Report to the Premier

on Oil Transportation and Oil Spills

by David Anderson, Special Advisor

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Acknowledgments

This report is the result of six months of meetings and discussions with many hundreds of people, from British Columbia, Alaska, Washington State and elsewhere. Rarely has there been such a comprehensive canvass of views of concerned citizens on an environmental subject. It would be impossible for me to single out by name and to thank all those who have taken part for their generosity with their time and knowledge, and it would be unfair to name but a few. May I express my gratitude to all for their help and assistance.

With respect to those who worked with me, an exception must be made. Allyson Baxter admirably handled letters, appointments and schedules in Victoria, and succeeded in establishing order in my work over the past six months. Bob Williams of the Public Affairs and Communications Branch of the Ministry arranged meetings in the coastal communities of the province, and accompanied me on these trips. He was the first with whom I discussed the presentations made at the hearings, and his thoughtful comments were of great value to me. My two part time researchers, Robbie Sheffman and Nooral Alam Ahmed, did fine work ferreting out background material and information on other spills. Finally I wish to thank Richard Fineberg of Governor Cowper's office for the arrangements for my trip to Alaska, and for the intellectually stimulating company he proved to be during the ten days of our travels together. I know I will long remember the helicopter trips through the mists of the mountain passes of the Kenai Peninsula on our way to inspect the beaches and the spill.

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REPORT TO THE PREMIER

Preface

This report is the end result of extensive public hearings in the coastal communities of British Columbia over the summer of 1989. Inevitably in such a process views range widely. I have restricted this discussion to three basic areas, prevention, response, and compensation for damage. This report is organized on that basis.

Some participants took a broad view of the term prevention. These people are correct in their general view that a reduction of tanker traffic reduces the risk of oil spills and damage to the marine environment. However, the specifics of some of the measures proposed that might reduce consumption of oil went beyond my mandate. The efficiency of wind and wave powered generators of electricity, or the importance of public transit to the overall reduction of the use of oil for transportation in large cities such as Vancouver, are questions that as a consequence will not be addressed at any length in this report. I trust that those who made presentations which dealt with energy conservation and alternative energy sources will not be disappointed. Their general thesis, that the problems of oil transportation are closely related to lifestyle, will be commented upon in the pages to follow, but an evaluation of each and every one of the many specific measures proposed which might promote lifestyle change is beyond the scope of this report.

I should also mention at the outset that the approach taken was to consider the problems of oil transportation and oil spills without regard for questions of jurisdiction. Some recommendations of this report therefore are not within the jurisdiction of the Province of British Columbia, and instead are the responsibility of Ottawa, of our neighbouring states of Alaska or Washington, or of the United States federal government in Washington D.C. Some can only be implemented by joint action.

This approach was deliberate, and was chosen for a number of reasons. First, earlier this year the Premier and the Minister of the Environment made it clear that they wished questions of jurisdiction to take a back seat to the questions of reducing the risks of the movement of oil by sea, and to the questions of improving oil spill response capability. Second, the public, particularly when commenting on the Nestucca spill on the west coast of Vancouver Island this past winter, made it abundantly clear that it is impatient with jurisdictional discussions as to which level of government might be responsible for what. Third, there are not always clearly defined jurisdictional limits in prevention or spill response activities. Is a seabird, for example, which may spend a part of its life in Canadian waters and a part in U.S. waters, the responsibility of the U.S. or Canadian governments, the Washington State government or the government of British Columbia? This question is not as academic as it at first sounds. When spill costs are calculated and damage claims made, such issues come to the fore. Fourth, in studies of this type which attempt to stay within the constitutional competence of a single level of government, there is an observable and understandable tendency to avoid the marginal or questionable areas of jurisdiction, and concentrate on the areas where jurisdiction is clear. Such a concentration inevitably leads to gaps at the margins. I do not believe we can afford such gaps in this important area. Fifth and finally, some six weeks after my appointment, the federal government appointed a panel of three with a mandate similar to that given to me by the Premier. As this report is expected to be made available to that panel, it appears appropriate not to leave gaps based on the vagaries of the constitution, but for me to attempt to assist that panel by dealing with the problem as a whole.

At some stage the question of jurisdiction must be addressed, and indeed jurisdictional issues will be discussed at some length in this report. However I am firmly of the view that consideration of such issues should follow rather than precede consideration of how to prevent oil pollution and how to improve spill response. The public has made clear its desire to have a much higher level of safety and of preparedness. We are all citizens of

both this province and of Canada. Regardless of constitutional responsibility, governments must organise and cooperate to achieve those goals. The constitution must serve, not impede, our efforts.

A final point needs to be noted. During the public hearings support for the current moratorium on offshore exploratory drilling was frequently expressed. By reason of the moratorium I have not included discussion of the offshore drilling issue in this report. That issue is now hypothetical. The issue of tank vessel oil transportation, by contrast, is real and urgent. It is the subject of this report.

SUMMARY

SUMMARY

This report is based on six months of public hearings in the coastal communities of British Columbia during the summer of 1989. The diverse proposals and recommendations coming from the public have been grouped, assessed, and where necessary supplemented, in order to come up with a coordinated and comprehensive series of recommendations to reduce marine oil spill risks and to improve response capability. The document is not focused only on areas of provincial jurisdiction: the nature of the problems faced in oil spill prevention and response, the presentations of the public, and the approach of the Premier all suggest that the subject be considered as a whole.

Prevention

Prevention is by far the most important area for government, industry, and individual action. Even under the best of conditions, response can be expected to be only partially effective. Further, from a cost effective point of view, prevention measures are by far the least costly method of improving the present situation.

The first, and most fundamental way to prevent tanker accidents is to reduce consumption of products derived from crude oil. This will reduce the traffic of refined products to the coastal communities, and also demonstrate the seriousness of our concern to other parts of the continent which, unlike British Columbia, are dependent on crude oil delivered by tanker. The report points out that current price levels for crude oil reflect only production costs, and do not reflect the full economic, environmental or social costs of the use of the product. It recommends that governments deliberately use the price mechanism, ie. raise the price of petroleum products through increased taxes, to reduce the rapid rate of increase of consumption of such products that is now occurring. It notes that a reduction in the current rate of increase of petroleum products was an objective of the Group of Seven nations earlier this year, and was called for in the final communique of the Global Conference on the Atmosphere in Toronto last year.

Further recommendations in this area call for a provincial Energy and Conservation Agency to promote and develop conservation strategies and alternative forms of energy. The report recommends that the federal government also make energy conservation and alternative energy development a matter of priority.

A method of oil conservation often overlooked is the recycling of lubricating oils. A greater use of recycled lubricating oil will not only reduce the requirement of shipping the crude oil feedstock of the displaced primary oil, but will have a beneficial pollution reduction effect as well. It is noted that consumer demand, not supply, is the bottleneck for increased recycling of lubricating oils in this province at the present time. The report recommends that municipal, provincial and federal governments expand the use of recycled oil in their vehicle fleets, and in the vehicle fleets of their crown corporations and agencies. It further suggests that the provincial government, in partnership with industry, embark on a limited advertising campaign to encourage British Columbians of the economic and environmental advantages of using recycled lubricating oil in private vehicles.

Reducing the number of tankers in nearby waters is another method of reducing oil spill risks. The report notes the lack of hard data on environmental resources at risk, and on the potential for ship accidents, in the Strait of Juan de Fuca and Strait of Georgia area. Nevertheless, from previous work in this area in the late seventies and early eighties, it concludes that the risk of an Exxon Valdez type accident for a loaded tanker outbound from the Trans Mountain docks at the Second Narrows is many times greater than the risk that existed in Prince William Sound on the night of 23 March when the Exxon Valdez left the Alyeska loading docks at Valdez. The report recommends that there be no expansion of crude oil exports from the Port of Vancouver, that the existing exports be phased out, and

that any laden tankers that leave the port before such a phase out be accompanied by the same type of escort and emergency response vessels as are now in use in Prince William Sound. Further recommendations suggest that, as is soon expected at Valdez, in the event of default by the shipper, the company responsible for shipping the oil and the seller, guarantee any response costs of a spill.

Reducing American tanker traffic coming to the refineries of Puget Sound and the Strait of Georgia is considered. It is concluded that at the present time pricing factors, and Alaskan supply factors, make a diversion from Alaskan tanker delivered crude to Canadian crude delivered overland by pipeline unlikely. This will change over the next decade. It is recommended that this method of reducing oil transits in the Strait of Juan de Fuca be vigorously explored in future years.

The possibility of a Canadian overland pipeline being built as a substitute for the present Trans Alaska Pipeline and tanker system is analyzed. The report concludes that the time it would take to construct such a Canadian pipeline would be a minimum of seven years, and that the remaining Prudhoe Bay oil reserves will by then be so reduced that such a line is not a feasible proposition. This analysis might change if more oil is discovered in Alaska; however it is concluded that the likelihood of discoveries of the magnitude required to alter the supply situation is remote.

The report considers methods of preventing accidents from tankers, tank barges, and other vessels on the Coast. On the basis of current information, double bottoms for tankers are considered to be desirable, but in the light of the instructions earlier this summer by the U.S. Congress to the U.S. Secretary of Transportation to examine the questions of double bottoms, double hulls, wing tanks and greater compartmentalization of tank vessels and to report thereon, it is recommended that a final position should await the outcome of that study. However regardless of the U.S. study, Canada should urge the International Maritime Organization classify petroleum products and crude oil as Type I cargoes (hazardous) rather than Type III (minor hazard).

The report notes that approximately twenty per cent of the tankers involved in the Alaskan trade are classified by the Tanker Advisory Center of New York as "poor" or "fair", below the average of the United States fleet. It further notes that the Alaskan run is considered to be particularly tough on vessels by reason of weather and sea conditions in winter. The report recommends that vessels which are below the average of the U.S. fleet not be permitted to load at the port of Valdez.

With respect to the extensive tug and barge traffic on the west coast, the report recommends that Canadian and United States inspection procedures, standards, and regulations be harmonized on the principle of the current highest standard of each country being adopted by the other. It is further recommended that for barges destined for Alaska, the open ocean standards of construction, equipment, manning and inspection be adopted. Finally it is recommended that all west coast tank barges be rebuilt to incorporate a double hull, and that this be done in a phased schedule over the next four years. The report cautions that these recommendations were developed without the advantage of the studies currently underway by the Coast Guard and the federal Review Panel chaired by David Brander-Smith, and suggests that they be examined in due course in the light of the information and conclusions of that work.

With respect to on-board equipment, the report notes the discussion of the role of the autopilot in the Exxon Valdez incident. It recommends that the design flaw which may lead to the officer of the watch not being aware that the autopilot is engaged be rectified by a warning light, and that this be done world wide.

A second recommendation with respect to on board equipment is that the trial use by Atlantic Richfield Company tankers of electronic charts, consoles and warning devices

which constitute the Precise Integrated Navigation System be monitored, and if the results justify it, this equipment become mandatory for tankers on the Alaskan run. In addition, to enable Canadian west coast operators to gain familiarity with and evaluate this (or equivalent) equipment, the report recommends that the larger Fisheries and Oceans and Coast Guard vessels be so equipped. Similarly, B.C. Ferries should be asked for their views on the advantages such equipment would offer to their fleet, particularly to the vessels serving the northern British Columbia ports.

A third recommendation with respect to on-board equipment is that Canada share engineering and research costs with Sweden on that country's proposal for the so-called "vacuum method" of containing oil on board a holed tanker. This proposal has many critics among naval architects, who claim it would result in dangerous hull stress which might well lead to vessel break up in the event of a grounding; it has equally fervent supporters, who believe that it might prevent most oil spills that now occur, and reduce the size and impact of those that still take place. It was the subject of discussion at the International Maritime Organization's Environment Protection Committee in June of last year. It is high time for a thorough engineering study.

A quick response to a spill is a vital component of a successful operation. Therefore on board spill response equipment for tankers and tank barges is recommended. As a general rule, for crew and training reasons, it is not recommended that the tanker crew be responsible for deploying such equipment; however equipment should be on board and available for speedy deployment by spill response teams ferried or helicoptered on board.

Changes to equipment or procedures on shore may also improve safety of tankers and tank barges. The radar systems of the Vessel Traffic Service at Ucluelet and in Vancouver Harbour were installed in the mid seventies at the time the Alaskan tanker route commenced. It is recommended that this radar be replaced with more modern and effective equipment with better ability to handle adverse weather, with better definition, and in the case of Ucluelet, with extended range. In addition, it is recommended that the Vancouver system be completed to cover the blind spots in the area to the east of Second Narrows, and on the north side of the harbour. There is no recommendation to extend VTS to the northern end of Vancouver Island. The Coast Guard decision that the costs of such an extension are not justified at the present time is probably correct. The decision should be left to the Coast Guard.

If VTService is to be effective, ships officers and pilots must have confidence in those who staff such centres. To this end, in areas such as Hamburg or Rotterdam, the staff of the VTService have extensive seagoing experience. A requirement for such experience would not be feasible on this coast at present, and is not considered necessary at this time. However, it is recommended that steps be taken to ensure the involvement of B.C. pilots and other professional mariners with deep sea experience in decisions affecting the operations of these VTS centres. A standing advisory body of both Coast Guard and industry should be established.

Both the Nestucca and Exxon Valdez spills underlined the importance of oceanographic research on current patterns. It is recommended that present oceanographic work in this area be given greater priority and funding, and that in particular, greater attention be paid to the area at the entrance to the Strait of Juan de Fuca, off the west coast of the Queen Charlotte Islands in Dixon Entrance.

The West Coast Tanker Exclusion Zone is designed to make sure that a laden tanker is far enough offshore that if disabled, for example by a power failure such as took place on the Exxon Philadelphia in April of this year, it would not drift onto shore before a tug dispatched from Prince William Sound or Anacortes Washington is able to come to its assistance.

Problems arise at the southern end of the exclusion zone. As laden tankers south of Ucluelet turn to head for the entrance to the Strait, they cut across the fishing grounds of the west coast banks. It is recommended that the West Coast Tanker Exclusion Zone be extended at its southern end so that tankers approach the entrance to the Strait from a more westerly position, on a course that passes to the south of or between the fishing banks.

By reason of the many possible marine sources of oil pollution, regulation and inspection systems vary considerably in effectiveness. U.S. tankers on the Valdez route are subjected to U.S. Coast Guard inspection. 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. The Ship Safety Branch does not have access to full incident or accident histories of the vessels, nor full maintenance and repair records. 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, generally speaking, those of the port state or the International Maritime Organization.

It must be noted that the deficiencies noted by the Canadian inspectors vary considerably in importance, and 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 below what it should be to protect our waters.

It is recommended that the Ship Safety Branch establish a Vessel Intelligence Unit to obtain more complete information on vessels in Canadian waters. This would be to augment the information currently available to the Ship Safety Branch from international sources. It is further recommended that as a matter of priority inspection be increased to the Coast Guard target level of 25% of vessels entering Canadian waters, and that this figure be increased to 40% in 1993. The report recommends that increased penalties be assessed against companies whose vessels have poor records, and that companies with consistently poor records in this regard be barred from 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 flags, vessels registered in such countries should be specifically prohibited from entry into Canadian ports until the situation is rectified.

It is recognized that the recommendation to bar individual ships, the ships of certain companies, or ships flying certain flags from Canadian ports is a departure from current world practice. It is expected that in the long run a more active port state role in this area will have a salutary effect in raising world standards and the effectiveness of international systems and organizations.

The report reflects the serious public concern over reduced crew size on vessels. A definitive finding of whether the small crew size contributed to the Exxon Valdez accident must await the U.S. National Transportation Safety Board findings, expected in six months time. It is impossible to be categorical on this issue. There is no "correct" crew size; many factors such as tonnage, length of the vessel, its age, the ports it may frequent, the crew's experience and training, and the equipment on board, all play an important part in determining what is appropriate.

It is recommended that no reduction in crew size of tankers or tank vessels either in the U.S. or Canada be permitted until the United States Transportation Safety Board reports its findings.

Spill Response - Preparation

Under the best of conditions, spill response can be expected to be only partially successful. The most important element in increasing the level of success is pre-spill preparation. The Nestucca and Exxon Valdez spill responses were both hampered by inadequate preparation.

A wide variety of measures are proposed to improve pre-spill preparation. These include effective coastal sensitivity mapping, the location of spill response equipment on board tankers and tank barges, emergency response vessels with equipment and spill response teams to accompany every loaded tanker east of the entrance to the Strait of Juan de Fuca, and the installation of spill response equipment on existing vessels, for example on dredges, in essence to create a response fleet of multi-purpose vessels capable of leaving their usual work and responding to a spill with only minor delay.

The report discusses the improved spill response capability that can be expected from the Petroleum Industry Response Organization regional team that is to be located in Seattle. It proposes the establishment of a local auxiliary response organization in coastal areas distant from the Coast Guard depots of Victoria, Prince Rupert and Vancouver. The main role of the auxiliary units would be near-shore defensive booming of sensitive areas. The Provincial Emergency Program is suggested as an appropriate logistics and administrative support agency for the auxiliary. To fulfil such a role, it is recommended that the Provincial Emergency Program receive more funds and other resources, and that it have more financial flexibility to enable it to make effective and quick use of local suppliers near the spill site.

Improvements in the capability of other government agencies prior to any spill are also suggested. Community relations and communications in particular are singled out as an important areas where the experience of Nestucca and of the Exxon Valdez responses suggest that far better pre-spill preparation is needed.

Pre-spill preparation for animal recovery and rehabilitation is dealt with at some length. The report notes that despite high costs and limited numbers of successful releases, such work is important. Recommendations in this area are that there be better coordination of animal recovery groups, that the important role of veterinarians and veterinary technicians be recognized, that training programs be undertaken, and that equipment be stockpiled or procurement systems put in place long before any spill. Procedures to avoid conflict when injured animals need to be destroyed are also the subject of recommendations.

Current research, particularly from the Exxon Valdez spill, is discussed, as are procedures for determining what research gaps exist, and what might be done to plug such gaps. Technological assessment of the many proposals for improving spill response that have been submitted by the public over the past year is similarly the subject of specific recommendations. In order to make use of existing expert personnel and equipment, up-to-date and regularly revised inventories of equipment and experts, as well as inventories of companies with expertise, are urged.

Other topics covered in the spill preparation section are spill worker safety and right to know of hazards, the training of spill workers, and of the crews of tank vessels, the possible use of fire and dispersants, oil waste disposal, and the role of existing response organizations.

Management and Organization

Although preparation is the key to improved response, both the Nestucca and the Exxon Valdez spills demonstrated the limitations of existing spill response organizational structures both in Prince William Sound and in British Columbia. These limitations have been recognized by the government departments and ministries involved. The question is how to design new and better organizational systems.

One method is to rewrite and refine the agreements, understandings, and protocols that exist between government ministries and departments, and to continue with an unchanged lead agency system. The report rejects that approach. It has failed in the past, and it will likely fail again in the future. It is simply too difficult for a large number of government bodies, faced as they are with a multitude of competing demands, to maintain anything approaching the coordinated level of financial and resource commitment required. Instead, the report recommends a separate agency be created from the government departments and ministries currently involved, and with university, industry, Native Peoples, and community representation. This separate agency would have only the two tasks of spill prevention and spill response. Government bodies would participate fully, just as they do at the present time, in areas of their responsibilities. The difference would be that the agency's role would provide the necessary focus, and the agency's existence would provide the necessary prod, for coordinated pre-spill activity.

It is recommended that administrative support for the agency come from the Department of Fisheries and Oceans, although contracts with the private sector would also be extensively used. Funding would be by way of one cent a litre special levy on oil products moved by water on the west coast. This separate source of funds is considered to be important. It will allow for repayment to DFO and other government bodies for support given, in order not to detract from existing work schedules, and will allow the employment of private contractors either to undertake work considered necessary by the agency but which a government department or ministry has failed to do, or to undertake other new tasks which the agency considers important but which no government body may be able to fund.

The emphasis of past agreements has been on whom in government will do what when the spill takes place. Only at the spill site did past failures to prepare, and present inabilities to perform as expected become clear. The emphasis of the proposed agency will be to see that to the greatest extent possible work will be done before the spill takes place. Abilities, or the lack of them, to a large extent will be known factors by the day of the spill, and where possible measures to compensate for weaknesses will already be in place.

Chapter One

Prevention

Reducing Oil Consumption

Chapter 1.01. Introduction

From the first public meeting I held in Tofino two weeks after my appointment there was one constant and repeated theme, namely that preventing marine accidents and oil spills should be the focus of attention. The words of the participant at Tofino who stated:

a pint of prevention is worth many barrels of cure

were repeated in one form or another at every public meeting I held, and often many times at each. The limitations of the cleanup process of the Nestucca spill observed on the west coast of Vancouver Island this winter was followed by a similar experience with the far more extensive Exxon Valdez spill. There is a general recognition that spill cleanup response is likely to be only partially successful at best, and that the emphasis of government, industry and the public must be to prevent spills from happening. To quote another participant from the public meeting in Queen Charlotte City:

the lesson of last time is that there had better not be a next time.

Unfortunately, other than by ceasing to use oil products on Vancouver Island and in the small communities of the coast, it is not possible to prevent the possibility of a next time. However the spirit behind these two remarks sum up the major theme of this report. The prevention of future spills is by far our most important task.

Section 1.02. Conservation Measures

The link between our society's oil consumption patterns and the carriage of oil by tank vessels at sea was one of the most constantly recurring themes of the public hearings I held. Increased conservation of energy was passionately advocated and debated. The development of new technologies in the energy area was also frequently proposed as a method of reducing oil tank vessel traffic on our coast. Those who put forward this view were unimpressed by comments to the effect that virtually all oil used in British Columbia comes to this province from Alberta by pipeline. Their reply to such comments was twofold. First, that virtually all oil used on the Coast, in the Charlottes and on Vancouver Island gets there by tanker or tank barge, and this poses a serious risk to our coastal environment. Second, they argued that in the light of the vast amounts of oil carried by sea to serve European, Japanese, North American and other markets, a reduction in these countries oil consumption is vital if the overall risk is to be reduced. British Columbians can hardly ask others to do what we would not do ourselves.

Some pointed out that reducing consumption of oil and developing alternative energy sources would have another desirable effect on the environment, namely the reduction of CO_2 emissions into the atmosphere. No doubt by reason of the recent and concurrent publicity the greenhouse effect and the Exxon Valdez spill had during the period of the hearings, the two objectives frequently became linked--indeed, inseparable--in the minds of many speakers.

Reducing CO_2 emissions has been a policy objective of the Canadian government since it hosted the June 1988 conference on "The Changing Atmosphere" in Toronto.

The final communique of the Group of Seven Industrialized Nations which met in Paris in July was issued during the course of the public hearings, and also was commented upon following its release. Excerpts particularly relevant to this report are as follows:

> *There is growing awareness throughout the world of the necessity to preserve better the global ecological balance....We strongly advocate common efforts to limit emissions of carbon dioxide and other greenhouse gases, which threaten to induce climatic change, endangering the environment and ultimately the economy.....We agree that increasing energy efficiency could make a substantial contribution to these goals. We urge international organizations concerned to encourage measures, including economic measures, to improve energy conservation and, more broadly, efficiency in the use of energy of all kinds and to promote relevant techniques and technologies.*

While CO_2 emissions and the greenhouse effect are not directly within my terms of reference, the desire of so many participants to let the government know that they considered harmful emissions into the atmosphere and oil pollution emissions into the marine environment as the two compelling reasons for concerted measures to alter oil consumption patterns must be recorded. It would not accurately reflect the results of an extensive hearing process to ignore this second but equally fundamental public concern over current crude oil consumption patterns.

Those participants who commented on this theme were generally critical of reduced government funding in the conservation and alternative energy areas over the past five years, and of the limited use of tax or pricing policies to advance these goals. Although their arguments were not always consistent, in general they viewed the present low price of crude oil, in the US$18 per barrel range during the period of my hearings, as a pricing

anomaly which did not properly reflect the real cost of the use of the product. In their view, the cost of oil should not be viewed as the price at the wellhead, or at the pump, or on the board of a commodities exchange. Price and cost are not synonymous terms. The true cost of oil had to include as well the environmental costs to society as a whole of the production, transportation and use of that oil. Thus conservation measures and alternate energy sources were not viewed as uneconomic by reason of the current low price of crude oil--indeed, quite the contrary. Government action is today even more necessary, because short term market forces are no longer working to promote reduced consumption and conservation.

I believe there is merit in the public's suggestions in these areas. From the early seventies until the mid eighties, higher crude oil prices encouraged conservation and the development of alternative energy sources. Government policies, motivated by economic considerations, on the one hand attempted to mitigate the price dislocation, and on the other attempted to reduce oil consumption. For the past half decade, that has not been the case. Today there is plenty of conventional crude oil available in the world, and it has rarely been cheaper. The result has been dramatically increasing rates of consumption. If a reduction of oil consumption is desired for environmental reasons, whether to reduce tanker spill risks or to reduce CO_2 emissions, or both, in the short run the price mechanism will require the prod of government policy.

Pricing energy products to achieve conservation goals is by no means unusual. Price induced conservation took place throughout the world following the OPEC embargo-related price increases of the early seventies. Indeed, at the present time British Columbia Hydro is reportedly considering requesting a ten per cent increase in hydro rates, solely for conservation purposes. Price increases are not the only policy option available to governments to dampen consumer demand, but the history of the past fifteen years in North America and Europe suggests strongly that it is the most effective single tool, the one which has the widest effect throughout the economy, and the one which best harnesses the ingenuity of the private sector to develop energy conserving strategies in every area of consumption.

It should be noted that Canadian conventional crude oil supplies are declining. It is beyond my mandate to comment on crude oil supply aspects of this situation; however it is a matter of record, commented on in National Energy Board reports and well documented in the literature on energy demand and supply, that there are serious future supply concerns for this country, concerns which are related to low price levels and the current rates of increases in consumption. It may well be that environmental, economic and energy policy objectives here converge. The final communique of the Group of Seven Industrialized nations, quoted above, suggests just that.

Recommendation: That in the light of the federal government's expressed concern over oil pollution in our coastal waters, and its expressed concern over CO_2 emissions, it reconsider its recent reduction of financial support for conservation measures and alternative energy sources.

Recommendation: That the Energy Development Agency promised in the February 1980 government policy document "An Energy Secure British Columbia" be established to direct and foster energy research and development programs within the province, in order to stabilize or reduce the current rates of increase of oil consumption.

Recommendation: That the provincial government re-examine its pricing and tax policies for petroleum products with a view to achieving its stated goal of reduced consumption of oil as a percentage of overall energy use, as outlined on pages 11 and 12 of "An Energy Secure British Columbia".

Recommendation: That as a measure to induce conservation, the level of provincial taxes on petroleum products be increased.

Recommendation: That Canada and British Columbia adopt the higher of the United States federal, or the California State, energy efficiency standards for vehicles, appliances and other equipment.

Section 1.03. Recycling Measures

Although petroleum products are generally considered a one time consumer item, in the area of lubricants, of which well over a hundred million litres are sold in the province annually, some recycling, to the level of 50%, is technically possible. Some participants stated that the figure is higher; however as the actual recovery figure is so much lower today than 50%, precision is not of much relevance one way or another.

From time to time in the public hearings suggestions were made to increase the level of recycling that takes place in the province. It was also pointed out, rather strongly on occasions, that the lack of effective recycling or disposal facilities encourages those of weak conviction to dump oil in storm sewers, from docks, on the ground, or in land fill sites.[1]

The method of increasing recycling most frequently suggested by the public was by increasing the recovery of used oil. Unfortunately, executives of Mohawk Oil, the British Columbia company which owns the only facility currently recycling oil in this province, have informed me that the limit to the amount of used oil which at present can be recycled is consumer resistance to the final product, not to a lack of supply. Their facility in North Vancouver is currently operating at well below its economically optimum level. The exception to this consumer resistance is within the provincial government; the company informs me that the personal interest of Environment Minister Strachan in this matter has resulted in considerable use of recycled lubricants by provincial government vehicle fleets. If the full potential of recycling in this area is to be realized, it is important that the use of this product be increased to the economically optimum level of the recycling facility, and when that is reached, expansion occur.

It should be noted that the reason for this resistance is not the quality of the recycled oil. Not only the officials of Mohawk Oil, but also those of other companies without such facilities which are in competition with Mohawk in lubricating oil sales have confirmed to me that the quality of the recycled oil for most applications is equivalent to that of virgin lubricating oils. I am informed that recycled oil has been used with success for the past six years in B.C. Transit's bus fleet.

Recommendation: That the Ministry of Energy Mines and Petroleum Resources explore ways to extend the current use of recycled oil to crown corporations and other public sector users, both municipal and federal.

Recommendation: That tax rebates be introduced to encourage increased use of recycled oil by private consumers.

Recommendation: That a limited advertising campaign, to be paid for equally by government and industry, be instituted to educate the private sector as to the economic and environmental advantages of purchasing recycled lubricants.

