Alaska Oil Spill Commission

Final Report

SPILL

The Wreck of the *Exxon Valdez*

Implications for Safe Transportation of Oil

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Alaska Oil Spill Commission

Final Report

SPILL

The Wreck of the *Exxon Valdez*

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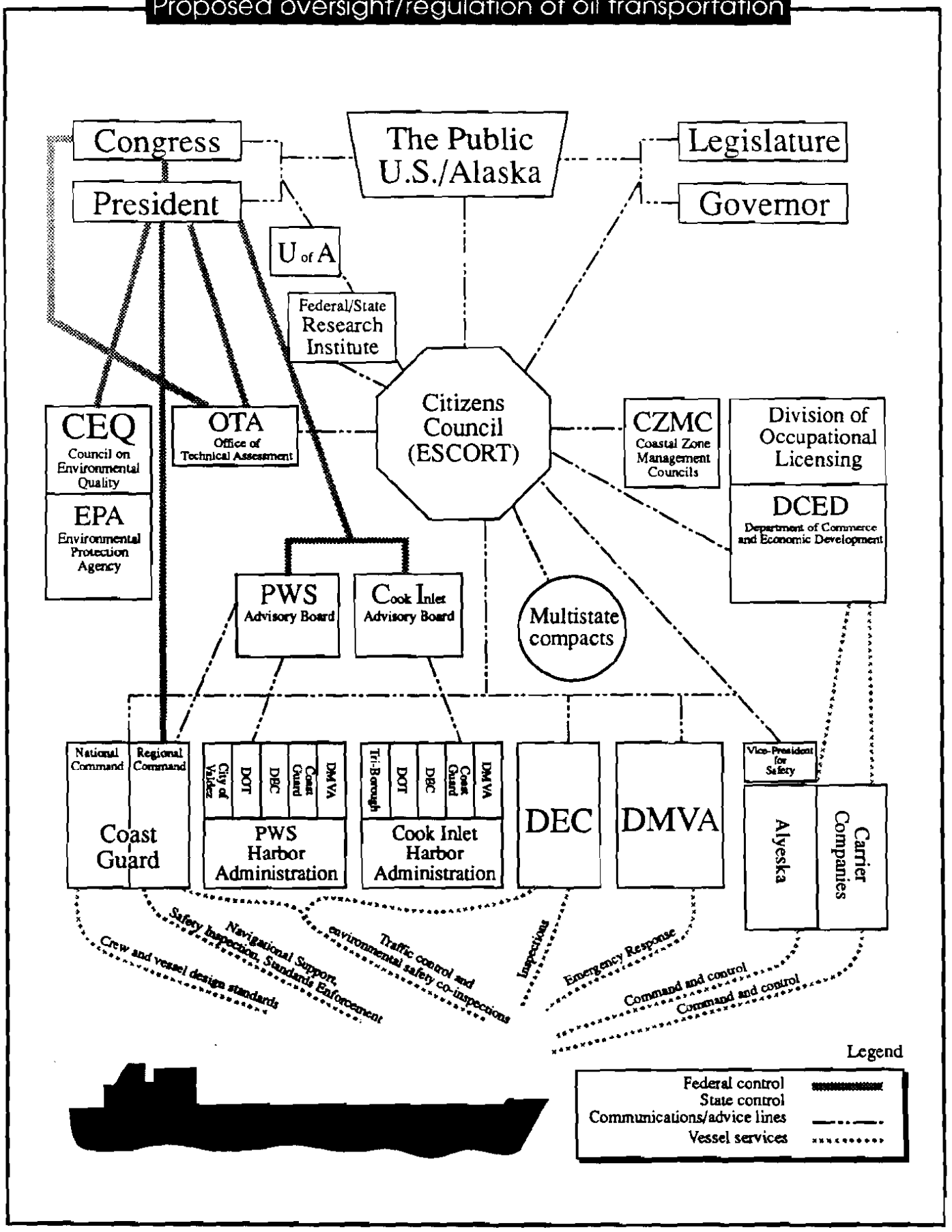

Foreword

On March 24, 1989, Alaskans awoke to the shock of disaster. Shortly after midnight, the 987-foot-long supertanker *Exxon Valdez* had run hard aground on Bligh Reef, spilling 10.8 million gallons of crude oil into the unspoiled waters of Prince William Sound. The worst case had occurred.

This was the threatened tanker catastrophe residents of Prince William Sound had dreaded—but many had come to discount—ever since the trans-Alaska pipeline system was proposed in the late 1960s. A few of those scrambling to cope with the disaster knew something more chilling still. Though nearly 11 million gallons of crude oil already had escaped the fully-loaded *Exxon Valdez*, another 40 million gallons remained on board— and the ship was in considerable danger of capsizing. The spill that became the environmental disaster of the decade easily could have been five times worse.

The system that carried 25 percent of America's domestic oil production had failed. So had the regulatory apparatus intended to make it safe. The promises that led Alaska to grant its rights-of-way and Congress to approve the Alaska pipeline in June 1973 had been betrayed. The safeguards that were set in place in the 1970s had been allowed to slide. The vigilance over tanker traffic that was established in the early days of pipeline flow had given way to complacency and neglect. In the months following the spill, more than 1,000 miles of Alaska's coastline would be sullied by North Slope crude.

Communities touched by the effects of the spill staggered under the damage to land and water upon which they lived or the impact of the massive cleanup mobilization after the spill. Alaskans from walks of life as diverse as the oil industry and subsistence communities struggled with the economic losses, sorrow and dislocations as well as, for some, the opportunities that came with the spill and cleanup. Attitudes toward oil development, the land and sea, the industry and the future were examined and re-examined as Alaskans searched for answers to the question of how things went wrong.

The Alaska legislature created the Alaska Oil Spill Commission to provide some of the answers. Two months after the spill, the governor appointed an independent panel to study the event and recommend public policy remedies. The commissioners came to their work with broad experience in government and public affairs. Their sole purpose was to learn the causes of this disaster and propose changes that would minimize chances for a recurrence of similar disasters anywhere. Our mission was clear: The report must show a path for Alaska, the United States and the world to a vastly improved system for transporting oil and other hazardous substances in the marine environment.

This disaster could have been prevented—not by tanker captains and crews who are, in the end, only fallible human beings, but by an advanced oil transportation system designed to minimize human error. It could have been prevented if Alaskans, state and federal governments, the oil industry and the American public had insisted on stringent safeguards. It could have been prevented if the vigilance that accompanied construction of the pipeline in the 1970s had been continued in the 1980s.

In 1977, when tanker operations began from Valdez, we thought we had created a system that offered guarantees against most disasters. As chairman of Alaska's Oil Tanker Task Force, I pulled together a team that provided the first full-scale simulation of marine operations ever done for a North American port.

Our simulation model demonstrated to the masters and pilots the conditions that would put their ships on the rocks. So we sought certain precautions: Tanker lanes into Port Valdez were set to insure the maximum feasible level of safety in tanker operations. Restrictions were imposed to limit operations in high winds. Agreements between the state, the industry and the Coast Guard established that when ice was encountered, the ships would slow down and proceed at minimum speed in the tanker lanes, rather than proceeding outside the lanes at sea speed, as did the *Exxon Valdez*.

The historical record developed by the Alaska Oil Spill Commission is clear: The original rules were consistently violated, primarily to insure that tankers passing through Prince William Sound did not lose time by slowing down for ice or waiting for winds to abate. Concern for profits in the 1980s obliterated concern for safe operations that existed in 1977.

This disaster could have been prevented by simple adherence to the original rules. Human beings do make errors. The precautions originally in place took cognizance of human frailty and built safeguards into the system to account for it. This state-led oversight and regulatory system worked for the first two years, until the state was preempted from enforcing the rules by legal action brought by the oil industry. After that, the shippers simply stopped following the rules, and the Coast Guard stopped enforcing them.

This past year the Alaska Oil Spill Commission traveled to the coastal towns and villages of Prince William Sound and Southcentral Alaska to hear from the people most affected by the spill. We found communities and individuals whose lives and trust had been destroyed, but who had rededicated themselves to protecting their livelihood on water and land. Walter Meganack, Sr., traditional village chief of the Alaska Native subsistence community of Port Graham, offered these words at a conference of mayors from spill-affected communities:

> It is too shocking to understand. Never in the millennium of our tradition have we thought it possible for the water to die. But it is true ... what we see

> now is death. Death—not of each other, but of the source of life, the water. We will need much help, much listening in order to live through the long barren season of dead water, a longer winter than before ... We have never lived through this kind of death. But we have lived through lots of other kinds of death. We will learn from the past, we will learn from each other, and we will live.

Port Graham is about 250 miles, by water, from Bligh Reef. To get there, the oil had to travel the length of Prince William Sound, past Green, Storey, Knight, Montague and LaTouche islands, out into the Gulf of Alaska and along the rocky headlands of Kenai Fjords National Park. It had to round the corner at the end of the Kenai Peninsula, plastering Elizabeth Island and heading into Cook Inlet and the outer reaches of Kachemak Bay. Moving beyond Port Graham and the surrounding area, the oil fouled beaches down the Alaska Peninsula—in Katmai National Park, along the Shelikof Strait, on Kodiak Island and beyond. As the oil spread so, belatedly, did the impact of cleanup and containment efforts, with an army of worker supplies, a navy of boats to move and house them and an air force to bring more personnel and track the oil's movement.

To trace on a map the tortured route of the oil spilled from the *Exxon Valdez* is to appreciate the vulnerability of every coastline on earth as supertankers of 500,000 deadweight tons and more carry crude oil to market. When the Alaska pipeline was being planned and built, the largest tankers in the American flag fleet were about half that size. The world's oil shipping companies, to the great benefit of consumers and corporate shareholders, have created a megasystem that carries oil from wellheads in the far corners of the earth to refineries in its major industrial centers. But this megasystem is fragile. It requires careful scrutiny from outside the industry in design, construction and operation. When it fails, as it has in tanker disasters around the world, entire coastlines are at risk. Had a spill the extent of the *Exxon Valdez* disaster occurred off the United States East Coast, the devastation would have stretched from Cape Cod to Chesapeake Bay.

This is a huge risk, yet Alaskans assume such peril daily as supertankers carry 2 million barrels of North Slope crude through Prince William Sound and out into the Gulf of Alaska. Other Americans on three coasts face just as ominous a threat as the world tanker fleet delivers 52 percent of U.S. oil consumption from foreign sources.

What will reduce these risks? Obviously, the present system, providing minimum penalties for creating massive environmental damage, has not deterred the industry from putting the coasts and oceans of the world at continual risk. The system calls out for reform. The mission of this commission is to explain what must be done and why.

Walter B. Parker, Chairman
Alaska Oil Spill Commission
February 1990

Table of contents

Foreword iii

Table of Contents vii

Commission members ix

Acknowledgements xi

Introduction 1

The Spill: Maritime disaster becomes a crisis 5

History: Oil in Alaska 29

Preparedness: Alyeska's oil spill contingency plans 37

Response: Chaos in the coastal communities 61

History: Oil spill prevention and response 85

Technology: Cleaning up crude 97

After the spill: Oceans of risk 111

Findings and recommendations 129

- Comprehensive prevention policy 129
- Responsibilities of industry 133
- State regulation and oversight 137
- Federal regulation and oversight 147
- Government response posture 155
- Implementing the response 161
- Research and development 169

Analysis of commission process 173

Conclusion 205

Bibliography 211

Appendices

Volume I

A HCA CSSB 277 (Fin)

B *Communities visited, commission hearings and witnesses*

C *Oiled Communities Response Investigation Report* by Sharon McClintock

D *Multiple Perspectives of the Alaska Oil Spill* by Harold Linstone

E *Department of Environmental Conservation Budget History* by Larry Persily

F *Impact of Fatigue and Other Factors on Human Performance and How They Relate to Maritime Accidents* by Clancy Philipsborn. The Mitigation Assistance Corporation

G *The Role of Insurance for the Preparedness and Response to Oil Spills: Liability and Compensation Issues* by Clancy Philipsborn. The Mitigation Assistance Corporation

H *Institutional Influences: The Coast Guard in Valdez* by Pete Spivey

I *Effect of U.S. Coast Guard Enforcement Performance on Oil Tanker Safety* by Mary Evans

Volume II

J *An Assessment of Tanker Transportation Systems in Cook Inlet and Prince William Sound* by Virgil Keith, Joseph Poricelli, Daniel North, Robert Schulze, Richard Willis. Engineering Computer Optecnomics, Inc. (ECO)

K *The* Exxon Valdez *Oil Spill: A Reassessment of Oil Spill Cleanup Technologies* by Virgil Keith, Joseph Poricelli, Daniel North, Robert Schulze, Richard Willis. Engineering Computer Optecnomics, Inc. (ECO)

L *An Overview of Spill Response in the Alaskan Arctic-Bering Strait to the Canadian Border* byVirgil Keith, Joseph Poricelli, Robert Schulze. Engineering Computer Optecnomics, Inc. (ECO)

Volume III

M *Sea Grant Legal Research Report* by Professors Harry Bader, Ralph Johnson, Zygmunt Plater, Coordinator, and Alison Rieser

Volume IV

N *T/V* Exxon Valdez *Oil Spill Chronology* by Ceceile Kay Richter

Alaska Oil Spill Commissioners

Walter B. Parker, Chairman—Anchorage, a former technical staff director of Alaska's Office of Pipeline Coordinator, currently is president of his own transportation and resource consulting firm and president of the Alaska Academy of Engineering and Sciences. Parker served on the Federal Field Committee for Planning in Alaska and co-chaired the Joint Federal-State Land Use Planning Commission for Alaska 1976-79. He was Alaska Commissioner of Highways and an Anchorage municipal assemblyman during the 1970's. He was chairman of the Alaska Oil Tanker Standards Task Force 1975-1977 and served 24 years with the Federal Aviation Administration.

F ner Wunnicke, Vice Chair—Anchorage, is an attorney who served as commissioner of t Alaska Department of Natural Resources in the early and mid-1980s. She managed the U.S. Department of the Interior's Alaska Outer Continental Shelf Office, co-chaired the Joint Federal-State Land Use Planning Commission for Alaska in the mid- and late 1970s, and served on staff of the Federal Field Committee for Development Planning in Alaska.

Margaret Hayes—Anchorage, is a geologist and former director of the Alaska Department of Natural Resources Division of Land and Water Management. She was employed by the department in various capacities from 1975 through 1988.

Tim Wallis—Fairbanks, is president of Tim Wallis and Associates, a consulting firm. The firm is currently representing a municipality and other interests as a lobbyist in Juneau. Wallis is a former state legislator, past president of Doyon, Ltd., an Interior Native corporation, as well as the past president of Alaska Federation of Natives and the Fairbanks Native Association.

John Sund—Ketchikan, is a former state legislator and commercial fisherman who now practices law and operates a fish-processing firm. Sund served on the Resources Committee as a state house member from 1984 to 1988 and from 1981 to 1985 was president and chief executive officer of the Waterfall Group Ltd., a resort operation.

Edward Wenk, Jr.—Seattle, professor emeritus of engineering, public affairs, and social management of technology at the University of Washington, is a former advisor to three presidents and Congress. An expert on the strength of ships, Wenk was a test pilot on the initial deep dive of America's first nuclear submarines and developed a world-class lab on the structural mechanics of submarine pressure hulls. The author of more than 150 papers and books, many on the interaction of technology with people and politics, he holds a master's of science from Harvard University and a doctorate of engineering from Johns Hopkins University.

Michael Herz—Berkeley, Calif., has studied previous oil spills and tanker accidents and is currently baykeeper and executive director of the San Francisco Bay-Delta Preservation Association, a nonprofit corporation that monitors oil and chemical spills. An advisor on oil spill dispersants, waste disposal, and the impact of oil spills on fisheries, Herz studied and produced a major report on the 1984 *Puerto Rican* tanker spill and has co-written three books and more than 80 technical reports and papers. He holds a doctorate from the University of Southern California, was a postdoctoral fellow at UCLA's Brain Research Center, and has been involved in marine research and policy since 1973.

Acknowledgements

Preparing a report of this scope requires many heroes. The Alaska Oil Spill Commission received generous assistance and unstinting support from literally hundreds of citizens, community leaders, public and elected officials, technical and academic experts, industry leaders, interest groups, technicians, contractors and staff. Those listed here will recognize their contributions. Those inadvertently omitted have our apologies—and thanks.

Gov. Steve Cowper and the Alaska Legislature created the commission and provided it both support and independence. Staff of the Legislative Information Offices, the Oil Spill Coordinator's Office, and the Governor's Office provided valuable information and assistance. Witnesses who appeared before the commission offered their descriptions of events, insight and counsel.

Others who helped most include, in no particular order: Mayor John Devens of Valdez and the other "Oiled Mayors" who helped arrange commission meetings in their communities; Jerry Hamel and others at the Alaska Department of Transportation and Public Facilities; Ron Dearborn, head of the University of Alaska Sea Grant Program and others connected with the program, professors Harry Bader of the University of Alaska, Zygmunt Plater of Boston College Law School, Alison Rieser of the University of Maine, and Ralph Johnson of the University of Washington; Coast Guard Vice Adm. Clyde Robbins and too many others to name; Adjutant Gen. John Schaeffer; Rick Steiner of the University of Alaska; President Frank Iarossi, Thelma Miller, T.W. Gillette and others at Exxon Shipping Company; Mike Williams and Robert I. Shoaf of Alyeska Pipeline Service Company; Harry Brelsford and Mary Nordale; U.S. Sen. Brock Adams and his staff; Jeff Petrick of the office of U.S. Rep. George Miller; Jim Fall and Herman Savikko of the Alaska Department of Fish and Game; Bill Hopkins of the Alaska Oil & Gas Association; Jack Roderick, whose book on the history of oil development in Alaska is forthcoming; Kenai Peninsula Borough Mayor Don Gilman; Jack Lamb and Riki Ott of Cordova District Fishermen United; Theo Matthews of United Fishermen of Alaska; Jerry D. Nebel, Rainbow Metals; William A. Publicover; George M. Nelson; Michelle Brown of the Alaska Department of Law; Capt. Robert Elsensohn of the Marine Master's Mates and Pilots; Dennis Kelso, Amy Kyle, Larry Dietrich, Lynn Kent, Richard Callahan, Marshall Kendziorek, L.J. Evans, Joe Sautner, Joyce Beelman and Dan Lawn of the Alaska Department of Environmental Conservation; Carl Lautenberger, Martha Fox, and Carolyn Gangmark of the U.S. Environmental Protection Agency; Sue Libenson of the Alaska Center for the Environment and Mike Wenig of Trustees for Alaska; librarians at Loussac and UAA libraries; Paul Gates of the U.S. Department of the Interior; Mike Penfold, former state director for the U.S. Bureau of Land Management; Robert LeResche, Mike Harmon, Kathy Abar and Jim Sellers of the Oil

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Introduction

The *Exxon Valdez* disaster shocked Alaska and the nation from a kind of oil-induced stupor concerning the maritime transport of crude oil. For decades, larger and larger supertankers have carried oil around the world with smaller and smaller crews and less and less public oversight. The March 24, 1989, debacle in Prince William Sound—a modern, well-equipped supertanker running hard aground on one of the best-known and most easily avoided hazards in the sound—dramatically illustrated the overall weakness of a transport system that could not prevent a string of human errors from unraveling into environmental and economic catastrophe.

Prevention efforts had clearly broken down. So, as it turned out, did the response: With 10.8 million gallons of North Slope crude loose in Prince William Sound, all sides found themselves unprepared and unbelieving. Though Exxon Shipping Company gradually mobilized a massive summerlong cleanup effort, the early response to the spill was characterized by shock, confusion and chaos.

As oil spread over the next few months to some 1,244 miles of Alaska coastline, public outrage spread with it. Continuing media exposure focused world attention on what became the nation's biggest environmental crisis since Three Mile Island. Exxon, Alyeska Pipeline Service Company, the Coast Guard, the Alaska Department of Environmental Conservation (DEC) and "Big Oil" found themselves targets of angry demonstrations, gasoline boycotts, shareholder protests, congressional hearings and criminal indictments. Exxon's top executives spent their summer battling public relations firestorms, while hundreds of volunteers from around the state, nation and world spent their summers working to save oiled animals. Residents of the sound, their lives disrupted first by the spreading slick and then by the cleanup campaign, found themselves most angered by their sense that one of the world's last unspoiled natural wonders had been desecrated.

Alaska, and especially Prince William Sound (a subject that has enthralled writers from Captain James Cook to John Muir), clearly held a special place in the American consciousness. And the wreck of the *Exxon Valdez,* by shocking those sensibilities, became one more symbol of the environmental stresses confronting the world as the decade drew to a close.

In response to the event, a number of review boards, commissions and watchdog agencies were assigned to study the causes and consequences of North America's largest oil spill. The Alaska Oil Spill Commission grew from the concerns of the Alaska legislature. Meeting in Juneau when the accident occurred, the legislature moved quickly with a series of bills to improve the state's preparedness and response to catastrophic oil spills. It also created an independent commission to review the

"I warned the community that the possibility of an oil spill in Valdez was very high. Given the high frequency of tankers into Port Valdez, the increasing age and size of that tanker fleet, and the inability to quickly contain and clean up an oil spill in open water of Alaska, we felt that we were playing a game of Russian Roulette. We knew 'The Big One' was only a matter of time."

Dr. Riki Ott, Cordova District Fishermen United
House Committee on Interior and Insular Affairs hearing, May 1989

issues raised by the *Exxon Valdez* spill and to find ways to resolve them. Gov. Steve Cowper appointed the seven-member Alaska Oil Spill Commission in May of 1989.

"What I'm afraid of is that the commission could end up being in such a defensive mode that it could end up making the world safe for oil spills."

Mike Milligan, Kodiak
Alaska Oil Spill Commission hearing, 8/11/89

The commission, granted the subpoena power to further its investigations, was given a broad mandate. The legislation issued these directions:

"The commission shall gather information relating to

"(1) the series of events that allowed the *Exxon Valdez* oil discharge to occur; and

"(2) the ensuing efforts to contain and clean up the oil discharged.

"By January 8, 1990, the commission shall submit a report to the governor and legislature containing its findings and recommendations on

"(1) the containment and cleanup actions that were taken or not taken after the discharge, the extent to which current technology was available and used, and ways to improve oil spill response technology and procedures;

"(2) steps that should be taken by all levels of government and by the oil industry to ensure proper management, handling and transportation of crude and refined oil and to improve the statewide ability of industry and governmental agencies to respond to oil discharges;

"(3) the extent to which oil industry practices and governmental practices and laws should be changed to minimize the potential for future events similar to the grounding of the *Exxon Valdez*; and

"(4) legislative proposals to encourage and fund prevention, response, cleanup and mitigation of all future discharges of oil."

"It takes great strength to recognize the reflection in the mirror. Look in the mirror, and dig deep within yourself. Don't create an image that isn't there. Act on what you see. The environment is a reflection of who we are. We can't ignore the reflection we see. We have to live with it—today, tomorrow, and forever."

Dolly Reft, Kodiak native
Alaska Oil Spill Commission hearing, 8/11/89

The commission divided its work into three categories: prevention of catastrophic oil spills; response to spills in the future; and institutions needed to accomplish those ends. Three subcommittees were established to pursue these topics. This division of investigation came about only after the commission had already conducted several investigatory meetings, hearing testimony of many of the main actors in the tragedy in the principal communities of Prince William Sound and other affected areas. Recommendations eventually emerged from deliberations of the three subcommittees, reported at each meeting to the commission as a whole. The committee structure did not mean that responsibility was delegated to only two or three people. Commissioners all took great interest in every revelation and lesson to be learned from the discoveries and insights uncovered in the course of the deliberations. Likewise, the staff was not segregated by committee assignment but worked as one team.

By midsummer, the commission had established a work plan based on four major objectives and key questions associated with each. The questions were straightforward:

(1) Record what happened. This entailed identifying technical and management successes and failures in the *Exxon Valdez* incident.

(2) Inform people of present risk. This meant identifying primary sources and magnitudes of risk involved in the maritime transport of oil.

(3) Recommend strategies to prevent an accident from occurring again. This involved evaluating the causes of risk, proposing technical and management solutions to foster safety, and probing legal and organizational structures to find gaps and inadequacies in coverage.

(4) Recommend strategies to improve the response to an accident. This meant establishing overall principles for effective oil spill response and then identifying legal, fiscal, managerial and operational strategies to put these principles into practice.

Based on that work program, the commission devised a schedule of hearings, research, investigation and analysis intended to answer questions concerning the safety of the maritime oil transport system.

As the *Exxon Valdez* experience, expert testimony and technical consultants' reports increasingly showed, oil spill response—cleanup—is an ineffective means of keeping oil off the beaches and away from valuable resources. The world's experience shows that even under favorable conditions and despite various promising research leads concerning cleanup technology, oil is extremely difficult to contain and collect once it has reached the water. Hearing this point reinforced frequently by testimony and the public record, commissioners increasingly shifted their focus toward prevention, and the institutions necessary to accomplish it.

Through summer and fall 1989, the commission met approximately every three weeks to hold hearings, take testimony, prepare its investigation and visit the major communities affected by the spill. It heard testimony from all the major players in the event—Exxon, Alyeska, the Coast Guard, DEC, other major state and federal agencies, local officials and residents affected by the spill. It questioned expert witnesses on topics ranging from tanker manning practices to chemical coagulants of oil and from vessel traffic systems to pilotage. The commission revisited the long debate about double-hull tanker designs; studied the consequences and frequency of catastrophic spills in Prince William Sound and Cook Inlet; and sent interviewers to 14 coastal communities to record the experiences and attitudes of Alaskans most directly affected. Investigators studied state budget documents relating to oil transportation oversight and contingency plans relating to cleanup capacity. A team of law professors affiliated with the University of Alaska Sea Grant Program examined legal

"I think [illegible] probabl[illegible] reluctance [illegible] management [illegible] that were involved [illegible] at the state and [illegible] levels [illegible] look at their performance."

Dr. [illegible]
University [illegible]
Alaska Oil Spill Commission hearing [illegible]

"We in industry cannot assume that all regulation is bad, it's not."

Jerry Aspland, President, ARCO Marine, Inc.
Alaska Oil Spill Commission hearing, 9/1/89

doctrines related to state oversight of oil transportation. Scholars on contract to the commission wrote papers on key events surrounding the spill, multiple analytical perspectives on the spill and the relationship between the Coast Guard and the oil tanker transport industry.

The commission presented its 59 major recommendations to Gov. Steve Cowper and the Alaska Legislature on Jan. 5, 1990, in a document entitled "Spill: The Wreck of the *Exxon Valdez*, Implications for Safe Marine Transportation." This final report, with attached appendices, completes the commission's official written statement to the people of Alaska and the United States.

Before convening to prepare their recommendations, commissioners asked themselves what the broad purposes of issuing this report should be. The answers were brief and to the point: The report must be a call to public attention and legislative action. It should provide an overall, unbiased account of the disaster as it illustrated failures in planning and regulation. It should shape future debate; persuade the electorate to demand improvements; convince legislators of the need for bold action; and create the energy to propel debate into the future.

This document is the result.

"The level of inability to function in chaos that's going on out there is ridiculous. The amount of money that is being spent is obscene."

Dennis Holan, Cordova fisherman
Alaska Oil Spill Commission hearing, 6/28/89

The Spill: *Maritime disaster becomes a crisis*

No one anticipated any unusual problems as the *Exxon Valdez* left the Alyeska Pipeline Terminal at 9:12 p.m., Alaska Standard Time, on March 23, 1989. The 987-foot ship, second newest in Exxon Shipping Company's 20-tanker fleet, was loaded with 53,094,510 gallons (1,264,155 barrels) of North Slope crude oil bound for Long Beach, California. Tankers carrying North Slope crude oil had safely transited Prince William Sound more than 8,700 times in the 12 years since oil began flowing through the trans-Alaska pipeline, with no major disasters and few serious incidents. This experience gave little reason to suspect impending disaster. Yet less than three hours later, the *Exxon Valdez* grounded at Bligh Reef, rupturing eight of its 11 cargo tanks and spewing some 10.8 million gallons of crude oil into Prince William Sound.

Until the *Exxon Valdez* piled onto Bligh Reef, the system designed to carry 2 million barrels of North Slope oil to West Coast and Gulf Coast markets daily had worked—perhaps too well. At least partly because of the success of the Valdez tanker trade, a general complacency had come to permeate the operation and oversight of the entire system. That complacency and success were shattered when the *Exxon Valdez* ran hard aground shortly after midnight on March 24.

No human lives were lost as a direct result of the disaster, though four deaths were associated with the cleanup effort. Indirectly, however, the human and natural losses were immense—to fisheries, subsistence livelihoods, tourism, wildlife. The most important loss for many who will never visit Prince William Sound was aesthetic—the sense that something sacred in the relatively unspoiled land and waters of Alaska had been defiled.

Industry's insistence on regulating the Valdez tanker trade its own way, and government's incremental accession to industry pressure, had produced a disastrous failure of the system. The people of Alaska's Southcentral coast—not to mention Exxon and the Alyeska Pipeline Service Company—would come to pay a heavy price. The American people, increasingly anxious over environmental degradation and devoted to their image of Alaska's wilderness, reacted with anger. A spill that ranked 34th on a list of the world's largest oil spills in the past 25 years came to be seen as the nation's biggest environmental disaster since Three Mile Island.

"The most telling remark, the president of Exxon, Mr. Stevens, said that the contingency plan cannot deal with a spill like this."

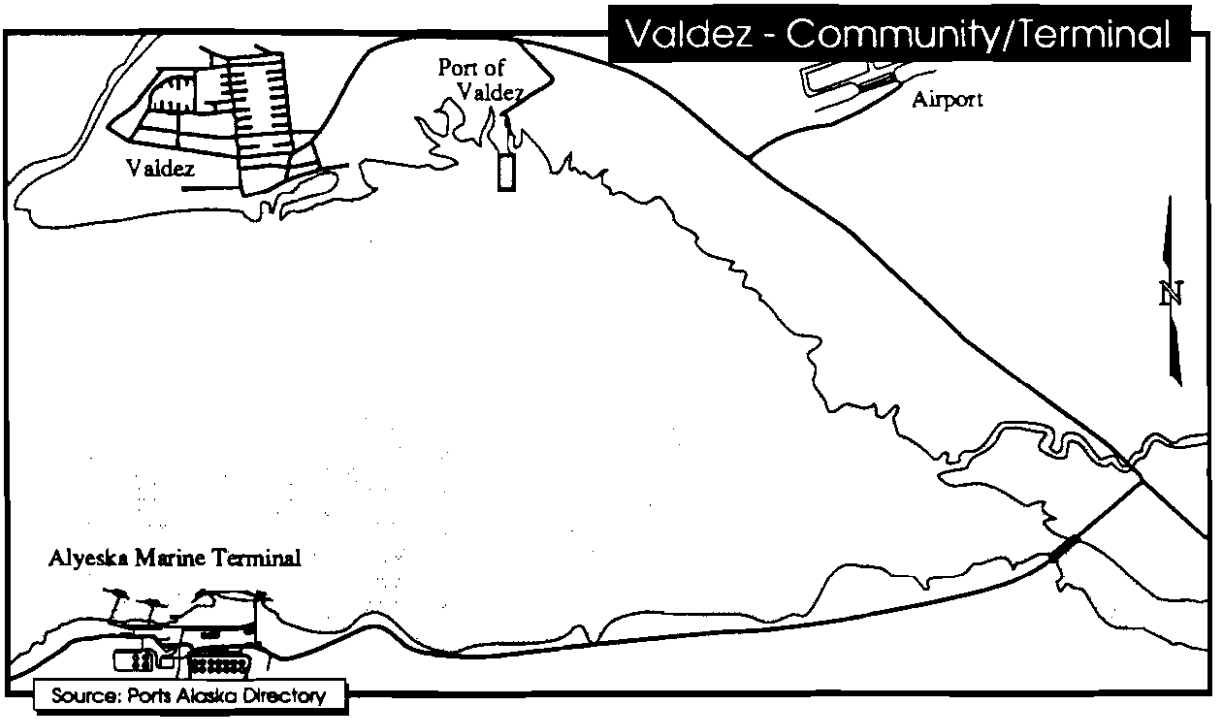
Rep. George Miller, California
House Committee on Interior and Insular Affairs hearing, May 1989

The *Exxon Valdez* had reached the Alyeska Marine Terminal at 11:30 p.m. on March 22 to take on cargo. It carried a crew of 19 plus the captain. Third Mate Gregory Cousins, who became a central figure in the grounding, was relieved of watch duty at 11:50 p.m. Ship and terminal crews began loading crude oil onto the tanker at 5:05 a.m. on March 23 and increased loading to its full rate of 100,000 barrels an hour by 5:30 a.m. Chief Mate James R. Kunkel supervised the loading.

"I think what's missing here is an attitude among state leaders that the buck stops here, with the people of Alaska and not in Houston or Washington, D.C."

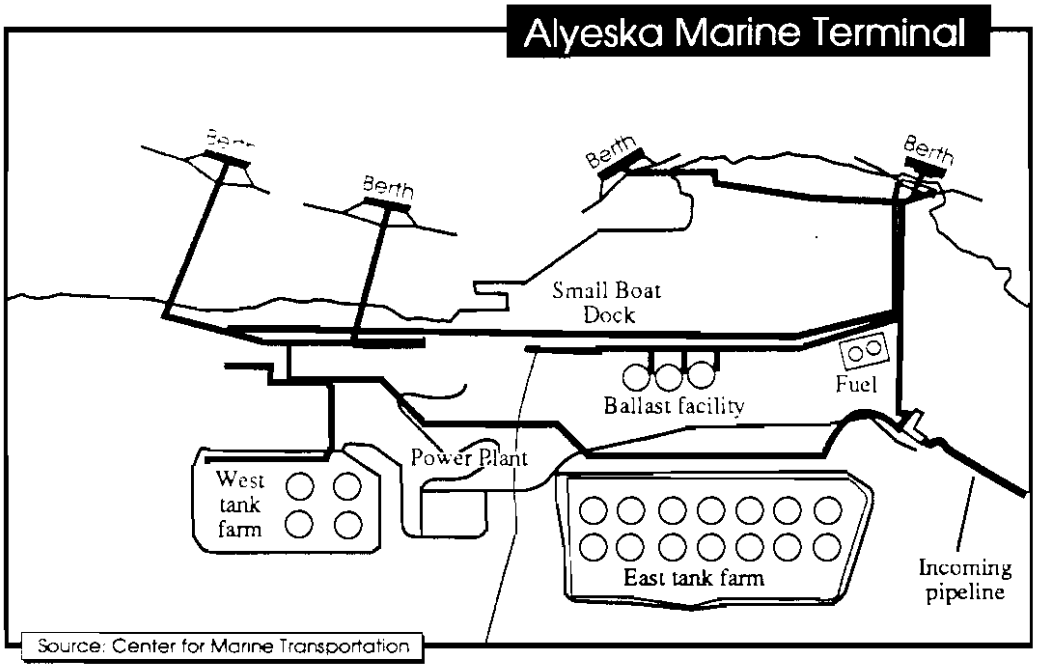
Professor Matt Berman, University of Alaska Alaska Oil Spill Commission hearing, 9/21/89

March 23, 1989 was a rest day of sorts for some members of the *Exxon Valdez* crew. Capt. Joseph Hazelwood, chief engineer Jerzy Glowacki and radio officer Joel Roberson left the *Exxon Valdez* about 11:00 a.m., driven from the Alyeska terminal into the town of Valdez by marine pilot William Murphy, who had piloted the *Exxon Valdez* into port the previous night and would take it back out through Valdez Narrows on its fateful trip to Bligh Reef. When the three ship's officers left the terminal that day, they expected the *Exxon Valdez's* sailing time to be 10 p.m. that evening. The posted sailing time was changed, however, during the day, and when the party arrived back at the ship at 8:24 p.m., they learned the sailing time had been fixed at 9 p.m.



Hazelwood spent most of the day conducting ship's business, shopping and, according to testimony before the National Transportation Safety Board (NTSB), drinking alcoholic beverages with the other ship's officers in at least two Valdez bars. Testimony indicated Hazelwood drank nonalcoholic beverages that day at lunch, a number of alcoholic drinks late that afternoon while relaxing in a Valdez bar, and at least one more drink at a bar while the party waited for pizza to take with them back to the ship.

Loading of the *Exxon Valdez* had been completed for an hour by the time the group returned to the ship. They left Valdez by taxi cab at about 7:30 p.m., got through Alyeska terminal gate security at 8:24 p.m. and boarded ship. Radio officer Roberson, who commenced prevoyage tests and checks in the radio room soon after arriving at the ship, later said no one in the group going ashore had expected the ship to be ready to leave as soon as they returned.



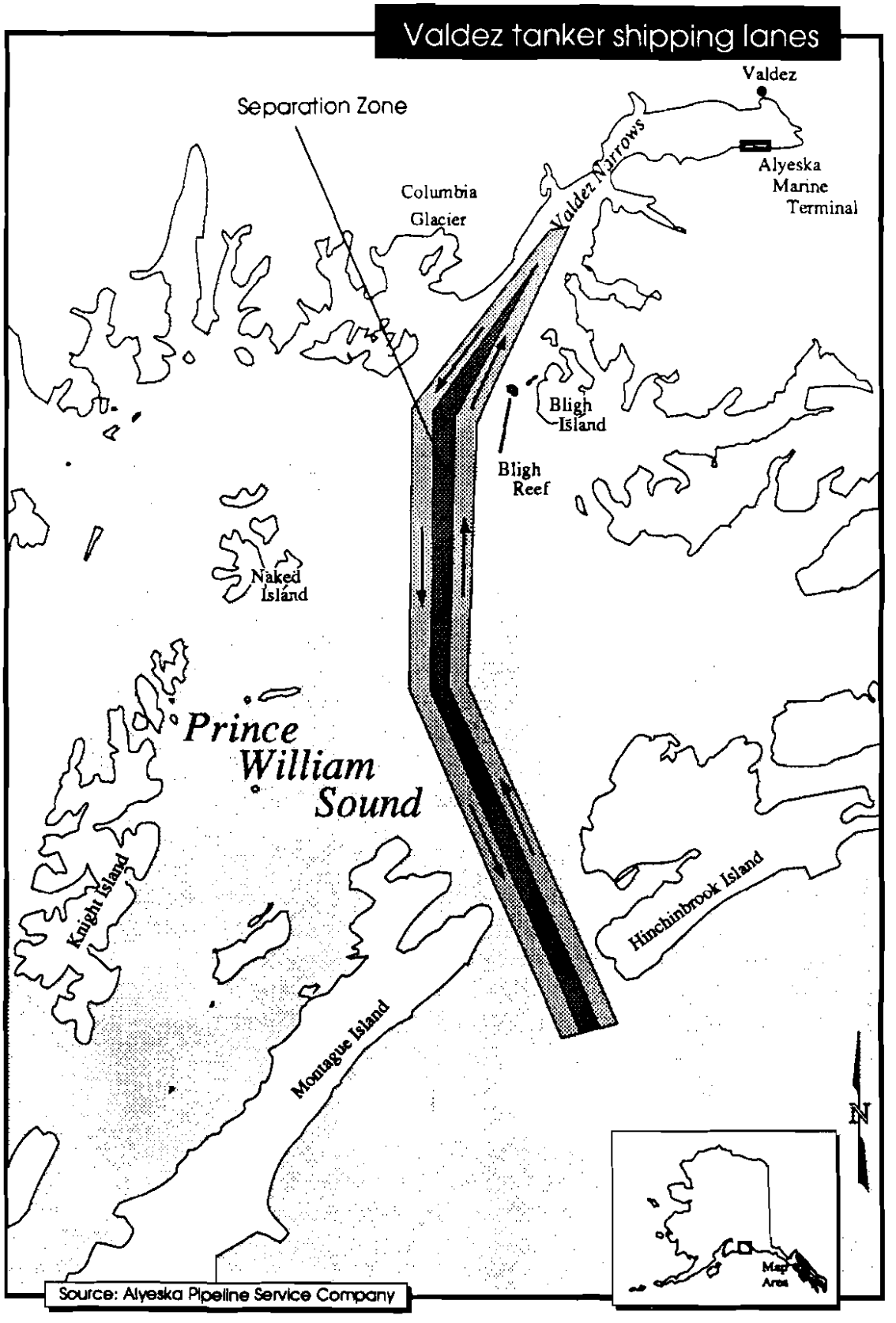
Both the cab driver and the gate security guard later testified that no one in the party appeared to be intoxicated. A ship's agent who met with Hazelwood after he got back on the ship said it appeared the captain may have been drinking because his eyes were watery, but she did not smell alcohol on his breath. Ship's pilot Murphy, however, later indicated that he did detect the odor of alcohol on Hazelwood's breath.

Hazelwood's activities in town that day and on the ship that night would become a key focus of accident inquiries, the cause of a state criminal prosecution, and the basis of widespread media sensation. Without intending to minimize the impact of Hazelwood's actions, however, one basic conclusion of this report is that the grounding at Bligh Reef represents much more than the error of a possibly drunken skipper: It was the result of the gradual degradation of oversight and safety practices that had been intended, 12 years before, to safeguard and backstop the inevitable mistakes of human beings.

Third Mate Cousins performed required tests of navigational, mechanical and safety gear at 7:48 p.m., and all systems were found to be in working order. The *Exxon Valdez* slipped its last mooring line at 9:12 p.m. and, with the assistance of two tugboats, began maneuvering away from the berth. The tanker's deck log shows it was clear of the dock at 9:21 p.m.

"Fishermen sense two things. First, no real commitment on the part of industry to dedicate enough funds as a cost of doing business in Alaska for the prevention of, and the response to, discharges of oil and other pollutants to the marine environment. And secondly, industry's only real concept of a response to a spill is limited to dispersal by either natural or chemical means. That essentially means, out of sight, out of mind, out of liability."

Theo Matthews, President
United Fishermen of Alaska
Alaska Oil Spill Commission hearing, 9/7/89


Valdez tanker shipping lanes
Valdez
Separation Zone
Alyeska
Marine
Terminal
Columbia
Glacier
Valdez Narrows
Bligh
Island
Bligh
Reef
Naked
Island
Prince
William
Sound
Knight Island
Hinchinbrook Island
Montague Island
N
Map
Area
Source: Alyeska Pipeline Service Company

Dock to grounding

The ship was under the direction of pilot Murphy and accompanied by a single tug for the passage through Valdez Narrows, the constricted harbor entrance about 7 miles from the berth. According to Murphy, Hazelwood left the bridge at 9:35 p.m. and did not return until about 11:10 p.m., even though Exxon company policy requires two ship's officers on the bridge during transit of Valdez Narrows.

The passage through Valdez Narrows proceeded uneventfully. At 10:49 p.m. the ship reported to the Valdez Vessel Traffic Center that it had passed out of the narrows and was increasing speed. At 11:05 p.m. Murphy asked that Hazelwood be called to the bridge in anticipation of his disembarking from the ship, and at 11:10 p.m. Hazelwood returned. Murphy disembarked at 11:24 p.m., with assistance from Third Mate Cousins. While Cousins was helping Murphy and then helping stow the pilot ladder, Hazelwood was the only officer on the bridge and there was no lookout even though one was required, according to an NTSB report.

