-11, COAST GUARD

COAST GUARD: Service relents on reducing tanker crews

Continued from Page A-10

One company they used was Marine Safety International, in Kings Point, N.Y. "We had a complete computer model of Prince William Sound and Valdez, the Narrows, all the way in to the dock," said Thomas Garrigan, a Marine Safety official.

About 20 Alaska-trade crew members took the simulator course each year at a total cost to the shippers of about \$80,000 a year, Garrigan said.

Four to six of those crewmen each year came from Exxon at an annual cost of \$20,000 to \$30,000.

In October 1968, the Coast Guard relaxed pilotage standards so that a crewman need have experience only on a ship of 1,800 gross tons or more — about 1/60th the cargo capacity of the Exxon Valdez — to obtain an unlimited pilotage endorsement.

Pilotage requirements for Prince William Sound were lowered to match the new national standards, which at the same time were raised slightly for the rest of the country.

Because most ocean-going mariners already have experience on ships of 1,800 tons or more, the tanker companies no longer needed Marine Safety's Prince William Sound simulator.

"When the companies that did training with us heard that, they stopped training," Garrigan said.

Greg Cousins, the third mate in charge of the bridge when the Exxon Valdez slammed into Bligh Reef, did not have a pilotage endorsement for the waters where Joe Hazelwood, the Valdez's skipper, turned the ship over to him.

Nor, said Garrigan, had Cousins ever trained on Marine Safety's Prince William Sound simulator in New York.

SHRINKING CREWS

Thirty years ago, the average American tanker carried a lot less oil and a lot more people than it does today.

Arthur McKenzie, who runs an independent rating service called the Tanker Advisory Center in New

York City, estimates the typical tanker in the late 1950s carried a cargo of about 6.3 million gallons and a crew of 40 to 42.

When the Exxon Valdez hit Bligh Reef with 53 million gallons of oil aboard, it carried a crew of 20.

Even so, it was more than 30 percent over staffed by Coast Guard standards. Exxon had the agency's approval to operate with as few as 15 people aboard.

As the size of crews required by the Coast Guard has dwindled in recent decades, the Coast Guard and shipping industry have justified the reductions on several grounds.

One is that the cost savings are needed to keep American shippers competitive with foreign operators, who have reduced their crews. According to industry and union officials, the savings are about \$120,000 a year per crew position eliminated.

Another justification is that a modern ship simply requires fewer people.

Automation of major systems — such as engines and steering — requires fewer hands, the industry and Coast Guard say. The increased reliability of modern equipment means fewer people needed for maintenance, they say.

McKenzie favors double bottoms and other tanker reforms opposed by the industry, but sides with the shippers on crew size.

His reasoning: Since most accidents involve human error, fewer humans mean fewer accidents.

"If you get rid, as much as you can, of the people and depend more on machinery, provided that machinery is designed and run properly, you're probably going to do better," McKenzie said.

Nonetheless, there are signs that even a crew of 20 on the Exxon Valdez wasn't large enough to prevent overload and fatigue when the ship came into Valdez to take on its cargo of North Slope crude.

Greg Cousins, the third mate in charge of the bridge when the Valdez hit the rocks, told the National Transportation Safety Board that he had been on duty from 8 a.m. March 23 until the crash 18 hours later,

except for a 3½-hour nap in early afternoon.

Cousins said he wouldn't have been on the bridge at all, except that he let his relief, Second Mate Lloyd LeCain, sleep in after his own long day at work. James Kunkle, the ship's first mate, told the board he frequently was up 24 hours at a time during cargo loading.

Federal law prohibits a shipowner or operator from permitting an officer to take over the bridge of a ship leaving port unless he's been off duty for at least six of the preceding 12 hours.

Cousins and the other mates denied being too tired to work properly and no official determination has yet been made on whether fatigue was a cause of the crash.

But sleep experts say it fits the pattern of sleep-related accidents.

"It's not unreasonable to suspect either that they were not able to detect how sleep deprivation was affecting their performance or they were unwilling to admit it," said Donald Tepas, an industrial psychologist at the University of Connecticut.

Despite the long history and high stakes of de-manning, the Coast Guard still has no agency-wide standard for setting minimum crew size.

Instead, the shipowner proposes a minimum crew size, then local Coast Guard officials evaluate and approve, subject to review by Coast Guard headquarters in Washington.

In the case of the Exxon Valdez, local Coast Guard officials — concerned about Exxon's bottom line — allowed their approval of smaller crews to continue even after headquarters told them they had done it improperly.

In September 1987, R.A. Janacek, the officer in charge of marine inspections at the Coast Guard station in Long Beach, Calif., wrote headquarters in Washington to request that the Exxon Long Beach — the Valdez's sister ship — be allowed to cut three positions in the engine room.

"Exxon is of course requesting prompt action to eliminate the cost of retaining these men on board,"

Janacek wrote. "The Exxon Valdez ... is already operating satisfactorily with reduced manning."

Fred Grady, the Coast Guard's chief of Merchant Vessel Personnel in Washington, wrote back two months later to say that not only was the proposed cut of the Long Beach crew inadequately documented, but that approval of crew reductions aboard the Valdez had never been reviewed by headquarters.

Nonetheless, the California office let it stand.

Paul Larson, the Janacek subordinate who had actually handled the Valdez evaluation, wrote Exxon on Jan. 28, 1988, to say the erroneously allowed crew cuts would stand because the ship had operated for six months with no problems.

"I certainly understand your vested interest in gaining approval in a timely fashion to reduce the crew and cut costs," Larson wrote. "The best I can do is apologize and assure you I will urge MVP's (headquarters) handling of your case as a priority rather than a routine matter."

Simpson, Yost's aide, defended Larson's decision to let approval for the Valdez's crew cuts to stand, despite the letter from headquarters saying it had not been properly reviewed.

"The bottom line is that what he did was perfectly legal," Simpson said. "If you want to find fault or error, the error was his in not clearing it through headquarters before he did it."

Hillman, the Exxon Seamen's Union official, thinks the Coast Guard should worry more about safety and less about Exxon's bottom line.

"You and I have this regulatory agency called the U.S. Coast Guard. It does not belong to the shipowners," said Hillman. "It was set up for a purpose: to see that these ships are operated safely and that the seamen are not abused by the shipowners."

Despite industry and Coast Guard insistence that crew cuts haven't jeopardized safety, people who have to bet money on it are beginning to think otherwise.

Harry Keefe is vice president of a marine insurance company called GRE America and vice chairman of an industry group called the American Institute of Marine Underwriters.

At a marine insurers' conference in Belgium last month, Keefe warned that modern shipping practices — including smaller crews and less crew training — are creating hazards at sea.

"We have had a revolution in technology accompanied by a de-emphasis on marine training," Keefe said in a speech to the conference. "In this scenario, who cares about safety?"

"True efficiency must incorporate a level of safety tolerable to society."

State To Use Alaska Waters

No.	Vessel Name	Rating	Weight	Age	Hull
ALASKA HESS					
1.	Mt. Cabrite	1	255 tons	18 years	Single
2.	Saint Lucia	1	255 tons	17 years	Single
3.	Seal Island	2	259 tons	16 years	Single
ARCO INC.					
1.	Arco Alaska	3	188 tons	10 years	Double
2.	Arco Anchorage	3	120 tons	16 years	Single
3.	Arco California	4	189 tons	9 years	Double
4.	Arco Fairbanks	3	120 tons	15 years	Single
5.	Arco Independence	4	262 tons	12 years	Single
6.	Arco Juneau	3	120 tons	15 years	Single
7.	Arco Prudhoe Bay	2	70 tons	18 years	Single
8.	Arco Sag River	3	70 tons	17 years	Single
9.	Arco Spirit	3	262 tons	12 years	Single
10.	Arco Texas	3	90 tons	16 years	Single
BAY TANKERS					
1.	Bay Ridge	1	228 tons	11 years	Single
2.	Stuyvesant	1	228 tons	12 years	Single
CHEVRON SHIPPING					
1.	Chevron Arizona	3	39 tons	12 years	Double B&S
2.	Chevron California	3	70 tons	17 years	Single
3.	Chevron Colorado	3	39 tons	13 years	Double B&S
4.	Chevron Louisiana	3	39 tons	12 years	Double B&S
5.	Chevron Mississippi	3	70 tons	17 years	Single
6.	Chevron Oregon	3	150 tons	19 years	Double B&S
7.	Chevron Washington	4	39 tons	13 years	Double B&S
COVE SHIPPING					
1.	Cove Liberty	1	69 tons	35 years	Single
2.	Cove Trader	1	50 tons	30 years	Single
EXXON SHIPPING CO.					
1.	Exxon Baltimore	3	51 tons	29 years	Single
2.	Exxon Baton Rouge	3	76 tons	19 years	Single
3.	Exxon Baytown	4	58 tons	5 years	Double
4.	Exxon Benicia	3	173 tons	10 years	Single
5.	Exxon Boston	3	51 tons	29 years	Single
6.	Exxon Galveston	3	27 tons	19 years	Single
7.	Exxon Houston	2	73 tons	25 years	Single
8.	Exxon Jamestown	3	41 tons	32 years	Single
9.	Exxon Lexington	3	41 tons	31 years	Single
10.	Exxon Long Beach	5	211 tons	2 years	Single
11.	Exxon New Orleans	3	72 tons	24 years	Single
12.	Exxon North Slope	5	173 tons	10 years	Single
13.	Exxon Philadelphia	3	76 tons	19 years	Single
14.	Exxon Princeton	3	43 tons	7 years	Double
15.	Exxon San Francisco	3	76 tons	20 years	Single
16.	Exxon Valdez	5	211 tons	3 years	Single
17.	Exxon Washington	3	41 tons	32 years	Single
18.	Exxon Yorktown	5	43 tons	6 years	Double
1.	Brooks Range	3	176 tons	11 years	Single
2.	Thompson Pass	3	173 tons	11 years	Single

1.	Atgun Pass	2	176 tons	12 years	Single
2.	Cheanut Hill	1	91 tons	13 years	Double
3.	Golden Gate	1	62 tons	19 years	Single
4.	Kenai	3	123 tons	10 years	Double B&S
5.	Keystone Canyon	3	173 tons	11 years	Single
6.	Kittanning	1	91 tons	12 years	Double
7.	Tonsina	3	123 tons	11 years	Double B&S
REUNION					
1.	Reunion				Single
MOBIL					
1.	Mobil Arctic	3	125 tons	17 years	Single
2.	Mobil Meridian	3	49 tons	28 years	Single
3.	Syosset	3	32 tons	31 years	Single
OMI					
1.	OMI Columbia	2	136 tons	15 years	Single
2.	OMI Dynacham	4	51 tons	8 years	Double
EASTERN LION					
1.	Eastern Lion	4	265 tons	16 years	Single
2.	Northern Lion	4	265 tons	15 years	Single
3.	Overseas Boston	3	122 tons	15 years	Single
4.	Overseas Chicago	4	92 tons	12 years	Double
5.	Overseas Juneau	3	120 tons	16 years	Single
6.	Overseas New York	3	90 tons	12 years	Double
7.	Overseas Ohio	4	91 tons	12 years	Double
8.	Overseas Washington	3	91 tons	11 years	Double
9.	Southern Lion	3	265 tons	14 years	Single
10.	Western Lion	4	265 tons	15 years	Single
B.T. ALASKA					
1.	B.T. Alaska	2	182 tons	11 years	Double
2.	B.T. San Diego	3	182 tons	11 years	Double
SUN TRANSPORT, INC.					
1.	American Sun	3	81 tons	20 years	Single
2.	New York Sun	4	34 tons	8 years	Single
3.	Nordic Sun	5	20 tons	8 years	Double
4.	Philadelphia Sun	5	34 tons	8 years	Single
5.	Prince William Sound	3	124 tons	13 years	Double B&S
6.	Texas Sun	2	53 tons	29 years	Single
7.	Tropic Sun	2	35 tons	32 years	Single
8.	Western Sun				Single
TEXACO INC.					
1.	Brooklyn	1	225 tons	15 years	Single
2.	Texaco California	2	39 tons	35 years	Single
3.	Texaco Connecticut	1	39 tons	36 years	Single
4.	Texaco Florida	3	39 tons	35 years	Single
5.	Texaco Georgia	3	26 tons	25 years	Single
6.	Texaco Mass.	2	27 tons	28 years	Single
7.	Texaco Minnesota	3	27 tons	46 years	Single
8.	Texaco Montana	3	27 tons	24 years	Single
9.	Texaco New York	3	39 tons	36 years	Single
10.	Texaco Rhode Island	3	27 tons	25 years	Single
TEXACO CORP.					
1.	Lion of California	2	16 tons	35 years	Single
TRINIDAD CORP.					
1.	Admiralty Bay	1	81 tons	18 years	Single
2.	Aspen	1	82 tons	18 years	Single
3.	Glacier Bay	1	81 tons	19 years	Single
COAST RANGE					
1.	Coast Range	4	40 tons	8 years	Double
2.	Sansinena II	3	265 tons	14 years	Single
3.	Sierra Madre	5	40 tons	8 years	Double

Valdez Tanker Fleet



Perhaps if we'd had a
 Perhaps if we
 have kept ahead
 and have had better
 of the ships going
 and out. We cut back
 on people here a few
 years ago... and
 Perhaps we should
 have done that
 — Vice Admiral Clyde Robbins

Capacity

Largest Tankers: 265,000 Dead Weight Tons Eastern Lion, Southern Lion, Western



Smallest Tanker: 16,000 Dead Weight Tons Lion of California



Age

Oldest Tanker: 46 years Texaco Minne
 Built 194

Average Age: 18 years

Newest Tanker: 2 years Exxon Long Beach Built 1987

Percent Double-Bottoms

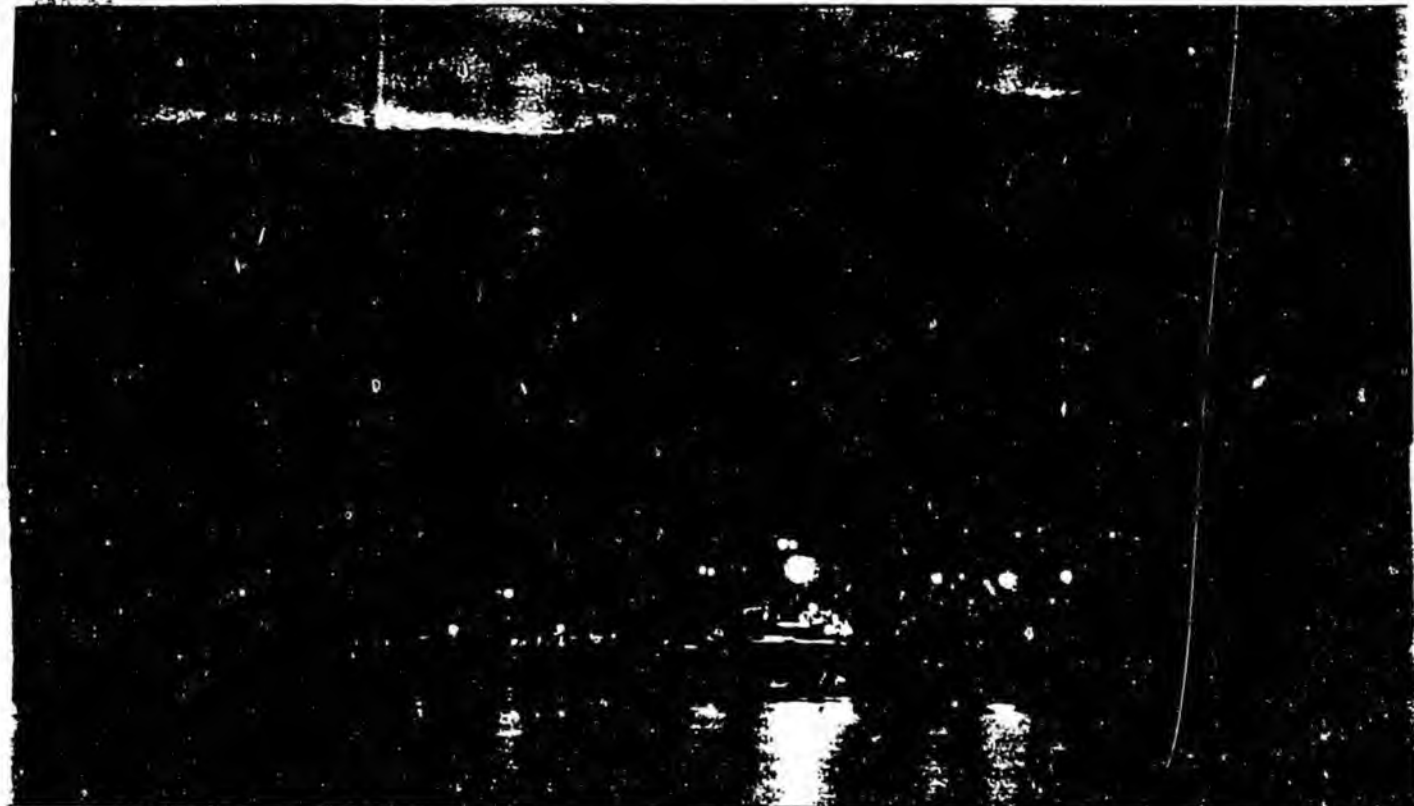
93 tankers are registered for Alaska trade

Type of hull designs



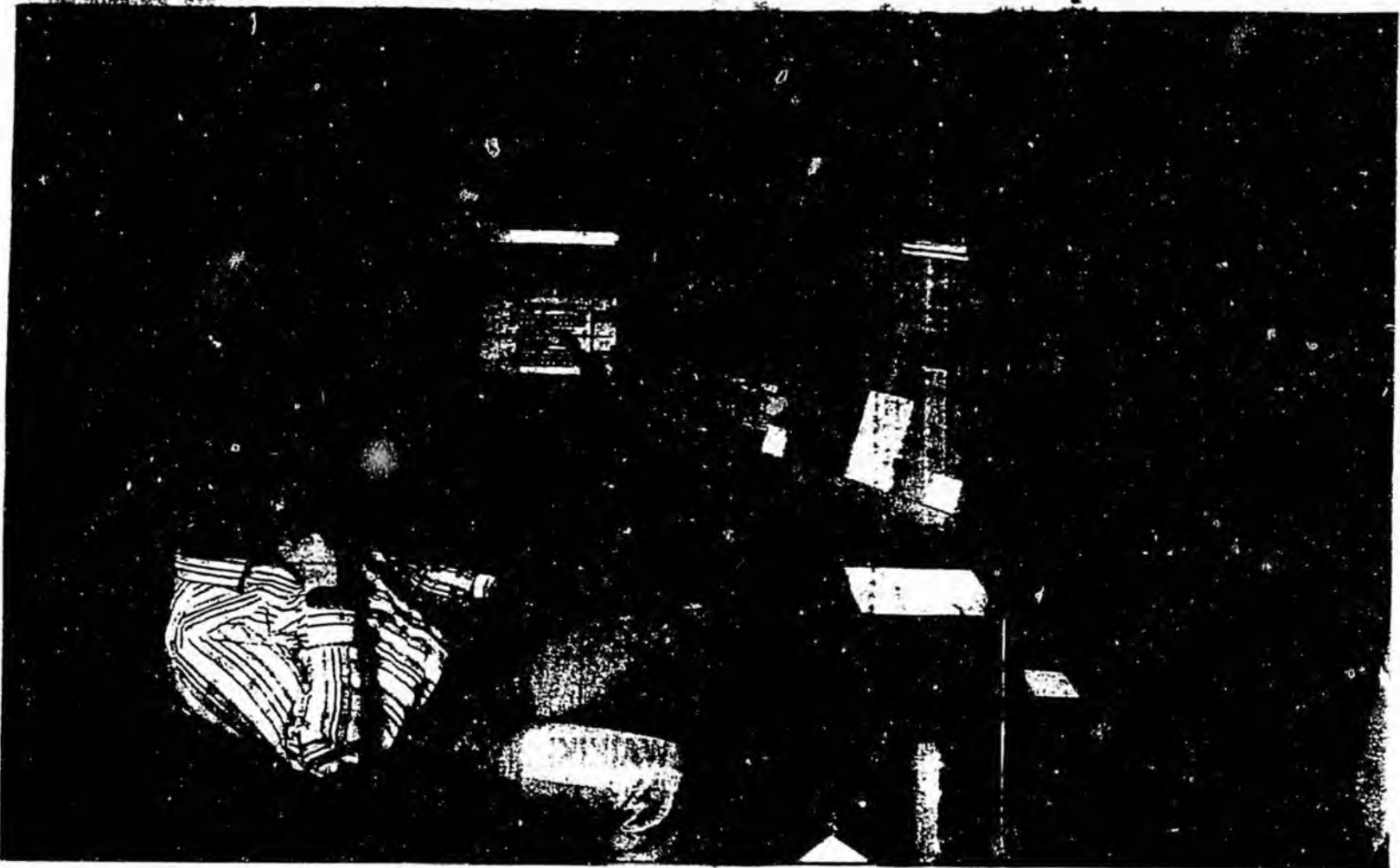
Condition	Percentage
Fair	10%
Good	20%
Very Good	30%
High	40%

DOUBLE-BOTTOMS...
 DOUBLE-SIDES...
 DOUBLE-ENDS...



A tanker loads oil at the Alaskan Marine Terminal in Valdez.