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1 The Final Report of the American Petroleum Institute's Task Force on Used Oil Disposal, undated but probably published in 1971, is interesting in this regard. It quotes a study completed in 1969 by Arthur D. Little, Inc. for the Massachusetts Division of Water Pollution Control to the effect that 23% of used automotive lubricating oil was dumped on the ground at source, and a further 18% could not be traced. While the report is not recent, the figures nevertheless demonstrate that disposal of automotive and marine lubricating oils creates a serious pollution problem.

Chapter Two

Prevention

Reducing Tanker Traffic

Section 2.01. Introduction

The second major area of suggestions from members of the public concerned methods to reduce tank vessel traffic by finding overland or pipeline alternatives to the present transportation systems that involve marine transportation. Three proposals in this connection were frequently mentioned. The first was the substitution of a Canadian overland pipeline for the present Trans Alaska Pipeline and tanker route south of Valdez; the second was diverting the current exports of heavy crude oil via tanker from Vancouver to the U.S. Midwest, with delivery by pipeline; and the third proposal was to substitute Albertan crude oil delivered by existing pipeline to the Strait of Georgia/Puget Sound area, thus avoiding the current use of tankers carrying Alaskan crude in waters of the Strait of Juan de Fuca, the Strait of Georgia, and Puget Sound. These three proposals are discussed below.

Section 2.02. The Canadian Pipeline Alternative to the Trans Alaska Pipeline/Tanker System

A large number of participants asked why a pipeline across Canada to the U.S. Midwest could not be built, so as to avoid the Alaskan tanker traffic risk that the Exxon Valdez incident has so graphically come to represent.

The proposal is not new. Shortly after the discovery of the Prudhoe Bay field three methods of transporting the North Slope oil were considered. The first was to transport oil directly from the North Slope by tanker to markets on the U.S. Atlantic seaboard. In 1970 the ice strengthened tanker SS Manhattan travelled from the U.S. east coast to Prudhoe Bay. A symbolic barrel of oil was helicoptered to the vessel when fifty kilometres from the Prudhoe Bay field, and it returned to the east coast, having shown that a tanker voyage was possible, but also that a tanker route from Prudhoe Bay to the lower 48 was not a feasible commercial option.

The second proposal was the overland option, or Canadian land bridge option, of a pipeline up the MacKenzie Valley and then through or near Edmonton to Chicago.

The third option was the Trans Alaska Pipeline/tanker system that was ultimately established. Industry favoured the latter proposal because both construction costs and construction time were expected to be less than for the overland Canadian route, and in June of 1969 they filed an application for a pipeline right-of-way between Prudhoe Bay and Valdez. After an extensive (and hitherto unequalled) environmental analysis, the permit for the pipeline right-of-way was approved by the Interior Departments Bureau of Land Management. Litigation over this decision then took place.

The permit was approved for a number of reasons. First and foremost was speed. The alternative Canadian route was longer, would have taken more time to construct, and more importantly, would have taken three or four years of study of engineering problems and environmental effects before any construction could begin. Even after such studies there was no certainty that a permit for construction would be given. Assuming a permit would ultimately have been given, the total time required for the Canadian route would have been a minimum of seven years, and probably at least a year longer than that.

Speed was critical. The U.S. in the early 1970s was suffering from the rapidly escalating prices and the supply uncertainty of the OPEC oil embargo. The faster Alaskan oil could be brought on stream, the less the U.S. balance of payments problem, the less the economic and energy insecurity, and the less the domestic political difficulties for both Congress and the Administration.

A second reason was Canadian indecision. While the Canadian government at one point invited an application from the U.S. consortium of oil companies to construct such a line, the Canadian Arctic Resources Committee, various environmental groups, groups concerned with Canadian Arctic sovereignty, native groups, and economic interests objecting to the exclusive use of such a facility for U.S. oil, all raised some form of objection. Canadian federal cabinet ministers reflected this indecision. The United States received no clear Canadian message.

A final reason for selecting the TAPS/tanker route was the process chosen for analyzing the two lines. Most studies showed the Canadian route to be superior. In brief, of the 23 headings under which the two routes were compared by the Interior Department, the Canadian route was ahead on seven, the TAPS/tanker route was ahead on four, and on the remaining twelve the two routes were judged to be similar. In the analysis the land impacts of the Canadian route and of the TAPS route were characterized as unavoidable impacts, but the effects to the marine environment of the tanker route were characterized as potential impacts. By assuring Canada, the Congress, and particularly the residents of the west

coast (both U.S. and Canadian) in 1973 that the tanker route from Valdez to the lower 48 would be the safest anywhere in the world and that the ships, crews, and navigational aids would be of the highest quality, the importance of these "potential" marine impacts were minimized. Indeed, despite well documented patterns of tanker accidents worldwide, they were virtually dismissed.

The adoption of this "unavoidable impact" and "potential impact" approach carried the day. By a decision of Congress the provisions of the National Environmental Policy Act were set aside. The line was built, and in August of 1977 ARCO Anchorage carried the first cargo of Alaskan oil to the lower 48. Twelve years and slightly over 8,700 cargo transits later, in the early minutes of March 24th, 1989, Captain Joseph Hazlewood and the Exxon Valdez decisively demonstrated the faulty reasoning of the original decision by the Interior Department and the United States Congress. "Potential" impacts do not always remain potential; ignoring or minimizing them is folly.

The paragraphs above give, in brief, the history of the pipeline, and explain, in part, the puzzlement of participants at the public hearings. If the decision to construct the Alaska Pipeline was a poor one, can it now not be corrected by a new decision to do what should have been done in the first place, namely conduct detailed engineering and environmental studies of the Canadian route, and, if it turns out to be a superior site, build such a line?

Unfortunately, the answer is complicated by the present existence of the 2 million barrel a day, 10 billion dollar Trans Alaska Pipeline system. It has been established and it is now as much a fact of geography as any Alaskan lake, river, or mountain. To abandon such a system would involve extraordinary economic costs. Second, over the past 12 years some seven billion barrels of oil have been extracted and sent south by the TAPS system. The Prudhoe Bay oil pools are now roughly half empty. Assuming a Canadian pipeline could be completed within seven years, which is by no means certain, any such system would then be able to carry only approximately a quarter of the total TAPS recoverable oil. The result would be prohibitive extra costs.

This problem may be overcome by future oil discoveries on the North Slope. Currently the oil industry wishes to carry out drilling in the Arctic Wildlife Reserve adjacent to the Prudhoe Bay field. Assuming this area is opened for drilling, and assuming it contains the most optimistic forecast of new oil discoveries (the chances of such a find are estimated to be below 20%) it would provide only a six month supply of oil for the U.S. Thus even under the most optimistic scenario it is highly unlikely that there will be sufficient additional oil to justify a Canadian pipeline.

In the final analysis, therefore, the chances of a Canadian pipeline route being established are remote in the extreme. The battle lost in 1973 was lost for all time. History cannot easily be reversed.

Section 2.03. Crude Oil Tankers Outbound from Vancouver

The risks associated with laden tankers outbound from Burrard Inlet caused considerable comment at the public hearings, particularly at the hearings in Vancouver. Further, the Municipal Council of Burnaby informed me of its opposition to this traffic, and by formal resolution specifically requested that I report on this matter.

Exports of Alberta crude oil from the port of Vancouver are not new. In the early and mid-seventies, during the OPEC oil embargo and consequent uncertainty about the deliveries of middle east crude oil to the refineries in Atlantic Canada and Quebec, substantial volumes of Albertan oil were sent by tanker from Vancouver through the Panama Canal to eastern Canada.

Following the embargo and supply emergency on the east coast, the traffic in crude oil dropped dramatically. While there were still some movements of both product and of crude, these were essentially incidental minor local adjustments to stocks and supply. Four years ago the amount of heavy crude oil shipped from Vancouver began to expand. Last year the volume of crude oil shipped from the port of Vancouver to the United States, Japan, Thailand, Taiwan, South Korea and Malaysia exceeded one million tons. This is carried by one or two tankers a month, of a maximum size of 90,000 tons. If the current $460 million Vancouver expansion program of TransMountain Pipeline Company proceeds as planned, the volume of oil exported will triple to 3 million tons a year, and the number of tankers will increase to 4 per month.

Whether this is the natural economic upper limit of the expansion of crude oil exports from Vancouver depends on a number of factors well beyond this report. These include the world price of conventional crudes, competition from Indonesia and other potential sources of heavy crude oils, the construction of upgrading facilities for crude oil both in potential markets overseas and in Canada, and in particular the demand for Canadian heavy crude delivered by pipeline to the U.S. midwest. On the one hand, if markets overseas continue to develop as they have in the past four years, the current expansion plan to 48 ships a year will likely be but a stage in the growth process, and this current plan will be followed by further applications to expand. This increase in capacity will bring even more oil to Vancouver, and even more tankers to the port to carry it overseas. On the other hand the existing destinations may not continue to provide markets in price ranges in which Canada can compete. In which case the existing traffic may decline or disappear, leaving Trans Mountain Pipeline Company with overcapacity and high overhead costs, which it will have little alternative but to attempt to pass on to the companies currently using its facilities to bring crude oil or products to Vancouver. If successful, this would increase prices to B.C. consumers.

In short, there can be no certainty in this area other than to note that the expansion plans of Trans Mountain are based on an analysis which suggests the market will expand, and it has announced its willingness to spend almost a half billion dollars on the basis that this analysis is correct. If the company's expectation of traffic proves correct, it is logical to conclude that further proposals to increase the traffic could follow.

British Columbians must therefore ask themselves as to whether the risks that this tanker traffic poses to the environment and shores of Burrard Inlet, the Strait of Georgia, the Canadian Gulf Islands, the American San Juan Islands, and the shores of the Strait of Juan de Fuca are worth incurring.

Unfortunately, no detailed risk analysis of this traffic has been conducted. The National Energy Board, which considered the first stage of the expansion plan of Trans Mountain Pipeline Company and which issued its approval in the summer of 1988, took a narrow view of the proposals before it, and gave no serious consideration to marine risks of increased traffic. In the National Energy Board's view, it had before it an application to

upgrade some existing pumping stations, to build two others, and to expand the company's Burnaby tank farm. It did not take the approach that the export objective of this expansion required consideration. Further, what little comment it made on terminal operations and marine environmental concerns in its 1988 decision was limited to Burrard Inlet, which is but a small fraction of the route, and involves only a small portion of the Canadian and American coastline at risk from crude oil exports. The decision of the National Energy Board has meant that these matters were not specifically analyzed and assessed.

Without such an analysis, precision in determining risk is not possible. However work done previously for the Alaska to Cherry Point route, for Trans Mountain's own Low Point proposal, and the competing Northern Tier Pipeline Company's proposal (both of the late seventies) suggests that, on a per barrel or per tanker transit basis, the risk of a marine accident inherent in the route from Trans Mountain Pipeline Company's Westridge terminal to the east of the Second Narrows bridge in Burrard Inlet, to traffic buoys at the entrance of the Strait of Juan de Fuca, is substantially greater than (for example) the American tanker traffic from the entrance buoy to Cherry Point. It is also substantially greater than the existing tanker traffic from Valdez to Hinchenbrook Island at the south end of Prince William Sound. The main reasons for this greater risk are the number of turns and the complexity of the channels, the tidal currents involved, and in particular the risk of collision with other vessels in these waters. The analysis of the British Columbia Government publication dated 1980 entitled "Oil Tanker Traffic - Assessing the Risks for the Southern Coast of British Columbia", which is based on the work done in the late seventies for those proposals, is of interest in this regard. Also important is the Report of the West Coast Oil Ports Inquiry, chaired by Dr. Andrew Thompson, which carried out work on tanker risks on the west coast in the late 1970s.

Unlike previous exports of propane from the port, the vessels engaged in the export of crude oil are obtained through spot charters, and are not dedicated to this route. In this they also differ from most of the Valdez fleet carrying Alaskan oil. As noted under the section "Inspection and Regulation" the tankers involved in this trade are inspected by the Ships Inspection Service when they first enter Canadian waters, and may be inspected again if they return to the port for a subsequent visit. The thoroughness of such inspection is limited. It can be expected to pick up obvious deficiencies, but is not a thorough check on the accident potential of the vessel. Trans Mountain Pipeline Company has its personnel carry out a visual inspection when the vessel docks. Some vendors of the crude oil shipped, particularly Esso, require that the vessels that carry the oil meet certain company standards for charter vessels. There is no legal requirement for them to do so, and neither company would likely incur legal liability for an accident caused by the negligent operation or defective equipment of such a vessel.

As a result of the inspections, it can be concluded that the vessels in this trade are of world standards. It appears unlikely, however, that on average they are of the quality of a major oil company's tanker fleet, such as Exxon, British Petroleum, or Chevron. The chartering system and the inspection system for vessels on this route almost certainly will be less demanding or thorough than that undergone by the vessels of a major oil company's tanker fleet, where complete histories of the vessel are available and where preventative maintenance is practised. In short, the vessels loading at Vancouver can be expected to be, on average, below the standards of those loading at Valdez. The risk of an accident caused by equipment failure or mechanical or structural problems, or an accident due to a mistake by the officers and crew, can thus be expected to be greater.

The next element requiring assessment is the resources at risk from a tanker accident in this area. Again, a full and detailed study of the environmental sensitivity of the Strait of Georgia, the Gulf Islands, the American San Juans and the Strait of Juan de Fuca to determine this element of the risk equation has not been done, although a great deal of information is nevertheless available. Hopefully the recommendations of this report with respect to coastal sensitivity mapping, section 4.02, will result in more information being

available in the future. However until such time as such studies are done, it is reasonable to conclude that these heavily utilized coastal areas, heavily utilized not only by people, both tourists and residents, but also by resident and migratory fish, birds, and marine and shoreline mammals, have a coastal sensitivity considerably higher than that of the shores of Prince William Sound, the western Kenai Peninsula and Kodiak Island, about which we have seen and heard so much in the six months since the Exxon Valdez spill.

A final factor is the nature of the oil shipped. The oil shipped from the Port of Vancouver is heavy Albertan crude. Cleaning up heavy crude oil from a marine spill is probably more difficult than cleaning up Alaskan crude oil, at least in the early stages. More research is required before more definite conclusions can be drawn in this area.

These factors, ship and crew quality, nature of the route, coastal sensitivity and possibly characteristics of heavy oil, all create a higher risk scenario for tankers coming to Vancouver than for those coming to Cherry Point. As already mentioned, a precise risk figure cannot be obtained without further technical analysis. Were such an analysis to be undertaken, I would expect a risk figure per transit to be two to three times higher for vessels loading at the Westridge terminal of Trans Mountain Pipeline Company than for the tankers unloading at Atlantic Richfield's Cherry Point docks, and perhaps four times greater than for loaded tankers transitting Prince William Sound.

I have stressed above the tentative nature of the figures advanced. They are not, however, entirely speculative. They are based in large part on my observations and conclusions between 1976 and 1980 as counsel for an intervenor (the British Columbia Wildlife Federation) before the Washington State Energy Facilities Site Evaluation Council in the matter of the Northern Tier Pipeline Company's application to construct an oil port in the Strait of Juan de Fuca and pipeline to the east; before the National Energy Board in the matter of Trans Mountain Pipeline Company's application for a certificate of public convenience and necessity authorizing the construction of 762mm pipeline from Low Point, Washington to the mid-northwestern United States; and before the Thompson West Coast Oil Ports Inquiry.

For risk to be considered acceptable, benefits must be weighed against them. In the case of heavy crude exports from the port of Vancouver, direct benefits appear to be the sales of the oil itself, harbour dues for the port authority, some employment of dock workers, pipeline workers and ships pilots, and a construction project of two or three years for the pipeline expansion. In addition, no doubt some leverage would be obtained by the sellers of crude oil in Alberta by reason of having an alternative Pacific market, limited though it is in comparison with the existing sales and the potential sales to the U.S. midwest.

The risk perceived by Alaskans both before and after the Exxon Valdez spill is discussed in Section 3.01. Public opinion, including the opinions of political leaders, alters dramatically after a spill. At that point the public is dealing not with an abstract set of numbers indicating the probable number of kilometres of oiled beaches, the probable number of dead birds, the probable dollar loss to the tourist industry or to the fishing industry, and other indicators of potential spill risk or environmental damage, and economic loss but it is dealing with the reality of the spill itself.

In considering the risk posed by tankers leaving Vancouver it is therefore useful to consider what would be the situation here were we to be faced with a major spill in the internal waters between Second Narrows and the entrance to the Strait of Juan de Fuca. If a spill took place, for example from the failure of the tanker's rudder to respond to the helm (the situation claimed by Third Mate Cousins at the National Transportation Safety Board hearings on the Exxon Valdez accident) at East Point, at the south end of Saturna Island, and the vessel grounded on either the adjacent Boiling Reef, or on Patos Island, one of the two American San Juan islands nearby, tidal currents would carry oil throughout the area in much the same way and for much the same distances as took place following the Exxon

Valdez spill, with the Fraser River estuary areas being hit early and hard with oil some centimetres deep. Appendix G, taken from the 1980 publication of the Government of British Columbia, referred to above, shows the type of slick that could be expected.

From the public hearings I conducted in the coastal communities of British Columbia, I think it is highly unlikely that, faced with such an accident, the public would adopt a philosophical approach, based on the fact that such an accident did not have a high chance of taking place, and accept that such a spill on our coast is the luck of the game, one of those things we have to put up with to obtain the benefits of the Port of Vancouver. British Columbians believe that long shots pay off. Our lottery corporation would have gone broke years ago if they did not.

A tanker accident at Boiling Reef may be a long shot. But the probability of a tanker leaving Westridge terminal having such an accident before it exits the Strait of Juan de Fuca is many times greater than was the chance of an accident in Prince William Sound on the evening of 23 March 1989 following the Exxon Valdez departure from the Alyeska Marine Terminal at Valdez.

Whether the environmental and economic risks are acceptable when weighed against the economic advantages is naturally a question on which people will differ. On the basis of an extensive public hearing process on the question of oil spill risk on our coast, I believe that the public of British Columbia would overwhelmingly answer that the risk of crude oil exports from the Port of Vancouver is unacceptable, and cannot be reduced to the point where it will become acceptable. I believe the public's opinion in this regard is entirely logical and sound.

Recommendation: That as a matter of environmental policy there be no further development of the export trade in crude oil from the Port of Vancouver.

Recommendation: That as a matter of environmental policy existing exports of crude oil from the Port of Vancouver be phased out.

Recommendation: That until such traffic ends, no crude oil tanker be permitted to load for offshore destinations, until a contingency plan for spill response for the outgoing voyage is filed and approved by the Oil Spill Response Agency or the Coast Guard for the Canadian internal, territorial, and pollution control zone waters through which the vessel will pass.

Recommendation: That legislation be amended to require the companies that sell and load crude oil in the port of Vancouver to guarantee the costs of spill response in the event of a foreign purchaser failing to meet his financial obligations in this regard.

Recommendation: That no laden crude oil tanker be permitted to leave the port of Vancouver unless accompanied by both a tug and an emergency response vessel, the tug to be equivalent to those currently escorting ARCO tankers to Cherry Point, and the emergency response vessel to have equivalent spill response and tug capability to those currently in operation in Prince William Sound.

Recommendation: That no laden crude oil tanker be permitted to leave the port of Vancouver without the emergency towing cable and associated gear comprising the "Prince William Sound Towing Package", and that, with appropriate amendments, the Prince William Sound Emergency Towing Contingency Plan be adopted for laden tankers in the Strait of Georgia and the Strait of Juan de Fuca.

Recommendation: That no laden crude oil tanker be permitted to leave the port of Vancouver without a second pilot on board for the transit to Victoria.

Recommendation: That heavy oil recovery research be expanded.

Section 2.04 Substitution of Canadian Crude Oil or Refined Products in Puget Sound

The third proposal for reducing oil traffic in local waters discussed at the public meetings was to provide Canadian oil to Puget Sound refineries to substitute for the existing deliveries of crude oil from Valdez, and, to a much lesser extent, other overseas supplies from such countries as Indonesia.

This has many attractive elements. First, unless new discoveries occur, overall Alaskan deliveries will be dropping at the rate of some 5% a year over the next few years, and will taper off to relatively low levels by the year 2005. During this period other suppliers to the areas of the lower 48 now served by Alaskan crude will have to be found. Second, Canadian deliveries, from a U.S. security point of view, are preferable to overseas suppliers, who, in the year 2005, can be expected to be providing some 80% of the petroleum requirements of the United States. Third, there is a real possibility of supplying the Puget Sound area with product rather than crude oil, which may well be in the interests of the Alberta government and producers.

The fly in the ointment is the lack of conventional crude oil in Alberta, a situation that can only be expected to worsen over the next fifteen years. Synthetic crudes would have to be used instead. Further, at the present time the established petroleum industry interests of the Puget Sound area can be expected to resist such a change, as it would involve an economic dislocation of their existing system, particularly if efforts were made to have heavy crudes used in this area. Substantial expenditure for reconstruction of refinery systems would be required.

Nevertheless, the proposal is not without merit. Canada does have substantial reserves of heavy crudes. At prices in excess of $30 per barrel, these become competitive. Refinery conversion to such crudes is very expensive, but the decreasing flows of Alaskan oil will soon require new supplies. For security and environmental reasons, such new supplies from Canada might merit a higher or premium price. Further, if Alberta builds a heavy oil upgrading facility, the resulting synthetic crude might be useable in existing Puget Sound refineries with relatively slight conversion costs. If, on the other hand, crude oil is refined to product in Alberta, and if that product is piped to Puget Sound, no refinery would be required on the coast, and there would be no conversion costs on the west coast.

Whether there will be developments of the type outlined above will depend in large degree on the level of interest of the Washington State and U.S. federal authorities to reduce the environmental risk of tanker traffic east of Cape Flattery. In the interests of protecting our common waters this aspect should be carefully explored.

Recommendation: That Canada undertake discussions with the U.S. administration to determine its interest over the next two decades in the possible substitution of Canadian crude oil or refined product delivered by pipeline for the existing supplies of tanker-borne Alaskan and overseas crude oil in Washington State.

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, Samuel K. Skinner, 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

with a double bottom. Vice Admiral Clyde Lusk, the deputy Commandant of the US Coast Guard, was quoted. He stated that had there been a double bottom on the Exxon Valdez "we believe there would have been considerably less outflow of oil".

However, it should be noted that had the Exxon Valdez a double bottom or double hull, and its stability been affected thereby, and had the weather been worse, it is unlikely but conceivable that the vessel might have capsized and the entire cargo been lost, thus increasing the oil released into Prince William Sound five-fold.

Concern over this point was expressed to me by both Sylvaine Zimmerman, a representative of Greenpeace in Vancouver, and by Tom Wyman, a representative of the Chevron Shipping Company of San Francisco. A diagram provided by Chevron Shipping comparing double hull and single hull tankers indicating why this might be so is attached as Appendix A. Briefly, when a double hull or double bottom is pierced, the vessel sinks deeper into the water by reason of flooding of the space between the bottoms. The resulting reduction in buoyancy causes the vessel to settle more firmly on the rocks penetrating the hull, thus increasing the risk of loss of the vessel during salvage or when pumping out the oil that may remain on board after an accident into lighters or other tankers. By contrast, following penetration of the hull, a single hulled tanker floats higher with the loss of oil.

Another fear is of an explosion in the space between the double bottoms. In October of 1984, the chemical tankship "Puerto Rican" suffered such an explosion, caused by the ignition of flammable hydrogen, created when leaked caustic soda reacted with the paint in the empty separation space. This fear was expressed by US Coast Guard Commandant Paul Yost in May of this year. His views were echoed by some industry spokesmen, particularly the American Petroleum Institute, in a report issued in June. Neither the Coast Guard nor the Industry have yet explained why inert gas cannot be in that space, which would eliminate such a risk.

The question is not a straight forward one. As indicated above, it has been debated and discussed for decades. However, it is in my opinion almost certain the Secretary of Transportation's study will show that the advantages of a double bottom far outweigh the disadvantages, essentially for the reasons advanced in 1973 and 1977, by Senator Adams earlier this summer, and by the many other studies on this subject, particularly that done in 1975 by the Office of Technology Assessment of the United States' Congress.

Little will be lost by awaiting the report of the Transportation Secretary. The Exxon Valdez and its sistership, the Exxon Long Beach, were constructed some three years ago, and were the last large tankers constructed in the United States. It is highly unlikely that construction will begin on any major new United States tanker for the Alaskan trade in the next twelve months. Awaiting the outcome of the study will thus not affect the construction of any tankers likely to be built, and thus not affect the risk to our shores one way or another. However, if, as I strongly suspect, the Secretary reports in favour of double bottoms, reduced tank size, or greater use of ballast sides for vessels on the Alaskan route, Canada and British Columbia should respond energetically to obtain such features not only on the Alaskan run, but worldwide.

Related to the specific issue of the merits of double bottoms, double hulls, compartmentalization, and wing tanks is the issue of the hazard classification of petroleum products. At the present time, bulk petroleum cargoes are considered by the International Maritime Organization as substances requiring only moderate safeguards against possible accidental release into the environment. The cargo category is described as "Type III". Type II cargoes are those that require substantial protection, while those cargoes that could have a substantial impact well beyond the accident scene are classified as Type I, and require the highest standards.

If the Nestucca and Exxon Valdez incidents prove anything, it is that petroleum products, both crude and refined, are currently underclassified and should be reclassified as cargoes requiring maximum protection.

Recommendation: That in the event of the Secretary of Transportation or National Academy of Sciences reporting in favour of double bottoms, greater use of ballast sides, or reduced tank size for new tanker or barge construction, the province, through the Western States/B.C. Task Force, encourage the adoption of the report by the appropriate United States authorities regardless of the position taken on such measures by the International Maritime Organization.

Recommendation: That in the event of the Department of Transportation or the National Academy of Sciences reporting in favour of double bottoms, greater use of ballast sides or reduced tank size for new tanker or barge construction, Canada support any initiatives at the International Maritime Organization to require such features in all new construction of tankers worldwide.

Recommendation: That in the event of the Secretary of Transportation or the National Academy of Sciences reporting in favour of double bottoms, greater use of ballast sides, or reduced tank size, for tankers and tank barges, Canada serve notice that within four years such design features will be required for tankers and tank barges calling at Canadian ports.

Recommendation: That Canada, in consultation with other concerned nations, propose at the International Maritime Organization that petroleum product cargoes be reclassified from Type III to Type I, requiring maximum protection.

The recommendations above on double bottoms and side tanks refer to barges as well as tankers. The focus is for such tank vessels in international trade. On the West Coast, as mentioned, there is an extensive carriage of refined products by barges, of which there are approximately 35 in B.C. waters. Participants at the public hearings frequently suggested that regardless of the success of any efforts to achieve better standards at the International Maritime Organization, Canada establish higher construction standards for barges in Canadian waters. The most commonly suggested method of achieving such a higher standard was by requiring a double hull for such vessels, which would provide barges with substantially reduced spill risks in the case of stranding, collision or ramming.

Unfortunately, the information I received at public hearings on this aspect of tug and barge operations could not be verified by published data. However, the federal review panel chaired by Mr. David Brander-Smith has commissioned technical studies in this area. Further, the Canadian Coast Guard is currently reviewing the question of barge safety. The recommendations below are therefore made subject to the proviso that they should be considered in the light of these technical and feasibility studies, when available.

Recommendation: That the Canadian west coast barge fleet by converted to double hulls, with a minimum 3/4 of metre between the inner and outer hull.

Recommendation: That this conversion be over a 4 year period, on an orderly annual schedule to be determined by industry and the Coast Guard.

Recommendation: That no "grandfathering" of existing barges be permitted; i.e. four years hence all barges for petroleum products must be double hulled.

In addition to the issue of compartmentalization, double hulls, double bottoms, or wing tanks, there are a number of other structural and mechanical issues that were of concern to those who took part in the hearing process.

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 would 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 to 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 worldwide.

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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 Britanny 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. 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
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 are 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, particulary 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 Nestucea 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 Integrated 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 a 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 Integrated 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 Integrated 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 Integrated 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 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]

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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 flags, 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 Arthur 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 year 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 in 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 its 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 B.C. 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.

Chapter Four

Oil Spill Preparation

maps would be a most welcome indication of departure from pre-Nestucca attitudes and organization.

There are a number of effective models for such sensitivity maps, including the Beaufort Sea maps prepared a few years ago. There are also private companies in this province with extensive experience in this work. What is needed now is an effective organizational structure to direct and coordinate development.

Recommendation: That representatives from the provincial Ministry of Environment, the federal Department of the Environment, the Department of Fisheries and Oceans and the Coast Guard be instructed to meet within the next sixty days to establish data requirements for oil spill sensitivity maps, to determine data gaps, and to establish interpretation objectives.

Recommendation: That coastal residents, particularly Native Peoples, be invited to assist in providing data gathered for oil spill sensitivity mapping purposes, and that later in the process such residents be given the opportunity of reviewing the draft maps as to content, and the opportunity to assist in establishing priorities for spill response for their local areas.