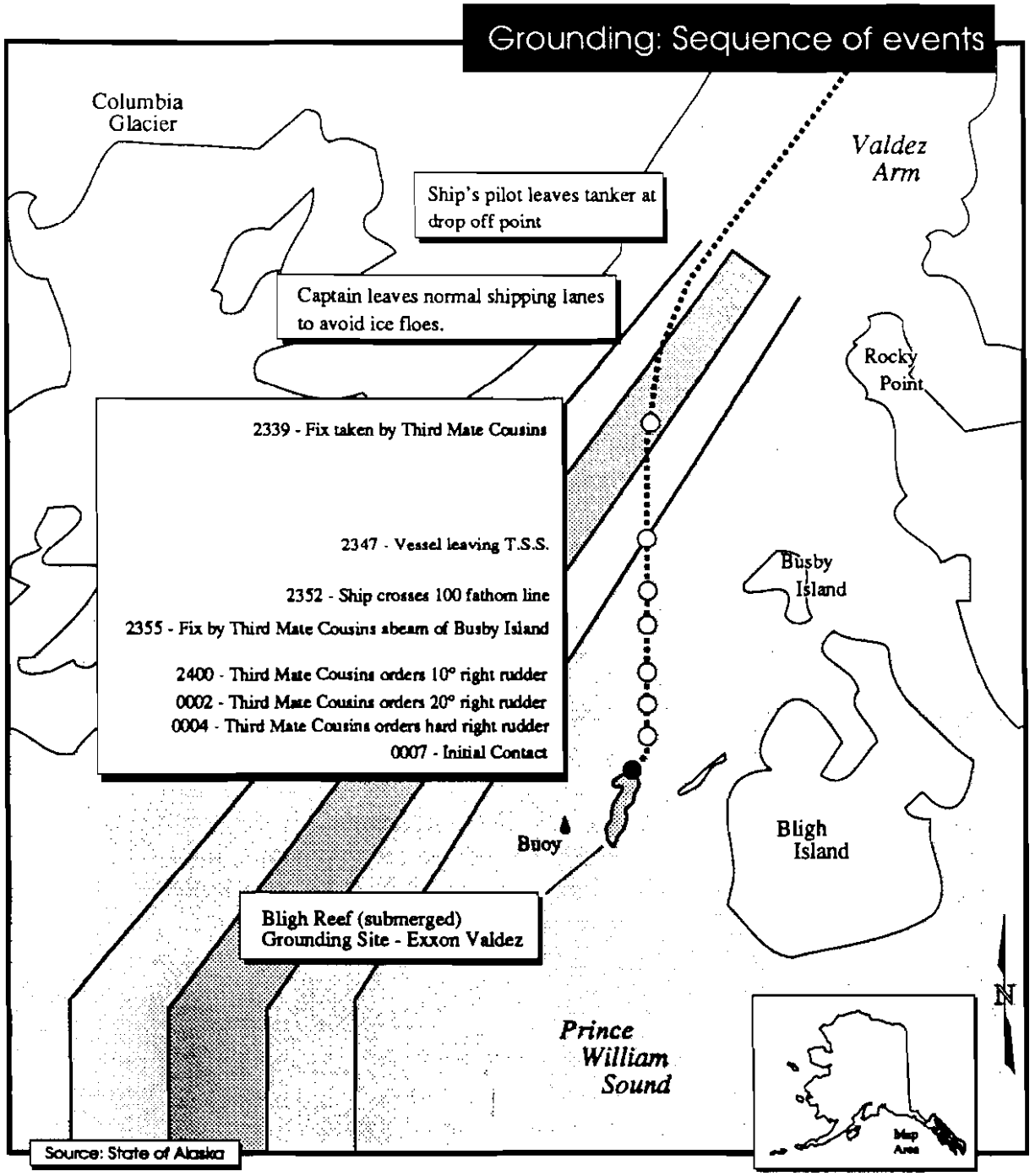
At 11:25 p.m. Hazelwood informed the Vessel Traffic Center that the pilot had departed and that he was increasing speed to sea speed. He also reported that "judging, ah, by our radar, we'll probably divert from the TSS [traffic separation scheme] and end up in the inbound lane if there is no conflicting traffic." The traffic center indicated concurrence, stating there was no reported traffic in the inbound lane.

The traffic separation scheme is designed to do just that—separate incoming and outgoing tankers in Prince William Sound and keep them in clear, deep waters during their transit. It consists of inbound and outbound lanes, with a half-mile-wide separation zone between them. Small icebergs from nearby Columbia Glacier occasionally enter the traffic lanes. Captains had the choice of slowing down to push through them safely or deviating from their lanes if traffic permitted. Hazelwood's report, and the Valdez traffic center's concurrence, meant the ship would change course to leave the western, outbound lane, cross the separation zone and, if necessary, enter the eastern, inbound lane to avoid floating ice. At no time did the *Exxon Valdez* report or seek permission to depart farther east from the inbound traffic lane; but that is exactly what it did.

At 11:30 p.m. Hazelwood informed the Valdez traffic center that he was turning the ship toward the east on a heading of 200 degrees and reducing speed to "wind my way through the ice" (engine logs, however, show the vessel's speed continued to increase). At 11:39 Cousins plotted a fix that showed the ship in the middle of the traffic separation scheme. Hazelwood ordered a further course change to a heading of 180 degrees (due south) and, according to the helmsman, directed that the ship be placed on autopilot. The second course change was not reported to the Valdez traffic center. For a total of 19 or 20 minutes the ship sailed south—through the inbound traffic lane, then across its easterly boundary and on toward its peril at Bligh Reef. Traveling at approximately 12 knots, the *Exxon Valdez* crossed the traffic lanes' easterly boundary at 11:47 p.m.

"What we have is a system driven by [illegible] the pipeline is pumping 2 million barrels of oil into the sound, and they have to get it out of here. They shouldn't have to restrict it, turn it off, or anything else. The decision to sail or not to sail is not a dispassionate decision based on weather or traffic."

Rep. George Miller, California
House Committee on Interior and Insular Affairs hearing, May 1989



Note: Times listed above are based on an interpretation of events by the State of Alaska in exhibits before the National Transportation Safety Boards. Other accounts differ.

At 11:52 p.m. the command was given to place the ship's engine on "load program up"—a computer program that, over a span of 43 minutes, would increase engine speed from 55 RPM to sea speed full ahead at 78.7 RPM. After conferring with Cousins about where and how to return the ship to its designated traffic lane, Hazelwood left the bridge. The time, according to NTSB testimony, was approximately 11:53 p.m.

By this time Third Mate Cousins had been on duty for six hours and was scheduled to be relieved by Second Mate Lloyd LeCain. But Cousins, knowing LeCain had worked long hours during loading operations during the day, had told the second mate he could take his time in relieving him. Cousins did not call LeCain to awaken him for the midnight-to-4-a.m. watch, instead remaining on duty himself.

Cousins was the only officer on the bridge—a situation that violated company policy and perhaps contributed to the accident. A second officer on the bridge might have been more alert to the danger in the ship's position, the failure of its efforts to turn, the autopilot steering status, and the threat of ice in the tanker lane.

Cousins' duty hours and rest periods became an issue in subsequent investigations. Exxon Shipping Company has said the third mate slept between 1 a.m. and 7:20 a.m. the morning of March 23 and again between 1:30 p.m. and 5 p.m., for a total of nearly 10 hours sleep in the 24 hours preceding the accident. But testimony before the NTSB suggests that Cousins "pounded the deck" that afternoon, that he did paperwork in his cabin, and that he ate dinner starting at 4:30 p.m. before relieving the chief mate at 5 p.m. An NTSB report shows that Cousins' customary in-port watches were scheduled from 5:50 a.m. to 11:50 a.m. and again from 5:50 p.m. to 11:50 p.m. Testimony before the NTSB suggests that Cousins may have been awake and generally at work for up to 18 hours preceding the accident.

Appendix F of this report documents a direct link between fatigue and human performance error generally and notes that 80 percent or more of marine accidents are attributable to human error. Appendix F also discusses the impact of environmental factors such as long work hours, poor work conditions (such as toxic fumes), monotony and sleep deprivation. "This can create a scenario where a pilot and/or crew members may become the 'accident waiting to happen.' ... It is conceivable," the report continues, "that excessive work hours (sleep deprivation) contributed to an overall impact of fatigue, which in turn contributed to the *Exxon Valdez* grounding."

Manning policies also may have affected crew fatigue. Whereas tankers in the 1950s carried a crew of 40 to 42 to manage about 6.3 million gallons of oil, according to Arthur McKenzie of the Tanker Advisory Center in New York, the *Exxon Valdez* carried a crew of 19 to transport 53 million gallons of oil.

"A pilot, [illegible] know [illegible] neither [illegible] navigation [illegible] It is the [illegible]

Jerry As[illegible] ARCO [illegible] Alaska Oil [illegible]

"What really happened here is that the system failed. We were down to the kicker on the football team making the tackle, and no coach wants that."

Vice Admiral Clyde Robbins, U.S. Coast Guard Committee on Interior and Insular Affairs hearing, May 1989

Minimum vessel manning limits are set by the U.S. Coast Guard, but without any agencywide standard for policy. The Coast Guard has certified Exxon tankers for a minimum of 15 persons (14 if the radio officer is not required). Frank Iarossi, president of Exxon Shipping Company, has stated that his company's policy is to reduce its standard crew complement to 16 on fully automated, diesel-powered vessels by 1990. "While Exxon has defended their actions as an economic decision," themanning report says, "criticism has been leveled against them for manipulating overtime records to better justify reduced manning levels."

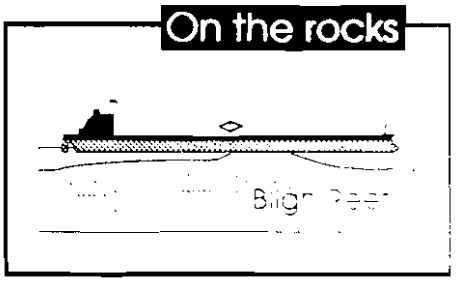
Iarossi and Exxon maintain that modern automated vessel technology permits reduced manning without compromise of safety or function. "Yet the literature on the subject suggests that automation does not replace humans in systems, rather, it places the human in a different, more demanding role. Automation typically reduces manual workload but increases mental workload." (Appendix F)

Whatever the NTSB or the courts may finally determine concerning Cousins' work hours that day, manning limits and crew fatigue have received considerable attention as contributing factors to the accident. The Alaska Oil Spill Commission recommends that crew levels be set high enough not only to permit safe operations during ordinary conditions—which, in the Gulf of Alaska, can be highly demanding—but also to provide enough crew backups and rest periods that crisis situations can be confronted by a fresh, well-supported crew.

Accounts and interpretations differ as to events on the bridge from the time Hazelwood left his post to the moment the *Exxon Valdez* struck Bligh Reef. NTSB testimony by crew members and interpretations of evidence by the State of Alaska conflict in key areas, leaving the precise timing of events still a mystery. But the rough outlines are discernible:

Some time during the critical period before the grounding during the first few minutes of Good Friday, March 24, Cousins plotted a fix indicating it was time to turn the vessel back toward the traffic lanes. About the same time, lookout Maureen Jones reported that Bligh Reef light appeared broad off the starboard bow—i.e., off the bow at an angle of about 45 degrees. The light should have been seen off the port side (the left side of a ship, facing forward); its position off the starboard side indicated great peril for a supertanker that was out of its lanes and accelerating through close waters. Cousins gave right rudder commands to cause the desired course change and took the ship off autopilot. He also phoned Hazelwood in his cabin to inform him the ship was turning back toward the traffic lanes and that, in the process, it would be getting into ice. When the vessel did not turn swiftly enough, Cousins ordered further right rudder with increasing urgency. Finally, realizing the ship was in serious trouble, Cousins phoned Hazelwood again to report the danger—and at the end of the conversation, felt an initial shock to the vessel. The grounding, described by helmsman Robert Kagan as "a bumpy ride" and by Cousins as six "very sharp jolts," occurred at 12:04 a.m.

On the rocks



The vessel came to rest facing roughly southwest, perched across its middle on a pinnacle of Bligh Reef. Eight of 11 cargo tanks were punctured. Computations aboard the *Exxon Valdez* showed that 5.8 million gallons had gushed out of the tanker in the first three and a quarter hours. Weather conditions at the site were reported to be 33 degrees F, slight drizzle rain/snow mixed, north winds at 10 knots and visibility 10 miles at the time of the grounding.

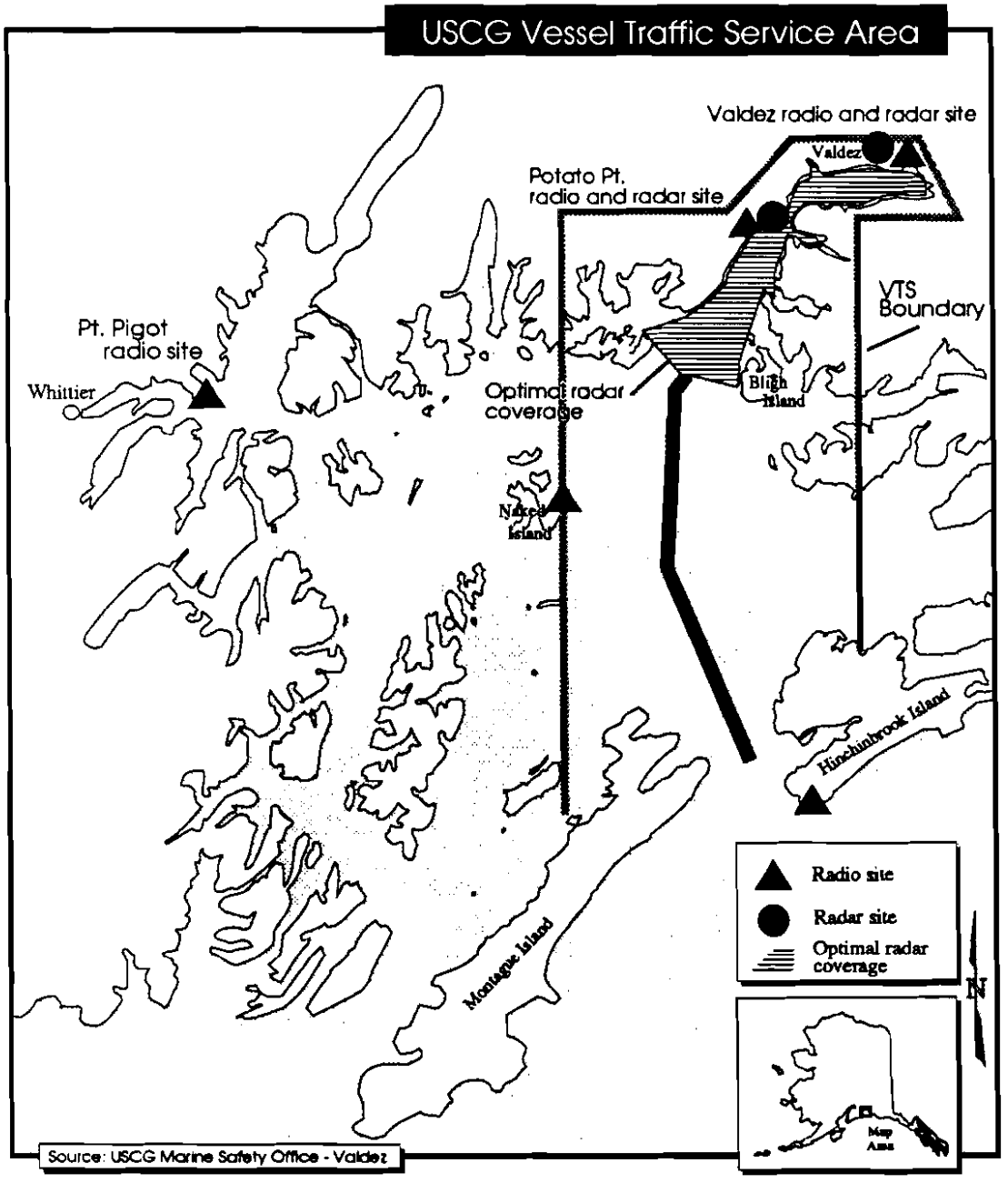
The *Exxon Valdez* nightmare had begun. Hazelwood—perhaps drunk, certainly facing a position of great difficulty and confusion—would struggle vainly to power the ship off its perch on Bligh Reef. The response capabilities of Alyeska Pipeline Service Company to deal with the spreading sea of oil would be tested and found to be both unexpectedly slow and woefully inadequate. The worldwide capabilities of Exxon Corp. would mobilize huge quantities of equipment and personnel to respond to the spill—but not in the crucial first few hours and days when containment and cleanup efforts are at a premium. The U.S. Coast Guard would demonstrate its prowess at ship salvage, protecting crews and lightering operations, but prove utterly incapable of oil spill containment and response. State and federal agencies would show differing levels of preparedness and command capability. And the waters of Prince William Sound—and eventually more than 1,000 miles of beach in Southcentral Alaska—would be fouled by 10.8 million gallons of crude oil.

After feeling the grounding Hazelwood rushed to the bridge, arriving as the ship came to rest. He immediately gave a series of rudder orders in an attempt to free the vessel, and power to the ship's engine remained in the "load program up" condition for about 15 minutes after impact. Chief Mate Kunkel went to the engine control room and determined that eight cargo tanks and two ballast tanks had been ruptured; he concluded the cargo tanks had lost an average of 10 feet of cargo, with approximately 67 feet of cargo remaining in each. He informed Hazelwood of his initial damage assessment and was instructed to perform stability and stress analysis. At 12:19 a.m. Hazelwood ordered that the vessel's engine be reduced to idle speed.

At 12:26 a.m., Hazelwood radioed the Valdez traffic center and reported his predicament to Bruce Blandford, a civilian employee of the Coast Guard who was on duty. "We've fetched up, ah, hard aground, north of Goose Island, off Bligh Reef and, ah, evidently leaking some oil and we're gonna be here for a while and, ah, if you want, ah, so you're notified." That report triggered a nightlong cascade of phone calls reaching from Valdez to Anchorage to Houston and eventually around the world as the magnitude of the spill became known and Alyeska and Exxon searched for cleanup machinery and materials.

Hazelwood, meanwhile, was not finished with efforts to power the *Exxon Valdez* off the reef. At approximately 12:30 a.m., Chief Mate Kunkel used a computer program

to determine that though stress on the vessel exceeded acceptable limits, the ship still had required stability. He went to the bridge to advise Hazelwood that the vessel should not go to sea or leave the area. The skipper directed him to return to the control room to continue assessing the damage and to determine available options. At 12:35 p.m., Hazelwood ordered the engine back on—and eventually to "full ahead"— and began another series of rudder commands in an effort to free the vessel. After running his computer program again another way, Kunkel concluded that the ship did not have acceptable stability without being supported by the reef. The chief mate relayed his new analysis to the captain at 1 a.m. and again recommended that the ship not leave the area. Nonetheless, Hazelwood kept the engine running until 1:41 a.m., when he finally abandoned efforts to get the vessel off the reef.



Source: USCG Marine Safety Office - Valdez

Initial response

At 12:30 a.m., Blandford notified Cmdr. Steven McCall, head of the Valdez Coast Guard Marine Safety Office, of Hazelwood's initial report. Under the National Contingency Plan (NCP) for oil spill response, McCall became federal on-scene coordinator in charge of initial response efforts. As captain of the port, McCall ordered Port Valdez closed to tanker traffic at 12:30 a.m., causing inbound tankers to be delayed at a safe anchorage at Knowles Head, beyond the spill site, for much of the next week.

"A lot of the Coast Guard personnel that came in did not have an understanding or a local knowledge of the area. I think that should be stressed in management of oil spills and contingency planning. Local knowledge is going to be a key ingredient."

Jim Butler, Kenai Peninsula Borough
Alaska Oil Spill Commission hearing, 9/7/89

Also notified in short order were McCall's executive officer, Lt. Cmdr. Thomas Falkenstein, Chief Warrant Officer Mark J. Delozier, and acting marine operations supervisor David Barnum at the Alyeska Marine Terminal. The call to Alyeska unleashed a second chain of calls—to terminal superintendent Chuck O'Donnell and then to Alyeska employees cross-trained in oil spill techniques. (O'Donnell later suffered embarrassment when it was reported that he went back to sleep after phoning Alyeska marine operations manager Lawrence Shier to inform him of the spill. He later testified that he only napped for about an hour, and an Alyeska chronology of events shows him at work in the early hours of the morning.) Alyeska dispatched the tug *Stalwart,* which had accompanied the *Exxon Valdez* through Valdez Narrows, to the grounding site to help stabilize the tanker or rescue the crew if necessary.

Direction and coordination of federal, regional, state, local and industry oil spill response efforts are outlined in plans developed under the National Contingency Plan. National and regional response plans established federal responsibilities for response. State roles were outlined in the Alaska State Oil and Hazardous Substances Pollution Contingency Plan. But because the industry spiller was expected to respond to any spill within its capability, the private Alyeska plan guided the initial response to the *Exxon Valdez* spill. Exxon began assuming responsibility for response efforts and implementing its own contingency plan as its officials began arriving in Valdez on the evening of March 24. Exxon formally took responsibility for spill response at noon on March 25.

As events unfolded it became clear that the NCP structure intended to coordinate and provide resources for effective spill response was a toothless tiger. No federal, state or industry entity had the resources or institutional mission to provide an effective response in Prince William Sound to a spill of this magnitude. The spill was not, in truth, remotely within Exxon's capability to contain and clean up—but no government or private entity, or combination of entities, was better situated than Exxon to carry out the response.

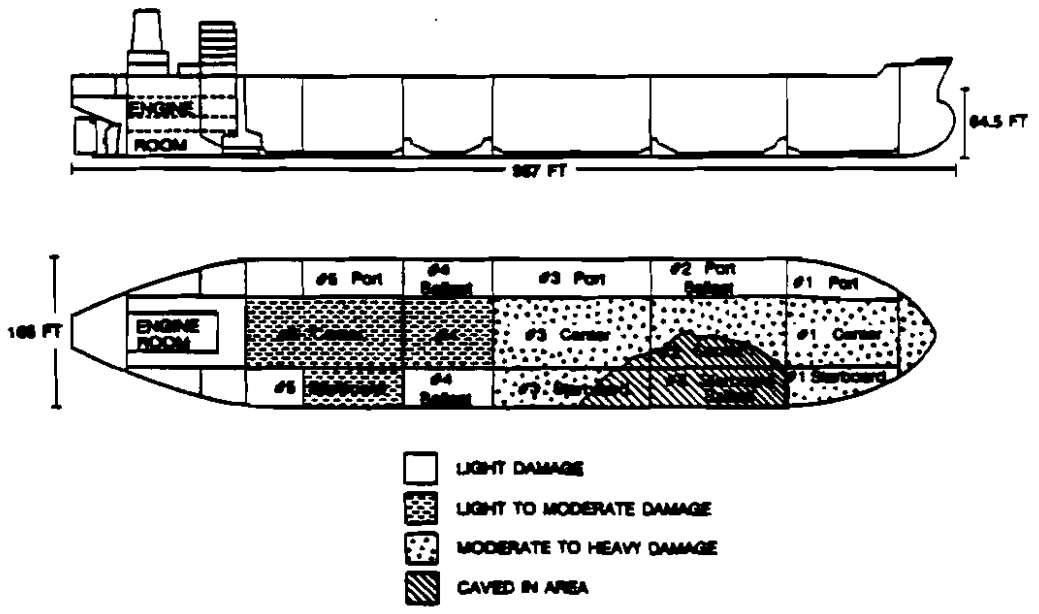
A series of phone calls moved through the chains of command at Alyeska, Exxon, the Alaska Department of Environmental Conservation, and other state and federal agencies. Frank Iarossi, president of Exxon Shipping Company, was notified in Houston at 1:25 a.m. (4:25 a.m. Houston time) and made a series of phone calls to

senior Exxon officials needed to mobilize Exxon's response. Also among those first alerted were Alyeska President George M. Nelson, vice president for environment and engineering Ivan Henman, and Valdez DEC office chief Dan Lawn.

Lawn phoned his superior in Anchorage at 1:20 a.m. and asked that DEC officials in Anchorage, Fairbanks, Kenai, Wasilla and Juneau be sent to Valdez. Lawn then went to the Valdez Coast Guard office to monitor events. He later was the first state official to reach the stricken *Exxon Valdez*, arriving at 3:35 a.m. with two Coast Guard investigators. Lawn later told the *Anchorage Daily News* that oil leaked from the ruptured tanks was "rolling up, boiling and cooking" around the ship. "It was kind of like a boiling cauldron." He also recalled climbing up the pilot's ladder on the side of the tanker and seeing oil in the water 2 feet higher than the surrounding seas.

Another member of that first group to reach the *Exxon Valdez*, Coast Guard CWO Mark DeLozier, soon smelled a strong odor of alcohol on Hazelwood's breath—a discovery that led the Coast Guard and state to seek blood and urine tests on Hazelwood and other crew members involved in the accident. While the tests were not taken until approximately 10 a.m., Hazelwood tested above allowable limits for blood alcohol. When the results of the test emerged later in the week, Exxon fired Hazelwood and the State of Alaska began criminal proceedings.

Exxon Valdez damage



Source: various

Alyeska began readying response equipment within 20 minutes of Hazelwood's report, but the spill completely overwhelmed the company's capacity for response. Events of the next several days proved that, even under relatively benign weather conditions, neither Alyeska nor Exxon could summon the equipment or resources to contain and collect even a small part of the spilled oil. The emphasis on privatization promoted by the Reagan Administration since 1981 and the State of Alaska since 1979 had failed abysmally.

Alyeska's efforts throughout that first night were hampered by the fact that the company's 126-foot flat-deck barge designated for spill response was damaged and unloaded at the time of the spill. The barge had been used in January 1989 to respond to the 71,000-gallon *Thompson Pass* spill at the Alyeska Marine Terminal. Cleanup gear was removed from the barge for cleaning, and heavy winds in a winter storm damaged the barge's bow. The barge still had not been repaired or reloaded at the time of the *Exxon Valdez* spill, though it was not damaged severely enough to prevent it from being used that night for response. Reloading of the barge was slowed by the fact that only one Alyeska crew member was qualified to operate a forklift needed to move equipment and materials to the barge as well as the crane used to lift them onto its deck, and hence he was forced to shuttle back and forth. Several feet of snow covered much of the response equipment, making it hard to find in the yard. The equipment barge Alyeska's contingency plan had promised would be available to respond to a spill within five hours did not reach the spill site until 2:54 p.m.—14 hours and 24 minutes after Alyeska first received notification of the accident. A tugboat carrying lightering equipment to the *Exxon Valdez* arrived at the site at 12:05 p.m.—11 hours and 35 minutes after the first report.

Alyeska's response efforts gradually picked up through the night and into the next day. Activity focused on several fronts:

- loading the response barge with boom, skimmers and other cleanup equipment;
- collecting and loading lightering equipment to be used to transfer remaining oil off the ship;
- obtaining chemical dispersant materials and application systems, from as far away as England;
- gathering work crews to report for duty either immediately or at first light, and
- locating and requesting more cleanup, transportation, communications and lightering equipment from around the state.

By 6 a.m. a total of 120 Alyeska personnel were working on various aspects of spill response in Valdez or Anchorage. Alyeska had contacted Alaska Clean Seas and Cook Inlet Response Organization (spill response organizations with equipment stockpiled in the state), state and federal agencies, and bird rescue experts.

The controversy over whether and how to use chemical dispersants to break up the spill had already germinated. The first query from an Alyeska official concerning dispersant use came about 40 minutes after Hazelwood's report to the Coast Guard in Valdez, and that request was repeated several times through the night. At 6:30 a.m. the Coast Guard asked Alyeska to prepare a formal request to use dispersants. A handwritten 10-page document sent by facsimile machine at 8 a.m. asked permission to apply 50,000 gallons of dispersants beginning at 2 p.m. Saturday, although only a fraction of that amount was available in Valdez or even in the state at that time. At the time of the request, Alyeska had less than 4,000 gallons of dispersants at its terminal, no dispersant application equipment, and no aircraft equipped to deliver the chemicals. A total of 8,000 gallons of dispersants were available in Kenai, and an additional 8,800 gallons of dispersants were available in Anchorage. The Alyeska document was sent at 10 a.m., again by facsimile machine, to Regional Response Team members in Anchorage (after the Coast Guard notified Alyeska that its facsimile machine in Valdez was malfunctioning). The episode is instructive: The industry pressed immediately and urgently for approval of dispersants even without sufficient equipment and supplies on hand to deliver them, and government resisted, imposing formal application requirements and asking for demonstrations of their effectiveness.

Dispersants were the source of endless debate both in the first few days after the accident and in public relations skirmishes throughout the summer. In fact, there is no worldwide consensus on the effectiveness of chemical dispersants. Protagonists advocate them as the best method for rapidly disposing of surface oil by dispersing it through the water column, and much experience supports that view. Opponents hold that dispersants merely change the problem—the oil remains in the water—and add their own toxicity to that of the oil.

European countries subscribing to the Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil (commonly called the Bonn Agreement) have reached no consensus on dispersant use. Belgium and the United Kingdom use dispersants as their first line of defense, though this approach is under fire and may change. France and Sweden use mechanical recovery as the first response but use dispersants when they are evaluated as the least harmful method. Denmark, West Germany and Norway use mechanical recovery as the first line of defense, allowing dispersant use only under extreme conditions when nothing else will work. The Netherlands has stopped dispersant use altogether. Canada (not a member of the Bonn Agreement) allows dispersant use only under the most strigent controls.

The United States has done little testing of dispersants in the past decade and thus has little to offer to the debate. Most of the dispersants in wide use are manufactured by major oil companies, including Corexit 9527, the chemical manufactured by Exxon and proposed for use on the *Exxon Valdez* spill. There is little independent research on their effectiveness. Without large-scale federal government testing, state and federal officials at the scene of an oil spill have little guidance in how to approach dispersant use with a particular kind of oil in the water.

Contingency plans in effect for Prince William Sound divided the sound into zones with three classifications of approval status. The spill occurred in Zone Two, requiring concurrence by both state and federal authorities for dispersant use, but most of the oil quickly moved into Zone One, where only approval from the federal on-scene coordinator (McCall) was required. McCall thus became the focus of much lobbying on both sides—the industry pressing for permission to spray dispersants while most state and federal agencies, fishermen and environmental groups urged caution. Here again the lack of research and testing hindered decision-making: McCall was required to make a determination that the benefits of dispersants outweighed the disadvantages before granting approval, but he had little evidence with which to proceed. Time is critical in the first few hours of spill response; without prior guidance, the on-scene coordinator is crippled in his ability to act effectively.

In the early morning hours, confusion surfaced on two other fronts—priority for loading equipment onto the response barge and whether containment boom should be placed to surround the *Exxon Valdez*.

At 4 a.m., according to Coast Guard and National Response Team reports, stability of the *Exxon Valdez*—and concern that the ship might capsize and break up, spilling the roughly 42 million gallons that remained on board—was the Coast Guard's highest priority. Starting about that time (and as loading continued on the response barge), Alyeska officials interpreted several messages from Coast Guard officials as directing them to place first priority on lightering equipment. Alyeska, as a result, decided to redirect cranes that had been loading the contingency barge to load lightering equipment at another terminal dock. Alyeska also recalled the tug *Sea Flyer*, which had just been dispatched to the spill, to load lightering equipment onto that vessel.

Alyeska later told investigators from the Center for Marine Conservation that this change split their workforce and slowed the response. The Coast Guard says Alyeska misinterpreted a simple suggestion. McCall, in fact, said he never dreamed the contingency barge was unloaded in the first place or that putting the lightering equipment on a tug would set back the response, and Alyeska never indicated otherwise to him.

"It's very important that a defined chain of command is recognized. You've got a couple of windows of opportunity in the initial management of a spill. You've got 12 hours, which is one tide cycle, a flood and an ebb. And then you've got, I'd say, four days and then after that it's gone."

Jim Butler, Kenai Peninsula Borough
Alaska Oil Spill Commission hearing, 9/7/89

"One of the big problems in this oil spill situation was that for the first couple weeks probably over 50 percent of management energy was spent in organizational determination and role decision."

Dave Liebersbach, Multiagency Coordination Group
Alaska Oil Spill Commission hearing, 8/31/89

The *Sea Flyer*, loaded with lightering equipment, eventually left the dock at 9:50 a.m., arriving at the grounding site at 12:05 p.m. The tug *Pathfinder*, towing two skimmers and the contingency barge loaded with 25 tons of equipment, left the terminal at 11:37 a.m. and arrived at the *Exxon Valdez* at 2:54 p.m. Along with the barge, according to Alyeska, were 4,800 feet of sea boom, approximately 3,000 feet of sorbent boom, 7,000 feet of sea curtain containment boom and 20 bales of sorbent pads. There were 19 Alyeska personnel on board the barge. The tug had a 2,500-gallon slop tank, and the two skimmers had a combined capacity of 5,000 gallons. Four 26-foot workboats departed the terminal under their own power.

At about 6 a.m. Alyeska's O'Donnell flew over the *Exxon Valdez* in a helicopter to examine the extent of the spill. From the helicopter O'Donnell radioed the grounded tanker to ask if they wanted the ship to be surrounded by containment boom. To O'Donnell's surprise, an unidentified Exxon official on the ship said no. (Later in the day it was decided not to boom the ship until after the *Exxon Baton Rouge* was positioned alongside for lightering. That operation was accomplished at 8:10 p.m. after hours of preparation and maneuvering, but again an Exxon official replied negatively to Alyeska's query about surrounding the two ships with boom.)

In any case no containment boom was available at the spill site until the contingency barge arrived at 2:54 p.m. Exxon finally ordered the two ships surrounded by boom the next day (Saturday, March 25), a job that was accomplished at 11 a.m.

Through the night, Exxon was gearing up to take command of spill response—ordering equipment from across the globe, gathering personnel and matériel to be flown into Valdez, preparing its scientific, technical and managerial resources for the task of salvaging the vessel and responding to the spill.

Exxon's first word of the accident came at 1:23 a.m. (4:23 a.m. Houston time) when Alyeska President George M. Nelson notified Exxon Pipeline Company President Darrell Warner. Warner notified Exxon Shipping Company President Frank Iarossi, who in turn called a list of Exxon senior officials and assistants, including Harvey J. Borgen, the shipping company's West Coast fleet manager. As time went by and the magnitude of the spill was confirmed, Exxon—legally and financially responsible for cleanup—increasingly assumed control of the response.

By 4 a.m. Exxon had begun planning to use the *Exxon Baton Rouge* as a lightering recipient of oil from the *Exxon Valdez*. At 4:30 Borgen called McCall to inquire about approval for dispersants (and, according to Exxon, understood McCall to state that Exxon Shipping Company had his approval to use dispersants on the spill). At 4:35 a.m. Iarossi reviewed Exxon's initial mobilization: two Exxon response teams, a spray aircraft C-130, equipment stockpiles from England and San Francisco, and two 707 aircraft contracted for dispersant shipment. At 6:23 a.m. Exxon issued a press

release: "Exxon Shipping Company officials are en route to the scene. Immediate response to the spill is being handled by crews from the pipeline terminal, with management of the operation being transferred to Exxon officials as they arrive. Alyeska crews will support Exxon personnel." The state received no formal notification of this change.

In the first hours after the spill the Coast Guard's role was essentially monitoring and oversight. McCall assumed his position as federal on-scene coordinator under the National Contingency Plan and Regional Response Plan created by the Clean Water Act of 1973. Alyeska and Exxon carried out most logistical and operational tasks relating to cleanup after the spill and salvage of the *Exxon Valdez*. The Coast Guard began weighing questions related to the use of dispersants on the spill and also entered discussions about the stability of the *Exxon Valdez* on the reef, the need to lighter the remaining 42 million gallons left on board and the prospects for salvaging the ship.

Valdez and the communities of Prince William Sound awoke to another Good Friday disaster that morning—25 years after Alaska's great earthquake on Good Friday 1964, whose epicenter was in the sound, devastated the same region. Stunned communities and individuals found their way of life and livelihoods threatened—herring roe fisheries in the vicinity of the accident were closed within days, for example—but few avenues for action were open to them. Fishermen represented by Cordova District Fishermen United were alerted to the spill shortly after sunrise, and repeatedly offered their boats, their knowledge and their services for spill response, but not until Monday night did the state, Exxon and CDFU representatives finally meet to prepare a plan for using these resources to combat the spill.

Both state and federal agencies began sending officials to Valdez, meeting by teleconference to assess the spill, or considering the risk to resources in Prince William Sound. The Alaska Department of Environmental Conservation convened a meeting in Juneau at 8:30 a.m. to organize response activities and inform other state agencies. Gov. Steve Cowper, who was in Fairbanks, and DEC Commissioner Dennis Kelso, who was in Anchorage, took part by phone. Cowper and Kelso then flew to Valdez, where they met a growing contingent of state officials converging on the city. (By 5 p.m. the state response offices in Valdez included the DEC, the Department of Fish and Game, the state Division of Emergency Services, the Alaska National Guard, the Civil Air Patrol and others.) Cowper and Kelso subsequently flew by chartered aircraft to a cove near the *Exxon Valdez*, where they were met by a Coast Guard boat that carried them to the vessel.

The Alaska Regional Response Team—consisting of representatives of the Coast Guard, DEC, Alaska Department of Fish and Game, U.S. Environmental Protection Agency, Department of the Interior, National Marine Fisheries Service and the National Oceanic and Atmospheric Administration—held its first meeting at noon

Friday. The group discussed dispersant use, the possibility of *in-situ* burning of the oil slick, and risks to wildlife and marine resources. It also considered whether to recommend a federal takeover of the spill and determined that it was not necessary.

By noon, the slick around the *Exxon Valdez* had spread to a size of 3 miles by 5 miles. CDFU had identified 75 boats ready and eager to respond. The *Exxon Baton Rouge* arrived at the site of the grounding to begin preparing for lightering operations to offload the 42 million gallons of oil still aboard the crippled tanker. For most of the first three days after the spill, three circumstances heightened the poignancy of the disaster and the frustration of area residents:

- The oil slick hovered in deep, calm waters near the grounded tanker—lengthening or widening, amoeba-like, with the tides but generally staying off the beaches and offering the illusion that containment remained a possibility;

- The weather turned calm and clear, keeping wind and waves from spreading the oil faster across the sound and providing ideal conditions for mechanical recovery; and

- Notwithstanding the benign weather conditions and seemingly opportune circumstances for oil recovery, the equipment available was utterly overwhelmed by the amount of oil in the water.

The shortage of equipment, slow response time and immense amount of oil in the water made catastrophic results inevitable, but the fact that this disaster occurred over days and weeks rather than minutes and hours meant that Prince William Sound residents could watch their agony unfold in slow motion. In the days following the spill, public attention intensified, on occasion turning the several-times-daily public briefings at the Valdez Civic Center into a forum for shouted accusations and epithets.

Equipment and personnel converged on Valdez throughout Day One—Good Friday—of the spill. Print and broadcast reporters began to arrive from around the world. Late in the afternoon the flow of oil through the trans-Alaska pipeline was reduced from 2.1 million barrels per day to 800,000 barrels per day, about 38 percent of capacity. Exxon established a command post at a Valdez motel. Iarossi and his contingent arrived by corporate jet from Houston at 5:37 p.m., joining a group of Exxon executives who had arrived earlier from Anchorage or other regions of the country. As the Exxon group grew in size and influence, Exxon assumed greater and greater control over response operations.

The Alyeska contingency barge reached the *Exxon Valdez* at 2:54 p.m. and began deploying containment boom and skimming equipment midway between the ship and the leading edge of the oil slick. The rationale given by Alyeska for this position

was that it would permit mechanical recovery at the point where the oil was thickest rather than the leading edge where it would be thinnest, but later appraisals disputed the point. At 6 p.m., DEC staff observed that only two of seven skimmers in the area actually were operating.

At 3:10 p.m. McCall gave permission for a trial application of dispersants, and at 6 p.m. a dispersant spray test was conducted by helicopter. The results were unsatisfactory due to lack of mixing energy on the surface of the water. Use of dispersants was deemed inappropriate at that time.

Exxon held the first of many press conferences at the Valdez Civic Center that evening, attended by about 100 representatives of the press, oil companies, government agencies and the public. Topics predictably included dangers to fisheries, hiring local people for cleanup, delays in response deployment, equipment stockpiles and dispersant use. Gov. Cowper assured local fishermen that dispersants, if used at all, would be carefully targeted.

Sunset came at 7:10 p.m., and skimming operations in the slick were interrupted—not because of failing light, but because crews ran out of storage space for the skimmed oil. At that point they had 210 barrels (8,820 gallons), less than one-tenth of 1 percent of the amount spilled. At 8:10 p.m., the *Exxon Baton Rouge* arrived alongside the grounded *Exxon Valdez* to begin rigging lightering hoses and pumps. At 8:30, Alyeska crews decided to station boom in an effort to protect beaches and fisheries at Bligh Island, directly east of the grounded tanker. At 10:15 p.m. the first lightering hose was connected to the *Exxon Baton Rouge*, though lightering was delayed for an underwater damage survey by divers and did not actually begin until 7:36 a.m. Saturday.

Hazelwood, relieved of duty by Exxon shipping group coordinator William Deppe, was taken off the *Exxon Valdez* at 11 p.m., and at midnight divers found substantial damage to starboard side and center cargo tanks.

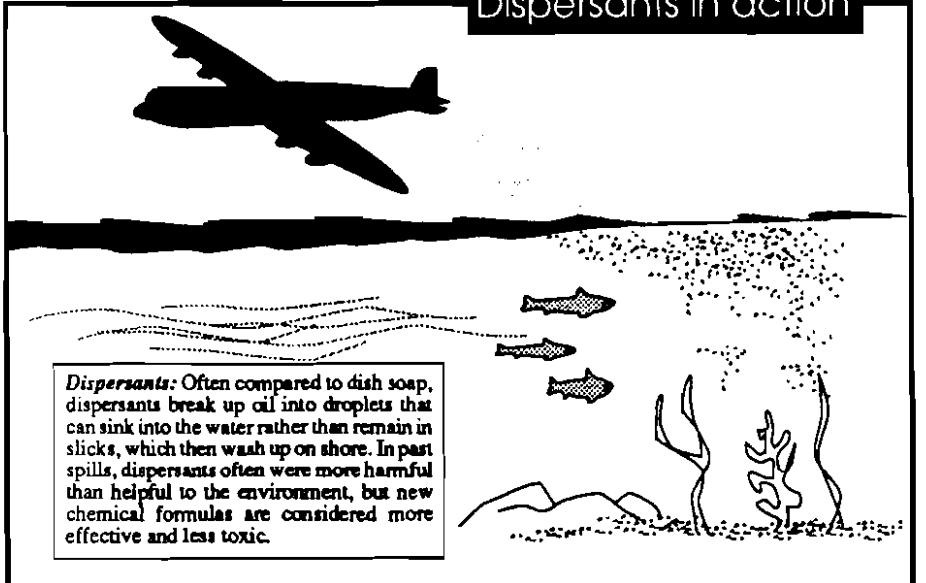
As Good Friday came to an end, equipment and personnel rushed toward Valdez. The oil was still flooding away from the *Exxon Valdez*, and precious little oil actually was being removed from the sound. The town of Valdez had been transformed. An airport that historically averaged 20 flight arrivals or departures per day had seen 444 in the first 24 hours after the spill. According to Exxon, the number of Exxon employees, contract personnel and fishermen contracted to respond to the spill numbered 176. Fifteen tons of air cargo had arrived that day. Twenty-five vessels, 15,000 feet of boom and three skimmers were deployed against the spill, according to Exxon. And still the slick was completely beyond human control.

Day two

Saturday morning brought further calm weather and tense feelings in Valdez. Flights into Valdez were jammed with industry, goverment and media personnel. State officials, particularly DEC Commissioner Kelso, heightened their criticism of the slow and inadequate response. Area fishermen, Valdez residents and a growing wave of reporters descended upon a noon press conference to query McCall, Iarossi and representatives of Alyeska.

The first dispersant spray plane, a Southern Air Transport C-130, arrived in Anchorage from Phoenix at 6:12 a.m. Lightering from the *Exxon Valdez* to the *Exxon Baton Rouge* began at 7:36 a.m. The Coast Guard reported at 7:45 a.m. that loss of oil from the ship had stopped. Divers completed their initial survey of damage to the ship, reporting substantial underwater damage over 50 percent of the ship's bottom. By 9:45 a.m., according to Coast Guard reports, mechanical recovery equipment working on the slick included five skimming systems, two 30,000-barrel barges to receive recovered oil, and 15,000 feet of boom deployed.

Dispersants in action



Dispersants: Often compared to dish soap, dispersants break up oil into droplets that can sink into the water rather than remain in slicks, which then wash up on shore. In past spills, dispersants often were more harmful than helpful to the environment, but new chemical formulas are considered more effective and less toxic.

Application: Sprayed by C-130s carrying 5,500 gallons per trip. The low-flying C-130s are directed by high-flying spotter aircraft. Spray must be released evenly and applied at the correct dispersant-to-oil ratio.

Ratio: The dispersant identified in the Prince William Sound Contingency Plan requires one gallon of chemical to break up 20 gallons of oil. At that ratio, it would take 540,000 gallons of dispersant to cover a 10.8 million gallon spill.

Source: Anchorage Times

At 9:45 a.m., Regional Response Team representatives met in Valdez. They discussed the afternoon's planned dispersant trial application and agreed that Exxon Shipping Company would assume management of the spill and financial responsibility. The full Regional Response Team met again by teleconference at 11:10 a.m., with deliberations again centered on dispersants and their use. Members agreed that mechanical recovery was currently the best cleanup method, given calm wind and wave conditions. They also expressed concern that dispersant and *in situ* burning tests not be allowed to detract from the main effort of mechanical recovery.

At 12:30 p.m. a National Oceanic and Atmospheric Administration helicopter overflight showed the slick extended southwest from the tanker approximately 10 miles and was from 3 to 7 miles wide.

At 2:25 the C-130 in Anchorage was loaded with dispersants; it arrived in Valdez at 3:51 p.m. Late that afternoon, with McCall, Iarossi and dispersant consultants watching and filming from a helicopter, the C-130 swooped low over the slick to spray 3,500 gallons of dispersants southwest of the grounded tanker. Iarossi and the consultants concluded the test was a success; McCall remained unconvinced. Further tests were scheduled for Sunday morning, and the C-130 flew to Kenai to load 5,100 gallons of dispersants and then to Anchorage for staging.