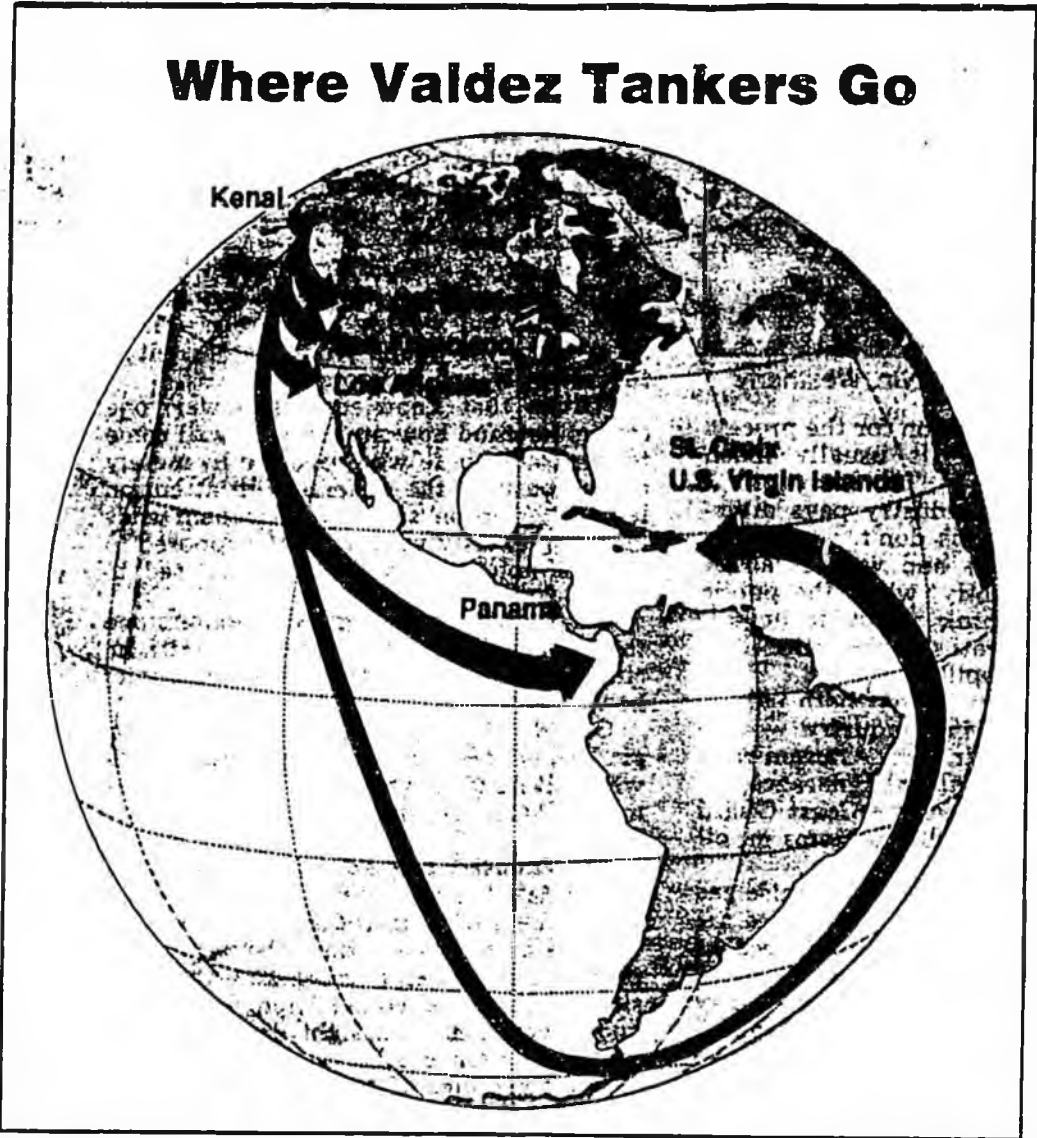
Anchorage Daily News photo by Paul So.



Anchorage Daily News file photo/Paul Souder

Bruce Blandford keeps watch in the Coast Guard's radar room in Valdez in a photo taken before the Exxon Valdez spill.

Where Valdez Tankers Go



Source: Alyeska Pipeline Service Co.

Ron Engstrom / Anchorage Daily News

Regulators: serving public or industry?

By STAN JONES

Daily News reporter

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If you tell an economist that the Coast Guard seems to have been captured by the industry it is supposed to regulate, he'll probably say, "Oh, sure, that's inevitable."

The Coast Guard's record on tanker safety — turning in a whistleblower, breaking promises of tough oversight and generally acting as the industry's partner — is typical in government regulation, according to people who study the subject.

"This is a real failure of democracy, and it's one that we've understood for a long, long time," said Peter Aranson, an Emory University economics professor and expert on the regulatory process.

The idea that agencies like the Coast Guard serve the industries they oversee, not the public they represent, may shock the layman. But economists and political scientists have long taken it for granted.

The Coast Guard has plenty of company in its coziness with the industry under its scrutiny, according to a national computer database of newspaper articles, and other sources. For example:

• According to the Washington Post, Nuclear Regulatory Commission documents alleging there were cracks in the floor of a containment facility at a Louisiana nuclear power plant were leaked to the plant's owner, apparently from the office of NRC Commissioner Thomas Roberts, who later tried to destroy evidence of the leak.

A commission investigator told Congress in 1987 he was ordered to turn over his notes and copies of the documents to Roberts.

"I saw no reason for them to continue to exist," Roberts told Congress when asked about it. "They were torn up and thrown in the wastebasket."

Later, however, copies of the documents were found in the files of the company that owned the plant. An accompanying note from a company vice president urged that the documents be kept confidential to protect the source within the NRC.

• In 1970, the Ralph Nader organization studied the Interstate Commerce Commission, which at the time set interstate freight and passenger rates for truckers and railroads. Nader's group found that of 11 commissioners who left the ICC between 1958 and 1987, six wound up working for the rail or highway industries.

• In Alaska, at least three people who served on the Alaska Public Utilities Commission — Diana Snowden, Marvin Weatherly and Gordon Zerbetz — later worked for the conglomerate that owns Alascom Inc., the largest utility under the commission's oversight. Snowden also worked for the company that would become Alascom before she was appointed to the commission.

While outright venality — bribes or lobbying — may go on at times, the



Gordon Zerbetz

Marvin Weatherly

experts say the explanation for the process of "industry capture" is usually much simpler.

In a nutshell, the industry pays attention, and the rest of us don't.

An industry thinks and worries about its regulator constantly, while the public at large doesn't think about it at all, unless there's a catastrophe like this spring's Exxon oil spill.

The reason for this is that both parties — the public and the industry — are behaving rationally. In fact, Aranson calls it the problem of "rational ignorance."

Suppose, for example, the Coast Guard proposes to require double bottoms on oil tankers.

If the regulation passes, it will raise gas prices a half-cent a gallon, and reduce the amount of oil that gets into the oceans each year by a small percentage.

You — John or Jane Q. Public — may think the increase in environmental quality too modest to justify the cost and therefore oppose the idea.

Or you may think just the opposite — that the improvement in environmental quality is worth the cost — and support it.

But, either way, it's rational for you to stay ignorant. It's not worth your while to spend time on the issue. Your chances of making a difference are slight and the outcome probably won't affect your life much, anyway. You won't bother to study the issue, write the Coast Guard or testify at a hearing.

You certainly won't hire an economist to analyze the costs and benefits of the regulation, or a naval architect to study whether double bottoms could be unsafe, or a law firm to tie up the matter in court.

Nor will you form a political action committee and hire a lobbyist to take your case — and your contributions — to key members of Congress. Neither will you offer Coast Guard officials nice offices and lucrative jobs after they retire.

But suppose you're the tanker industry. If you're rational, you'll do all that and more.

Double bottoms will cost you \$6 million a ship, more if they have to be put on existing vessels. If you expect to buy 100 new ships over the next 10 years, the Coast Guard is about to raise your bill by \$600

million. You may be able to kill or stall the proposal for a few hundred thousand dollars.

So you write letters and go to hearings; you hire economists, lobbyists, naval architects and every other kind of expert in sight; you incite friendly congressmen to denounce the proposal and threaten the agency's budget; you foment panic among unions whose members will lose jobs if oil shippers switch to lower-cost forms of transportation.

In short, a regulatory agency hears loudly and constantly from the industry it deals with, but weakly and rarely — if at all — from the public whose interest it is theoretically out to protect.

"Given that knowledge is power, one can understand how an industry will come to dominate those who regulate it, merely on the basis of the difference in attention levels," Aranson said. "Government ends up doing exactly what it's not supposed to do and not doing what it's supposed to do."

Industry capture is so well-understood that books have been written on it, including at least one that tells companies how to do it.

Called "The Regulatory Game — Strategic Use of the Administrative Process," it was published 11 years ago by two economists, Bruce Owen and Ronald Braeutigam.

"No industry offered the opportunity to be regulated should decline it," they counsel in the book's introduction.

They then explain how the regulatory process can be used to make sure that such sinister forces as competition, innovation and government oversight don't interfere too much with profits.

Some samples of their advice:

• On information management: "Agencies can be guided in the desired direction by making available carefully selected facts."

Or, if that fails, "delay can be achieved by over-response: flooding the agency with more information than it can absorb."

• On litigation: "The delay which can be purchased by litigation offers an opportunity to undertake other measures to reduce or eliminate the costs of an eventual adverse decision. If the administrative process goes on long enough, it is even possible to ask for a new hearing on the grounds that new and more accurate information may be available."

• On delay through innovation: "A well-timed announcement of an innovation or technological breakthrough can mount a difficult issue which threatens to go against the firm. At a minimum, the terms of the debate may change sufficiently to require to the decision process to begin anew."

• On lobbying: "An official contemplating a decision must be led to think of its impact in human terms, and not in institutional or organizational terms. Officials will be much less willing to hurt long time

acquaintances than corporations."

• On experts who help shape policy: "Be prepared whenever possible to co-opt these experts. This is most effectively done by identifying the leading experts in each relevant field and hiring them as consultants or advisors, or giving them research grants and the like. ... It must not be too blatant, for the experts themselves must not recognize that they have lost their objectivity and freedom of action."

• On playing one agency against another: "The most common instance of this occurs with respect to geographic jurisdiction: state versus federal, or one state against another. The interests of these agencies often diverge, and one can court the assistance of one in dealing with another."

In time, according to the experts, the regulators take on the mindset of the industry that they deal with.

"It's very common to find the agency worrying about the economic health of the people they're regulating," said Bruce Owen, one of the authors of "The Regulation Game."

"What it comes down to is, they've simply identified with the industry," he said.

Owen now runs his own economic consulting firm in Washington, D.C., but does not, he said, have any clients in the oil or shipping industries.

Another well-documented facet of the regulation game is the ease and frequency with which employees in regulatory agencies end up working for the industries they oversee.

In the case of the Coast Guard, the traffic includes former Coast Guard Commandant Jack Hayes. Before running the Coast Guard from Washington, he ran its Alaska district from Juneau and was in charge when the tanker system was set up in Prince William Sound 12 years ago. After the spill, he did post-spill community relations work for Alyeska Pipeline Service Co.

The crossover from agency to industry is also all but inevitable, according to the experts.

"When you go to work for government and you become expert at regulating an industry, what you do is create a certain value for yourself which is very specific," Owen said. "Your skills are only worth something, outside the government, to that particular industry."

In Owen's view, the realities of regulatory politics make it unlikely the Coast Guard will ever, on its own, go against the industry on a major issue like double bottoms.

Only Congress can do it, he said. "Big dramatic events like the Exxon Valdez are the focal points for exactly that kind of movement," Owen said. "If there is ever any hope of reforming the Coast Guard in the 'appropriate' direction, it's on these occasions."

10-15-89 Anchorage Daily News

Alyeska whistleblower was left out on a limb

By STAN JONES

Daily News reporter

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Berth operator Steve Eward was troubled by the oil slicks and sheens and dead fish and birds he kept seeing around the tanker terminal in Valdez, so he reported them to his bosses at Alyeska Pipeline Service Co.

The year was 1977 and the terminal, like the pipeline it serves, had only been in operation a few months. Alyeska didn't seem to want to do much about the problems.

"What I would see would be late response or no response or maybe one supervisor would come down, look it over, and say, 'Well, gee whiz, if we wait long enough the current will take it away,'" Eward said in an interview this summer.

was spread out on Fisken's desk.

"Your days with Alyeska are numbered," Eward quoted Fisken as saying.

That day, Eward says, he was reassigned to what he describes as a "menial" pump-maintenance job.

"They were hoping it would discourage me and I might just want to resign," Eward said.

He didn't resign, but was fired in November 1978, after an altercation with an Alyeska security guard that both Eward and the company say wasn't serious.

Fisken has since died, but Paul Connors, who was working in the Coast Guard's Valdez station on the day Eward brought in his evidence and who sent him upstairs to see Purdy, confirms parts of Eward's account.

He figured the Coast Guard would know what to do about the pollution, so he built a file.

"I started taking copies of the logbooks when we would have a spill or a sheen on the water," Eward said. "They would show the response time and what the response was ..."

When Eward thought he had enough information, he went to Homer Purdy, commander of the Coast Guard station in Valdez, turned over 40 pages of copies and sat through an hour-and-a-half tape-recorded interview.

When Eward went to work the next morning, his boss, Alyeska Marine Superintendent Bill Fisken, called him in. The evidence that Eward had given to Purdy

Please see A-11, EWARD

"I do recall that within a day or two of that meeting in the office, I was asked to take a rather large envelope over to Capt. Fisken (at Alyeska) and to make sure that I gave it to him directly," Connors said recently.

Connors didn't look in the envelope, but he said it could have contained the documents and tape recording of Eward's interview.

"I realize the guy feels like somebody squealed on him, and they probably did in all reality," Connors said. "But you can't, because you're the regulatory agency, divorce yourself from sending information back and forth with the people you're regulating."

Homer Purdy, the Coast Guard official Eward says took his evidence, is retired and living in the Washington, D.C., area. He works for a company that maintains electronic gear under contract to the Coast Guard.

Purdy said in a recent interview he doesn't remember Eward coming to his office that day in 1977, or forwarding any evidence from Eward to Alyeska.

But he said that, if it did happen, it wasn't because he was trying to get a whistleblower fired.

"I would not hang somebody out to dry on purpose," Purdy said. "I personally resent the insinuation, if there is one, that I was in any way in collusion with Alyeska to go after this man or his job or that I wasn't doing my job up there in Alaska."

Purdy said the standard at the time was that an alleged pollution incident didn't amount to a case unless an investigator — either federal or state — actually saw oil on the water.

He said he might have forwarded reports of pollution to Fisken, along with a demand that Fisken check out the allegations and explain what was going on at the terminal.

"It may have been naive on my part, but my goal was to stop it, or would have been to stop it," Purdy said.

Alyeska spokesman George Jurkowich said company records and recollections seem to confirm that the Coast Guard sent over information on Eward.

"There is some memory of him having gone to the Coast Guard and the Coast Guard coming back to Alyeska," Jurkowich said.

Eward's information apparently did not lead to any enforcement action, according to Alyeska.

Eward now fishes commercially in Alaska in the summer, and deals in fishing permits and boats in the winter. He said he tries not to think of his experience with Purdy, Alyeska and the Coast Guard, but the memories are still sharp.

"The one incident that stands out strong in my mind is taking all that information to the Coast Guard and then having it turned over to my boss," Eward said.

COMMENTS BEFORE

ALASKA HOUSE RESOURCES COMMITTEE

ON

TECHNOLOGY OF TANKER TRANSPORTATION

GOOD AFTERNOON. MY NAME IS TOM GILLETTE. I AM PRESENTLY EXTERNAL AFFAIRS ADVISOR FOR EXXON SHIPPING COMPANY. BY EDUCATION I AM A NAVAL ARCHITECT AND MARINE ENGINEER, SO I WELCOME THE OPPORTUNITY TO SPEAK TODAY BEFORE THIS COMMITTEE ON THE SUBJECT OF TANKER TRANSPORTATION TECHNOLOGY.

AS IS TRUE WITH MANY ACTIVITIES, CHANGES IN VESSEL DESIGN THROUGHOUT THE CENTURIES HAVE BEEN MORE EVOLUTIONARY THAN REVOLUTIONARY. EACH DESIGN BUILDS UPON EXPERIENCE WITH PRIOR DESIGNS, INCORPORATES NEW DEVELOPMENTS IN A FEW AREAS, AND COMPLIES WITH THE THEN-CURRENT COAST GUARD AND CLASSIFICATION SOCIETY RULES WHICH THEMSELVES ARE THE RESULT OF AN EVOLUTIONARY PROCESS. THE GENERAL TREND IS FOR EACH NEW SHIP TO BE BETTER AND SAFER THAN ITS PREDECESSOR.

THIS DOES NOT MEAN THAT THE OLDER VESSELS ARE UNSAFE. WITH PROPER INSPECTION AND MAINTENANCE AND RETROFITTING OF IMPROVED AUXILIARY AND NAVIGATION EQUIPMENT, OLDER VESSELS CAN AND DO ACHIEVE OPERATING AND SAFETY RECORDS COMPARABLE TO THOSE OF NEWER VESSELS.

WITH THIS AS BACKGROUND, LET ME ADDRESS WHAT I UNDERSTAND TO BE ONE OF THIS COMMITTEE'S MAJOR CONCERNS, WHETHER DOUBLE BOTTOMS SHOULD BE REQUIRED IN OIL TANKERS TO REDUCE THE RISK OF OIL SPILLS. MEASURES TO REDUCE MARINE POLLUTION WERE THE SUBJECT OF MUCH STUDY DURING THE 1970'S, BOTH IN THE UNITED STATES AND THE INTERNATIONAL MARITIME ORGANIZATION (IMO). IN 1978, THE DELEGATES TO THE IMO AGREED ON NUMEROUS MEASURES TO REDUCE OIL POLLUTION. TANKERS WERE REQUIRED TO HAVE INERT GAS SYSTEMS TO REDUCE THE RISK OF TANK EXPLOSIONS. SEGREGATED BALLAST SYSTEMS WERE REQUIRED AND THE DISCHARGE OF OILY BALLAST PROHIBITED; THIS IS A MAJOR FACTOR CONTRIBUTING

TO THE REDUCTION OF DISCHARGES FROM TANKER OPERATIONS INTO THE OCEANS BY ALMOST 50 PERCENT.

ANOTHER REQUIREMENT ADOPTED BY IMO TO REDUCE POTENTIAL OIL SPILLAGE WAS PLACEMENT OF THE SEGREGATED BALLAST TANKAGE ADJACENT TO THE SHELL OF THE VESSEL. THE SEGREGATED BALLAST COULD BE LOCATED EITHER IN DOUBLE BOTTOMS, AFFORDING SOME PROTECTION IN CASE OF GROUNDINGS, OR PROTECTIVELY LOCATED WING TANKS, WHICH AFFORDED SOME PROTECTION FROM COLLISIONS. EXXON SUPPORTED THESE IMO PROPOSALS.

STATISTICS AVAILABLE IN 1978 AND NOW ON LARGE SPILLS DO NOT MAKE A CONVINCING CASE FOR OR AGAINST PUTTING SEGREGATED BALLAST IN DOUBLE BOTTOMS AS OPPOSED TO WING TANKS. DATA DEVELOPED FOR THE ALASKA OIL SPILL COMMISSION CONFIRM DOUBLE BOTTOMS ALONE WOULD NOT REDUCE THE AMOUNT OF OIL RELEASED AS A RESULT OF MAJOR TANKER INCIDENTS SINCE MORE OIL HAS BEEN SPILLED AS A RESULT OF COLLISIONS AND RAMMINGS THAN GROUNDINGS. THEREFORE, THE IMO HAD GOOD REASON TO LEAVE TO THE VESSEL OWNER AND DESIGNER THE DECISION AS TO WHETHER THE PROTECTIVELY LOCATE TANKAGE SHOULD BE ON THE BOTTOM OR SIDE OF THE VESSEL. THE IMO TREATY PROVISIONS WERE RATIFIED BY THE SENATE AND INCORPORATED BY CONGRESS INTO THE 1978 PORT AND TANKER SAFETY ACT. SUBSEQUENTLY, THE COAST GUARD ISSUED REGULATIONS IMPLEMENTING THESE REQUIREMENTS, WHICH WITH A FEW MINOR EXCEPTIONS BECAME FULLY EFFECTIVE IN 1986. THE ACTIONS TAKEN IN THE LATE 1970'S REPRESENTED A GIANT STEP FORWARD IN REDUCING MARITIME OIL POLLUTION.

DURING THE 1970'S DELIBERATIONS, IT DOES NOT APPEAR THAT SERIOUS CONSIDERATION WAS GIVEN TO A DOUBLE HULL REQUIREMENT. A DOUBLE HULL

CONSISTS OF A DOUBLE BOTTOM UNDER THE CARGO TANKAGE AND A VOID SPACE BETWEEN THE SHELL PLATING AND THE OUTBOARD BULKHEAD (WALL) OF THE CARGO TANK, LEAVING NO CARGO IMMEDIATELY ADJACENT TO THE SEA.