Recommendation: That the cost of preparing such oil spill sensitivity maps be borne equally by the two levels of government, and that they be printed under the authority of both.

Section 4.03. On Board Response Booms and Skimmers

At the public hearings I frequently heard suggestions that booms, skimmers, and other response equipment be kept on board tankers, and that the tanker crew should deploy such equipment in the event of a spill. After discussing the concept with experienced tanker officers, I have come to the conclusion that in the event of an accident to a tanker, the tanker crew is likely to be preoccupied with dealing with the vessel itself, with preventing fire, with saving life, or with salvage concerns. Tanker crews today are small.[1] Further, it is unlikely that the crews of a vessel the size of a tanker would have or could develop readily the small boat skills required to do an effective job.

Small, coastal product tankers such as the Esso Tofino are an exception. These vessels have, relatively speaking, larger crews. Further they probably have crews of greater experience and with much greater small boat handling skills. The smaller coastal tanker should, in my opinion, continue to have spill response equipment on board and the vessel's crew should continue to deploy it when needed.

However the first part of the suggestion has merit. When the Petroleum Industry Response Organization team is established next year in the Puget Sound area, a subject which will be discussed further under the Response Section of this report, a full time professional spill response group of a dozen persons could be helicoptered onto the deck of any vessel involved in an accident between Valdez and the Strait of Juan de Fuca within a few hours of receiving a distress call. Further, the crew of a tanker escort vessel in Prince William Sound or in the Strait of Juan de Fuca and Puget Sound area could supplement the equipment carried by its own vessel with the equipment on board the tanker. Such a system would likely dramatically reduce the time required to respond to a spill, provided always that sea and weather conditions are such as to permit booming and the recovery of oil by oil recovery equipment, and provided the tanker had empty tank space for the recovered oil, either in its own on board tanks or in hypalon or neoprene bladder tanks that could be put over the side to float semi-submerged in the water for later recovery.

Recommendation: That tankers be required to carry appropriate booming material, oil recovery equipment, neoprene or hypalon bladder tanks for the recovered oil/water mix, and a heavy duty work boat to assist helicopter borne spill response crews or escort vessel personnel in the event of a spill.

Recommendation: That oil barges carry booming equipment and oil recovery equipment similar to that carried by local coastal tankers to enable a quick response in the event of an accident, and also to provide protection during coastal oil transfer operations.

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1 As noted in the Crew and Manning section of this report, the size of the crew required by the Coast Guard certificate of the Exxon Valdez is fourteen persons, fifteen if the radioman required by Federal Communications Commission regulations is included. At the end of the Second World War, ships of a tenth of the tonnage of the Exxon Valdez could be expected to have a crew of nearly double that size.

Section 4.04. Near Incident Response Emergency Response Vessels

Following the Exxon Valdez incident, and the criticism of the slowness of the response of the Alyeska Service Company to the spill, a review of escort vessel capability in Prince William Sound was undertaken. Until that time the requirements in that area and in the Strait of Juan de Fuca for tankers carrying Alaskan oil were essentially the same, namely tug escort through the more confined internal waters. Following the review, the escort requirements in Prince William Sound were expanded. Two escort vessels now accompany every laden tanker leaving Valdez, and stay in close proximity until the entrance to Prince William Sound. One of these vessels is an Emergency Response Vessel capable of providing initial on-site oil spill response. The Emergency Response Vessels are heavy duty tugs of some 220 feet in length, originally used in the North Sea for laying the anchors of oil drilling rigs. They have crews of approximately twelve persons, but are capable of accommodating twenty-five people. They have booms, skimmers and work boats on board, and have tankage for a substantial amount of recovered oil or oil /seawater mix. More details on these vessels will be found in Appendix B.

Both accompanying vessels, whether an Emergency Response Vessel or a tug, are equipped to take a tanker in tow with its Prince William Sound Towing Package (see Appendix C) and carry a bow fender system enabling them to come alongside a tanker and provide pushing assistance. During the transit of the Sound the Emergency Response Vessels remain on station not more than a half mile from the tanker, and remain in radio contact with the tanker, with the terminal, with the Vessel Escort Response Base and with the United States Coast Guard's Vessel Traffic System control room. The Escort vessels operating in Valdez and Prince William Sound are under contract to provide emergency services. This eliminates any need for a tanker in distress to negotiate a salvage contract from another source such as took place during the Amoco Cadiz incident on the Britanny Coast in 1978, where negotiations between the captain and potential salvage vessels wasted a great deal of time. The captain of a tanker with problems can make a rapid decision with respect to towing assistance from the escort vessel in times of an emergency, and can ignore salvage considerations.

As mentioned, the old system in Prince William Sound was essentially the same as the system in place in the eastern Strait of Juan de Fuca for ships carrying Alaskan oil. Unfortunately the improvements to the system introduced in Prince William Sound have not been matched at the southern end of the route. They should be. On a per shipment or per ton basis, the route from the entrance of the Strait of Juan de Fuca to Cherry Point has a higher a chance of a tanker accident than has the route from Valdez to Hinchenbrook Island.

The discussion above deals with tankers carrying Alaskan oil. Tankers carrying oil from Vancouver do not have a tug escorting them either to Discovery Island or to Race Rocks. This omission by the Canadian authorities in 1989 to institute the tug escort system that the Atlantic Richfield Company put in place with respect to its ships in 1977 defies rational explanation.

Another advantage to accompanying emergency response vessels should be noted. A second vessel, operating independently, provides a useful check on the navigation of the tanker being escorted. Provided of course that the vessels are operating independently, and not simply following one another, the escorting vessel will likely observe departures from standard procedure, or erratic behaviour of either the tanker or other vessels nearby. For example in the case of the Exxon Valdez, an escorting vessel would in all probability have called up third mate Cousins on the VHF to note concern over his departure from both the outbound and inbound traffic lanes, and his proximity to dangerous waters. Further, an escorting vessel would likely have noticed that even had the orders of Captain Hazlewood been successfully carried out, the ship would have been closer to Bligh Reef than standing

orders allowed, and would no doubt have reported this to Cousins before the situation become impossible to rectify.

Recommendation: That escort vessel services in the Strait of Juan de Fuca for tankers bound for Cherry Point or other refineries in the area, and for tankers outbound from Vancouver, be the same as those for Prince William Sound. Specifically, this requires the existing tug escort, and emergency response vessels of the same or equivalent power and capabilities, with similar crews and similar spill response equipment, as those in Prince William Sound. The Emergency Response Vessels would be in addition to the tug escorts.

Recommendation: That to avoid salvage contract discussions and delays, arrangements for emergency services contracts with a disabled tanker should be the on the same basis as in Prince William Sound.

Section 4.05. Near Incident Response multi-purpose Auxiliary Vessels

The Exxon Valdez incident has demonstrated yet again the extensive amount of equipment needed to respond to a major or catastrophic spill. Unfortunately, for cost reasons, it will never be possible to have adequate amounts of dedicated equipment. Dual or multi-purpose equipment, capable of being switched from its normal use to spill response when needed, is essential. Existing inventories of vessels in B.C. must be examined to determine whether they provide opportunities in this regard.

The Finnish built Soviet vessel used in Alaska, described as the world's largest oil skimmer, is an example of a dual purpose vessel. When not engaged in oil spill response, it is used for dredging harbours and river channels. Similarly the United States Corps of Engineers had two dredges in Alaska, which were temporarily converted to oil recovery vessels, and which performed well.

The greatest resource of the Canadian west coast in this connection is the extensive tug and barge industry, one of the world's largest and most efficient. The performance of the "mosquito" fleet of fishing vessels in Alaska this past summer indicates that fishing vessels also can carry out a wide variety of tasks and play an important role in spill response. Appendix I lists the Fisheries Management Foundation's suggested tasks for fishing vessels in the event of a spill. Further, there is an extensive pile-driving and dredging industry on the coast. These industries are operated by a highly skilled workforce, which would require relatively little training to be effective in oil spill response.

Ideally oil spill recovery equipment would be on board a dual purpose vessel at all times, to avoid the loading delays associated with the Alyeska response on 24 March 1989.[1] As speed in response is critical, it would also be very important for the vessel to be able to disengage on short notice from its usual work. However, even if such vessels were not available for a dual or multi-purpose role by reason of other work for part of the year (fishing vessels for example), such vessels could nevertheless improve spill response capability for the part of the year that they are available. At other times of the year other vessels and personnel might take over. In the Campbell River area for example, commercial fishing vessels might undertake some standby role in the winter months, while in the summer, when such vessels can be expected to be fishing and not immediately available, and when local sport and guided recreational fishing results in some hundreds of small boats on the local waters, the early response function might switch to the local guides and sport fishermen, who could pick up response equipment from shore staging areas on very short notice.

Recommendation: That private industry be invited to submit proposals for the development or equipment of dual purpose or multi-purpose vessels with oil recovery capability.

Recommendation: That during the winter months a number of fishing vessels be equipped with booms, oil recovery equipment, and neoprene or hypalon bladder tanks for oil/water mixes. Owners or operators of these vessels would contract with the Spill Response Agency to be on short notice standby for oil spill response work.

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1 Loading and deploying the Alyeska response barge at Valdez took four times longer than the oil spill response plan called for. The evidence at the National Transportation Safety Board hearings in Alaska discussed this in detail.

Recommendation: That the Canadian Petroleum Association and the Petroleum Association for the Protection of the Canadian Environment be requested to establish a committee of the Canadian west coast petroleum industry to determine what equipment and staging areas on the west coast of Canada will be required to better extend the effectiveness of the Seattle PIRO response centre to the Canadian west coast.

Recommendation: That the Canadian Petroleum Association and the Petroleum Association for the Protection of the Canadian Environment be asked to arrange appropriate representation of the Canadian petroleum industry on the Seattle PIRO Implementation Steering Committee.

Section 4.06. The Petroleum Industry Response Organization

In June of this year the American Petroleum Association announced that the United States Petroleum Industry intended to establish a national system of spill response, based on five regional response centres, each designed to respond to an oil spill of up to 200,000 barrels, slightly below the size of the Exxon Valdez spill. Each centre will have a full time response team, and will undertake training on an ongoing basis. There will be, in addition, staging areas where equipment will be stored and maintained. The Petroleum Industry Response Organization (PIRO) is intended to supplement existing organizations and equipment, and will work closely with the United States Coast Guard. One of the regional response centres will be Seattle, which in addition will be a staging area for equipment.

The American Petroleum Institute is aware of the cooperation between the two countries in handling Cherry Point bound traffic, and of the compensation arrangements with respect to a spill of Alaskan crude oil, arrangements which date from the establishment of the route.[1] It has agreed that following a request by the United States Coast Guard, it will respond to a spill in Canadian waters, or to a spill which, like the Nestucca, moves into Canadian waters from the US.

From the west coast Canadian viewpoint, the location of a PIRO response centre close to the border and close to the Juan de Fuca waterway is a distinct advantage. There are two regional response organizations, Clean Sound in Puget Sound and Burrard Clean in Burrard Inlet, but neither has the offshore equipment or capability that PIRO is expected to develop. Burrard Clean will be discussed further below. The only other response team of this type is that of the Alyeska Service Company in Prince William Sound. Its performance at the Exxon Valdez incident suggests that it has not been able to provide an effective response within the Sound, let alone outside it. This will no doubt change.

The Seattle PIRO response centre will thus provide a nearby, full time, spill response organization, with effective deployment systems and with back-up resources from the other PIRO response centres. There has been nothing of this type of spill response capability available on the west coast to date. If established as envisaged, it will become the cornerstone of catastrophic spill response in the region.

Although there were many calls during the public hearings for the establishment of a Canadian full time spill response team similar to the PIRO regional centre teams, the cost of such a full time, dedicated team is high. If the PIRO team lives up to expectations and its advance publicity, the question of a Canadian team becomes moot. It would be a duplication of effort and not be an effective use of resources were Canada to establish a similar organization on the west coast. Canada should concentrate its efforts on dual or multi-purpose vessels, on lightering barges, and on developing and acquiring equipment better able to recover spilled oil in moderate or heavy seas, as discussed below.

Rec - Complement PIRO

Rec - Pace on Piro

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1 Correspondence between Charles DiBona, President of the American Petroleum Association and David Anderson, August 1989. See Appendix G.

Section 4.07. Local Auxiliary Teams

Speaker after speaker at the public hearings stressed the need for local involvement in all phases of oil spill prevention and response. The role of volunteers and Native Peoples in the Nestucca spill response was discussed at great length. Particularly in the smaller communities, in the Queen Charlotte Islands, on northern and western Vancouver Island, and on the central coast, local citizens made abundantly clear they hold firm views on the need for local residents to be involved. This desire to participate must be given appropriate recognition, and supported by adequate organization, equipment and training.

The role that a local auxiliary might best fill would be in deploying light equipment, such as booms or skimmers in waters near shore, and in on shore cleanup. They would have an important defensive role, such as the identification of local areas where defensive oil spill booming might be appropriate, and planning and carrying out such work. As an example, this might involve preparing to protect by booms a particularly valuable area or resource, such as an aquaculture area. Boat handling skills would be important.

On shore work would be to provide the organization for clean up activity similar to that undertaken by both volunteers and government personnel on the west coast of Vancouver Island following the Nestucca spill. Depending on response, it is suggested that Bamfield, Tofino and Ucluelet might be appropriate locations on the west coast of the island, with further units established on the central coast at Waglisla or Shearwater, and in the Queen Charlotte Islands at Masset, Queen Charlotte City and Sandspit.

On northern Vancouver Island, Campbell River, Comox, and Port McNeill appear to be the most appropriate communities for such local involvement; the currents in the area are strong, and the level of skill in small boat handling is extremely high. Further, the interest of the local population, the resorts, and the sport fishing industry in effective spill response is very high, in part due to the extensive cruise ship and tug and barge traffic that passes the community daily.

Recommendation: That an auxiliary service for oil spill preparation and response be established, with units in the coastal communities of Vancouver Island, the Queen Charlottes and the Central Coast.

Recommendation: That the auxiliary service local teams become the front line of oil spill defence in their respective areas, with sufficient light booms, absorbent material, and other equipment to enable sensitive local areas to be given some level of defensive protection prior to the arrival of equipment and personnel from other locations.

Recommendation: That in areas with heavy concentrations of small boats, such as Campbell River, local sports fishing associations, commercial guided fishing resorts, and other such bodies be requested to assist in organizing an oil spill response auxiliary.

Recommendation: That the tribal councils of Native Peoples on the west coast be invited to submit proposals for the establishment and organization of oil spill auxiliary units in their areas.

Recommendation: That overall organization and logistic support for the auxiliary units be provided by the Provincial Emergency Program.

Recommendation: That the Coast Guard and the Petroleum Industry provide the Auxiliary with boom handling and spill response training.

Recommendation: That the Auxiliary be organized during the winter and spring of 1990, that training take place towards the end of this period, and that local exercises take place in the early summer of 1990.

Section 4.08. The Burrard Clean Co-operative

Some years ago the companies involved in shipping oil products in Burrard Inlet established a co-operative, Burrard Clean, the object of which was to deal with incidents at their docks or other facilities in Vancouver harbour. It is a pleasure to report that the organization has dealt with a considerable number of spills in the waters for which it is responsible in a fully professional and effective manner. Credit is due to the co-operative members, and in particular to Mr. Martyn Green, the manager, and the team he has assembled.

However a problem of success is that people may expect more than can be delivered, and suggest new tasks beyond the capability of the organization. Burrard Clean has been successful because it has worked within the range of conditions where its equipment has not been overwhelmed, either by sea and weather conditions or by the size of a spill. Those who complained at the public hearings that the co-operative was not used to any appreciable extent in the Nestucca spill, or that its equipment is not capable of handling offshore winter conditions, missed this important point. By far the majority of oil spills are minor, and take place in port under calm sea conditions, during fuelling of merchant ships, or during loading or unloading of petroleum products. It is very important for coastal British Columbia that Burrard Clean continue to do those tasks in our largest port, and continue to do them well. Catastrophic spills, those over 100,000 barrels, fortunately take place rarely. Small spills are numerous. While its personnel, equipment and expertise are part of the general inventory for spill response on this coast, the industry co-operative should not be diverted from the tasks it has carried out effectively in past years.

Only one area needs mention, namely the response of Burrard Clean to a spill resulting from operations other than of its member organizations. At present, if it responds to such spills the costs may not be recovered from the polluter, and the members of the cooperative may ultimately be required to foot the bill. The co-operative frequently responds to such incidents; indeed, the majority of spills it responds to are of that type. It does so, however, at a risk of not being paid. In line with the principle that a task of government is to ensure that a spill should be responded to immediately regardless of whether the polluter has agreed to pay, discussed below, it appears appropriate for public funds to be available for such situations, and for Burrard Clean to be reimbursed accordingly.

Recommendation: That an agreement be entered into to make public funds available to reimburse Burrard Clean for the costs of handling a spill not caused by or coming from the facility of a Burrard Clean co-operative member. Public funds would not become available until the usual channels of securing payment had been exhausted.

Recommendation: That no change be made to the role of Burrard Clean.

Recommendation: That the manager of Burrard Clean be a member of the Spill Response Agency.

Section 4.09. On Shore Response Involvement of the Petroleum Industry

A side effect of the Exxon Valdez spill and the poor performance of the Alyeska Service Company and Exxon's senior officers in the response to that spill has been a substantial increase in the public's suspicion of and hostility to the petroleum industry. Time after time in public hearings the abilities, attitudes and intelligence of Mr. Rawls of the Exxon Corporation and Mr. Iarossi of Exxon Shipping were described in the most unflattering of terms. I cannot remember a single occasion in the six month process when such assessments were disputed.

However, from the point of view of spill response preparation there is a danger to this attitude, namely the knowledge, resources and trained personnel available in the petroleum industry for spill response will be ignored, or will not be fully employed. I believe that in the interests of effective response, such an attitude is short sighted. Utilizing petroleum company expertise in this area does not require governments to reduce their supervisory or regulatory roles, nor does it require government or public acceptance of industry positions on all spill response issues. Further, conversations I have had with oil industry executives suggest that the industry is willing to assist, and to devote substantial resources to the twin goals of prevention and improved response.

Recommendation: That petroleum industry representatives be invited to participate with government in spill response preparation, and in particular assist in training of spill response personnel, in establishing depots of spill response equipment, and in technical assessments of oil spill recovery equipment.

Recommendation: That the Petroleum Industry participate fully in the work of the Spill Response Agency.

Section 4.10. On Shore Animal Rescue and Rehabilitation

To a remarkable degree, public reaction to both the Nestucca and Exxon Valdez spills centered around the effect of the spill on birds and marine mammals. Photographs of dead or dying birds, or the bodies of oiled sea otters, were staple fare for the TV and press reporters for weeks, indeed for months, after the event.[1] Time after time in the public hearings the damage to wildlife was denounced in terms of moral outrage. Injury to birds and mammals, particularly marine mammals, became symbolic of the total environmental impact of the incidents, of the environmental destructiveness of oil transportation by sea, and of mankind's exploitive disregard for the natural world.

By reason of the importance of the commercial fishery off the west coast of Vancouver Island and in Prince William Sound, fish were a source of great concern, one that was raised at every public meeting I held. However, in both spills documented evidence of fish mortality by reason of the spills was either not available or was slight.[2] This matter is discussed in excellent detail in the July 26th, 1989 report of the Department of Fisheries and Oceans to the federal Review Panel chaired by Mr. David Brander Smith, and no doubt it will be discussed in his panel's report.

As a result of this attitude, considerable efforts were made to rehabilitate birds and marine mammals. At both Ucluelet and Tofino much effort was expended by volunteers, by SPCA personnel and bird rescue organizations, and by veterinarians. In comparison with the number of birds known to have died from the spill, the numbers of birds that were recovered and treated successfully does not appear great. The situation was much the same in Alaska. In addition, in Alaska considerable effort was expended to capture and treat oiled sea otters. The expense was considerable. While the final figures are not available, my visit to the sea otter rehabilitation centre in Seward, my observations of the rehabilitation centre near Homer, and my discussions with two veterinarians involved at the two centres, have persuaded me that the final figure per sea otter successfully treated and released would be in the neighbourhood of $80,000 US dollars per animal.

A few participants found this emphasis on wildlife to be misplaced emotionalism. They pointed out that although the sea otter population in Prince William Sound was hard hit by the spill, and may have lost one third or even one half of its number, there is no threat to the population as a whole, and absolutely no direct threat of extinction of this species. Similarly the spill posed no threat of extinction to any bird species affected. Further, many of these species populations lose far greater numbers of birds from adverse winter conditions than occurred from either oil spill. Some professional biologists, who have wrestled with small budgets for their baseline surveys, habitat protection, or other scientific work on behalf of wildlife over the years, and who have rightly attributed those small budgets to the public's general indifference to this vital ongoing work, found the concern over the small number of affected individual birds and sea otters to be astonishingly irrational.

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1 When the first oiled bird was taken to the bird cleaning facility in Valdez, competition for photographs was so intense that a British and an Alaskan TV crew came to blows in their efforts to photograph the event.

2 A distinction must be made between damage to fish and the damage to the livelihood of fishermen. The importance of preventing consumer rejection and market damage led fisheries officials to adopt a zero tolerance policy for oil in fish products; this in turn led to extensive closures of fisheries with resulting critical impacts on the income of those engaged in the finfish or shellfish industry.

However those who have focused only on the small numbers of birds and animals successfully treated, and the high costs involved, miss the point. Oiled birds and mammals have become symbolic. Efforts to assist those affected are similarly symbolic of the desire to make atonement to nature for what is viewed as the carelessness, greed and folly of mankind. Those responsible for spill response must take this attitude into account and prepare accordingly.

A surprising number of birds and mammals can be affected by an oil spill. There are first those affected directly -- those that ingest oil or breathe oil fumes in the two or three days following the spill when the lighter fractions are evaporating from the surface oil. The Alaskan experience suggests that for marine mammals such as sea otters, seals, dolphins, whales and porpoises, this causes many more deaths than was previously thought. Other birds and mammals are affected by oil on their feathers or fur, leading to hypothermia.

Second, there are those animals one step removed, who feed on oiled vegetation or on the flesh of animals which have died from spill effects, and are poisoned as a result. At certain times of year, particularly when other food is scarce, blacktail deer may eat seaweed on the beach. If the seaweed is contaminated, the animal will be affected. Bears and eagles, not to mention a large number of smaller mammals and birds that frequent the shoreline, search for carrion on the beach and are similarly affected if they come across oil-killed birds or mammals.

In pre-spill preparation, some limits must be imposed. As an example, it is to my mind impractical to plan for the treatment of one to two hundred kilo black bears, or two to three hundred kilo sealions. The situation would be different were such large animals scarce or endangered; however if populations are at healthy levels, expenditure on preparation would be very high and appears not to be warranted. I similarly cannot conceive of circumstances in which preparations for deer poisoned by oil would be practical.

The situation is different for sea otters. There are approximately three hundred and fifty sea otters on the west coast of Vancouver Island, living in two colonies some kilometres apart. These animals were reintroduced to this coast nearly twenty years ago, after being hunted to extinction in the 19th century. The populations are growing, but a single spill on the west coast could wipe out the entire population. Indeed, the body of one sea otter killed by oil was recovered after the Nestucca spill. Others from that area may also have died, and their bodies not been recovered. By reason of the heavy media attention given to oiled sea otters in Alaska over the summer, public interest in and sympathy for the sea otter is high. If any single animal on this coast can be considered symbolic of the damage done to the environment by oil spills, and symbolic of the ruthless exploitation by man of an animal species for profit, it is the sea otter.

Strong concern also exists for sea birds and for eagles. After all recent major spills on the coasts of B.C. and Washington, and after many of the minor ones, oiled birds were recovered, and many of these were treated successfully and released. In all parts of the B.C. Coast, as well as in Alaska, I met volunteers who had been involved in one way or another with bird recovery and treatment. There is considerable interest, as well as a developing expertise, in bird recovery and rehabilitation. This again is an area where pre-spill preparation can result in a far more effective response when a spill occurs.

Given the level of expertise and interest in the public, government efforts should be devoted to encouraging and supporting the volunteer effort rather than setting up parallel organizations. One clear area of concern is in coordination. The various groups, while they share common goals, do not appear to be working together in a manner that would maximize their effectiveness at the time of a spill. Further, there appears to be uncertainty as to the roles of the B.C. Ministry of the Environment and the Canadian Wildlife Service in animal rehabilitation. Finally, there appears to be no coordination with private industry, which stock and distribute many of the items used in bird recovery through their stores

throughout British Columbia. I have reason to believe that the private sector might well be interested in assisting by providing and delivering supplies in times of emergency. Such assistance would obviate the need for extensive stockpiling, and would guarantee fresh supplies.

Recommendation: That the B.C. Ministry of the Environment and the Canadian Wildlife Service jointly acquire stocks of bird recovery equipment, particularly on-line waterheaters and other equipment or hardware not readily available off-the-shelf, and locate such stocks in seven depots in coastal British Columbia.

Recommendation: That the B.C. Ministry of the Environment and the Canadian Wildlife Service enter into discussions with the major supermarket chains of British Columbia to determine how in the event of an emergency the private sector might be able to assist in providing material needed for rehabilitation.

Recommendation: That the Province of British Columbia and the Canadian Wildlife Service jointly fund a contract with the Vancouver Aquarium, the College of Veterinarians of British Columbia, the Society for the Prevention of Cruelty to Animals, or any similar organization identified as having an interest in bird recovery and rehabilitation to:

a. Provide four three-day training seminars in bird cleaning and rehabilitation in different parts of British Columbia for up to twenty participants at each seminar;

b. Keep abreast of the international literature and advances in this field, and disseminate such information by way of a newsletter to volunteers and others interested;

c. Maintain appropriate stocks of equipment, to be provided by the two government agencies, in secure facilities on the lower mainland, in Victoria, the west coast of Vancouver Island, North Vancouver, the Queen Charlotte Islands, the central Coast and Prince Rupert;

d. Provide liaison and coordination with other bird rescue and rehabilitation groups in the province and in the neighbouring states of Alaska, Washington, Oregon and California.

Recommendation: That the B.C. Ministry of the Environment and the Canadian Wildlife Service jointly fund a contract with the University of British Columbia, the Vancouver Aquarium, the College of Veterinarians, or any other organization with expertise in animal rehabilitation or in sea otter handling to:

a. Provide two three-day seminars (one of which should be on the west coast of Vancouver Island) for up to twenty volunteers in otter recovery and rehabilitation;

b. Determine a suitable location on the west coast of Vancouver Island for a sea otter recovery facility;

c. Develop a suitable contingency plan to build and have such a recovery facility in operation within five days of a spill;

d. Maintain at a secure facility the minimum stocks of equipment appropriate for such a facility, bearing in mind the need to have it in operation at short notice;

e. Keep abreast of the scientific literature and advances in the area, and publish a newsletter to keep interested volunteers and others informed of such material.

Before ending this section on bird and mammal recovery and rehabilitation I would add one important caveat. I was told by a number of those involved in post spill animal rehabilitation, particularly in Alaska, that many of the oiled birds recovered are captured because their condition is extreme and they are consequently unable to avoid capture. That situation can be expected to be the same in British Columbia. When animals are in this condition the chance of their recovery is slight, and any treatment is likely only to prolong suffering. Recognition of this, and appropriate humane dispatch of birds or mammals in such condition, is an important responsibility that cannot be wished away or ignored. Long before judgment is clouded by fatigue, emotional stress and frustration that accompanies spill response and the handling of oiled birds and mammals, guidelines for euthanasia need to be drawn up and discussed as part of spill training. Further, it should be noted that this is an area where professional expertise is required, both in determining what animals have chance of recovery without excessive suffering, and how an animal without such a chance of recovery should be destroyed. It is not an area for emotional arguments between lay persons at a recovery centre or on a beach where hope may outweigh the dispassionate assessment of a clinical condition.

While on the unhappy topic of destroying animals, the Prince William Sound experience, particularly with seals, demonstrated the need to make some provision for the scientific work which would accompany animal recovery and rehabilitation. Biologists may require sample animals for tissue or organ examination, and this may involve shooting and collecting the animals required. Here again, preparation, analysis of the need, and explanation of the scientific requirements to the public, is required.

Recommendation: That where possible a bird or mammal rehabilitation clinic should have a veterinarian, or a veterinary technician working under the supervision of a veterinarian, on staff.

Recommendation: That clear written policy guidelines covering the circumstances under which a suffering animal will be destroyed be established prior to the operation of any rehabilitation facility.

Recommendation: That the training programs for volunteers include discussion and understanding of the policy guidelines on destroying suffering animals.

Recommendation: That the requirements for scientific research on oiled animals be carefully considered in pre-spill planning and preparation, and if permits are required for animal collection, these be approved in advance by the appropriate government authority.