At 8:45 p.m., an *in situ* burn test was conducted near Goose Island. An estimated 15,000 gallons of oil were consumed by collecting the oil behind fireproof booms and igniting it. Approximately 100 square feet of tar were left as residue. Alyeska and Exxon pronounced the burn test a success, but burning as an option for cleanup was prevented the next evening when high winds spread the oil across the sound.

By Saturday midnight the vital statistics showed more equipment and manpower in hand but little progress against the oil. Five skimmer systems had collected a cumulative total of 50,400 gallons (1,200 barrels) of oil from the water. About 504,000 gallons (12,000 barrels) had been discharged from the *Exxon Valdez* to the *Exxon Baton Rouge*. Two Coast Guard cutters were on the scene, either directing traffic or providing transportation. There had been 633 flights into or out of the Valdez airport that day, carrying, among other things, 47 tons of air cargo. Exxon employees or workers under contract in Valdez numbered 250. And according to Exxon, 56 vessels, 26,000 feet of boom and six skimmers had been deployed against the spill.

"The seven oil companies who own Alyeska broke a contract with the U.S. government and the people of the state of Alaska. Simply put, Alyeska was unprepared to deal with an oil spill of this magnitude, as they promised they would be, and they failed to react quickly during the critical early hours of the spill to minimize environmental damage, as they are mandated to do."

Dr. Riki Ott, Cordova District Fishermen United
House Committee on Interior and Insular Affairs hearing, May 1989

Day three

The weather remained calm and clear Easter Sunday, perpetuating for many the illusion that somehow this spill might still be mastered. As increasingly frantic fishermen and local residents demanded greater action against the spill, the wind gradually picked up—a portent of major changes that night.

Reports of dead or oiled birds and wildlife began arriving in Valdez. Eight tankers were now anchored at Knowles Head, waiting for directions or permission to proceed into the closed Port of Valdez. Lightering operations continued. Five more skimmers were on their way from San Francisco and England, and more boom, dispersant and other equipment were also being brought in. State officials and the governor's office were discussing the possibility of a disaster declaration. By 1:30 p.m., 84,000 gallons (2,000 barrels) of oil had been collected from the spill. Exxon was still pressing for dispersants.

The first break in the pattern came with successful dispersant spray tests at midday and late afternoon. With wave agitation providing better conditions for dispersing the oil, results of the test were deemed successful. That evening, representatives of Exxon, the Coast Guard and the state met in Valdez to discuss the use of dispersants and overall cleanup coordination.

The meeting brought two major results:

- McCall gave full authorization for use of dispersants on the bulk of the slick.

- Participants proposed a new three-headed command structure involving Exxon, the Coast Guard and DEC. Operations would be headed by Exxon, but an operations committee involving the Coast Guard, DEC, state Division of Emergency Services, Fish and Game, CDFU and Exxon would have a voice in all response decisions.

Gov. Steve Cowper declared a state disaster at 6:30 p.m. Sunday. Most of the oil from the stricken tanker remained at the center of the sound in deep water and off the beaches. It had spread to more than 50 square miles—which, to unknowing observers oblivious to the destruction still to come, seemed an awesome sprawl.

Later, Exxon's Iarossi reported the results of the meeting with the Coast Guard and the state, sounding almost jubilant in describing "spectacular" results from the dispersant tests. He announced agreement on dispersant use and *in situ* burning, tallied up the equipment either available or on the way, and strived to give the impression that for the first time real progress could be expected against the spill.

"The Coast Guard, within a month at one point, was handling four major spills, chasing salmon pirates in the North Pacific, and interdicting drug traffic from Panama. We don't provide enough funding for them to do any one of those tasks adequately, and yet we ask them to do all of them."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

But the unpredictable weather of Alaska's springtime finally intervened. That night, as Exxon prepared to drop dispersants, burn high concentrations of oil, and increase booming and skimming efforts, a windstorm blew through the sound and sent spilled oil flitting across the waves. Winds recorded at 73 miles per hour closed the Valdez airport, grounded air traffic and sent boats scurrying for cover. Skimmer systems, booms and other equipment had to be moved to sheltered waters for protection. The night's storm drove oil ashore in large quantities for the first time, coating beaches at Little Smith, Naked and Knight islands. The next morning, oil was reported on trees up to 30 to 40 feet above ground. More significantly still, the storm dispersed the oil in its own fashion, overnight driving the leading edge of the slick to more than 40 miles from Bligh Reef and churning much of the oil into a frothy, brown, mayonnaiselike mixture called "mousse."

Chemical dispersants and burning were no longer serious options. Most of the slick was now in Zone Three in the vicinity of Naked and Knight islands. Use of dispersants generally was not recommended and required both state and federal approval on a case-by-case basis. A disappointed Iarossi told attendees at a Monday public briefing, the oil was too far strung out and weathered to permit dispersants or burning to succeed on a large scale. (Some dispersants were dropped on oil remaining in Zone One on Monday, with satisfactory results, but the bulk of the oil was out of reach. There is some question whether the dispersant drop had been authorized.) About 1.5 percent of the oil had been recovered, dispersed or burned by the time the wind began to blow.

The spill was hopelessly out of control, a calamity in full bloom. From Sunday night onward, response authorities and crews were doomed to chase a spill they would never contain. They skimmed a few barrels here and there from coves and bays where it had collected. They boomed particularly sensitive areas such as hatcheries in a valiant effort to divert the destruction. They established bird, otter and wildlife rescue operations to try and save the dying creatures of the sound—or at least to collect and count the bodies. They watched beach after beach being plastered with oil from a slick that obeyed only the rules of winds, currents and the dispersing forces of physics. But they never caught up to the 10.8 million gallons of crude oil spilled three nights earlier.

Two events punctuated the Valdez civic scene the night the *Exxon Valdez* left the harbor, just hours before the grounding. At the Valdez Civic Center, Alyeska held its annual safety awards banquet. Over in city council chambers, a less congratulatory meeting of about 30 residents discussed the impact of oil on Valdez. Riki Ott, a biologist and CDFU board member from Cordova, spoke by telephone after her scheduled flight was grounded by weather. Ott holds a master's degree in oil pollution and a doctorate in sediment pollution and has been a sharp observer and outspoken critic of Alyeska's environmental policies. The discussion turned to what would happen in the event of a major oil spill. "Gentlemen," she said, "it's not a matter of what if, but when."

The *Exxon Valdez* ran aground a little over an hour later. The systems intended to prevent such an accident had failed. Officers and crew on the ship were very likely fatigued from double duty during loading operations the day before the accident. The ship was accelerating and departing approved tanker lanes rather than slowing down to move through floating ice. There was only one officer on the bridge, rather than the Coast Guard and company policy of two. The ship's captain had been drinking, and the next morning tested at unacceptable levels of alcohol in his blood and urine. The Coast Guard Vessel Traffic Center routinely assented in the *Exxon Valdez's* decision to leave its outbound traffic lane, and its vessel monitoring system failed to detect when the ship left the traffic lanes altogether. And as a last resort, after the ship went aground, there was no double hull to prevent or even reduce the outflow of oil from its cargo tanks. (A Coast Guard study later showed that up to 60 percent less oil would have been spilled if the *Exxon Valdez* had been equipped with a double hull.)

The early response to the crisis was equally ineffective, though not for lack of effort: Undermanned and underequipped, Alyeska's best efforts could not begin to contain a spill so large. Reaching around the world to rush cleanup equipment and matériel to the scene, Exxon pressed for permission to use dispersants, even though only a tiny fraction—perhaps less than 1 percent—of the needed chemicals were available in Alaska. State and federal agencies, concerned by the prospect of adding further chemical poisons to an already devastated Prince William Sound, resisted dispersants and urged greater focus on mechanical recovery. Alyeska and Exxon opened

their checkbooks early and often, trying belatedly to buy what they didn't have—preparedness and control over the calamity unfolding before them.

But this unstated reality thwarted the best intentions of all: There weren't enough skimmers, storage barges, dispersants, spraying systems, booms, boats, personnel or good ideas to make a dent in the 10.8 million gallons of crude oil floating across the surface of Prince William Sound.

"As far as who's in charge of an oil spill, it sure as hell should not be the spiller."

Lee Glen, Habitat Division, Alaska Department of Fish and Game
Alaska Oil Spill Commission hearing, 7/12/89

Most Americans' awareness of oil development in Alaska probably doesn't extend much beyond the discovery of the Prudhoe Bay field in 1968 and construction of the trans-Alaska pipeline in the 1970s. Actually, several distinct eras of development have occurred, dating back to before the turn of the century.

In the late 1800s and early 1900s, combinations of oil companies and private investors looked for oil throughout Alaska, the most notable early prospect being near the town of Katalla, just south of Cordova on the Gulf of Alaska.

Oil men originaly were drawn to Katalla by a series of large oil seeps that had been staked as early as 1897. Numerous seeps in what would become the Naval Petroleum Reserve No. 4 (now National Petroleum Reserve-Alaska, or NPRA) encouraged President Warren G. Harding's decision to preserve that 25 million acres in Alaska's interior arctic region for future government exploration. Seeps on the North Slope also provided early attention ultimately leading to discovery of the enormous oil reserves at Prudhoe Bay.

"Figure out what 25 percent of the nation's oil is worth."

Rep. George Miller, California House Committee on Interior and Insular Affairs hearing, May 1989

Just a touch of oil fever would come to Nome, too, when in 1906 a small exploration crew was lured there by the promise of oil perceived in the filmy sheens found in lagoons of the area and by beach foam that seemed to have a quality of paraffin about it. Results did not measure up to expectations.

Alaska's early oil explorers sank wells around the turn of the century on the east coast of the Alaska Peninsula near Ugashik, known as the Cold Bay District, but no major quantities of oil were found.

Union Oil of California, Associated Oil and Standard Oil of California returned to Cold Bay in force in 1921, their interest possibly renewed by a new oil leasing law passed by Congress in the 1919-20 session. The *Seattle Post Intelligencer* (June 24, 1923) said the new law had the effect of "unlocking the oil fields which the conservationists had put the padlock upon, and throwing it open to those who were qualified and financially able to exploit, explore and develop the land and put it in the way of productiveness." Echoes of such rhetoric aimed at conservationists by the forces of development are heard across Alaska to this day.

A boomtown of 2,000 sprang up across the creek from the old town of Kanatak after the companies returned to Cold Bay. The companies drilled on several seeps and were encouraged by a gas discovery in 1923, but none of the wells produced enough oil to merit continued exploration. Standard returned in 1938 and drilled one deep test well but had the same results.

"Each of the various interested parties is trying to pass on their own real or perceived costs to everybody else."

Professor Matt Berman, University of Alaska Alaska Oil Spill Commission hearing, 9/21/89

What might be termed the modern era of oil development in Alaska began with Phillips Petroleum winning a million-acre development lease from the Department of the Interior to explore in the Gulf of Alaska. While Phillips was beginning its operations in the gulf in 1953—ultimately drilling three dry wells—other large companies and small, local partnerships were moving onto the Kenai Peninsula south of Anchorage and tying up lease tracts there.

Industry interest ignites

The first big strike on the Kenai came in July 1957 on land leased by the Richfield Company (ultimately ARCO) in the National Moose Range at Swanson River on the northern part of the peninsula. News of the discovery launched the most serious exploration in Alaska's history to that point. Within six months of the announcement of a confirmation well at Swanson River, the amount of federal land in the territory leased for oil exploration soared from 6 million to 19 million acres.

"But apparently there is no institutional life to promises. The Department of Environmental Conservation described what you did today as inertia and incompetence. I would add carelessness. That is not a personal indictment, it is the institutional indictment. The promises made not only to the people who live in Alaska, but to all Americans who love Alaska were that you would protect this resource if we gave you the right to remove the oil. You broke your word out of carelessness."

Rep. Wayne Owens, Utah Committee on Interior and Insular Affairs hearing, May 1969

Standard Oil (now Chevron) bought half interest in the field for $30 million and took over as operator. Drilling operations moved a couple of miles east of the discovery to define the breadth of the reservoir and found nothing. Another well a couple of miles to the west also came up dry. If skepticism about the field was beginning to grow, it disappeared for good in 1959 when a second big strike was confirmed 6 miles away at Soldotna Creek on leases held by a group of Anchorage investors. After some 60 years of minor successes, this find marked the beginning of the oil industry settling in at last as a potent and long-term development force in Alaska.

Anchorage and parts of the Kenai Peninsula boomed as transportation and oil industry support centers. Soon more than a hundred companies had representatives looking for land, but many of them were forced to turn to other parts of Alaska after they found most of the attractive acreage on the peninsula already under lease. Pan American (forerunner of Amoco), for example, found nothing suitable on the Kenai and decided to look over Southwest Alaska. The company finally leased a large tract on the Yukon-Kuskokwim Delta but pulled out after drilling one unsuccessful well.

In addition to the economic benefits the Kenai Peninsula discoveries afforded Anchorage and a few other communities, they further heightened interest in Alaska's overall oil potential and were responsible for providing a crucial source of revenues to the government of the fledgling state. Alaska had been admitted to the union on Jan. 3, 1959, just months before the Soldotna Creek discovery was confirmed.

Congress had given the territorial government the rights to 90 percent of royalties from federal leases in the Swanson River field. And in the act establishing Alaska as the 49th state, Congress provided for the new government to select about 103.5 million acres of federal land for state ownership, requiring that the state retain the subsurface estate. Oil development had been a premise of statehood, as it was widely acknowledged that its small population and huge expanse of land offered Alaska few other prospects for supporting the responsibilities of a state government.

With the Kenai fields producing, the state's first governor, William A. Egan, began selecting lands and holding lease sales as quickly as possible, as congressional transition grants required a replacement source of funds. Offshore tracts in Cook Inlet off the Kenai Peninsula were among the first put out to bid. The royalty payments granted previously by Congress and the eventual bonus payments from the new state leases were critical to financing a viable government in those early years.

"We can't rely on government agencies to be the sole watchdog over industry."

Unidentified witness, Port Graham, Alaska

Prudhoe Bay

By 1962 the industry had done seismic surveys on parts of Alaska's North Slope. At Prudhoe Bay and in the Colville River area they found geological structures from a prehistoric seabed that appeared to hold high potential as oil-bearing formations.

Oil companies and some in the state bureaucracy urged Gov. Egan to select the North Slope as part of the statehood entitlement, but Egan initially was reluctant. He finally acquiesced in 1964, later enduring some criticism for it. Had the leases been sold under federal ownership they would have been offered under a noncompetitive bid, instead of having bidders compete through bonus offerings.

The first Prudhoe Bay lease sale was offered in December 1964, followed by a second sale in July 1965. Alaska Native groups protested a planned third sale, and following Egan's defeat at the polls by Walter J. Hickel in November 1966, the outgoing governor removed the sale from the schedule. One of Hickel's first acts as governor was to reschedule the sale for January 1967.

Eleven months later, Atlantic-Richfield made its first discovery at Prudhoe Bay, but the suspected size of the find was kept secret until it was confirmed by another well in the spring of 1968. Findings were finally announced in July that year, and the news was electrifying: The field was a supergiant—the largest in North America—estimated at 25 billion barrels, with about 10 billion recoverable under present technology. The structure also proved to be a rich natural gas reservoir, holding an estimated 30 trillion cubic feet.

"Industry must provide a safe environment, sensitive and profitable marine—a safe, environmentally sensitive transportation system for profit. We're obligated to meet all laws, we're obligated to provide the very best people, and we must be sensitive to the needs."

Jerry Aspland, President, ARCO Marine, Inc.
Alaska Oil Spill Commission hearing, 9/1/89

The fourth Prudhoe Bay lease sale, covering tracts bordering those sold previously, was held on Sept. 10, 1969. Proceeds to the state totalled more than $900 million in lease bonus money. The three previous Prudhoe Bay sales had netted the state less than $20 million, and in 10 years of statehood, Alaska's 22 oil and gas lease sales had raised a total of less than $100 million. The young state's entire operating budget in 1969 was less than $125 million. In 1989 it topped $2 billion.

The industry began to plan a method of transporting the oil to market, and quickly made it known that an overland pipeline from the North Slope to an ice-free port—preferably Valdez—was the only transportation system it favored. There was no shortage of alternative ideas offered from other sources, ranging from hauling the oil by tanker through the Northwest Passage of Canada, to using "super-submarine"

tankers to glide beneath the Arctic icepack, to an overland pipeline that would cross the Arctic National Wildlife Range in the northeast corner of Alaska and run south through Canada to the Lower 48 states.

"I would hope that the state would provide an environment so that drills and experiments and training exercises can be conducted without fear of new regulation. ... We should work together so that when a catastrophe happens we can come together as a group because of our training exercises."

Jerry Aspland, President, ARCO Shipping, Inc. Alaska Oil Spill Commission hearing, 9/1/89

Supporters of the Canada route included Canadians, who saw it as a way to open the Mackenzie Valley and Beaufort Sea to development, and Americans from the Northeast and northern tier states—America's heaviest net oil consumers—who favored the security and enhanced supply of an overland route that terminated in or near their markets. U.S. reliance on imported oil grew increasingly worrisome in view of two new developments—growing cartel influence of the Middle East-dominated Organization of Petroleum Exporting Countries (OPEC) and the announcement that Middle East oil production had surpassed U.S. output for the first time in 1965. Many believed a trans-Canada line would securely tie Canadian oil to U.S. markets, guaranteeing supply from a politically stable source far into the future.

Many Alaskans suspected that the Canadians were prepared to exact a heavy price for transporting Alaska oil through their country, which would have reduced the oil's value at the wellhead and, in turn, reduced the amount of taxes and royalties collected by the state. Negotiations on the subject were initiated but never concluded.

A substantial part of the Alaska workforce, heavily influenced by the construction industry and unions that were a dominant force in the state's politics at the time, also wanted the line kept in Alaska solely because of the jobs its construction would provide. State government favored the Alaska route because it provided clear access to pricing determined by the international trade, a more certain and probably more attractive price than would prevail if the oil were "captured" solely by Midwest markets.

Governor Egan also was wary of Canada's proposal. Because major opponents of the Alaska route actually opposed any North Slope development at all, instead favoring national programs to emphasize conservation and the use of alternative fuels, the governor feared that abandoning the Alaska route to try to win approval for a line running through the environmentally fragile Mackenzie River Valley could doom the project altogether. The oil industry supported an all-Alaska route, and they had an important backer in President Richard M. Nixon. The line would not run through Canada.

But the pipeline project quickly got caught in two major snares in the form of tough new environmental restrictions under the National Environmental Protection Act (NEPA) of 1969 and lawsuits filed by Alaska Native villages, whose residents contended the line would cross land that belonged to them, based on historical use by Native peoples. Native claims had been in limbo since the United States purchased Alaska from Russia in 1867, and the pipeline quickly became hostage to those frustrations.

The Native claims issue actually was settled in Washington, D.C., with remarkable speed, considering the history and scope of the problem. Nixon signed the Alaska Native Claims Settlement Act in December 1971, clearing this major obstacle to the pipeline with a law that gave newly created Native corporations title to 44 million acres of land and $962 million paid out over 20 years by the state and federal governments.

The environmental issues remained, however, and the lawsuits they spawned continued to stall the pipeline. One lawsuit that presented special difficulty contended that Congress had never given power to the Interior Department to grant a right-of-way for the sites designated along the route to serve as pump stations. With the project delayed indefinitely, businesses and land speculators who had gambled investments on the anticipated pipeline construction boom folded one after the other, causing no small amount of economic grief.

Trans-Alaska pipeline boom

Alaska voters had returned Egan to the governor's office in 1970, and one of the issues in his campaign was a declaration of intent to help settle the Native land claims issue in a manner favorable to Alaska's Natives. In an attempt to sort out what the state's relationship should be with an industry viewed by many as monolithic, Egan introduced a bill that would have had the state issue bonds to build and own the pipeline.

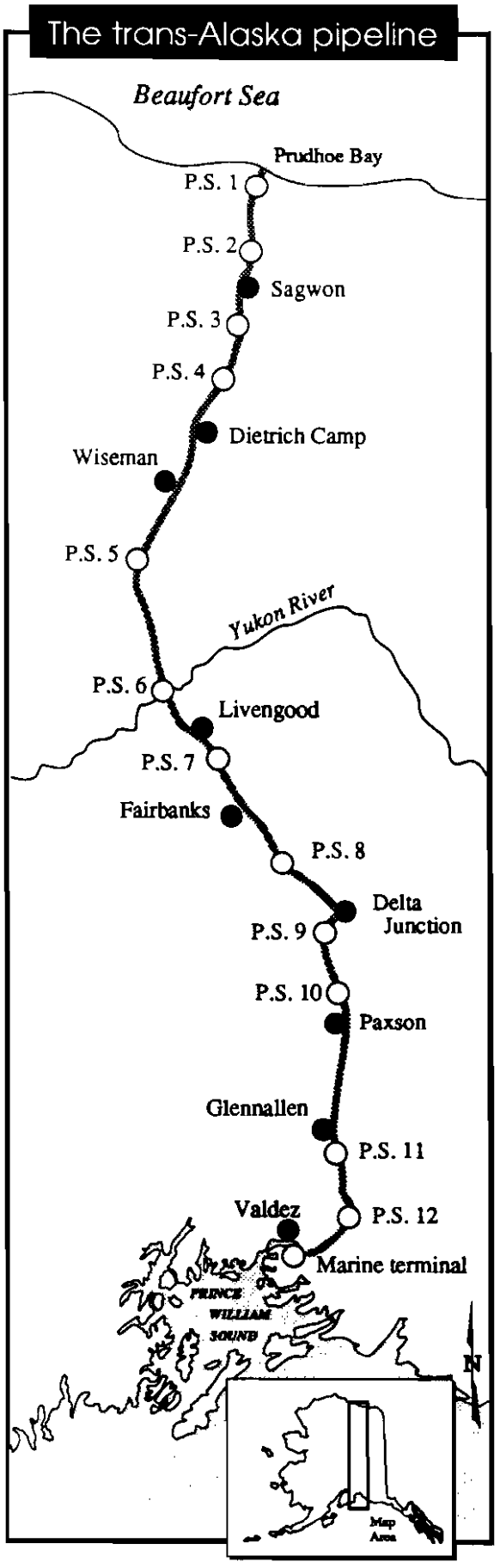
State Senator Chancy Croft of Anchorage had a different view of what the relationship should be. He filed a bill that would establish a right-of-way leasing scheme to charge a tariff, set by the state, wherever the pipeline crossed state land. Despite earlier criticism of Egan for selecting the Prudhoe Bay land for state ownership, those selections now provided the foundation for Croft's bill, which was promoted as a way for Alaska to claim a strong measure of regulatory control over the industry. Both bills sparked tremendous political battles and heavy industry lobbying in opposition during the 1972 legislative session. When the session ended, Egan's bill had failed. Croft's had passed.

The industry responded by filing lawsuits over the right-of-way law and threatening to hold up pipeline construction. With assurance from Interior Secretary Rogers Morton that protecting the environment would be a foremost goal of the pipeline project, congressional sentiment to exempt the project from many of the environmental restrictions of NEPA had begun to build. Resolution of the issue finally came on July 17, 1973, when Vice President Spiro Agnew, presiding as president of the Senate, cast the dramatic tie-breaking vote for the Trans-Alaska Pipeline Authorization Act to pass Congress.

The environmental exemptions of the act cleared a host of lawsuits by eliminating their proponents' legal footing to sue and providing the necessary access to federal

"The people of this state have a real problem on their hands in that they are junkies. They are junkies for oil money. They are physically and psychologically addicted to oil money. They cannot imagine life without oil money, just like a heroine addict. I was not here before the pipeline. ...But I can imagine life without oil money. I can imagine what it was like in this state before the pipeline, and I would like to see it that way again."

Ben LeVine, former oil spill worker
Alaska Oil Spill Commission hearing, 7/15/89



right-of-way. Congressional sidestepping had ended a contentious national environmental struggle over the pipeline.

With the pipeline act about to leave Congress and Nixon certain to sign it into law, Egan called the state legislature into special session on Oct. 17, 1973. He offered the members a legislative and legal settlement that had been negotiated with the industry during the summer: The state would repeal Croft's right-of-way leasing law, which Egan believed probably was unconstitutional. In exchange the oil companies would drop their lawsuits, pay an increased severance tax on the oil they produced with a minimum rate per-barrel and accept a 20-mil property tax on the pipeline.

The plan would mean additional funds to the state, but it also meant giving up an important measure of control over the industry that would prove difficult ever to regain. The legislature reluctantly took the deal, and when the special session adjourned on Nov. 12, the state's role in the pipeline in many respects had been reduced from regulator to tax collector. Four days later Nixon signed the pipeline act into law.

The pipeline project had gained a new aura of urgency as these final hurdles were being cleared. On Oct. 20, 1973, the Arab member-countries of OPEC announced they were cutting production and embargoing all oil shipments to the United States in retaliation for U.S. support of Israel in the Arab-Israeli War. Serpentine lines soon appeared at gasoline stations across the country; by December 1973 the price of oil nearly quadrupled from about $3 per barrel to more than $11.

Pipeline construction began in the summer of 1974, and the project finally started fulfilling the promise of riches that so many had gone broke betting on in 1971. Workers came to the state by the thousands, and their willingness to pay boomtown prices drove up the cost of living in Alaska. Crime rates marched right along with prices, transportation systems sagged, and for three years it seemed the state was filled with strangers. Many Alaskans would become at least temporarily wealthy "during the pipeline," but it was not an era recalled fondly by many who lived through it.

Oil flows to Valdez

By the time the first oil flowed into the line on June 20, 1977, and began its long journey to the tankers in Valdez, the project's cost had soared from its original $900 million estimate to $9 billion. The state would later attribute at least $2 billion of the cost to waste and poor management by Alyeska Pipeline Service Company, the consortium of oil companies that oversaw construction and would operate the pipeline. The state's contention was important because the cost of building the pipeline would be reflected in the tariffs Alyeska charged to move each barrel of oil through the line. The producers would then deduct the tariffs and other overhead charges to establish the net price "at the wellhead" that state taxes and royalties are based on. A state lawsuit over the issue would linger for nine years before a final settlement in 1986 cut Alyeska's tariffs by approximately one-half through the year 2011. To date, Alyeska has paid the state approximately $1.5 billion in payments under the settlement.

"We can't rely on government agencies to be the sole watchdog over industry."

Unidentified witness, Port Graham, Alaska

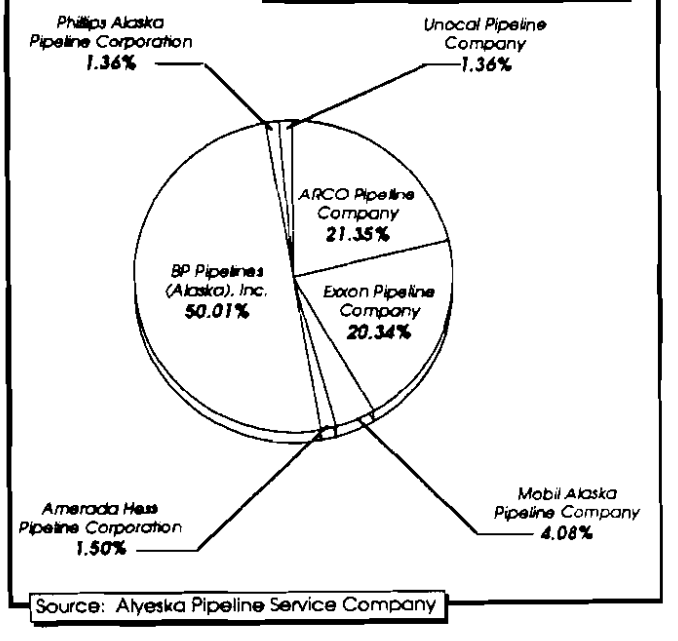
Once the oil arrived at the Alyeska terminal in Valdez, some of the tankers would transport it to Puget Sound and California, while others would take it to Panama, where it would move through another pipeline for reloading and shipment to ports in the Gulf of Mexico or the East Coast.

When Valdez was being promoted as a tanker port during congressional deliberations on the pipeline act, Interior Secretary Rogers Morton assured those concerned about environmental damage to Prince William Sound that the tankers would have double bottoms, and that sophisticated electronic equipment would be employed to watch over them and promote safe operations. Although the U.S. Coast Guard promised to push for both systems, by the time the oil was flowing in 1977 the agency had not installed either full-coverage radar or any other electronic surveillance in the sound.

Under terms of the Pipeline Authorization Act, the Coast Guard was required to establish the Vessel Traffic Service operation in Valdez. The largely advisory system keeps track of tankers and provides them with traffic and weather information as they transit the sound. It also monitors tankers through a one-way zone in the Valdez Narrows, the most constricted passage in the area.

The Coast Guard appears to have run a fairly strict traffic service that exceeded minimum requirements in the early years of the Valdez oil trade. But evidence gathered by the Alaska Oil Spill Commission indicates that Coast Guard budget cuts and related personnel reductions, regression to a

Alyeska ownership



Source: Alyeska Pipeline Service Company

"hands off" attitude, and complacency after 12 years of operations without a major accident had led to a reduced level of vigilance by the time the Exxon Valdez ran aground in March 1989 (Appendix K).

The state had attempted to tighten its grip on shipping safety issues in 1976 with passage of a law giving it broad authority to regulate tanker traffic to and from Valdez. The law also offered incentives for improved safety measures taken by shippers, but elements of the law were struck down by the U.S. District Court when the industry challenged it on grounds that it preempted federal authority. The legislature then repealed the remaining portions of the law.

The world tanker fleet, which had grown exponentially between the end of World War II and the early 1970s, was seriously overbuilt by the time oil began to flow through the pipeline. The opening of Alaska's North Slope and development of Britain's North Sea oil fields further reduced the need for tankers hauling oil from the Middle East. By the early 1980s, the oil shipping industry found itself in a depression that had put about a third of the world's supertankers out of business.

With so many tankers competing for cargo, the U.S. shipping industry maintains that to compete in today's world markets it has been forced to keep pace with cost-cutting trends set by foreign shippers, including reliance on increased automation and steadily decreasing crew sizes. The Coast Guard routinely has approved the industry's crew-reduction requests, even for ships in the Valdez trade that have always been protected from foreign competition by the federal Jones Act.

The shipping industry always has had implied pressures to meet deadlines of its own making. Capt. Robert Elsensohn, a veteran skipper who serves as a director of the International Organization of Masters, Mates and Pilots, told an Alaska Oil Spill Commission investigator the pressures may not always be spoken, but they are a fact of life. "In 35 years as a ship's master, no shipping company has ever told me to do anything foolish or unsafe to meet a deadline," Elsensohn said. "What they do is hand you a schedule. They know pretty close to the hour how long it should take to complete a voyage, and if you consistently take much longer than that, they'll just find someone else who will meet their expectations."

"It's my conviction that the primary responsibility for the Exxon Valdez spill lies with the state and federal governments. Not with Exxon, not with Alyeska. They are corporations designed to produce revenues. The greatest amount of revenue with the least expenditure. That's their job and the only purpose for their existence. Theoretically, our governments are here to look after the public interests, to protect the public. ...I'm sorry to say that we have largely met resistance, disinterest."

Mike O'Meara, Homer area homesteader
Alaska Oil Spill Commission hearing, 7/18/89

Preparedness: Alyeska's oil spill contingency plans

Serious disagreements over oil pollution response in Prince William Sound repeatedly have marred relationships between Alyeska Pipeline Service Company and government agencies. In theory, that response is embodied in Alyeska's oil spill contingency plans: in fact, plans often became battlegrounds where oil spill response capability was the major casualty. Methods proposed—and ignored—in 1976 would have significantly improved spill cleanup after the disaster of the *Exxon Valdez*.

An oil spill contingency plan is the primary way the state and Coast Guard can insure that adequate planning has provided for appropriate response to anything from a minor spill to a gigantic one. A contingency plan identifies and organizes resources and lays out response strategies to most effectively deal with spilled oil. Alyeska prepares its own plan, which is then subjected to government review. Many other companies prepare oil spill contingency plans for ships, oil terminals and other facilities handling hazardous materials or in case of natural disaster, but Alyeska's is by far the largest and most elaborate of the more than 400 contingency plans now on file in Alaska.

A contingency plan bridges idea and action to be taken in the event of an oil spill. As will become apparent, a plan exists on paper that can be evaluated intellectually. Personnel and equipment to implement it are real and can be examined and evaluated. A plan, the equipment and the people can be evaluated together only through spill drills or with actual spills. Then is when the bridge between idea and action is supposed to be crossed. Both preparation and execution contribute to the result.

Alaska law requires preparation of contingency plans for a variety of situations. And though the Department of Environmental Conservation (DEC) can withhold approval, it has inadequate statutory and regulatory means to force compliance with plan standards. State law also currently provides only minor sanctions for failing to follow a plan in the event of a spill.

Local contingency plans such as Alyeska's are supposed to fit into other federally sponsored planning processes, up to and including the National Contingency Plan (NCP). There is a serious gap, however, between theory and reality.

What follows is not an evaluation of Alyeska's present contingency plan, considering equipment, personnel, training or general organizational effectiveness. The commission's task was to examine the history of the process of developing and implementing Alyeska's contingency plans from the first one—approved only months before oil began flowing in the trans-Alaska pipeline in July of 1977—to the

"[Alyeska] said they couldn't understand where the public had ever perceived that they were capable of cleaning up an oil spill. And that was because industry told us that for so many years that we perceived that in the public. ... we need to be prepared in every measure, but we also need to have a mechanism for full response immediately."

Cheryl Sutton, Kenai Peninsula Fishermen's Association
Alaska Oil Spill Commission hearing, 9/7/89

plan approved in 1987, which was in effect when the *Exxon Valdez* grounded on Bligh Reef.

The first contingency plan

"What tends to happen is DEC will get dragged into a septic tank argument and it will drain away as many resources as fighting, for instance, the Alyeska ballast water treatment plant. There's a real problem with priorities within DEC."

Sue Libenson, Executive Director
Alaska Center for the Environment
Alaska Oil Spill Commission hearing, 9/21/89

At first, Alyeska promised that its contingency plan would be completed and tested a year before the pipeline became operational. Instead, plan review began less than a year before oil was scheduled to flow to Alyeska's Valdez terminal. On Aug.12, 1976, Frank A. Therrell, manager for contingency planning and technical permits at Alyeska, sent an incomplete review set of contingency plans to Chuck Champion, state pipeline coordinator. A similar set went to Andrew P. Rollins, Jr., the federal official assigned to the pipeline project.

The review job itself was daunting. Although Alyeska's initial delivery of documents contained volumes only on Prince William Sound, the Valdez tanker terminal and one of the 12 districts into which the 800-mile pipeline had been divided. Not until after the *Exxon Valdez* disaster would state and federal governments again devote this much time and money to review of an Alyeska contingency plan. A complex of interdisciplinary, multiagency government teams was mobilized to oversee environmental and other considerations related to this mammoth project. State and federal pipeline offices plus the state-federal Joint Fish and Wildlife Advisory Team (JFWAT) included staff who used their knowledge to help develop guidelines for the world's largest private construction project. Unfortunately, many people who helped develop and review this first plan were unavailable later for periodic review and revision, leaving government overseers without the depth of expertise required for continuing review.

There were other reasons for the declining effort on subsequent contingency plans, including a reluctance on the part of the state legislature, encouraged by oil industry lobbyists especially, to appropriate money to satisfy environmental concerns. Also, nothing major seemed to go wrong. Technology had triumphed, it seemed, and millions of fish continued to be taken yearly from the sound. As time went by, and significant spills did not occur, less emphasis was placed on the contingency plan.

"It's just a simple question of who's in charge."

Jim Butler, Kenai Peninsula Borough
Alaska Oil Spill Commission hearing, 9/7/89

Reviews of the initial Alyeska oil spill contingency plan apparently did not get off to a smooth start. After only two months State Pipeline Coordinator Chuck Champion wrote Alyeska President Dr. William J. Darch, stressing that "the trans-Alaska pipeline will not begin operations until the Alyeska Oil Spill Contingency Plan has been approved by the Office of Pipeline Coordinator."

Several volumes of the plan were found inadequate, and action on them was suspended until they were revised. A special committee including JFWAT members was created to work with Alyeska to expedite the revisions. Alyeska's draft had been found seriously wanting and, pressure was on to get a plan in place so that oil could flow the next summer.

Of the many comments, one stands out for its candor and for its absence from subsequent Alyeska oil spill contingency plans. John S. Vania, management coordinator for the state Division of Game in Anchorage wrote Nancy Kavanagh, habitat biologist on the Pipeline Surveillance Team:

> The section on Wildlife Care and Rehabilitation, Annex 609, is mostly garbage. Any time and money spent on planning and materials for cleaning birds and mammals in this climate is an utter waste. We would suggest that rather than spend money on care and rehabilitation it should be spent on prevention of spills and on immediate cleanup when one does occur. If any wildlife is lost because of a spill the state should mitigate those losses.

"EPA classified Alyeska as a nonprofit organization and based their entire permit on that. When operations at Alyeska were compared to other operations including facilities partly owned by the Alyeska owner companies, it becomes readily apparent that the oil industry is operating under a set of global double standards."

Dr. Riki Ott, Cordova District Fishermen United
House Committee on Interior and Insular Affairs hearing, May 1989

The most caustic critic of the plan may well have been Randy Bayliss. The DEC regional supervisor for Prince William Sound opened his comments on the Valdez terminal plan to DEC Deputy Commissioner Jerry Reinwand on Dec. 13, 1976, as follows:

> Alyeska's Valdez Terminal Oil Spill Contingency Plan, in almost every major facet, contains mistakes and inadequacies, demonstrates microscopic thinking, and, worse, omits major functions that are necessary. In addition to the following general critique of major shortcomings, certain expletives are pencilled in the margin of the Plan. The initial Plan is so bad, the Department should consider prosecution for violation of Solid Waste regulations and anyone who reviews this Plan should get hour-for-hour Comp Time as Sick Leave.

He followed that broadside with several pages of specific criticism.

The need to deploy equipment to a spill from several locations rather than just from the Valdez terminal began to receive consideration in late December. Rear Adm. J.B. Hayes, Commander 17th Coast Guard District, provided the sharpest initial focus in a Dec. 28, 1976, letter to A.P. Rollins, Jr., the chief federal pipeline officer. Hayes noted that response times for vessels stationed in Valdez to a spill in Hinchinbrook Entrance had been determined to be seven to eight hours. "It is strongly recommended that Alyeska preposition appropriate response resources in the vicinity of Hinchinbrook Entrance." Although similar recommendations followed and became more specific, Alyeska never responded.

Overall, Adm. Hayes was far more positive in what he termed his "in-depth review" of the Valdez Terminal and Prince William Sound portions of Alyeska's Oil Spill Contingency Plan, commenting, "We have generally found the plan to be well thought out and quite good."

Bayliss, in a Jan. 11, 1977, memo to DEC's Jerry Reinwand reviewing the Prince William Sound Oil Spill Contingency Plan, pointed out that spill containment

equipment was overcommitted:

> The same time 11,000 feet of boom and skimmers stored at the berths, which are already proposed for both berth containment and Port Valdez protection have again, and for the third time, been committed for another more distant use, notwithstanding that these were inadequate for the original two commitments. Separate boom and equipment must be solely dedicated for containment and exclusion in the Sound.

This was the lead item in a list of six "major deficiencies" and 10 "other deficiencies and sources of minor irritation."

A publishing deadline exerted pressure at a Feb. 7, 1977, meeting of representatives of Alyeska, the Federal Pipeline Office and the State Pipeline Coordinator's Office. Alyeska said it had sent all sections of the contingency plan to the printers. The parties apparently agreed that review comments would be incorporated into final plans "but some may be in the form of addendums," according to a memorandum from D.S. Braden, a state field surveillance officer. Final approval of the contingency plan would be withheld unless addenda were referenced as a formal, integral part of the plan. They would be printed in the second edition of the plan.

Another major concern, this one with the plan's General Provisions, was raised by Morris J. Turner of the federal Alaska Pipeline Office on Feb. 12, 1977: "The degree of adequacy/capability of manpower and equipment necessary for conducting the immediate response actions." Turner mentioned that State Pipeline Coordinator Champion shared his concern in an 18-page letter of comments transmitted to Alyeska's Therrell on behalf of both state and federal pipeline agencies.

"At the National Transportation Safety Board hearing there was testimony that the top level leadership in the Exxon spill response had not even read the Alyeska plan."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Alaska Oil Spill Commission hearing, 8/31/89

The first spill drill under the Alyeska contingency plan was conducted in early February. Billed as a communications exercise, or "desktop" drill without actual field activity, it exposed a variety of weak spots. To demonstrate Alyeska's capability and readiness to execute the contingency plan, Therrell in late February sent the Alaska Pipeline Office a one-page training schedule that would culminate with demonstrations in May 1977. In subsequent years state officials would complain that not enough drills had been held, and that drills were essential to a complete evaluation of the Alyeska contingency plan.

Bayliss pointed out Alyeska's slow response to review comments in a Feb. 23, 1977, memorandum to George Franklet, pipeline coordinator in the DEC commissioner's office. He said that an earlier draft of the General Provisions had been "carefully reviewed" by the state pipeline coordinator/JFWAT/Alaska Pipeline Office Committee, "who did an excellent job." However, Alyeska "has only gotten about 15 per cent of that review incorporated into this January draft."

The issues still to be resolved before pipeline start-up were identified by Champion

in a March 4, 1977, letter to Alyeska President Dr. William J. Darch. Champion listed four major issues and six additional areas identified by the joint government ad hoc review committee. The major issues included proof of personnel support capability and purchase of additional oil spill equipment. Among the additional areas were "the role of Quality Assurance/Quality Control in writing and updating the plan, and in auditing the response capability," and "Evaluation of Alyeska's Training Program."

An adjunct to the contingency plan, Alyeska's computer program for determining the fate of an oil spill in Prince William Sound, was criticized on March 15, 1977. D.S. Braden, DEC field surveillance officer, wrote ecologist James P. Whaley about a test of the program, concluding that if Alyeska "intends to advertise a computer capability for this purpose or use it as an operational tool, the computer program should be re-worked." Braden listed a minimum of six parameters to be included and said the information was all available locally.

"Clearly from our understanding of what the state expected from us and what the people of the state expected from us, we had a good plan and we executed it. The problem many times is that people automatically assumed that adequacy or inadequacy hinges on being able to pick up 248 or 262,000 barrels before it gets on the shore."

Theo L. Polasek, Vice President of Operations Alyeska Pipeline Service Company House Committee on Interior and Insular Affairs hearing, May 1989

A difference of opinion among reviewers of the Port Valdez and Prince William Sound contingency plans surfaced May 2, 1977, in Bayliss' memorandum to DEC Deputy Commissioner Reinwand. Bayliss said that "APO [the federal pipeline office] and USCG [Coast Guard] say the plans are quite good. SPCO [State Pipeline Coordinator's Office], JFWAT, and DEC say the plans stink and other reviewers (NMFS, Fish & Wildlife) agree."

Bayliss also said Alyeska had not responded on three major points:

"1) They refuse to buy more than 11,000 feet of boom (we want about 60,000 feet).

"2) They refuse to place any boom or boats in Prince William Sound (we want about 80,000 feet and six boats divided up at sites on Montague, Naked and Glacier Islands).

"3) They refuse to buy lightering pumps."

At a meeting with state and federal officials on May 6, 1977, Alyeska's Therrell presented a list of boom available on the West Coast—86,000 feet between Prudhoe Bay and San Francisco. But the company argued that about 18,000 feet of boom was enough for Port Valdez. According to Therrell, State Pipeline Coordinator Champion on advice of the attorney general, stated "the legal position of his office as not having any jurisdiction in the plans under question but that the state did have a major interest in plans formulated." During the wide-ranging meeting, Alyeska also presented a 25-page report on the status of its oil spill contingency plan training.

At a separate work session that afternoon between the Coast Guard and the govern-

"This is a matter of public safety, public health and environmental integrity. Americans are not used to these items being subject to negotiation or to the private decisions of the company that spilled the oil in the first place."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Water and Power Resources, July 1989

mental ad hoc committee, Cmdr. R.C. Nichols presented a plan to station two barges in Prince William Sound, one near Hinchinbrook Entrance and the other near Bligh Island. Each would have lightering pumps, containment boom, dispersant kits, skimmers, boats, helicopter landing facilities, mess and berthing facilities.

Four days later, Allan L. Carson, Alaska Department of Fish and Game supervisor for pipeline surveillance, wrote to Nichols to provide the department's concurrence with his immediate response proposals. Carson also called for the staging of exclusion boom and related equipment throughout the sound.

By early June 1977 the last of the ad hoc committee's comments on the 12-section plans had been sent to Alyeska. Arlan H. Kohl of the Alaska Pipeline Office thanked the committee members for their efforts, through which "significant improvements have been incorporated in the OSCP." A JFWAT review of the Port Valdez volume was in progress, and the group planned to review the General Provisions when they were submitted. JFWAT did not plan to comment on the Prince William Sound volume "since it is outside our purview," according to coordinator James E. Hemming. Champion had said earlier that his office had no legal jurisdiction to review either the Prince William Sound or the Valdez terminal volumes. These positions substantially weakened the review effort.