AS A RESULT OF MORE RECENT INCIDENTS THE QUESTION AS TO WHETHER DOUBLE HULLS SHOULD BE REQUIRED HAS GAINED GREATER PROMINENCE. THE COAST GUARD HAS POINTED OUT THAT DOUBLE HULLS WOULD BE SAFER THAN DOUBLE BOTTOMS OR WING TANKS ALONE. THIS OF COURSE COULD REQUIRE MORE TANKERS; A STUDY BY THE NASSCO SHIPYARD INDICATED AS MUCH AS 60% MORE TANKERS WOULD BE REQUIRED IF PRESENT SIZES WERE MAINTAINED AND ALL WERE BUILT WITH DOUBLE HULLS MEETING CURRENT RULES. OBVIOUSLY, A BALANCE MUST BE SET. THE COAST GUARD ALSO HAS SPONSORED A STUDY BY THE NATIONAL ACADEMY OF SCIENCES (NAS) ON THESE AND OTHER VESSEL DESIGN MODIFICATIONS WHICH MIGHT IMPROVE ENVIRONMENTAL SAFETY. EXXON SUPPORTS THIS STUDY EFFORT, WHICH MUST ADDRESS MANY COMPLEX VESSEL DESIGN ISSUES IN ARRIVING AT ITS CONCLUSIONS.

WHILE IMPROVING VESSEL DESIGN TO MINIMIZE OIL LOSSES FROM COLLISIONS OR GROUNDINGS IS ONE APPROACH TO PROTECTING THE ENVIRONMENT, PREVENTION OF GROUNDINGS AND COLLISIONS IS CLEARLY THE BEST ANSWER. IN THIS REGARD, VESSEL TRACKING SYSTEMS OFFER PROMISE. RADAR-BASED TRACKING SYSTEMS ARE WELL UNDERSTOOD AND IN PLACE IN SEVERAL LOCATIONS. THEY REQUIRE A FAIR DEGREE OF HUMAN MONITORING AND COMMUNICATION SO, WHILE A STEP FORWARD, THEY CERTAINLY AREN'T FOOLPROOF. PLACING A TRANSPONDER ON A VESSEL WITH A SATELLITE LINK TO A SHORE STATION, AS RECENTLY ANNOUNCED BY THE COAST GUARD ON A TRIAL BASIS FOR PRINCE WILLIAM SOUND, WILL ALLOW A VESSEL'S LOCATION TO BE PINPOINTED. HOWEVER, COMMUNICATION TO THE VESSEL IS STILL NEEDED IN AN EMERGENCY SITUATION.

ANOTHER SYSTEM UNDER DEVELOPMENT WOULD HAVE THE VESSEL'S EXACT LOCATION DETERMINED FROM NAVIGATION SATELLITES AND SUPERIMPOSED ON ELECTRONIC NAVIGATION CHARTS IN THE BRIDGE OF THE VESSEL. IF THE VESSEL IS OUTSIDE ITS PRESET COURSE, ALARMS WOULD SOUND AND CORRECTIVE ACTION WOULD BE DISPLAYED. THIS REAL-TIME APPROACH TO NAVIGATION COULD SIGNIFICANTLY REDUCE RESPONSE TIME IN AN EMERGENCY. SINCE 1985 EXXON SHIPPING HAS BEEN WORKING WITH PRIVATE CONTRACTORS ON SUCH A SYSTEM. WE HAVE ALSO BEEN CONSULTING WITH THE COAST GUARD AND THE MARITIME ADMINISTRATION AND, WHILE NOT YET READY, HOPE THAT SUCH A SYSTEM CAN BE IMPLEMENTED ON A TRIAL BASIS IN THE NEAR FUTURE.

NOT ALL THE PROPOSALS BEING MADE TO IMPROVE MARITIME SAFETY AND OIL SPILL RESPONSE ARE GOING TO BE PRACTICAL OR REASONABLE. IMPARTIAL BODIES SUCH AS THE NATIONAL ACADEMY OF SCIENCES ARE BEST POSITIONED TO MAKE DECISIONS AS TO WHAT IMPROVEMENTS CAN AND SHOULD BE MADE TO IMPROVE TANKER SAFETY. SUCH DECISIONS WILL OF NECESSITY BE BASED ON CURRENT TECHNOLOGY AND PERCEPTIONS OF COSTS, BENEFITS AND RISKS, ALL OF WHICH CONSIDERATIONS ARE LIKELY TO BE DIFFERENT FROM THOSE PREVALENT IN THE PAST.

WHILE EFFORTS TO IMPROVE SAFETY CONTINUES, PAST EFFORTS HAVE NOT MADE ANY TRANSPORTATION SYSTEM, WHETHER HIGHWAY, AIR, RAIL OR MARINE, ACCIDENT-FREE. TO REDUCE FUTURE RISK, KNOWLEDGEABLE PEOPLE MUST MAKE RATIONAL JUDGMENTS BASED ON CURRENT KNOWLEDGE AS IS BEING DONE IN THE NAS STUDY. THESE JUDGMENTS CAN THEN SERVE AS THE BASIS FOR FEDERAL LEGISLATION AND SUBSEQUENT COAST GUARD REGULATIONS CONCERNING VESSEL DESIGN REQUIREMENTS. EXXON SHIPPING BELIEVES THIS APPROACH, WHICH IS THE SAME AS THAT WHICH CULMINATED IN THE PORT AND TANKER SAFETY ACT, OFFERS THE BEST PROCEDURAL MEANS OF ACHIEVING FURTHER REDUCTIONS IN MARITIME POLLUTION.

ECO

**ASSESSMENT OF
TANKER TRANSPORTATION SYSTEMS
IN
COOK INLET
AND
PRINCE WILLIAM SOUND**

Prepared for:
ALASKA OIL SPILL COMMISSION

Prepared by:
ENGINEERING COMPUTER OPTECNOMICS, INC.

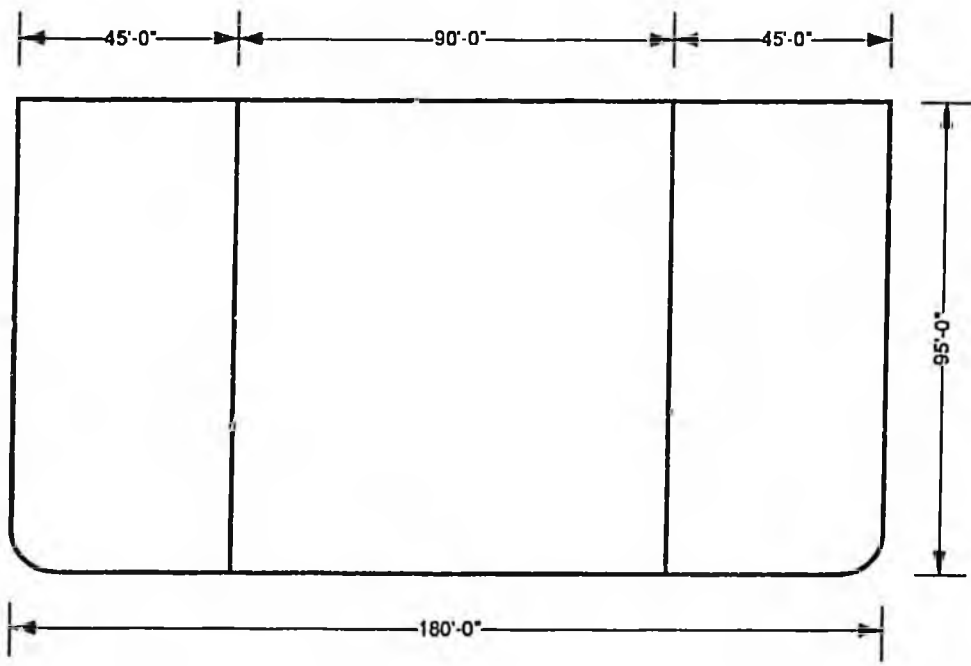
ASSESSMENT OF TANKER TRANSPORTATION

IMPROVED TANKER DESIGN

- DOUBLE HULLS
- CENTRALIZED BUNKER TANKS
- AUTOMATED CARGO CONTROL SYSTEM
- AUXILIARY THRUSTERS
- PRECISE NAVIGATION SYSTEMS
- IMPROVED LIFEBOATS



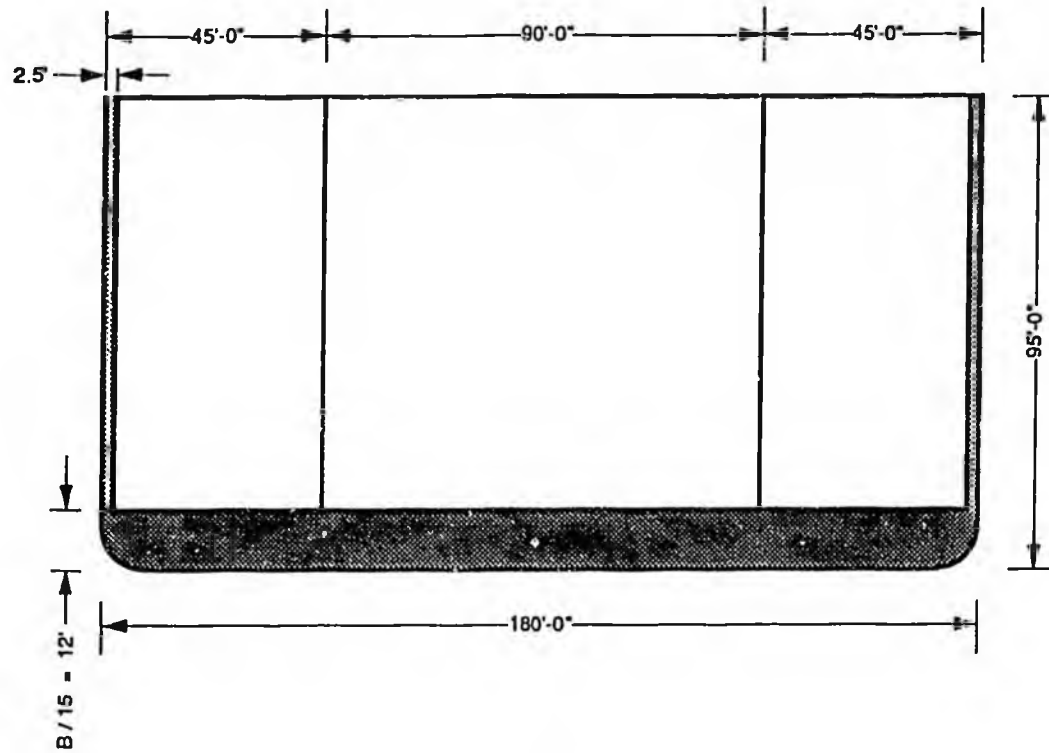
NOMINAL 250,000 DWT
SINGLE HULL TANKER
WITH STAGGERED
WING BALLAST TANKS



DOUBLE BOTTOM = NONE
DOUBLE SIDES = NONE



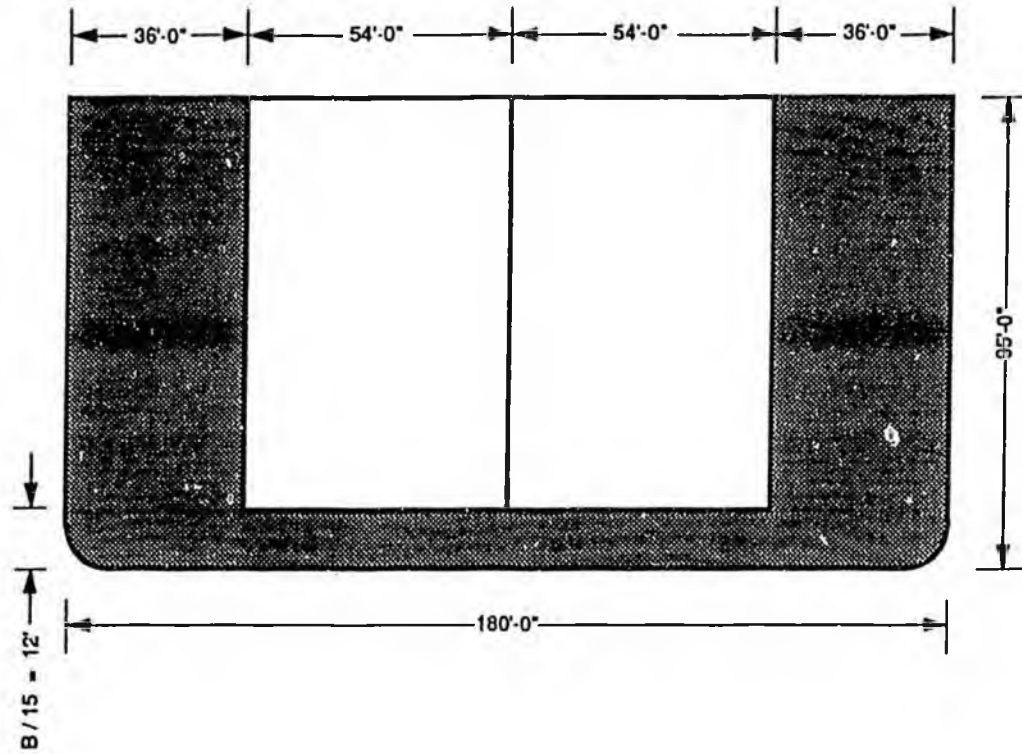
NOMINAL 250,000 DWT
DOUBLE HULL TANKER
(TYPE II)



DOUBLE BOTTOM (minimum) = $B / 15 = 180' / 15 = 12'$
DOUBLE SIDES (minimum) = 76 cm (approx. 2.5')



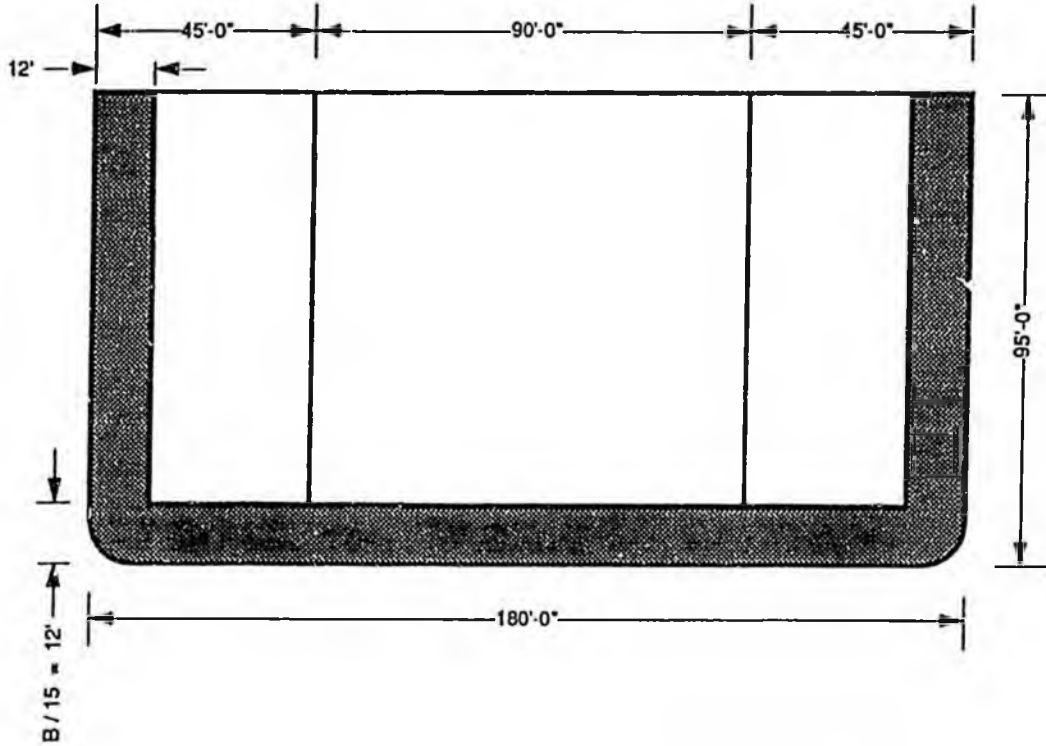
NOMINAL 175,000 DWT
DOUBLE HULL TANKER
(TYPE 1)



DOUBLE BOTTOM (minimum) = $B / 15 = 180' / 15 = 12'$
DOUBLE SIDES (minimum) = $B / 5 = 180' / 5 = 36'$

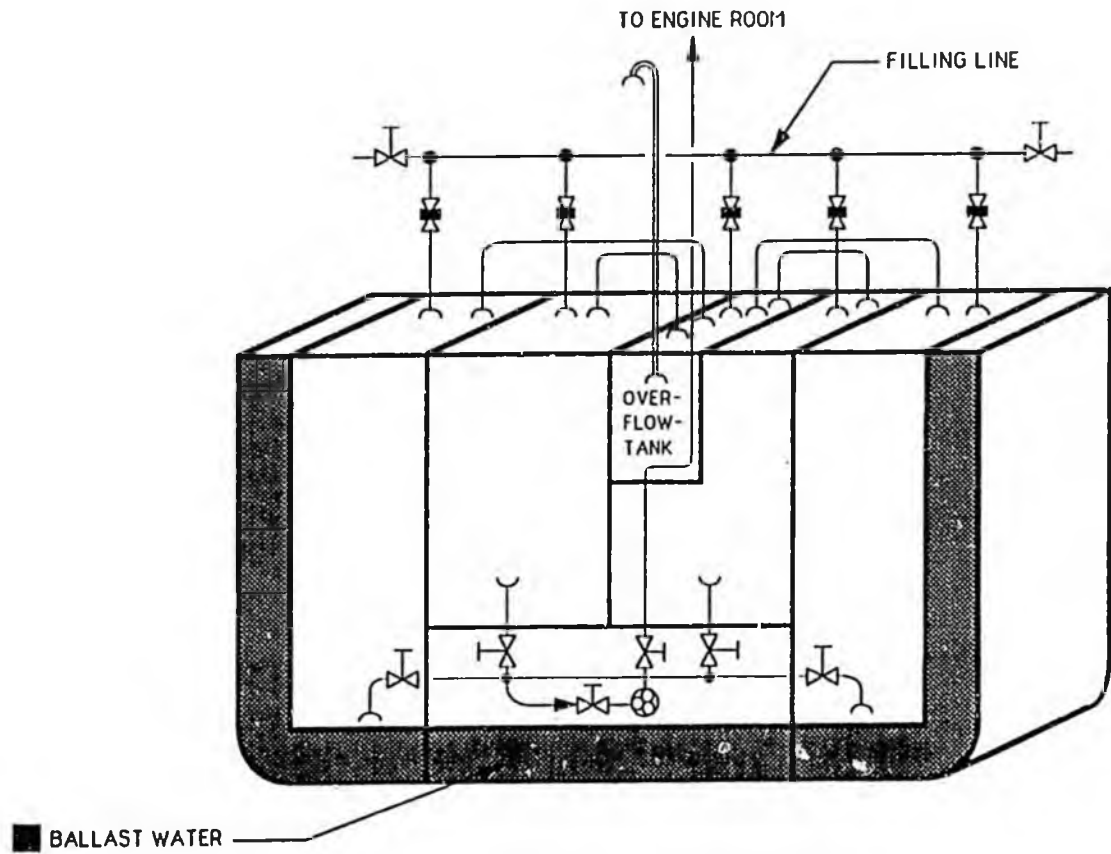


NOMINAL 250,000 DWT
DOUBLE HULL TANKER
(TYPE II - modified)



DOUBLE BOTTOM (minimum) = $B/15 = 180'/15 = 12'$
DOUBLE SIDES (minimum) = $B/15 = 180'/15 = 12'$