Section 4.11. On Shore Response Equipment Stockpiles

The establishment of the PIRO response centre and satellite staging areas, and the proposed full time ERVessels, will considerably increase the equipment available. However there is a need to develop further the spill response capability on the Canadian west coast. It may be that a spill, as in the case of Nestucca, affects both countries at the same time, and PIRO is fully occupied in the US. Further, as the Exxon Valdez has shown, in the event of a catastrophic spill the more equipment and personnel that can be quickly assembled, the more likely the spill response will be effective. Under such circumstances, the PIRO Seattle response team and the local ERVessel or vessels will need as much backup as can be obtained, not only from Canada and the United States, but as in the case of the Exxon Valdez, from countries all over the world.

Some dedicated equipment is stockpiled at Coast Guard facilities in Victoria, Vancouver, and Prince Rupert. Participants in virtually every other coastal community pointed out the difficulty of transporting and deploying equipment from those centres in their regions in winter or during adverse weather conditions.

The effectiveness of this equipment is currently being evaluated in the light of the experience of Nestucca and the Exxon Valdez. There are also new developments and proposals, many of which were explained by their inventors and promoters during the public hearing process. All such material has been passed on to the Technology Division of the Environment's Emergency Section of the Canadian Coast Guard for evaluation. It is hoped that this evaluation, and a similar 6 million dollar evaluation program currently underway at the Groton, Connecticut, US Coast Guard facilities, will uncover promising developments in what has been for the past fifteen years a relatively unchanged technology. It should be noted that by reason of the interest generated by the Exxon Valdez incident, both the United States and Canadian technological assessment facilities are currently swamped with proposals, inventions and developments that are awaiting evaluation. A crash program is needed to deal with the back log.

Finally, incredible though it may appear, it must be noted that in the Exxon Valdez, some spill personnel did not know where the equipment was that they were looking for, and the response was delayed by lengthy equipment searches. This is documented in may newspaper reports, and on pages 34 to 38 of "The Exxon Valdez Oil Spill: A Management Analysis", September 1989, published by the Centre for Marine Conservation.

Recommendation: That Coast Guard spill response equipment depots be strengthened, particularly with equipment capable of use off shore or in moderate wind and sea conditions.

Recommendation: That the number of Coast Guard spill response depots be increased by establishing a depot on the Queen Charlotte Islands, and one on northern Vancouver Island.

Recommendation: That the National Research Council, provincial research councils, and the University community be enlisted to assist the Coast Guard in evaluating spill response equipment proposals.

Recommendation: That the Coast Guard's budget for oil spill response technology assessment be doubled immediately and that this level of funding continue for the next two years.

Recommendation: That on a six monthly basis equipment checks and up-to-date inventories of equipment in Coast Guard spill response depots be carried out.

Section 4.12. The Provincial Emergency Program

The Provincial Emergency Program is small, has a correspondingly small budget, and yet has to be prepared to provide logistical support in emergencies as overwhelming and diverse as a San Francisco sized earthquake in Vancouver or an Exxon Valdez type spill in the Strait of Juan de Fuca or on the west coast of the Queen Charlottes. It was suggested to me that for organizational purposes it should be part of the Ministry of the Environment, as most emergencies with which it would have to deal are environmental in nature. However, by reason of the impact of earthquakes in urban areas, and PEP's consequent need to co-ordinate with many other agencies not generally considered environmental in orientation, such a change does not appear to me to be warranted. The Program requires upgrading, however. Its logistics and support roles are important in spill response, but at current levels of activity they cannot be effectively carried out.

The question is what level of expansion is required. In my opinion the minimum target level should be a spill which involved one thousand volunteers or paid spill response workers for a period of three weeks. PEP should have the resources and a capability to equip such numbers with appropriate protective clothing, to provide them with food, shelter and transportation as required. To do this some equipment stockpiling will be necessary. Equally important will be easy access to funds for local purchases.

Recommendation: That the Provincial Emergency Program be expanded to allow it to effectively support a spill response auxiliary, and to provide effective logistics support in the event of a spill.

Recommendation: That financial controls be relaxed in order to provide easier access to discretionary funds by Provincial Emergency Program staff in times of emergency.

Section 4.13. On-Shore Waste Disposal

The problem of disposal of the oiled debris collected by the spill response personnel plagued officials at both the Nestucca spill and the Exxon Valdez spill. At Nestucca, there was in fact a plan to handle the debris collected. However by reason of local opposition at the time, the plan was abandoned. The debris was trucked to the eastern side of Vancouver Island and burned in the Ladysmith incinerator which, thanks to the low volume of oil in the debris (estimates vary, but 5% was the highest I heard) and the high volume of sand and rock, was no easy task. In Alaska, which had some 40 thousand tons of oiled debris to dispose of, much of it absorbent materials used in oil spill recovery, various methods of disposal were attempted. Perhaps the most extraordinary example of Alaskan difficulties in waste disposal was the barging of oiled rocks from a Kenai Peninsula beach area to a landfill site in Oregon. Criticisms of the waste disposal plans at Valdez were surprisingly similar to those on the west coast of Vancouver Island. As at Nestucca, sharp debate took place over the merits of burning the debris, the effectiveness of portable incinerators, and the long term effect of disposal of debris in landfills.

The difficulties experienced in waste disposal at Nestucca and in Alaska illustrate the importance of establishing effective plans for oiled waste disposal prior to the occurrence of a spill. The not-in-my-backyard syndrome will make such planning difficult, but advanced planning is essential if the problems associated with this aspect of the two spills are not to be repeated in the future. Effective planning, with public involvement, can be expected to develop plans with enough credibility with the public to permit their implementation at the time of an incident.

Recommendation: That the Waste Disposal Branch of the Ministry of the Environment prepare and circulate to all coastal municipal and regional governments a "white paper" on oil spill debris disposal proposals.

Recommendation: That following consideration of the responses to that 'white paper" a plan for oil spill debris disposal be adopted and published.

Recommendation: That efforts to develop satisfactory barge transportable incinerator units be continued.

Although the focus of this report is on accidental spills, it should be remembered that most of the oil entering the oceans of the world from ships does so as the result of a deliberate decision by a ship's captain, and not by reason of an accident. These deliberate oil discharges are the result of pumping out bilge water mixed with leaked fuel oil or lubricating oil, or of discharging overboard ballast water containing residual fuel oils, or discharging the washings from fuel or cargo tanks over the side. Generally speaking, this is done on the high seas. The long term effects of the practice are unknown. Generally, no oil reaches the shore, and such overboard discharges pass unnoticed. Occasionally, however, these deliberate oil discharges hit our shores.

Efforts have been made to curb the practice, principally by having waste water treatment facilities at docks. Thus, when a vessel arrives at a terminal, it can hook up and discharge the mix of water and oil for shoreside treatment.

There are three problems with the current system, however. The first is that such treatment facilities are not widespread. The second is that they often do not function effectively. The Valdez terminal ballast water treatment system, for example, has been the subject of numerous expert criticisms ever since the facility was established twelve years ago. Finally, because a charge per ton is generally levied for the treatment of the waste water, the captain of the vessel may attempt to dump waste water over the side before entering port in order to reduce the charges.

Recommendation: That Canada expand and upgrade the ballast and waste water treatment facilities of Canadian ports.

Recommendation: That there be no charge for receiving and treating the ballast or waste water in Canadian ports.

Recommendation: That Canada, through the International Maritime Organization, work to eliminate charges for receiving and treating ballast or waste water in ports world wide.

Recommendation: That there be improved inspection and maintenance of ballast or waste water treatment facilities.

Recommendation: That where practical the Ship Safety Branch of the Coast Guard collect samples of bilge water from vessels in West Coast ports, in order to improve detection of the source of near shore bilge water dumping by departing merchant vessels.

Recommendation: That all merchant vessels be required to empty slop tanks before leaving a Canadian port.

Section 4.16. Inventories of Resource People, Companies and Equipment

The Exxon Valdez spill response indicated that there was a serious weakness regarding Exxon's information about spill response equipment available both in the United States and outside of that country. Small communities in Alaska telephoned companies and government departments around the world in their efforts to obtain booms and other equipment. Their success in this regard was remarkable. However, their efforts should not have been necessary. In the day of the computer and the fax machine up-to-date inventories of equipment world wide should be available. Examples of an equipment inventory list from Alaska is given in Appendix D.

Similar lists of resource persons should also be available. For example, the experts on sea otter capture in Alaska were mostly Californians, and the Alaskan sea otter recovery program depended heavily on these people. Their numbers are few. It would be particularly important that their cooperation and involvement be enlisted as soon as possible in the event of a spill threatening the two sea otter colonies on the west coast of Vancouver Island. The small numbers of sea otters in those colonies makes a speedy response all the more critical. An up to date inventory of those capable of helping us in this regard would be of great help. Appendix D also contains an example of the Prince William Sound experts list for sea otters.

The Exxon Valdez incident has provided Alaska with expertise in a wide variety of areas of importance in spill response. In the event of a major or catastrophic spill on the Canadian west coast, the Oil Spill Response Agency would certainly wish to invite a number of such people to assist here.

Recommendation: That the Oil Spill Response Agency obtain and where lacking compile, inventories of spill response equipment, companies, and of expert personnel.

Recommendation: That Canadian inventories of spill response equipment be made known to the spill response agencies of European, Japanese, United States and other coastal nations.

Recommendation: That Canada through the International Maritime Organization, work to establish an effective world wide spill response equipment and expert personnel inventory.

Section 4.17. Research Coordination

A side effect of the Exxon Valdez spill is considerably increased research interest in oil spill response technology. This has been commented on above, both in connection with equipment and with the "vacuum" system of oil retention on board a stricken tanker.

There are other areas where research may lead to important developments. One is the use of bacteria to digest oil on the water and reduce it to harmless chemical components. The concept is not new. In 1970 the House of Commons Special Committee on Environmental Pollution reported on the need for research in this and other spill response areas. There was little follow up to those recommendations, although some work has taken place over the past two decades on the use of bacteria to decompose sewage sludge. Earlier this summer a Sidney firm, the CBR Corporation, received a $400,000 federal grant for work in this area.

Since it was first announced that this was being tried in Alaska, much has been written on "bio-remediation" as the process is known there. To date, there is little to suggest that there has been a major breakthrough. Encouraging the use of bacteria that exist naturally in the waters of the area through the use of chemical fertilizers, as is currently being attempted in Alaska, may be effective in speeding up the natural breakdown process of the crude oil, but there would be very serious risks to importing a strain of bacteria from elsewhere, or using a strain developed under laboratory conditions.

This is one more area where a careful study of the research material that results from the Exxon Valdez spill will be important. To a degree this will take place in the normal course of events as government and university personnel, depending on their personal interests, come across reports in scientific journals. Unfortunately from an overall spill response point of view this process is uneven. Coordination from the specific point of view of oil spill response in British Columbia would be helpful.

Recommendation: That a contract be arranged between the Oil Spill Response Agency and the University of British Columbia for the University to work with the University of Alaska, the University of Washington, the US National Ocean Pollution Policy Board, the National Oceanic and Atmospheric Administration, the National Research Council, and the US National Academy of Sciences to survey what research work is currently underway in Alaska, when results are likely to be available, and what gaps exist in the overall research programs.

Recommendation: That the gaps in research identified as important to spill response on the west coast be discussed by the government officials involved, by UBC personnel, and by the Spill Response Agency to establish priorities and funding requirements for a spill response research program.

Recommendation: That an active policy of disseminating such research information as it becomes available, in plain English, to civil servants, interested members of the public, journalists, and oil spill auxiliary personnel, be adopted.

Recommendation: That further research be undertaken to determine effective burning procedures. This should include the use of wicking agents such as wood chips, and should consider the toxicological effects of burning oil.

Recommendation: That the Department of Fisheries and Ocean's 1979 "Plan for Scientific Response to an Oil Spill in the Beaufort Sea" be updated and adapted to the Canadian west coast.

Section 4.21. Spill Worker Safety and Right to Know

Spill response may involve dangerous work in remote areas and under extreme weather conditions. Workers who are not confident that those in charge have a good appreciation of the conditions faced, or workers who are themselves unprepared psychologically or physically for the task, are unlikely to contribute to a successful response effort.

Many acts and regulations cover worker safety. Naturally, spill response must take into account all such provincial and federal provisions. In addition, steps must be taken to make sure that spill response workers are not endangered by handling hazardous clean up substances or led into dangerous situations by their own strong environmental concern. A number of participants at the public hearings who had been volunteers at Nestucca suggested that the spill response efforts there were lucky not to be marred by accident. Chief Baird of the Ucluelet Band and other Chiefs of the Nuu-Chah-Nulth Tribal Council expressed similar views in meetings with me. However well intentioned, the involvement of urban volunteers who were unprepared and unfamiliar with the west coast in winter could well have led to tragedy. Small boat accidents, rising tides on isolated beaches, exposure and hypothermia are all west coast killers. Slippery oil-covered logs, rocks and kelp are very hazardous. One important objective of the spill response auxiliary is to establish organizational structures and institute training programs prior to a spill, in order to reduce such risks.

At Nestucca the Provincial Emergency Program arranged to have Workers Compensation coverage for volunteers. This was an important protection for those engaged in clean up, but there was some confusion as to when the coverage began and as to what forms had to be signed to obtain coverage. Pre-spill preparation should address such matters.

Recommendation: That the Oil Spill Response Agency's communications team prepare a series of warning pamphlets to alert personnel of the dangers encountered in oil spill response activities, and what individual preparations are required to reduce such dangers.

Recommendation: That with the assistance of petroleum industrial safety personnel, appropriate guidelines for the safe handling of oiled debris and spill clean up materials be developed.

Recommendation: That arrangements be made with the Workers Compensation Board to provide automatic coverage to those registered with the Spill Response Agency as auxiliary personnel during both training exercises and actual spill response.

Recommendation: That all government agencies adopt a "Right To Know" policy with respect to information in its possession regarding the health risks of handling crude oil, petroleum products, or response material and equipment.

Recommendation: That such health and safety information be prominently displayed at spill response headquarters and in other locations likely to be frequented by spill response personnel.

Chapter Five

Management and Organization

Section 5.01. Introduction

Spill response preparation was second only to prevention as a topic of discussion at the public hearings. Particularly in discussions of the Nestucca spill, there was a widespread feeling that a lack of organizational preparation for such an event was a basic cause of the confusion and the delays which occurred. Calls for a military type command structure capable of making decisions and having them carried out without question were frequent. There was a clearly expressed view that too many people representing too many interests were involved in too many decisions.

The public's perception is echoed in the presentations to the federal Review Panel of Mr. David Brander-Smith on the Nestucca response by the three federal agencies most involved, Environment Canada, the Coast Guard, and the Department of Fisheries and Oceans. At page 6 of its presentation DFO states:

> *In situations where differing interagency priorities arise, effective mechanisms to resolve and circumvent these are necessary.....*

Stripped of the guarded bureaucratic language, this suggests that differences between government people from different departments during the Nestucca spill could not always be effectively resolved on site. This too often resulted in appeals to higher authorities within the agencies in Victoria, Vancouver or Ottawa, where bureaucratic and political forces of no relevance to oil spill response were enlisted to support individual agencies positions. This in turn increased indecision and delay.

The 26 July submission to the federal Review Panel by the Pacific and Yukon Region of Environment Canada has a similar passage on Page 2 under the heading "Observations.... from the Nestucca Experience".

The Coast Guard dealt with the same issue in their 26 July 1989 brief to the federal panel in commendably direct language. It stated:

> *It became apparent at the beginning of the Nestucca cleanup operation that although plans were developed by the government agencies involved, these plans were not sufficiently integrated. The result was that there were problems in definition of role, in the structure of the overall organization and in coordinating the efforts of the departments. Our plans are incomplete as they relate to the province of British Columbia. We will be reviewing our plans with the province to cover these deficiencies.*

Much the same criticisms have been made about the response to the Exxon Valdez spill, where the slow and ineffective response to the spill has led congressmen to demand that Coast Guard Vice Admiral Robbins become a spill "commander" rather than a spill "coordinator". A September 1989 study of the Exxon Valdez spill by the Centre for Marine Conservation of Washington D.C. describes the situation as follows:

> *No one was fully in charge of the spill response... Consequently, substantial time was spent while Exxon, the Coast Guard, and other agencies jockeyed for control or approval of various actions and plans. This situation demonstrated that in order for a spill response to be effective and efficient, someone must be in charge who has the authority to autocratically direct the use of spill response resources and to establish priorities, standards, and procedures with primary regard for correcting the problem at hand. (page 181)*

Exxon Corporation's Chief Executive Officer, Lawrence Rawl, agrees. In May Fortune Magazine quoted him as saying:

We need somebody that shows up with the authority to move quickly....

Setting up such a military style command system when a spill occurs is superficially attractive, but in my opinion it would raise a host of new criticisms about the neglect of certain interests and values by the on site spill commander. A major spill inevitably involves a large number of interests and organizations, each with its own legitimate concerns, and each determined to have those concerns given a full hearing. Only then does the discussion get down to determining priorities for action. The answer lies not in more power to a single individual or government department, but in having an organization which will permit such interests and values to be discussed and taken into account in spill response planning, before a spill occurs. Major oil spills are complex events. Spill response preparation will cut down on the delay and discussion on site. Appropriate planning can be a substitute for on-site debate and delay.

The four words above are the only ones I intend to underline in this chapter. I cannot over emphasize the importance of this pre-spill planning work. Other than the chapter of this report dealing with prevention, it is behind virtually every specific recommendation. The chronologies of events prepared by government agencies at both the Nestucca response and the Exxon Valdez response, and the individual comments to me of involved citizens both in British Columbia and in Alaska have a common scarlet thread of organizational delay. Only effective pre-spill preparation can deal effectively with this failing.

There are a great number of agreements and plans dealing with spill response. These include the National Marine Emergency Plan of 1977, the Western Region Marine Contingency Plan, the Joint Oil Spill Response Plan, the Canada-United States Joint Marine Pollution Contingency Plan of 1986, and the Understanding Between Canada and British Columbia Concerning Federal/Provincial Responsibilities in Oil and Hazardous Material Spills (1981). These were all in effect before and during the Nestucca spill. Unfortunately, as the quotes above from the three federal agencies most involved demonstrate, they did not result in a system in place where pre-spill planning and preparation resulted in a smoothly working organization when the spill actually took place.

In fact, the multiplicity of agreements and plans may be an impediment to successful emergency response. There are a number of reasons for this conclusion. First, conversations with officials of various federal and provincial agencies who have responsibility in the field suggest that good personal and working relationships with members of other agencies have been far more important than the details of the agreements and understandings. Indeed, a surprising number of officials in the field are unaware of the existence of agreements, let alone the details. Second, the agreements are often based on constitutional concepts which are not necessarily relevant in spill response. For example, in Section 5 of the the 1981 British Columbia -Canada agreement noted above, responsibility for dealing with a spill is based on where the spill originated. While this division is logical from a constitutional perspective, it is not logical from the perspective of how best to deal with an oil spill. It demonstrates the unfortunate fact that the concerns of those who draw up such agreements are not exclusively those of the subject of the agreement. Third, these agreements quickly become out of date. The British Canada-Canada agreement calls for an annual update. Perhaps one has taken place during the past eight years, but not one of the provincial or federal officials to whom I mentioned this was able to tell me if that were so. Fourth, there is clearly a tendency to regard agreements as the object of the exercise, and to overlook the fact that agreements are but a means to an end, the end being effective spill response. While the Coast Guard, Fisheries and Oceans, Environment Canada, and the B.C. Ministry of Environment are all correct in stating that such agreements must be brought up-to-date, further agreements of the traditional type are unlikely to be key elements to improved preparation and response.

Another weakness of the existing system stems from the "lead agency" approach. The lead agency concept is a two edged sword. Generally speaking it is useful to have one

government agency in charge, and the system has worked well for smaller spills. However in the case of major or catastrophic incidents the approach results in that agency carrying an undue burden of the spill response, rather than playing a coordinating role for the efforts of all.

Further, the fact that the lead agency is in charge may cause officials elsewhere, but senior to those on the spot, to fall into the erroneous view that their role is to control those on the spot through normal line-of-command instructions. This heresy is dangerous. If there is a spill response team in charge on site, the role of senior staff elsewhere is to provide support to that team, not to control it.

I should add that this phenomenon is not restricted to government bureaucracies. The general manager of MacMillan Bloedel's Harmac Mill, Mr. Roger Killin, and the Environmental manager, Mr. Bob Wiekenkamp, were kind enough to discuss their emergency response experience with me. Private industry appears to have a good understanding of the need for senior staff to provide support for those in more junior positions responsible for the emergency response, rather than to provide instructions.

In short, the existing organization and approach based on agreements is unlikely to achieve the results required. It resembles a sports team which has not trained as a group, and where the expectation of team members performance is entirely based on written job descriptions or employment contracts. Cohesion, the experience with the abilities and limitations of other team members, the split second, almost instinctive understanding of when and how previous plans must be altered or dropped to deal with the unexpected, in short the development of the group identity which makes a good team far more than the sum of the parts, is lacking and will remain lacking if the traditional approach is not altered.

Section 5.02. Oil Spill Response Agency Structure

The section above has described the weaknesses of the Nestucca and Exxon Valdez responses. Needed is an coordinating agency vested with the constitutional authority of both governments, with the specific mandate of spill prevention, spill response preparation, and on-site spill response. This agency would not replace any existing government department, ministry or agency, but would focus the efforts of all to specific tasks. It would include representatives of industry, Native Peoples and the university community, and in addition have representation from the public at large. The core of the membership of the coordinating agency would remain government personnel, from the Department of Fisheries and Oceans, the Department of Environment, the Coast Guard, the provincial Ministry of Environment and the Provincial Emergency Program.

Existing government departments and ministries have a multitude of tasks, and too often in periods between spill response emergencies, the clear objective of spill response becomes subordinated to other requirements and concerns. The major advantage of a coordinating agency of the proposal would be to keep spill response prevention and preparation activity from becoming lost or sidetracked in the bureaucratic machine, as has happened previously not only in British Columbia, but also in Alaska. Further, an existing organization would be in place and in charge when a spill took place. Responsibility of members would be to the agency, and to the spill response goals of the agency, not to individual ministries, departments, industries or organizations. A parallel would be a military task force, where the personnel assigned to the task force answer to that organization and its objectives rather than to the more general structures of the individual services.

Independent funding will be of importance to the effectiveness of the agency. As the objective is oil spill response, it appears appropriate that, while initial funding be from government grants, as soon as practicable it be financed directly from those who use petroleum products on the coast by way of a per litre levy of one half to one cent.

I regard such independent funding as critical. The government system of funding programs no doubt makes sense in the case of individual agencies or specific joint programs. I offer no comment on this. However, as the many recommendations of this report suggest, there will be many agencies involved one way or another in spill response. To expect appropriate funding levels for all their oil spill response tasks to be available at appropriate times is not realistic. The Oil Spill Response Agency must have the ability to itself patch up by way of outside contracts those areas where the various government systems fail to deliver the necessary product on time. To take a specific example, if adequate studies of current patterns are not done to the satisfaction of the Agency, the members of the Agency would be able to have this deficiency rectified by way of a contract with a private company, a university or perhaps an international organization.

Separate support services for the Agency would appear unnecessary, and instead should come from an existing government department, or by way of contracts from the private sector, or both. Fisheries and Oceans, which has some sixty vessels in operation on the coast, which has some hundreds of personnel spread throughout the coast, and which conducts oceanographic and other research activity important in spill response, appears to be the most suitable source for such support. The independent funding source of the Agency would allow Fisheries and Oceans to be reimbursed for such support services, in order to spare that department from diverting resources to the Agency from other departmental tasks and priorities. This problem of diversion of resources to oil spill tasks is commented on in the Fisheries and Oceans 26 July brief on page 28. Independent funding will prevent Spill Response Agency objectives from conflicting with other departmental or ministerial priorities.

It will be noted that the "lead agency" concept has not been discussed to any degree in connection with the Agency. This is not an omission. There will be spills where the

Section 5.04 Relationship to Western States/B.C. Task Force

The creation of the Western States/B.C. Task Force on Oil Spills is a welcome development in spill prevention and in spill response in the northeast Pacific. Previous agreements with Washington State have not been backed up by organization and structure. I am unaware of any previous agreement with our only other adjacent maritime neighbour, the State of Alaska. Previous Coast Guard to Coast Guard agreements, or federal government to federal government agreements have overlooked the fact that the federal constitutional structures of our two countries assign some areas of jurisdiction for spill prevention and spill response to the sub-national level of the states or the provinces.

While the Western States/B.C. Task Force holds promise, it should be seen as supplementary to existing federal government agreements. Also it should be noted that the various members have very different organizational and funding arrangements in areas of concern to the Task Force. A final caution concerns the role of Alaska as a result of the Exxon Valdez spill. The past six months has been an exhausting experience for the state agencies involved in spill response, particularly the Alaskan Department of Environmental Conservation. With all their full-time personnel and many scores of temporary employees devoted to the Exxon Valdez spill response, planning for a future emergency, or planning for joint exercises, with ourselves and the other west coast states, is simply not possible.

On the other hand when the aftermath of the Exxon Valdez response activity is under control, a flood of important new information on spill response preparation and on-site activity can be expected from Alaska. The experience of the past months in Prince William Sound, on the Kenai Peninsula and on Kodiak Island will become, one way or another, the text book for our efforts in this area in future years.

In summary the Task Force is important and will likely become more so next year, but effective organization on the Canadian west coast is not dependent on action by the Task Force. We must establish our own effective organization in order to strengthen the Task Force's future capability.

As discussed above, I believe the most important organizational step for both the federal and the provincial government is to establish a single agency charged with (a) prevention; (b) preparation for spill response; and (c) on-site or actual spill response. Effective on-site spill response (c) is entirely dependant on effective preparation (b). The post mortem examinations of the Nestucca response all come to the conclusion that we were inadequately prepared. I have explained in Chapter Four why I do not believe that the approach of the past, namely more agreements and more interdepartmental, or interministerial agreements, are likely to succeed in assuring adequate preparation for a future spill. An action oriented agency for pre-spill decision making and follow up is required. Such an agency could, itself, be represented on the Task Force, or the provincial Ministry of Environment representative to the Agency could also be the B.C. member of the Western States/B.C. Task Force.

Recommendation: That the Spill Response Agency representative from the B.C. Ministry of the Environment also be the B.C. representative to the Western States/B.C. Task Force on Oil Spills.

Section 5.05. Use of the Military

There was relatively little involvement of the Canadian Armed Forces in the Nestucca spill. Armed Forces aircraft carried out some slick surveillance duties, and for a short period an armed forces helicopter assisted at Tofino. However it should also be noted that military personnel and their families from CFB Holberg were active volunteers in the shore line response in their area, and that military cadets from Royal Roads Military College went as volunteers to Long Beach, where their work won high praise.

In the second week in January 100 personnel from Esquimalt were placed on standby, but they were not called on to assist. None of these people had previous spill response training. Apparently there are no formal agreements between the Coast Guard and the Canadian Armed Forces with respect to spill response.

This contrasts sharply with the French response to the Amoco Cadiz disaster of 1978, and subsequent response to other oil spills in that country. In the Amoco Cadiz incident the response involved many thousands of military personnel, military trucks, aircraft and ships, and tons military equipment working over a period of months.

The failure to use the military was a constant theme at public hearings. Further, there was a frequently expressed view that the confusion surrounding spill response could be overcome by a military command structure.

The Canadian policy with respect to the use of the military appears to combine the worst of all worlds. On the one hand the military is expected to respond to spill emergencies when other agencies have shown themselves incapable of handling the problem without them. Inevitably, this means that they will be called in late, when the opportunity of a successful effort will be slim indeed. On the other, because they constitute a final reserve, it is unlikely that spill response training will be a matter of any priority, or that the personnel ultimately sent will be effectively equipped and trained with specialized equipment. Indeed, at the present time I understand that the Canadian military receive no spill response training and have no specialized equipment for this work,other than what is incidental to the deployment of naval vessels. On both counts the Armed Forces response to a spill can be expected to be ineffectual, through no fault of the military, but by reason of the policy vacuum.

Members of the public of the coastal communities who attended my meetings found this lack of coherent policy with respect to the involvement of the military to be quite inexplicable, even bizarre. From the comments at public meetings, it appears that the Canadian Armed Forces are, generally speaking, held in high regard. It is recognized that they have many qualities of great value in spill response, particularly discipline, physical conditioning, effective command structures, and extensive logistic support. Further, the Canadian Armed Forces are trained to understand the importance of operating in combination not only with other Canadian land, sea or air components, but also with the armed forces and civilian agencies of other NATO or United Nations countries. They understand the task force approach; in this regard they have much to teach their civil service counterparts. Finally it was noted by a number of speakers that an easing of past world tensions has taken place over the past few years, and that the Armed Forces under such circumstances might welcome more non-military roles. One can only hope that a participant at the Tofino hearing was correct when she said:

> *With luck, a spill will be the only war they'll ever have to fight.*

Correct or not, involvement in environmental disasters of this kind by the military makes sense. Future UN roles of the Canadian Armed Forces can be expected more and more to be the result of world population pressures, drought, or Greenhouse induced flooding. Ideology can be expected to decline, and environmental issues increase, as causes of world

conflict. To borrow a prophetic phrase of the Science Council of Canada, our Armed Forces will need to become Environmental Peacekeepers. An understanding of and practice for this future UN role overseas can begin at home.