In counterpoint to Hemming, ADF&G's Carson wrote Champion on June 9, 1977, protesting that the section plans were not acceptable and that JFWAT had not received promised amendments or addenda to them, let alone conducted a review. A final copy of the General Provisions also had never been received, so it was impossible to see if earlier changes had been incorporated or to conduct a review of new material. He reminded Champion that Alyeska had been told March 4, 1977, that the earlier comments would have to be incorporated before the plan could be regarded as final.

Carson listed other problems with the contingency plan and concluded that, "It is JFWAT's contention that APSC [Alyeska] be required to respond satisfactorily to each item and that government take the time to seriously consider each response and demand that APSC accommodate our comments before the OSCP can be approved."

Meanwhile, using state legislation enacted in 1976 (Ch. 266 SLA 1976), on June 10, 1977, DEC proposed sweeping regulations governing the transportation of oil, contingency plans and spill cleanup. Minimum standards for adequacy of oil spill cleanup were revised, and new, detailed requirements were established for oil spill contingency plans. The up-dated requirements reflected the state's experience (and frustration) in reviewing Alyeska's contingency plan. The notice said in part:

> Both terminals and marine carriers must submit information regarding personnel training, availability of cleanup equipment, and projections of the

median and maximum probable oil spill. Additionally, terminals must submit information regarding the meteorology, oceanography, terrain and environment for the area of operation.

Detailed standards regarding minimum response time for deployment of equipment for containment, of a discharge and protection of sensitive environmental areas, and minimum cleanup capability—as well as the requirement that best available containment and cleanup technology be utilized—are established as a basis for reviewing contingency plans.

DEC planned to use a staff of seven to implement the full range of conditions called for by the 1976 legislation.

Approval and dissatisfaction

Then, with only a month before oil was to flow in the trans-Alaska pipeline, events unfolded rapidly. Federal approval was given to the Alyeska Oil Spill Contingency Plan in a letter dated June 11, 1977 from Morris J. Turner of the Alaska Pipeline Office to Alyeska's President Darch. The letter contained the language of an unfulfilled promise that "These documents are not considered 'final' since they will be updated continuously and submitted annually to the Authorized Officer for review and approval in accordance with Stipulation 2.14.3. [a federal stipulation governing pipeline construction.]"

Next, Allan Carson, state pipeline surveillance supervisor, sent a memo on JFWAT letterhead to Champion recommending approval of the corrected revision of the General Provisions. He noted his understanding that approval "will not preclude future reviews through the normal channels." An identical memo was sent by James E. Hemming, the federal coordinator, to Turner of the Alaska Pipeline Office.

Then on June 17, 1977, Champion sent Darch a letter approving Alyeska's oil spill contingency plan. He noted that, "Although principal approving authority is vested in Federal agencies for the OSCP for: Port Valdez Marine Terminal, dated March 1977, and Prince William Sound, dated March 1977, this office concurs that these plans also are within the intent of Stipulation 2.14." Earlier, the coordinator's office had said the Prince William Sound plan was not within its jurisdiction.

Champion also invoked the idea of updating the contingency plans "on an on-going basis." But then, foreshadowing a fading level of effort, he added two sentences later, "Updated OSCP after the end of 1977 should be submitted to the Commissioner, Department of Natural Resources, State of Alaska." This recognizes the decision to eliminate the Office of the Pipeline Coordinator and fragment the regulatory presence through the state departments of Environmental Conservation, Natural Resources and Fish and Game all taking a part.

"Recently, both Exxon and Alyeska asserted that the state-approved contingency plan was somehow not really a set of requirements. Under Alaska statutes, it is unquestionably a binding document. Our law states that the company must have a state-approved plan in place as a condition of operating the terminal at Valdez. Failure to do what the approved plan says is a violation of state law. When Exxon entered the picture in the first days of the spill, they did not follow the Alyeska plan, and later said they followed their own. Whatever plan they were following, if any, it apparently was not a state-approved plan."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Coast Guard and Navigation, July 1989

A week later, Allan Carson sent a memo of outrage and injury to Champion. He said the JFWAT had reviewed Alyeska's addenda to its contingency plans for the pipeline sections and, "We find them to be totally unacceptable." Carson concluded, "Since the OSCP has been approved, APSC [Alyeska] has maneuvered the government into accepting a shoddy piece of work."

"The industry's response during the first, critical 72 hours of the spill was ineffective, in part because of Alyeska's decadelong efforts to scuttle a meaningful oil spill contingency plan. Alyeska failed to carry out its oil spill plan, and Exxon was unprepared and unable to implement an effective response. The industry's response in the following weeks has sometimes been reluctant and shortsighted, characterized by stalling techniques, misinformation, and a refusal to pay real attention to damage outside of Prince William Sound."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Senate Committee on Commerce, Science and Transportation, May 1989

On July 12, 1977, Bayliss finally told Reinwand that the Alyeska oil spill cleanup plans "are in a deplorable state." Concerning the Port Valdez and Prince William Sound plans, he said the following:

> Port Valdez: This Plan simply got 'forgotten.' SPOC [state pipeline office coordinator] claimed responsibility to review and approve the Plan but nothing has happened lately and it probably will slip between the cracks. To my knowledge, Alyeska has received no official comments on this Plan, also woefully lacking, inadequate, and unacceptable.
>
> Prince William Sound: Not forgotten, this Plan is blatently disowned. SPOC and APO were reluctant to look at it, much less claim responsibility for it. The Co-op promised in 1973 for cleanup in Prince William Sound has not materialized and Alyeska, not legally responsible, has volunteered to cleanup oil spills in the sound as a matter of 'expediency.' Of course, the Plan, presented by Alyeska for review, is as woeful, inadequate and unacceptable as the Port Valdez Plan, only worse.

Bayliss also commented that remedies for the Port Valdez and Prince William Sound Plans "are forthcoming, in our proposed but not guaranteed regulations. For the Pipeline Plan, perhaps Alyeska will voluntarily come about, and perhaps there's a tooth fairy."

Industry attacks

The state's fledgling program for more stringent oil transportation safety, mandated by Ch. 226, SLA 1976, was attacked two months later when Chevron U.S.A. Inc., and seven other companies sued the state over its newly adopted oil transportation regulations as well as the law. The law and regulations gave Alaska wide-ranging authority regulating the design, equipment, navigation, operation, certification, inspection, financial responsibility, oil spill liability, cleanup capability and responsibility of oil tankers entering Alaska waters. It also established the Coastal Protection Fund financed by "risk charges" imposed on tankers, and it imposed civil and criminal penalties for non-compliance.

The industry's law suit, *Chevron v. Hammond*, claimed that the state's new oil transportation law and regulations were unconstitutional. The oil companies argued that federal laws and regulations preempted the state from entering various fields it had intruded upon. The companies also claimed that the state's laws and regulations

conflicted with federal laws and regulations and thus were invalid under the supremacy clause of the U.S. Constitution.

DEC Commissioner Ernst Mueller vowed that Alaska would fight; however, similar laws and regulations in the State of Washington had already been struck down as unconstitutional by a three-judge panel, although the case was on appeal to the U.S. Supreme Court. A loss for Alaska would mean dramatically diminished authority compared to what it had anticipated.

Alyeska at that time was not a model of preparedness. In December 1977 Randy Bayliss of the DEC compared the equipment listed in Annex 403 of Alyeska's Oil Spill Contingency Plan for the Valdez Terminal with equipment actually on hand. His itemized list showed that of 170 pieces of equipment, 137 were broken or missing.

In the first quarter of 1978 the DEC began to review the Alyeska Marine Terminal Plan and the Prince William Sound Plan under the standards of its new regulations. Then on March 6, 1978, the U.S. Supreme Court struck down the State of Washington's tanker law, which would have limited the size of tankers entering the island waters of Puget Sound. Alaska Attorney General Avrum Gross said the action probably would negate portions of Alaska's tanker law. Federal court action on the pending Alaska case was expected in August.

When the federal court ruled on *Chevron v. Hammond*, the state found itself virtually powerless to enforce in many areas of oil transportation. The special fund to be financed by tanker fees, which had been counted on to support some staff, vanished. Morale dropped, and the ability to carry on a vigorous enforcement program shrank.

Meanwhile, only six of the state's 29 objections from the previous year to the General Provisions of Alyeska's new 1978 edition of the contingency plan had been met. In an Aug. 17, 1978, document that point was only part of a general review of Alyeska's entire contingency plan that was sent by Alvin G. Ott, supervisor of the Alaska Department of Fish and Game's Pipeline Surveillance Team, to the new State Pipeline Coordinator Amos C. Mathews. Apparently sensing the same pressure to publish that shaped contingency plans in 1977, Ott said he understood the 1978 plan "is to be printed in its final form within a matter of weeks."

Plan stalls

State work on Alyeska's oil spill contingency plans slowed down in 1979 and little is to be reported. Under a January 1980 date, Alyeska issued a new edition of its contingency plan containing minor changes from the 1978 version; however, the state did not even begin to review the plan until late in the year.

"Federal and state governments should set requirements, industry should write a plan meeting those, affected states should be included in the approval process, and authority should exist under both federal and state law to direct and enforce implementation."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Coast Guard and Navigation, July 1989

Andrew M. Spear, DEC's manager of oil pollution control, was involved with a tanker handbook that vessels using the Alyeska terminal would use in the event of a spill. In a Nov. 13, 1980, letter to R.A. Gale of Sohio, chairman of the Alyeska Marine Services Subcommittee, Spear discussed tanker handbooks extensively but said of the contingency plan only that, "I did get a copy of Alyeska's contingency plan dated January 1980, and it will be reviewed in accordance with the new regulations." He later told Ralph G. Hill of Keystone Shipping that when pending regulations were completed the department would review the plan. This apparently put Alyeska in the position of having submitted a plan to be evaluated under regulations it knew nothing about.

The regulations mentioned by Spear were being prepared under a state law passed earlier in 1980 to create a new legal framework for oil transportation that would replace the one destroyed by the court decision in *Chevron v. Hammond.*

A simulated oil spill drill had been held June 19, 1980, at the Valdez terminal. Radio communication was inadequate; a deep-sea boom had failed to inflate properly (equalling its performance on two earlier drills); and a response vessel again lacked power to tow some equipment. Even so, Joyce Beelman of DEC concluded, "In overview, the oil spill simulation drill was very professionally executed and the deep-sea boom problem was skillfully handled. All personnel involved in the operation are to be commended for a fine job."

On Jan. 8, 1981, Andrew Spear asked Dan Lawn and Doug Lockwood, both of the DEC office in Valdez, to review Alyeska's contingency plans by Jan. 30, 1981. The record supplied by DEC shows no response to Spear's memo and no formal action on the plans. Meanwhile, letters came in from organizations contacted by Alyeska—organizations in Washington, Alaska, California and Hawaii—all promising to provide oil spill containment and/or recovery equipment in the event of an emergency. Response times were not indicated.

"I think the lesson to be learned is that the kind of event that did occur, can occur."

Al Ewing, Assistant Regional Administrator Environmental Protection Agency Alaska Oil Spill Commission hearing, 11/14/89

A 16-page "Spill Prevention Control and Countermeasure Plan" for the Valdez terminal was issued in August 1981 by Alyeska as part of a filing with the Environmental Protection Agency. It defined conditions at the Valdez terminal, procedures and practices, and training for Alyeska personnel. The plan appears to have been involved with Alyeska's change from maintaining full-time contract personnel for spill response to having spill response handled by its own employees.

On Nov. 5, 1981, Ben Hilliker of Alyeska submitted two review copies of the General Provisions, Valdez Terminal and Prince William Sound portions of his company's contingency plan for approval under new state regulations. On Dec. 7, 1981, Erwin Koehler of DEC's Oil Pollution Control sent Andrew Spear three pages of review comments. Among other things, Koehler again raised two major concerns:

1) Could equipment located in Valdez be transported to any area of Prince William Sound in a reasonable time? 2) Was the training of personnel adequate?

Spear apparently contradicted himself in a communication to Koehler on Dec. 21, 1981. In one sentence he said that review and approval of the contingency plan would continue, while in the next sentence he said that, "The Alyeska plan is grandfathered in *as it was approved* in 1979 and 1980 (Sec. 13, Ch. 116, SLA 1980). Theoretically, the plan would not need to be approved again until the third year. For this reason, it will be necessary to examine the files and establish under what conditions the Alyeska contingency plan was approved."

About this time, Exxon Company, U.S.A. notified the state in its contingency plan of something that would surprise many people following the *Exxon Valdez* spill. On March 5, 1982 A.R. Minton filed Exxon's Oil Discharge Contingency Plan for vessels operated by Exxon Company, U.S.A. within the waters of the State of Alaska. In that plan, Exxon said, "For most tanker spills, the response plan outlined in the Alyeska plan will suffice. However, in the event of a major spill by an Exxon owned and operated vessel, it is anticipated that the Exxon Company, U.S.A. Oil Spill Response Team ... would be activated to manage the spill response." Elsewhere, Exxon's plan said that Alyeska would manage the response to spills of less than 250 barrels in most instances. Beyond that, spills would be evaluated on a case-by-case basis to determine the extent of Exxon involvement. The fact that such action would preempt use of the Alyeska contingency plan in favor of one less carefully worked out and reviewed apparently was never considered by DEC officials.

After two years DEC finally completed review of Alyeska's January 1980 contingency plan. A letter sent to Alyeska on March 23, 1982, contained three pages of comments but omitted many issues still unaddressed from earlier plans. Steve J. Zrake, environmental field officer, gave Alyeska a conditional approval, good for 45 days, and negotiations subsequently led to an extension of the conditional approval period.

In reviewing the plan, Dan Lawn, now the district office supervisor for DEC in Valdez, tried on July 13, 1982, to apply a "reality test" to Alyeska's contingency plan. He said that technically Alyeska's response to department questions "probably satisfies the regulation requirements on paper; however, APSC has never been able to demonstrate that the recovery rates listed in Appendix B are possible to attain." Lawn added that "all our experience with APSC oil spill recovery rates indicate that the recovery rates listed are 80 percent too high." The remainder of his memo continued to catalog other equipment limitations and problems with the plan.

Nevertheless, on Jan. 3, 1983, Steve Zrake, DEC's regional oil spill program manager in Anchorage, wrote Ben Hilliker of Alyeska granting full approval for Alyeska's Valdez Terminal and Prince William Sound Contingency Plans and for the General Provisions as they pertain to those plans. Zrake cited several major

"In March of 1982, while reviewing Alyeska's plan, we found that the company considered a [illegible] barrel spill the maximum probable spill. We said that was too low. Then, in May [illegible] 1986, we insisted the company plan [illegible] of 200,000 barrels. Please allow me to briefly quote from Alyeska's official response: 'Alyeska believes it is highly unlikely a spill of this magnitude would occur. Catastrophic events of this nature are further reduced because the majority of the tankers ... are of American registry and all of these are piloted by licensed masters or pilots.' "

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Senate Committee on Commerce, Science and Transportation, May 1989

issues that had been resolved, including: "The adequacy of Alyeska's ability to respond to a major discharge in Prince William Sound was questioned. The response scenario presented in your letter of June 22, 1982 demonstrates on paper Alyeska's ability to respond to and clean up a major discharge." Approval had taken approximately three years, and according to Zrake it would last for another three.

"This same attitude on the part of Alyeska's top management is also reflected in their intransigence on air pollution and water pollution. Both are major issues, and Alyeska has balked at making the necessary improvements. Last week, Alyeska even filed a lawsuit in an attempt to block stronger controls on the discharge of hydrocarbons from their ballast water treatment plant. This appalling insensitivity to the resources and people of Prince William Sound is amazing in light of the events of the last six weeks. But it is typical of the approach taken by Alyeska's corporate leadership in air pollution, water pollution, and oil spill preparedness."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Senate Committee on Commerce, Science and Transportation, May 1989

During the remainder of 1983 virtually no further action on Alyeska's contingency plan appears in available documents, although procedures were developed for the review of all oil spill contingency plans.

Meanwhile, starting in the early 1980s, Alyeska began changing the way it would implement its contingency plan. Originally, a contractor provided services related to oil spills. Then Alyeska switched to using employees dedicated exclusively to those tasks. Finally, a change was made to training a large body of people with other jobs at the terminal to handle an oil spill.

Retired Alyeska President George M. Nelson praised the final result to the Alaska Oil Spill Commission.

> The way we had it staffed, as when we dealt with the Thompson Pass oil spill in January (1989), is far and away the best way to have it staffed. We had a more effective way of dealing with an oil spill ... than if we had a small group, be they contractor or be they a small group of employees.

Jim Woodle had a different view of the changes. After 25 years in the Coast Guard, Woodle retired in early 1982 to move from being commander of the Marine Safety Office in Valdez to being marine superintendent of the Alyeska terminal. He told the Alaska Oil Spill Commission:

> In the period of two years that I was there, the average size of a shift went from a total of 18 down to approximately eight or 10 persons. The thinking was that in the event of, say, a major oil spill, instead of having eight people dedicated to cleaning up the oil, you had eight people there, but in turn they were off doing things such as loading tankers or tying up tankers, or running the ballast water treatment system. In the event of a major oil spill you would cease all operations and put these people to work cleaning up oil. Well, the bottom line was you no longer then had a dedicated oil spill recovery team. You no longer had people capable and ready to maintain the equipment.

Woodle, who had seen figures showing a decline in spills over the years, offered this interpretation of the numbers:

> If you look at the figures, for example from '77-'78-'79-'80, you will see vast numbers of oil spills responded to by the terminal. Then in later years you look at the '81-'82-'83-'84 time frame and you see a rapid drop in the number of oil spills. And on the surface it looks like they just physically

> weren't spilling oil like they once were. What you actually have is the—when you had a dedicated contractor force ready and able to respond to oil spills at a moment's notice ... they responded to every sighting of oil in or near the port. As you began to reduce personnel, say a ship operator or supervisor was required—if he was going to respond to an oil spill, then he would also have to grab somebody off of a dock or possibly suspend loading of a tanker. There was a great deal of reluctance to do this ... that spill didn't get logged and so noticeably it appears that there were fewer and fewer spills in the terminal when in actuality there were just fewer responses to oil ... By and large the general approach of the terminal was we were doing a great job stopping oil spills in the water and therefore we didn't need an oil spill response capability.

Woodle also told of equipment that was not in good shape. He said five booms were physically in inventory that could be shown to an inspector, all lined up. When Woodle first began work at the terminal and proposed to take all five booms out and inflate them, he says he was told never to suggest doing that because, "They didn't have 1) the capability of activating all five at one time from the standpoint of manpower; 2) they weren't sure that three of them could operate. They basically kept two available for drill purposes, and the other three had never been used."

Woodle was terminated within hours after he handed a three page letter of critism to Alyeska's George M. Nelson in Anchorage on April 15, 1984.

Concerning oil spill recovery, Woodle's letter cited shortcomings in employee training and experience. He said manning reductions had affected all operating areas, and cost-cutting efforts had limited the purchase of new oil spill equipment. Concerning the prospect of a large spill, Woodle wrote:

> Due to reduction in manning, age of equipment, limited training opportunities, and lack of experienced coordination personnel, serious doubt exists that Alyeska would be able to contain and clean-up effectively a medium or large size oil spill.

On May 1, 1984, Dan Lawn, DEC's district office supervisor in Valdez launched a major critical assault on problems at Alyeska's Valdez Marine Terminal. In a memo to Bob Martin, DEC deputy director in Anchorage, Lawn framed the general situation:

> Over the past several months, there has taken place a general disemboweling of the Alyeska Valdez Marine Terminal operational plan.
>
> Not only have there been severe personnel cuts but operational plans and routine maintenance have been reduced drastically.

> Morale is at an all time low and the majority of knowledgeable and competently trained individuals have either quit, been terminated or transferred up the line. What this has done is left inadequately trained people to maintain the facility and an insufficient number of people to operate it.

And he issued a warning:

> As you know, PWSDO (Prince William Sound District Office) has been under-budgeted and under-staffed to adequately inspect the terminal and keep in touch with their day-to-day operations. Unfortunately, this has been a signal to Alyeska that the state is no longer interested in the TAPS [trans-Alaska pipeline system] project. ... We can no longer ignore the routine monitoring of Alyeska unless we do not care if a major catastrophic event occurs.

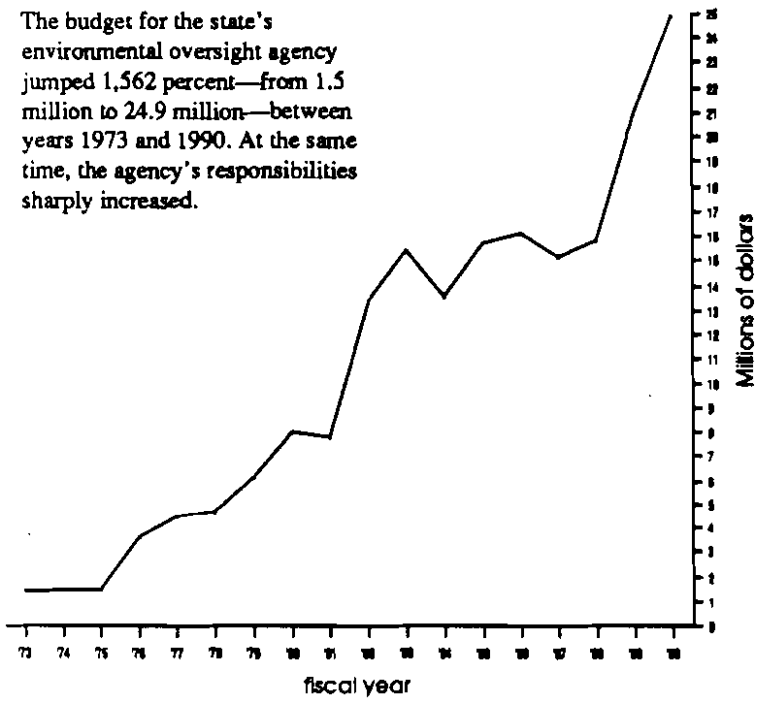
Lawn then listed 18 problems at the terminal, among them outdated oil spill recovery equipment, reduced training programs and questionable equipment reliability.

A spill drill held Sept. 25, 1985, sounded a bit like the Keystone Cops, judging from the account provided by Theresa Svancara of DEC's Valdez office. Among the events reported: Two pieces of boom remained unjoined for "a significant amount of time," which would have let oil escape. Later, a boat ended up trapped within the boomed area. When a pump truck battery went dead, a call was made to the maintenance building for a new battery, and "at this point there were quite a few people just standing around without specific jobs to do" because no one provided alternate tasks. Use of a list to summon additional people failed because it was outdated. Finally, hose was deployed from an impound basin to the pump truck, but it was not deployed completely because, according to Svancara, Alyeska employee Larry Shier "said it would be too much work to roll it up again."

Alyeska held another oil spill drill at the Valdez terminal Oct. 17, 1984. Lynn J. Tomich of the Alaska Operations Office of the U.S. Environmental Protection Agency observed several weaknesses. Among them: 1) Equipment and manpower might not have been appropriate for the environmental conditions of Port Valdez; 2) Effective co-

DEC budget

The budget for the state's environmental oversight agency jumped 1,562 percent—from 1.5 million to 24.9 million—between years 1973 and 1990. At the same time, the agency's responsibilities sharply increased.



Source: Alaska Department of Environmental Conservation and Anchorage Daily News

ordination efforts were lacking during the response drill; 3) Location of contingency equipment throughout facility could delay response time; and 4) Adequate training might not be provided for both shifts that work the terminal. Tomich also noted that "it appears that Alyeska did not treat this exercise as a realistic spill event."

Tom McCarty of DEC's Valdez office concluded that "Alyeska's spill response activities have regressed to a dangerous level." He urged an unannounced drill "as soon as possible," with the Coast Guard, EPA and DEC present and "prepared to take action if the drill is a failure, or if corrective measures are necessary."

"We do have spills along the pipeline corridor. Between 1979 and 1983, 1.5 million gallons was spilled along the pipeline corridor and one of the main problems is that there are leaks that cannot be detected—Alyeska cannot detect leaks less than 2,000 gallons per minute."

Professor Harry Bader, University of Alaska Alaska Oil Spill Commission hearing, Anchorage, 11/14/89

On Dec. 19, 1984, Dan Lawn wrote a nine-page report discussing the terminal in general, the ballast water treatment system and the fire and safety program. He also sharply criticized Alyeska's contingency plan for:

- Reductions in staff and training that weaken spill detection and response.
- Diminished communications capability, including no direct contact between the marine terminal and tankers beyond Port Valdez.
- The age and condition of equipment.
- A lack of realistic data on response times. "The contingency barge is outfitted and ready in the summer, but all equipment is stored in winter."

Lawn blasted Alyeska's computer model for oil spill recovery as not "worth the paper it's printed on ... whoever set it up couldn't be found, or was no longer in business."

Again Lawn argued for more staff. "Most of the problems at VMT have escalated or developed after the Department's Inspection Program slowed due to lack of funding and manpower allotments." He declared, "Alyeska has proven that they will not take any major corrective action unless forced by the regulatory agencies."

Another plan

According to Paul S. O'Brien, manager of Oil Pollution Control for DEC, Lawn's two memos prompted him to urge the new DEC commissioner, Bill Ross, to authorize a special review team for Alyeska's oil spill contingency plans. Following a late October meeting with Lawn in Valdez, O'Brien wrote Ross on Oct. 30, 1985, about how to review and approve the contingency plan. O'Brien said that "the major problems may not be with the technical contents of the plan but instead with the execution of the plan in the field." He called for a spill drill to test the plan. He also noted that the 1982 review and approval of the plan took one year, adding that "we should not expect this year's review to be completed quickly." O'Brien also said that the public was clamoring "rightfully so, that Alyeska's cleanup capability is

inadequate," and that DEC should not allow itself to be stampeded into hasty review action.

"Alyeska has always been hard to deal with. They've always had an iron door policy. Several times, a couple of their leaders have been real open, however, the gentlemen in charge of the facility have always made it almost impossible to deal with them. DEC had to fight continuously to be over there."

Marla Adkins, owner, Knight Island lodge
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

Headed by O'Brien, DEC's review team also included Lawn from Valdez and Pat Cyr from the department's Anchorage regional office. The opening of contingency plan negotiations was signalled by O'Brien Nov. 6, 1985, in a letter to Ben Hilliker, Manager of environmental protection and government reports at Alyeska. O'Brien noted cordially that the General Provisions and Prince William Sound contingency plans would expire Jan. 3, 1986, and he took other steps to get the renewal process started. The letter was an unrequired courtesy, since it was Alyeska's responsibility to get the renewal process taken care of under DEC regulations a renewal application had to be received no later than 65 days before the expiration date of the current plan.

Alyeska seemed to think renewal would not be difficult. Alyeska attorney Judith E. Brendel, replying for Hilliker on Nov. 14, 1985, told O'Brien that Alyeska requests approval of the Valdez terminal plan "with the addendum dated June 22, 1982." She said Alyeska "plans to reprint the OSCP in 1986 and will incorporate the addendum into the appropriate areas of the contingency plan." Apparently the General Provisions and the Prince William Sound elements would be dealt with separately.

On Dec. 15, 1985, Pat Cyr of DEC's Anchorage office urged that the contingency plan include scenarios: "If Alyeska insists their plans are okay as is," he said, "we can push for what I consider a definite void: scenarios. By outlining how they can be prepared properly and completely, and if they judiciously do this, the scenario should be pretty clear where they are weak and need to be improved." In other words, Cyr proposed that Alyeska play spill games on paper, determining in thought if the plan could respond to various hypothetical spill situations.

On Dec. 20, 1985, Alyeska conducted a staff-only spill drill. In an internal communication, C.D. Robinson wrote to W.D. Howitt on Dec. 23, 1985, that "The objective of this drill was to exercise the on-site response capability ... The objective of the drill was met." In addition to recapping the spill events, Robinson provided summaries of follow-up meetings held first with terminal managers and later with supervisors and lead operators. The problems identified appeared to be slight.

The first in this series of contingency plan review meetings took place on Jan. 14, 1986. Paul O'Brien's three-and-a-half-page agenda raised a wide variety of issues, virtually all of them noted by DEC in the recent past. Of interest is an entry under "Response" that Alyeska might not be handling all oil spills. It says, "Member companies doing their own response (e.g., Exxon, ARCO)." At the meeting Alyeska generally agreed to provide information on issues that DEC raised. On the matter of Exxon and ARCO, Alyeska "denied that the two companies were pulling out" according to a Jan. 22, 1986, memo from Pat Cyr. Three DEC people and four from Alyeska attended the meeting.

Information was provided, and another meeting was held Feb.19, 1986. The agenda included nine specific issues: training, scenarios, equipment, response times, communications, environmental, dispersants, (computer) trajectories, and reconnaissance. The plan review was rigorously reviewed.

Limited access

Meanwhile, Dan Lawn's inspections of Alyeska's Valdez terminal apparently had been noted at the highest corporate level. George M. Nelson, Alyeska's president, told Commissioner Ross on March 19, 1986, of changes in procedures for DEC access to the terminal. Advance notice of intent to enter the terminal facilities—"preferably one day's notice"—would be required. Visits should be confined to 8 a.m. to 4 p.m. These requirements could be waived under unusual or exceptional circumstances. DEC representatives also would have to check in with a designated Alyeska representative "who will accompany them at all times during their stay on the terminal to answer any questions or address any concerns they may have at the time." Lawn was not mentioned directly, but both Nelson and Ross say he was the cause of the letter.

Ross replied to Nelson on March 27, 1986, saying in part:

> I concur that the procedures are, by and large, reasonable and DEC will conform with them, consistent with the need to discharge our official duties.
>
> As we discussed on the phone, DEC reserves the right to conduct impromptu visits for the purposes of monitoring and/or enforcement activities. However, should the need arise to do either of these, it is reasonable that we check in with your designated representative.

Alyeska's slack response March 27 and 28, 1986, to an oil spill at the Valdez terminal drew an angry response from Coast Guard Cmdr. Steven A. McCall, captain of the port. McCall told W.D. Howitt, Alyeska's terminal superintendent, on April 14, 1986, that the main reason Alyeska failed to clean up a 10- to 20-gallon spill in 12 hours was that response crew efforts diminished toward zero as two other ships were docked. Much response crew effort switched from the spill to the ships and Coast Guard officers began directing the spill work of Alyeska personnel.

McCall noted that Alyeska had assured him the company was "able to respond to oil spills at the terminal without interruption due to other activities." He declared that he "would not hesitate to use my authority as captain of the port to, in the future, delay the mooring or unmooring of vessels during oil spill cleanups unless an adequate response can continue during such activities." McCall was still captain of the port when the *Exxon Valdez* ran aground.

"The people in Cordova have long been under the impression that Alyeska primarily has been an impenetrable fortress."

Rick Steiner, University of Alaska Marine Advisory Program
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

"If your house catches fire, you do not call your lawyer or your banker. You call the fire department. ... In the meantime, you and your neighbors have responded to the best of your ability. When the fire department arrives on the scene they do not look for court orders to enter your home. If you are not there they break the door down. They get in and they take their hoses and they spray the walls down, hose down all your expensive furniture and put the fire out. Once the fire is out, the cause is determined and insurance agents take over. There is no such mechanism not to respond to an oil spill of any size. And it is very unfortunate."

Kelly Weaverling, Coordinator, Prince William Sound Wildlife Rescue Alaska Oil Spill Commission hearing, Cordova, 6/28/89

After a subsequent oil spill at the Alyeska terminal on April 13, 1986, Tom McCarty of the DEC wrote a four-page narrative, which included the following comments:

> This spill/cleanup activity appears to confirm our concerns over Alyeska's ability to respond adequately to a spill at the VMT (Valdez Marine Terminal). Cleanup equipment did not function, cleanup personnel were not available, supervision was lacking. The addition of contract laborers and boats, plus an oil spill cleanup expert from Anchorage, was helpful to the overall effort; however, it came too late.

The DEC reviewed information Alyeska supplied over the preceding four months, and on May 1, 1986, O'Brien sent a collection of specific comments to attorney Brendel of Alyeska. He later commented to Amy Kyle, DEC deputy commissioner, on May 29, 1986, "I've recently learned that Alyeska has hired a competent oil spill consultant from Anchorage to update and revise their plan—I'm sure that they did this because of the extent of our comments on the plan."

Alyeska's spill drill performance on June 18, 1986, appeared to improve significantly over earlier efforts. But DEC's McCarty of the Valdez office qualified his judgment:

> One of Alyeska's better performances, no doubt. What isn't referred to or made common knowledge, is that Alyeska has been mobilizing and debugging their clean up equipment for at least a week prior to this drill. The surface skimmer was sitting in the parking area adjacent the small boat harbor. It is normally (winter months) mothballed in the maintenance warehouse (likewise, much of the clean up gear used in this drill).

McCarty ended saying he would like to see "an unannounced spill drill scheduled for, say, 10 p.m. Jan. 2."

Alyeska's Brendel requested conceptual approval of the contingency plan when she sent O'Brien a collection of changes and additions on July 16, 1986. She commented on the following topical categories and transmitted 67 pages of information on: a) response personnel training; b) oil spill scenarios, including one for a 200,000-barrel spill in Prince William Sound; c) equipment; d) response times; e) communications; f) environment; g) dispersants; h) trajectories; i) reconnaissance; and k) spill response.

O'Brien replied on Sept. 4, 1986, acknowledging Alyeska's time and effort, but saying that several major issues still had to be adequately addressed before the state could approve Alyeska's contingency plan. The high-priority issues he identified included:

- Personnel Training (need more information to determine who is available and qualified to do what).

- Reconnaissance (strong commitment needed for prompt test aerial reconnaissance when needed).

- Scenarios (too general).

- Equipment (good information, but must inventory and evaluate equipment for location, type, quantity, running condition).

- Response Actions (effective supervision and choice of equipment should be part of the plan to be evaluated).

- Dispersants (need information on logistics and operational considerations).

O'Brien also discussed lower priority issues in the areas of communications, environment, trajectories, response time and format, and he told Brendel the DEC wanted to finish its review of Alyeska's contingency plans by Oct. 10, 1986.

Following a meeting Sept. 16, 1986, with DEC personnel, Brendel wrote Paul O'Brien on Oct. 3, 1986, establishing the basis for conceptual approval of the Alyeska contingency plan. She said that the most likely spill volume for vessels under way in trade with the Valdez terminal "appears to be in the 1,000 to 2,000 barrel range." The "mean return time" or number of years in which an event was expected to occur was 241 years for the 200,000-barrel scenario.

On Oct. 13, 1986, O'Brien replied, "We feel Alyeska has adequately addressed the major issues raised in our earlier correspondence and meetings with you." He gave conceptual approval for the Valdez Terminal, Prince William Sound and General Provisions sections of the contingency plan, as long as Alyeska agreed to changes discussed in this letter and incorporated information requested earlier. As another condition of approval, Alyeska would have to "pass" an unannounced oil spill exercise within the next 45 days.

Perhaps remembering Coast Guard irritation during a spill when manpower was diverted to take care of arriving tankers, Terminal Superintendent W.D. Howitt wrote on Nov. 4, 1986, to DEC's Dan Lawn in Valdez. "It is Alyeska's intention not to interrupt tanker traffic for the drill." Howitt said it would be best to conduct the drill when there was little or no traffic. After discussing ship schedule matters, he added, "Although Alyeska will not divert resources from maintaining traffic for the drill, we can demonstrate the capability of these resources at a later time."

After extensive preparations, the spill drill was held Nov. 24, 1986, using floating oranges to simulate spilled oil. Pat Cyr in DEC's Anchorage office later commented to O'Brien and Lawn in a memo Dec. 3, 1986:

"Surely Exxon is not suggesting that they would not have oil spill response capability during that time [winter]. Surely the rest of the industry would not agree with that because industry has clearly told us that they believe that they do have that capacity. In fact, the oil spill contingency plans that apply in this area depend on that assumption."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

APSC's spill response was acceptable, I feel, but not by a wide margin as this was a partial sink or swim exercise ... It would seem apparent that another unannounced spill exercise, with Coast Guard and EPA-approved oil, should occur in 1987. The reactive nature to wind and current, of the simulant oil would come closer to real oil than oranges which should help weaken APSC's argument for not deploying longer V-booms and completing other exercises in the required manner.

"It is very inappropriate to have a private party making decisions about how things are handled. ... Not just from the idea that you don't let the criminal set the penalties. It just doesn't work that way. They've got a whole different set of priorities and values than we do."

Ken Roemhildt, North Pacific Processors
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

On Dec. 5, 1986, Brendel sent several final draft copies of the Prince William Sound and Valdez Terminal sections of Alyeska's oil spill contingency plan to Paul O'Brien. On Dec. 29 Pat Cyr sent six pages of specific analysis and his more general thoughts on the plan to O'Brien and Lawn. He thought the plan could be approved, but he leaned toward conditional approval, with final approval deferred until added corrections were made and the results of another unannounced spill were received.

Plan approved

Drafting of a letter to Alyeska on the status of its contingency plan revisions took time, but by March 2, 1987, a six-page document was prepared by Cyr for O'Brien's signature. Official approval was sent from O'Brien to Brendel on June 11, 1987, and it was conditional. Alyeska also had to incorporate into its contingency plan the changes recommended in DEC's five-page Attachment A, and it had to provide an on-scene coordinator for spills on DEC's terms. O'Brien also provided a copy of the DEC's evaluation of the November 1986 spill drill and told Brendel, "We reserve the right to request Alyeska to conduct additional oil spill exercises and may modify the approval of the APSC contingency plan, based on the results of Alyeska's response efforts at future oil spills or spill exercises."

Brendel replied on July 22, 1987, with a three-page letter and two attachments totaling seven pages. Her biggest concern seemed to be the requirement of an on-scene coordinator, whose role she distinguished from that of a spill manager—either of which position could be filled by a variety of people. She also challenged various parts of the spill drill evaluation.

On Oct. 14, 1987, Brendel sent O'Brien the reprinted Alyeska Oil Spill Contingency Plans: General Provisions, Valdez Terminal, and Prince William Sound. On Nov. 2, 1987, Pat Cyr wrote O'Brien cataloging discrepancies between what Alyeska said it would do and what it had done in the plans. O'Brien, noting he had commitments on many fronts, apologized to Brendel in a letter Jan. 29, 1988, that replied to hers of Oct. 14, 1987. He provided a variety of comments but said they "are not designed to effect plan revisions at this time." Instead, he expected them to be addressed during the plan's renewal in 1990.

W.D. Howitt, Alyeska's terminal superintendent, announced another "desktop" spill drill in a letter April 6, 1988 to Dan Lawn. He said, "The purpose of the drill

is to exercise the management interface between ARCO Marine, Inc., and Alyeska as well as exercise the resources of AMI, in taking over management of an oil spill from an ARCO vessel in Prince William Sound." The schedule of events for May 3 called for continental breakfast, lunch and a reception, between which were threaded 10 speeches, travel and the start of the spill exercise at 3 p.m. On May 4—following continental breakfast, ground rules for the oil spill simulation and team briefings—the exercise continued from 10 a.m. until 1:30 p.m, when it ended with lunch. Various critiques and comments followed until a 5 p.m. reception.

Dan Lawn's inspections of the Alyeska terminal remained a bone of contention. C.F. O'Donnell, DEC superintendent, wrote Lawn on Aug. 5, 1988, restating "the understanding of Alyeska and ADEC regarding inspection of the Valdez Marine Terminal by DEC personnel as embodied in Alyeska President George Nelson's letter of March 19, 1986 to DEC Commissioner Bill Ross, and Ross' reply of March 27, 1986." To that O'Donnell added that "photographic equipment will be allowed on site only with my prior authorization."

The letter drew a five-page response on Aug. 12, 1988 from Assistant Attorney General Michael J. Frank to Alyeska general counsel Alfred T. Smith. Frank disavowed the implications of a requirement to abide by the understanding, saying DEC would cooperate where possible, but would go where it wanted, when it wanted if a legitimate need arose, and it would take pictures and use other mechanical methods as necessary.

Lawn was present at or near the terminal for three spills that occurred there during the first quarter of 1989: the *Thompson Pass* on Jan. 3; the *Cove Leader* on Jan. 16; and the *St. Lucia* on March 11. He told the Alaska Oil Spill Commission he would grade Alyeska's overall performance on the spills as C, D, and C-minus, respectively. His performance criteria were: initial containment, initial cleanup, continued containment, continued cleanup, oil spilled vs. oil recovered, commitment to the response. Lawn said his A grade on initial containment in the *Thompson Pass* spill was because "they had a damned boom around the ship. They had it contained before it spilled."

Alyeska's former president, George M. Nelson, by contrast, thought highly of his company's response to the *Thompson Pass* spill, citing it several times in an interview with the Alaska Oil Spill Commission. His first comment was, "We handled that in excellent shape according to the commissioner of the Department of Environmental Conservation Denny Kelso and a number of his minions."

In general comments on the 1987 contingency plan, Nelson said:

> Our oil spill plan, worked out with the state, approved by the state in 1987, is a good plan. It dealt with the most likely spill: one to two thousand barrels.

> We had the people, the equipment, the facilities, the training, the drills and everything else to operate that plan and did operate it very well. So, yes, I'm satisfied with the plan—for dealing with what amounts to the most likely spill.

"Corporations have one function, and that's to make a profit, and there's nothing wrong with that. ... But in order to have a level playing field with other corporations, there's not a whole lot of room for social conscience."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/16/89

Paul O'Brien agreed that the plan was designed for the most likely case, as required by Alaska law and regulations, but he thought it could have dealt with the *Exxon Valdez* spill through a staged effort—something indicated by the inclusion in the plan of a 200,000-barrel spill scenario. O'Brien told the Alaska Oil Spill Commission he and his co-workers felt that in the event of a catastrophic event, Alyeska's initial response would have been:

> Throw everything at it. That first response capability is what they should have, with the ability to call on backup support to provide a larger, more massive-scale operation for cleanup activities ... Containment is the key in any spill response situation. If you contain the spill, you've got half the battle licked ... But—the general rule is—once oil gets away and you're in a chase-down mode, you've lost the battle. This is the perfect case.

With a well-prepared contingency plan, well implemented, the disaster of the *Exxon Valdez* could have been far less serious. Oil might never have reached shore. The quality of the 1987 plan and actions taken to implement it will be argued in the courts for years. Meanwhile, a new contingency plan was being produced by Alyeska, which attempted to take into account what Alyeska had learned as a result of the *Exxon Valdez* disaster .

Conclusion

The record is even more elaborate and complex than recounted in this section of the commission report. Following are some important observations:

- The General Provisions section (p 1-13) of the Alyeska Oil Spill Contingency Plan says, "Full-scale, company-wide field exercises will be held at least once per year to insure overall readiness for response to large-scale oil spills and to assure that communications will be rapid and effective." A variety of other drills are also called for (p. 9-177). Given Alyeska's weak record of spill and spill-drill performance, state officials should have the authority to call table-top or full-scale spill drills until performance is satisfactory. Significant penalties for poor performance might also be appropriate.

- No action ever was taken to suspend the 1987 contingency plan's conditional approval based on poor performance. Apparently, no significant leverage ever was applied to obtain contingency plan provisions the state believed were important. The reason may be, in former DEC Commissioner Bill Ross's words, "If there is an enforcement policy that has as its only option the nuclear

one, it's not a very good enforcement policy ... I never thought about about shutting down the pipeline." Other options for negotiating and enforcement are necessary.

- The Valdez DEC office always has been seriously understaffed, which weakened the state's position relative to Alyeska. The state cannot negotiate or enforce effectively without adequate competent personnel. Even the state's three-man team to deal with the 1987 plan was not enough; all had additional tasks and were pitted against resources greater than theirs.

- ARCO and Exxon indicated in writing years ago that in certain circumstances they might not use the Alyeska contingency plans developed with the state. Their intention to take over a major spill by one of their own ships was clear, but perhaps forgotten or overlooked. Exxon took over direction of the March 24, 1989, disaster and dealt with it freely, perhaps with no obligation to follow the contingency plan. Ironically, the plan does not allow for such a takeover. According to the General Provisions (p. 1-1), "Alyeska will maintain full responsibility and control in the event of an oil spill unless a government agency specifically notifies Alyeska they have assumed responsibility and control."

- Some significant ideas have disappeared from active consideration. The record on contingency plan work since 1980 has not demonstrated any consideration, for example, of whether Alyeska should: 1) have two to three times as much boom as it did; 2) station boom and other equipment at various locations around Prince William Sound; or, as the Coast Guard recommended, 3) put permanent installations at various locations in the sound.

- Vanished over the years is active contingency plan participation by the Alaska Department of Fish and Game and the Alaska Department of Natural Resources, both of whom have specialized knowledge and a stake in the effectiveness of the plan.