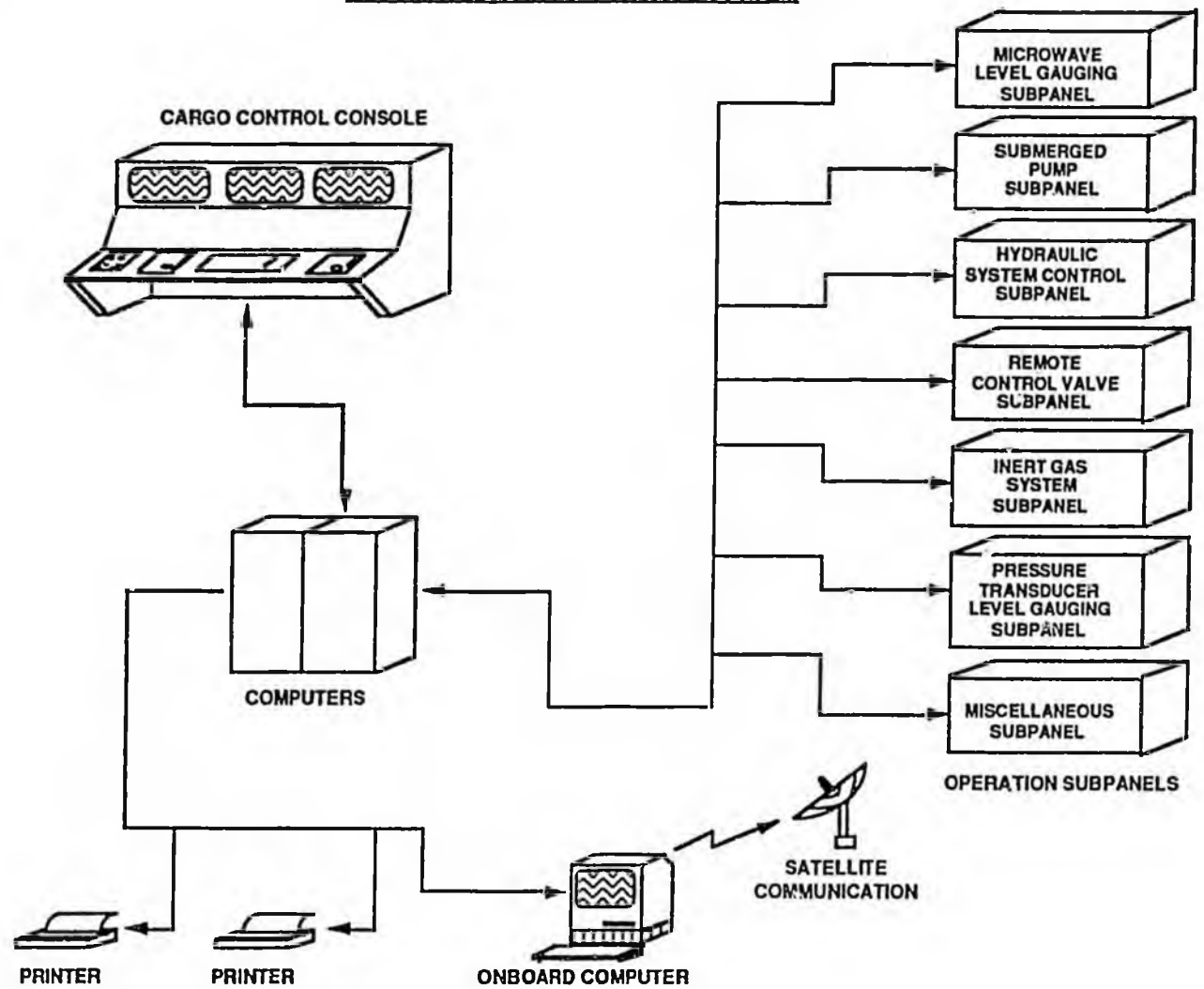
CENTRALIZED BUNKER TANKS



7

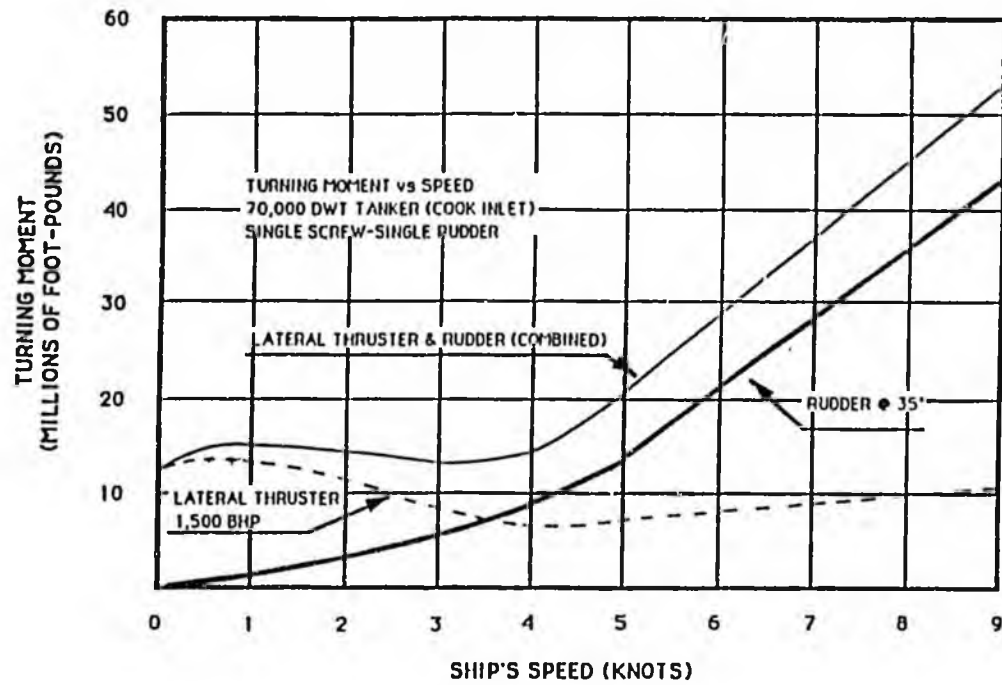


AUTOMATED CARGO CONTROL SYSTEM

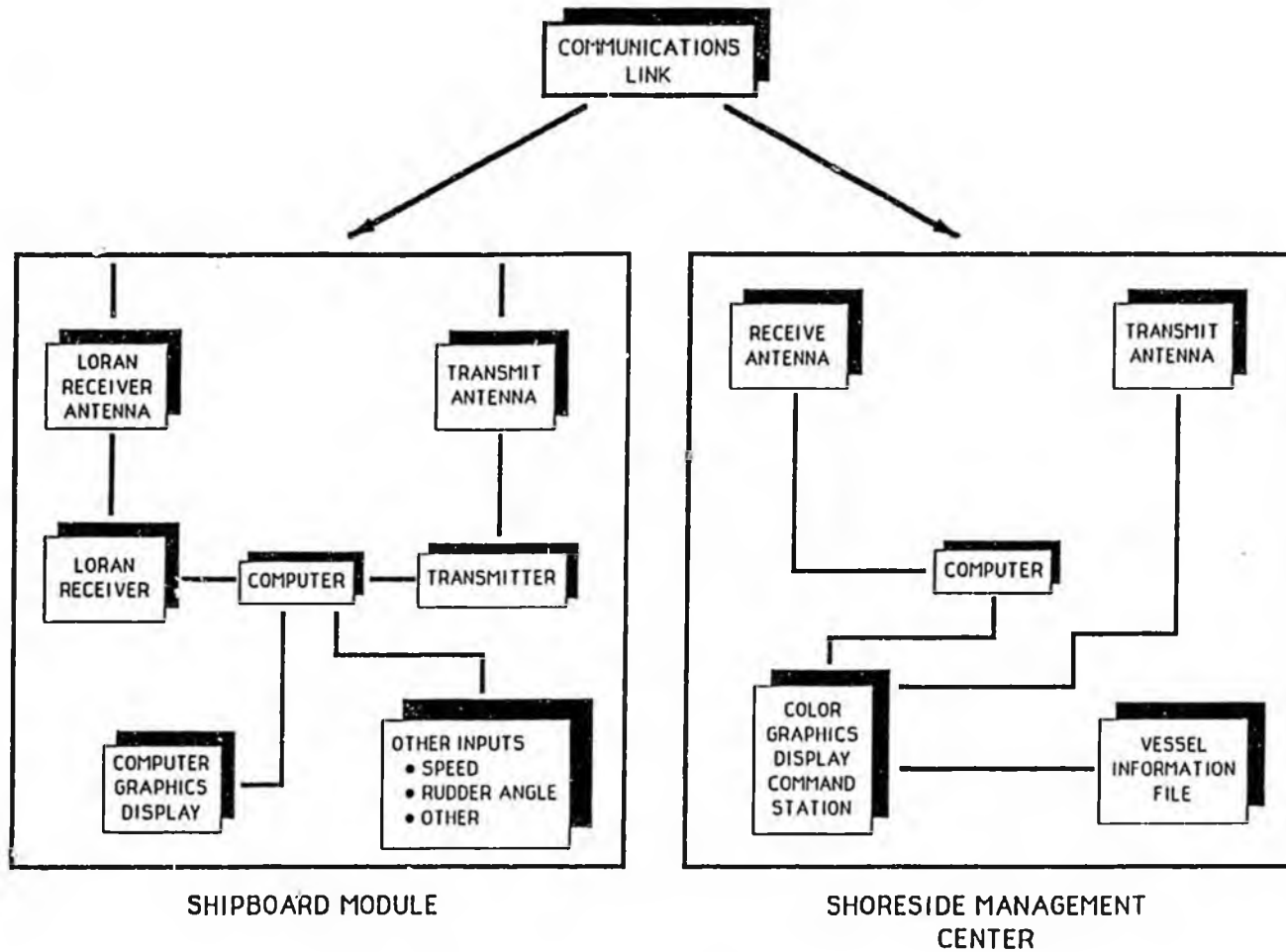


8

AUXILIARY THRUSTERS

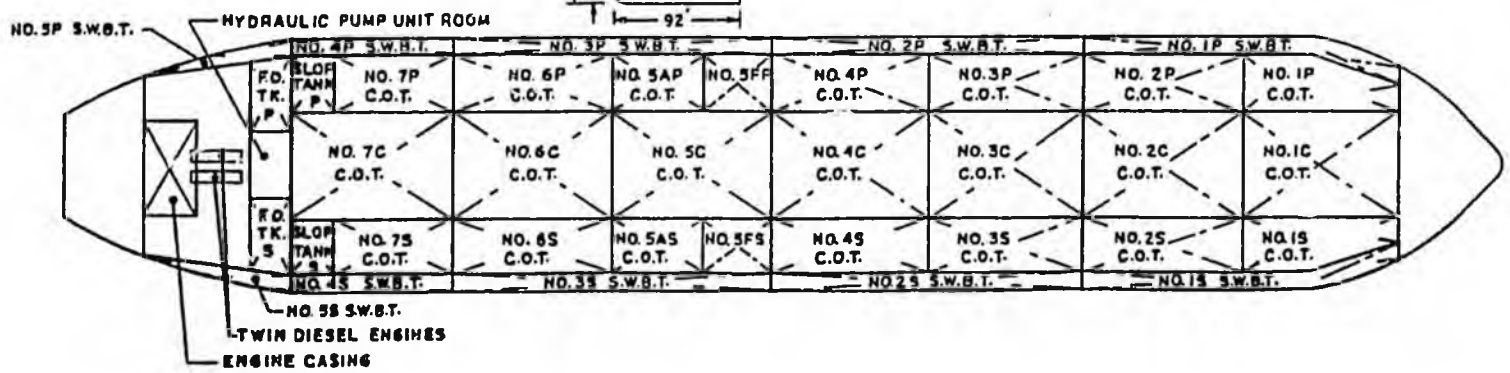
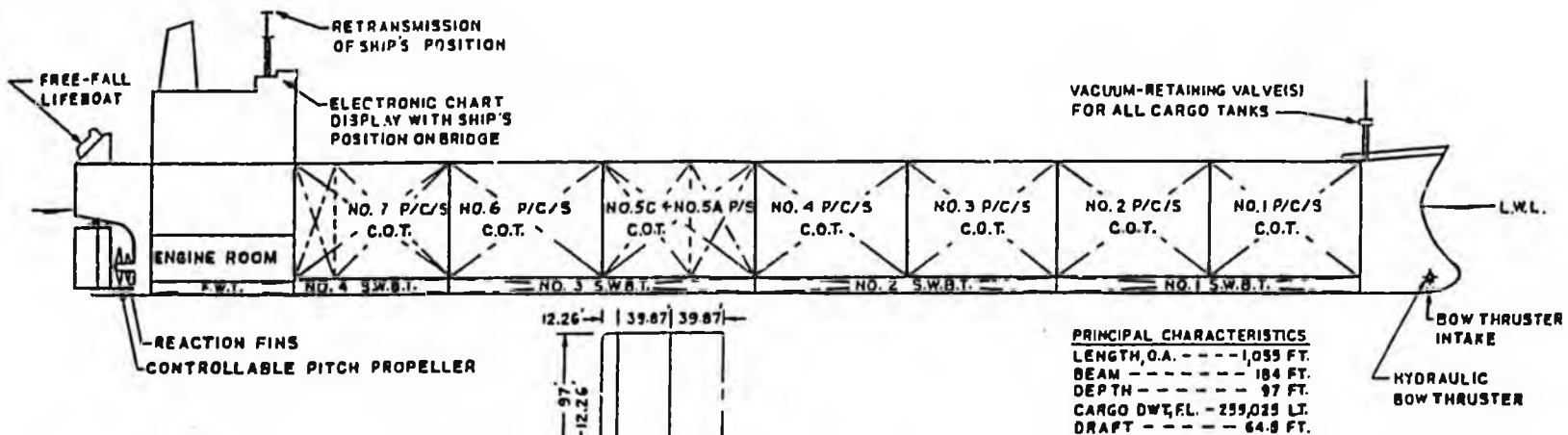


VESSEL MONITORING SYSTEM





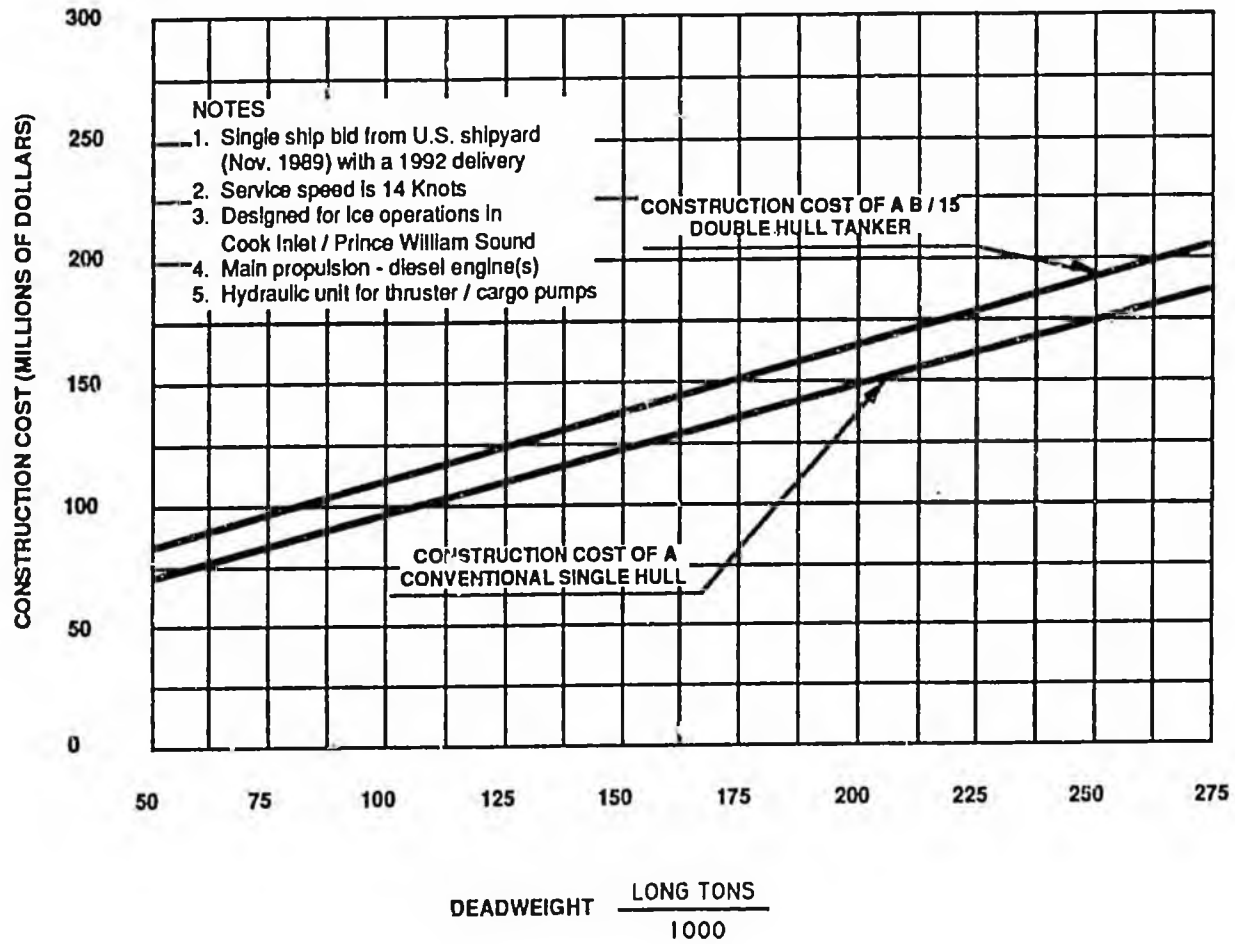
250,000 DWT CRUDE CARRIER



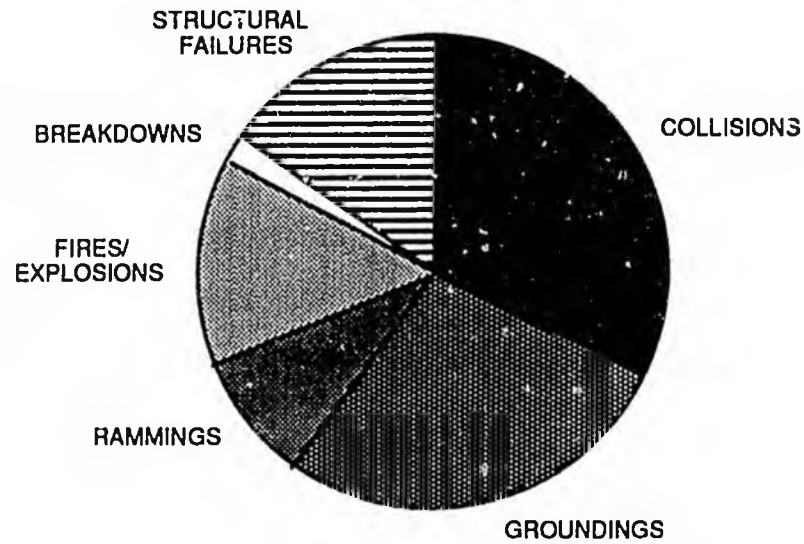
12



CONSTRUCTION COST COMPARISON DOUBLE HULL VERSUS CONVENTIONAL BUILT TANKER



OIL SPILLS BY TYPE OF ACCIDENT

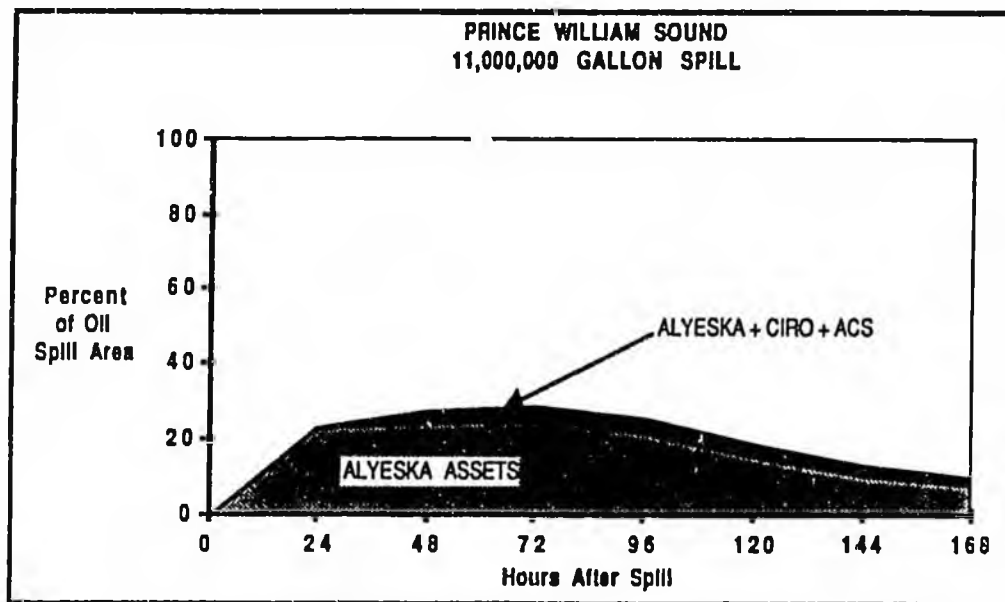




SPILL RESPONSE CAPABILITY

PRINCE WILLIAM SOUND

11,000,000 Gallon Spill



MARINE TRANSPORTATION SYSTEM MODIFICATIONS

GROUP I

**MANDATORY DRUG AND ALCOHOL TESTING
EMERGENCY AND HIGH RISK NAVIGATION TRAINING
PORT CLOSURE/RESTRICTION SYSTEM
TWO PERSON WATCHSTANDING REQUIREMENT
IMPROVED LOADING AND UNLOADING PROCEDURES
LOCAL SPILL PREVENTION INVOLVEMENT
SPILL RESPONSE EQUIPMENT COORDINATION**

GROUP II

**VESSEL MONITORING SYSTEM
TRAFFIC SEPARATION LANES AND ONE-WAY TRAFFIC
DESIGNATED ANCHORAGE AREAS
EMERGENCY RESPONSE/POLLUTION CONTROL VESSELS
IMPROVED LOADING/UNLOADING DESIGN**

GROUP III

IMPROVED TANKER DESIGN



**PROJECTED SPILL PROBABILITIES
AND RECURRENCE INTERVALS
COOK INLET
SUMMARY - ALL SPILLS**

MODIFICATIONS	SPILL PROBABILITY PER 1000 PORT CALLS	RECURRENCE INTERVAL
None - Existing	2.93	2.0
Group I	2.52	2.3
Group I and II	1.49	3.9
Group I,II, and III	0.67	8.7