By contrast with Canadian indecision on this matter, the United States Navy, the United States Marine Corps, the United States Air Force, the United States Army, the United States Corps of Engineers and the Alaska National Guard all played substantial roles in the Exxon Valdez response, and were very effective. In particular, the training in damage control and the military's recognition of the need for improvisation in the face of the unplanned and unexpected stood them in good stead.

Recommendation: That the Canadian Armed Forces be regarded as a resource for spill response in the same manner as civilian government departments and ministries.

Recommendation: That Canadian Armed Forces personnel take part in the Spill Response Agency's planning and preparation work.

Recommendation: That a small cadre of Canadian Armed Forces personnel on the west coast receive spill response training, as agreed by DND and by the Oil Spill Response Agency.

Section 5.06. Use of Contractors

A contractor, Sprayaway Services, was employed by Souse Brothers on 5 January, some days after oil first was sighted at Long Beach, and some 10 days after a contractor for Souse Brothers commenced operations in Washington State. On 10 January the contractor had over one hundred people employed. However this figure dropped to below fifty five days later, and remained at from 10 to 20 for the remainder of the month. Difficulties between Souse Brothers and the contractor as to the amount of money available for hiring people were never satisfactorily resolved. The Coast Guard and Souse Brothers had differing views of the seriousness of the response required. The contractor found himself caught in the middle, on the one hand he was asked to do more, and on the other he was without the financial guarantees necessary to hire more people and equipment. Two weeks after the contractor began work, he turned his contract with the Nuu-Chah-Nulth Tribal Council over to the Coast Guard. He continued working with a reduced number of other employees until the end of the month, and did very little in February. By contrast, the Nuu-Chah-Nulth Tribal Council had two to three dozen people at work until mid-March.

Another problem was the two day delay in identifying the oil on the shore as from the Nestucca, before which Souse Brothers was not willing to hire a contractor. At the public hearing in Tofino in mid-May, serious reservations were expressed about the effectiveness of an approach which relied first on determining the identity of the polluter, and second, on the effectiveness of the contractor the polluter then employed.

Contractors were extensively used in Alaska, particularly the firm Veco; however similar concerns about the organizational effectiveness of using contractors also were expressed during the response to the Exxon Valdez Spill. The loss of response time in the first few days, due to the policy of letting the polluter respond first, was particularly criticized. Indeed, in this regard Alaskan organization was inferior to the Canadian Nestucca response.

It must be recognized that efforts to involve the contractor and Souse Brothers in the clean up was the result of earlier unsuccessful experiences in British Columbia following the 1973 Erwan-Sun Diamond incident and the later Irish Stardust incident. Following those two spills, efforts to recover costs of clean up from the polluter in large part were unsuccessful. Whether Souse Brothers will eventually pay the $4 million costs of the federal government or the $350,000 costs of the provincial government, or the claims of the 44 Canadian individuals who have stated they suffered economic loss from the Nestucca incident, is at this time not known.

Recommendation: That the practice of attempting to secure a contractor for spill cleanup paid for by the polluter before government funds are expended be abandoned.

Recommendation: That the spill response team have full responsibility for immediate spill response regardless of the whether the identity of the polluter is ascertained, or whether a contractor has been employed.

Recommendation: That current legislation be revised with a view to enabling cost recovery by governments from the polluter regardless of the extent of crown ownership of the affected property, and regardless of whether the polluter has authorized the expenditure, or been given the opportunity of carrying out spill response himself.

Section 5.07. Involvement of Native Peoples

Two weeks after the oil from the barge Nestucca first washed up on the B.C. shore, members of the tribes of the Nuu-Chah-Nulth Tribal Council were contracted to take part in the clean up operations. Even before that time many Nuu-Chah-Nulth peoples had been active as volunteers. For the latter part of the spill response, from mid-February on, Nuu-Chah-Nulth members constituted the bulk of the clean-up personnel. In the same period, on the northern part of the Island, members of the Kwakiutl District Council were similarly extensively engaged in response work.

All government agencies spoke most highly of the work performed by these teams. Their knowledge of the coast and its resources, their willingness and ability to perform hard, unpleasant and sometimes dangerous work in adverse weather conditions was widely praised.

Native peoples took an important role in the public hearing process as well. I am particularly grateful to the North Coast Tribal Council, the Nuu-Chah-Nulth Tribal Council, the Council of the Haida Nation, the Kwakiutl District Council, and the Heiltsuk and Ucluelet Band Councils for their active participation.

In a number of places in the text above, and in the recommendations, the role of Native Peoples in past and future spill response is discussed or touched upon. Further recommendations follow.

Recommendation: That the Tribal and Band Councils of the west coast be fully involved in, resource identification, environmental mapping, and sensitivity analysis for spill response.

Recommendation: That spill response priorities on coastal sensitivity maps be reviewed annually by the Spill Response Agency with the Tribal Councils, and where appropriate, with Band Councils.

Recommendation: That the Spill Response Agency include representation by Native Peoples.

Recommendation: That the Tribal Councils of the west coast be involved in the planning and operation of the Spill Response Auxiliary.

Recommendation: That the location of archaeological or sites of historic significance to Native Peoples be identified and clearly marked on spill response maps.

Recommendation: That Tribal Councils of the west coast and the Spill Response Agency establish special guidelines for response work on or near archaeological or historic sites.

Chapter Six

Spill Response-Incident Scenario

Section 6.01. Introduction

The pages above have made clear the importance of planning and preparation for spill response. Effective preparation will reduce the time taken to assess the situation, it will provide reasonably reliable trajectories of the oil; it will allow spill response personnel to know where their efforts should be concentrated and what priorities should direct their efforts, and it will assure logistic support, information and effective communications. Nevertheless an oil spill is a very complex affair. On site spill response is never easy. Allowances must be made for weather, for the remoteness of some areas where spill impact might be expected, for gear failure and for a vast number of other variables.

For the purposes of obtaining an overall picture of the response process, and how the equipment personnel and organization recommended above would fit in, the paragraphs below briefly outline the stages of on site spill response. As noted frequently in this report, oil spills are complex affairs. The scenario below is only a brief outline, with details deliberately omitted.

The purpose is to demonstrate how important pre-spill preparation is to the speed of the ultimate incident response. The objective must be to convert the onboard response from hours to minutes, to convert the on water response from days to hours, and to convert the on shore response from weeks or months to days.

A final caution, however, is needed. The word response is used, not clean up. For a major or catastrophic spill clean up is an inappropriate term. According to testimony of the General Accounting Office consultant Mr. Virgil Keith, who testified before the House of Representatives Subcommittee on the Coast Guard and Navigation at Cordova on August 9th, 1989, had effective organization and effective preparation been done in Alaska before the Exxon Valdez incident, approximately 40% of the oil released might have been recovered. This is double the amount actually recovered, and this would have been a distinct improvement. It must be recognized that a doubling of response effectiveness is all that can be expected with present levels of technology. For the Exxon Valley spill this means that 60% of the oil would have remained for nature rather than 80%. The improvement is marginal.

Section 6.02. Response On Board

Other than in the case of small coastal tankers or barges, little spill response can be expected from the crew on board the vessel. As discussed above, crews of supertankers are small, and in the event of a mishap all available crew members will in all likelihood be engaged in attempting to deal with the ship and its problems, rather than attempting to contain or recover the cargo spilled. If, as expected, the Emergency Response Vessel is nearby, its crew will be the first to respond. If they are not nearby, Coast Guard, PIRO, or auxiliary personnel may be the first to take spill response measures.

Section 6.03. Response on the Water (near ship)

The response on water, as near to the source of the spill as is possible, is critical. On board equipment, such as rapid deployment booms, oil recovery devices, and holding tanks for the recovered oil from the ruptured tanks or for the oil/water mix actually picked up, will likely be the equipment deployed first. Although the vessels crew may assist in deployment of this equipment, such action by the crew is not expected. The minimum crew activity is to make the spill equipment available (ie. open doors and hatches where necessary, and place the spill response equipment on deck) to rig fenders for lightering operations and for PIRO and Coast Guard vessels, and to prepare hose fittings for the removal of the oil still on board. If the tanker is in Strait of Juan de Fuca or Strait of Georgia waters, this will be put into operation by the crew of the Emergency Response Vessel. Even outside of the Strait, the Emergency Response Vessel may be the first on the scene.

Shortly after, PIRO teams and equipment will be expected to arrive by helicopter or by surface vessel. If for any reason the Emergency Response Vessel has not arrived on the scene, PIRO teams will deploy the equipment on board. All this presupposes that weather, sea and ship conditions allow for such activity.

The next level of on water response envisages the arrival and deployment of Coast Guard vessels with appropriate equipment loaded from shore based depots from Victoria, Vancouver, Prince Rupert, Sandspit or Port McNeill.

The third level of response are dual or multi-purpose vessels from the private sector, including dredge/oil recovery vessels, and tug and barge combinations with lightering capability, to receive oil from the vessel's tanks and to receive oil/water mixes recovered from the sea.

During this on water (near ship) response period it is possible, but not likely, that the on scene spill commander will, in accordance with previously determined criteria, authorize burning of the fresh oil on the surface of the water, whether or not contained by booms. It is also possible, but again, unlikely, that in accordance with previously determined criteria, the use of Type III dispersants will be authorized.

By reason of previous planning and pre-spill preparation, such issues will be dealt with in accordance with established guidelines on site. Extensive consultation should be unnecessary.

Section 6.04. Response on water (near shore)

Near shore response will initially be carried out by auxiliary personnel. It will be their responsibility, in accordance with previously developed spill trajectory information and sensitivity maps to carry out defensive protection of particularly sensitive areas such as hatcheries, aquaculture operations, salmon spawning streams or estuaries. This will be accomplished largely by deploying and maintaining booms.

If within reasonable range, auxiliary personnel outside of the predicted impact area will respond by transporting their spill response equipment to the area where it is required, and will provide, if weather and sea conditions permit, supply and liaison as directed.

Section 6.05. Response on Shore

If the spilled oil has escaped the efforts of the on water response personnel, on shore response will commence. The response on shore will be by auxiliary personnel, and volunteers, soon supplemented by a quick response team of professionals from the Spill Response Agency, the Coast Guard, and by a Provincial Emergency Program support and logistics team. The objectives will be to mobilize local residents for on shore cleanup, the priorities of which will have been predetermined by the process involved in developing the sensitivity maps. In addition, if bird and mammal recovery and rehabilitation centres are deemed to be needed, this will be established under the direction of the SPCA, the College of Veterinarians, the Vancouver Aquarium, or some other organization involved in the pre-spill preparation, with whom a contract would be already in existence.

Concurrently, the Oil Spill Response Agency will have named an on site spill commander, and will have brought together the on site staff team that will assist him or her. If appropriate, an on shore headquarters will be established. Agency members not assigned to the on site team will have the task of acquiring further equipment and support from other sources, within their own departments or ministries, within other agencies of governments, and from industry, whether in Canada or abroad. Their activities in this regard will be on the basis of previously prepared equipment and resource personnel inventories, and by their previous involvement in training and exercises with spill response organizations elsewhere.

Section 6.06. Response in the Air

In accordance with a previously arranged contract, a private firm will commence fixed wing overflights to observe the spill, using both infra red and regular cameras. We are fortunate on the west coast that we can call on companies such as Pacific International Mapping of Sidney, a world leader in this work. In addition, if flights commence early enough and their use is warranted, radio tracking buoys available from the Sidney DFO will be deployed. If more aircraft are needed, and if the necessary equipment can be installed, both military and provincial aircraft will assist in this work, provided that search and rescue or air ambulance flights are not affected.

Helicopters also will be obtained through previously arranged contracts with the private sector, as well as from government sources. They will be used primarily for transport and liaison, for observing oil on the waters near shore and on the shoreline, for animal transportation to rescue centres, and in the many scores of other ways by which they proved their worth in both the Nestucca and the Exxon Valdez incidents.

Finally if equipment and supplies from elsewhere are needed, transport aircraft will be chartered to bring such material from Alaska, other Canadian depots, and from more distant destinations such as the North Sea or Japan. Once again, pre-spill work will have determined the source and location of the equipment, and as far as possible will have established the links or contracts with the military, cargo airlines, or with air shipping agents in order to minimize loading and transportation delays.

Chapter Seven

Compensation and Insurance

Section 7.01. Compensation

The Torrey Canyon incident of 1967 resulted in serious public concern over the damage of marine oil pollution on the marine environment. The high level of accidents of the world's tanker fleet became a matter of serious international concern. This public reaction--not the accident itself--was the catalyst for a number of significant changes in international compensation arrangements. Two of these are voluntary plans of the shipping and petroleum industries, and two are government regimes. There is a great deal of overlap, and the systems as they presently operate are highly confusing to the lay person. The present situation can best be understood if it is recognized that the two voluntary, industry, schemes were quickly put in place in 1969, and were designed to assure some level of compensation prior to the establishment of the international regimes, which, as ratification by the various states was involved (a sometimes lengthy process) took many years to secure. Further complications arise, however, because the details of the voluntary schemes are not identical to the international agreements; thus in some cases the voluntary schemes still operate regardless of the government regimes, while in most the government schemes have replaced the voluntary programs. The Tanker Owners Voluntary Agreement concerning liability for Oil Pollution, for example, was originally for a five year period until the Civil Liability Convention came into force. Because of gaps in the Civil Liability Convention, TOVALOP is still considered useful and is still in existence.

There is another (but by no means the last) complication, by reason of the fact that Canada became a party to the international system in April of this year, some twenty years after it was first established. Early in that period a national compensation fund for oil pollution damage had been set up. This fund still exists and indeed is likely to be expanded under new amendments to the Canada Shipping Act. Thus, in considering compensation, not only must the two voluntary schemes and two international programs be considered, but also the provisions of the Canadian domestic programs.

The impact of insurance also must be taken into account. This again may be affected by the schemes mentioned in the paragraphs above, although generally speaking insurance is considered first, and the schemes above are supplementary and provide financial backup in the areas where insurance coverage does not operate or is inadequate.

A further complication for west coast Canadians is the effect of American legislation and compensation schemes. As of April of this year Canada became a party to the two international regimes; the United States is not. However, by reason of the potential impact of the Alaskan tanker route on the Canadian west coast shoreline, special provisions in American compensation schemes apply to Canada. At present, in the wake of the Exxon Valdez spill, the American legislation is being revised. Passage of some of this legislation is expected before the end of the year. It is important that the special financial protection afforded Canada back in the early 1970s is not swept away as more general schemes for all United States waters are legislated into effect.

The reader of this chapter will quickly conclude that the system in effect for compensation is extremely complex. Further, there are many uncertain areas with respect to coverage, some of which are entirely avoidable. A revision of the whole system is overdue, with a view to creating a straightforward method to compensate those affected by a spill, or those who have incurred costs in responding to a spill. For a start, British Columbia should examine why so little compensation for response expenditures was available after the Erwan/Sun Diamond and Irish Stardust incidents of 1973, and consider whether changes to legislation are needed.

Recommendation: That a thorough review of all compensation legislation and insurance provisions be undertaken, with a view to creating a standard, simplified, and effective recovery system for spill response related costs.

Section 7.02. The Voluntary Plans: TOVALOP and CRISTAL

The voluntary plans are the Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution (TOVALOP) and the Contract Regarding a Supplement to Tanker Liability for Oil Pollution (CRISTAL). These plans are described as voluntary. This refers to the ship owner or shippers decision as to whether or not to join the schemes. Once a company becomes a party to the agreements, it is bound by the contract to meet its terms and conditions.

The Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution (TOVALOP) is a liability scheme which deals with spills of cargoes of "persistent oil" (crude oil, fuel oil, heavy diesel oil and lubricating oil) . When a spill takes place, the agreement guarantees that governments and others who incur reasonable costs in responding to the incident or who suffer pollution damage will be compensated. Costs incurred in responding to an incident may be the result of attempts to eliminate the threat, or actions to minimize the damage. Pollution damage is defined as the direct loss or damage from the escape of the spilled oil Thus it will cover such matters as oiled fishing boats and gear, or contamination of shellfish beds. Non commercial, or environmental losses (described as theoretical and speculative), are not covered.

Compensation under the TOVALOP scheme is limited. The limits depend on the size of the tank vessel which has caused the spill. For tankers up to 5 thousand gross tons, the maximum is US$3.5 million. For tankers over that size, the limit is US$3.5 million plus US$493 for each ton over the size limit, up to a maximum of US$70 million. This upper limit would be for a tanker of some 140,000 gross tons.

The TOVALOP scheme would be an expensive one were the parties to the agreement directly liable for one another's accidents and spills. TOVALOP therefore insists that its members obtain insurance, or otherwise demonstrate financial liability. In this way the TOVALOP scheme itself avoids liability for incidents. The insurance may be standard marine insurance from Protection and Indemnity Associations (known as P and I clubs) or from the International Tanker Indemnity Association, which specializes in marine oil pollution risks.

The Contract Regarding a Supplement to Tanker Liability for Oil Pollution (CRISTAL) was originally created to provide a compensation supplement to the TOVALOP system, and was essentially the creation of the oil industry. It is thus similar in definitions and in many of its provisions. It was amended in February of 1987 to increase compensation levels for oil spill damage from tanker accidents which would not be fully compensated under the terms of TOVALOP, the Convention, or the International Oil Pollution Compensation Fund, described below.

The limits of liability of the CRISTAL contract are on the same gross tonnage basis as those for TOVALOP. For tankers up to 5 thousand gross tons, the limit is US$36 million. For vessels over that size, the limit is US$36 million, plus a per ton figure of US$733 for each gross ton over 5 thousand tons. The maximum is US$135 million, which represents a vessel of approximately 140,000 gross tons. Both these schemes expire automatically in 1992 unless reviewed. Situations in which either would be of use to Canada or a Canadian claimant appear remote.

Section 7.03. The International Schemes: The CLC and the IOPC Fund

Compensation for damage caused by oil spills from laden tankers is governed by two international conventions, the 1969 International Convention on Civil Liability for Oil Pollution Damage (the CLC), and the 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (the IOPC Fund). These were the direct result of the Torrey Canyon diaster of 1969. They were established under the auspices of the International Maritime Organization, then known as the International Maritime Consultative Organization.

The CLC governs the liability of shipowners for oil pollution damage. This Convention lays down the principle of strict liability for shipowners and creates a system of compulsory liability insurance. As in the case of the voluntary schemes, the shipowner's liability is linked to the tonnage of the ship, not to the extent of the damage caused by the incident. There are some 65 states party to the CLC, but this number does not include the United States. Canada joined the CLC and the IOPC Fund in April of this year. Previously, Canada had adopted the view that the limits on liability of the schemes were too low. With the 1984 agreement to increase the limits, the Canadian position changed. It is worth noting that had Canada participated prior to the Nestucca spill, and if Souse Brothers had refused to pay, the CLC and IOPC Fund would have provided some measure of compensation for the reasonable expenditures of both the federal and provincial governments. I stress the word "reasonable". It has a somewhat special and very limited meaning in this area, which is unnecessary to go into at length. Suffice to say that many of the Nestucca response expenditures that Canada and British Columbia would consider reasonable would not be so described by the officers of the CLC or the IOPC Fund. The problems of what is recoverable and whether there should be compensation for environmental or non-economic losses can be expected to create problems in the future. This matter is in need of attention.

Other caveats are also needed. Although the 1984 changes in limits persuaded Canada to join these international schemes, the protocol which would implement the conclusions of the 1984 conference is not yet in force, by reason of the limited number of nations that have signed. Ironically, Canada has not yet signed the 1984 protocol. Further, there are differences between the language of the Canada Shipping Act, and that of the CLConvention, which add to confusion and which should be harmonized.

The IOPC Fund Convention is a supplement to the CLC, and is designed to provide supplementary compensation to those who suffer damage from oil spills, and to indemnify shipowners for a portion of their liability under the CLC. The upper limit payable under this fund is some US$81 million, which includes the sum paid by the shipowner or his insurer under the CLC.

Recommendation: That Canada adhere to the 1984 Protocol to the Civil Liability Convention.

Recommendtion: That Canada ratify the United Nations Convention on the Law of the Sea.

Recommendation: That Canada amend the Canada Shipping Act to bring the language into conformity with the language of the CLC and IOPC Fund Convention.

Recommendation: That Canada, with other like minded states, work to have CLC and IOPC Fund compensation provide for the environmental and non-economic costs of oil spills.

Section 7.04. National Plans: Canada's Ship-Source Oil Pollution Fund

In 1971 the Canada Shipping Act was amended to allow for a levy of 15 cents per metric ton on all oil shipped in or out of Canada, such monies going to a fund to assist in compensation for oil spill damage, then known as the Maritime Pollution Claims Fund, and now known as the Ship-source Oil Pollution Fund. This levy was collected between 1972 and 1975, when the then Minister of Transport determined that it was no longer necessary. Very few claims have come to the fund or been accepted. The fund now stands at some CAN$150 million. In the 1989 amendments to the Act, the levy was increased to a possible 30 cents, but this levy is not yet in effect. As with the various voluntary and international plans discussed above, the Canadian scheme has a some differing criteria from the other plans. It is thus available to extend and augment compensation available under the international programs.

The existence of the Ship-source Oil Pollution Fund may - the issue is far from certain - preclude coverage in Canada of TOVALOP, or CRISTAL. In any event, the two voluntary, industry, schemes would in most cases be unusable by reason of the adherence by Canada to the CLC and the IOPC fund. Compensation from the industry plans is only available if all other sources of compensation have been exhausted.

Recommendation: That the 30 cent levy authorized by the recent amendments to the Canada Shipping Act to augment the Ship-Source Pollution Fund be brought into effect as soon as possible.

Recommendation: That the guidelines governing the Ship-Source Oil Pollution Fund be examined with a view to clarifying the areas of coverage of the Fund, particularly the areas unlikely to be covered by the international compensation schemes.

Recommendation: That once the Fund reaches CAN$200 million, one third of the monies collected under the Ship-Source Pollution Fund be allocated to research in the areas of oil spill prevention and response.

Section 7.05. Insurance

Marine insurance for tankers is undertaken by Protection and Indemnity Associations, generally referred to as P and I clubs, and named after a geographic area. The purpose is no different from insurance in other areas of human activity, namely to aggregate the losses of a particular form of activity, develop accurate predictions of loss, and through premiums to spread the risk of loss or damage to all members of a group. The market is totally international.

The upper limit for marine insurance for tankers has traditionally been US$ 400 million. Above that figure the P and I clubs have refused to offer coverage, although there is now some discussion of doubling this figure. In the light of Exxon's claim to have spent some US$1.3 billion in the wake of the Exxon Valdez incident, the whole question of the adequacy of insurance and compensation scheme coverage should now be re-examined. While it is certainly true that much of this extraordinary expenditure by Exxon had little or no appreciable effect on the task of removing oil from water, beaches, or rocks, or for that matter from fur and feathers, nevertheless the Exxon expenditures have become, in the eyes of the public, the new dollar benchmark for spill response. Even if only half of the Alaskan expenditures were undertaken in the case of a spill on the Canadian west coast, the amount would still exceed the insurance and compensation fund limits as they presently exist.

Recommendation: That Canada require a minimum $US 400 million insurance coverage for tankers entering Canadian ports.

Recommendation: That when responsible P and I Clubs offer tanker coverage greater than $US 400 million, Canada re-examine insurance requirements with a view to raising insurance limits to a minimum of $US 650 million.

Section 7.06 U.S. Legislation

In 1973 when the decision to proceed with the Trans Alaska Pipeline was made, there was considerable concern that a realistic assessment of the marine segment of the route to the lower 48 states had not been done. Indeed, in its haste to approve a method of transporting Prudhoe Bay crude oil to markets, the U.S. Congress, through the Trans Alaska Pipeline Enabling Act of 1973, exempted the route from a judicial review of whether the impact requirements of the Environmental Policy Act of 1969 had been met. This naturally did not satisfy those who had concerns over the environmental risks that the Alaskan tanker traffic posed to the west coast, particularly Canadians, to whom the route posed risks but provided no benefits. Recognizing this, the United States authorities included the Canadian west coast under the compensation scheme for Alaskan oil pollution damage on the same basis as the United States west coast.

In the wake of the Exxon Valdez spill there have been a flurry of bills introduced in the United States Senate and House of Representatives to raise liability limitations, establish clear financial responsibility, and to improve spill response organization. In addition, legislators in various states, particularly Alaska and California, are engaged in the same task, and in the additional one of protecting the right of the individual state to establish limits higher than those of the federal legislation.

There is a serious possibility that in these efforts to rationalize and improve the existing legislative framework, the special financial coverage provisions for the Canadian west coast will be altered to our detriment. Further, the United States legislatures may develop response structures which fail to take into account the special maritime provisions on the west coast which have U.S. tankers leaving Cherry Point passing entirely in Canadian internal waters on the outbound leg of their voyage, and which allow oil tank barges destined for Alaska from Puget Sound to transit the waters of British Columbia's Inside Passage.

Recommendation: That Canada closely monitor the United States legislative initiatives in the area of oil spill compensation and response with a view to preserving existing U.S. legislative spill fund coverage for the Canadian west coast.

Recommendation: That through the Western States/B.C. Task Force committee on legislation, the four U.S. Pacific states be made aware of the special position of the Canadian west coast in U.S. national legislation, and the need to preserve it.

Recommendation: That the four U.S. west coast States be requested to take the existing financial compensation coverage available to Canada into account when drafting their own legislation, or when proposing amendments to the U.S. national legislation.

SUMMARY

OF

RECOMMENDATIONS

RECOMMENDATIONS

Section 1.02. Conservation Measures.

1. **Recommendation:** That in the light of the federal government's expressed concern over oil pollution in our coastal waters, and its expressed concern over CO_2 emissions, it reconsider its recent reduction of financial support for conservation measures and alternative energy sources.

2. **Recommendation:** That the Energy Development Agency promised in the February 1980 government policy document "An Energy Secure British Columbia" be established to direct and foster energy research and development programs within the province, in order to stabilize or reduce the current rates of increase of oil consumption.

3. **Recommendation:** That the provincial government re-examine its pricing and tax policies for petroleum products with a view to achieving its stated goal of reduced consumption of oil as a percentage of overall energy use, as outlined on pages 11 and 12 of "An Energy Secure British Columbia".

4. **Recommendation:** That as a measure to induce conservation, the level of provincial taxes on petroleum products be increased.

5. **Recommendation:** That Canada and British Columbia adopt the higher of the United States federal, or the California state, energy efficiency standards for vehicles, appliances and other equipment.

Section 1.03. Recycling Measures

6. **Recommendation:** That the Ministry of Energy Mines and Petroleum Resources explore ways to extend the current use of recycled oil to crown corporations and other public sector users, both municipal and federal.

7. **Recommendation:** That tax rebates be introduced to encourage increased use of recycled oil by private consumers.

8. **Recommendation:** That a limited advertising campaign, to be paid for equally by government and industry, be instituted to educate the private sector as to the economic and environmental advantages of purchasing recycled lubricants.

Section 2.03. Crude Oil Tankers. Outbound from Vancouver

9. **Recommendation:** That as a matter of environmental policy there be no further development of the export trade in crude oil from the Port of Vancouver.

10. **Recommendation:** That as a matter of environmental policy existing exports of crude oil from the Port of Vancouver be phased out.

11. **Recommendation:** That until such traffic ends, no crude oil tanker be permitted to load for offshore destinations, until a contingency plan for spill response for the outgoing voyage is filed and approved by the Oil Spill Response Agency or the Coast Guard for the Canadian internal, territorial, and pollution control zone waters through which the vessel will pass.

12. **Recommendation:** That legislation be amended to require the companies that sell and load crude oil in the port of Vancouver to guarantee the costs of spill response in the event of a foreign purchaser failing to meet his financial obligations in this regard.

13. **Recommendation:** That no laden crude oil tanker be permitted to leave the port of Vancouver unless accompanied by both a tug and an emergency response vessel, the tug to be equivalent to those currently escorting ARCO tankers to Cherry Point, and the emergency response vessel to have equivalent spill response and tug capability to those currently in operation in Prince William Sound.

14. **Recommendation:** That no laden crude oil tanker be permitted to leave the port of Vancouver without the emergency towing cable and associated gear comprising the "Prince William Sound Towing Package", and that, with appropriate amendments, the Prince William Sound Emergency Towing Contingency Plan be adopted for laden tankers in the Strait of Georgia and the Strait of Juan de Fuca.

15. **Recommendation:** That no laden crude oil tanker be permitted to leave the port of Vancouver without a second pilot on board for the transit to Victoria.

16. **Recommendation:** That heavy oil recovery research be expanded.