- The alleged collective spirit of "continuous revision" of the first plan dissipated into bare minimum efforts, except for the thrust directed by the state at the 1987 plan. As in the past, Alyeska intended to make only minor changes to the pending plan.

Performance by Alyeska and the state, individually and jointly, did not lead to an effective contingency plan, one maintained in a state of high readiness for a major or minor oil spill. Wide gaps between regulations or professional postures and the reality of oil transportation in Prince William Sound invited disaster. When disaster occurred, the methodology offered by the contingency plan failed to contain and recover significant amounts of the spilled oil and failed to clean up the shoreline.

"And finally, after the engineer from Alyeska had been pressured enough, he said: 'We knew there was no way we could ever protect your beaches. If we had a major spill, the oil was gonna hit your beaches. You know, let's be realistic.' And he's probably correct. But when they wanted to put the terminal at Valdez and the Prince William Sound fishermen raised hell, they pulled this same plan and said: 'You are protected.' And the fishermen didn't know enough to ask the right questions."

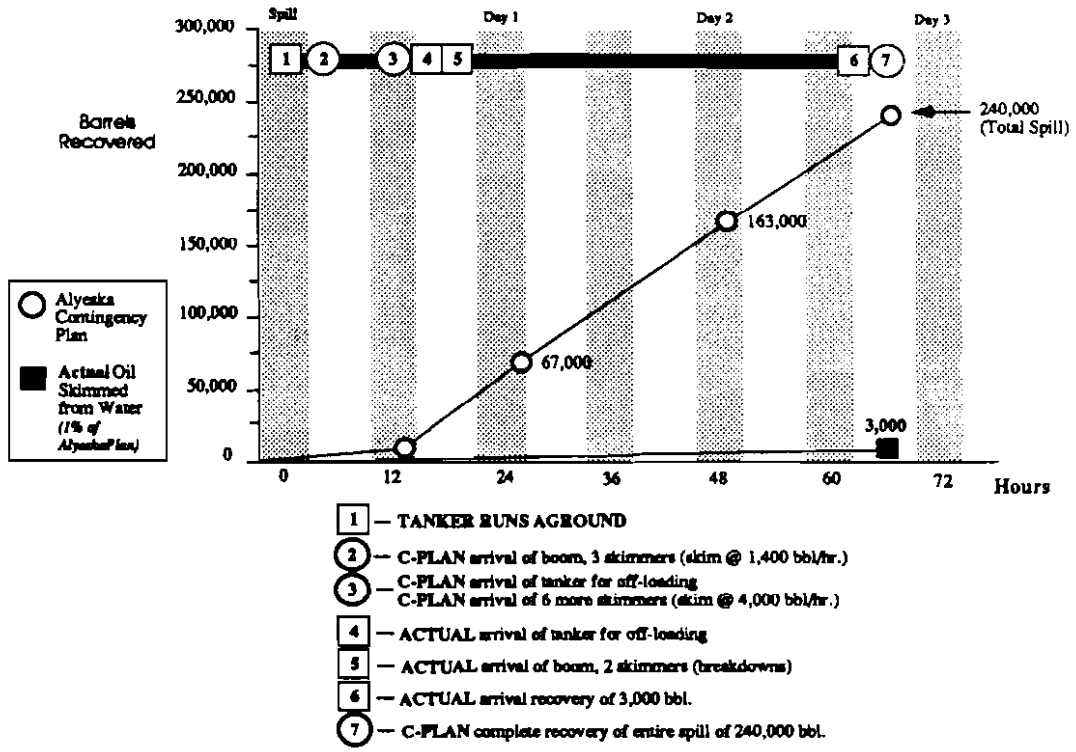
John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

Response: Chaos in the coastal communities

Response to the *Exxon Valdez* spill changed radically Sunday night, March 27, three days into the spill. A major windstorm pushed the oil slick more than 30 miles across Prince William Sound, stirring the oil into a frothy brown "mousse" that plastered beaches on Little Smith, Naked and Knight islands. The storm, which grounded aircraft until nearly noon Monday, halted skimming operations and ruined plans for dispersant use and *in situ* burning. It also established a pattern of helplessness for the small army of response workers trying to contain the oil in remote locations far from supply centers. As the May 1989 Report to the President by U.S. Transportation Secretary Samuel Skinner and EPA Administrator William Reilly noted, "The time lag in transporting and deploying equipment forced the responders into catch-up efforts from the outset."

The pattern persisted for months: Oil from the *Exxon Valdez*—now beyond containment—would range through Prince William Sound and the coast of Southcentral Alaska, eventually striking beaches nearly 600 miles from Bligh Reef. Cleanup and response efforts in these remote coastal regions would proceed with varying levels

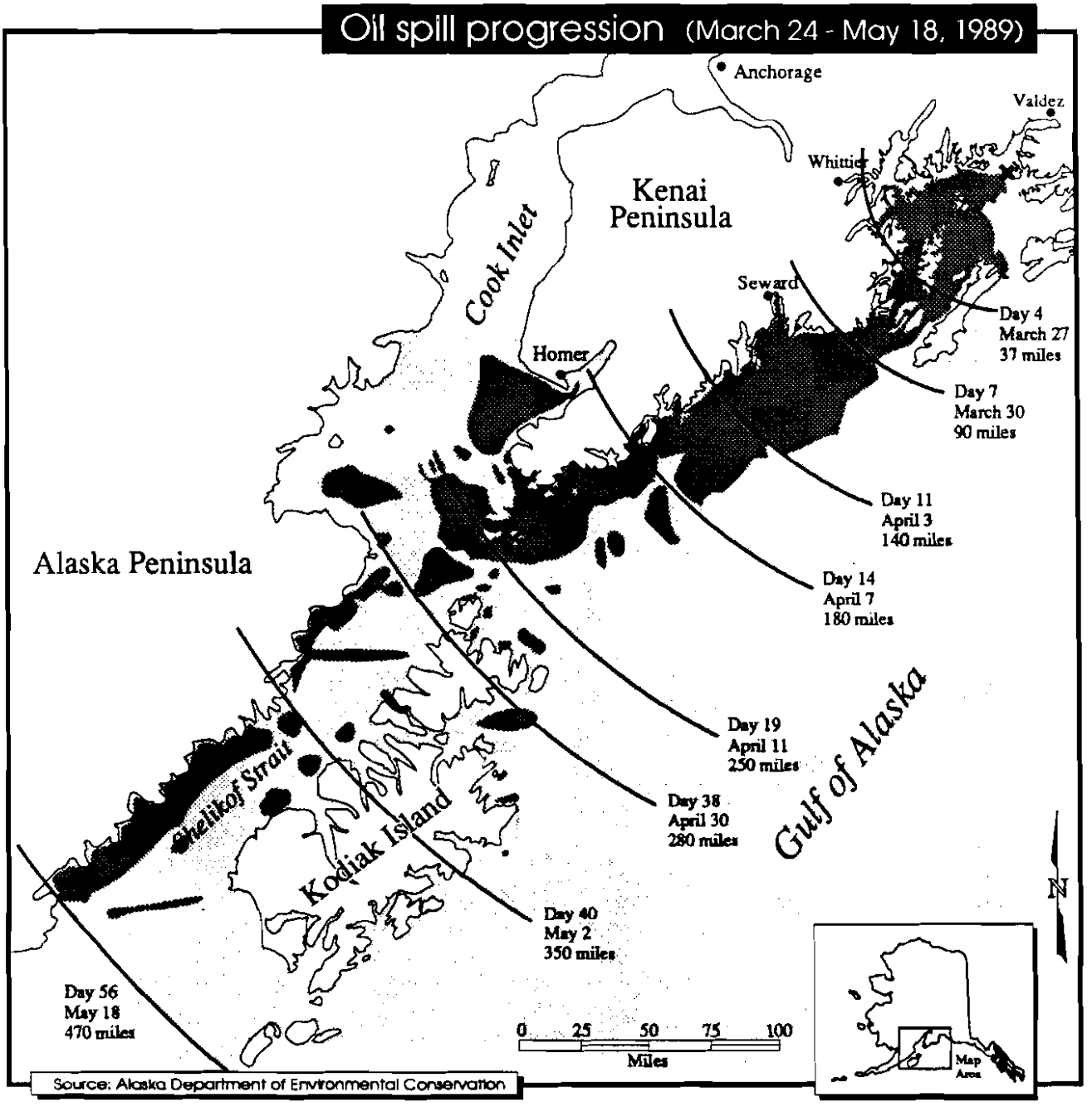
Actual vs. intended contingeny plan cleanup



Source: State of Alaska 5/89

of organization and effectiveness—but never with sufficient resources to seriously affect the course of the oil. Both public and private response capabilities would be revealed as inadequate and unprepared, though various communities would mobilize heroically in their own defense. And as time went by, news from the dozens of spill response fronts would feed public relations battles by all sides.

Before the storm, calm conditions had given the emergency a certain hopeful backdrop, as though frantic effort, worldwide mobilization and luck might still permit those fighting the spill to overcome the overall lack of preparedness. After the storm, the job became one of organization—mobilizing the equipment, personnel,



logistics, communications, management and decision-making ability to pursue the oil and mitigate its impact. That became a summerlong struggle—a protracted campaign involving uncounted millions by public authorities, some $1.5 billion in corporate outlays, 11,000 cleanup workers, hundreds of boats and aircraft, and the exertions of at least 20 communities in the path of the oil.

In the early hours and days after the spill, response was organized and directed by Alyeska and Exxon, with monitoring and some approval functions performed by the on-scene coordinator (in this case, the head of the Valdez Coast Guard Marine Safety Office, Cmdr. Steven McCall). Under the National Contingency Plan, the on-scene coordinator is responsible for insuring a proper response by monitoring the spiller's activities and acting to "federalize" the spill if the spiller is not carrying out a response adequately. Federalizing a spill involves notifying the party responsible for the spill of its liability for cleanup costs and then directing the use of federal funds to accomplish the response.

"In boarding both the Japanese vessel and the Soviet vessel I had no problem getting on those vessels, but yet there was a guard at the door of the VECO office when I tried to enter that door. And I started wondering who is really afraid of me."

Rita Turner, Seward
Alaska Oil Spill Commission hearing, 7/14/89

In the case of the *Exxon Valdez* spill, McCall and his superiors in the Coast Guard determined very early that Alyeska and later Exxon were able to mobilize more resources, more quickly, than the federal government. As public concern and outrage mounted and discussions proceeded as far as the White House over whether to federalize the spill, the Coast Guard's limited access to funds was a good reason to find that Exxon was responding adequately. After visiting Prince William Sound the week after the spill, Coast Guard Commandant Paul Yost testified to a subcommittee of the U.S. House Merchant Marine and Fisheries Committee that insufficient funds were available for a major federal effort in responding to the spill.

The *Exxon Valdez* spill response illustrated the emptiness of the National Contingency Plan's and Alyeska's promises to provide the manpower and resources to handle a catastrophic spill. Alaska, like other states, has long relied on the NCP to organize and provide resources for response, but the shortcomings of preparedness—especially in the crucial first few hours and days after the spill—were clear. The record of the past decade shows that the federal government has relied on private industry to contain or clean up a major spill. The government had prepared no resources of its own to handle even moderate-sized spills adequately. Nor is there any indication that either the Environmental Protection Agency or the Coast Guard, the federal administrators of the NCP, made any prior effort to determine whether the oil industry actually had the capability to clean up a catastrophic spill.

By day four of the spill a three-headed, three-tiered command structure had been created to coordinate the response. At the top was a steering committee consisting of Rear Adm. Edward J. Nelson, commander of the 17th Coast Guard District, Frank Iarossi, president of Exxon Shipping Company, and Dennis Kelso, commissioner of the Alaska Department of Environmental Conservation. The second tier was an Operations Coordinating Committee consisting of officials representing state and

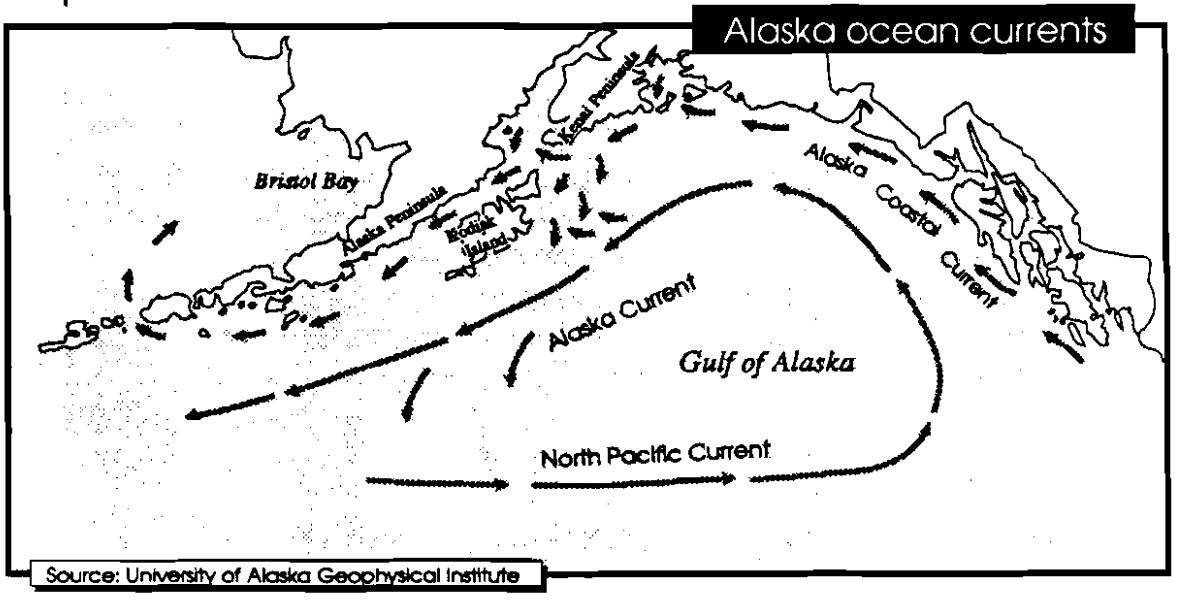
federal agencies and local fisheries groups. The third tier was the on-scene operational forces of the state, the Coast Guard, Exxon and local communities. The president later ordered Coast Guard Commandant Paul Yost to go to Valdez to direct the spill response, thereby imposing, for a time, a third command structure.

"I cannot tell you enough the respect that I have for the level of professionalism and the personal commitment, the personal loss that some of our state employees have put into this thing."

Dave Young, Oil Spill Coordinating Office, Homer Alaska Oil Spill Commission hearing, 7/15/89

Confusion marked the first weeks of effort to battle the spill. Equipment arrived from across the country and around the world—by air, truck and barge. Boats and aircraft were leased, work crews hired, communications systems bolstered and supply lines established. No plan had been developed for dealing with a spill mobilization this big. No one knew how to chase the slick as it moved with the winds and currents. During that first week, busloads of workers sat idle in Valdez, awaiting orders and equipment. Stories of mismanagement and chaos passed through the bars and restaurants. Gradually, however, massive amounts of equipment and supplies arrived to combat the spill.

Coast Guard and Navy equipment and personnel were among the first response forces to reach the area. By 10 a.m. on March 25, four members of the Coast Guard Pacific Area Oil Spill Strike Team were aboard the *Exxon Valdez* to assist with lightering and salvage and cleanup operations. By the fourth day Coast Guard aircraft, cutters and smaller boats had arrived to assist with communications, salvage and response. Two Navy skimmers arrived in Anchorage March 27 and were deployed from Valdez March 29, and 22 Navy skimmers were on hand by April 10. The Navy and the Coast Guard supplied the major portion of the oil skimming equipment eventually deployed. The U.S. Army Corps of Engineers converted several dredges to skimmers, which proved very useful.

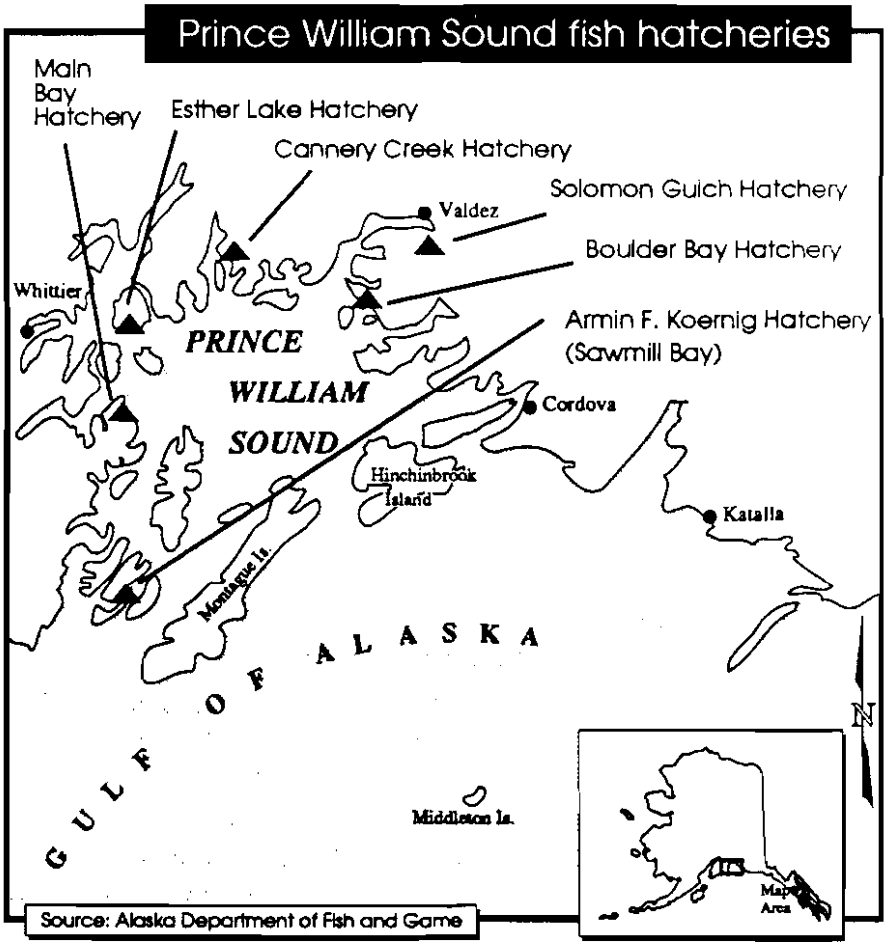


Source: University of Alaska Geophysical Institute

A success story in the early days of the spill resulted from a midnight meeting between representatives of the Cordova fishermen and the Nelson-Iarossi-Kelso steering committee "troika" on Monday night, four days after the spill. That meeting, instigated by Kelso, led to organization of the "mosquito fleet" of fishing boats from

Cordova and Valdez bent on diverting the spreading slick away from three salmon hatcheries in Prince William Sound. It was the first time Exxon (or Alyeska) had accepted the Cordova fishermen's repeated and increasingly urgent offers to help with the cleanup effort—and perhaps the first effective effort against the advancing oil.

The hatcheries had been about to release spring runs of salmon fry when the spill occurred, but oil concentrations as low as 3 to 4 parts per million—not even visible on the water—could kill the young salmon. By deploying and maintaining triple layers of sorbent or containment boom around the hatcheries and using other booms to divert the slick away from the area, the fishermen were successful in protecting the hatcheries. The hatchery defense became the top priority of containment efforts, and by April 5 the 66,000 feet of boom spread around one hatchery at Sawmill Bay represented nearly two-thirds of total boom deployed.



The oil spread relentlessly in the days following the windstorm, coating the islands, beaches and bays of Prince William Sound. Storey, Peak, Eleanor, Smith, Knight, Evans, Green, Montague, Latouche—all these islands were coated as the oil streamed generally northeast-to-southwest through the sound. Reports of bird and sea otter mortalities escalated, and both oiled animals and wildlife carcasses began arriving at rescue centers in Valdez. The Native village of Chenega Bay, destroyed by the tidal wave following the 1964 Alaska earthquake and rebuilt in a new location, once again found itself at the center of disaster.

The Port of Valdez was reopened for tanker traffic on March 28, relieving pressure on the storage tank farm at the Valdez Alyeska Marine Terminal. Skinner, Reilly and Yost flew over the sound on March 29, then returned to Washington to report to the president. Light sheens of oil were observed in the Gulf of Alaska, outside Prince William Sound, by April 2. The Alaska Department of Fish and Game canceled herring fishing seasons in the sound based on damage to spawning areas, on April 3. Lightering operations to remove the remaining cargo from the *Exxon Valdez* were

completed on April 4. The ship was refloated the next day and moved to a bay at nearby Naked Island for evaluation and temporary repair. Nearly 700,000 gallons of crude oil remained in the vessel.

Valdez became the summerlong center for cleanup staging, mobilization and supply as well as the site of bird and otter rescue centers. The three-tiered, three-headed response structure continued to direct response efforts. With the bulk of beach cleanup efforts taking place in Prince William Sound, Valdez became the nerve center of response—a boomtown with five times its normal population, a raucus atmosphere of activity and stress, a strained system of city services, and a busy cadre of bureaucratic officials.

"I'm sure we could recruit any number of volunteer groups, and we could probably find ways to finance and equip them. But we can't do this alone. Alaska communities are struggling with closed fisheries, sharp increases in mental health referrals, strained city and village budgets, and uncertainty that stretches far into the future."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Committee on Merchant Marine and Fisheries, August 1989, Cordova

Community response

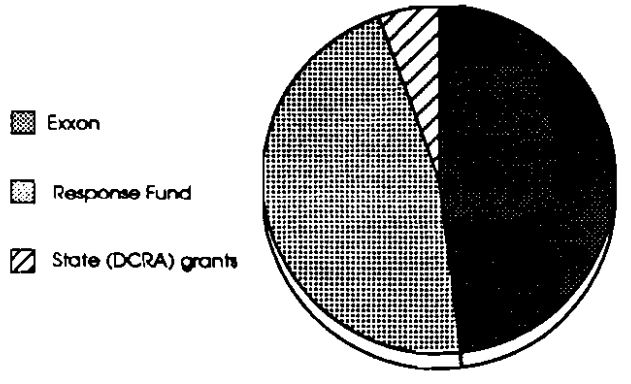
While Exxon successfully lightered and refloated the *Exxon Valdez*, the spilled oil spread out of control. During the first 72 hours when the oil drifted near Bligh Reef, the oil spill was a specific event happening at one place and time. However, as the wind rose and prevailing sea currents swept the oil out of Prince William Sound and along the coast of Alaska, the oil spill became a plague that infected one community after another.

The *Exxon Valdez* oil spill became, in effect, many oil spills. The mass of crude oil broke into separate slicks, changed consistency, oiled and reoiled the coastline. The arrival of the oil in each community set off a similar vortex of emotions—uncertainty, fear, anger, helplessness, and a deepening sense of loss. However, the ways in which the communities responsed to the crisis were quite different.

Each community's response began with the realization that the spill was not a remote event but an imminent crisis. Though the effect of currents was well known to local residents, each community hung onto the hope that it might be bypassed by the oil. Only reluctantly did communities outside Prince William Sound acknowledge that the oil was arriving on their beaches as well. Some had been told by NOAA or the Coast Guard that only a small amount of oil would escape Prince William Sound. That forecast turned out to be greatly mistaken.

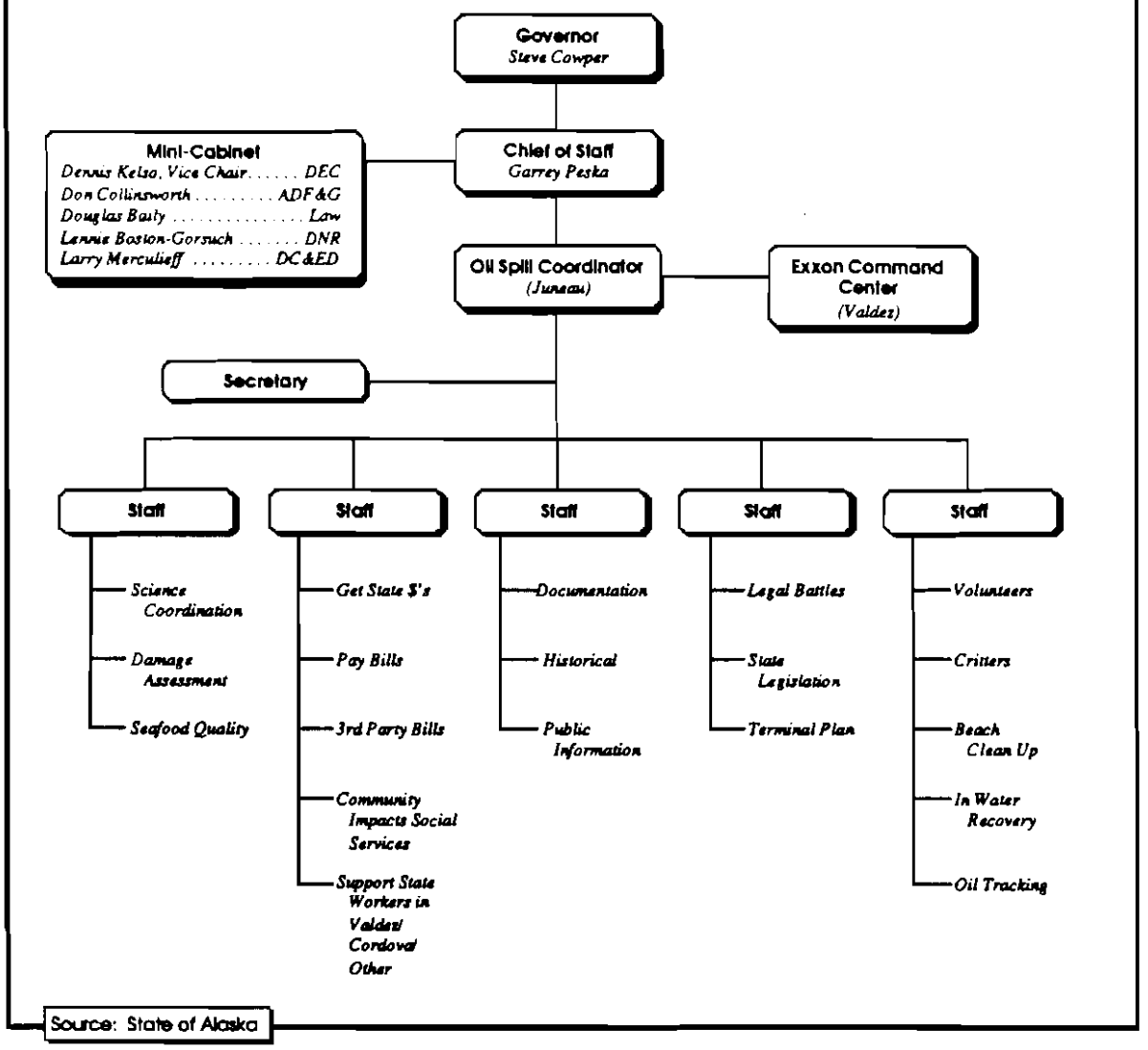
Over a six-month period the oil fouled 1,244 miles of Alaska's coast—hitting land first on the islands in the sound, then on the outer reaches of Resurrection Bay, along the headlands of Kenai Fjords National Park, around the southern end of the Kenai Peninsula, into Kachemak Bay, across Cook Inlet to the Katmai coast, along the bays and coves of Kodiak Island and Shelikof Strait, and down the Alaska Peninsula to Chignik Lagoon.

Payments to communities



Source: Alaska Office of the Governor

Spill response coordination



Source: State of Alaska

Given more time to prepare, some communities outside the sound tried to mount a defense before the oil arrived. People in Seward, Homer, Kodiak and the surrounding areas built containment boom and organized emergency teams. Though particular beaches and bay areas could be protected, residents could do little overall to stop the advancing oil. Government agencies, also given time to prepare, formed special response organizations, often to little or no avail.

Mayors of more than 20 communities formed an alliance to fight common problems such as the doubling and tripling of community populations, increased crime, lack of adequate housing, pressure on social service organizations, and the need for extra police, garbage, sewer and health care workers. The "Oiled Mayors" tried unsuccessfully to negotiate a plan with Exxon that would provide what they had agreed was fair and uniform assistance for each impacted area.

As a consequence, people in each community had to draw on their own resources to deal with Exxon and VECO and to combat the oil spill. Following brief descriptions highlight how coastal communities and their residents dealt with both the oil and the chaotic and stressful cleanup operations.

"Can you imagine what would happen if the operators of a nuclear power plant said tomorrow, 'We'll tell you what safety measures are necessary at our plant; we'll tell the workers what levels of radiation are safe for workers; we'll tell the people around the plant how we want them to act in case of a meltdown.'"

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Water and Power Resources, July 1989

Valdez

The Alaska Coastal Current, which moves through the Gulf of Alaska in a great counterclockwise gyre, carried the oil away from Valdez. Because of its proximity to Bligh Reef and because both Alyeska and the Coast Guard were located there, Valdez became the epicenter of the spill response, inundated by people and overwhelmed by the confusion that marked so many aspects of the spill.

The impact on Valdez was immediate. Within hours of the tanker's grounding, the town began filling with oil spill specialists, bureaucrats, biologists, reporters, television crews, and curiosity seekers. Within the first week the community's population of 2,300 more than doubled. The Valdez airport, which normally handles fewer than 20 flights per day, serviced 687 flights on March 30.

By mid-April, Exxon's cleanup operations were gearing up and Valdez experienced another surge of immigrants—out-of-work laborers, students, housewives and others seeking cleanup jobs. The town's population swelled to 12,000, more than five times its normal size. Hotels and motels doubled their rates and remained full. Camper parks overflowed. People exercised squatters rights on vacant lots. Local residents feared an outbreak of contagious diseases. The crime rate rose 300 percent. Mental health workers reported increased substance abuse and domestic violence. Valdez patrolmen worked overtime, and Exxon fortified its work areas with a small army of security guards. At a fall meeting of the Alaska Oil Spill Commission, Valdez Mayor John Devens described the feelings and frustrations of residents besieged by forces beyond their control, likening the sensation to one of being in an "occupied city."

The influx of Exxon's cleanup money supercharged the local economy: some benefitted, some didn't. Valdez Mayor Devens lamented: "This type of sudden wealth isn't all that good for people. Everybody wants the money, but it is an unreal type of earning. Kids who had never worked before were suddenly earning huge amounts of money. Then most of the town's service employees vacated their jobs and went out to clean rocks. This resulted in not having the services we needed to take care of all the people that were coming in. There was a lot of good that came from the influx of oil spill money: businesses on their last legs became solvent again. But there were lots of people in town who weren't getting any of Exxon's money, and, if you were on a fixed income in the city of Valdez, all of a sudden you couldn't afford to live."

Cordova

Cordova had neither oil on its shores (thanks to prevailing currents in the sound) nor the enormous influx of people experienced by Valdez. But the spill's impact on the people of Cordova was immediate and particularly devastating because it was the realization of long-standing fears. In Cordova, where virtually everyone depends on commercial fishing for their livelihood, fishermen had filed suit years before to prevent the trans-Alaska pipeline from terminating at Valdez. Their primary concern was not the 800 miles of pipe transecting Alaska, but the prospect of a fully loaded supertanker spilling its cargo in Prince William Sound.

On the morning of March 24, the town of Cordova was in a state of shock because the townspeople knew exactly what was at stake—the fisheries, their way of life and the water to which they are so closely linked. It is difficult to overstate the emotional impact of the spill on the people of Cordova. Everyone from preschool children to the most seasoned fishermen was devastated. But they were not overwhelmed.

Many residents experienced a number of distinct emotional phases in the aftermath of the grounding of the *Exxon Valdez*. The first reaction was to do something positive, anything that would help. When both Alyeska and Exxon rejected initial offers of assistance, frustration set in: many Cordovans became intensely angry. When the tides, currents and first high winds carried the oil to beaches thoughout the sound, there was a pervasive sense of despair. Then, facing the imminent and critical loss of the salmon hatcheries, Cordovans reasserted their reserves of self-reliance.

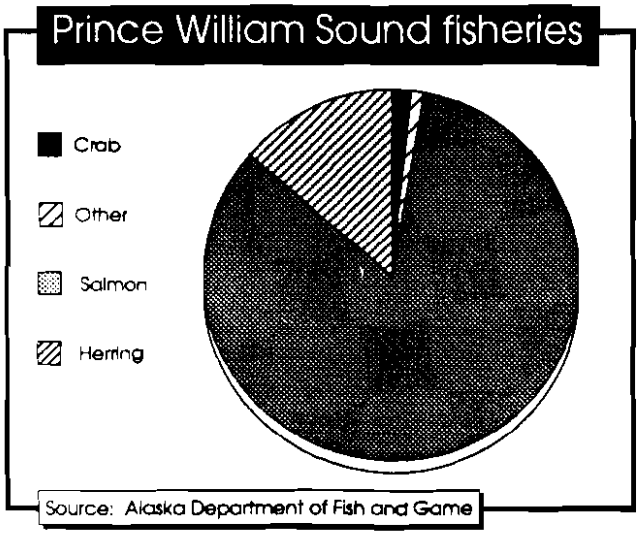
With their resourcefulness and extensive knowledge of Prince William Sound, the fishermen organized an armada of local boats that went out to save the hatcheries. Cordova District Fishermen's United became a command center for volunteer efforts and spill response information. Individual Cordovans became formal and informal advisors to Exxon, the state and federal agencies. In April a city ordinance established the Cordova Oil Spill Response Office. The Disaster Response Committee was formed at the same time by the mayor, the chamber of commerce, Native organizations, fish processors and citizens at large. Its goal was to coordinate information, identify community needs, and enable the city to speak with a unified voice.

From the early hours of March 24 through the spring and summer months and into first days of winter, the people of Cordova had to deal with the unrelenting pressure of complex and intractable problems, including the loss of fishing seasons, filing claims with Exxon, dealing with "gag orders" in oil spill work contracts, and the shortage of childcare, housing and service industry workers. Many normal municipal services ceased until the end of August.

"We have a problem," Cordova City Manager William Weinstein wrote the governor's office on June 26. "There are certain municipal costs resulting from this oil spill that Exxon is refusing to pay and no one else wants to pay either. ... We must conduct

"Let's be prepared to deal with eventuality. Say an accident does happen that we're not able to prevent or that we can't immediately deal with, let's get the equipment out on site. Let's pick the most important areas. Let's have a plan. Let's think about it. Let's have the people there to deliver it. And let's do it. You know we identified all this for Cook Inlet in 1979. ... This is not a mystery to anybody what needs to be done."

Lance Trasky, Southcentral Regional Supervisor Alaska Department of Fish and Game Alaska Oil Spill Commission hearing, 11/14/89



some economic analysis. We are incurring legal costs which are related to the spill, but unrelated to any potential litigation. This community is not alone in its needs and none of us can withstand the financial burden brought about by this disaster. ... the *Exxon Valdez* oil spill is an economic emergency as much as a physical emergency."

The spill provided an economic gain, offsetting losses for about 60 percent of the community, but the other 40 percent suffered unalloyed losses. Some losses fit Exxon's claims guidelines, others did not. Strife and tension arose between those who benefitted and those who suffered materially from the spill.

Tatitlek

On the morning of March 24, residents of the Native village of Tatitlek were astonished when they tuned into a national television news broadcast. From an announcer thousands of miles away, they learned that the nation's largest oil spill was unfolding in their backyard, just on the other side of Bligh Island from their village.

As with Valdez and Cordova, the prevailing currents carried the oil away from the village of Tatitlek. But oil washed through many of the subsistence hunting and fishing grounds used traditionally by the people of Tatitlek. Here the taking of fish, shellfish, birds, seals and creatures of the sea is not a sport or a luxury but a way of life, a necessity. In Tatitlek and other Native villages the oil spill not only resulted in biological contamination of subsistence resources but created the debilitating conundrum of not knowing what food sources were poisoned, what was safe to eat, who to believe, and whether the region would ever fully recover.

"There's never been a major marine oil spill that's ever been successfully contained and cleaned up. ... But I think the point is that nobody ever really tried; nobody's ever had any equipment; nobody ever planned for it."

Lance Trasky, Southcentral Regional Supervisor Alaska Department of Fish and Game Alaska Oil Spill Commission hearing, 11/14/89

"Mussels, clams, starfish—things are dying off and floating up on the beaches," said Tatitlek village council president Gary Kompkoff. "The tides come and go out, come in and go out. The scientists do their research one day, and everything looks fine. But what about the tide coming in? There's frustration, uncertainty and fear—a fear of what the future's going to bring. We go from fear to anger to frustration with this thing. It's going to be with us for a long time."

Chenega Bay

Twenty-five years to the day before the *Exxon Valdez* went aground, the Good Friday earthquake of 1964 sent up a tsunami which demolished the ancient village of Chenega. For 20 years the Chugach people of Chenga were "homeless," forced to live far from their ancestral lands and waterways in Prince William Sound. Elders directed the construction of a new village at Chenega Bay in 1984. Villagers had barely settled into their new community when the *Exxon Valdez* went aground.

A sense of panic ensued as the people of Chenega Bay watched as the dark, oil-laden waves rolled in. Currents carried the oil through Montague Strait, past Knight Island and into the bays, coves and passages surrounding the village.

It was the time to gather herring roe from kelp and prepare for salmon fishing, but the oil disrupted this seasonal food gathering. "We depend on ourselves," said a village elder. "And we depend on the seals, sea lions, deer, butter clams, ducks and sea life. Now the ducks are disappearing. The sea life is disappearing. Even if they come around, we are staying away from them."

"I started asking, where is the backup equipment, where is the boom material? I called various agencies. I must in all fairness to Exxon, the Coast Guard, DEC, we all know we didn't have the right setup in order. The right hand didn't know that the left hand was doing."

Marla Adkins, owner, Knight Island lodge
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

With the oil came dozens of fishing boats trying to save the nearby salmon hatchery, helicopters with state and Exxon officials, planes with strangers who may have come to help but who often aroused suspicion and fear among the village people. Approximately 20 Chenega Bay residents were hired by VECO, amidst complaints of name calling, lawyers delaying the cleanup, and a pervasive insensitiveness to how frightening the spill was to the Native villagers.

"People felt like they were being jerked around and misled when VECO delayed putting people to work on the beaches," reported commission investigator Sharon McClintock. "The response effort did not maximize the use of local people and affected them on many levels: the invasion of agencies and the media, the way Exxon tried to show what a great job it was doing, the demands on the community's limited facilities, the overabundance of coordinators, the sense that Exxon didn't have the foggiest notion of what to do, the inability to discuss the situation because of pending litigation, the demoralizing of workers. People aren't crying openly, even about the loss of their subsistence resources, but inside there is tremendous grief. With the future so uncertain, some elders feel homeless again. And there is a feeling that no one cares, no one is helping. People are afraid to say anything because Exxon might use it against them in court. So most people keep it inside, and the hurt doesn't seem to go away."

Whittier

Whittier, at the northwest end of the sound, was out of the path of the oil but close enough to feel the effects of the devastation. Shock and then anger marked the initial reaction of Whittier residents to the spill. They were prepared to initiate containment efforts before oil reached their shores, but attempts to elicit a response from Exxon were unsuccessful. They were told that boom was not available for them. "We got the distinct feeling that people felt Whittier was not a part of Prince William Sound," said one resident.

Acting on its own initiative, Whittier declared a state of emergency. This activated the town's Emergency Operations Committee, but frustration mounted because neither the state nor Exxon was able to provide equipment and logistical support quickly enough. Like other small communities, Whittier soon experienced budget

shortfalls. Whittier's local government was further handicapped when several staff members quit to work on the oil spill. Normal city functions were interrupted, and additional police officers had to be hired to cope with the influx of people associated with the cleanup.

Exxon did provide funding for some emergency relief help, and city administrator David Moffit reported that "their relations with me have been very honorable." Nevertheless, when oil was sighted at nearby Esther Island, the area's commercial fishing was closed, creating an instant recession. Fishermen and fish processors were out of work, local merchants had few sales, and the city administration itself, which depends upon a local sales tax for much of its operating budget, found its treasury drying up at the same time as social service costs skyrocketed.

"Crisis tends to amplify personalities. If you are a jerk and along comes a crisis, you're going to be a real jerk. You may not get along with your wife, you get a real crisis, you are gonna knock her around—or vice versa."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

Seward and Kenai Fjords

NOAA and the Coast Guard informed the people of Seward soon after the spill that only a very small amount of oil, perhaps 50 barrels, would escape Prince William Sound. Local fishermen thought otherwise. When Dr. Thomas Royer of the University of Alaska challenged the official assumptions by delineating the prevailing currents that would carry oil out of the sound, the people of Seward started mounting their own defense.

The National Park Service played a key role in galvanizing community response. During the critical first days of the spill, park service officials had to buck Coast Guard reassurances in order to protect Kenai Fjords National Park and to assist the community in safeguarding important salmon streams. A key decision was to bring the Alaska Incident Command Team to Seward. To help the community forge a cohesive response, the team's emergency response experts helped establish lines of communication and responsibility and secure supplies for fighting the oil and coping with the cleanup. The Multiagency Advisory Committee (MAC), which met daily to make critical decisions, proved to be one of the most effective coordinating groups developed during the spill. The Incident Command Team completed its work and turned over well-organized emergency operations to Exxon on April 17. The MAC group, however, continued meeting throughout the summer to set cleanup priorities, the most critical being the removal of oiled birds and animals from the food chain.

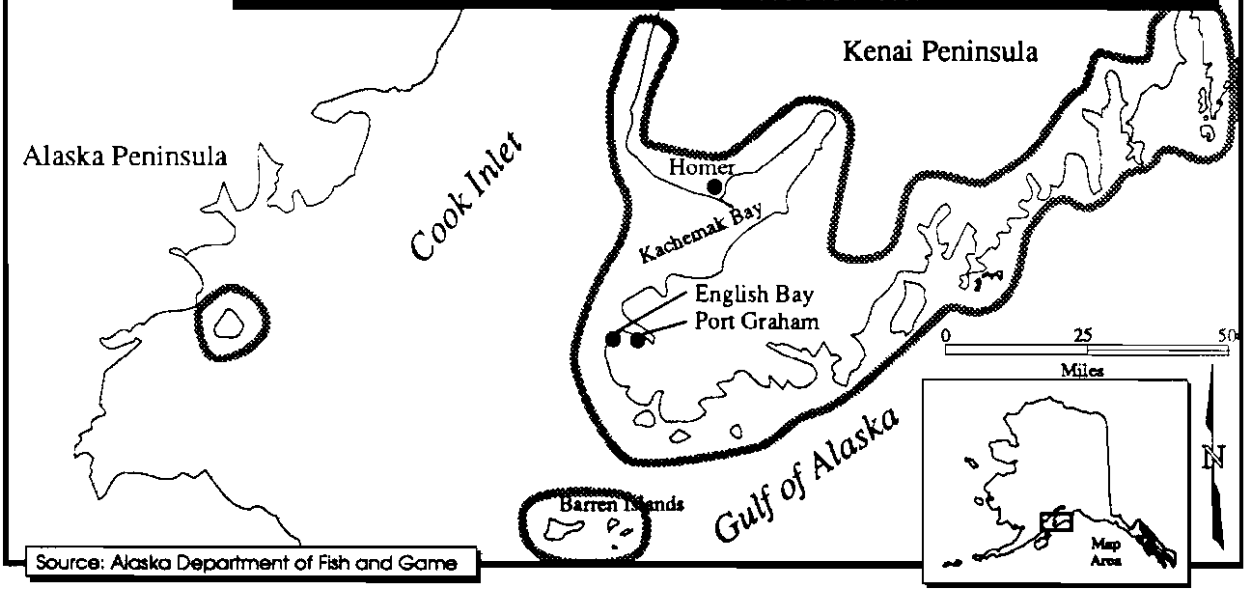
English Bay

English Bay, located near the southwestern tip of the Kenai Peninsula, is home to more than 200 predominantly Aleut Natives who depend upon the sea for their livelihood. Early April currents swept oil around the end of the Kenai Peninsula and into virtually all of the traditional hunting and fishing areas of the English Bay people.