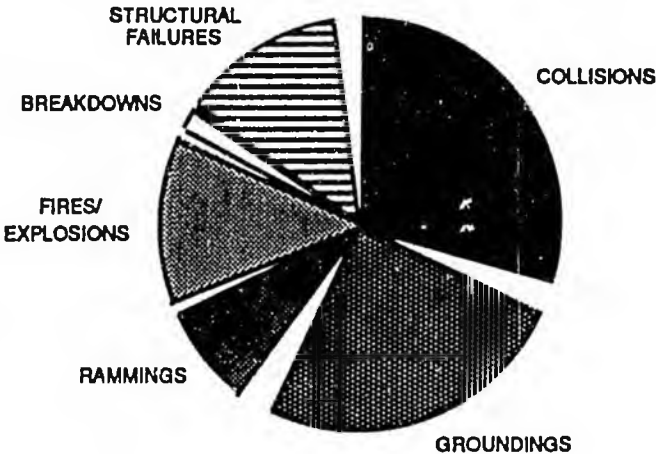
17



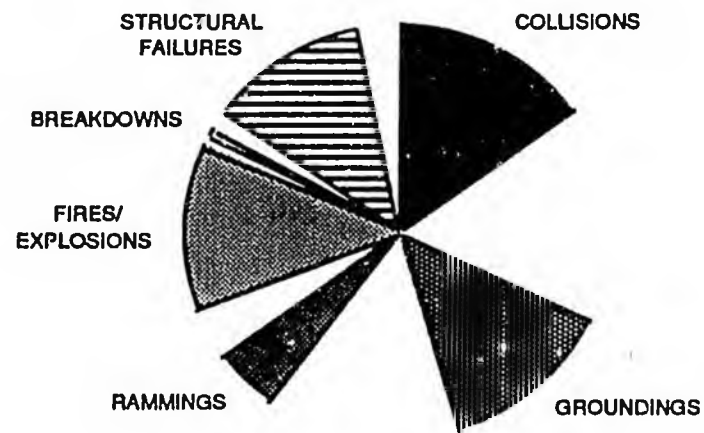
**PROJECTED SPILL PROBABILITIES
AND RECURRENCE INTERVALS
PRINCE WILLIAM SOUND
SUMMARY - ALL SPILLS**

MODIFICATIONS	SPILL PROBABILITY PER 1000 PORT CALLS	RECURRENCE INTERVAL
None - Existing	0.98	1.1
Group I	0.84	1.3
Group I and II	0.49	2.2
Group I,II, and III	0.224	5.0