Section 2.04 *Substitution of Canadian Crude Oil or Refined Products in Puget Sound*

17. **Recommendation:** That Canada undertake discussions with the U.S. administration to determine its interest over the next two decades in the possible substitution of Canadian crude oil or refined product delivered by pipeline for the existing supplies of tanker-borne Alaskan and overseas crude oil in Washington State.

Section 3.02. Ship Safety - Structural and Mechanical

18. **Recommendation:** That in the event of the Secretary of Transportation or National Academy of Sciences reporting in favour of double bottoms, greater use of ballast sides, or reduced tank size for new tanker or barge construction, the province, through the Western States/B.C. Task Force, encourage the adoption of the report by the appropriate United States authorities regardless of the position taken on such measures by the International Maritime Organization.

19. **Recommendation:** That in the event of the Department of Transportation or the National Academy of Sciences reporting in favour of double bottoms, greater use of ballast sides or reduced tank size for new tanker or barge construction, Canada support any initiatives at the International Maritime Organization to require such features in all new construction of tankers worldwide.

20. **Recommendation:** That in the event of the Secretary of Transportation or the National Academy of Sciences reporting in favour of double bottoms, greater use of ballast sides, or reduced tank size, for tankers and tank barges, Canada serve notice that within four years such design features will be required for tankers and tank barges calling at Canadian ports.

21. **Recommendation:** That Canada, in consultation with other concerned nations, propose at the International Maritime Organization that petroleum product cargoes be reclassified from Type III to Type I, requiring maximum protection.

22. **Recommendation:** That the Canadian west coast barge fleet by converted to double hulls, with a minimum 3/4 of metre between the inner and outer hull.

23. **Recommendation:** That this conversion be over a 4 year period, on an orderly annual schedule to be determined by industry and the Coast Guard.

24. **Recommendation:** That no "grandfathering" of existing barges be permitted; i.e. Four years hence all barges for petroleum products be double hulled.

25. **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.

26. **Recommendtion:** 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

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

28. **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

29. **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.

30. **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

31. **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.

32. **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.

Section 3.06. Ship Safety - Prince William Sound Towing Package

33. **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

34. **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.

35. **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

36. **Recommendation:** 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.

37. **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.

38. **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

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

40. **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

41. **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.

42. **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.

43. **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.

44. **Recommendation:** That B.C. 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

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

46. **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%.

47. **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.

48. **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.

49. **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.

50. **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.

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

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

53. **Recommendation:** That Canadian and U.S. regulations regarding what level of alcohol constitutes impairment be standardized.

54. **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.

55. **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

56. **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.

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

58. **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.

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

60. **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.

61. **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.

62. **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.

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

64. **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.

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

66. **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 duties.

Section 3.14. Tanker Exclusion Zone

67. **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.

68. **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.

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

Section 3.15. Fishing Vessels and Pleasure Craft

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

71. **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.

72. **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.

73. **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.

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

Section 3.16. The Vancouver Port Corporation

75. **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.

Section 4.02. Coastal Sensitivity Analysis and Mapping

76. **Recommendation:** That representatives from the provincial Ministry of Environment, the federal Department of the Environment, the Department of Fisheries and Oceans and the Coast Guard be instructed to meet within the next sixty days to establish data requirements for oil spill sensitivity maps, to determine data gaps, and to establish interpretation objectives.

77. **Recommendation:** That coastal residents, particularly Native Peoples, be invited to assist in providing data gathered for oil spill sensitivity mapping purposes, and that later in the process such residents be given the opportunity of reviewing the draft maps as to content, and the opportunity to assist in establishing priorities for spill response for their local areas..

78. **Recommendation:** That the cost of preparing such oil spill sensitivity maps be borne equally by the two levels of government, and that they be printed under the authority of both.

Section 4.03. On Board Response - Booms and Skimmers

79. **Recommendation:** That tankers be required to carry appropriate booming material, oil recovery equipment, neoprene or hypalon bladder tanks for the recovered oil/water mix, and a heavy duty work boat to assist helicopter borne spill response crews or escort vessel personnel in the event of a spill.

80. **Recommendation:** That oil barges carry booming equipment and oil recovery equipment similar to that carried by local coastal tankers to enable a quick response in the event of an accident, and also to provide protection during coastal oil transfer operations.

Section 4.04. Near Incident Response - Emergency Response Vessels

81. **Recommendation:** That escort vessel services in the Strait of Juan de Fuca for tankers bound for Cherry Point or other refineries in the area, and for tankers outbound from Vancouver, be the same as those for Prince William Sound. Specifically, this requires the existing tug escort, and emergency response vessels of the same or equivalent power and capabilities, with similar crews and similar spill response equipment, as those in Prince William Sound. The Emergency Response Vessels would be in addition to the tug escorts.

82. **Recommendation:** That to avoid salvage contract discussions and delays, arrangements for emergency services contracts with a disabled tanker should be the on the same basis as in Prince William Sound.

Section 4.05. Near Incident Response *Multi-Purpose Auxiliary Vessels*

83. **Recommendation:** That private industry be invited to submit proposals for the development or equipment of dual purpose or multi-purpose vessels with oil recovery capability.

84. **Recommendation:** That during the winter months a number of fishing vessels be equipped with booms, oil recovery equipment, and neoprene or hypalon bladder tanks for oil/water mixes. Owners or operators of these vessels would contract with the Spill Response Agency to be on short notice standby for oil spill response work.

Section 4.06. The Petroleum Industry Response Organization

85. **Recommendation:** That the Canadian Petroleum Association and the Petroleum Association for the Protection of the Canadian Environment be requested to establish a committee of the Canadian west coast petroleum industry to determine what equipment and staging areas on the west coast of Canada will be required to better extend the effectiveness of the Seattle PIRO response centre to the Canadian west coast.

86. **Recommendation:** That the Canadian Petroleum Association and the Petroleum Association for the Protection of the Canadian Environment be asked to arrange appropriate representation of the Canadian petroleum industry on the Seattle PIRO Implementation Steering Committee.

Section 4.07. Local Auxiliary Teams

87. **Recommendation:** That an auxiliary service for oil spill preparation and response be established, with units in the coastal communities of Vancouver Island, the Queen Charlottes and the Central Coast.

88. **Recommendation:** That the auxiliary service local teams become the front line of oil spill defence in their respective areas, with sufficient light booms, absorbent material, and other equipment to enable sensitive local areas to be given some level of defensive protection prior to the arrival of equipment and personnel from other locations.

89. **Recommendation:** That in areas with heavy concentrations of small boats, such as Campbell River, local sports fishing associations, commercial guided fishing resorts, and other such bodies be requested to assist in organizing an oil spill response auxiliary.

90. **Recommendation:** That the Tribal Councils of Native Peoples on the west coast be invited to submit proposals for the establishment and organization of oil spill auxiliary units in their areas.

91. **Recommendation:** That overall organization and logistic support for the Auxiliary be provided by the Provincial Emergency Program.

92. **Recommendation:** That the Coast Guard and the Petroleum Industry provide the Auxiliary with boom handling and spill response training.

93. **Recommendation:** That the Auxiliary be organized during the winter and spring of 1990, that training take place towards the end of this period, and that local exercises take place in the early summer of 1990.

Section 4.08. The Burrard Clean Co-operative

94. **Recommendation:** That an agreement be entered into to make public funds available to reimburse Burrard Clean for the costs of handling a spill not caused by or coming from the facility of a Burrard Clean co-operative member. Public funds would not become available until the usual channels of securing payment had been exhausted.

95. **Recommendation:** That no change be made to the role of Burrard Clean.

96. **Recommendation:** That the manager of Burrard Clean be a member of the Spill Response Agency.

Section 4.09. On Shore Response Involvement of the Petroleum Industry

97. **Recommendation:** That petroleum industry representatives be invited to participate with government in spill response preparation, and in particular assist in training of spill response personnel, in establishing depots of spill response equipment, and in technical assessments of oil spill recovery equipment.

98. **Recommendation:** That the Petroleum Industry participate fully in the work of the Spill Response Agency.

Section 4.10. On Shore - Animal Rescue and Rehabilitation

99. **Recommendation:** That the B.C. Ministry of the Environment and the Canadian Wildlife Service jointly acquire stocks of bird recovery equipment, particularly on-line waterheaters and other equipment or hardware not readily available off-the-shelf, and locate such stocks in seven depots in coastal British Columbia.

100. **Recommendation:** That the B.C Ministry of the Environment and the Canadian Wildlife Service enter into discussions with the major supermarket chains of British Columbia to determine how in the event of an emergency the private sector might be able to assist in providing material needed for rehabilitation.

101. **Recommendation**: That the Province of British Columbia and the Canadian Wildlife Service jointly fund a contract with the Vancouver Aquarium, the College of Veterinarians of British Columbia, the Society for the Prevention of Cruelty to Animals, or any similar organization identified as having an interest in bird recovery and rehabilitation to:

a. Provide four three-day training seminars in bird cleaning and rehabilitation in different parts of British Columbia for up to twenty participants at each seminar;

b. Keep abreast of the international literature and advances in this field, and disseminate such information by way of a newsletter to volunteers and others interested;

c. Maintain appropriate stocks of equipment, to be provided by the two government agencies, in secure facilities on the lower mainland, in Victoria, the west coast of Vancouver Island, North Vancouver, the Queen Charlotte Islands, the central Coast and Prince Rupert;

d. Provide liaison and coordination with other bird rescue and rehabilitation groups in the province and in the neighbouring states of Alaska, Washington, Oregon and California.

102. **Recommendation**: That the B.C. Ministry of the Environment and the Canadian Wildlife Service jointly fund a contract with the University of British Columbia, the Vancouver Aquarium, the College of Veterinarians, or any other organization with expertise in animal rehabilitation or in sea otter handling to:

a. Provide two three-day seminars (one of which should be on the west coast of Vancouver Island) for up to twenty volunteers in otter recovery and rehabilitation;

b. Determine a suitable location on the west coast of Vancouver Island for a sea otter recovery facility;

c. Develop a suitable contingency plan to build and have such a recovery facility in operation within five days of a spill;

d. Maintain at a secure facility the minimum stocks of equipment appropriate for such a facility, bearing in mind the need to have it in operation at short notice;

e. Keep abreast of the scientific literature and advances in the area, and publish a newsletter to keep interested volunteers and others informed of such material.

103. **Recommendation**: That where possible a bird or mammal rehabilitation clinic should have a veterinarian, or a veterinary technician working under the supervision of a veterinarian, on staff.

104. **Recommendation**: That clear written policy guidelines covering the circumstances under which a suffering animal will be destroyed be established prior to the operation of any rehabilitation facility.

105. **Recommendation**: That the training programs for volunteers include discussion and understanding of the policy guidelines on destroying suffering animals.

106. **Recommendation:** That the requirements for scientific research on oiled animals be carefully considered in pre-spill planning and preparation, and if permits are required for animal collection, these be approved in advance by the appropriate government authority.

Section 4.11. On Shore Response - Equipment Stockpiles

107. **Recommendation:** That Coast Guard spill response equipment depots be strengthened, particularly with equipment capable of use off shore or in moderate wind and sea conditions.

108. **Recommendation:** That the number of Coast Guard spill response depots be increased by establishing a depot on the Queen Charlotte Islands, and one on northern Vancouver Island.

109. **Recommendation:** That the National Research Council, provincial research councils, and the University community be enlisted to assist the Coast Guard in evaluating spill response equipment proposals.

110. **Recommendation:** That the Coast Guard's budget for oil spill response technology assessment be doubled immediately and that this continue for the next two years.

111. **Recommendation:** That on a six monthly basis equipment checks and up-to-date inventories of equipment in Coast Guard spill response depots be carried out.

Section 4.12. The Provincial Emergency Program

112. **Recommendation:** That the Provincial Emergency Program be expanded to allow it to effectively support a spill response auxiliary, and to provide effective logistics support in the event of a spill.

113. **Recommendation:** That financial controls be relaxed in order to provide easier access to discretionary funds by Provincial Emergency Program staff in times of emergency.

Section 4.13. On-Shore - Waste Disposal

114. **Recommendation:** That the Waste Disposal Branch of the Ministry of the Environment prepare and circulate to all coastal municipal and regional governments a "white paper" on oil spill debris disposal proposals.

115. **Recommendation:** That following consideration of the responses to that 'white paper" a plan for oil spill debris disposal be adopted and published.

116. **Recommendation:** That efforts to develop satisfactory barge transportable incinerator units be continued.

117. **Recommendation:** That Canada expand and upgrade the ballast and waste water treatment facilities of Canadian ports.

118. **Recommendation:** That there be no charge for receiving and treating the ballast or waste water in Canadian ports.

119. **Recommendation:** That Canada, through the International Maritime Organization, work to eliminate charges for receiving and treating ballast or waste water in ports world wide.

120. **Recommendation:** That there be improved inspection and maintenance of ballast or waste water treatment facilities.

121. **Recommendation:** That where practical the Ship Safety Branch of the Coast Guard collect samples of bilge water from vessels in West Coast ports in order to improve detection of the source of near shore bildge water dumping by departing merchant vessels.

122. **Recommendation:** That all merchant vessels be required to empty slop tanks before leaving a Canadian port.

Section 4.14. Communications

123. **Recommendation:** That an analysis of communications problems at Nestucca be undertaken by a committee of the Oil Spill Response Agency.

124. **Recommendation:** That the committee invite a representative of BC Telephone Company to assist in its work.

125. **Recommendation:** That the Canadian Armed Forces be requested to provide advice on effective emergency communications systems.

Section 4.15. Community Relations

126. **Recommendation:** That the Oil Spill Response Agency examine the experience of spills elsewhere, particularly the Exxon Valdez incident, with a view to developing and equipping an effective spill response community relations team.

127. **Recommendation:** That community television and radio companies on the west coast be contacted with a view to establishing what facilities might be available in the event of a spill to assist in community relations and communications.

128. **Recommendation:** That the Oil Spill Response Agency invite media people who reported on the Nestucca spill to offer suggestions as to how government, community and media relations personnel might carry out their tasks more effectively.

129. **Recommendation:** That in the event of a future spill, the Oil Spill Response Agency's community relations and communications teams have a public bulletin board as near as possible to the spill response headquarters, where, as soon as it became available, pertinent information would be placed on view for the spill response personnel, media and press, and for local residents.

130. **Recommendation:** That where possible a recorded spill report, updated frequently, be available by local telephone and on local community TV.

131. **Recommendation:** That in the event of a future spill, in the absence of local auxiliary personnel, municipal and Native leaders be invited to join the on site spill response team.

132. **Recommendation:** That the communications and community relations teams be fully involved in planning and pre-spill activity, as well as in all facets of the on site spill response work, in order to develop authoritative spokespersons capable of relieving other spill response officials from such tasks.

Section 4.16. Inventories of Resource People, Companies and Equipment

133. **Recommendation:** That the Oil Spill Response Agency obtain and where lacking compile, inventories of spill response equipment companies and of personnel.

134. **Recommendation:** That Canadian inventories of spill response equipment be made known to the spill response agencies of European, Japanese, United States and other coastal nation.

135. **Recommendation:** That Canada through the International Maritime Organization, work to establish an effective world wide spill response equipment and expert personnel inventory.

Section 4.17. Research Coordination

136. **Recommendation:** That a contract be arranged between the Oil Spill Response Agency and the University of British Columbia for the University to work with the University of Alaska, the University of Washington, the U.S. National Ocean Pollution Policy Board, the National Oceanic and Atmospheric Administration, the National Research Council, and the U.S. National Academy of Sciences to survey what research work is currently underway in Alaska, when results are likely to be available, and what gaps exist in the overall research programs.

137. **Recommendation:** That the gaps in research identified as important to spill response on the west coast be discussed by the government officials involved, by UBC personnel, and by the Spill Response Agency to establish priorities and funding requirements for a spill response research program.

138. **Recommendation:** That a policy of disseminating such research information as it becomes available, in plain English to civil servants, interested members of the public, journalists, and oil spill auxiliary personnel, be adopted.

139. **Recommendation:** That further research be undertaken to determine effective burning procedures. This should include the use of wicking agents such as wood chips, and should consider the toxicological effects of burning oil.

140. **Recommendation:** That the Department of Fisheries and Ocean's 1979 "Plan for Scientific Response to an Oil Spill in the Beaufort Sea" be updated and adapted to the Canadian west coast.

Section 4.18. Training

141. **Recommendation:** That the Spill Response Agency establish a training schedule for all components of the spill response system, and that large scale exercises take place on a regularly scheduled basis.

142. **Recommendation:** That the petroleum industry, particularly those companies with spill response personnel and equipment on the west coast, including Atlantic

Richfield and other companies with facilities in the United States, be canvassed for possible assistance in training auxiliary spill response personnel.

143. **Recommendation:** That the major annual exercise of the Spill Response Agency be observed and assessed by an outside independent organization, such as the Alaska Department of Environmental Conservation, or the Shetland Oil Terminal Advisory Group of Sullom Voe.

Section 4.19. Dispersants

144. **Recommendation:** That developments in dispersant technology be monitored, and if new products show promise of being less toxic than those of the past, their limited use be considered.

145. **Recommendation:** That joint research with European countries, Japan, and with the United States on dispersant use and their effects be undertaken.

146. **Recommendation:** That the Arizona depot for U.S. dispersants be contacted to determine what dispersants are presently available, in what quantities, and how quickly they can be shipped.

147. **Recommendation:** That B.C.'s aerial forest fire suppression companies be contacted to determine whether their equipment is suitable and would be available the event of a decision by a spill commander to use dispersants.

Section 4.20 Absorbent Materials

148. **Recommendation:** That financial controls be relaxed in order to provide easier access to discretionary funds by Provincial Emergency Program staff in times of emergency.

Section 4.21. Spill Worker Safety and Right to Know

149. **Recommendation:** That the Oil Spill Response Agency's communications team prepare a series of warning pamphlets to alert personnel of the dangers encountered in oil spill response activities, and what individual preparations are required to reduce such dangers.

150. **Recommendation:** That with the assistance of petroleum industrial safety personnel, appropriate guidelines be developed for the safe handling of oiled debris and spill clean up materials.

151. **Recommendation:** That arrangements be made with the Workers Compensation Board to provide automatic coverage to those registered with the Spill Response Agency as auxiliary personnel during both training exercises and actual spill response.

152. **Recommendation:** That all government agencies adopt a "Right To Know" policy with respect to information in its possession regarding the health risks of handling crude oil, petroleum products, or response material and equipment.

153. **Recommendation:** That such health and safety information be prominently displayed at spill response headquarters and in other locations likely to be frequented by spill response personnel.

Section 5.02. Oil Spill Response Agency Structure

154. **Recommendation:** That the federal and provincial governments establish a joint Oil Spill Response Agency with the task to co-ordinate prevention, spill response preparation, and on-site spill response for oil spills in west coast waters.

155. **Recommendation:** That the Agency's operations be funded by a levy of one half to one cent per litre to be added to the cost of all petroleum products and crude oil shipped to or from a west coast Canadian port.

156. **Recommendation:** That the agency's administrative support be entrusted to the Department of Fisheries and Oceans.

157. **Recommendation:** That membership of the agency include representatives of industry, the public, Native Peoples, and the university community as well as federal and provincial officials.

158. **Recommendation:** That the agency's life be for three years, unless extended by joint decision of the federal and provincial governments.

Section 5.04. Relationship to Western States/B.C. Task Force

159. **Recommendation:** That the Spill Response Agency representative from the B.C. Ministry of the Environment also be the B.C. representative to the Western States/B.C. Task Force on Oil Spills.

Section 5.05. Use of the Military

160. **Recommendation:** That the Canadian Armed Forces be regarded as a resource agency for spill response in the same manner as civilian government departments and ministries.

161. **Recommendation:** That Canadian Armed Forces personnel take part in the Spill Response Agency's planning and preparation work.

162. **Recommendation:** That a small cadre of Canadian Armed Forces personnel on the west coast receive spill response training, as agreed by DND and by the Oil Spill Response Agency.

Section 5.06. Use of Contractors

163. **Recommendation:** That the practice of attempting to secure a contractor for spill cleanup paid for by the polluter before government funds are expended be abandoned.

164. **Recommendation:** That the spill response team have full responsibility for immediate spill response regardless of the whether the identity of the polluter is ascertained, or whether a contractor has been employed.

165. **Recommendation:** That current legislation be revised with a view to enabling cost recovery by governments from the polluter regardless of the extent of crown ownership of the affected property, and regardless of whether the polluter has authorized the expenditure, or been given the opportunity of carrying out spill response himself.

Section 5.07. Involvement of Native Peoples

166. **Recommendation:** That the Tribal and Band Councils of the west coast be fully involved in, resource identification, environmental mapping, and sensitivity analysis for spill response.

167. **Recommendation:** That spill response priorities on coastal sensitivity maps be reviewed annually by the Spill Response Agency with the Tribal Councils, and where appropriate with Band Councils.

168. **Recommendation:** That the Spill Response Agency include representation by Native Peoples.

169. **Recommendation:** That the Tribal Councils of the west coast be involved in the planning and operation of the Spill Response Auxiliary.

170. **Recommendation:** That the location of archaeological or sites of historic significance to Native Peoples be identified and clearly marked on spill response maps.

171. **Recommendation:** That Tribal Councils of the west coast and the Spill Response Agency establish special guidelines for response work on or near archaeological or historic sites.

Section 7.01. Introduction

172. **Recommendation:** That a thorough review of all compensation legislation and insurance provisions be undertaken, with a view to creating a standard, simplified, and effective recovery system for spill response related costs.

Section 7.03. The International Schemes: The CLC and the IOPC Fund.

173. **Recommendation**: That Canada adhere to the 1984 Protocol to the Civil Liability Convention.

174. **Recommendtion:** That Canada ratify the United Nations Convention on the Law of the Sea.

175. **Recommendation:** That Canada amend the Canada Shipping Act to bring the language into conformity with the language of the CLC and IOPC Fund Convention.

176. **Recommendation:** That Canada, with other like minded states, work to have CLC and IOPC Fund compensation provide for the environmental and non-economic costs of oil spills.

Section 7.04. National Plans: Canada's Ship-Source Oil Pollution Fund

177. **Recommendation:** That the 30 cent levy authorized by the recent amendments to the Canada Shipping Act to augment the Ship-Source Pollution Fund be brought into effect.

178. **Recommendation:** That the guidelines governing the Ship-Source Oil Pollution Fund be examined with a view to clarifying the areas of coverage of the Fund,

particularly the areas unlikely to be covered by the international compensation schemes.

179. **Recommendation:** That once the Fund reaches CAN$200 million, one third of the monies collected under the Ship-Source Pollution Fund be allocated to research in the areas of oil spill prevention and response.

Section 7.05. Insurance

180. **Recommendation:** That Canada require a minimum $US 400 million insurance coverage for tankers entering Canadian ports.

181. **Recommendation:** That when responsible P and I Clubs offer tanker coverage greater than $US 400 million, Canada re-examine insurance requirements with a view to raising insurance limits to a minimum of $US 650 million.

Section 7.06 U.S. Legislation

182. **Recommendation:** That Canada closely monitor the United States legislative initiatives in the area of oil spill compensation and response with a view to preserving existing U.S. legislative spill fund coverage for the Canadian west coast.

183. **Recommendation:** That through the Western States/B.C. Task Force committee on legislation, the four U.S. Pacific states be made aware of the special position of the Canadian west coast in U.S. national legislation, and the need to preserve it.

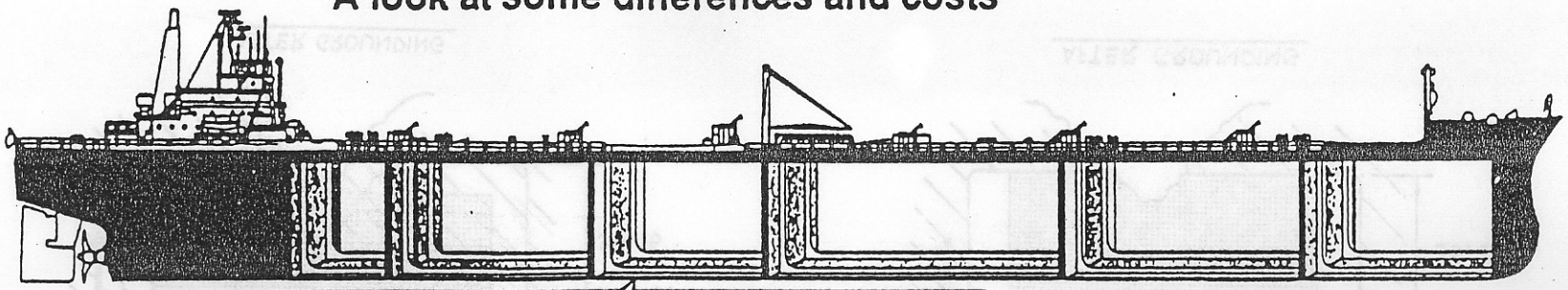
184. **Recommendation:** That the four U.S. west coast States be requested to take the existing financial compensation coverage available to Canada into account when drafting their own legislation, or when proposing amendments to the U.S. national legislation.

APPENDICES

Appendices

Double-Bottom Tankers

A look at some differences and costs

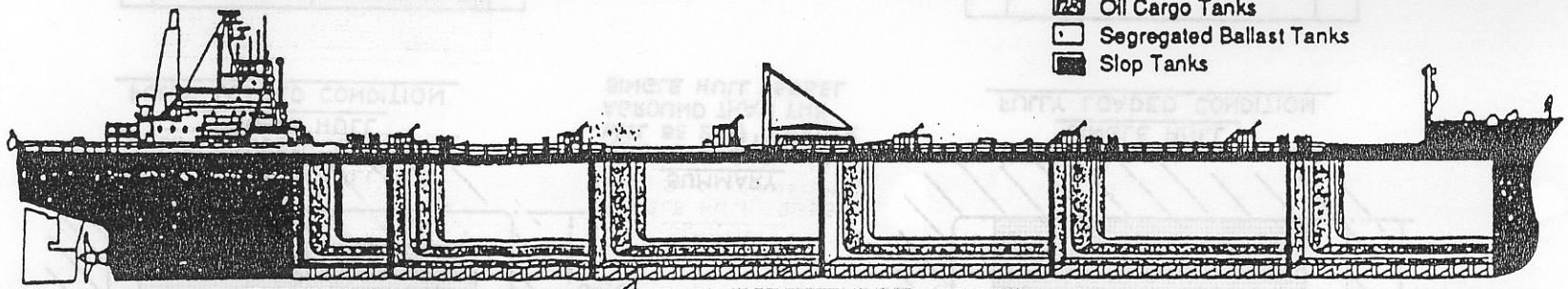


Single-Bottom Hull Construction

EXXON VALDEZ

Key to Compartments

- Oil Cargo Tanks
- Segregated Ballast Tanks
- Slop Tanks

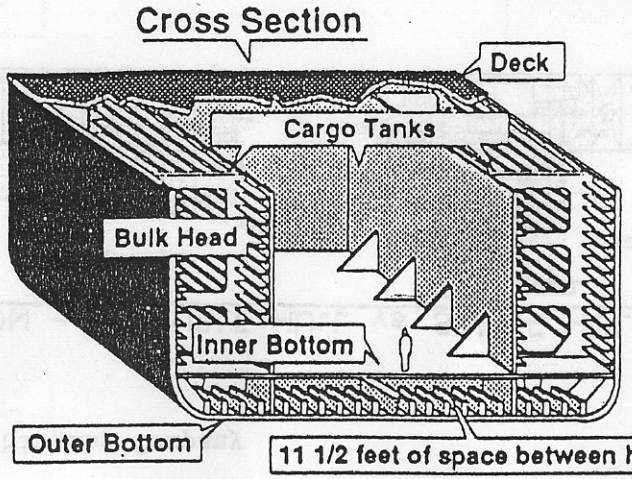


Double-Bottom Hull Construction

EXXON VALDEZ redesigned with a 11.5 foot double bottom

How a double bottom would have made a difference on the Exxon Valdez

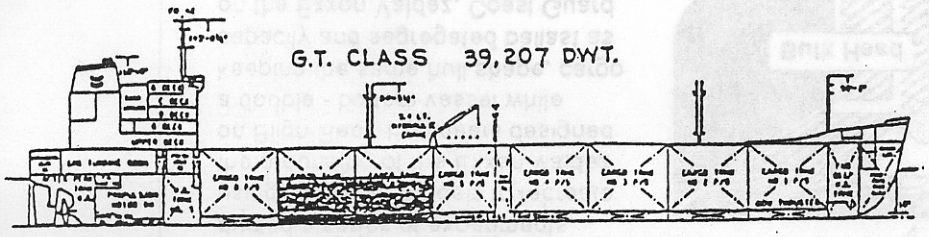
The U.S. Coast Guard has conducted a series of experiments using computer models to recreate the grounding of the Exxon Valdez on Bligh Reef. Engineers designed a double - bottom vessel while keeping the same hull shape, cargo capacity and segregated ballast as on the Exxon Valdez. Coast Guard studies have shown that if the Exxon Valdez had been designed with 11.5 feet between the two hulls, it would have reduced the oil spill 25% to 60%.