The hardest hit areas near English Bay were Port Chatham, Elizabeth Island and Anderson beach. Oil sank into the sand and gravel. It covered rocks and seeped

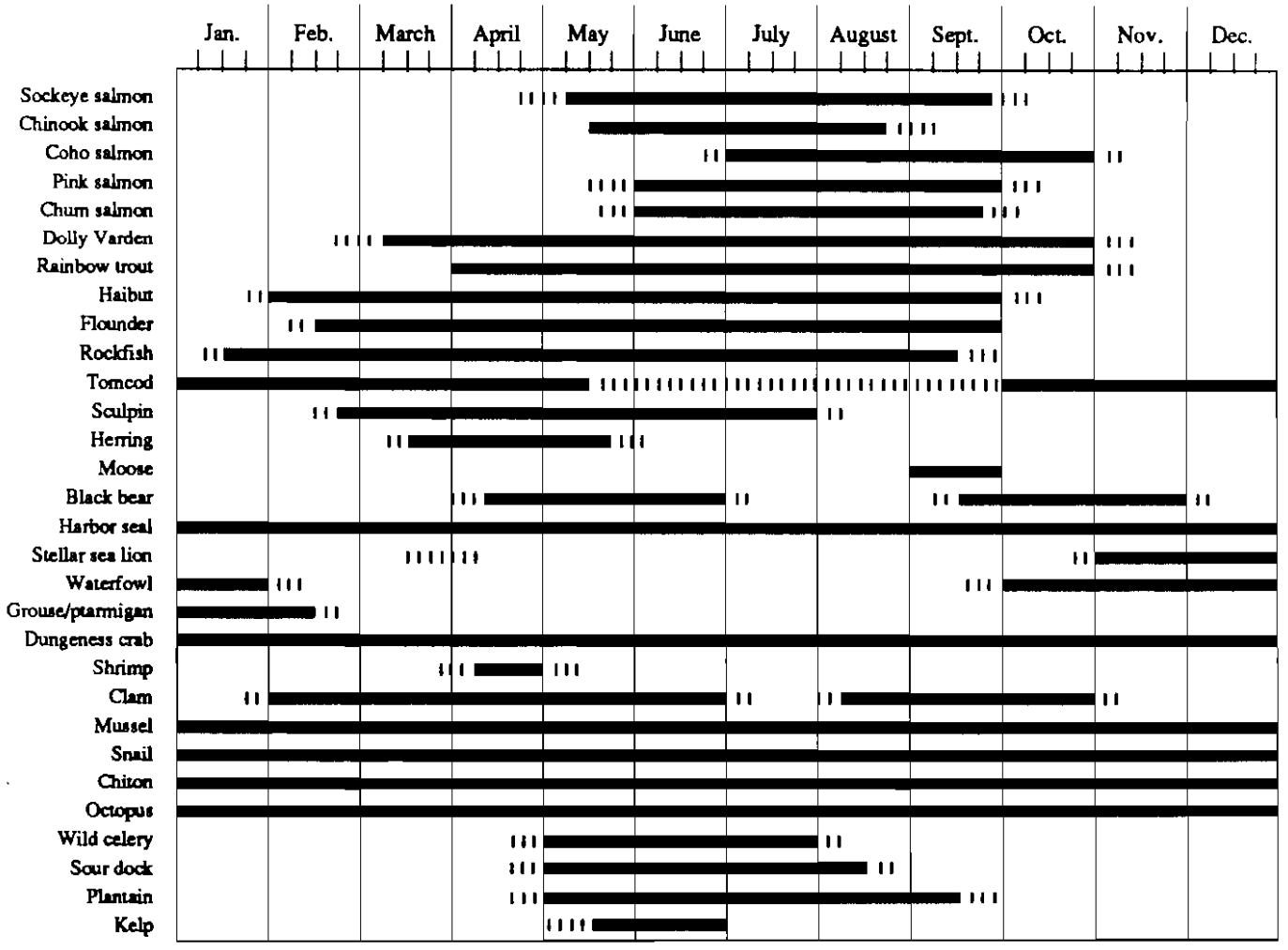
Subsistence use areas

Port Graham and English Bay Residents
1880's to Present



Source: Alaska Department of Fish and Game

Annual round of subsistence resource utilization in Port Graham and English Bay, 1981-1982



Source: Alaska Department of Fish and Game

Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort.

underneath them. Oil coated kelp, barnacles and the beach immediately in front of the village. And oil returned throughout the summer, repeatedly reoiling the English Bay coast. Beyond the specific biological impacts, the oil had a psychological impact on the villagers, who said in numerous ways that their world would never be the same again. Residents freely expressed feelings of helplessness, depression, hurt, anger, and hopelessness.

Many English Bay residents eventually made sizeable amounts of money from cleanup jobs. Others, however, were unable either to earn money or to pursue their normal gathering of subsistence foods. In June, the village of Tyonek, which was unaffected by the spill, airlifted king salmon to the people of English Bay. The village of Angoon in Southeast Alaska sent seal meat, seaweed and seal oil. Dozens of cases of frozen salmon were provided by Chugach Alaska Corporation.

There were delays in getting cleanup equipment and trained response personnel in English Bay, but once mobilization occurred, the usually quiet and peaceful village was transformed into what looked like a battle zone, with planes and boats full of cleanup workers, officials, reporters and television crews zooming in and out of the community at all hours. Cleanup employment drew many people away from key positions in the community, interrupting already-stressed services such as the health clinic and police department. Feelings of frustration and hopelessness caused incidents of drinking to rise, discouraging the community's sobriety movement. As disruption continued, resentment and suspicion grew, and traditions of sharing and goodwill suffered.

Cleanup methods, procedures and attitudes often had a demoralizing effect on the people of English Bay. Native villagers overheard what they considered racist remarks broadcast over boat radios. Villagers were not initially given safety training and informed of the health risks associated with cleaning up oil. Morale declined as rules for beach cleaning changed and conflicting orders were given by cleanup contractor VECO International. VECO was viewed as not properly dealing with either the beach cleanup or the local people. The consensus of beach workers was that had they been allowed to organize their own cleanup they could have done a more effective job. Like many of the other small communities, English Bay did not have the political clout either to improve the cleaning process or to curb the intrusion.

"The way it was supposed to happen, which sounded good, was that the bill would be sent to the spiller, and the spiller would pay it. Unfortunately, because of long court cases and companies going out of business, that money has not been returned."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

Port Graham

Port Graham, located on the outer shore of Kachemak Bay, is a small Native village and, like neighboring English Bay, relies on traditional foods from the sea. When the first oiled birds and otters started to appear, many of the Port Graham women went down to the beach, even though the weather was stormy. Going out in a skiff at that evening's low tide, they collected the prized and nutritious clamlike "bidarkies" in the fading light. They were afraid that once the oil washed ashore it would be a long time before might dare eat them again. That night they shucked and cleaned the

bidarkies and gave each family in the village one bagful, knowing these might be the last for years to come.

Although not trained or equipped for such an emergency, the Port Graham Village Council became the primary coordinator for local cleanup operations. VECO rented the community hall and other facilities in Port Graham. A fax machine was provided by the Kenai Peninsula Borough. In mid-April, VECO supervisors met with the community and hired all the adult residents who were available to work. This employment provided an influx of cash to the community, but the organization and implementation of the cleanup pitted local people against VECO foremen and each other for supervisory positions.

Port Graham Chief Walter Meganak Sr. described the situation thusly:

> We lose trust for each other. We lose control of our daily life. Everybody pushing everyone. We start fighting. We Native people aren't used to being bossed around. We don't like it. But now our own people are pointing fingers at us. Everyone wants to be boss, we are not working like a team.
>
> We lose control of our village. The preschoool meets in the community center. We shut down the preschool so the oil company can have the center. We work for the oil company now. We work for money now. The springtime season of our village ways are gone. Destroyed.
>
> We hardly talk to each other any more. Everybody is touchy. Everybody is ready to jump you and blame you. People are angry and afraid. Afraid and confused. Our elders feel helpless. They cannot work on cleanup, they cannot do all the activities of gathering food and preparing for winter. And most of all, they cannot teach the young ones the Native way. How will the children learn the values and the ways if the water is dead? If the water is dead, maybe we are dead—our heritage, our tradition, our ways of life and living and relating to nature and to each other.

"One of the things that was different about this particular emergency is that the event itself was outside municipal boundaries ... of all our communities. It was a local emergency because of the effects of the accident on the lives and economy of the people of Cordova."

Erling Johansen, Mayor of Cordova
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

Seldovia

Seldovia, a fishing community of about 500 across Kachemak Bay from Homer, virtually fronts on the sea and was, therefore, particularly vulnerable to the spreading oil. Although NOAA, the Coast Guard and Exxon all initially dismissed the possibility of oil reaching Seldovia, the local residents knew from the first days of the spill that the oil would be coming their way.

During the first week of April, citizens of Seldovia told the Coast Guard that oil was going to hit their shoreline, but the Coast Guard reassured them that oil would not reach Seldovia. With no official support, the people of Seldovia mounted their own response. On April 5, city fire chief Frank Monsey was appointed emergency

operations officer. One hundred and fifty residents banded together to work around the clock to cut trees and make boom from logs, roughcut boards, plywood—anything at hand.

By April 12 virtually all of Seldovia's residents were involved in the volunteer effort. Their objective was to build 8,000 feet of boom to protect Seldovia Bay and the harbor. The Coast Guard promised to provide commercial boom, but the residents never saw it. Exxon was asked for advice on making log booms, but no advice was forthcoming. The people designed and built their own.

An Incident Command Team flew to Seldovia from Homer to help the volunteer group develop a comprehensive response plan that detailed lines of responsibility, tasks to be performed and the resources needed. Exxon ignored the plan and, instead, sent its contractor VECO to hire local people. After Exxon's initial lack of response, many Seldovians did not feel right about accepting the oil company's money. Some went to work, others didn't. The volunteer effort died. The community's dedication dissolved in anger, frustration and resentment.

"When the local people lost their spiritual drive, the cleanup effort suffered," said one observer in Seldovia. "Without any authority, the Incident Command team went home. Turf wars among agencies began delaying decisions. Exxon installed an organization that was too bureaucratic to be effective. Trust was not put in local people; even those hired as coordinators were not allowed to do their jobs properly."

"We started contacting Exxon and negotiating with them as far as recognizing the impact on Cordova businesses. Of course, the initial reaction was, Cordova's not even near the spill. We don't even recognize Cordova at all."

Erling Johansen, Mayor of Cordova
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

John Michaelson, Seldovia's representative to the Homer-based Multiagency Advisory Committee (MAC team), became so frustrated that he attempted a citizen's arrest of the Exxon representative for disseminating false information and endangering people.

Homer

People are drawn to Homer for its stunning landscape, incredibly abundant marine life and a relaxed, peaceful lifestyle. With 5,000 residents it is the largest community on Kachemak Bay, and it was the scene of some of the most intense anger and frustration experienced in the aftermath of the *Exxon Valdez* oil spill. Residents feared the oil would ruin not just beaches but everything they cared about.

Local residents formed their own MAC group, patterned after the successful incident command structure in Seward. Through the MAC group they pleaded with Exxon for commercial boom and for oil spill expertise. "We wanted an oil spill rep to work with, someone with oil spill experience," said Homer's first MAC team chairman, Loren Flagg. "Exxon finally showed up with someone called a 'community liaison.' He was a public relations man who had never been involved in an oil spill before. This showed us a callousness, a lack of care. And as a result, we got off to a very slow start, nothing got done."

One of the problems encountered by Homer and other communities was that the farther one was from Exxon's Valdez command center the harder it seemed to be to get decisions and action. "When we had MAC meetings, it seemed as if every step of the way Exxon was dragging its feet over doing anything," said MAC chairman Loren Flagg. "I came to the conclusion that all the marching orders were coming from Valdez. What Exxon was doing in Homer was a sham. We had our problems right there in Homer and on the outer coast, and we shouldn't have had decisions coming out of Valdez. Making the decisions right there in Homer would have solved a lot of problems."

"We've had some serious problems this year with the unavailability of cannery workers to process the red salmon run. The fish were in good supply, but processing workers weren't."

Ken Roemhildt, North Pacific Processors
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

Kenai Peninsula Borough Mayor Don Gilman was able to secure response funds for Homer from Exxon, and the MAC team was able to order its own boom for the protection of key streams, lagoons and hatcheries. In Homer, as in virtually every impacted community, Exxon was perceived as trying to solve the problems of the spill with money. Pouring hundreds of millions of dollars into the cleanup produced a massive effort, but in many instances it didn't go to the root of the problems, according to many residents.

"People were so upset," said Homer resident and oil spill coordinator Mei Mei Evans. "They kept asking the Exxon rep what his company was going to do to halt the devastation. And he said, 'Don't be upset. We'll pay for everything.' He sincerely thought that money could make it all better. But here in Homer most people don't really care all that much about money or material things. They care about a quality of life that in some cases they have traveled across the entire country to find. Some things are sacred. This country is sacred. The connection of these people to the country is sacred. And no amount of money can magically undo the damage, the sacrilege."

Kodiak

The city of Kodiak, home to some 6,700 residents and one of the most productive fishing ports in the world, seemed at first far removed from the stricken tanker lodged on Bligh Reef about 300 miles away. Before the oil began moving out of Prince William Sound, however, the people of Kodiak realized it was coming their way. With Exxon and most agency officials preoccupied in the sound, Kodiak initiated its own response.

"I think it's important that there was the feeling that services [mental health] services would increase. But actually the center has decreased mental health over the last month. That's because people are still involved with the spill, and they haven't had time to wonder what's going to happen when this is all finished."

Dr. Brad Williams, Homer Community Mental Health Director
Alaska Oil Spill Commission hearing, 7/15/89

With a history of tsunamis, Kodiak had previously established the Emergency Services Council to combat unexpected disasters. This emergency support system, composed of Kodiak City, Kodiak Borough and the U.S. Coast Guard became the key coordinator of Kodiak's spill response. Perceiving communications as an essential element of the spill response, an effort was made to keep residents of the city and of the island's widely scattered villages informed. Frequently scheduled public meetings were not only broadcast over radio, but were linked to villages through teleconference phones to provide residents opportunities to raise concerns, ask questions and make suggestions.

The Emergency Services Council also helped establish cleanup priorities and provided technical advice and local knowledge in support of the regional activities of Exxon, VECO and state and federal agencies. NOAA was on hand to advise the Coast Guard. The state's Division of Parks and the Historical Preservation Office, both in the Department of Natural Resources, assisted in identifying archeological sites at risk. The National Park Service, generally perceived as one of the most professional and effective spill response agencies, established an emergency field office in Kodiak to combat the spill's impact on the Katmai coast.

"Back in those days there was no such thing as an Exxon contract. These people never asked if they were going to get paid. Didn't care if they were going to get paid. Their crews didn't care if they were getting paid. They put their own fuel in the boats, they bought their own groceries. They just wanted to save the sound and their hatcheries. ... We were ready. The fishermen never expected to have to be ready. Alyeska told us they could take care of it themselves, if it ever happened. They were not ready. We were ready. And our people didn't expect to get paid."

Marilyn Leonard, Executive Director, Cordova District Fishermen United
Alaska Oil Spill Commission hearing, Cordova, 6/26/89

By April 7 Kodiak residents were using Afognak Island logs to manufacture boom to protect the Katoi hatchery. By the time Exxon arrived in Kodiak, local people had already deployed their booms. These homemade booms were relatively ineffective, however, and Kodiak had to plead continually for supplies of heavyweight, deep-sea commercial boom. When VECO mobilized cleanup operations on Kodiak Island, approximately 400 local people were hired. Several hundred other workers were brought to Kodiak at a time when the community had many nonworking fishermen and cannery workers available who were not hired by VECO.

Kodiak's economy was turned inside out. The spill dislocated every segment of the community—fishing, government, construction and services. In addition to specific economic hardships, Kodiak endured the confusion and inconsistencies that appeared in virtually every aspect of Exxon's spill response. When oil sheen closed down the salmon and herring fleets, many crews went to work on the cleanup. But fishermen were informed that they would have to stand ready to go fishing, either to be prepared for a short opening or to qualify for claims compensation. Thus, many waited in vain to fish instead of working on the cleanup. Some made no money fishing and had trouble with their claims against Exxon. Many service businesses such as hotels and restuarants had higher revenues than normal, but they also had higher labor costs due to the inflated wage scale.

Exxon did set up a claims office to intercept and settle claims before they got to court, but claims negotiations did not always leave good feelings. People with claims encountered great difficulties in achieving equitable and consistent claim settlements. Among the various Kodiak fishing groups, processors, supply companies and cannery workers, some collected quickly while others faced delays or outright rejection of claims. Seemingly deserving people got nothing. Others, who would not have been fishing if the seasons were open, did receive compensation. By August many more boat owners were in danger of losing their boats because of late mortgage payments.

Because of the state's "zero tolerance" policy (which closed fisheries where oil had been found in the water), Kodiak processors got no fish except those flown in from Bristol Bay. To keep crews employed, they began using pelagic stocks that normally were processed in the fall. This practice was halted when a federal closure was placed on the pollock fishery.

City and borough staffs and budgets were severely overburdened. When public employees left to take more lucrative cleanup jobs, it exacerbated an already tenuous situation. Proper functioning of the community's social service programs was particularly crucial. During the intense first months of the spill, Kodiak's domestic violence rate tripled. The caseload for the Kodiak Mental Health Department rose 700 percent. Eight young people, including several children of Coast Guard personnel, committed suicide.

"These people fish for a living. They are fishermen by choice. I think it's more than an occupation. I think it's a religion."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

Ouzinki

Ouzinki is a small Native village near the town of Kodiak. Areas it depends upon for subsistence resources were slathered with oil. Though the oiled beaches and dead birds brought deep pain, the disorganization of the spill response fostered suspicion, distrust and resentment.

"Yeah, there is resentment. There is resentment alright," said Ouzinki mayor Zack Chichenoff. "Exxon and VECO started doing stuff in the villages. At first they tried to make separate contracts with each community. We kept putting demands on them and they started coming around." However, as Chichenoff pointed out, when problems arose Exxon and VECO often shifted responsiblity to each other: "If you talk to VECO, they say that Exxon doesn't give them what they need. And then if you go to Exxon, they say that VECO isn't doing their job."

Behind all the confusion that embroiled the lives of the cleanup workers and corporation supervisors lay a quieter, less publicized crisis—the spill's impact on children. "Kids don't go dip around in the ocean like they used to," Chichenoff said. "Some kids don't see their parents, except late in the evening when they are all tired out. The parents don't have much time to take off with the kids, the little ones especially."

Children and adults alike feared health problems associated with the oil and the cleanup procedures. Ouzinki public safety officer Bill Pyles said that the oiled beaches "really have a putrid smell that makes people sick, nauseous. These are warning signs of danger. Exxon and VECO have been into this thing for about three months, and they are finally sending over hygienists to tell us things we should have known about safety in the first place. I was so mad when they laid this bombshell on us. I'm a public safety officer and I was doing everything I thought was right to keep everybody safe. Then, they finally get around to telling us what you gotta do to keep people from getting hurt."

"Exxon continually told us there was no commercial boom available ... At one point when they told us there was none, Mayor Gilman and I picked up the phone and had boom on the plane in an hour."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

Old Harbor

Throughout the summer Native villagers of Old Harbor on Kodiak Island reported finding dead bear and deer, which had evidently ingested oil-fouled kelp and other seaweed along the beach. In July residents still were sighting oil sheen and heavy mousse floating in the bays and inlets, fouling beaches and killing wildlife.

Exxon contracted local people for oil spill cleanup in the Old Harbor area, but villagers soon became disillusioned with the effort. Transit to and from the cleanup sites took six hours each day, leaving only two hours for actually cleaning. No boom and skimmers were deployed to remove oil from the water before it reached the shore. Villagers overheard Exxon officials say that once the oil soaked into the beach gravel, no further cleanup measures were necessary.

The Old Harbor tribal council, fishing association, city council and Native corporation jointly developed a cleanup proposal which would have provided a full eight-hour work day for cleanup crews and would have resulted in appreciably cleaner beaches. Their proposal was rejected.

Karluk

Karluk, an unincorporated community on the north side of Kodiak Island, has about 90 residents, virtually all of whom depend on fishing for their livelihood and sustenance. The villagers biggest concern was protection of the Karluk River, which has an extraordinarily productive red salmon run. Karluk was not recognized as a cleanup priority and encountered numerous problems as a result.

The Karluk oil spill response, finally initiated on May 17 with 19 workers, was handicapped because equipment was inadequate, essential supplies were unavailable and the village lacked an institutional response mechanism. Exxon officials waited until oil was washing into the Karluk River lagoon before making an aerial reconnaisance of the situation. Villagers complained that Exxon gave them conflicting promises, offered them less money for both beach cleaning and vessel charters and provided training five weeks late.

The lack of instruction and organization was apparent when workers struggled to attach pom-poms (absorbent pads that look something like cheerleaders' props) to containment boom. Where the booms were deployed in the swift tidal currents, the pom-poms bobbed and swayed and disappeared into the ocean. Because of the lack of transport vehicles, beach cleaners often had to walk across a mile of beach to deposit their bagged debris.

"The net result of this was Exxon did come, and the first person they sent was public relations. This didn't help a whole lot. It did give people somebody to yell at and somebody to take their anxieties out on; but it didn't solve the problem. The anxieties remained."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

The emergency closure of commercial fishing seasons eliminated fishing jobs. As intervillage rivalries for the handful of cleanup jobs intensified, nearly one-third of the village's population left in disgust. "Exxon's cleanup effort was hit and run, and our people are still paying the price," said one community leader. "Too many promises made by Exxon weren't kept. The beaches remain polluted."

Akhiok

The people of Akhiok, a village of 93 people on the south side of Kodiak Island, depend on deer, seals, sea lions, fish, clams and other seafoods that are normally abundant near the village. When the spill occurred more than 400 miles from Akhiok,

the villagers saw it as a tragedy far removed from their lives. On April 9, however, tides and northwest winds brought the oil into Shelikof Strait and washed it onto Afognak Island. The people of Akhiok knew it was only a matter of time before it hit their village.

In mid-April "scouts" sent out by the village reported that tarballs and dead birds were beginning to wash in. Soon oil hit nearby beaches and the community was in shock. "What is coming of our world?" asked an elder who cried while walking among dead birds on the shore. The highest concentration of sheen and tar balls was in the vicinity of Alitak Bay and on three small islands in front of Akhiok where surf pushed oil into the gravel beaches.

"One of the first things the attorneys found after the spill is that the rights of cities affected by a spill are not clearly stated in the law."

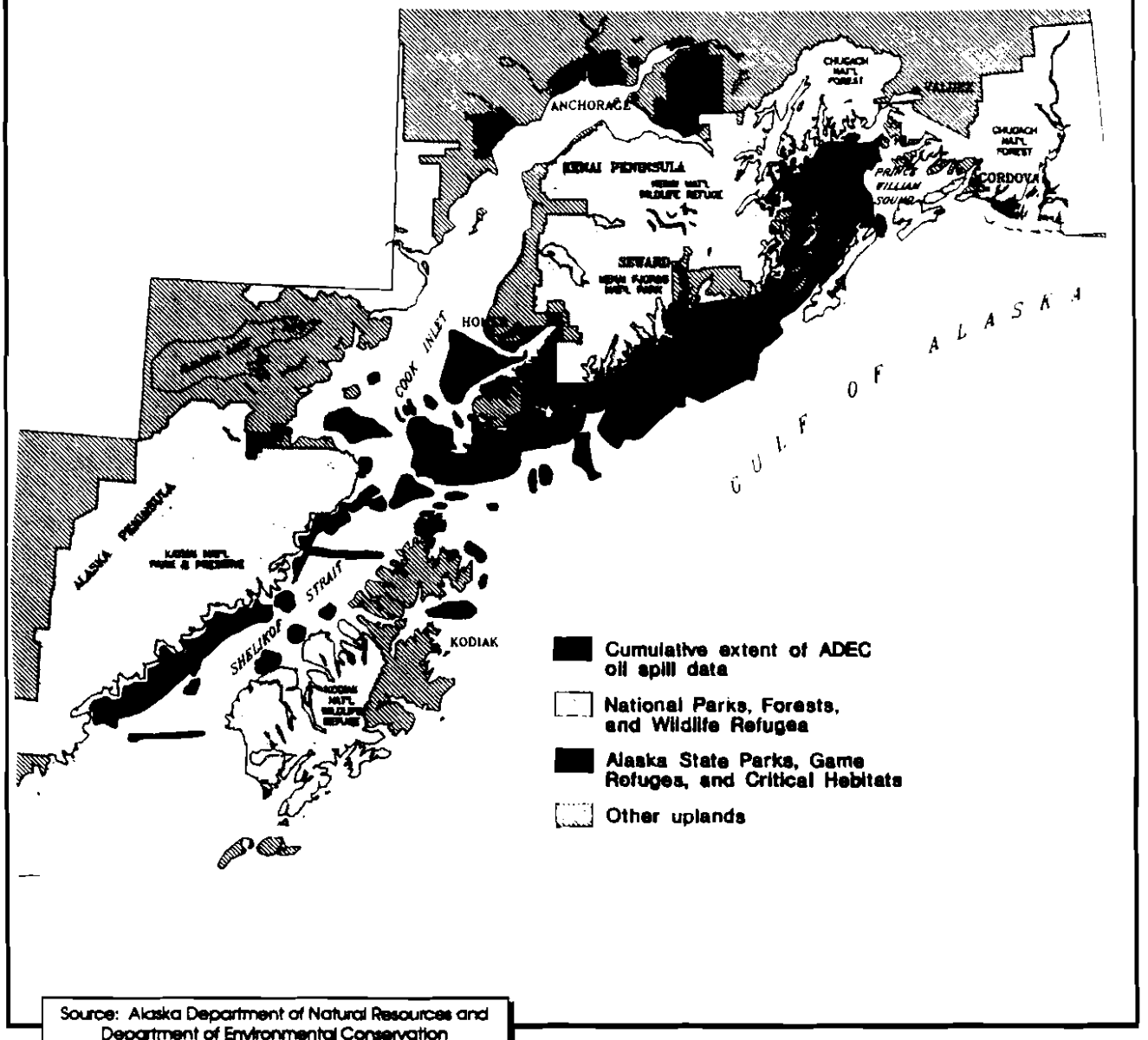
Mead Treadwell, Director, Cordova Oil Spill Disaster Response Office
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

Akhiok, like most small coastal communities, had no predetermined emergency response system in place. This compounded the environmental and spiritual problems precipitated by the oil and the social and psychological problems arising from the cleanup. The City of Akhiok, which had both a phone and a facsimile (fax) machine, provided information for the local spill response. However, most of the city employees went to work for VECO, crippling many municipal functions during the local cleanup which extended from May 15 to September 15. At times the city was forced to pull people off the spill to take care of pressing city business. VECO's policy required these people to go to the bottom of the employment list, creating a dilemma for those who wanted to help the community and also be gainfully employed in the cleanup. Not everyone who wanted to work was hired, a situation that created a significant schism within the community. Competition for jobs and the new disparity between haves and have-nots fostered resentment both toward Exxon and VECO and among the villagers themselves.

Akhiok had been a close-knit community and during the previous two years had made remarkable progress in combatting alcoholism, which affected roughly 90 percent of the villagers. Before the spill, 85 percent of the people were involved in a successful sobriety movement. By mid-October, the convoluted influx of money, fear of losing the hunting and fishing way of life and the daily stress of the spill cleanup combined to disrupt family life and drop the sobriety rate to about 50 percent. The Kodiak Area Native Association and RuralCAP sent a team of people to facilitate a three-day healing session, modeled after the traditional "talking circles" of Native Americans.

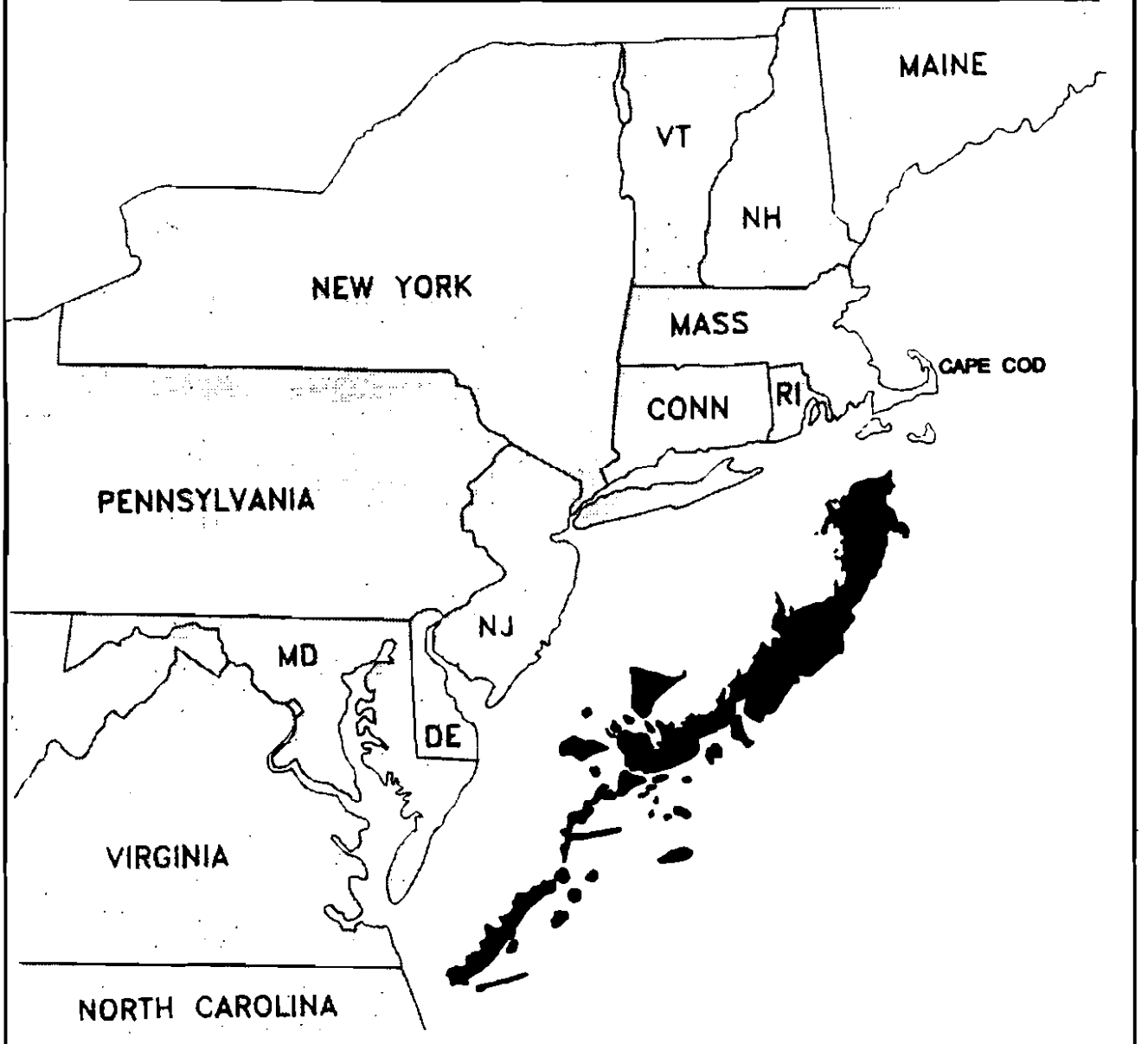
The people of Akhiok received a final psychological shock when Exxon demobilized in fall. VECO arrived in the village unannounced and seized all documents related to the spill. Records and files from city offices were confiscated and quickly removed from the village.

The Alaska Oil Spill: March 24 to June 30



Source: Alaska Department of Natural Resources and Department of Environmental Conservation

Extent of Alaska oil spill compared to East Coast landmarks



Source: Alaska Department of Natural Resources and Department of Environmental Conservation

Larsen Bay

When Karen Serieka, a young writer from Boston, visited Larsen Bay in the midst of the spill, she was struck by the fact that "people are part of the beauty of Alaska. They seem to have closer ties to the land, particularly the Native people who see the land as their body. I think we all have to start seeing the land as our body. You know, the land is not just a resource put here for our use and our profit. We don't own it. We're a part of it, or we should be. And when we disrupt the balance of the land we really hurt ourselves."

And people in Larsen Bay felt injured, deeply violated. "People here have some awfully strong feelings," said Larsen Bay Mayor Charles Christiansen. "I have a lot of strong feelings myself, but I'm not a very good speaker. People are sad. They're very sad. The oil just keeps showing up all over the place. "

"Everybody's mad, but what can you do?" Christiansen asked. "We try to make the best of it and get out there and clean it up. When the oil came, everybody in Larsen Bay went out and started working the beaches and doing everything they could without contracts or anything from the oil companies. They just figured it was their duty to go ahead and keep it off their shores. People in most places, you know, they just won't let their kids on the beaches anymore. You don't see them running up and down in the water like they used to do."

"Nature shouldn't be fooled with," Christiansen said. "Nature put something wonderful out there for us, and man shouldn't fool with it."

"These were government people that were pulled away from their regular jobs to come in and do this. They didn't have spare budget either. Again, this made it very frustrating in the community that these groups could not do anything. Couldn't make anything happen. The next move was to try to bring Exxon here, because Exxon was in charge of the spill. Exxon was in charge of the containment and ultimately in charge of the cleanup. And Exxon was reluctant to come. I'm not sure why. Possibly they viewed it the same way we did initially. You know, it's [the spill] itself is 400 miles away."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

History: Oil spill prevention and response

Oil spills are inevitable. A high frequency of spills is not. Spills have been eroding the natural environment ever since the first oil tanker shipments left American and British ports in the mid-1800s. The first major tanker spill in the sea was recorded in 1907, when the *Thomas W. Lawson* sailing ship grounded off the Scilly Islands of Great Britain, dumping 2 million gallons of crude oil into the ocean. Large or well-publicized spills have been followed by spates of legislative initiative, and the *Exxon Valdez* spill is no exception. The Alaska legislature approved a package of oil spill-related legislation and revised a controversial tax provision to reinstate an oil industry tax soon after the Prince William Sound disaster. Congress, at this writing, was resolving differences between House and Senate approaches to a major oil spill liability measure that has been around in one form or another for some 15 years.

Visible pollution on British shores between 1907 and 1922 prompted Parliament to pass the first legislation directly related to oil spills—the Oil in Navigable Waters Act. The 1922 law prohibited oil discharges from vessels in ports and connecting waterways. Following Great Britain's lead, in 1924 the United States passed the U.S. Oil Pollution Act, which prohibited oil discharges that were damaging to "aquatic life, harbors, docks and recreation." In 1926 the U.S. Congress, disturbed by damage caused by oil in the sea, proposed the first International Conference of Maritime Nations. Thirteen governments endorsed a convention draft, but none adopted it.

Oil companies began developing their own prevention and response regimes. In 1926 the International Shipping Owners met in Washington, D.C., and agreed to observe maritime zones and certain oil loading policies. Over the ensuing decades, oil shippers developed self-insurance systems to spread the risk in tanker operations and costs of spill response. They also created a worldwide network of cooperative organizations to stockpile equipment and personnel for oil spill response.

The U.S. Navy gained extensive experience with oil spill cleanup during and after World War II. In 1940 oil tankers had reached a size of just 12,500 deadweight tons, a fraction of the *Exxon Valdez*'s 214,000 deadweight tons and the 500,000-ton supertankers now plying the seas. By 1947 the U.S. had become a net importer of oil. In 1950 there were 2,138 oil tankers using the world's oceans.

In 1952 a group of ornithologists and tourists set up an Independent Advisory Committee on Oil Pollution of the Sea in Great Britain after finding many birds dead from oil-loading activities. This independent advisory council prompted United Nations' action with the support of the U.S. Congress to hold an Intergovernmental Conference on Oil Pollution in 1954. The conference did not result in ratification of any agreement, but it did bring together the world's oil producers for the first time and

"There were a lot of important streams, important entries and stuff which were boomed off. Unfortunately, the equipment was not adequate and the oil got, in some cases, under it anyway. Obviously, this was a miserable failure. The people were unprepared. The equipment wasn't any good ... It could have been a whole lot different. Sure, it would've still been a mess, but a lot of these areas we wouldn't be trying to take the oil out of four feet of gravel."

Lance Trasky, Southcentral Regional Supervisor Alaska Department of Fish and Game Alaska Oil Spill Commission hearing, 11/14/89

Top 65 oil spills

No.	Date	Spill	Location	Volume thousand bbl.
1	Jun 79-Mar 80	Ixtoc I, well blowout	Mexico	3,300-10,200*
2	Feb-Dec 83	Nowruz Oil Field, well blowout(s)	Persian Gulf	1,900-4,400
3	Aug 6, 83	CASTILO DE BELLVER/brake, fire	South Africa	1,200-1,900*
4	Mar 16, 78	AMOCO CADIZ, grounding	France	1,600-1,800
5	Jul 19, 79	AEGEAN CAPTAIN/ATLANTIC EMPRESS	Off Tobago	1,182*
6	Aug 80-Jan 81	D-103 Libya, well blowout	Libya	1,000
7	Aug 2, 79	ATLANTICV EMPRESS, fire	Barbados	988*
8	Mar 18, 87	TORREY CANYON, grounding	England	850-920*
9	Feb. 23, 80	IRENES SERENADE, fire	Greece	292-871*
10	Dec 19, 72	SEA STAR, collision, fire	Gulf of Oman	840*
11	Aug 20, 81	Kuwait Nat. Petrol. Tank	Gulf of Oman	743
12	May 12, 76	URQUIOLA, grounding	Spain	642-730*
13	Mar 20, 70	OTHELLO, collision	Sweden	438-730
14	Feb 25, 77	HAWAIIAN PATRIOT, fire	N. Pacific	723*
15	Nov 15, 79	INDEPENDENCE	Turkey	688
16	May 25, 78	No. 128, well/pipe	Iran	667
17	Jan 29, 75	JAKOB MAERSK	PORTUGAL	595*
18	Jul 6, 85	BP storage tank	Nigeria	569
19	Aug-Oct 85	THE NOVA, Kgarg Island	Iran	510
20	Dec 11, 78	BP, Shell fuel depot	Zimbabwe	478
21	Feb 27, 71	WAFRA	South Africa	467*
22	Aug 9, 74	METULA, Strait of Magellan	Chile	380
23	Jan 7, 83	ASSIMI, fire	Off Oman	376*
24	Mau 5, 70	POLYCOMMANDER	Spain	73-365
25	Jun 12, 78	Tohoku storage tanks, earthquate	Japan	357
26	Dec 31, 78	ANDROS PATRIA	Spain	348
27	Dec 10, 83	PERACLES GC	Qatar	333
28	Nov 6, 85	ranger, TX, well blowout	Texas	150-326
29	Jun 13, 68	WORLD GLORY, hull failure	South Africa	322
30	Jun 1, 70	ENNERDALE, struck granite	Seychelles	299
31	Dec 18, 74	Mizushima Refinery, oil tank rupture	Japan	270
32	Jun 14, 73	NAPIER	SE Pacific	263*
33	Dec 29, 80	JUAN A> LAVELLEJA	Algeria	262
34	Mar 24, 89	EXXON VALDEZ, grounding	Alaska	258
35	Oct 19, 76	Turkish Petroleum Corp.	Turkey	255
36	Nov 1, 79	BURMAH AGATE, collision, fire	Texas	31-255*
37	Mar 27, 71	TEXACO OKLAHOMA, 120 mi offshore	North Carolina	220-256
38	Jun 11, 72	TRADER	Mediterranean	248
39	Feb 4, 76	ST. PETER	SE Pacific	248
40	Jan 18, 77	IRENE'S CHALLENGE	Pacific	248
41	Jan 28, 72	GOLDEN DRAKE	NW Atlantic	226
42	Dec 28, 70	CHRYSSI	NW Atlantic	226
43	Nov 25, 69	PACOCEAN, broke in two	NW Pacific	219
44	May 27, 77	Caribbean	E Pacific	219
45	Dec 30, 76	GRAND ZENITH, disappearance	NW Atlantic	212
46	Jul 28, 76	CRETAN STAR	Indian Ocean	212
47	Nov 5, 69	KEO, hull failure	Mass.	210
48	Nov 4, 69	Storage tank	New Jersey	200
49	Apr 22, 77	Ekofisk Bravo, well blowout	North Sea	110-195
50	Apr 1, 72	GIUSEPPI GULIETTI	NE Atlantic	190
51	Dec 16, 77	VENPET, VENOIL, collision	South Africa	175-190
52	Dec 15, 76	ARGO MERCHANT, grounding	Mass.	183
53	Oct 15, 67	Humble oil pipeline, offshore leak	Louisiana	160
54	Dec 21, 73	JAWACTA	Baltic Sea	146
55	Sep 8, 67	R.C. STONER	Wake Island	143
56	Nov 70	MARLENA	Sicily	102
57	Apr 20, 70	Pipeline, NW shore Tarut Bay	Saudi Arabia	100
58	Dec 2, 71	Oil well, 80 mi SW Laban	Persian Gulf	100
59	Mar 7, 80	TANIO, broke amidship	France	99
60	Jan 2, 88	Ashland storage tank, rupture	Penn.	90
61	Jan-Oct, 69	Santa Barbara Channel, well blowout	California	33-80
62	Feb 4, 70	ARROW, grounding	Nova Scotia	36-73
63	Nov 13, 70	Storage tank, Schuylkill R.	Penn.	71
64	Jul 30, 64	ALVENUS, grounding	Louisiana	67
65	Mar 10, 70	Offshore platform, well blowout	Louisiana	65

Conversion Factors — 7.3 bbl/ton; 42 gal/bbl
Tanker spills from the Iran/Iraq war were not generally available.
*Fire burned part of spill

Source: ECO, Inc., Dec. 1989

gave international exposure to the problems of oil spills and pollution. The Intergovernmental Maritime Consultative Administration (IMCO), which later played a key role in 1970s debates over double-bottom tanker design, was formed as a special U.N. agency in 1959.

In 1964 tanker operators instituted a voluntary clean seas code, known as TOVALOP, in which a large portion of the cost of cleaning up an oil spill was to be met by a vessel-owner insurance pool. A compensation scheme for individual victims of oil pollution events, known as CRISTAL, also was voluntarily arranged between oil cargo owners.

Tankers were getting larger and carrying more oil across the seas. In 1965 the average size of an oil tanker was 27,000 deadweight tons. By 1968, the year of the historic oil discovery at Prudhoe Bay, 60 tankers of 150,000 deadweight tons or more were sailing the world's oceans. And they were having accidents: 1,416 tanker casualties in a world fleet of 6,103 tankers in 1969.

By the late 1960s the increasing number and severity of oil spills sparked public concern. The *Torrey Canyon* spill of 1967 dumped nearly 37 million gallons of crude oil into the waters off the southwest coast of Great Britain from a ship of 118,000 deadweight tons. Cleanup cost about $16 million in 1967 dollars. The spill caused high mortalities of animal and plant life and again brought widespread international attention to oil spills and effects on global waters and related habitats. The Santa Barbara, Calif., spill of 1969 had a similarly galvanizing effect on American concern after 1.39 million gallons of oil from an offshore well were spewed into Santa Barbara Channel.

Following the 1967 *Torrey Canyon* spill President Lyndon B. Johnson encouraged national interest in the oceans by declaring the "International Decade of the Ocean" starting in 1968. He also called for an oil spill panel to develop a contingency plan for the containment, cleanup and liability of oil spills. A Marine Science Affairs Committee Report to the President in 1968 discussed oil pollution control and the desirability of positive traffic control, stricter enforcement of restrictions against routine dumping, and cooperative measures to contain or control accidental spills. The first report of the President's Panel for Oil Spills, published in 1969 under the Office of Science and Technology, made a statement that remains true 20 years later: "The nation still does not have an adequate oil spill technology and has not yet provided the means for bringing an adequate technology into being ... in the design, manning, operation, regulation, inspection and legal liabilities of tankers for the transfer of oil ... on our waterways."

"In terms of our own [agency] people here in Homer, I'd come down and see some poor guy with his eyes propped open with toothpicks trying to answer my general questions while he's trying to put out fires.

Mike O'Meara, Homer area homesteader
Alaska Oil Spill Commission hearing, 7/15/89

A Marine Science Affairs Committee report in 1970 listed oil as a major source of pollution in the marine environment, estimating that 1 million tons (300 million gallons) of oil per year were spilled or leaked into the marine environment. The report stated that 60 percent of all oil produced in the world was being shipped by marine transport, noting the "high level of harmful effects of spills, mortality of marine life and accumulation of hydrocarbons, and damage to property" caused by such spills. Another report estimated that in one year 5.1 million gallons of oil were accidentally discharged from tanker ships in U.S. ports. Also in 1970, the U.S. Congress created both the Environmental Protection Agency and the National Oceanic and Atmospheric Administration to monitor and protect environmental resources.

In 1973, the year Congress approved construction of the trans-Alaska pipeline and the Valdez tanker trade, it was estimated that 11,250 oil spills occurred annually in the United States. In 1974 the National Academy of Sciences estimated that tankers, oil terminals and other oil transportation-related sources were the cause of 2.1 million metric tons (635 million gallons) of petroleum discharge into the marine environment per year. The same report cites human error as contributing to 88 percent of all oil spill accidents.

Oversight hearings on the trans-Alaska pipeline system were conducted in the mid-1970s, and supertankers began working the Valdez trade in 1977. (An account of contingency planning for Prince William Sound is found elsewhere in this report.)

"We are obligated to provide systems which enhance marine transportation safety, and we do it economically."