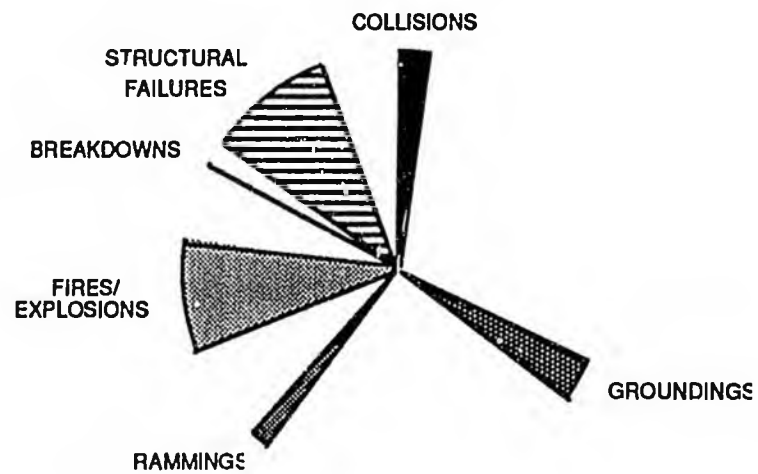
REDUCTION IN OIL SPILLS BY ACCIDENT TYPE DUE TO GROUP I MODIFICATIONS



REDUCTION IN OIL SPILLS BY ACCIDENT TYPE DUE TO GROUP I AND II MODIFICATIONS

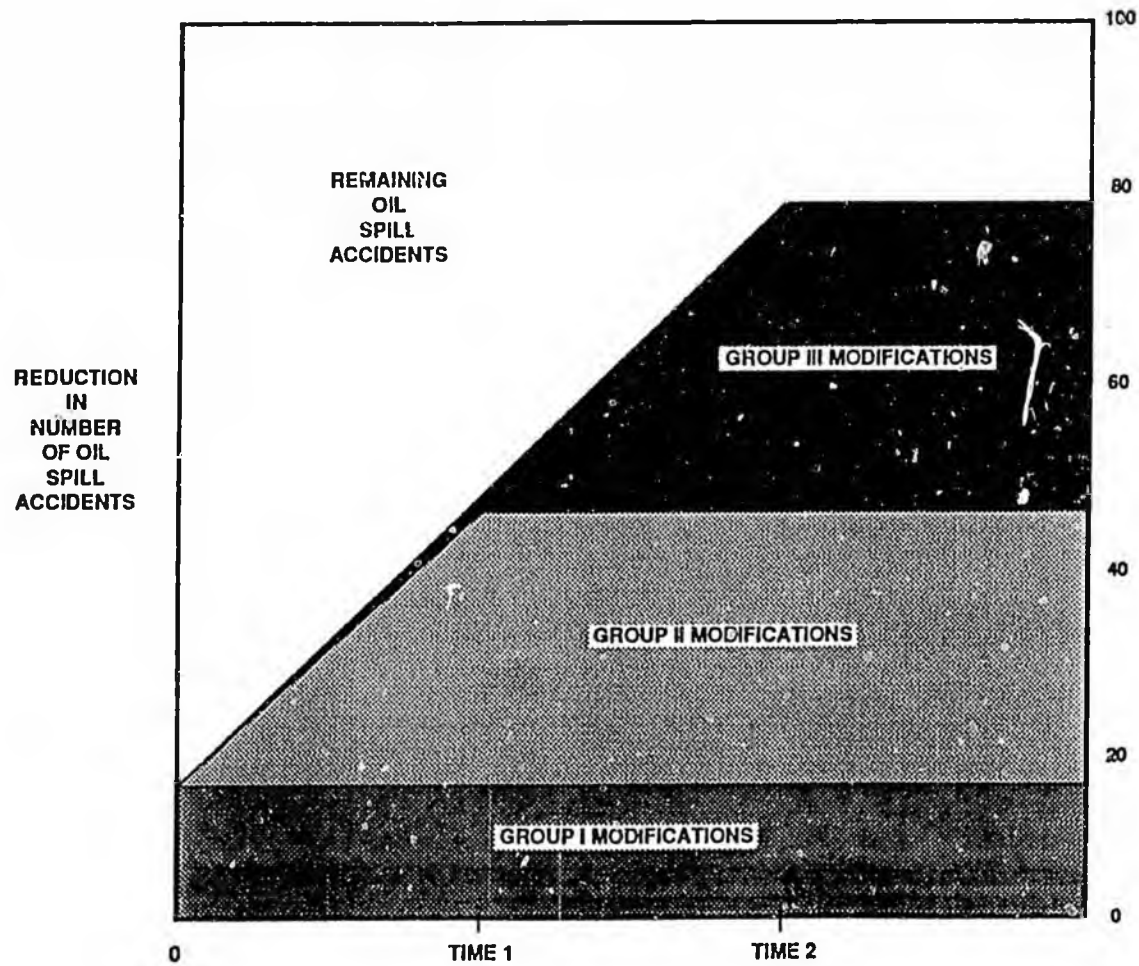


REDUCTION IN OIL SPILLS BY ACCIDENT TYPE DUE TO GROUP I, II AND III MODIFICATIONS





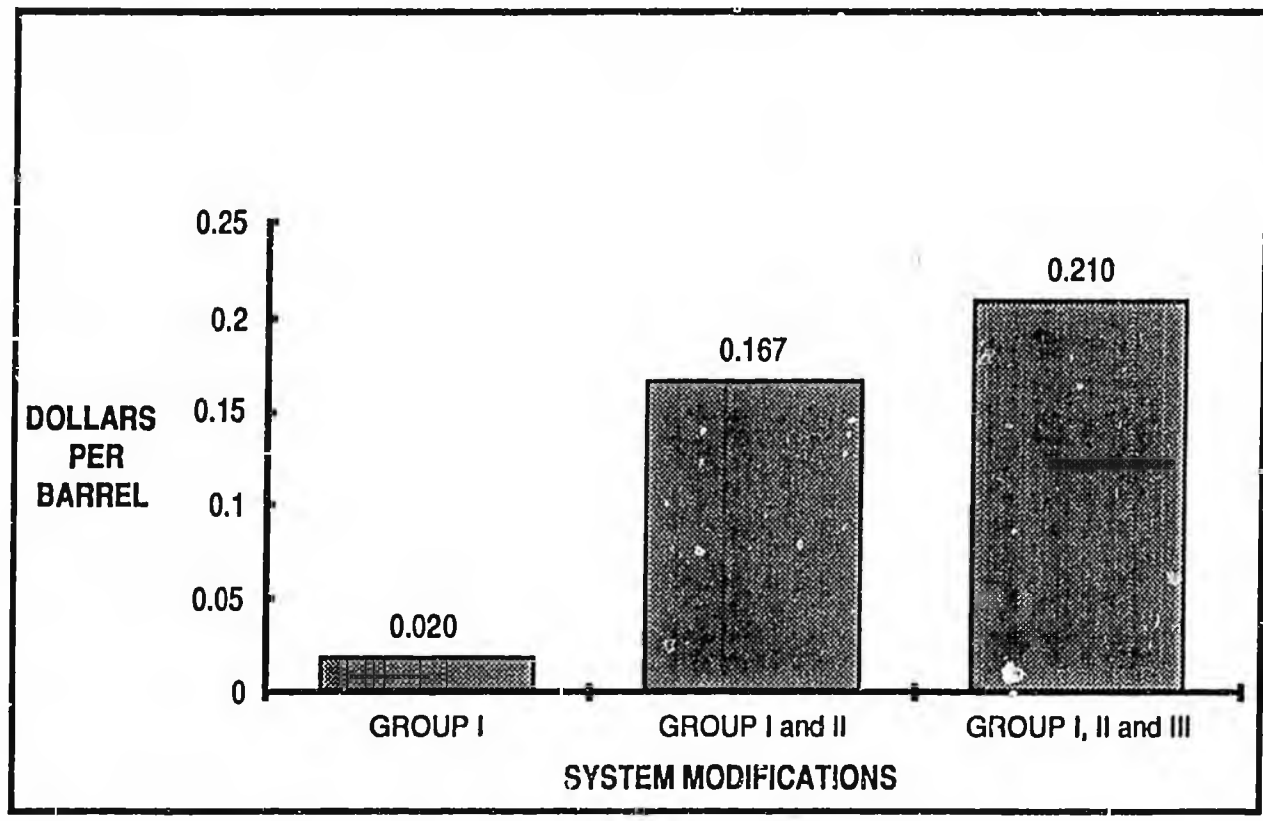
EFFECT OF SYSTEM MODIFICATIONS ON THE REDUCTION OF OIL SPILL ACCIDENTS





COST OF SYSTEM MODIFICATIONS PER BARREL

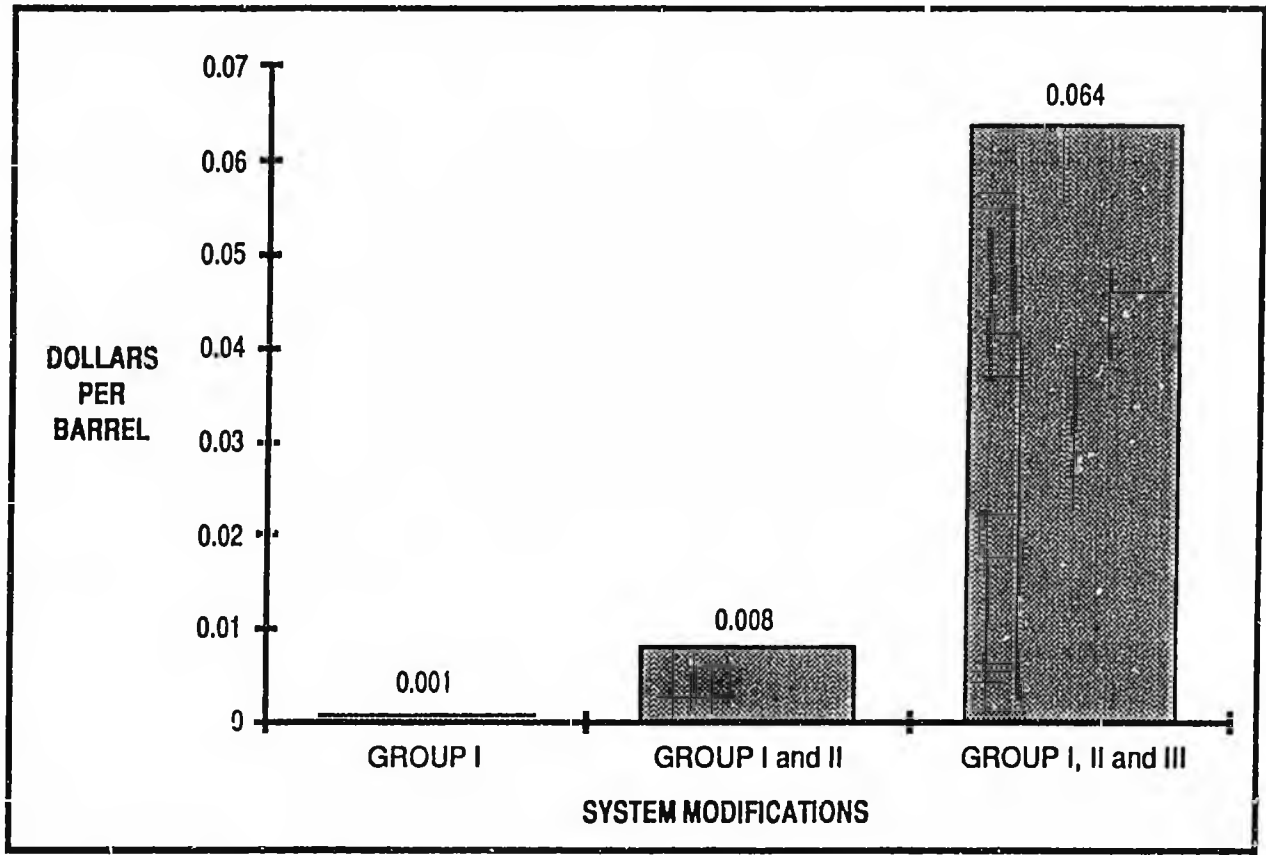
COOK INLET



23



COST OF SYSTEM MODIFICATIONS PER BARREL
PRINCE WILLIAM SOUND



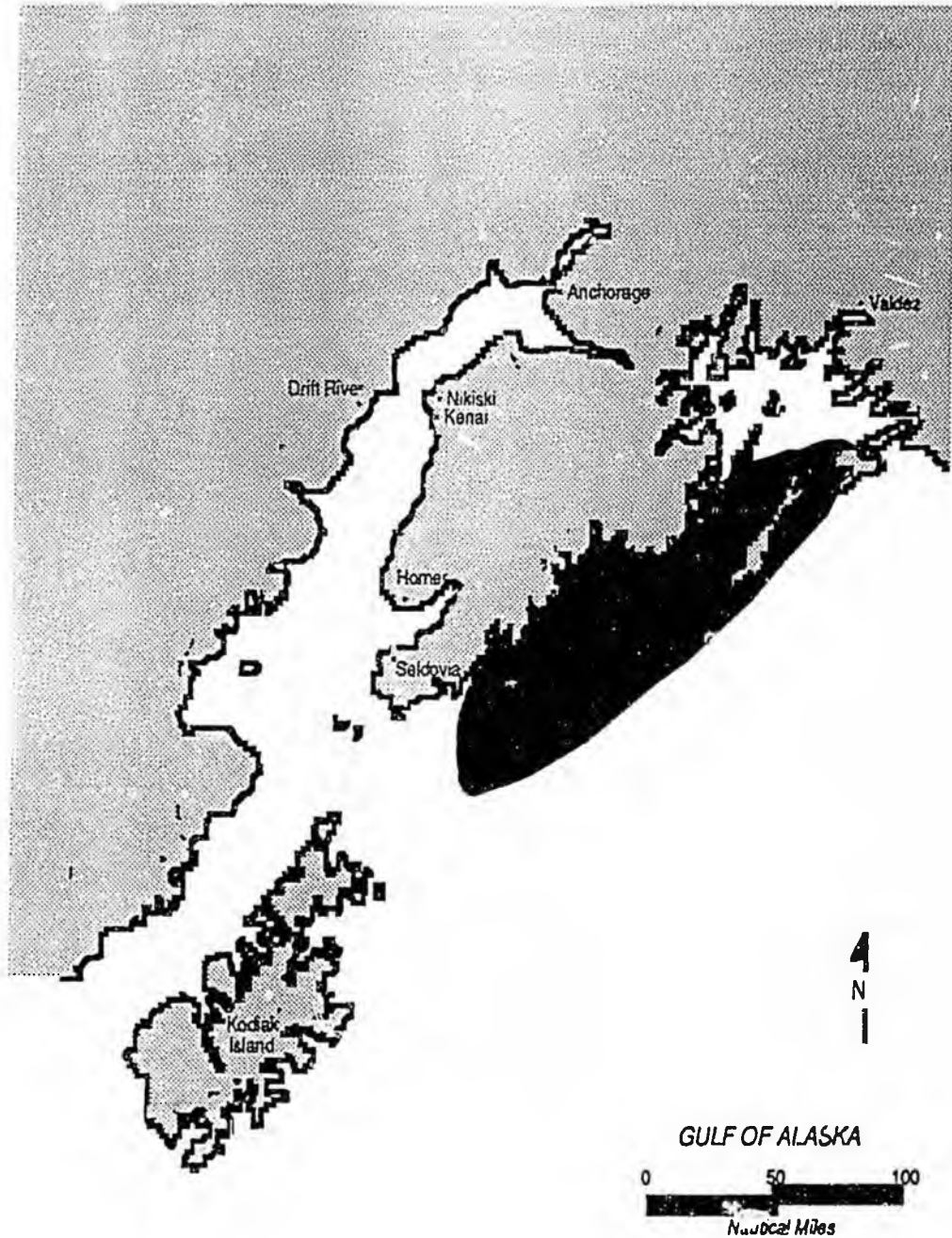


**SPILL IN COOK INLET - NIKISKI
9,000,000 GALLONS - 168 HOURS AFTER SPILL**



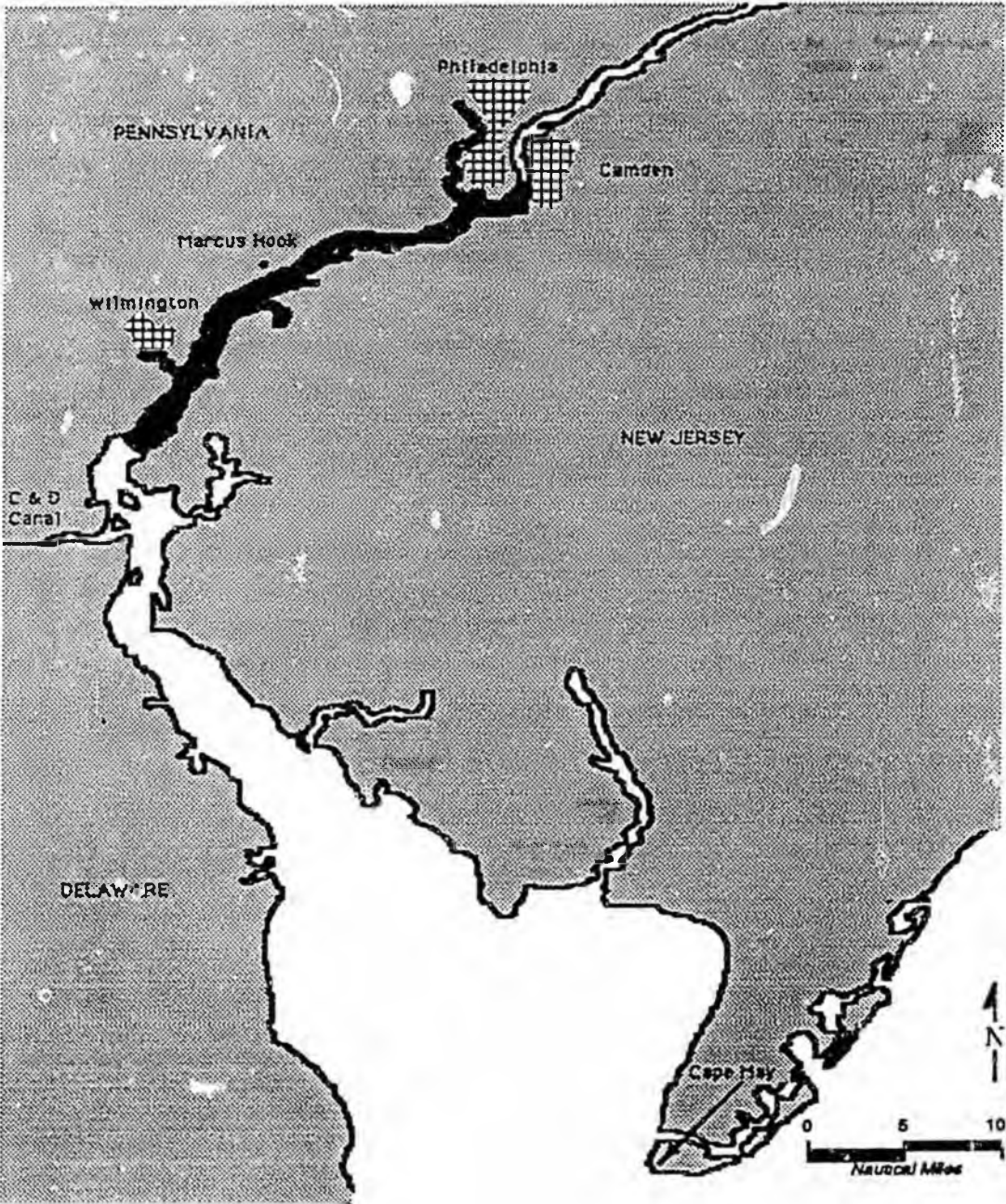


SPILL AT HINCHINBROOK ENTRANCE 11,000,000 GALLONS - 168 HOURS AFTER SPILL





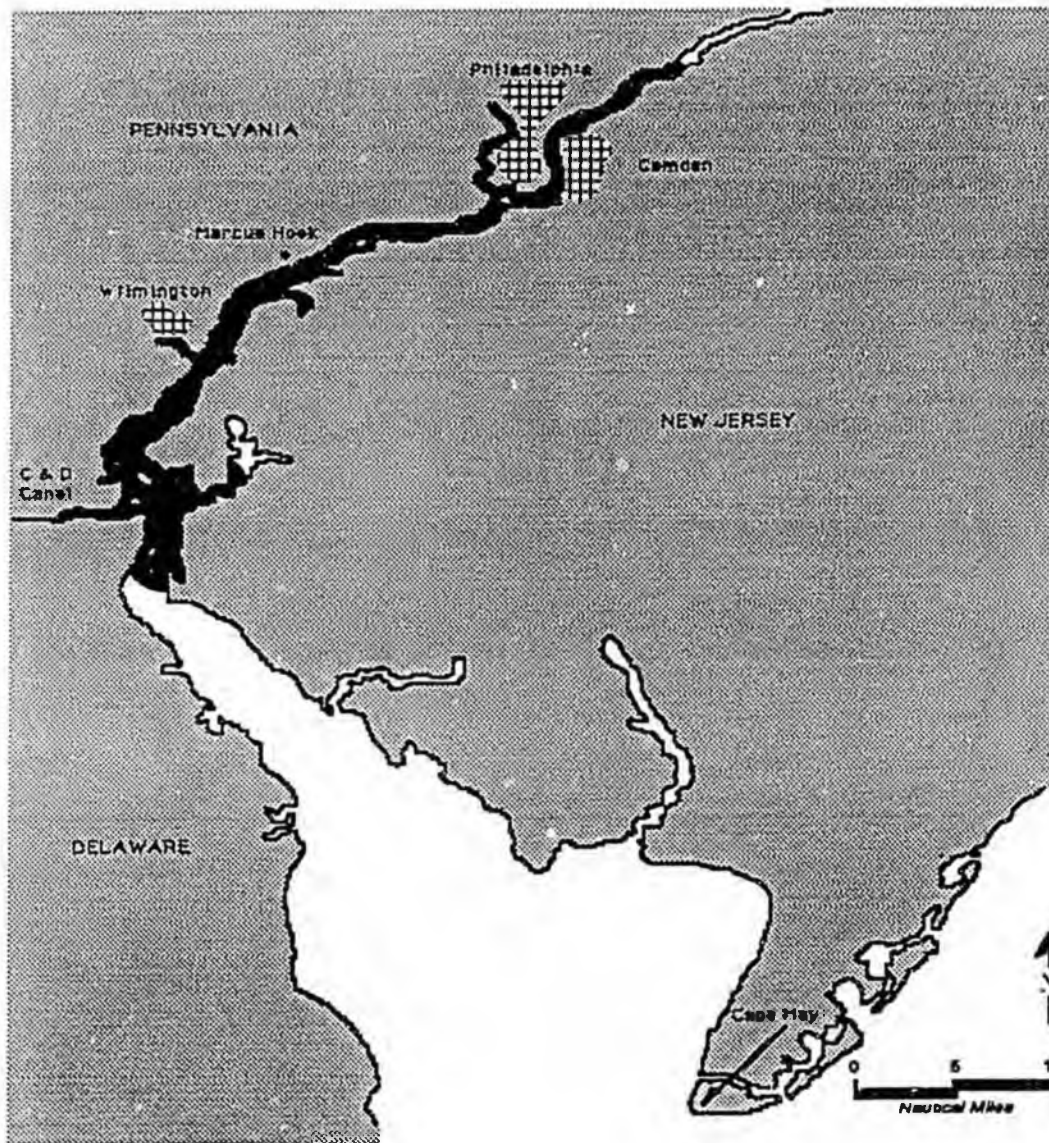
**DELAWARE BAY - 24 HOURS AFTER SPILL
SPILL SIZE = 11,000,000 GALLONS AT MARCUS HOOK
TYPICAL WINTER WIND AND CURRENT CONDITIONS**



ASSESSMENT OF TANKER TRANSPORTATION



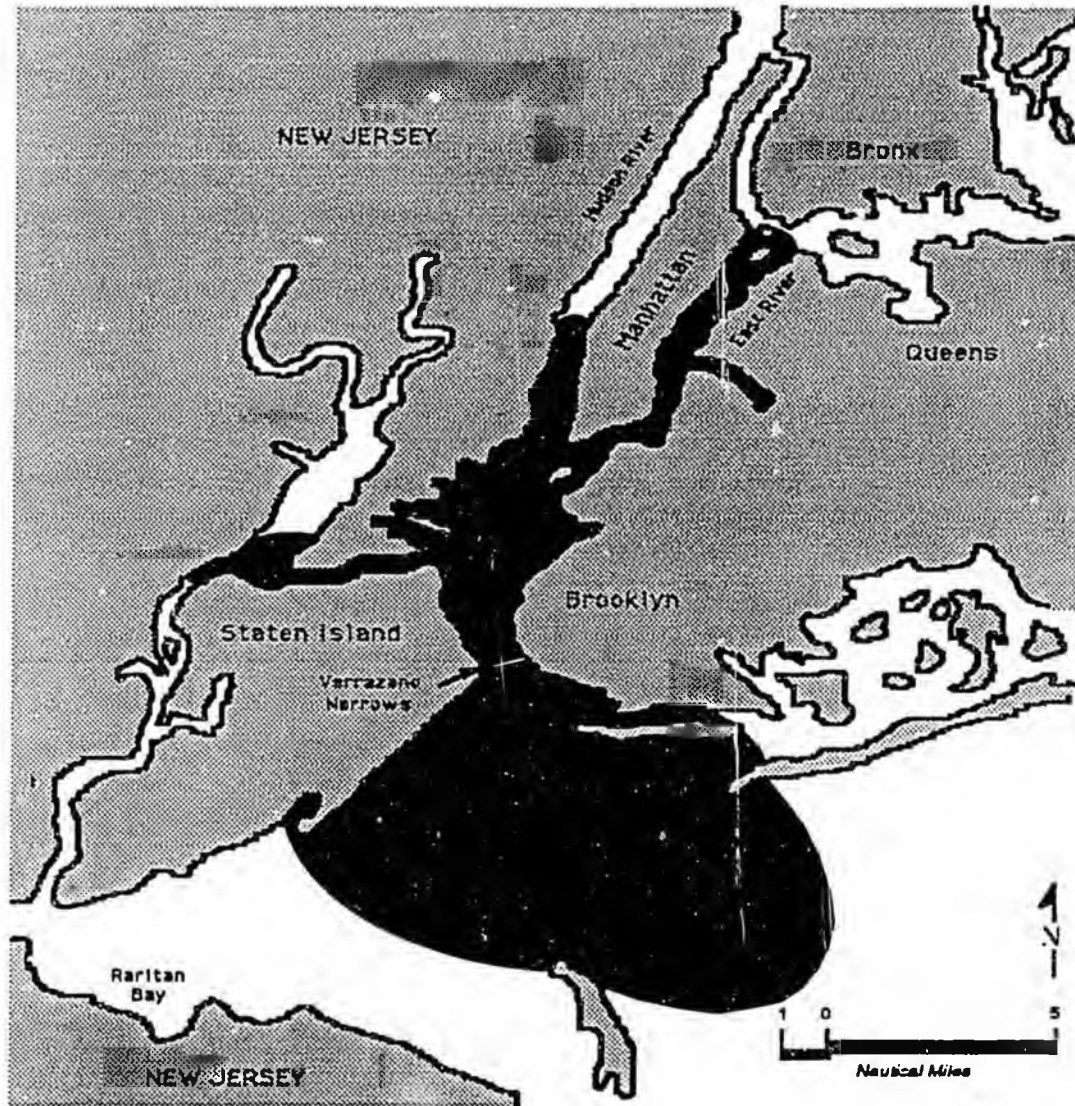
**DELAWARE BAY - 48 HOURS AFTER SPILL
SPILL SIZE = 11,000,000 GALLONS AT MARCUS HOOK
TYPICAL WINTER WIND AND CURRENT CONDITIONS**



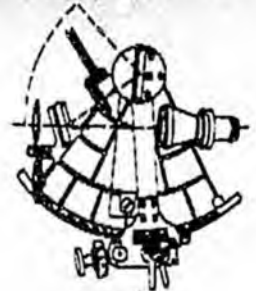
ASSESSMENT OF TANKER TRANSPORTATION



**NEW YORK - 24 HOURS AFTER SPILL
SPILL SIZE = 11,000,000 GALLONS AT VERRAZANO NARROWS
TYPICAL WINTER WIND AND CURRENT CONDITIONS**



13 January 1990



**TANKER
ADVISORY
CENTER, INC.**

FAX (907) 463-5661

Rep Davidson's office?

Mr. Jay Nelson
Alaska Oil Spill Commission
Juneau, Alaska

Dear Mr. Nelson:

As discussed on the telephone yesterday, enclosed is a list of steps, in order of priority, to prevent oil spills from tankers.

During my presentation to the Commission on Tuesday 16 January 1990 I plan to focus my discussion on the first item, namely:

- Protect cargo tanks with double hulls
- Tank locations as Type I Chemical Tanker: Sides B/5, Bottom B/15
- Protect all bunker tanks the same as cargo tanks
- Strengthen the hull: Scantlings to be 130% of full load draft

Sincerely yours,

Arthur McKenzie

Prevention of Oil Spills in Order of Priority



**TANKER
ADVISORY
CENTER, INC.**

- **Use Double Hulls: Type I Spacing, Scantlings 130%**
Petroleum (Crude oil & products) including bunkers, should be carried only in double hulled vessels with tank locations the same as for Type I chemical tankers. Distance of inner hull from outer hull to be breadth of tanker divided by 5 or 11.5 meters, whichever is less. Height of double bottom must be breadth of tanker divided by 15 or 6 meters, whichever is less. *Scantlings to be 130% of full load draft.*
- **Check Officer/Pilot Competency on Simulators**
All deck, engine officers and pilots should be tested on simulators at least every two years to determine their competency to handle emergencies.
- **License Tank Vessel Owners/Operators & Key Shore-side People**
Renewal of licenses to be based partly on safety & pollution performance.
- **Require Oversight of Classification Societies by Elected Officials**
These quasi governmental Societies, composed of shipowners, builders, insurers & government officials, establish construction and maintenance standards for ships. They are in competition with each other for clients. Vessels' records are confidential. Public oversight by elected officials & access to ship records is required.
- **Wash Dirty Cargo Tanks Only With Oil, Not Water**
Dirty wash oil can be downgraded &/or reprocessed, avoiding water pollution.
- **Install Voyage Data Recorders on All Ships**
Lloyd's of London have developed and now sell a 'Black Box' for ships to record automatically vital vessel data for 40 days & then rewrite. The Voyage Data Recorder is ejected if vessel sinks & is recoverable.
- **Use Electronic Charts Showing Vessel's Position**
Ship's position automatically plotted by radar, Loran or satellite. Alarms warn of dangerous trends. Hydrographic Office can update charts remotely. Low cost Radar reflectors need to be installed in ports and dangerous waterways.
- **Expand Testing for Substance Abuse**
Test shipboard personnel for substance abuse when applying for license or certificate and for renewals. Test all involved personnel immediately after a casualty. Require reports periodically from Masters & supervisory shore staff commenting on any evidence of substance abuse by personnel on duty.
- **Require Preparation/Approval Operating Manuals**
Manuals to be prepared by owners and approved by licensing authorities for the operations and maintenance of tank vessels.

13 January 1990

ALASKA OIL SPILL COMMISSION

300. Planning and Response Organization.

301. Spill and Response Activities and Coordination - General.

For pollution response activities, Federal on-scene coordination is accomplished through a single predesignated agent, the OSC, who presents information to and receives advice from the RRT. The EPA and USCG respond to incidents and provide predesignated On-Scene Coordinators (OSCs) within their respective areas. However, DOD will designate OSCs for hazardous substance releases from DOD facilities and vessels. The EPA will provide OSCs for oil discharges and hazardous substances releases into or threatening the inland zone and, unless otherwise agreed, for all planned removals and remedial actions. The USCG will provide OSCs for oil discharges, and for the immediate removal of hazardous substances, pollutants or contaminants into or threatening the coastal zone. The USCG will not provide predesignated OSCs for discharges and releases from hazardous waste management facilities or in similarly chronic incident.

302. Regional Response Team.

A. This Plan uses the Alaska RRT as an advisory body to the OSC which enables Federal, State and local governmental agencies to participate in response to pollution incidents. The primary members include representatives of specified Federal agencies in each state as well as a designated State representative. These members are responsible for the coordination of all input from their respective agencies, as well as providing resources and other available assistance.

B. Federal Agency RRT Membership:

Agency	Representative
1. Dept. of Agriculture	U.S. Forest Service, Juneau, AK
2. Dept. of Commerce	National Oceanic and Atmospheric Administration, Anchorage, AK
3. Dept. of Defense	Commander, 6th Infantry Division, Fort Richardson, AK
	U. S. Army Engineer District, Alaska, Anchorage, AK

- | | |
|--|---|
| 4. Dept. of Energy | Richland Operations
Office, Richland, WA |
| 5. Dept. of Health and | HHS, Alaska Area
Human Services
Native Health Service,
Anchorage, AK |
| 6. Dept. of Interior | Regional Environmental
Officer, Anchorage, AK |
| 7. Dept. of Justice | U. S. Attorney,
Anchorage, AK |
| 8. Dept. of Labor | OSHA, Anchorage, AK |
| 9. Dept. of State | Department of State,
Washington, D. C. |
| 10. Dept. of
Transportation | Commander, Seventeenth
Coast Guard District,
Juneau, AK |
| 11. Environmental
Protection Agency | EPA Region X, Alaska
Operations Office,
Anchorage, AK |
| 12. Federal Emergency
Management Agency | FEMA Region X,
Bothell, WA |

C. State Agency RRT Membership:

- | | |
|-----------|--|
| 1. Alaska | Department Of
Environmental
Conservation, Juneau, AK |
|-----------|--|

D. Roles and Responsibilities of Federal RRT Member Agencies

1. The roles and responsibilities of the RRT member agencies are described below. Included also are each agency's resources and types of assistance that may be provided to the OSC. Each agency provides one member and at least one alternate member to the RRT.

2. The Department of Agriculture (USDA) provides expertise in managing agriculture, forest and wilderness areas. The Soil Conservation Service can be helpful in predicting effects of pollutants on soil and their movements over and through soil. The U. S. Forest Service (USFS) has responsibility for certain Federal lands. The USFS can provide local knowledge about communications, logistics, contractors, and equipment availability. They also have in-house radio communications, field housing, and air, land and water transportation capability within their areas.

3. The Department of Commerce (DOC), through the National Oceanic and Atmospheric Administration (NOAA), provides support to the NRT, RRT, and OSC with respect to living marine resources for which it has management authority, including marine fisheries, marine mammals and certain endangered species. They provide meteorological, hydrologic, ice and oceanographic data for marine, coastal and certain inland waters; tide and current information; charts and maps; and satellite imagery. In response to requests from the OSC, NOAA provides on-scene scientific assistance for releases in coastal and marine areas through the regional Scientific Support Coordinator (SSC). (See Section 300.34 for further SSC information.) NOAA acts on behalf of the Secretary of Commerce as a Federal trustee for living and nonliving natural resources in coastal and marine areas. Resources of concern to NOAA include all life stages, wherever they occur, of fishery resources of the exclusive economic zone and continental shelf; anadromous and catadromous species throughout their ranges; endangered and threatened species and marine mammals for which NOAA is responsible; tidal wetlands and other ecosystems supporting these living marine resources; and resources of National Marine Sanctuaries and Estuarine Research Reserves. For resources in coastal waters and anadromous fish streams, NOAA may be a co-trustee with the Department of the Interior, other Federal land managing agencies, and possible Indian tribes as well as the affected state. It will coordinate with co-trustees in investigating damages. Other DOC resources and support that can be provided are described below.

a. Through the National Weather Service (NWS), DOC can provide information on the current and predicted climatological and meteorological conditions at the scene of a significant spill incident. They can provide hydrometeorological observations and forecasts; satellite imagery; use of the NWS communications network and special-purpose aircraft. Site-specific forecasts are available to assist aircraft and ship operations or to provide real-time weather data for pollutant trajectory analyses. Weather Service Forecast Offices (WFSO) responsible for this region are located in: Juneau, Anchorage, and Fairbanks.

b. Through the National Environmental Satellite, Data, and Information Service (NESDIS), DOC can provide satellite imagery of coastal regions. Data buoys can be tracked through the use of the NIMBUS F Satellite. NESDIS can also provide climatological data on marine weather, oceanic conditions, and water column characteristics.

c. The National Marine Fisheries Service (NMFS), provides a broad variety of biological and oceanographic services which can address the impact of spill contaminants and cleanup operations on marine organisms and the marine ecosystem. Such services include population assessments to determine mortalities, laboratory facilities for specific contaminant impact at sublethal levels on marine organisms, and a nationally recognized group of marine pathologists. The regional office maintains extensive contacts with the commercial fishing industry, marine recreational interests, and state fisheries agencies. Chemists and toxicologists may be consulted on properties and toxic potential of various hydrocarbon contaminants to provide information on marine fisheries, marine mammals and certain endangered species to assist in identifying resources at risk and thus determine areas requiring priority protection. Regional personnel alert fishermen to oil slicks and other contamination hazards that may adversely affect fishing operations or equipment.

4. The Department of Defense (DOD) provides representatives from the U. S. Army, and U. S. Army Engineer District, Alaska to the RRT. Resources and assistance available from DOD agencies are outlined below.

a. The U. S. Army has various military facilities, vehicles, equipment, and, in some cases, aircraft which can be made available in the event of critical incidents. In addition, construction-related equipment may be locally available.

b. The U. S. Army Corps of Engineers (USACE) can provide expertise in all disciplines of engineering. USACE can also provide assistance in the area of dredging, surveying, supply vessels, and manpower. Their expertise can be used for clearing channels, locating obstructions, etc. Activation of USACE resources in support of an RRT activity would be in the form of a written mission assignment which outlines the parameters of work to be done and estimated dollar authority to accomplish the mission.

c. The U. S. Navy is the Federal agency most knowledgeable and experienced in ship salvage, shipboard damage control and diving. The USN has an extensive array of specialized equipment and personnel available for use in these areas as well as for open sea pollution incidents.

5. The Department of Energy (DOE), through its Radiological Assistance Program, provides assistance in recommending radiological control and protective measures. In addition, DOE coordinates Federal radiological assistance through the Federal Radiological Monitoring Assessment Program.

6. The Department of Health and Human Services (HHS).

a. HHS is responsible for providing direct on-scene or indirect assistance for chemical spills and emergencies in which there is a potential or actual threat to the public's health. Such assistance includes health related field guidance and laboratory support, access to toxicology data bases for health and medical data, biological sampling and testing and recommendations for environmental testing.

b. During an emergency response, the OSC may call upon the HHS representative to provide consultation and advice on whether potential or real threats to human health may exist. HHS response capabilities include but are not limited to:

(1) Reviewing available background information on the incident and estimating the potential for human exposure to hazardous substances on-site and to hazardous substances which may have migrated off-site via all pathways.

(2) While on-site, in order to determine if a threat to human health exists, recommending any additional environmental sampling or monitoring procedures needed to define extent of exposure, including identification of persons at high risk or particularly high exposure.

(3) Accessing computerized toxicological data bases through remote video and hard copy terminals maintained by the Center for Disease Control (CDC) and National Library of Medicine. The data base is an interactive data file containing chemical, physical, biological, pharmaceutical, toxicological, and environmental data on approximately 6,000 known and potential toxicants. This system supplements CHRIS and OHMTADS and is a useful source of information during an emergency response.

(4) Providing advice concerning evacuation or taking other preventive measures.

(5) Investigating possible toxic contamination of the food chain.

(6) Outlining potential pathways to human populations based upon soil kinetics/contamination, wind direction, aquifer contamination and/or food chain involvement.

(7) Obtaining and reviewing information regarding allegations of human illness associated with the incident.

(8) Investigating health complaints reported by on-site workers and nearby off-site residents.

(9) Conducting needed health studies which may include any one or a combination of methods, e.g., vital records reviews, review of medical records, administer surveys, conduct clinical examinations, test and analyze human specimens, conduct laboratory and hospital investigations, establish disease/exposure follow-up registries, etc.

(10) Reviewing plans for the safety and health of response workers, and providing advice about operations for compliance with appropriate OSHA regulations for worker safety and health.