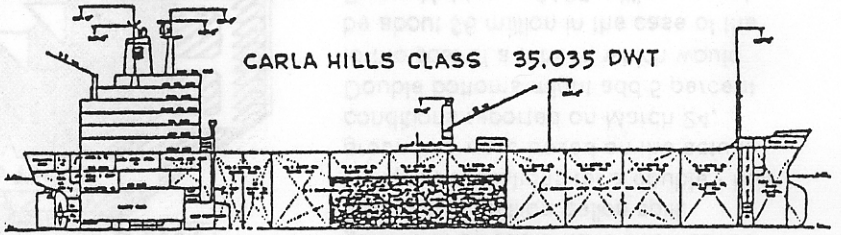


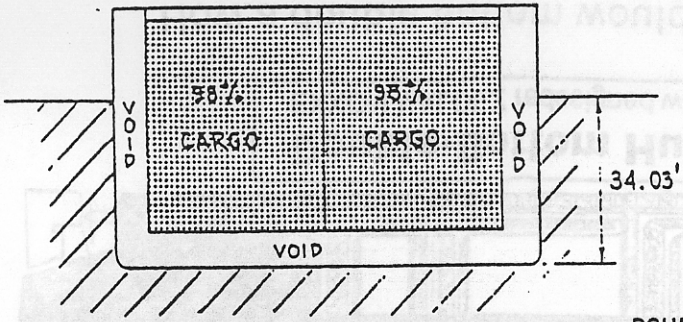
Between 3.1 million to 6.8 million gallons of oil could have been saved from the 11 million gallon spill. Oil spill calculations for a double - hull grounding were based on the actual conditions reported on March 24, Double bottoms might add 5 percent to the cost of a tanker, which would be about $6 million in the case of the Exxon Valdez, a $125 million vessel. Exxon has estimated that the spill will cost $1.3 billion.

Source: Chevron Shipping Company

GROUNDING COMPARISON — DOUBLE HULL vs SINGLE HULL



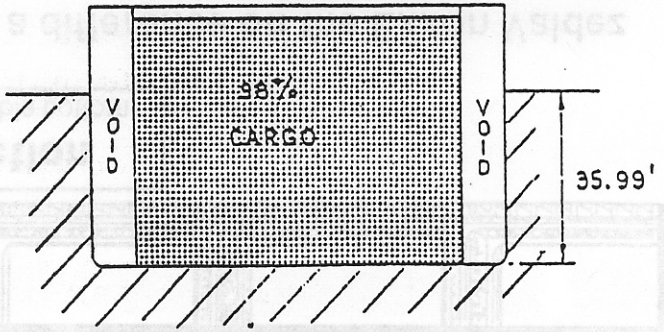




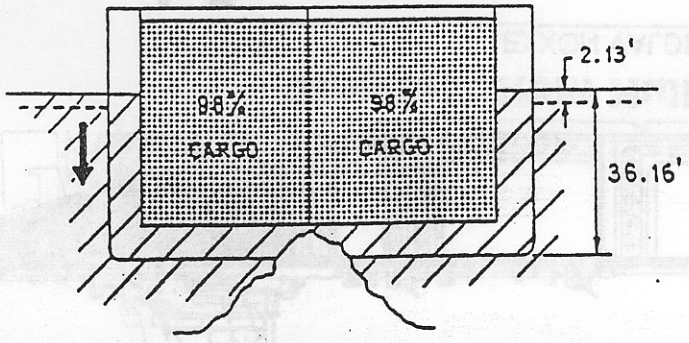
DOUBLE HULL
FULLY LOADED CONDITION

SUMMARY

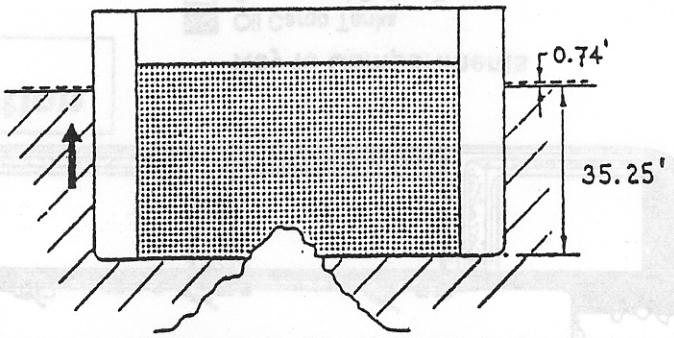
DOUBLE HULL VESSEL WILL BE 2.87' HARDER AGROUND THAN THE SINGLE HULL VESSEL



SINGLE HULL
FULLY LOADED CONDITION



AFTER GROUNDING



AFTER GROUNDING

APPENDIX A

DESCRIPTION OF EQUIPMENT

'BIEHL TRADER' - ERV1

LOCATION:	Valdez - Rotating escort service
REGISTRY:	
Home port:	Houston, Tx
Built:	1977, Campbell Industries, San Diego, Ca
Type:	Anchorhandling towing / supply vessel
Class:	ABS; +A-1, E, AMS, ACCU, Tug / Supply Ice Class "C"
Gross tons / Net tons:	1184 / 484
CHARACTERISTICS:	
Length o.a.:	209 ft 9 in
Beam o.a.:	42 ft 8 in
Depth:	20 ft 8 in
Maximum draft:	17 ft 7 in
Displacement:	2750 tons
Deadweight:	1100 tons
Deck space:	110 ft x 34 ft
PERFORMANCE:	
Normal running speed / Maximum:	13.5 kt / 15.7 kt
Bollard pull:	100 ton
PRIMARY SPILL RESPONSE:	
Containment Boom:	3000 ft Expandi 4300, on 2 ea deck reels (1500ft/rl) 500 m (1600 ft) Vikoma Ocean Boom, on deck reel
Skimming System(s):	2 ea Vikoma SS50 disc type
Deck crane(s):	1 ea 8 ton hydraulic - 3 ton SWL
Workboat(s):	1 ea 20 ft
Refer to appropriate equipment specifications for additional information	
TOWING & ANCHOR HANDLING:	
Towing & anchor handling winches:	Three drum waterfall
Towing Drum:	Pull: 60 tons; Brake: 315 tons
Anchorhandling drum:	Pull: 32 tons; Brake: 125 tons
Break drum:	Pull: 150 tons; Brake: 250 tons
Stern roller:	Yes
Ground tackle:	2 ea 4400 lb bow anchor, 1800 ft ea 1-3/4" studlink chain 1 ea 3300 lb Pool type spare bow anchor
CAPACITIES:	
Recovered oil storage:	
Deck tank:	150 bbl; heatable
Below deck:	3760 bbl
Fuel oil:	138,000 gal, 450 tons
Drill water:	(Designated for recovered oil storage - see above) addl 210 tons capacity in rig chain lockers
Potable water:	29,000 gal, 110 tons
Bulk tanks:	6275 cu ft
Deck cargo:	500 tons
MACHINERY:	
Main propulsion:	7500 bhp total 2 ea De Laval Enterprise DMR-46 diesels, each operating a controllable pitch propeller in a nozzle
Bow thruster:	310 hp diesel / electric
Generators:	4 ea 170 kva diesels
COMMUNICATIONS:	
SSB radio telephone:	2 ea
VHF:	2 ea + 2 ea handheld
Call sign:	WYK 2365
CREW (typical):	10 Crew: Master, Chief Mate, 2nd Mate, Chief Engineer, 2nd Engineer, 3rd Engineer, 3 ABS, Cook
ACCOMODATIONS:	Certified for 20 persons total

Source: Tanker Spill Prevention and Response Plan for Prince William Sound.
Alyeska Pipeline Service Company. August 1989.

DESCRIPTION OF EQUIPMENT

'BIEHL TRAVELER' - ERV2

LOCATION:	Valdez - Rotating escort service
REGISTRY:	
Home port:	Houston, Tx
Built:	1977, Campbell Industries, San Diego, Ca
Type:	Anchorhandling towing / supply vessel
Class:	ABS; +A-1, E AMS, ACCU, Tug / Supply Ice Class "C"
Gross tons / Net tons:	1184 / 484
CHARACTERISTICS:	
Length o.a.:	209 ft 9 in
Beam o.a.:	42 ft 8 in
Depth:	20 ft 8 in
Maximum draft:	17 ft 7 in
Displacement:	2750 tons
Deadweight:	1100 tons
Deck space:	110 ft x 34 ft
PERFORMANCE:	
Normal running speed / Maximum:	13.5 kt / 15.7 kt
Bollard pull:	100 ton
PRIMARY SPILL RESPONSE:	
Containment boom:	3000 ft Expandi 4300, on 2 ea deck reels (1500 ft/reel)
	500 m (1600 ft) Vikoma Ocean Boom, on deck reel
Skimming system(s):	2 ea Vikoma SS50 disc type
Deck crane(s):	1 ea 8 ton hydraulic - 3 ton SWL
Work boat(s):	1 ea 20 ft

Refer to appropriate equipment specifications for additional information

TOWING & ANCHOR HANDLING:	
Towing & anchor handling winches:	Three drum waterfall
Towing drum:	Pull: 60 tons; Brake: 315 tons
Anchorhandling drum:	Pull: 32 tons; Brake: 125 tons
Break drum:	Pull: 150 tons; Brake: 250 tons
Stern roller:	Yes
Ground tackle:	2 ea 4400 lb bow anchor, 1800 ft ea 1-3/4 " studlink chain
	1 ea 3300 lb Pool type spare bow anchor
CAPACITIES:	
Recovered oil storage:	
Deck tank:	150 bbl; heatable
Below deck:	3760 bbl
Fuel oil:	138,000 gal, 450 tons
Drill water:	(Designated for recovered oil storage - see above)
	add'l 210 tons capacity in rig chain lockers
Potable water:	29,000 gal, 110 tons
Bulk tanks:	6275 cu ft
Deck cargo:	500 tons
MACHINERY:	
Main propulsion:	7500 bhp total, 2 ea De Laval Enterprise DMR-46 diesels,
	each operating a controllable pitch propeller in a nozzle
Bow thruster:	310 hp diesel / electric
Generators:	4 ea 170 kva diesels
COMMUNICATIONS:	
SSB radio telephone:	2 ea
VHF:	2 ea + 2 ea handheld
Call sign:	WYK 2364
CREW (typical):	10 crew: Master, Chief Mate, 2nd Mate, Chief Engineer, 2nd Engineer, 3rd Engineer, 3 ABS, Cook
ACCOMODATIONS:	Certified for 20 persons tota

PRINCE WILLIAM SOUND - EMERGENCY TOWING CONTINGENCY PLAN

RECOMMENDED TOWAGE PACKAGE EQUIPMENT SPECIFICATIONS

1. Towing Wire

Length: 400 feet between bearing points of the thimbles

Diameter: 2 1/4 inches

Wire Grade: X IPS preformed galvanized

Breaking Strength: 463,000

Core: I.W.R.C.

End Fittings: heavy duty 2 1/4 inch alloy steel Hawser thimble or equivalent

Lubrication: heavy duty asphaltic

Weight: 1 foot = 10 pounds

2. Polypropylene Floating Pick-up Line

Length: 720 feet

Size: 6 inch circumference

Breaking Strength: 46,800 pounds

S.W.L.: 6,700 pounds

Construction: 8 stranded braided AMC polypropylene rope

Fittings: Thimble hard eye spliced on one end, and 30 inch soft eye spliced on the other end

3. Floating Pick-Up Buoy ("SEAFLOAT")

Length: 30 inches

Size: 20 inch diameter

Pull Through Load: 5,000 pounds

Weight: 40 pounds

Internal Diameter of Eye: 2 1/4 inches

Color: International orange for high visibility

Source: Tanker Spill Prevention and Response Plan for Prince William Sound. Alyeska Pipeline Service Company. August 1989.

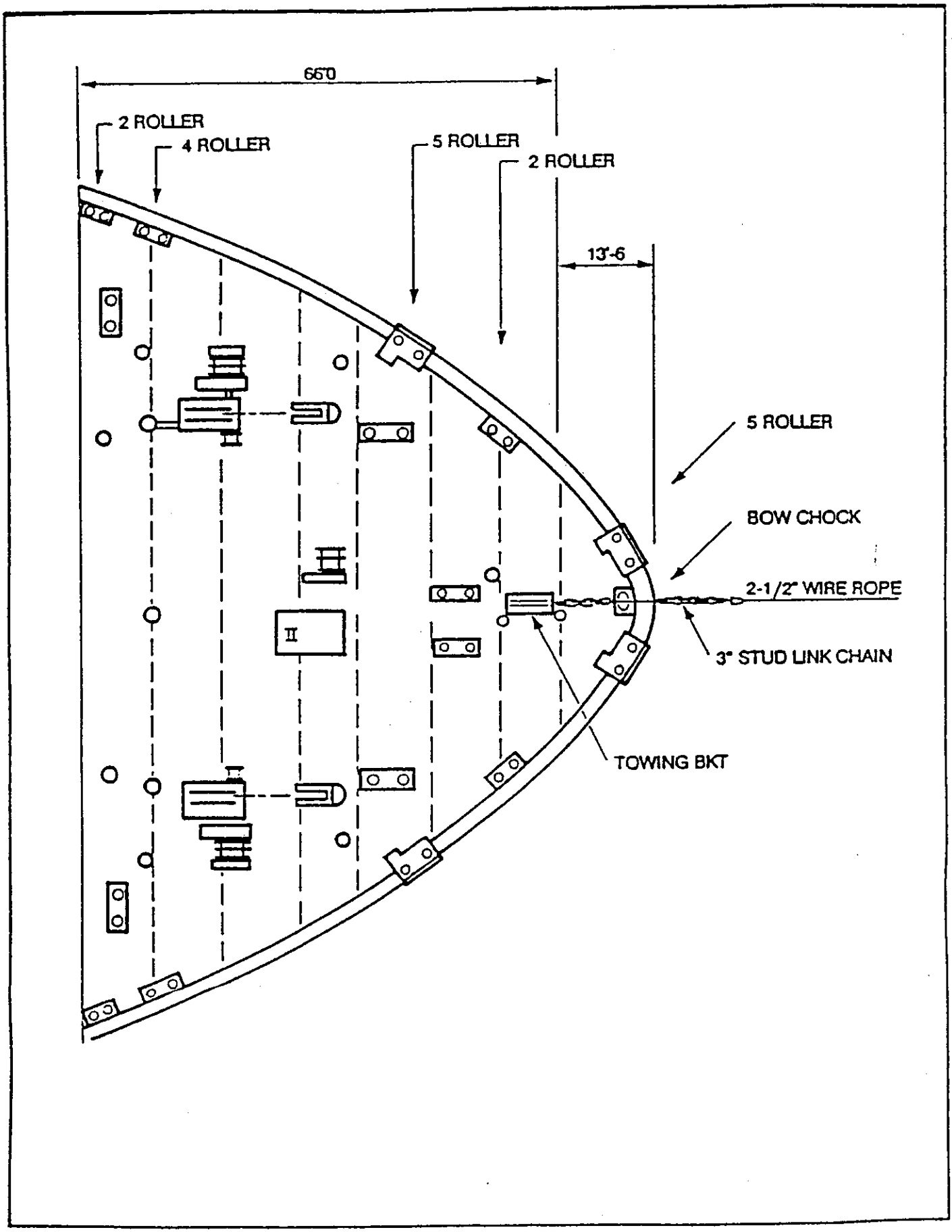
4. Connecting Shackle

Size: 2 1/4 inch diameter "D" shackle with 4 1/8 inch jaw openings

Breaking Strain: 55 tons

The following additional equipment may be useful during the rigging stage and should be readily available:

1. One sledge hammer
2. Two chain stoppers suitable for use with 2 1/4 inch wire.
3. Two rope messengers of adequate length.
4. Adequate supply of heaving lines.
5. Three inch lashings of securing wire, in order to conduct a controlled streaming of the wire.
6. Grappling hook


66'0
2 ROLLER
4 ROLLER
5 ROLLER
2 ROLLER
13'-6
5 ROLLER
BOW CHOCK
2-1/2" WIRE ROPE
3" STUD LINK CHAIN
TOWING BKT

SUMMARY BY RESOURCE

AIRCRAFT SUPPORT
AIRPHOTO TECH, INC.
AIR LOGISTICS OF ALASKA
ALASKA HELICOPTERS, INC.
AVIATION SYSTEMS, INC.
BIEGERT AVIATION, INC.
ERA AVIATION, INC.
EVERGREEN HELICOPTERS
FRONTIER FLYING SERVICE
MARKAIR, INC
NORTHERN AIR CARGO, INC.
SECURITY AVIATION

CAMP FACILITIES
POOL ARCTIC ALASKA

COMMUNICATIONS
ALASCOM, INC.
ALASKA TELECOM
COMTEC BUSINESS SYSTEMS
MICROCOM

CONSULTANT
CH2M HILL
FLUOR DANIELS
SPILTEC
UNDERWATER CONSTRUCTION, INC.
UNIVERSITY OF ALASKA
ANCHORAGE
FAIRBANKS

CLEANUP EQUIPMENT
N.C. MACHINERY COMPANY
VECO

EQUIPMENT MAINTENANCE
EARTHMOVERS OF FAIRBANKS
N.C. MACHINERY COMPANY
SEWARD SHIP CHANDLERY
VIKOMA INTERNATIONAL, LTD.

FOOD SERVICES
COMPAS AHTNA
STATEWIDE SERVICES

GROUND TRANSPORTATION
ALASKA PACIFIC TRANSPORT
FRONTIER TRANSPORTATION COMPANY

LABOR
AIME
AHTNA CONSTRUCTION
EARTHMOVERS OF FAIRBANKS
MORRISON-KNUDSEN
NORTH EMPLOYMENT AGENCY, INC.
NORTHWEST TECHNICAL SERVICES
PRICE / AHTNA
VRCA, INC.

LAND-LEGAL/PERMITTING
LAND FIELD SERVICES

MEDICAL/INDUSTRIAL HYGIENE
IT CORPORATION
MORRESEY, LEO K. DR.

PUBLIC RELATIONS
MURRAY, BRADLEY, INC.

SECURITY
AMERICAN GUARD & ALERT
WACKENHUT OF ALASKA

SHORE FACILITIES/AREA
TESORO ALASKA PETROLEUM CO.
VALDEZ DOCK COMPANY

TRAINING
PETROLEUM INDUSTRY TRAINING SERVICE
VIKOMA INTERNATIONAL, LTD.

WATERCRAFT SUPPORT
COASTWISE TRADING COMPANY (AMOCO)
CROWLEY MARITIME
FOSS MARITIME
PUGET SOUND TUG & BARGE
SMIT INTERNATIONAL (AMERICAS)
UNITED MARINE TUG & BARGE
ZAPATA GULF MARINE CORPORATION

WASTE ANALYSIS/MANAGEMENT
AMERICAN NORTH, INC.
CHEMICAL & GEOLOGICAL LAB OF ANCHORAGE
ENVIRONMENTAL SCIENCE & ENGINEERING
IT CORPORATION
NORTHERN TESTING LABS
NORTHWEST PROCESSING

WILDLIFE SUPPORT
INTERNATIONAL BIRD RESCUE CENTER

Source: Prince William Sound Oil Spill Response Plan of the Alyeska Corporation

ALPHABETICAL LISTING BY SUPPLIER

AHTNA CONSTRUCTION & PRIMARY PRODUCTS
Drawer G
Copper Center, AK 99573
Roy Ewan (907)
(907) 822-3476
CRAFT LABOR
Expiration: 12/31/90

AIME
P. O. Box 3130
Anchorage, AK 99523
Cortney Broberg
(907) 346-3312
SCADA LABOR SUPPORT
Expiration: 3/31/90

AIR LOGISTICS OF ALASKA
1812 East 5th Avenue
Anchorage, AK
Michael Risk
(907) 452-1197
AIRCRAFT SUPPORT
Expiration: 5/31/90

ALASCOM, INC.
629 E Street
Anchorage, AK 99501
Frank Whiton
(907) 456-9662
COMMUNICATIONS SUPPORT
Expiration: When Cancelled

ALASKA HELICOPTERS, INC.
P. O. Box 190283
Anchorage, AK 99519
Rex Bishopp
(907) 243-3409
AIRCRAFT SUPPORT
Expiration: 1/31/90

ALASKA PACIFIC TRANSPORT
Dave Faulk 349-9899
7900 King St.
Anchorage, Ak
GROUND TRANSPORTATION SUPPORT

ALASKA TELECOM, INC.
6623 Brayton Drive
Anchorage, Ak
344-1223
COMMUNICATIONS SUPPORT

AMERICAN GUARD & ALERT
1413 Hyder Street
Anchorage, AK 99510
D. L. Evans
(907) 272-8884
GUARD SERVICES
Expiration: 11/1/89

BIEGERT AVIATION, INC.
22022 South Price Road
Chandler, AZ 85224
James Jefferies
(602) 895-0444
AIRCRAFT SUPPORT
Expiration: 1/31/90

AMERICAN NORTH
201 E. 56th, Suite 200
Anchorage, Ak
Glen Akins 562-3452
WASTE MANAGEMENT / ENVIRON.
DAMAGE ASSESSMENT

CHEM AND GEO LAB'S
5633 B St.
Anchorage, Ak
Steven Edy 562-2343
TAPS 3747
Lab Testing / Analysis
Expiration: When cancelled

CH2M HILL, INC.
Denali Tower North
2550 Denali Street
Anchorage, Ak 99503
Dan Rowley (907) 278-2551
ENGR / ENVIRONMENTAL PERSONNEL

COASTWISE TRADING CO. 2501
Palmer Highway,
Suite 110
Texas City, TX 77590-7091
Walter Kristiansen
(713) 474-2644
ESCORT VESSELS
Expiration: 7/13/90

ALPHABETICAL LISTING BY SUPPLIER (CONTINUED)

COMPAS AHTNA
2525 Gambell Street
Anchorage, AK 99503
Roy Goodman
(907) 287-1310
CATERING SERVICES
Expiration: 12/31/90

COMTEC BUSINESS SYSTEMS
611 E 12th Ave.
Anchorage, Ak
276-6630
COMMUNICATIONS SUPPORT

EARTHMOVERS OF FAIRBANKS
925 Aurora Drive
Fairbanks, AK 99709
Jim Thurman
(907) 456-5087
EQUIPMENT MAINTENANCE
Expiration: 12/31/90

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
1205 E. International Airport Rd
Anchorage, Ak
561-3055
WASTE ANALYSIS

ERA AVIATION, INC.
6160 South Airpark Drive
Anchorage, AK 99502
D. Baumiester
(907) 248-4422
AIRCRAFT SUPPORT
(TAPS 3503) Exp.: 5/31/91

EVERGREEN HELICOPTERS
1935 Merrill Field Drive
Anchorage, AK 99501
Victor Frase
(907) 276-2454
AIRCRAFT SUPPORT
Expiration: 1/31/90

FLUOR DANIELS
900 W 5th Ave, Suite 300
PO Box 196680
Anchorage, Ak 99519
Gordon Stevens (907) 276-2636
ENGR CONSULTANTS / PERSONNEL

FOSS MARITIME
660 West Ewing Street
Seattle, WA 98119
Steve Scalzo
(206) 453-0985
BARGE SUPPORT
Expiration: 5/8/90

FRONTIER FLYING SERVICE
3820 University Avenue
Fairbanks, AK 99701
Gerry Rocer
(907) 474-0014
AIRCRAFT SUPPORT
Expiration: 1/31/90

FRONTIER TRANSPORT CO.
6710 Wes Way
Anchorage, AK 99518
Dean McKenzie
(907) 349-5944
SURFACE FREIGHT CONSOLID.
(TAPS 4587) Exp.: 11/30/89

FRONTIER TRANSPORT CO.
6710 Wes Way
Anchorage, AK 99518
Dean McKenzie
(907) 349-5944
SURFACE FREIGHT TRANSPORT
(TAPS 4723) Exp.: 1/31/91

INTERNATIONAL BIRD RESCUE CENTER
699 Potter Drive
Berkeley, CA 94710
Alice Berkner
(415) 841-9084
BIRD RESCUE SERVICES
Expiration: When Cancelled

I. T. CORPORATION
575 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830
(615) 481-3300
ENVIRONMENTAL CONSULTING
INDUSTRIAL HYGIENE TESTING/TRAINING

LAND FIELD SVCS., INC.
Fairbanks Ak
456-1206
LAND / LEGAL PERMITTING

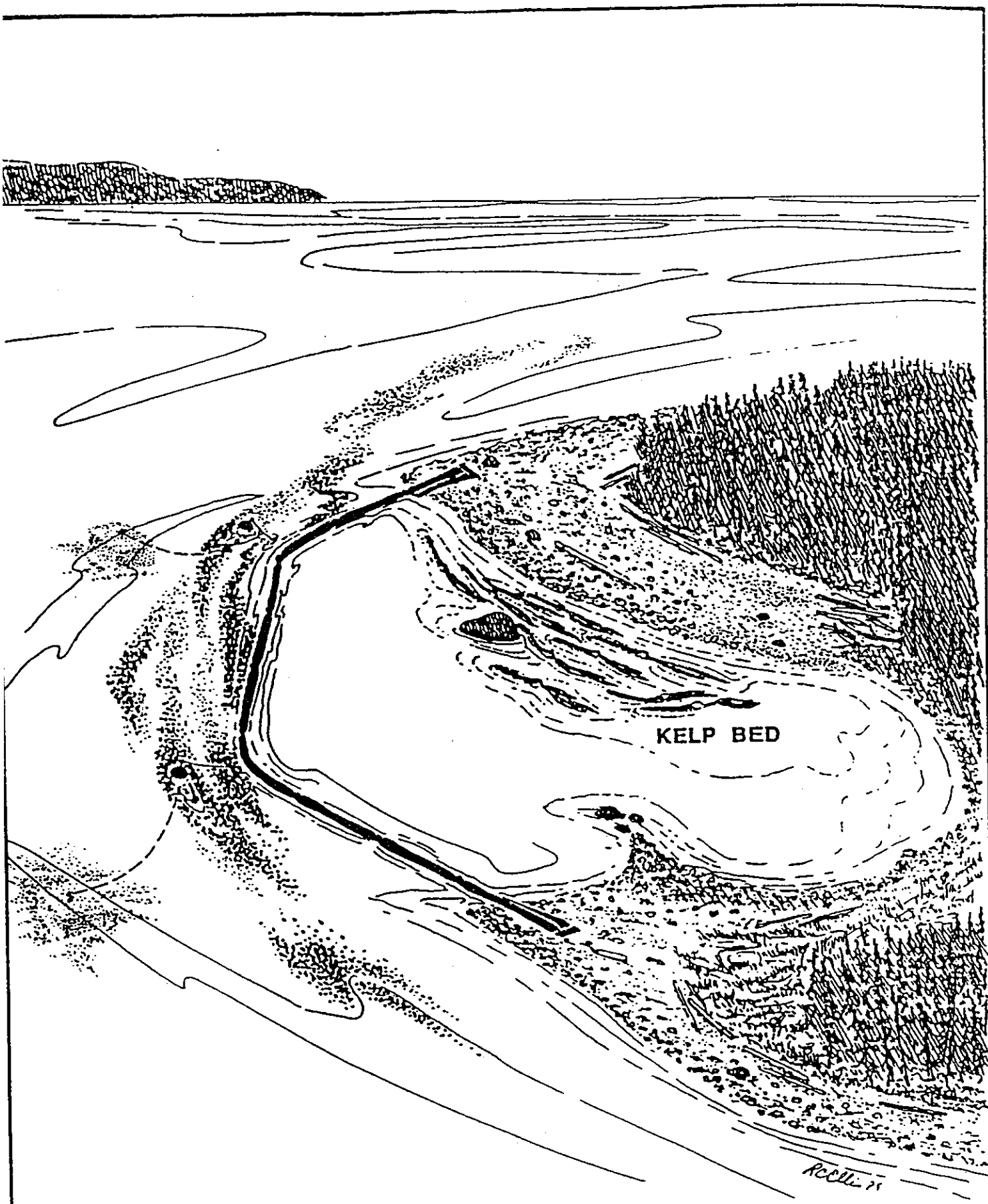


FIGURE 503.6-3 SHORELINE CONTAINMENT: EXCLUSION BOOMING

EXAMPLE OF BRIEF OF PERSONNEL AND INFORMATION INVENTORY FOR SEA OTTERS.

SEA OTTERS

Of the marine mammals, the sea otter is the most sensitive to the effects of oiling. This fact — plus its relatively small size and its listing as "threatened" in California under the Endangered Species Act — has resulted in the development of techniques for capturing, cleaning, and rehabilitating oiled otters. While sea otters in Alaska are not "threatened," they are protected under the Marine Mammal Protection Act.