Jerry Aspland, President, ARCO Marine, Inc.
Alaska Oil Spill Commission hearing, 9/1/89

Efforts to impose double-bottom construction on tankers in the Valdez trade were made both through the negotiations leading up to the granting of state and federal right-of-way permits and in national forums considering tanker trade generally. The State of Alaska began such efforts in the early 1970s after the realization that Valdez tankers would face enormous challenges and stress in the demanding waters of the Gulf of Alaska. It was also recognized widely that Prince William Sound's extraordinary marine environment deserved special protection. ARCO originally built two

double-bottom tankers for the Alaska trade, responding to public expectations at the time. But when legally enforceable covenants did not follow, the practice was dropped.

With Coast Guard backing, the United States went to conferences of the International Maritime Organization (IMO, formerly called IMCO) in 1973 and 1978, pressing for worldwide double-bottom construction standards for oil tankers. Subjected to heavy industry opposition and lobbying, the initiative lost overwhelmingly each time. Since 1978 the Coast Guard has backed away from its earlier stance favoring double bottoms, and the status quo in the world's tanker fleets—including the Prince William Sound fleet—has remained in favor of single bottoms. Because of the Coast Guard's change of heart, double-bottom and double-hull requirements remained dormant from 1978 until the *Exxon Valdez* disaster revived them on Capitol Hill.

"If it really is Exxon's position that an effective response cannot be safely maintained during the winter months, then what does that say about the transport of oil in Prince William Sound or in other parts of the Alaska environment during those same months?"

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

The grounding of the *Amoco Cadiz* off the coast of France in 1978 spilled some 70 million gallons of oil, about 6.5 times the amount of the *Exxon Valdez* spill. More than a decade later, there are still reports of asphalt-based substances on French beaches, and marshes and waterways are only now returning to their previous biological richness.

Americans had experienced relatively few catastrophic oil spills before the *Exxon Valdez* disaster. The largest and most devastating to the environment had been caused by blowouts and other accidents at offshore facilities. The last major tanker spill near the United States was the *Alvenus* spill off the Gulf Coast in 1984; it was about one-third the size of the *Exxon Valdez*, and almost all the spilled oil was carried out to sea by prevailing winds and currents. Until the *Exxon Valdez* spill, a kind of complacency, coupled with an unspoken faith in technology and Yankee ingenuity, had prevailed. The February 1990 tanker accident off the coast of Huntington Beach, California, spilled nearly 400,000 gallons of North Slope crude oil, reminding the public and its representatives how vulnerable coastal areas are to such incidents.

The United States splits responsibility for oil spill prevention and response between the Coast Guard in the U.S. Department of Transportation and the Environmental Protection Agency. The National Contingency Plan is chaired by EPA with the Coast Guard as vice chair. The Coast Guard is responsible for managing the federal interest in maritime spills, and EPA has authority on land. The states are responsible for developing contingency plans and for insuring that private facilities have adequate contingency plans, which allows the EPA to have a minimal role in the NCP it chairs. The EPA has only a minor presence in Alaska, so its functions are performed by other agencies through delegation or contract.

Primary cleanup responsibility lies with the spiller. The federal government takes over if the spiller's response is inadequate. States are not prohibited from participation and are not required to take over from the spiller. Private oil spill cooperatives

and response organizations are relied upon to train and maintain the necessary levels of response. Federal funds are presently inadequate for major spills.

Oil spill response equipment is widely distributed in the United States, but the quantity is inadequate for responding to major spills. U.S. spill response capacity rests with the Navy, Coast Guard, the Army Corps of Engineers and industry cooperatives.

"In a large emergency like this individuals who may be shuffled off in some appropriate, ineffectual position in this bureaucracy are called to the fore and given positions of responsibility which they do not rate."

Kelly Weaverling, Coordinator, Prince William Sound Wildlife Rescue Alaska Oil Spill Commission hearing, Cordova, 6/28/89

The Navy controls the largest equipment arsenal for fighting large offshore spills. Equipment is concentrated at Williamsburg, Va., and Stockton, Calif., with a smaller stockpile in Honolulu. Though intended primarily to fight Navy spills, these stockpiles are considered national resources and can be used in an emergency. Navy equipment from both large depots was used in the *Exxon Valdez* cleanup effort. Coast Guard equipment and expertise also were prominent, especially in the early response efforts of the Pacific Area Strike Team based near San Francisco. Coast Guard equipment includes skimming barriers, pumps, storage bladders and lightering gear, but the Coast Guard generally relies on private contractors and spill cooperatives for extra mechanical cleanup equipment. The Coast Guard directed lightering efforts to remove the oil remaining aboard the *Exxon Valdez*—one of the major achievements of the disaster response.

Other resources for fighting the spill came from private sources—either Alyeska and its member firms, the Cook Inlet Response Organization or other private cooperatives. The largest such cooperative in the world is Oil Spill Response Ltd. (OSRL) based in Southampton, England. Because Exxon is a full member, it could call on half the cooperative's available equipment to fight the *Exxon Valdez* spill, and indeed OSRL equipment was among the first to arrive in Prince William Sound.

Ninety-three such cooperatives have been formed in the United States, but most are designed for fighting small spills in protected harbors, sheltered waters and inland areas. According to the American Petroleum Institute's June 1989 Task Force Report on Oil Spills, "No U.S. cooperative has been designed to deal with a catastrophic spill." The API report also set forth an industry proposal for five regional oil spill response centers, each of which would have the capacity to respond to a spill of more than 9 million gallons. The estimated cost of each center is $15 million each for equipment and facilities, but there is serious doubt whether this is enough to provide credible response capacity for a spill the size of the *Exxon Valdez*.

"The vessel traffic system needs to go through a very thorough external audit. And that's done not by the U.S. Coast Guard, not by DEC, probably not by anybody in this room, but by people who have nothing to gain or lose by what they say."

Rick Steiner, University of Alaska Marine Advisory Program Alaska Oil Spill Commission hearing, Cordova, 6/28/89

As the United States develops new response structures, two lessons to learn from the *Exxon Valdez* spill are that the role of the states must be better defined and enhanced and that the role of the spiller must be written. Alyeska has invested in major stocks of new response equipment since the *Exxon Valdez* disaster, including various types of containment boom, skimmers, lightering equipment, storage barges and response vessels. Additionally, Alyeska recently "signed a contract with a citizens committee

to monitor the Valdez oil terminal and advise the company on operations. Alyeska will pay the group $2 million a year" (*Anchorage Daily News*, Feb. 9, 1990). The company's current approach is twofold—beef up response capabilities and provide local oversight of prevention and response. The commission has recommended that this private effort be integrated into a state program of citizen oversight also including government agency operations. Citizens and their governments must remain vigilant, especially if private concerns continue to be allowed to dominate oil spill prevention and response in the United States.

Oil spill response systems in Europe

Alaska state government has many changes under consideration, including those recommended by the commission. Specifics are yet to be determined, but it may be instructive to examine what some other countries have done to protect their shores.

Eight countries surveyed parties to the Bonn Agreement (Belgium, the Netherlands, the Federal Republic of Germany, the United Kingdom, France, Denmark, Sweden and Norway). Their governments have a combined oil recovery capability of 250,000 barrels (10,500,000 gallons) per hour, while private industry also has that again, or more, and all of the equipment is a maximum of 12 to 24 hours away from a spill in the North Sea and Baltic area covered by the agreement. By contrast PIRO (the Petroleum Industry Response Organization) in the United States has significantly less recovery capability, and it is days away from Alaska.

"Corporations have a bottom line of money ... Some people say oil companies are complacent, they don't really expect an oil spill. They expect oil spills. They just know it's a cost of doing business. ... This one is going to be slightly costly for them."

Rick Steiner, University of Alaska Marine Advisory Program
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

Seven entrust marine oil spill response to a single ministry or department. Most have response plans—national and regional. The largest of these countries does not exceed the area of a single major geographic division of the United States. France has two response plans divided between major regions, in comparison with the United States division between maritime (Coast Guard) and inland (EPA) responsibilities. In France and most other European countries fire departments handle small incidents and specialized units deal with larger spills. Only in the United States, Italy and the Netherlands is it common to rely upon the services of private companies.

Federal Republic of Germany

Oil spill response is shared by the West German government and the four coastal states. This joint jurisdiction covers the open sea, coastal waters, major rivers and canals. The coastal states handle coastlines and ports. The governing body is the Marine Pollution Committee, made up of federal representatives from the ministries of Transport, Interior and Research and Technology. The committee is charged with developing new technology and methods to control pollution, coordinating the purchase of new equipment and proposing response measures.

Operational duties lie under the control of the Federal Board of Waterways and Navigation and the coastal states. The affected state manages minor incidents directly, while a response direction group, composed of one federal representative and one each of the four coastal states, handles major spills.

Belgium

Belgium's Ministry for the Interior has responsibility for major spills; municipalities handle minor incidents. The Ministry for the Environment and Public Health is responsible for drafting necessary legislation and regulations. The Ministry of Defense and the Naval Operations Command are assigned special responsibilities to supply personnel and equipment for response at sea. Municipal and port authorities are responsible for initial response and may call upon mobile response teams based at Antwerp and Liedekerke, as needed.

Denmark

Oil spill response policy in Denmark generally is the responsibility of the National Agency for the Protection of the Environment (NAEP) under the Ministry of the Environment. Port authorities handle small spills in ports and the provincial governments along the coasts. The NAEP takes over when a large or moderate spill occurs. The response capability objective of the NAEP is 3 million gallons (10,000 tons), a figure which may be reduced if deemed unobtainable.

A traffic system has been established to channel traffic between the Baltic and the North seas. Ships must maintain contact with the Aarhus control center. Response centers are maintained at Koersoer and Copenhagen by the NAEP. In addition, the Navy maintains 10 depots of booms, dispersants and recovery equipment along the coasts. Six depots are also operated by the civil defense corps to supply equipment for use in shallow water and on the beaches.

Denmark is a member of the North Sea Operators' Clean Sea Committee and has the resources of this group available for accidents from offshore oil rigs. There is no research center, and no research grants have been made in recent years.

France

France began contingency planning for oil spills after the grounding of the *Torrey Canyon* on the Cornish coast in 1967. The grounding of the *Amoco Cadiz* in 1978 on the coast of Brittany insured that these plans were upgraded substantially.

The responsibility for oil spill response is divided between the Maritime Prefects for response at sea and the Departmental Prefects for control ashore. The Maritime Prefects are military authorities in control of the three maritime regions. These

"Take Yellowstone, where they have 28,000 people fighting that fire. You take the one agency that deals with crisis as a routine part of their daily mission and that's the firefighters, they have an incident command function that divides up from the commander on down. You have operations, logistics, planning and finance. And they do that because everything they do crosses agency and jurisdictional boundaries and so you plug the people into the box, you don't plug the boxes into the different agencies."

Mark Hutton, Bristol Bay fisherman
Alaska Oil Spill Commission hearing, 6/28/89

prefects coordinate with the local governments, the maritime industry and other users of the oceans to develop a response plan known as POLMAR MER.

The Departmental Prefects develop a response plan known as POLMAR TERRE for use on land, including boom protection for coasts, identification of environmentally sensitive areas requiring priority and waste storage sites. Together the two form the POLMAR Plan, which is the equivalent of the U.S. National Contingency Plan. The equipment for offshore use is stored in three ports. Equipment for use on land is stored at eight sites.

"I have never been a 'greenie.' But I've become one hell of an environmentalist out of this. It's really made me give a lot of thought to what legacy we are going to leave behind and what steps we take now as to whether or not we have a progressive civilization 100 years from now."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

For minor spills at sea, a prefect uses its own resources. If these are insufficient, the POLMAR MER Plan is put into effect, giving authority to use resources from other administrations and the private sector. The primary source of spill response at sea is the French navy. The Departmental Prefects of the 26 coastal departments rely upon the mayors for response to minor spills, usually with local fire departments. Large spills bring POLMAR TERRE into action, which authorizes use of private resources. If both plans are in operation at once, central coordination is provided by the minister for the Interior.

Norway

Spill response policy and coordination are the responsibility of the State Pollution Control Authority (SFT) in the Ministry for the Environment. Operational responses are divided between the SFT, the local governments and the oil industry and include offshore areas. Local government and oil companies are required to have response plans approved by the SFT. The SFT provides aerial surveillance services, modeling of slick movements and assistance in determining protection priority for environmentally sensitive sites.

The 3-mile limit in Norway is based on the outer islands of the coastal fringe, thus considerable marine area is within it. The SFT operates a National Pollution Control Center at Horten, which manages national stocks of response equipment, provides training, evaluates equipment and advises on equipment purchases.

For major spills, the SFT presides over the Government Response Committee (AKU), which brings together the ministries and authorities of interest with the scientific community and the oil industry. AKU takes operational command when either industry or local contingency plans are not adequate for the response. AKU is based either at Stavanger for southern spills or Bodo for those in the north.

Coastal communities are grouped in 52 response zones. Each zone sets up a response group whose jurisdiction is within the the 3-mile limit. The group is headed either by a fire chief or harbor master and is composed of local government personnel, the fire brigades, the police and industry personnel. The response group prepares local plans

and is responsible for meeting half of the equipment costs, with the state paying the other half.

Oil companies are required to equip themselves to deal with any spill arising from their operations. Through their industry organizations and membership on the AKU and other response groups, the oil companies form an integral part of the response effort but are under government control at all times.

The SFT has 12 depots along the coast and 15 ships equipped for oil response. They also have 30 large fishing vessels (seiners) under contract. The local response groups have about 20 km of boom and many small skimmers. The Norwegian Oil Operators Association for Pollution Control at Sea (NOFO) can recruit 16 supply ships, 24 large skimmers and large amounts of boom and storage within the 24-hour response limits of the national response plan.

Research and development center around the Norwegian Institute of Technology at Trondheim. R & D is jointly funded by the government and the oil industry.

The Netherlands

Oil spill response in the Netherlands concentrates on the tanker traffic entering Europort at Rotterdam. The coastal areas are much less at risk. The responsibility along navigable waterways, at sea and along the coasts, is with the RIJKSWATERSTAAT (RWS, or State Waterways Authority), a part of the Ministry of Transport and Public Works. RWS is divided into four directorates; one for the North Sea coastline and three sharing responsibility for the Waddenzee. The main navigable waterways and coastline are under control of the RWS. The oil industry has direct responsibility for the Rotterdam refineries.

The response target of the RWS is 15,000 cubic meters (approximately 3.4 million gallons) in three days. The RWS operates a computerized model forecasting oil spill movements. It also provides daily air surveillance with side-scanning radar. Response organization is focused at a national and international contact center at Ijmuiden, operated by the Coast Guard in conjunction with other entities. Sea response is determined jointly by the North Sea Directorate and the shipping and maritime affairs authorities. Operations are carried out by the North Sea Directorate with its own vessels or by private tug and salvage companies. A major spill triggers action by a policy group to advise on measures to be taken and an operational group to carry them out.

The RWS has assumed local beach cleanup since 1985 as local governments could not handle even small spills. The RWS automatically enters a spill that is more than 2,200 gallons. Both government and private vessels respond to major spills at sea. In the ports, equipment of the port authority or the private companies is used. Onshore cleanup is based on private equipment resources.

"Unfortunately, when you are dealing with Exxon being in charge, number one, you're dealing with people who have never been here. They don't understand the fishing industry, they don't understand the state's needs, and from our experience on the outer coast, we know they don't know what our resources are. They don't understand fishing boats. They don't understand Alaskans."

Sonja Karaza, Prince William Sound seiner
Alaska Oil Spill Commission hearing, 7/15/89

Research and development is conducted by the RWS, private companies and specialized institutes.

United Kingdom

After the *Torrey Canyon* incident in 1967 the United Kingdom placed responsibilities for oil spill response in the Ministry for the Environment. After *Amoco Cadiz*, it was moved to a separate unit, the Marine Pollution Control Unit (MPCU), now in the Department of Transport. The MPCU now has responsibility for pollution control at sea and onshore as described below. At sea, MCPU has sole authority except for the Royal Navy, which takes care of its own ships and dockyards. The Department of Energy has responsibility for offshore oil installations.

Responsibility for minor spills onshore is divided between the local governments for beaches, port authorities in the ports, and water authorities for inland waters. The MPCU provides advice and may choose to replace them when a spill crosses jurisdictional boundaries to threaten other sectors or when local resources are insufficient.

The target for MPCU for sea spills is to have response capability for 880,000 gallons and to insure response by spraying dispersants from aircraft within 30 minutes. The target on land is to maintain sufficient equipment to aid local authorities in treating "several thousand tons" of oil.

These targets are the essence of the national response plan which also covers transfer of cargo, use of dispersants, containment and recovery of oil. Local plans are required to inventory available equipment, including private resources. MPCU aids in identifying sites with priority for protection and methods for protection. The United Kingdom has a project for modeling slicks along the entire coastline. Air surveillance by side-scanning radar is also under development.

Reports of oil spills are made to HM Coast Guard stations, which immediately inform MPCU. At sea MPCU takes over and with local concurrence will follow the oil onto the beaches if appropriate. For land spills, MPCU notifies the local authorities and sets up a joint response center if local resources are insufficient. The MPCU has a fleet of seven aircraft for spraying dispersants and 25 chartered tugs with permanently mounted spraying equipment. A limited number of skimmers are maintained for sea response. MPCU maintains three depots for booms, skimmers, sprayers and other equipment. Oil companies support the government effort with personnel and dispersants. Aircraft from the sea response are used to spray beaches if appropriate.

Sweden

Sweden has traditionally dominated oil spill response in the Baltic. Policy responsibility rests with the National Environmental Pollution Council (NPE). Offshore

independent civil authority. Local authorities have responsibility for onshore response. Industry has responsibility for its facilities. Response targets are for spills between 2,100 gallons and 210,000 gallons.

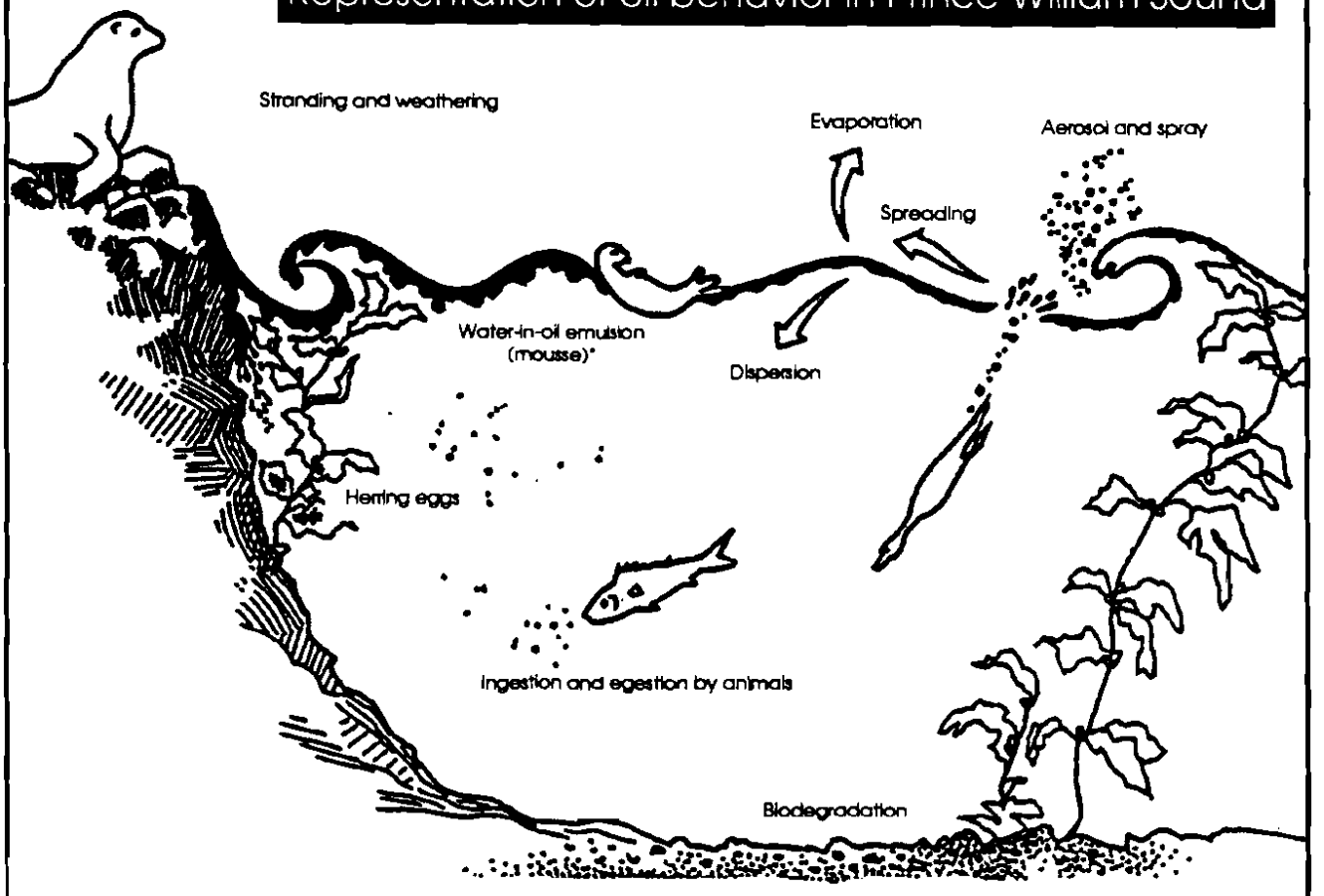
Sea response is based on nine SCG centers along the coast. There are four regions with response plans. Onshore, fire brigades are the first line of defense with other municipal equipment as necessary. Five depots for response equipment and training courses are provided by the SCG and fire brigadse.

A five-year R & D program (TOBOS) began in 1985 under direction of the National Technological Development Council.

"If you can find a way to legally do it, put control of future spills in the hands of Alaskan. ...I honestly feel we are not going to get the sensitivity from federal regulators. The 21-day wonders that waltz in and out of here on three-week rotation from Boston harbor or Florida, wherever it might be, they are not going to learn about how to deal with oil in Alaska in the three weeks they're here."

Lee Glen, Habitat Division, Alaska Department of Fish and Game
Alaska Oil Spill Commission hearing, 7/15/89

Representation of oil behavior in Prince William Sound



*Mousse is the name given to the thick emulsion of water and oil (50-60% water) caused by the wind and waves.

Source: National Response Team

The spread of oil through Prince William Sound and along Alaska's southcentral coast after the *Exxon Valdez* grounding was a predictable disaster. The damage it caused could have been forecast by a cursory review of history and an examination of conditions and currents in the region. The difficulty in containing and collecting it also should have been appreciated by any careful observer of the world's oil spill cleanup experience. This section of the report contains a description of what becomes of oil once it hits the water and a description and evaluation of cleanup technology.

Properties of North Slope crude oil in the water

Crude oil is a complex mixture of organic (hydrocarbon) compounds and inorganic (noncarbon-based) compounds. The hydrocarbons in crude oil fall into two groups or fractions: aliphatic and aromatic. Aromatic hydrocarbons are the more toxic of the two. Because of their lower molecular weight they evaporate into the air or dissolve into the water and are not readily broken down in the environment. Inorganic compounds contain trace elements and heavy metals: nickel, vanadium, sulfur and nitrogen.

The individual compounds in crude oil determine the oil's bulk properties, how it weathers and how it affects marine organisms. Alaska North Slope and Cook Inlet crude oils are similar in composition and have a higher abundance of toxic aromatic hydrocarbons and inorganic sulfur compounds relative to other crude oils.

No matter what the source of oil, crude or refined, when it enters the marine environment it immediately starts to weather—that is, it changes form. The primary mass transfer processes are evaporation, dissolution and dispersion. Spilled oil left in the environment does not disappear, it is partitioned into the water column, air, sediments and organisms.

Oil spilled on the water begins to disperse rapidly in response to gravity and surface tension. Initially, gravity dominates and collapses the spill into a thin pool, countered by the inertial forces. The mass transfer processes accelerate as the oil spreads over the water surface because this creates a greater surface area. Temperature, sea state, wind velocity and local currents also influence these processes when oil movement is retarded by the drag of the oil slick over a viscous surface-water layer, the differential surface tension between the water-air and water-oil interfaces drives the spill.

Evaporation and dissolution describe molecular transfer, in contrast to dispersion, which describes the transfer of discrete oil droplets into the water column or water

"The few Coast Guard people that I have met in the field are green. I mean, they reminded me of summer hires. They were kids right out of school, and I can't help feeling that the powers that be are up there telling them to get those guys out of here and get this signed off so we can get this paper work, this paper chase done and get on with our business of running government."

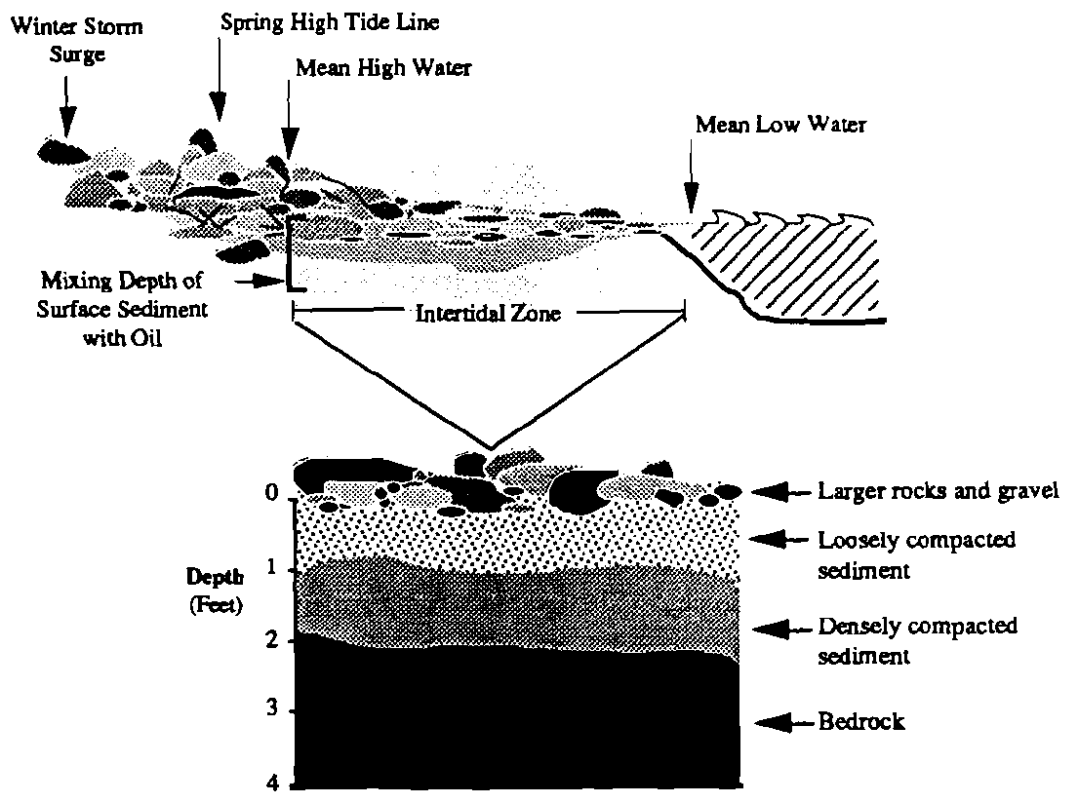
Rich King, Upper Cook Inlet fisherman
Alaska Oil Spill Commission hearing, 9/7/89

droplets into the oil due to wind/wave action and other forms. At the same time that evaporation is occurring, the oil disperses into droplets.

The mass-transfer processes are most important during the initial states of a spill—the first 48 hours. During the first 48 hours, the lighter-end aromatic hydrocarbons evaporate, leaving behind higher-molecular-weight aromatics and the aliphatics. The heavier-weight aromatic hydrocarbons eventually sink to the sediments on the bottom or are washed up on shore. The aliphatics are readily broken down by bacteria or other organisms through metabolism.

If light wind and waves prevail after an oil spill (10 knot winds, light chop), as was the case after the *Exxon Valdez* grounding, the oil spreads, evaporates and breaks up faster. The rate of dispersion—droplet formation—can exceed the rate of evaporation, so some of the oil drops will contain low-molecular-weight aromatics. As these droplets sink or are dispersed, organisms in the water column and sediment can be exposed to the toxic aromatics, especially benzene, ethylbenzene, toulene and xylene. (The actual molecular transfer of hydrocarbons into the organisms would involve dissolution.)

Typical beach profile in Prince William Sound



Source: State of Alaska

Testing of North Slope crude indicates that only 15 to 20 percent of spilled oil will evaporate from the slick. That is probably consistent with what happened in the *Exxon Valdez* oil spill. The remaining oil is persistent and can travel great distances.

If the surface is agitated and wavy after an oil spill, water mixes with the oil to form a frothy water-in-oil emulsion, or " mousse." In the case of the *Exxon Valdez* oil spill, the wind did not start blowing hard until more than 60 hours after the spill, but when it did, the oil changed into sheen and mousse and in a single night traveled 20 miles. Once a water-in-oil emulsion is formed, additional dissolution of hydrocarbons to the water column and sorption into suspended sediments is greatly reduced. In other words, as the mousse forms, other avenues of environmental transfer are blocked, and the oil is extremely difficult to clean up. What is not recovered manually floats away until it either breaks up into smaller bits and washes ashore as tarballs or the entire emulsion washes ashore and coats the beach wreaking havoc with the intertidal ecosystem.

"The die is cast, that Prince William Sound is going to recover pretty much at its own rate. And that no matter what we do, the rate isn't going to change a whole lot."

Professor David G. Shaw, University of Alaska
Alaska Oil Spill Commission hearing, 9/21/89

An oil slick floats in much the same way as an iceberg. As the slick increases in thickness, it extends deeper into the water. Only about 10 percent rises above the waterline; 90 percent stays below. Marine zooplankton occupy a similar layer of water as the oil slick. These tiny animals drift in the currents in the upper surface waters, indeed, blooms of zooplankton are often mistaken from the air for oil slicks.

Zooplankton include representatives of virtually every group of marine life, either in developmental stages (the young of many species of crab or fish, including salmon fry), throughout their whole life (tiny crustaceans—the copepods and ostracods), or as adults. Copepods form the base of the pyramid of marine life because they transform the microscopic plant life in the sea into food which can be used by larger animals. More fish and other aquatic creatures feed on copepods than on any other one kind of animal known.

When oil or petroleum hydrocarbons enter a marine ecosystem, the zooplankton, particularly copepods, eat oil droplets that are similar in size to their algae food source. Some of the hydrocarbons are stored in the body's lipid or fat reserves; others pass through the body with other undigested materials as fecal pellets. Because of the large numbers of copepods in the world's oceans, scientists have estimated that production of oily fecal pellets is one of the major pathways by which oil reaches bottom sediments and organisms.

Oil stored in the body fat of copepods or other zooplankton can be readily transferred to fish that feed on the zooplankton. When seabirds or marine mammals, such as sea lions or fur seals, prey on fish containing stored hydrocarbons, they too may become contaminated. Organisms that have picked up hydrocarbons, if they don't die from the acute exposure, will metabolize the hydrocarbons (which may damage the liver), store them in fat or other tissues for later metabolism, transfer them to developing

eggs, or eliminate them whereby the hydrocarbons are again in the system and the process repeats.

Meanwhile, contaminated fecal pellets that sink to the bottom are attacked by bacteria. The bacteria repackage the broken-down fecal pellets with decaying plant matter, small sediment grains, and the bacteria themselves into a new food source called detritus. Detritus is the major food source for bottom-dwelling creatures.

Detritus is siphoned off the bottom by clams and other bivalves. When sea otters or other animals prey on clams contaminated with hydrocarbons, these animals may become contaminated. Small animals that live within the bottom sediments (benthic species) feed heavily on detritus and are known to pick up and store hydrocarbons in their bodies. These small animals are a major food source for bottom fish which, in turn, pick up the hydrocarbons from their food source. Crabs may become contaminated by feeding on fish that have stored hydrocarbons in their bodies.

Other marine organisms which live in the water column (pelagic species) take up hydrocarbons through the water they breathe or consume and through their diet. Seabirds and marine mammals take up the hydrocarbons through diet and through preening.

"The cleanup effort consisted principally of managers, most of whom knew little about the area or environment they're entrusted to restore, fairly rigidly supervising laborers. These same managers, private and public, have discouraged volunteers with local knowledge from helping in the cleanup effort. This kind of centralization works for mobilizing heavy equipment and disposing of hazardous waste, ... but I think it's discouraged the flexibility and creativity needed to pick up oil with the primitive technology that we have in remote areas."

Professor Matt Berman, University of Alaska
Alaska Oil Spill Commission hearing, 9/21/89

There has been an ongoing debate about whether the North Slope crude released in the *Exxon Valdez* oil spill sank in the waters of Prince William Sound. Community members and oil spill workers frequently said they observed oil that had sunk in the water. Federal and oil company scientists contended, however, that the oil was lighter than water (.98:1) and would not sink unless it rolled off a sandy shoreline (of which there is not much in Prince William Sound) and was released mixed with sand.

Oil spill cleanup technology

The consequences of the *Exxon Valdez* oil spill have brought into question the usefulness of existing oil spill containment and pollution–abatement technologies, not only for a catastrophic spill the size of that from the *Exxon Valdez* (10.8 million gallons) but also for any major oil spill in an offshore, remote or sensitive area.

In general, none of the currently available technologies are adequate for these incidents. In the United States, almost all existing technology has been developed for use in harbors and other protected waters, not in offshore, remote or environmentally sensitive waters. The performance of equipment deployed at the scene of the *Exxon Valdez* spill gave no reason for confidence in the success of pollution abatement at sea.

Mechanical containment and recovery is the primary U.S. oil spill response, as it was in the *Exxon Valdez* oil spill. Mechanical recovery, however, is not effective overall:

Historically, no more than 10 to 20 percent of the oil has been recovered from large spills. The *Exxon Valdez* spill recovery rate was less than 10 percent, which is not untypical. (Where the *Exxon Valdez* experience was unusual was in the salvage of the cargo remaining on board the vessel and the salvage of the vessel itself.)

"I might also add that the Coast Guard's new assignment with relation to drug interdiction has complicated this as well. The Coast Guard has been forced to transfer resources that otherwise would be dedicated to this function."

Rep. Richard J. Durbin, Illinois
House Committee on Interior and Insular Affairs hearing, May 1989

Current mechanical containment and recovery technology is not effective in waves greater than about 6 feet, winds greater than 20 knots, or currents greater than 1 knot. Conditions often exceed these limits, leaving little margin for the effective use of existing mechanical equipment.

A recent draft report from the Office of Technology Assessment suggests that only modest and gradual improvements can be expected from response technology research and development. The most obvious improvements, it states, would not require any technological breakthroughs—just good engineering design and testing, good maintenance and training, and timely access to the most appropriate systems.

With improvements in these areas and in response capability and organization, it is feasible to do better than has been done, but experts consider it unlikely that technical improvements will result in recovery of more than half the oil from a typical major spill.

Very little data exist on the performance of oil spill response equipment and agents on the open ocean. In an incidental way, Prince William Sound and the Gulf of Alaska became field laboratories for use testing of a variety of skimming and containment equipment and other kinds of spill mitigation. However, there is no coordinated program for testing equipment and products and assembling data on such activities.

Shortly after the *Exxon Valdez* spill the U.S. Coast Guard Research and Development Center in Groton, Conn., agreed to serve as a clearinghouse for proposals submitted to the state or federal government on new cleanup technologies. By late August about 550 proposals had been received. Exxon received an estimated three times that many.

Of the first 225 proposals evaluated by the Coast Guard by mid-June 1989, half concerned existing technology, products or resources. These were forwarded to Exxon. About 35 percent were discarded because they were not related to spill cleanup, were considered to have no R & D potential or lacked qualities needed for further review. The other 15 percent, however, were thought either to have immediate potential for testing and possible implementation in the Valdez spill or potential as longer-term R & D efforts. The focus of the Coast Guard effort, however, was on shoreline cleanup and beach-washing technologies. Field tests in Alaska in early June evaluated chemical dispersant tests proposed by Exxon.

At an Aug. 22 interagency round-table discussion led by Alaska State Sen. Mike Szymanski, DEC Commissioner Dennis Kelso noted frustration with the relatively

few techniques and products Exxon had been willing to look at in field trials. After proposals went through an elaborate committee system of the interagency response organization, Exxon decided what to use on the beaches.

"The marine industry needs to revamp all personnel training and development programs to meet today's modern fleet demands."

Jerry Aspland, President, ARCO Marine, Inc. Alaska Oil Spill Commission hearing, 9/1/89

The U.S. Navy has indicated to the commission that it has an interest in any new technologies and in having them demonstrated to Navy personnel. It also indicated that it could properly evaluate some of these new "ideas" and that its "open-door policy" would allow for complete sharing of information. However, this correspondence occurred after the spring-summer 1989 response effort was concluded and did not indicate whether the Navy would have been prepared to send evaluators to Alaska.

A basic failing of the *Exxon Valdez* spill response was that there was no place for new ideas in oil spill containment and collection. Such equipment and techniques should be tested well in advance of a spill, and the commission has recommended that improved testing and preapproval procedures be established. Laboratory tests can never totally simulate real world conditions.

Data should be collected on field performance during any major oil spill response, but this effort should not be part of the operational organization: The operational organization has too many higher priorities. Ideally, a national or international scientific organization, which could apply the same set of standards to evaluating field experiences in any oil spill, should direct such a program.

This group must begin work immediately after a spill; otherwise the chance to evaluate equipment and technologies during the first 48 hours of the spill—the most critical period for pollution abatement—will be lost. The products and equipment reviewed should have potential for immediate short-term use with high payoff. Long-range R & D projects would not have a place.

An R & D program should not be keyed to a particular spill. The organization that goes into action after notification of a spill should have permanent staff and facilities and a program that continues year-round, regardless of field emergencies. That way the best new ideas can be tested whenever a spill happens.

Either combined with or related to any cooperative R & D organization should be an information clearinghouse. Aside from regular biennial oil spill conferences and various irregularly scheduled meetings, no formal forum exists for the exchange of information between the U.S. and other countries. It is said U.S. researchers in general are often accused of not being familiar with continuing European research. Greater coordination and collaboration could eliminate unnecessary duplication of research efforts and lead to faster dissemination of research results, faster progress on problems of mutual concern and better use of limited R & D funds.

Mechanical spill-response equipment

Mechanical spill-response technologies can be divided into two major categories—containment booms and such oil-recovery devices as skimmers, pumps and dredges (Appendix K). In general, containment with booms becomes virtually impossible with current velocities perpendicular to the boom in excess of 1 knot. In wave heights in the range of 6 to 9 feet, the efficiency even of booms specially designed for severe conditions decreases as oil escapes the boom. In wave heights above 9 feet, oil is whipped into the water and recovery is not possible. Current velocities of more than 1 knot also shut down most recovery efforts. Additionally, seas in excess of 6 feet will render most recovery equipment, along with the small boats used to deploy it, inoperable or ineffective.

Boom

Experience in the *Exxon Valdez* effort was particularly instructive with respect to the use of containment boom. Only a small amount of boom had been tested compared to the number of booms available. Indeed, most of the boom products tested were no longer on the market, at least not in the configuration tested.

Reports from supervisors at the *Exxon Valdez* spill indicate that some very large boom was used, but also that boom of nearly every vertical dimension down to 18 inches was used successfully. This provided new information on the kinds of boom that users feel is necessary in offshore operations. These reports indicate that for successful spill containment offshore, boom does not have to be as deep as was previously assumed.

Spill supervisors agreed that boom between 30 and 48 vertical inches (including freeboard and draft) was adequate and that boom in the 18- to 24-inch range could be used even offshore. Experience with boom with vertical dimension of 60 inches and 80 inches was less successful. The large boats required to tow it often had to operate at speeds faster than that at which the booms should have been deployed.

The results of one previous set of tests, involving the release and capture of crude oil in severe weather conditions off the coast of Newfoundland, were corroborated through experience in the *Exxon Valdez* spill. In the Newfoundland situation the best boom was able to retain oil for periods of about 45 minutes. If a skimmer were employed inside the boom, this would have been the window during which oil could have been recovered. The *Exxon Valdez* experience, where skimmers were successfully used inside of booms over and over again, indicates that offshore boom can contain oil for recovery provided skimmers are available at the spill site and ready to go, and existing wave conditions permit the skimmers to operate.

Booms may have reached their practical limits in terms of maximum wind and wave conditions in which they can be expected to contain oil. Future developments are not

"As regards the cleanup effort and the equipment, I think it would stop the average reader just to read that the equipment that was used in most cases was inadequate. In most cases it didn't work. In a lot of cases the equipment was not in place."

Vince O'Reilly, City of Kenai
Alaska Oil Spill Commission hearing, 9/7/89

likely to be in the direction of greater ability to operate in harsh sea conditions but in ease of operation within the limits now attained. Booms that can be deployed from reels and do not require bolting sections together are generally easier to handle offshore. Additional improvement can most likely come from increased ease of deployment, perhaps in the development of lighter-weight and more durable materials and in the devices that export the booms.

Homemade technology in the form of log booms was tried by several communities to deflect or contain the *Exxon Valdez* oil spill. Though such booms have been in use on the West Coast for this entire century, Exxon labeled them experimental in Prince William Sound and the Gulf of Alaska and, reportedly, did not accept early offers of logs with which to construct booms. The state reportedly also rejected their use. Finally, in the absence of protection by either Exxon or the state, communities, as a result of local activism, constructed and used log booms to defend their coastlines. For the communities, this was a necessary expedient and sometimes useful effort, but future preparedness should provide these communities with proper containment boom. Log booms are better than no defense, but should be considered a last resort.

Skimmers

The *World Catalog of Oil Spill Response Products* (1987) defines some 14 different kinds of skimmers: weir, suction, boom, vortex, disk/drum, brush, rope-mop, paddle-belt, sorbent-belt, sorbent lifting-belt, brush lifting-belt, submersion-belt, sorbent submersion-belt and submersion-plane. This does not include vacuum devices and dredges that may serve the same purpose.

"It's embarrassing to know that the level of our technology of this great country is what it is when I see out there that the most effective thing is an oil absorbent pad."

Dennis Holan, Cordova fisherman
Alaska Oil Spill Commission hearing, 6/28/89

The ability of such mechanical response equipment is affected by environmental conditions (e.g., current velocity, wind velocity, wave height, ice/debris presence, visibility) that work as much on the oil as on the equipment. Also, the volume of oil spilled, its innate physical characteristics (whether crude or refined, light or heavy) and acquired physical characteristics (e.g., viscosity, emulsification and debris attraction) which are a product of the age of the spill and weathering, further encumbers the equipment. Not only that, but the physical setting, which may include anything from remoteness to water depth to configuration of coastline, affects the type, ability and use of equipment.

Consequently, over the course of spill response, a great variety of oil recovery equipment must be available. What works one day might not work the next.

Sorbent lifting-belt skimmers were the mainstay in the *Exxon Valdez* spill. Because the spilled oil became so viscous and emulsified, the sorbent part of the belt was not generally used. The sorbent surface was removed and only the conveyor-belt type material was used to transport the viscous oil up the ramp. The biggest problem with these skimmers was not how well they recovered oil but pumping of recovered oil out of the sumps.

A great many weir skimmers were also used in the *Exxon Valdez* oil spill. The simple weir skimmer which uses gravity to drain oil off the water surface worked well early in the spill when the oil was still fresh. As the oil weathered and became more viscous, emulsified and mixed with debris, the simple weir skimmers quickly clogged and were no longer useful. The weir-vortex skimmers were effective for a much longer period of time, especially some of the large models. The weir-hopper skimmers were effective for a still longer period of time but were finally stopped by very viscous oil mixed with pop weed and kelp.

"We need to establish a prize for invention of technologies that work. Organized research to produce information that would help achieve the goal of minimizing social costs isn't really being undertaken, at least there is very little compared to the enormous quantity of research that's being generated to try to assess damages."

Professor Matt Berman, University of Alaska Alaska Oil Spill Commission hearing, 9/21/89

Disk skimmers, which are manufactured in Europe and Canada but not the United States, was used effectively early in the *Exxon Valdez* spill before the oil had become viscous, emulsified and mixed with debris. Disk/weir skimmers were used for a longer period of time because, as the oil became viscous, the large weir could be used alone. Some observers believe that disk skimmers could have been used for an even longer period of time if the skimmer operators had been more familiar with their use.

Typical paddle-belt skimmers were used briefly in Valdez but did not work well. The experience indicates that for such highly viscous oil, the skimmer should have had a ramp with large holes. So modified, the skimmer has the potential for use in highly viscous oil and merits additional development and attention. A special paddle-belt skimmer that moved down through the oil and scooped it up into a sump was used on the *Exxon Valdez* oil spill and worked quite well.

In the U.S., the Coast Guard ODI skimmer is the only model of boom skimmer used. This skimmer was put into service six days after the *Exxon Valdez* oil spill occurred and worked well for a week. After that the oil became too viscous to go through the weirs but the system continued to be used as a sweeping net.