(11) Coordinating appropriate health response with Federal, State and local health agencies and the private medical community.

(12) Providing advice and assistance as required by the OSC on health matters in community relations, and dealing with the media.

(13) Coordinating proficiency testing for laboratories analyzing human biological specimens.

7. The Department of the Interior (DOI) provides technical expertise with respect to geology, hydrology, minerals, fish, wildlife, history, and recreation as well as information on lands and resources specifically under its jurisdiction. Within the Department, individual bureaus have specific responsibilities and capabilities as follows:

a. The U. S. Fish and Wildlife Service (FWS) provides expertise on migratory birds, endangered and threatened species, and critical habitats, as well as information on national wildlife refuges and national fish hatcheries. It can resolve problems such as dispersal of birds, habitat identification, protection, damage assessment, and bird rehabilitation, including coordination of volunteers. Liaison with Audubon Society Chapters is maintained by the FWS and can be activated in response to spill incidents involving oiled and injured wildlife. FWS may be able to provide vehicles and boats locally for spill cleanup near national wildlife refuges.

b. The Minerals Management Service (MMS) has expertise in geology, geophysics, petroleum engineering, and oil spill modeling. It also has expertise and responsibility in well control and abatement of pollution sources from Outer Continental Shelf (OCS) oil and gas facilities. It can provide expertise in oil drilling, producing, handling, pipeline transportation, and information from the OCS Environmental Assessment Program. It has access to continuously manned facilities which can be used for command, control, and surveillance of spills occurring from operations conducted under the Outer Continental Shelf Lands Act. MMS can direct a lessee to clean up pollution resulting from its lease activities with their equipment or via direct contract under the authority of OCS Order No. 7 and 30 CFR 250.43. MMS may also coordinate helicopter transportation from a lessee operating in the area during emergencies. The MMS has the authority to suspend any activity within a 500 meter radius of any pollution source for abatement purposes as stated by the Memorandum of Understanding (MOU) of August 16, 1971 between the Departments of the Interior and Transportation. Through the MMS's Offshore Inspection Program, the MMS maintains a representative in each area of drilling activity who could act as the initial Federal observer for a pollution incident related to oil and gas operations. MMS has primary review and approval authority for oil-spill-contingency plans submitted under the Outer Continental Shelf Lands Act, as amended, and authority for regulating air quality which could result from in situ burning of oil spills on the OCS.

c. The National Park Service (NPS) can provide information on all national parks, monuments, and preserves in Alaska. NPS also provides expertise on historical, archaeological, architectural, recreational, and subsistence resources. NPS may be able to provide local logistical support, such as vehicles, aircraft, and boats for spill surveillance, damage assessment, or cleanup on or near national park lands.

d. The U. S. Geological Survey (USGS) can provide expertise on geologic, geohydrologic, and geochemical resources as well as ground and surface water properties.

e. The Bureau of Land Management (BLM) has responsibility for certain Federal lands and minerals. BLM may be able to provide local logistical support such as camps, vehicles, and aircraft for spill surveillance and damage assessment or cleanup on or near BLM managed land. BLM is responsible for providing the On-Scene Coordinator for Trans-Alaska Pipeline System spills on Federal lands.

8. The Department of Justice (DOJ), through the U. S. Attorney, provides legal advice concerning legal questions arising from discharges, releases, and Federal agency responses.

9. The Department of Labor (DOL), through the Occupational Safety and Health Administration (OSHA), provides advice, guidance, and assistance regarding hazards to persons involved in removal or control of oil or chemical spills.

10. The Department of State (DOS) will lead in developing joint international contingency plans. It will help to coordinate an international response when a pollution incident crosses international boundaries or involves foreign flag vessels. Additionally, DOS will coordinate requests for assistance from foreign governments and offer U. S. proposals for conducting research at incidents that occur off other countries.

11. The Department of Transportation (DOT).

a. On behalf of DOT, the U. S. Coast Guard provides the predesignated On-Scene Coordinators (OSCs) for the coastal zone and chairs the RRT when it is activated during a coastal zone response. The Coast Guard provides representatives to the RRT when activated for inland spills. In the coastal zone, the Coast Guard will ensure that the NCP is effectively and efficiently implemented with optimum coordination among Federal agencies and will recommend changes in the Plan as necessary. For an inland zone response, the Coast Guard provides technical expertise and resources relative to environmental protection and mitigation during periods of RRT activation. The Coast Guard offers expertise in marine environmental protection, port safety and security, marine law enforcement, ship navigation and construction, and the manning, operation and safety of vessels and marine facilities. For the purpose of planned RRT meetings, the Coast Guard will serve as Co-Chairman with the EPA.

b. The Coast Guard maintains facilities, vessels, aircraft and vehicles which can be used for command, control, and surveillance of pollution incidents occurring in coastal areas. The USCG also maintains special forces and teams including the staff of the National Response Center (NRC), the National Strike Force (NSF), the OSC Emergency Task Force (ETF), the Coast Guard District Staff Emergency Task Group (ETG), and the Public Information Assist Team (PIAT). See Section 308 for further discussion of these special forces.

12. The Environmental Protection Agency (EPA).

a. The EPA provides predesignated On-Scene Coordinators for the inland zone and chairs the RRT during an inland spill response. EPA provides a representative to the RRT when activated for coastal spills. In the Inland zone, EPA will ensure that the NCP is effectively and efficiently implemented with optimum coordination among Federal agencies and will recommend changes in the Plan as necessary. During a coastal zone response, EPA provides technical expertise and resources relative to environmental protection and mitigation during periods of RRT activation. For the purpose of planned RRT meetings, EPA will serve as Co-Chairman with the Coast Guard.

b. The Alaska Operations Office, Anchorage (AOO), has no clean-up or containment equipment for use should an incident occur. In a major inland spill situation, manpower and equipment will be obtained from commercial contractors, state, Federal, military, industry, public municipalities and local contractors on an availability basis.

c. EPA resources available through the Alaska Operations Office are:

(1) Sample analysis performed by the Regional EPA laboratory, Seattle, Washington or at commercial laboratories in Alaska.

(2) Environmental effects monitoring and advice to the OSC on the use of chemical dispersants. EPA will coordinate scientific interests for on-scene research and provide lab facilities.

(3) Aerial photographic over flights for inland spills: EPA has pre-established arrangements for rapid acquisition of commercial aircraft for aerial photographic services and for rapid processing of the resultant film.

(4) Oil/Hazardous Substance disposal sites: The EPA Region X office maintains necessary liaison with state and local governments to assist the OSC in identifying suitable disposal sites for oil/hazardous substances recovered during a spill response.

(5) EPA maintains special forces to assist the OSC including the Environmental Response Team (ERT) based in Edison, New Jersey, and the Technical Assistance Team (TAT) available from Seattle, Washington. The Oil and Hazardous Materials Technical Assistance Data System (OHMTADS) is accessible by EPA. See section 307 of this plan for further discussion of these special forces.

13. The Federal Emergency Management Agency (FEMA).

a. FEMA monitors the status of pollution emergencies and would evaluate a request for a major disaster declaration if received from the Governor of Alaska pursuant to the Disaster Relief Act of 1974, as amended. If the President declares that a pollution emergency constitutes a major disaster, the Director of FEMA will coordinate and direct the Federal response.

b. FEMA is delegated responsibility under CERCLA and Executive Order 12316 for temporary housing and permanent relocation of residents, businesses and community facilities as a result of hazardous material incidents covered by CERCLA.

E. Role and Responsibilities of the State of Alaska.

1. The Governor of Alaska has designated the Alaska Department of Environmental Conservation as the state RRT representative. ADEC also represents and coordinates the RRT involvement of various other state, county, and municipal organizations.

2. ADEC provides the State On-Scene Coordinator (SOSC) and State Spill Response Team (SSRT) for oil or hazardous substances incidents in accordance with Alaska Oil and Hazardous Substances Pollution Contingency Plan as authorized by the Alaska Oil Pollution and Other Hazardous Substances Control Act.

3. ADEC has various functions, capabilities and resources both before and during a pollution incident. They include:

a. maintaining and making proper disbursements from the Oil Spill Expense Reserve.

b. maintaining a current listing of available containment and cleanup equipment, providing on-scene monitoring of all discharge cleanup activities for which ADEC is designated as the lead State Agency, coordinating technical expertise concerning the biological impact of a probable or existing discharge.

c. determining and approving the locations to be used as pollutant disposal sites.

d. pre-planning and concurring on the use of dispersants for the State of Alaska, along with EPA. (See Annex X concerning Dispersant Use.)

e. providing notification of a hazardous material incident to the appropriate State, local and Federal agencies.

f. providing a Public Information Officer, in coordination with Office of the Governor, and

g. arranging for emergency hazardous substance response with private contractors.

h. providing population data for all locations throughout the State of Alaska through the Alaska State Demographer: Dr. Greg Williams, (907)465-4500.

F. The planning and preparedness functions of the Regional Response Team are outlined below:

1. Maintain a continuing review of regional pollution emergency response operations and equipment readiness to insure adequacy of regional planning and coordination for combating discharges of oil and hazardous substances.

2. Develop procedures to promote the coordination of Federal, State and local governments, and industry groups and private agencies to respond to pollution incidents.

3. Provide information to the NRT on research requirements.

4. Maintain a readiness posture to respond to significant discharges of oil or other hazardous substances.

5. Recommend revisions of the National Plan to the NRT on the basis of observations of response operations.

G. The response and coordination functions of the RRT are outlined as follows:

1. Respond whenever the RRT is activated. The degree of response and therefore the extent of RRT activity will depend on the particular situation.

2. Monitor and evaluate reports generated by the OSC ensuring their completeness. Based on this evaluation, the RRT may recommend courses of action in combating a discharge.

3. Assist the OSC in acquiring and employing response resources from Federal, State, and Local governments and private agencies.

4. Coordinate all Federal public information activities with the OSC and act as the focal point for information transfer between the OSC and the NRT, so as to minimize or prevent dissemination of spurious or incomplete information. Public information actions are discussed in Annex VI of this plan.

5. Submit POLREPs to the NRT as determined necessary by the appropriate Co-chairman.

303. RRT Activation.

A. The RRT comprises members of many agencies who must, with no prior notice, be capable of responding to an incident and call out personnel and equipment from their agency in an expeditious manner. The key to successful response actions is prompt activation and implementation of this Plan. The appropriate RRT Co-Chairman will activate whenever one of the following situations exists:

1. A major or potential major discharge or release (activation is automatic);

2. Any pollution emergency when the OSC/RPM or any member of the RRT makes a request to the RRT Co-Chairman;

3. At any time when determined by either Co-Chairman.

B. The RRT may be activated by any means of communications, but will normally be done by telephone to the persons designated in Annex II of this Plan. The activation call will specify the time of RRT activation, the meeting place if assembly is planned, and as much about the incident and the requirements to be placed on the particular agency as are known. (A full membership activation will normally be called whenever a major incident occurs.) A limited membership activation may be called by either co-chairman, whenever it is apparent that the service of only selected members is needed.

C. The Co-Chairman will determine if assembly of the RRT is advantageous or whether telephone activation and electronic mail is sufficient to respond to the incident.

D. It is anticipated that lesser incidents for which a limited membership activation has been called will normally be handled by telephone or electronic mail. Activated members will operate from their home or business location and will coordinate their agency's on-scene staff tasks and RRT staff tasks from that point. The Regional Response Center (RRC) will be staffed by USCG or EPA personnel and a contact system will be maintained with each activated member. Members will call into the RRC whenever the member needs to discuss matters with the Co-chairman or whenever the member is about to make a change of location and telephone contact number.

E. Assembly of the RRT will normally occur whenever a major incident occurs; all members are activated; extensive briefings are necessary for members; or whenever a drill activation for training occurs. The assembly of the RRT will normally occur at the RRC or alternate RRC site indicated in section 304 below. Members should be prepared to operate from the RRC. Therefore, members are encouraged to provide all necessary contact lists, agency phone books, technical manuals, etc., necessary to implement the appropriate tasks assigned the agency. In prolonged RRT activations, it is anticipated that members will return to their homes or place of business after the RRT assembly briefing to continue their RRT tasks and attend future RRT meetings as prescribed by the Co-Chairman.

F. Deactivation of the RRT will occur after mutual agreement by the senior USCG and EPA members. Deactivation will normally be by telephone notification unless the RRT is assembled.

304. Regional Response Center.

A. The Regional Response Center is the regional coordinating site for notification, communication, and inter-agency coordination during a pollution incident. The primary Regional Response Center is located within the Operations Center of the Commander, Seventeenth Coast Guard District and is staffed around - the - clock. It may be contacted at (PTS) 759-7340 or (907) 586-7340. The alternate Regional Response Center is located in the EPA, Alaska Operations office at Anchorage, and is staffed on an as needed basis. It may be contacted at (907) 271-5083 or (206) 442-1263 after normal working hours.

B. Additional alternate sites for the Regional Response Center may be designated at the discretion of the appropriate Co-Chairman when needed.

305. RRT Communications.

A. RRT activation will normally be conducted by the appropriate RRT Co-Chairman by the most rapid means available, normally the telephone. Upon activation, RRT members will automatically begin receiving copies of all message traffic from the OSC to the Regional Response Center and from the Regional Response Center to the National Response Center.

B. Routine Communications will be performed by telephone and use of the electronic mail system (See Tab A of Annex V for a description of the E-mail system). General messages can be transmitted using the "Mail" function. Information concerning spill reports will be transmitted to RRT members, using the "RRT" function.

306. On-Scene Coordination.

A. As the single Federal official responsible for ensuring proper pollution response and enforcement, the OSC is the most important component in the national response organization. Federal on-scene coordination during a response is accomplished through the OSC, who provides reports to and receives advice from the RRT. The U.S. Coast Guard designates the OSC for discharges of oil or release of hazardous substances in the coastal zone; EPA designates the OSC for inland response operations dealing with discharges of oil or hazardous substance releases. If the incident involves a release from a chemical waste site, EPA will provide the OSC. DOD will furnish the OSC for hazardous substance releases from DOD facilities or vessels.

The OSC/RPM directs Federal Fund-financed response efforts and coordinates all other Federal efforts at the scene of a release or discharge. Should the circumstances indicate, the OSC/RPM can request support from special forces with expertise in containment and cleanup, environmental protection, and public affairs. The OSC/RPM:

- a. shall collect pertinent facts about the discharge or release such as its source; potentially responsible party; nature, amount, and location of the material; and potential impact upon the environment and human health, welfare and safety;
- b. shall promptly advise the appropriate State agency;
- c. should notify the affected land managing agency and trustees of natural resources, as promptly as possible;
- d. shall address worker health and safety at the response scene;
- e. shall direct response operations as described in Subparts E and F of the NCP;
- f. should consult regularly with the incident-specific RRT when it has been activated;
- g. shall evaluate incoming information and immediately advise FEMA of potential major disaster situations and the HHS representative when a possible public health emergency exists;
- h. should consult with DOI and DOC/NOAA representatives if a discharge or release may adversely affect any endangered or threatened species, or result in destruction or adverse modification of the habitat of such species;

STEVE COWPER
GOVERNOR



STATE OF ALASKA
OFFICE OF THE GOVERNOR
JUNEAU

RECEIVED

August 24, 1989

Environmental Conservation

The Honorable Samuel Skinner
Secretary
Department of Transportation
Room 10200
300 Seventh Street, SW
Washington, DC 20590

Dear Mr. Secretary:

The grounding of the T/V Exxon Valdez and resulting disastrous oil spill demonstrates the need for improving navigational aids and tracking systems, and assessing conditions under which crude oil tanker and tank barge traffic proceeds in Alaskan waters.

The State of Alaska has taken steps to improve navigation safety by oil tankers and tank barges in Prince William Sound. We are writing now not only to inform you of these initiatives, but also to ask your assistance in seeking and implementing further safeguards in Prince William Sound and in Cook Inlet.

We have identified a suite of safety measures and proposed navigational aids that I think would go a long way toward preventing another occurrence like the grounding of the T/V Exxon Valdez. They include those we can and have implemented ourselves, some that require legislative action by Congress, and several within the regulatory authority of the Coast Guard but which may require funding.

As one means to improve the safety of tanker traffic, the Alaska Department of Environmental Conservation has issued an emergency order to Alyeska Pipeline Service Company. This order requires, among other things, that two tugs accompany all outbound tankers to Hinchinbrook Entrance, the entrance to Prince William Sound, and that a pilot licensed for Prince William Sound be aboard the bridge of any cargo-laden tanker between the Valdez Marine Terminal and Seal Rocks. As further provided in the Order, Alyeska Pipeline Service Company has established an alcohol testing program for command officers of tankers. As directed, Alyeska has enhanced substantially its response and cleanup capability. The State has extended the distance from Valdez

The Hon. Samuel Skinner

-2-

August 24, 1989

in which tankers must have state-licensed pilots on board. Previously, state-licensed pilots left tankers north of Bligh Reef; now they will disembark at a point south of Bligh Island.

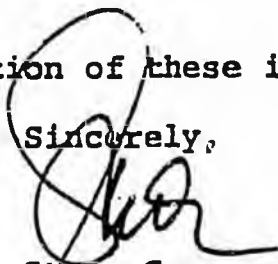
These state requirements will help in Prince William Sound. However, we believe that it is important to obtain the increased measure of safety that can be provided by backing up the State's action with federal action in both Prince William Sound and Cook Inlet. While the State has not invoked emergency measures in Cook Inlet, the navigational hazards there are also of concern.

The enclosed list of navigational aids and safety measures includes agency or Congressional actions that the State believes are necessary in the short term to guard against future oil spills in Prince William Sound and Cook Inlet. The list was developed by the Alaska Department of Environmental Conservation after consultation with the state marine pilots' association, and other state agencies. We look forward to your analysis of which actions can be accomplished by your agency in the near future and which require Congressional action.

We offer whatever assistance would help to implement these proposals as soon as possible. Members of my cabinet and I already have lent support to a number of these ideas in testimony before Congressional committees. The State also is working closely with those members and committees that have jurisdiction over these issues and the funding to make them possible. We look forward to working with you on the regulatory items as well.

Thank you for your consideration of these important matters.

Sincerely,



Steve Cowper
Governor

Enclosure

cc: Secretary Robert A. Mosbacher, Sr.
Commissioner Dennis D. Kelso
John W. Katz, Special Counsel
Bob LeResche, State Oil Spill Coordinator

STATE OF ALASKA

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

NAVIGATIONAL AIDS FOR PRINCE WILLIAM SOUND AND COOK INLET
TANK VESSEL AND BARGE TRAFFIC

1. Provide increased funding for United State Coast Guard (USCG) Alaska operations to allow implementation of enhanced navigational aids for Prince William Sound and Cook Inlet tanker traffic, improve USCG operations statewide, and provide enhanced training for USCG vessel traffic system personnel.
2. Re-equip the USCG Vessel Traffic System (VTS) in Prince William Sound with more powerful, state-of-the-art radar equipment which will track tankers and sound an alarm should tankers leave designated traffic lanes. Install a similar system in Cook Inlet.
3. Install USCG-operated VTS radar on Naked Island and/or Hinchinbrook Island in order to provide full radar coverage of the tanker traffic lanes and tanker anchorages.
4. Review operations during poor weather conditions to determine whether loaded tanker and tank barge traffic should be restricted during conditions that would hamper oil spill tracking, containment and recovery operations. Install additional weather stations in the Prince William Sound and Cook Inlet areas as needed in order to secure adequate data for forecasting weather conditions (including visibility, wind and sea states) that would preclude oil spill tracking, containment and recovery operations.
5. Install electronic radio beacons (RACON) or lighthouse structures equipped with powerful, long range navigational lights on Bligh Reef and Seal Rocks. Install these same devices on navigational hazards in Cook Inlet.
6. Require that all tankers of any registry transiting Prince Williams Sound at any point between Seal Rocks and the Alyeska Pipeline Service Company Valdez Marine Terminal have aboard a federally licensed pilot to assist in navigation, communications and lookout. Evaluate the pilotage requirements for Cook Inlet tankers and invoke comparable restrictions.

7. Require tankers transiting Prince William Sound and Cook Inlet to fix their positions on the nautical chart or chart overlay of the area at least once every six minutes and retain the chart or overlay with these positions for thirty days for inspection by USCG.
8. Require all tankers of any registry entering and departing Port Valdez to embark and disembark a state-licensed pilot in the vicinity of Bligh Reef at Latitude 60° 49'N, Longitude 147° 01'W. Establish similar requirements for Cook Inlet.
9. Require two tug boats to accompany all outbound tankers to Hinchinbrook Entrance and to accompany any inbound tanker with crude oil cargo from Hinchinbrook Entrance to the Alyeska Valdez Marine Terminal.
10. Require direct radio contact between Alyeska's Valdez Marine Terminal Operations Center and the bridge of incoming and outgoing tankers, accompanying tugs, and Alyeska's oil spill response vessels while incoming or outgoing tankers are located at any point between the Valdez Marine Terminal and Seal Rocks at the Hinchinbrook Entrance. Require Alyeska to record all radio transmissions and preserve each recording for a period of at least thirty days for submission to ADEC and the USCG upon request. Require terminal--tanker radio contact in Cook Inlet.
11. Require each tanker, accompanying tug boats, and oil spill response vessels to notify the terminal immediately by radio transmission if an incident occurs or if there is any indication of a problem which threatens an outbound or inbound tanker or other tank vessel, or its cargo. Incident(s) include, but are not limited to: (a) any mechanical problem with the vessel that might affect the power or steering of the vessel; (b) the discovery of any hull damage and/or compartment flooding; or (c) any collision that jeopardizes the seaworthiness of the vessel, including any collision with an iceberg that jeopardizes the seaworthiness of the vessel.
12. Require masters of tanker vessels to reduce speed and to maneuver through ice while remaining within the designated traffic lanes or to delay sailing from the terminal if ice conditions prevent them from maneuvering at a slower rate of speed while maintaining their vessels within the designated traffic lanes during transit through the ice.