Because sea otters do not have layers of blubber, they rely on their fur for thermoinsulation. As a result, direct oiling of more than a small portion of their fur may result in rapid death from hypothermia. In addition, irritation of their eyes may occur. Furthermore, otters groom frequently to maintain the conditioning of their fur. This behavior can cause ingestion of oil, which in turn may cause digestive-tract irritation, possible neurological changes, and physiological stress of the kidneys. The sea otter is considered to be equally vulnerable to spilled oil during all stages of its life cycle.

RESPONSE STRATEGIES

Primary Response. Because of their sensitivity to oiling and stress, primary response strategies should be emphasized for sea otters.

Secondary Response. This response may be feasible; however, deterring techniques have not been very successful because sea otters appear to habituate very easily to noise and other distractions associated with human activity.

Capturing and relocating sea otters may be feasible if only a few are in danger of being oiled. However, the potential for sea otters to be oiled should be high before this technique is used. Capture techniques are discussed in the Western Oil and Gas Association's Sea Otter Oil Spill Contingency Plan. Herding sea otters with boats, seismic exploders, and killer whale sounds have provided limited success for deterring sea otters.

Tertiary Response. This response may be feasible under certain conditions. The response and cleaning techniques developed for sea otters in California may be modified for those in Alaska. The reports providing these guidelines are presented below.

EXPERTS: ARRT AGENCIES

Mimi Hogan — Technical expert - sea otters
Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
(907) 786-3444

Tony DeGange — Technical expert - sea otters
Fish and Wildlife Service, Research
1011 E. Tudor Road
Anchorage, AK 99503
(907) 786-3444

Source: Prince William Sound Tanker Spill Response plan of Alyeska Pipeline Service.

SEA OTTERS, CONT

EXPERTS: OTHERS

Dr. Charles W. Monnett
P.O. Box 1846
Cordova, AK 99503
(907) 424-5475

Technical expert - sea otters

Dr. Carolyn McCormick
15536 Husky Street
P.O. Box 772564
Eagle River, AK 99577
(907) 688-2668

Veterinarian - sea otter experience

Dr. Ken Hill
Prince William Sound Veterinary Clinic
Box 1290
Cordova, AK 99574
(907) 424-3498

Veterinarian - sea otter experience

Dr. Randall Davis
Hubbs Marine Research Center
1700 South Shores Road
San Diego, CA 92109

Transporting, cleaning, rehabilitating oiled sea otters

Dr. Pat Gullett
California Dept of Fish and Game
Wildlife Investigations Lab
Rancho Cordova, CA 95670
(907) 355-0124

Veterinarian - sea otter experience in Alaska

Dr. Thomas D. Williams
Aqujito Veterinary Hospital
Monterey, CA. 93940
(408) 372-8151

Veterinarian - sea otter experience in Alaska

Dr. T. A. Gornall
2201 34th Avenue, W.
Seattle, WA 98199
(206) 285-0515

Veterinarian - sea otter experience in Alaska

MANUALS: DETERRENTS, CAPTURING, CLEANING, REHABILITATING

Hubbs Marine Research Institute. 1986. Sea Otter Oil Spill Mitigation Study. Pacific OCS Region. Minerals Management Service. U.S. Department of the Interior. Contract No. 14-12-001-30157.

The major emphasis of the study was the development of a safe and effective procedure to clean and rehabilitate oiled sea otters. A recommended protocol for capturing, transporting, cleaning, and rehabilitating oiled sea otters in California is outlined. It should be noted that in California, sea otters are listed as "threatened"

SEA OTTERS CONT

under the Endangered Species Act. While sea otters in Alaska are not "threatened," they are protected under the Marine Mammal Protection Act. The status of sea otters may affect recommended protocols in Alaska, which may differ from those in California.

Western Oil and Gas Association. 1987. Sea otter oil spill contingency plan. Hooks, McCloskey, and Associates, Inc.

This document was developed by Western Oil and Gas Association as a technical database for use by the California Department of Fish and Game in updating the sea-otter section of the state's oil-spill contingency plan. This document synthesizes available information about the activities and procedures that government agencies and industry could implement in the event that an oil spill threatens or affects sea otters in California. It should be noted that in California, sea otters are listed as "threatened" under the Endangered Species Act. While sea otters in Alaska are not "threatened" they are protected under the Marine Mammal Protection Act. The status of sea otters may affect recommended protocols in Alaska, which may differ from those in California.

Mate, B., and B. Harvey. Acoustic Deterrents for Marine Mammals, Oregon Sea Grant Report ORESU-W-86-001.

RESOURCE INFORMATION

Calkins, D.G. and K. B. Schneider. 1985. The Sea Otter (Enhydra lutris). In: J.J. Burns, K.J. Frost, and L.F. Lowry, eds. Marine Mammal Species Accounts. Alaska Department of Fish and Game Technical Bulletin 7.

Kenyon, K.W. 1969. The Sea Otter in the Eastern Pacific Ocean, N. Am. Fauna 68.

Kenyon, K.W. 1982. Sea Otter (Enhydra lutris). In: J.A. Chapman and G.A. Feldhamer, eds. Wild Mammals of North America; Biology, Management, Economics. The Johns Hopkins University Press, Baltimore, Maryland.

Packard, J.M. 1982. Potential Methods for Influencing the Movements and Distribution of Sea Otters: Assessment of Research Needs. Marine Mammal Commission. Washington, D.C. (Aval. Nat. Tech. Inf. Serv., PB 83-109926).

Riedman, M.L. 1987. Summary of Information on the Biology of the Sea Otter. Final Environmental Impact Statement for Proposed Translocation of Southern Sea Otters. Vol. II: Technical Support Documents. FWS and University of California, Santa Cruz.

Rotterman, L.M. and T. Simon-Jackson. 1988. Sea Otter, Enhydra lutris, a Species Account with Research and Management Recommendations. Prepared for the Marine Mammal Commission, Washington, D.C.

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005
202-682-8100

Charles J. DiBona
President

August 2, 1989

Mr. David Anderson
Special Advisor to the Premier
on Oil Transportation and Oil Spills
Province of British Columbia
Parliament Buildings
Victoria
British Columbia V8V 1X4
Canada

Dear Mr. Anderson:

I understand your concern about whether the new Petroleum Industry Response Organization (PIRO) would respond to tanker oil spills in Canadian waters. Those who have helped develop the U.S. petroleum industry's new program certainly agree with you that oil spills do not respect national boundaries and must be dealt with regardless of the location of the tanker accident.

While PIRO would have the resources to deal with major tanker spills in U.S. waters, nothing in the new program would prevent a PIRO response to a spill in Canadian or other foreign waters.

It is our understanding that the states of Washington, Oregon, Alaska and the Province of British Columbia have formed a "States/British Columbia Oil Spill Task Force" in which you are involved. As this group works to develop a coordinated contingency plan for response to a major spill in common waters, consideration of appropriate PIRO involvement would be welcomed.

Under the program, PIRO would respond to spills whenever the U.S. Coast Guard requests its involvement. A spill in foreign waters would most likely come under the jurisdiction of another nation, but if the U.S. Coast Guard asked PIRO to respond to a foreign spill, it would.

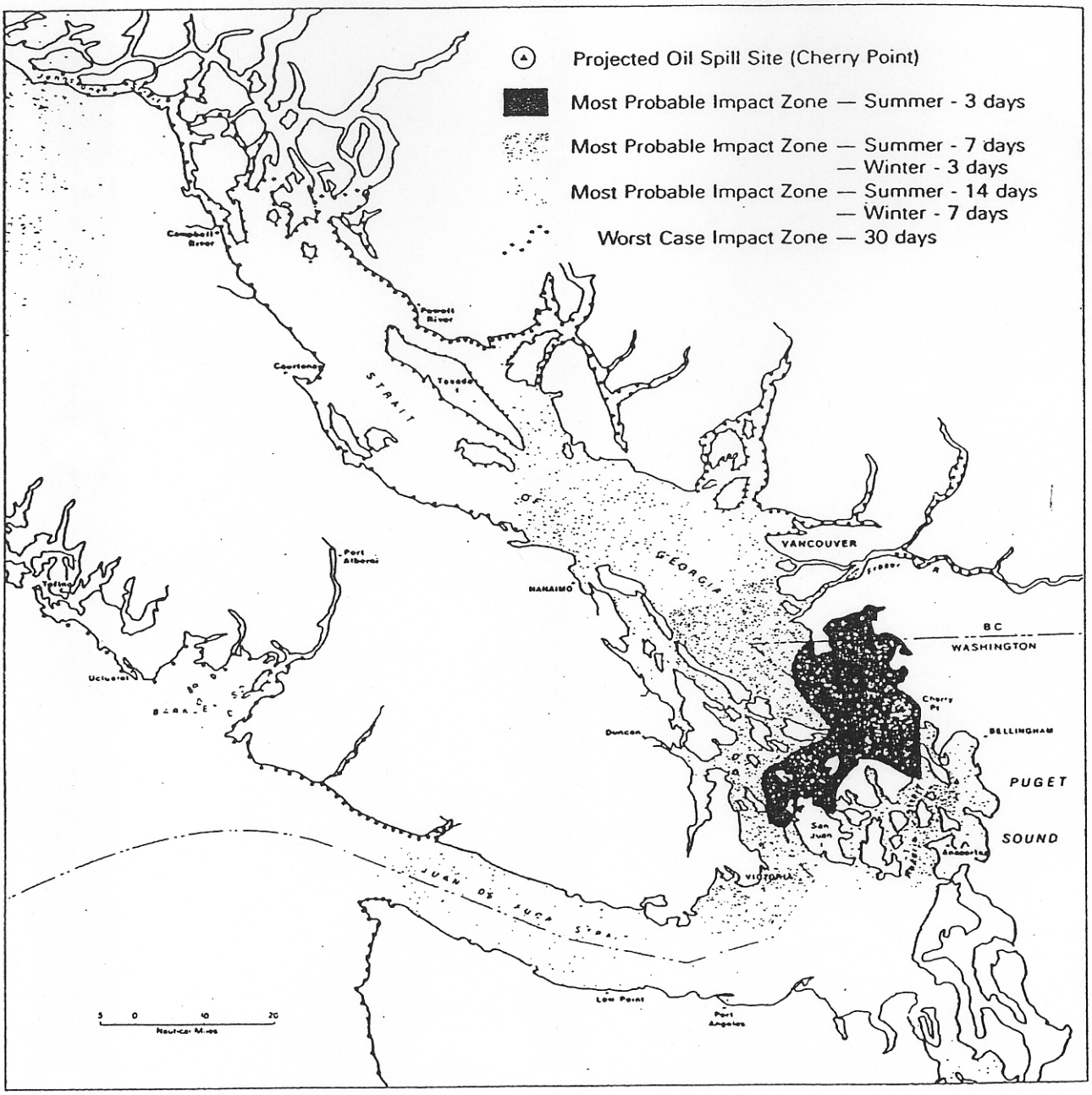
As you requested, I am enclosing a copy of the API Oil Spill Task Force report. The concerns of you and others in Canada will certainly be taken into account as the new industry program is implemented.

Sincerely,

Charles J. DiBona

Enclosure

Projected impact of an Oil Spill in Rosario Strait.



Cherry Point

Source: Province of British Columbia
(Oil Tanker Traffic - Assessing
the Risks for the Southern
Coast of British Columbia - 1980)

APPENDIX H

Source: "Oil Spills and the Fishing Industry", Fisheries Management Foundation, Seattle. 29 July 1989

Fishing Vessel Capabilities for Oil Spill Response.

1. Containment of the spill, deploying, anchoring and tending booms. This includes oil diversion booms and sorbent booms.

2. Planning and identification of sensitive areas for fisheries and wildlife.

3. Oil collection including using fishing vessels as skimmers of-opportunity, as tow boats for oil collection booms used with dedicated skimmers or as "pair trawlers" with oil booms to collect and concentrate oil for pick-up by skimmers. They can be used to recover oiled debris, including sorbents (Figure 2).

4. Maintenance and repair of equipment, both onshore and afloat. Many tenders and larger crab boats are equipped with cranes, welding and burning equipment and hand tools.

5. Clean up of boats, boat harbors, shorelines.

6. Logistics and supply of chartered boats, chartered aircraft (fish spotters) and miscellaneous equipment and services.

7. Public information. As an integral part of the local community, the views and comments of the fishing industry personnel make good press. Responsible factual and technically accurate information, rather than dire subjective comments can promote healing and aid in the clean-up response.

8. Damage assessment; including biological studies of seafood taken with commercial gear and water samples for hydrocarbon contamination, transportation for scientists and supplies.

9. Housing afloat for marine work crews.

10. Procurement, transportation and distribution of food and supplies to offshore operations.

11. Transportation of supplies and, to a limited degree, personnel including work crews, press and special visitors to the spill site.

12. Communications centers and command posts. Large (200 feet) factory trawlers, often equipped with satellite communication sets (SATCOM) and other radio equipment, including fax and telex, could make excellent offshore command centers for spill control and offshore hotel space.

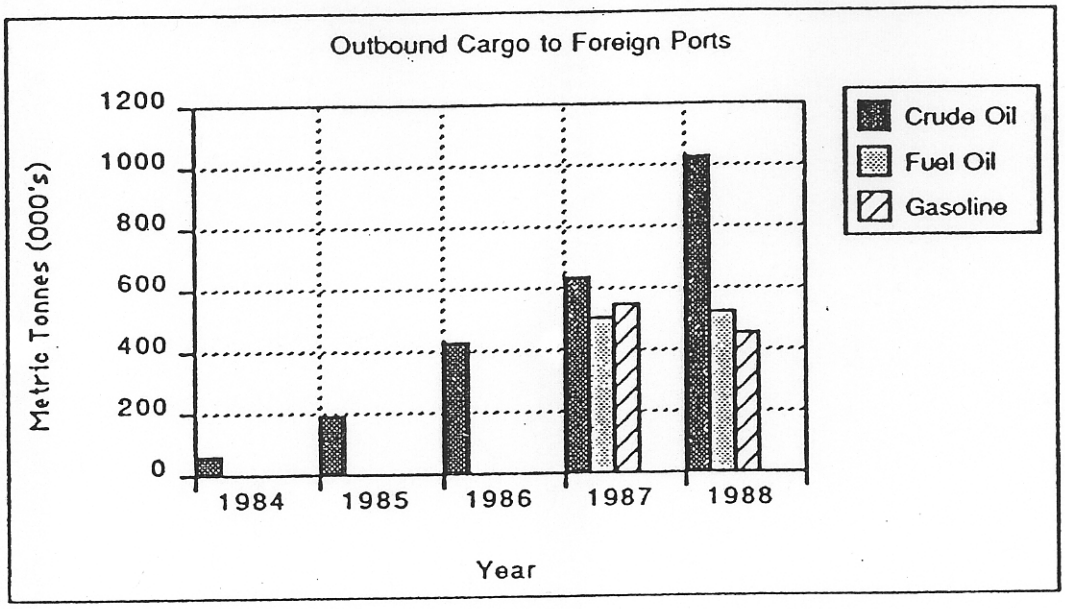
Port of Vancouver Statistics
5-Year Comparison of Principal Commodities Traffic

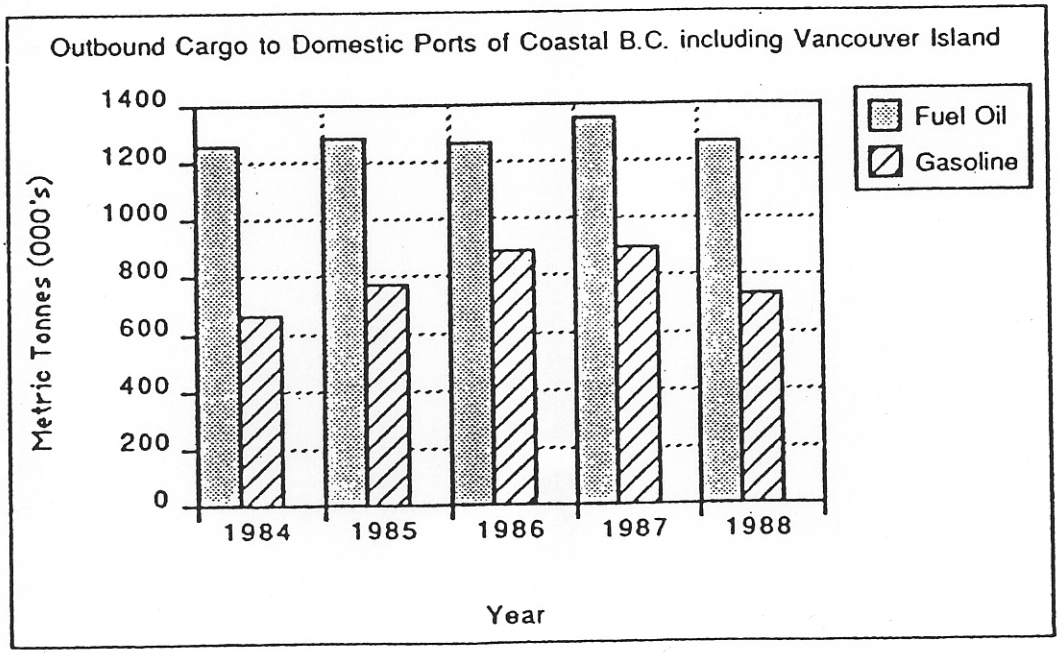
Outbound Cargo to Foreign Ports

Year	Crude Oil	Fuel Oil	Gasoline
1984	61	No data	No data
1985	190	No data	No data
1986	430	No data	No data
1987	638	500	546
1988	1025	522	454

Outbound Cargo to Domestic Ports

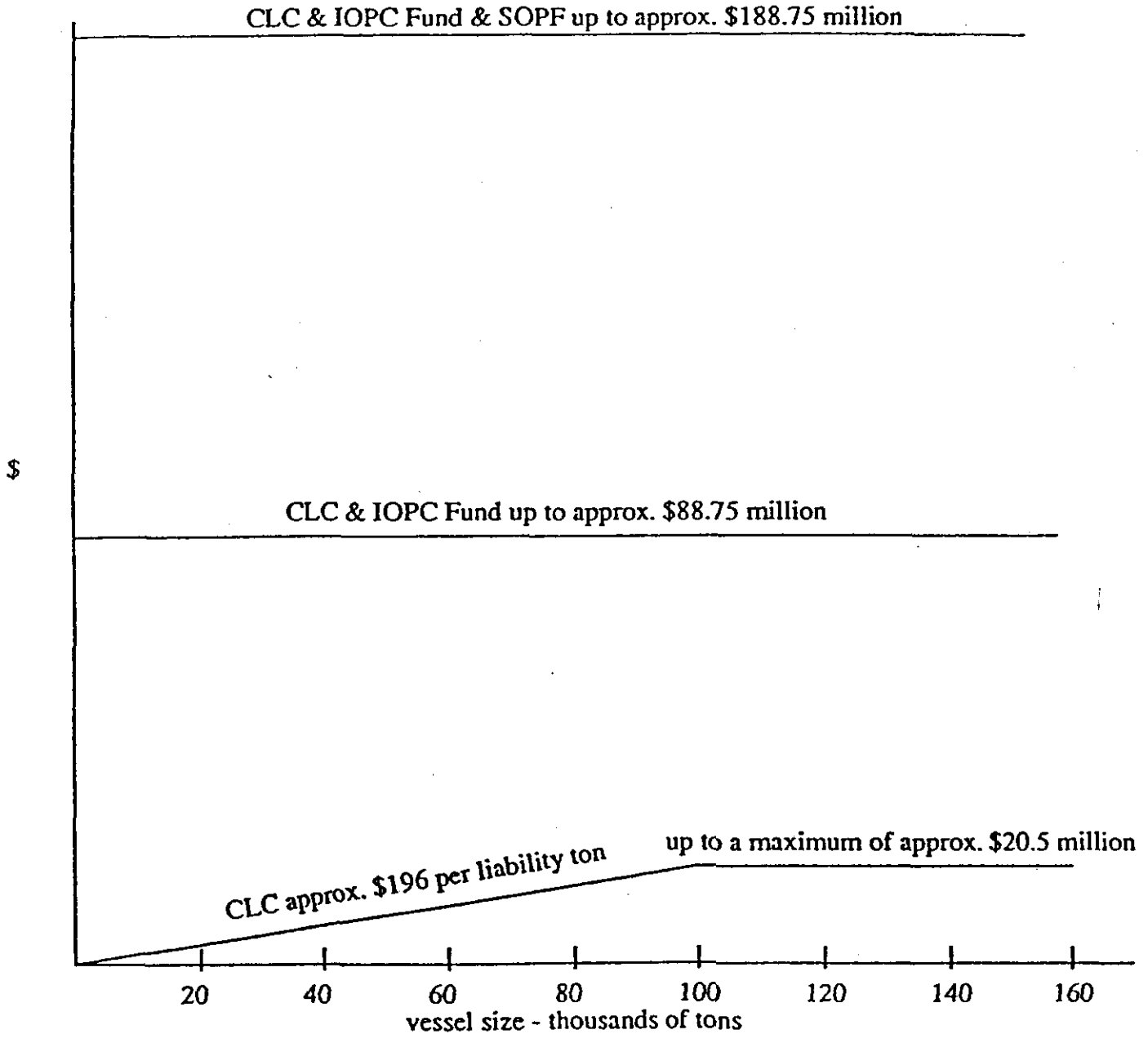
Year	Fuel Oil	Gasoline
1984	1256	667
1985	1283	767
1986	1269	881
1987	1357	895
1988	1265	735





Canada Shipping Act Part XVI - Compensation for Oil Pollution Damage in respect of any one incident involving a laden tanker

(Canadian dollars based on the value of the SDR at 25 August 1989)



(1) 1969 Civil Liability Convention (CLC) provides compensation of up to approx. $20.5 million.

(2) International Oil Pollution Compensation Fund (IOPC Fund) and CLC provide aggregate compensation of up to approx. $88.75 million.

(3) Shipsource Oil Pollution Fund (SOPF), IOPC Fund and CLC provide a combined amount of up to approx. $188.75 million for any one incident involving a laden tanker.

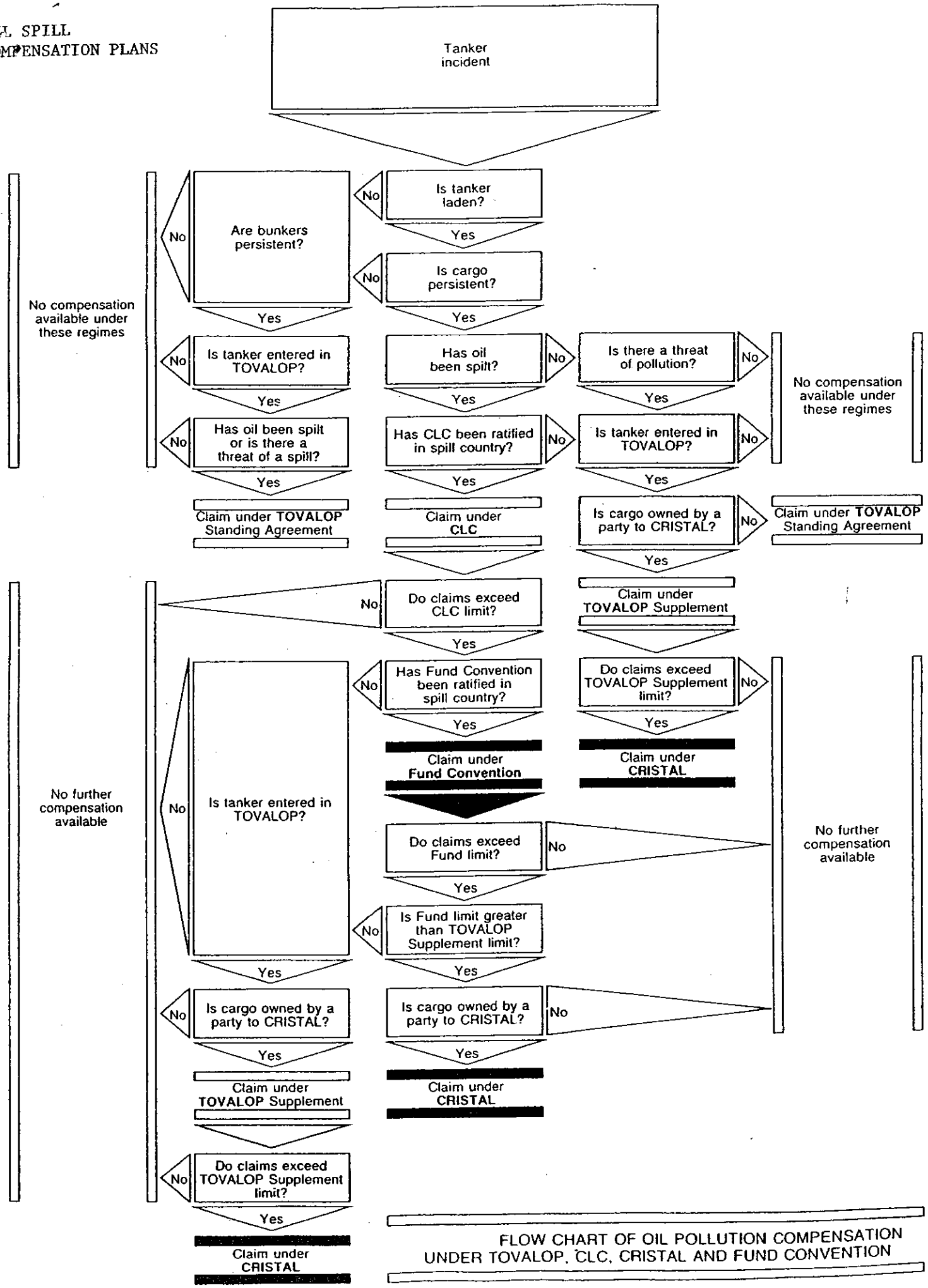
Note: The SOPF provides up to $100 million over and above the funds available under the IOPC Fund and CLC and is also available for oil spills from other classes of ships and certain claims for loss of income.

COMPENSATION FOR OIL SPILLS FROM TANKERS

	Primary Compensation provided by Shipowners			Supplementary Compensation provided by Cargo Owners	
	TOVALOP Standing Agreement	TOVALOP Supplement	CLC, 1969	CRISTAL	Fund Convention, 1971
Nature of regime	**Voluntary plan**	**Voluntary plan**	**International convention**	**Voluntary plan**	**International convention**
When does each apply?	When persistent oil threatens to escape or does *escape from* a participating tanker Tanker is not required to be loaded with cargo and no spill need occur	When persistent oil threatens to escape or does *escape from* a participating tanker Tanker must be loaded with CRISTAL-owned cargo although no spill of cargo need occur	When persistent oil escapes from a laden tanker No liability if tanker is unladen or if no oil is actually spilt	When persistent oil threatens to escape or does escape from a tanker Tanker must be loaded with CRISTAL-owned cargo and compensation paid by tanker owner up to TOVALOP Supplement *limit*	When persistent oil escapes from a laden tanker No liability if tanker is unladen or if no oil is actually spilt. Ownership of *cargo irrelevant*
Where can each apply?	*Only when* CLC, 1969 does not apply	*Worldwide*	In States party to CLC, 1969	Worldwide	In States party to CLC, 1969 and Fund Convention, 1971
Limits of Liability	US$160 per limitation ton up to maximum of US$16.8 million	US$3.5 million for tankers *up to* 5,000 gross tons, rising to maximum of US$70 million	US$181 per limitation ton up to maximum of US$19.1 million (see note 1)	US$36 million for tankers up to 5,000 gross tons, rising to maximum of US$135 million, including compensation paid by tanker owner	Total made up to US$81.8 million, including any compensation paid by tanker owner under CLC, 1969 (see note 1)

Footnote 1: The limits of liability under the CLC, 1969 and Fund Convention, 1971 are based on specified units of account the US$ equivalents of which vary depending upon exchange rates. Those shown above have been converted, to the nearest round figure, at the rate of conversion applying as at 1st June, 1988 (SDR = US$1.364)

OIL SPILL
COMPENSATION PLANS



FLOW CHART OF OIL POLLUTION COMPENSATION UNDER TOVALOP, CLC, CRISTAL AND FUND CONVENTION

APPENDIX K

Tanker Advisory Centre's list of "poor" (1) and "fair" (2) tankers in the Alaskan Trade.

Company	Vessel	Rating
Amerada Hess	Mt. Cabrite	1
	Saint Lucia	1
	Seal Island	2
Bay Tankers	Bay Ridge	1
	Stuyvesant	1
Cove Shipping	Cove Liberty	1
	Cove Trader	1
Keystone Shipping	Atigun Pass	2
	Chestnut Hill	1
	Golden Gate	1
	Kittanning	1
Texaco	Brooklyn	1
	California	2
	Connecticut	1
	Massachussetts	2
Tosco Corporation	California Lion	2
Trinidad Corporation	Admiralty Bay	1
	Aspen	1
	Glacier Bay	1

Source: Anchorage Daily News 17 October, 1989 APPENDIX L