13. Require mandatory random drug and alcohol testing for all persons in command of tankers and tank barges, and prohibit the use of drugs or alcohol by such persons within twelve hours of their boarding of any such vessel.
14. Forbid the use of Montague Straits by tankers or tank barges not making fuel deliveries for use by local communities.
15. Evaluate the size and overall adequacy of ship complements aboard tanker vessels and require increased training and experience for personnel on the bridge of tanker vessels.

FINAL REPORT

**AN ASSESSMENT OF
TANKER TRANSPORTATION
SYSTEMS IN COOK INLET AND
PRINCE WILLIAM SOUND**

PREPARED FOR:

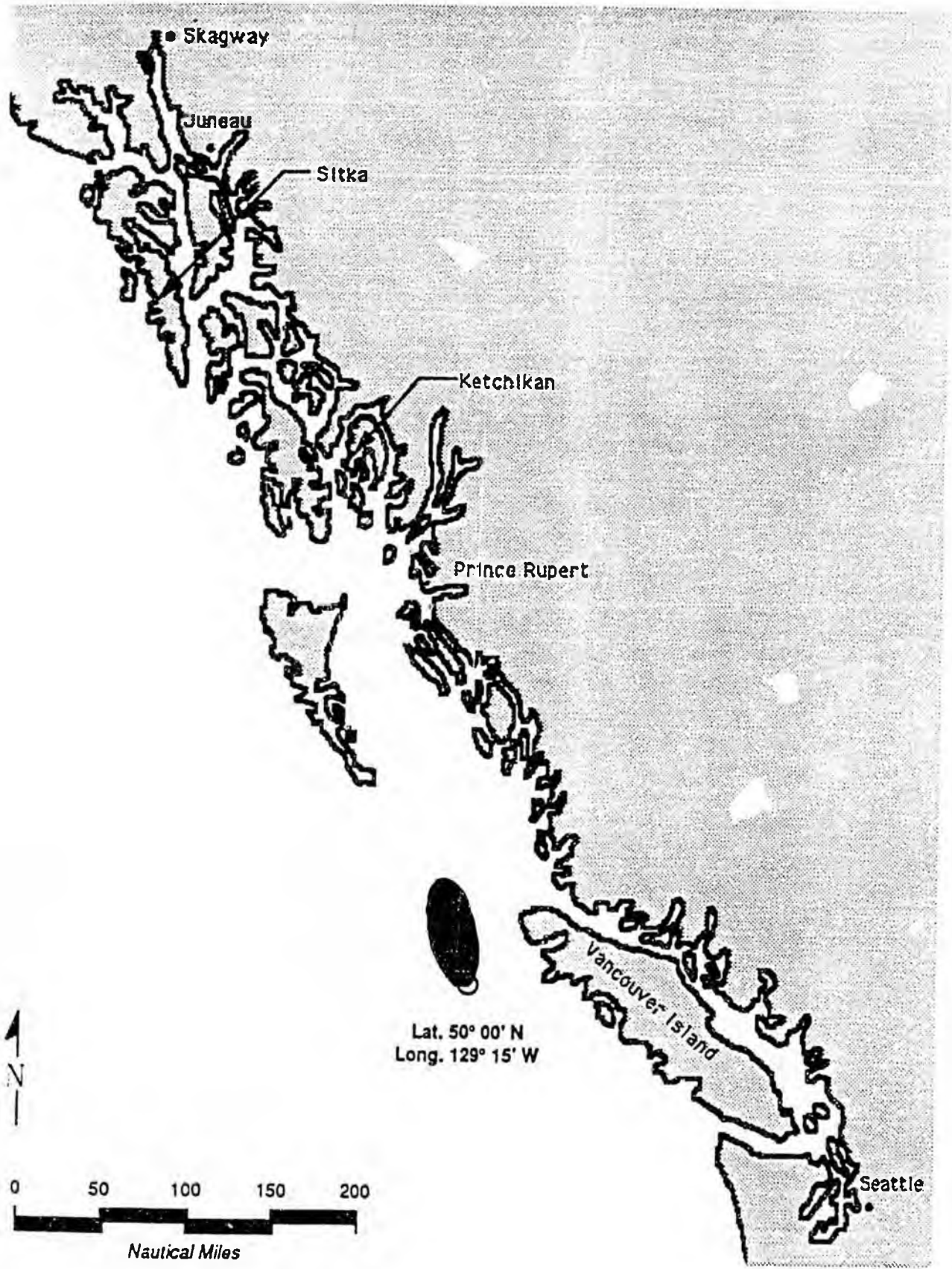
**ALASKA OIL SPILL COMMISSION
707 "A" STREET, SUITE 202
ANCHORAGE, ALASKA 99501**

PREPARED BY:

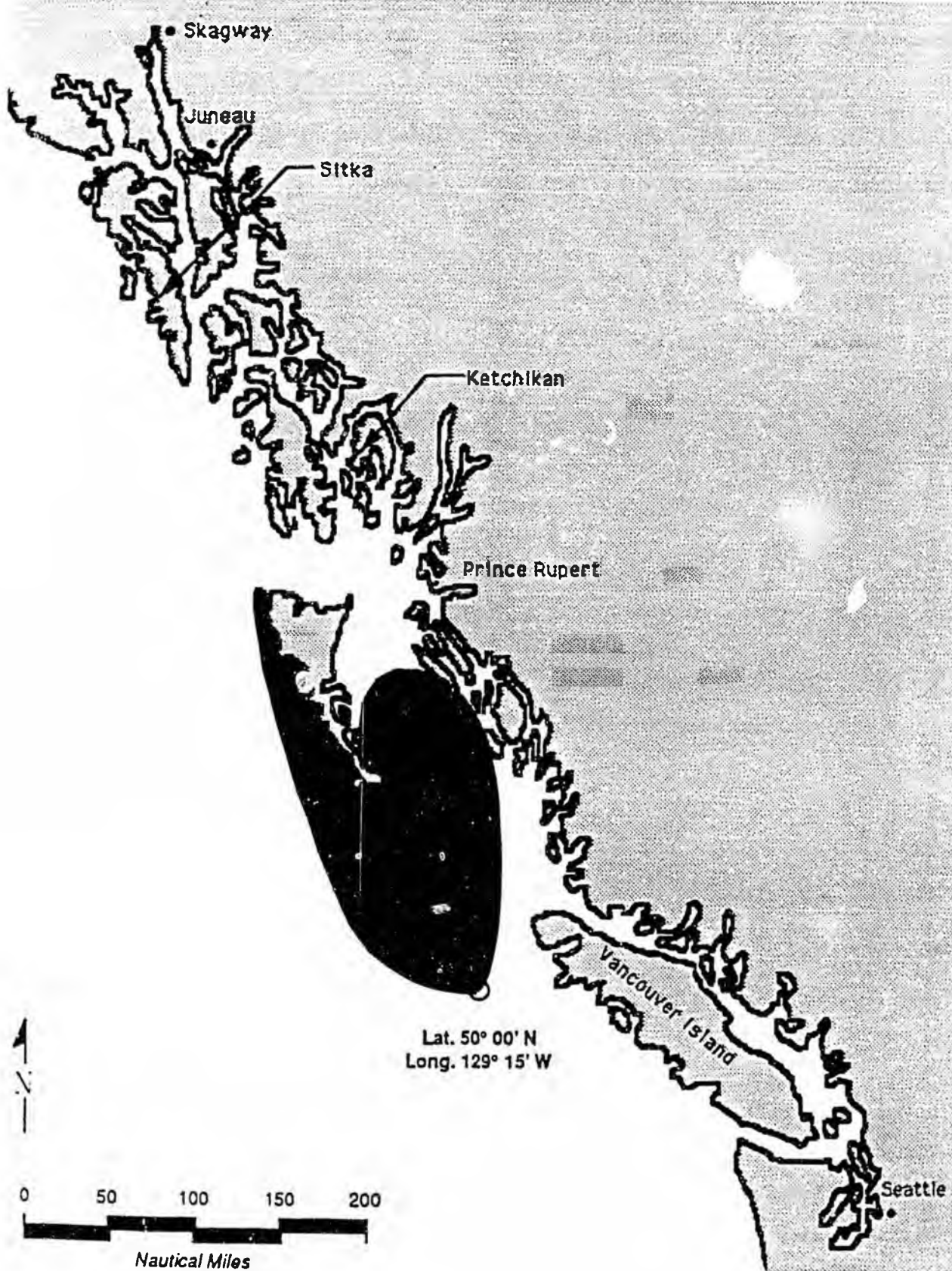
**ENGINEERING COMPUTER OPTECNOMICS, INC. (ECO)
1036 CAPE ST. CLAIRE CENTER
ANNAPOLIS, MARYLAND 21401**

DECEMBER 8, 1989

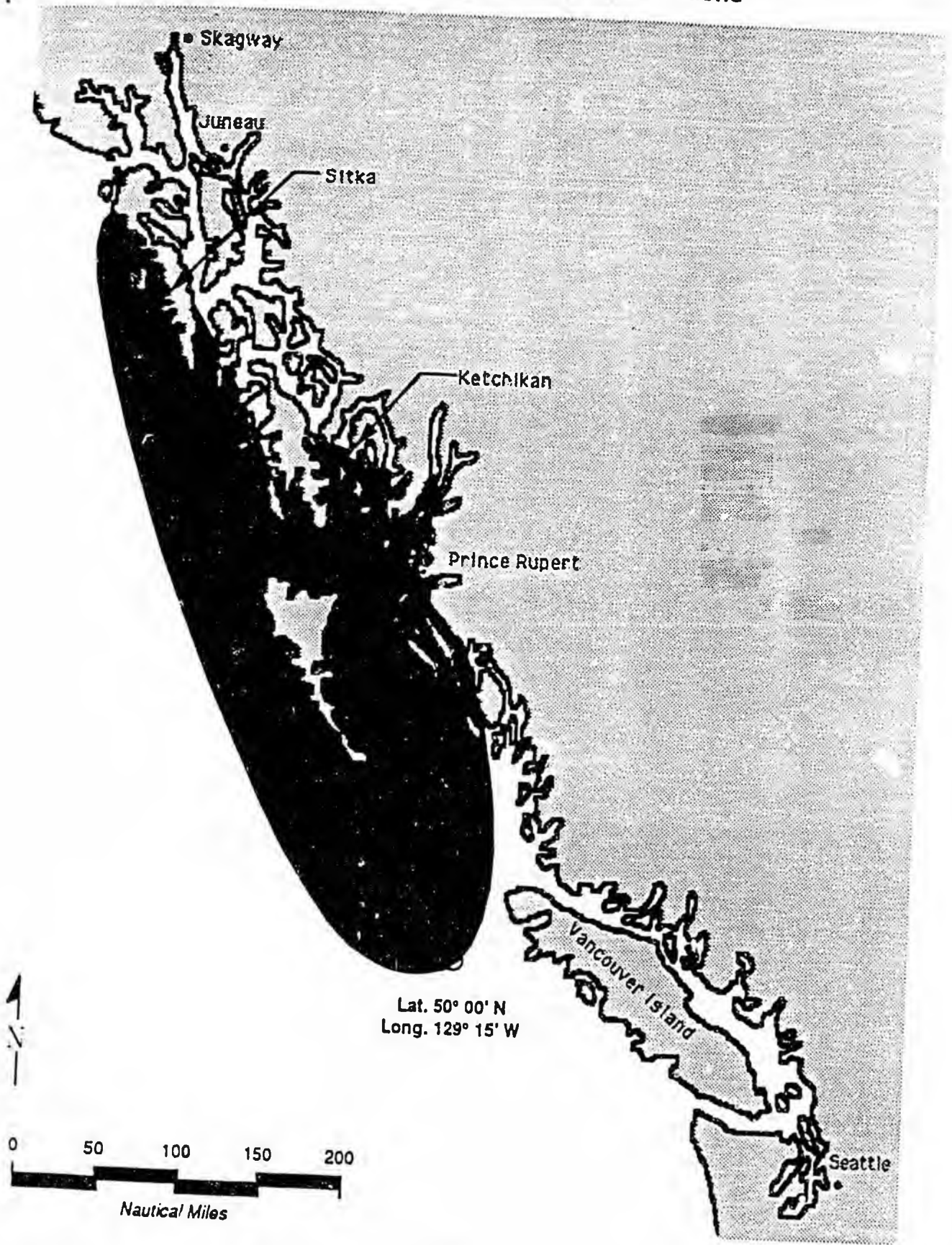
Offshore Spill Site - 24 Hours After Spill
Spill Size = 75,000,000 Gallons
Typical Winter Wind And Current Conditions



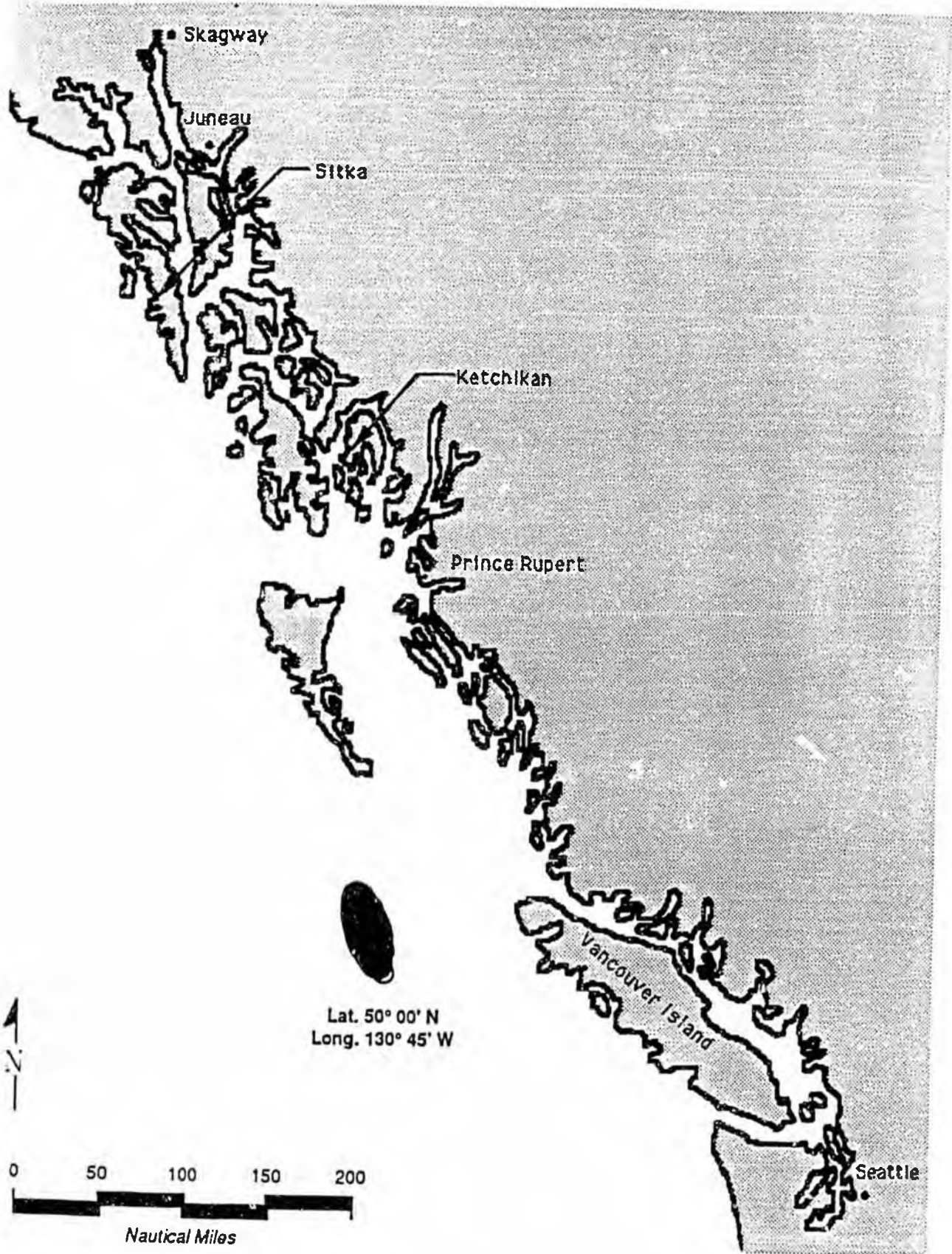
Offshore Spill Site 1 - 168 Hours After Spill
Spill Size = 75,000,000 Gallons
Typical Winter Wind And Current Conditions



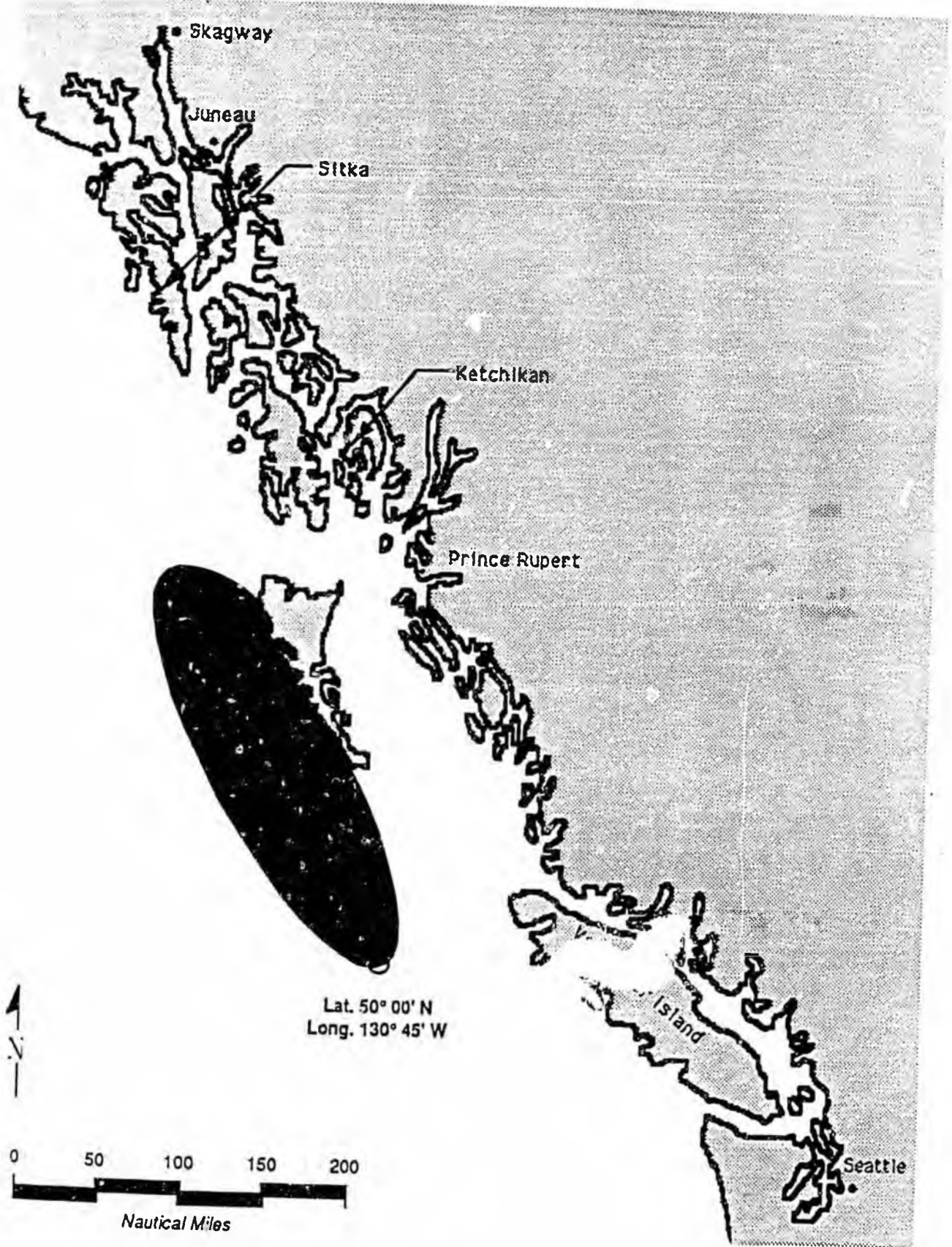
Onshore Spill Site 1 - 336 Hours After Spill
Spill Size = 75,000,000 Gallons
Typical Winter Wind And Current Conditions



Offshore Spill Site 2 - 24 Hours After Spill
Spill Size = 75,000,000 Gallons
Typical Winter Wind And Current Conditions



Offshore Spill Site 2 - 168 Hours After Spill
Spill Size = 75,000,000 Gallons
Typical Winter Wind And Current Conditions



Offshore Spill Site 2 - 336 Hours After Spill
Spill Size = 75,000,000 Gallons
Typical Winter Wind And Current Conditions