The petrophilic properties of rope-mop skimmers limit the amount of water recovered; the oil content may be as high as 90 percent of the liquid recovered, making it the most efficient instrument. Large rope-mop skimming systems designed for use in recovering viscous oils are manufactured but apparently were not available for use in the general response effort in the *Exxon Valdez* spill. Rope-mop skimmers were introduced in the *Exxon Valdez* spill only to recover oil draining off the shoreline. These devices need further field trials and, perhaps, further refinements.

Brush lifting-belt skimmers were not used on the *Exxon Valdez* spill. These skimmers, manufactured only in Europe, have not undergone any extensive testing to demonstrate their effectiveness. Vortex skimmers, likewise manufactured only in Europe, also were not used in the *Exxon Valdez* oil recovery effort.

Several types of skimmers that might have been effective in recovery operations in the *Exxon Valdez* spill existed only as prototypes. These included the sorbent flat-belt skimmer, the submersion-plane skimmer and brush skimmers. Information on the

submersion-plane skimmer is that it is a very good skimmer, but it was never produced because of the lack of demand for large harbor and offshore skimmers. What it could have contributed to the *Exxon Valdez* spill will never be known.

Suction devices

The *Exxon Valdez* oil spill demonstrated the effectiveness of suction skimming devices in recovering the highly viscous water-logged and debris-clogged oil. Vacuum trucks moved around by means of barges recovered oil with 8-inch diameter hoses. Two Army Corps of Engineers hopper dredges were used with excellent results. The dredges, with suction heads turned upwards, came at the oil from underneath. They were able to collect in minutes what could not have been moved by other means in days. Additionally, their pumping systems included suction hose up to 24 inches in diameter, making them ideal for recovering very viscous, weathered oil.

The experience with the dredges was helpful when it came to modifying the large Russian skimming vessel. That vessel—reportedly 425 feet in length—was essentially a trailing hopper dredge with oil recovery and storage capabilities.

Hopper dredges are especially suitable for dual use. It takes only a few minutes for a hopper dredge to discharge its cargo and to be available for spill cleanup duties. In the Netherlands, where the technology has gone even further, dredges are fitted with sweeping arms for oil containment and recovery. Though this requires preparation time, the process is under four hours which still makes it possible to label the dredge a quick-response device.

Unlike other skimmers, even vacuum pumps and dredges can be fully employed even when they are not involved in a major oil spill. Moreover, dredges that keep ports and waterways clear normally operate in areas where the risk of oil spills is high—the approach channels to ports. Another advantage of vacuum pumps and dredges is that they can hold sizeable amounts of recovered oil, therefore extending the time between offloadings. These devices deserve further investigation to improve their application in oil–spill response activities.

"Everyone is frustrated and wants a magic solution, and everyone wishes we had it right now. But the fact is, most of the cleanup is just hard work—manual labor, and very time consuming."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Water and Power Resources, July 1989

Mechanical-recovery enhancers

A number of products have been marketed or at least touted to assist in the recovery of spilled oil. Though their characteristics vary, the benefits are sufficiently similar to justify grouping them together under the heading of enhancers.

Gelling agents change liquid oil into gelatinous masses. Consistency of the masses may vary. Gelling agents require mixing with the oil and adequate time to set, but specifics vary by product.

Information on one such product is that a gel of modest strength can be formed in about eight hours; a gel with substantial strength takes 130 hours (5.5 days). Field tests have shown that large amounts of the gelling agent may be required, up to 40 percent of the volume of the spill itself. The potential of this gel, therefore, seems more likely directed toward tanker accidents where pollution might be avoided or diminished by gelling the oil remaining in the tanks.

One gelling-type agent which can be used in open water is a chemical powder which essentially rubberizes the oil, making it more visco-elastic. This change makes the oil adhere to oil spill recovery surfaces, thus greatly increasing the effectiveness of oil skimmers, particularly rotating disk and drum types.

Unlike some other products, this gelling agent has been extensively laboratory tested. However, while its efficacy was shown on blends of Canadian Alberta crude, the same testing showed that it decreased the efficiency of pickup for both Prudhoe Bay and Endicott crude oils from Alaska. Therefore, not surprisingly, it was not used on the *Exxon Valdez* spill. The possibility exists that redesigned skimmers might restore and even enhance the effectiveness of this product.

"We need to have a program to advance the technology. Let's get some good boom here. Let's get some better dispersants that actually do work. Let's test them beforehand so that people actually know how to use them."

Lance Trasky, Southcentral Regional Supervisor Alaska Department of Fish and Game Alaska Oil Spill Commission hearing, 11/14/89

Another very promising series of gelling-type agents, also called coagulants, were called to the attention of the commission by the Office of the Assistant Deputy Under Secretary of the Navy for Safety and Survivability. The commission was particularly intrigued by a demonstration of these products, which use microencapsulating polymers to coagulate spilled oil and permit easy mechanical cleanup. A characteristic of these products, which are available in powder or liquid forms, is that they attract and lock, or bond the oil, so that it is not absorbed, either by water or by land or other solid surfaces. When poured onto a solid-surface spill, the action was said to be immediate. Cleanup by the Navy was a matter of sweeping up and bagging the material for disposal in accordance with hazardous materials disposal procedures. These coagulants are widely used to deal with fuel spills on U.S. Navy vessels, and large-scale testing for oil-spill applications would appear to be desirable.

One of the gelling products is advertised for use on mammals and birds. The product, massaged into fur or feathers, wicks the oil and, after a few minutes, can be rinsed away. Compare this to the laborious process developed at *Exxon Valdez* spill rehabilitation centers—washing the animals over and over in liquid detergent.

Other chemicals have been developed to break or prevent emulsions. These products have the ability to reverse the emulsion from water in oil to two separate phases. The advantage in doing this is that the oil can then be recovered more efficiently or dispersed or burned more successfully. Most of these products are more soluble in water than in oil, however, and will quickly leave the system if there is sufficient water. One recent product developed by Environment Canada is a mixture of long-

chain polymers and does not have this drawback. This material is said to prevent the formation of water-in-oil emulsions at treatment ratios as low as 1:2,000.

The high-pressure water-jet barrier is a promising addition to containment technology. Designed to herd oil under a variety of operating conditions, the device can be mounted on and used with oil skimming devices. When corralled by the barrier, burning or some type of collection and recovery becomes much easier.

"The Atigun Pass spill, which fouled 30 miles of inland stream and riparian environment, was detected by an Alyeska employee because he smelled hydrocarbons in the air. If the detection system promised by Alyeska that could detect a hole the size of a bullet in the pipeline is an employee's nose, we have a problem."

Professor Harry Bader, University of Alaska Alaska Oil Spill Commission hearing, Anchorage, 11/14/89

Air-bubble barrier systems require large amounts of compressed air. Obviously, the logistical problem this presents makes them unsuitable for use in most remote areas.

Oil treatment systems

The mechanical recovery mechanisms discussed above generally are unable to cope with large oil spills in the open ocean. Other processes exist that do not involve the physical removal of oil from the water. These include the dispersal of oil by chemical means, the burning of the oil on site and bioremediation. As a group, they are called treating agents.

Effectiveness remains the major problem with most treating agents. Effectiveness is generally a function of molecular size and type. Crude and refined oil products have a wide range of molecular size and composition, and the composition of crude oils varies widely. This leaves little scope for a universally applicable and effective spill-control chemical.

Chemical dispersants

In general, a dispersant sprayed onto an oil slick is intended to reduce the cohesiveness of the slick so that the oil is broken into small droplets by wave action and water current. The resulting oil droplets are then dispersed into the water column and diluted to low concentrations.

According to professional observers at the Arctic Marine and Oil Pollution Conference, Calgary, June 7-9, 1989, dispersants in general are not very effective, and in particular Corexit 9527—the Exxon product used on the *Exxon Valdez* oil spill— is not very useful on Prudhoe Bay crude oil. Exxon seemed to be the only party watching the applications to the *Exxon Valdez* spill that was enthusiastic about the product. Indeed, much of the literature on dispersant effectiveness is suspect as most in wide use are manufactured by major oil companies.

"When you look at the tools that we had to work with, both in the water response are in the shoreline effort, the tools are not very well developed."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 6/3/89

Merv F. Fingas of Environment Canada, who was a presenter at the Calgary conference, stated that the evidence on dispersants is that they "maybe" do some good and "will not cause harm." However, test results compiled by his agency show dispersants' effectiveness averages only 30 percent and, even under highly controlled experimental situations, were not highly effective. In 15 real-time situations,

including the *Torrey Canyon,* Santa Barbara, *Amoco Cadiz,* and *Ixtoc I* spills, four levels of effectiveness were indicated: little effectiveness/adverse ecological (1), no effect (5), little to no effect (1), and little effect (8). In practice, according to Fingas, this translates to a general range of 10 to 30 percent.

Other literature on dispersants indicates that while currently available dispersants are less toxic than the oil they disperse, dispersed oil may impact a greater fraction of the water column than undispersed oil. Dispersant use may involve a tradeoff between the probable environmental effects of a treated oil slick with the possible shoreline impacts of an untreated one. It should also be noted that the decision to use dispersants must be made prior to a spill or very early in the spill as oil becomes less dispersable as its viscosity increases.

The use or nonuse of dispersants can be a matter of logistics. None of the application equipment—fixed-wing aircraft with permanently installed spray boom and interior storage, C-130 aircraft with attachable Airborne Dispersant Delivery Systems (ADDSPACs), helicopters with spray buckets, or vessels with spray systems—was available in Valdez at the time of the *Exxon Valdez* spill. And, though there were C–130s in Anchorage, there weren't any ADDSPACs. Additionally, with respect to airborne delivery, the pilot must be specially qualified because of the low altitude, barely above the water, at which the aircraft must be flown.

"Equipment and research and development: It was shocking to us that some of the equipment that was available in other parts of the world was not available in the United States. ... There was no repository of information about where the equipment was, what its characteristics were, how long it took to move it from where it was then to where it would be useful, what kind of shipping characteristics it had, whether you can even get it there. That needs to be fixed."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

In-situ burning

To burn effectively, a slick must be at least 3 millimeters thick, must have adequate volatility, must be continuous and cannot be emulsified. This means that the burn must be conducted in very special conditions, generally in the first day of the spill when the product is still fresh and not much evaporation has occurred.

Even under optimum conditions, there are many negative side effects from burning oil. These include the tarry residue left over, the effect of the toxic smoke on nearby populations, and the contamination which can be produced from fallout. The resultant visible air pollution must, however, be balanced against the invisible air pollution caused by allowing evaporation of toxic volatile components of the oil.

Recently, more time and money have gone into developing and testing fireproof booms than any other R & D development activity for spill response. Other developments with respect to *in-situ* burning generally deal with ignition systems, including floating pyrotechnical devices that can be deployed by air amd helitorch igniter, a tank system containing gelled gasoline suspended on cables below a helicopter. Under design is a laser ignition system using two coupled lasers from a helicopter to heat and ignite oil spills.

Bioremediation

Bioremediation is the use of microbes, either naturally occurring or introduced, to break down spilled hydrocarbon molecules in place. Though potentially the least damaging and least costly treatment option, treatment takes a long time, and significant scientific and practical application issues have yet to be addressed. The effect on local habitat of increased microbe creation, both indigenous and nonindigenous, must be studied in depth to insure the cure is not worse than the disease. This is a new but burgeoning area that should be carefully monitored for its potential.

Tests of this technique on water have shown little or no enhancement over naturally occurring biodegradation. Use of bioremediation on impacted shorelines, however, has apparently been successful in some cases. On beaches where it could take five to seven years for oil to break down under natural conditions, it has been said that bioremediation with fertilizer could reduce that to two to five years. Diatomaceous earth was also tried as bioremediation for Prince William Sound.

One product approved for testing in Alaska by the Coast Guard R & D center involved something its manufacturer described as a "bactozyme." The product was described as a natural enzyme (it was not a bacteria) that digests, engulfs and converts oil to carbon dioxide and water. The ingredients of the product were approved by the EPA. Exxon was so advised but rejected testing of the product on the *Exxon Valdez* spill.

"People are coming to the office, phones are ringing off the wall, fisherman are ready to go. By noon Friday we had 75 boats on our list—15 of those in Tatitlek 15 minutes away from the tanker. I called Alyeska again. They told me they had assigned a person to that task and he would call me back. To this day, no one has every called me back. ... Later I was told they were real concerned about using amateurs. People not on their payroll. I tried to explain to them, these are not amateurs. These are people who have been working in the sound most of their lives, and they know the sound better than anybody they're going to bring in to help them."

Marilyn Leand, Executive Director, Cordova District Fishermen United
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

Sinking agents

The French used about 3,000 tons of powdered chalk to sink an estimated 20,000 tons (5,000,000 gallons) of oil following the 1967 *Torrey Canyon* spill. Very little sunken oil came ashore. However, Canadian tests of several sinking agents have shown that none was effective in holding oil after the initial sinking and that it slowly leeched back to the surface. The sinking mass can suffocate bottom life and otherwise expose bottom-dwelling organisms to oil. Sinking agents are generally forbidden by environmental regulatory agencies and none was commercially available.

Computerized mapping

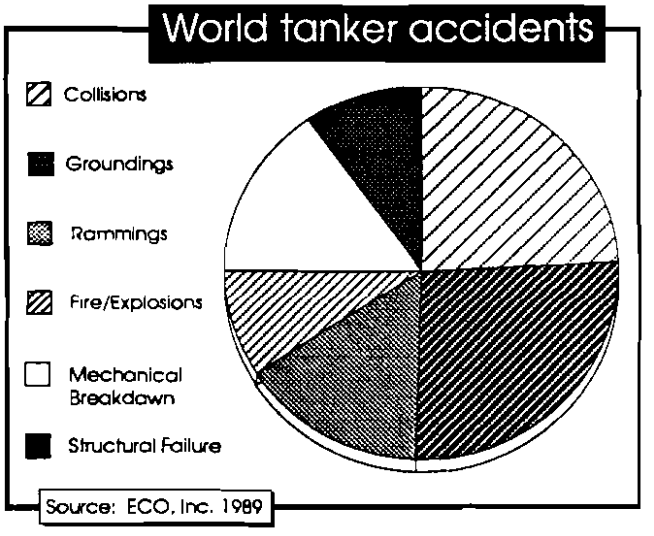
The spill area generally lacked reliable, up-to-date maps. The U.S. Geological Survey map was completed in 1951-52, was the Good Friday earthquake of 1964 altered the landscape. Technical advances in computerized mapping were realized by Exxon, which created its own Geologic Information System during spill response. Exxon mapped Prince William Sound through overflights, then digitized the area to create base maps. This resulted in the ability to call up overlay applications for approximately 40 different uses including environmentally sensitive areas, oil movement, location of response equipment or manpower, etc. For most of the time during the 1989 spring-summer response, aerial observation data were entered manually but now can be taken from video tapes.

Pollution from oil tankers constitutes a major risk to the world's oceans and coastlines, though not the only one. Worldwide, an estimated 1.1 billion gallons of oil—100 times the amount lost from the *Exxon Valdez*—are emptied into the oceans from all sources each year. The majority comes from a prosaic, if relentless, source—storm sewer runoff. Approximately 150 million gallons a year comes from major oil spills of 10,000 gallons or more. The remainder comes from routine, if not always legal, bilge pumping, operational losses such as leaky pipes, or small oil spills.

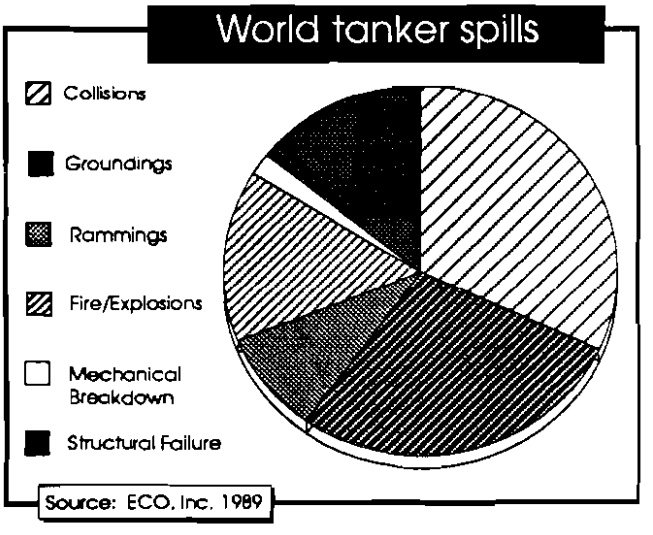
To keep oil out of the water, the primary preventative—the best possible oil transport technology and training—must be provided to keep an accident from happening. When it does happen, and accidents are inevitable, the system must be ready to supply ways to minimize the outflow of oil from the source.

Oil spill risk assessment

Opinions differ on the level of hazard we face. The American Petroleum Institute recently commented: "The industry's track record in dealing with non-catastrophic spills which have occurred has been good. Catastrophic spills have been infrequent." (API Task Force Report on Oil Spills, June 14, 1989). The Alaska Oil Spill Commission found worldwide, however, an average of one catastrophic spill per year for the past 20 years. Spills from tankers, well blowouts and terminals happen everywhere. Wherever large tankers operate, the residents of adjacent coasts assume risk.



On March 24, 1989, it became Alaska's turn, and coastal dwellers from around the Gulf of Alaska suffered the same inexorable fate experienced by too many other regions of the world.



Some believe that accidents are an inevitable part of doing business and that when spills occur, nature will eventually repair the damage. This has been the refrain of shippers and the oil industry for decades. The rising frequency of accidents, however, must be curtailed. What may seem episodic to some appears catastrophic to others. Alaska's Cook Inlet suffered from the *Glacier Bay* spill in 1987, and Prince William Sound, Cook Inlet and Kodiak Island waters absorbed the brunt of the

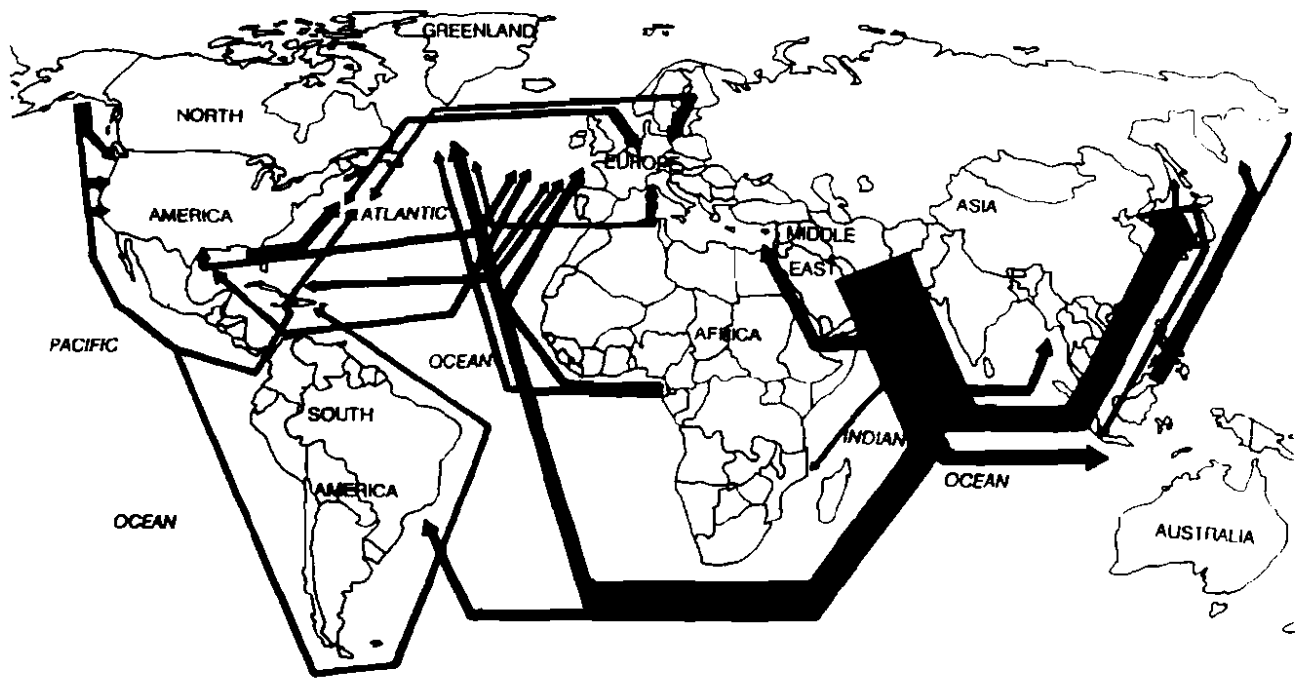
10.8 million-gallon spill from the *Exxon Valdez* in 1989. Two major spills in three years seemed appallingly frequent to many Alaskans.

The length of time the effects of a spill persist can be of critical importance in evaluating risk. In October, 1989, NOAA sent a team to the site of the *Arrow* oil spill (Feb. 4, 1970) off Newfoundland and to the site of the *Amoco Cadiz* spill in France (March 16, 1978). They found that both sites still showed evidence of oiled beach sediments (NOAA, Coastal Ocean News, Fall 1989). Thus, a coastline might be subjected to a second spill before the effects of the last spill had been mitigated. The colder the water, the more likely it is that spill effects will endure. This means that Alaska's coast is particularly vulnerable to repeat spills with long-lasting results.

A risk assessment report produced for the commission by ECO (Appendix J) determined spill recurrence interval for spills the size of the one from the *Exxon Valdez* would be every 13.5 years for Prince William Sound and every 24.5 years for Cook Inlet. Another way of looking at risk is to assume that someone born in Cordova in 1977 who lives until 2060 could expect to endure six catastrophic spills in a lifetime under the system that was operating on March 24, 1989. A person living in Cook Inlet for those years could expect to endure four spills. Both would live with oiled beaches and contaminated seas most of their lives.

Acceptable levels of risk obviously lie in the eyes of the beholder.

World oil tanker routes by volume



Source: Seattle Times/American Petroleum Institute

Many investigators and analysts have pointed out that the marine transportation system is an error-reducing system (Appendix D). As such it contrasts with the safety-reinforcing air transport system. poor safety record of the marine shipping industry overall through the years—15 percent of the world's ships have some kind of accident every year—is matched by the average number of accidents for tankers. Miraculously, only one tanker accident of every eight results in an oil spill—with a higher proportion, the world would be awash in spilled oil.

"I think it's important to begin a process of informing society at large of the uncertainty, the risks and the tradeoffs that are involved in most human activities and especially in these kinds of large scale resource development activities."

Professor David G. Shaw, University of Alaska
Alaska Oil Spill Commission hearing, 9/21/89

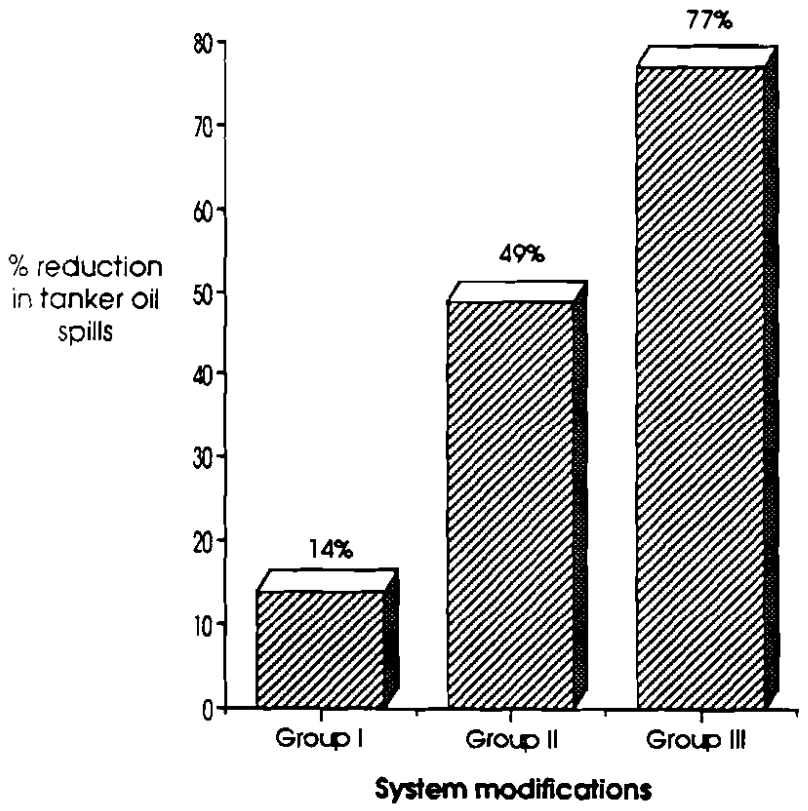
Among the error-inducing components of the marine system are the ships themselves, designed to the cheapest standards; reduced crew levels justified by increased electronic gear and automation; single power plants and propellers that provide no backup in case of failure of either component of the system; constant operations in waters where these deep-draft vessels have little clearance; obsolete navigation systems that have slow response time; and a strict hierarchical system of command that mitigates against team approaches to vessel operations. The oil transportation marine system carries this to the ultimate in having the cheapest possible vessels manned by the smallest possible crews carrying the maximum amount of oil. Though the commission encountered wide variance among companies, the system generally reflects these tendencies.

Today's error-inducing system usually advances human error as the explanation for an accident. That argument effectively closes off any detailed analysis of the system itself by shifting the blame to the most convenient individual available, either the master, the watch officer or both. Blame is not attached to overall company policy that may have led to the accident—such as excessive work hours leading to officer and crew fatigue, route shortcuts to save time and a general misunderstanding in the maritime industry of the overall advantages, disadvantages and effects of automation.

Shippers assume technology will reduce human error, but the opposite can occur where reliance upon new instruments leads to more carelessness and increased risk-taking. The more complicated the equipment, the more difficult it will be to maintain or to repair in case of system failure. Improved instrumentation provides "greater economical efficiency and certainly greater ease, but the risk per ship would seem to remain constant," according to a captain who was a director of Shell Oil Co. An absence of disasters on a particular route over a period of years and the existence of contingency plans and equipment that satisfies the narrowest letter of the regulations create great confidence that nothing can happen. When that confidence is brutally interrupted by a disaster, the easiest route for both management and regulator is to ascribe it to human error.

Many in the oil transportation industry were quick to point to the *Exxon Valdez* spill as an aberration unlikely ever to occur again. This view overlooks two major factors. On a worldwide basis several accidents have occurred similar to the *Exxon Valdez*, among them the *Torrey Canyon* (8th largest spill of all time) and the *Metula* (22nd)—

Reduction in tanker oil spills
due to marine transportation system modifications



Oil spill reduction due to marine transportation system modifications

System modification	Reduction in oil spills (per cent)	Cumulative Reduction (per cent)
Group I		
• Mandatory drug and alcohol testing		
• Emergency and high-risk navigation area training		
• Port restricitons/Port closure system	14	14
• Two person watchstanding requirement		
• Improved loading/unloading procedures		
Group II		
• Vessel monitoring system		
• Traffic separation lanes with one-way traffic		
• Designated anchorage areas	41	49
• Emergency response/pollution control vessels		
• Improved loading/unloading designs		
Group III		
• Improved tanker design	55	77

Source: ECO, Inc. 1989

both of which, like the *Exxon Valdez* (34th), involved leaving designated traffic lanes to save time. Also relevant is the knowledge that the next great spill is likely to have some other cause completely.

Oil spill risk mitigation

ECO's recommendations on oil spill risk mitigation were grouped in three categories—Group I for instant implementation would reduce the risk of oil spills by 14 percent; Group II, which could be implemented within a year, would reduce the risk by 41 percent in itself and 51 percent cumulatively with Group I; Group III, which focused on improved tanker design that would require about 10 years to implement completely, would reduce oil spills by 55 percent by itself and by 77 percent combined with the other two groups.

Incorporating the recommendations of all three groups into the oil transportation system would lengthen the recurrence period for a catastrophic oil spill to 57.4 years for Prince William Sound and 105.6 years for Cook Inlet. Thus, our present-day young person born in 1977 could expect to endure one catastrophic spill during a lifetime instead of six, while Cook Inlet teen could hope to live life without another major spill in Cook Inlet (unless a catastrophic spill in Prince William Sound swept into Cook Inlet, as would be likely, according to models ECO developed (Appendix J).

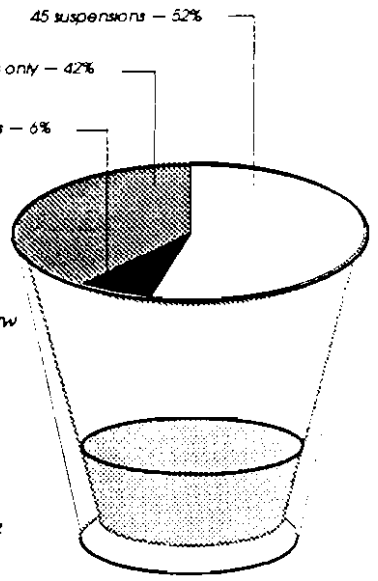
The above scenarios are based upon a continued flow of oil through Prince William Sound and Cook Inlet at about present levels for the next century. The geology of Alaska supports this possibility; the demand for oil for the next century in the United States is a somewhat greater unknown since it is dependent upon national and international responses to global warming and other pollution-induced environmental factors.

Group I

Recommendations contained in Group I are:

- Mandatory drug and alcohol testing
- Emergency and high-risk navigation area training
- Port closure system
- Two-person watchstanding requirement
- Improved loading/unloading procedures
- Local spill prevention involvement
- Spill response equipment coordination

Drunk on duty



Cases in Point

Of 92 merchant-ship crew members involved in alcohol-related cases between 1984 and 1989, 86 were proven intoxicated. Here's the breakdown of the penalties imposed by the Coast Guard.

Source: Seattle Times/U. S. Coast Guard

Many of the Group I recommendations are in place at Valdez and at some other terminals, but their implementation is still somewhat scattered. Most of these improvements to the system can be made within present budgets or with small additions.

In the Valdez trade mandatory drug and alcohol testing now applies to all personnel, including state pilots, involved in tanker operations. Federal regulations are the prime compliance force, but it is critical that state industry regulations are promulgated to support the federal rules. Terminal operators should be responsible for insuring that testing is performed on all vessel crews whenever there is reasonable cause to suspect drug abuse or intoxication. This testing is already in place at the Valdez terminal, but compliance in Cook Inlet and at other terminals in Alaska requires further implementation. Annual costs are estimated at $100,000 for major terminals and $4,000 per ship. Total costs for Alaska would be $300,000 for major terminals, about $500,000 for the smaller terminals in the state and $320,000 for the vessels.

Training for emergency operations and high-risk navigation areas requires much higher use of marine training simulators than is common in the oil shipping industry now. The commission found wide variance in attitudes towards simulator training among owners, masters, mates and pilots and little indication that helmsmen were receiving such training.

"I feel real comfortable with local knowledge and people in-state who can participate in a very big way."

Cheryl Sutton, Kenai Peninsula Fishermen's Association
Alaska Oil Spill Commission hearing, 9/7/89

The main advantage of simulator training is to improve the ability of the bridge watch to recognize situations that may lead to an accident and to instill good operating practice that will reinforce the ability of the bridge watch to act as a team in preventing accidents and in recovering from situations where an accident is imminent or, in the worst case, has already occurred. Costs for a simulator in Valdez would be $400,000 initially, then $210,000 annually for instruction and $500 per student.

The commission heard repeated testimony and information from interviews that the port closure system for wind and ice that had been put in place at the opening of the Valdez terminal in 1977 had gradually decayed over the years. Original limitations on operations in high winds based on simulator operations were ignored, and evidence exists that both masters and pilots were operating in 70- to 80-knot winds. In the early days of operations, ships did not leave port if officers were worried about ice in the tanker lanes, whereas the *Exxon Valdez* knowingly set sail despite reports of ice in the arm.

When such practices are permitted, soon one ship after another is getting away with taking extra risks and cutting its time until it becomes common practice and disaster strikes; then the guidelines are reestablished. Port captains must have firm authority to insure a standard level of compliance among masters on this issue. The costs of this implementation are the operating costs engendered by delaying tanker sailings until safer operating conditions prevail.

The requirement for two officers would insure that when a vessel is in restricted waters, two qualified pilots in those waters would be on the bridge. Probably the greatest testimony to the sloppiness that operating practices had descended to on the *Exxon Valdez* is that her master was gone from the bridge almost entirely from the time she left the dock until the state-licensed pilot was dropped, and then after a minimum time on the bridge with the third mate, who had no license for Prince William Sound, he went below again.

The commission has been assured that two licensed watch officers is standard practice among most shippers. The Coast Guard must insist that this practice become universal, for history has shown that either the standard practice is disregarded at times or the definition of restricted waters is subject to opinion.

Until the early 1970s it was common practice for ships, including tankers, to carry two third mates. The spare third mate was considered a vital factor in assuming in-

port duties and providing a measure of relief at sea to lessen fatigue. We believe the almost universal elimination of this position contributes to excessive levels of fatigue among deck officers. (The chief cost in remedying this situation would be salary and support for the additional mate.)

It should be mandatory that a licensed engine room officer be on station in the engine room when the ship is in restricted waters. The most immediate response should be available when a power failure occurs, such as what happened to the *Prince William Sound* while in its namesake body of water in 1980, and has happened to several ships in the Alaska trade since.

Finally, the maintenance of pilot proficiency is much easier when simulators are a part of the licensing regulations and are used for recurrent proficiency checks. This was done in Prince William Sound until 1984 when the Coast Guard abruptly changed the regulations to eliminate simulator-qualifying as a part of the licensing procedure.

Improvement of loading and unloading procedures would help eliminate what has historically been a major source of oil spills. Usually these are cleaned up quickly, as well-run ports have adequate small-spill response capability. (The commission heard from more than one witness, however, that the Coast Guard in Valdez would come inspect a small spill only if the total discharge was estimated to be more than the amount of fuel it would take them to get to the site.) Over time, ports with inadequate response find small spills cumulatively result in chronic low-level pollution. Licensing of dockside personnel and managers to insure appropriate initial training and periodic updating should be the next step. Annual reviews of terminal practices should be undertaken by the regulating agencies. Cost would be minimal—probably no more than $10,000 per year per terminal.

"I wanted to ask a question of the admiral of the Coast Guard, and that was if the spill cleanup is going to be stopped in September because Exxon says that it is too hazardous, or they can't work on the area, and my question is, what would they have done if the spill had occurred on September 16, or October 1st, or in the fall? Would they have let it go until the following spring until it was safe enough to go out there?"

James Paine, Homer
Alaska Oil Spill Commission hearing, 7/15/89

Local involvement in spill prevention can take the form of oversight advisory committees, such as recently established by Alyeska and also proposed in federal and state legislation, and local response corps or centers already authorized under Alaska law and in the works now. The Alyeska Contingency Plan also provides for community response centers.

The history of past local involvement in Alaska is a depressing account of gradual atrophying of what was once a good system for both prevention and response. A stronger local presence would insure continuing vigilance and should have a place in the system recognized under both federal and state law. As a watchdog of oil transportation, local oversight groups should have access to dockside operations, the ship and other related facilities. They do not replace federal or state inspectors. They are watching the watchers to make sure that the system does not return to a state of somnambulant satisfaction in two or three years. The idea is based on the simple proposition that those who live in a region permanently have the greatest interest in

maintaining standards of large systems that intrude into their lives and is reinforced by the success of such a committee at the Sullom Voe terminal in Scotland.

"Perhaps for the first time in history, the consequences and costs associated with major failures are greater than the value of the lessons we learn from those failures."

Professor Todd LaPorte, University of California Alaska Oil Spill Commission hearing, 8//89

The local response corps has its genesis in Prince William Sound in the quick action taken by firefighters with no formal training in spill response to protect sensitive areas. With training, drills and an adequately stocked equipment depot, the commission believes the local response corps is the most cost-effective way to protect priority areas first and to support initial response efforts.

The use of both local advisory groups and local response corps in areas outside Prince William Sound and Cook Inlet will require integrating the oil spill response effort with other local and state efforts to keep costs within bounds while still maintaining a presence in every area of the state that is at risk from spills. It is envisioned that local response corps will be trained and equipped under both state, federal and private auspices. Vessel and equipment leases negotiated in advance will be a part of local response plans. Integration of the oil spill response system with hazardous material response and fire response would appear to be the most efficient way to proceed at this time.

Initial costs for local program development are estimated at $100,000 per site, with annual training and drill costs estimated at $200,000. To these must be added retainer costs for vessels and equipment. Coastal Zone Management committees have been suggested as appropriate for some regions, but the commission believes each region should set up its own structure to match its needs with local resources. Discussions were held with port directors and local officials on this matter who supported this conclusion. Alyeska has pledged $2 million annually for its advisory council; other means of funding must be found for the rest of the state.

Coordination of spill equipment logistics may appear to be a simple task, but Alyeska failed in this area in response to the *Exxon Valdez* spill because the importance of immediate response was overlooked in contingency plans at every level. Large spill recovery systems are very costly and are cost-effective only in the case of a major spill. They cannot be air transported and thus must be available on a regional basis. The spreading oil slick quickly overwhelmed oil spill response effort in Prince William Sound.

"The community must be imbedded in the bureaucracy because this is the only way oversight is going to happen. It's the only way that continued community involvement is going to happen. And it's the one way to guard against apathy if you don't have another oil spill for 20 years."

Jim Sykes Alaska Oil Spill Commission hearing, 9/21/89

The large spill recovery equipment Alyeska brought into Prince William Sound could not be mobilized effectively for a spill in Cook Inlet. Just getting it to the spill area would probably take at least 24 hours. Bad weather would slow both transportation time and recovery ability. Commitment of the entire force would leave Prince William Sound unprotected. Because of the problems of insurance liability and leaving their own areas unprotected, spill cooperatives seldom commit more than 50 percent of their force to areas outside of their responsibility.

Slow surface response time has led to the use of small skimmers that can be airlifted from place to place. Some nations favor airborne response with dispersants as the best way to handle distant spills. Alaska should carefully evaluate all options if it is to achieve a reasonable statewide oil spill response posture and encourage research into more effective dispersants and gelling agents.

The failure of the American Petroleum Institute to thus far include Alaska in its network of response depots leaves the state relying on Alyeska, the Cook Inlet Response Organization and a few small contractors as its only in-state capability beyond resources provided directly by the state. The nearest Navy depot is at Stockton, California, and the nearest Coast Guard depot is at Hamilton Field, California. Eight hours to get equipment to Southcentral Alaska is about the best that can be expected from existing federal sources.

The eight nations of western Europe that are part of the Bonn Agreement for a united oil spill response can muster equipment to recover 250,000 gallons of oil per hour by government equipment. They also have nearly the same capacity from private industry equipment. None of the ports in western Europe exports as much oil as does Valdez. Only Europort at Rotterdam imports as much oil as Valdez ships out. A regional response plan for Alaska should be able to put resources to work within the first 24 hours that are equivalent to those now in place for spill response in western Europe.

"Your basic hazard is navigation, but the hazards in Cook Inlet and Prince William Sound are the currents, the wave action, seasonal ice, wind, limited visibility, storms, other marine traffic, an unforgiving bottom. It's rock. And you run aground in Prince William Sound and Cook Inlet, the likelihood of rupturing your outer hull is very, very high. And there are numerous detached rocks, shoals, reefs, and other facilities which present hazards to shipping."

Joe Porcelli, Hazard Assessment Specialist Engineering Computer Optechnomics Alaska Oil Spill Commission hearing, 11/14/89

Group II

Group II recommendations focus on those areas that can be accomplished within the next year. They are:

- Vessel Monitoring Systems
- Traffic separation lanes with one-way traffic as necessary
- Designated anchorage areas
- Emergency response/pollution control vessels
- Improved loading/unloading design

The commission gives the highest priority to establishment of vessel monitoring systems as the prevention tool that can be installed most quickly and offer the most immediate results after installation. The system proposed differs markedly from the present systems that are advisory in nature and rely on radar as their chief aid in tracking vessels. The commission proposes the use of systems that would show vessel positions, maps and hazards on an electronic map display not only in the vessel

traffic center but also on the bridge of the participating vessels. Such displays can easily and cheaply be sent to offices outside the vessel traffic center so that owners, terminal managers and concerned government agencies also can observe the traffic. There are several systems now available, some relying upon Loran-C retransmission of the vessel's position for input, some relying upon Global Positioning Satellite.

"Everybody feels at risk. What's going to happen next year? Is my son going to be able to fish? How's life going to be for me in the future? Giving people the opportunity to participate in planning and prevention ... you would have a better response in terms of the cleanup. ... It gives people another opportunity to maintain their mental stability in the situation."

Erling Johansen, Mayor of Cordova
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

The advantage is that both the bridge watch crew and the vessel traffic monitor would have a constant portrayal of their vessel's and other vessels' positions, which are updated every six seconds in most systems. If vessels stray from traffic lanes or designated routes an alarm can sound on both the bridge and in the vessel traffic center. Print instructions can also be conveyed over the system if voice communication is lost with the vessel.

Each ship carrying oil or other hazardous cargo into Prince William Sound or Cook Inlet would be required to have a vessel module aboard. Many container ships already have this equipment, so it would probably be no imposition on commerce to require them on all large ships. (Many point out that smaller vessels not in the system would still be a problem.) This system in no way substitutes for the mariner's traditional duty of naked-eye observation to avoid traffic and other hazards. The situation is similar to that prevailing now between aircraft in the air traffic control systems and those operating under visual flight rules. Ships and boats outside the system could obtain instant traffic information on ships in the system by monitoring vessel traffic frequencies. Fishermen and recreational boaters would find it easier to avoid large ships than is possible under the present system.

Installation costs for the system are estimated at $400,000 for the vessel traffic center and $30,000 for each vessel or remote station. Traffic center costs are estimated at $550,000 annually, with no additional costs for vessel operations.

Designated anchorages should be established to insure separation from vessels in the traffic lanes and to minimize the possibilities of grounding while at anchor. The recent accident of the *American Trader* at Huntington Beach, California, and the *Glacier Bay* accident in Cook Inlet in 1987 both emphasize this problem as one not to be taken lightly. Some additional survey costs may be incurred because of this recommendation, but they should increase existing budgets by no more than $50,000 for each area.

Emergency response vessels (ERVs) and pollution control vessels are already operating in Prince William Sound under Alyeska control, and one has been leased for operation by the Cook Inlet Response Organization. In Prince William Sound the ERV will accompany the tanker along with a tug to provide immediate assistance in the case of power failure. (This is necessary because it is difficult or impossible to anchor in most of Prince William Sound if power is lost.) The commission recommends that in Cook Inlet one ERV be stationed in the northern inlet at Nikiski and

one in the southern inlet at Seldovia or Homer. Vessels in trouble can normally anchor in Cook Inlet and operating the vessels on standby from the above locations will enable them to respond to either a spill or to provide timely towing assistance.

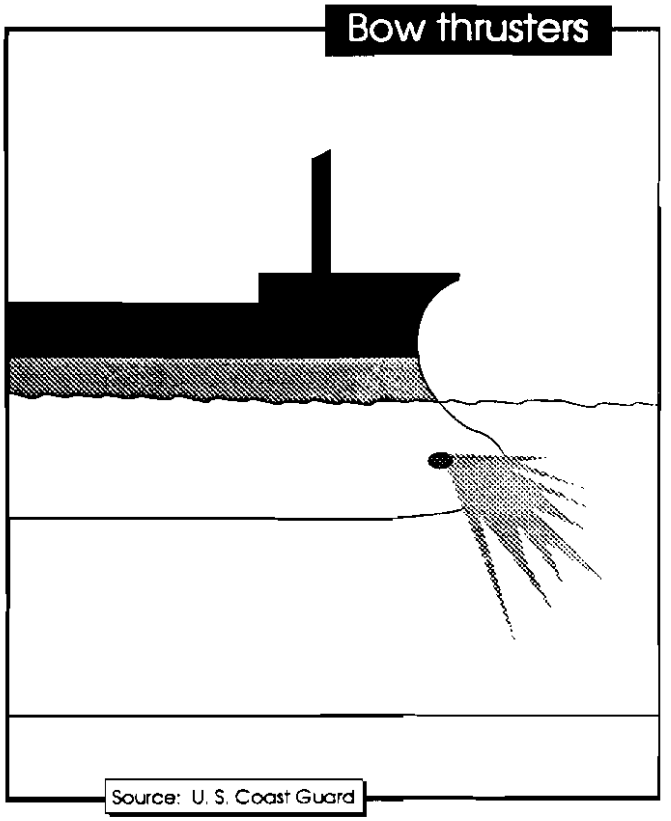
The costs of two vessels with their emergency response equipment is estimated at $7 million with annual operating costs for both vessels at $2.2 million.

All loading facilities in Prince William Sound and Cook Inlet should be updated to accommodate vessels with automated cargo control systems. These systems eliminate one of the major sources of harbor spills, the untended valve that is not closed at the proper moment, and other manual operations that are error-prone.

Group III

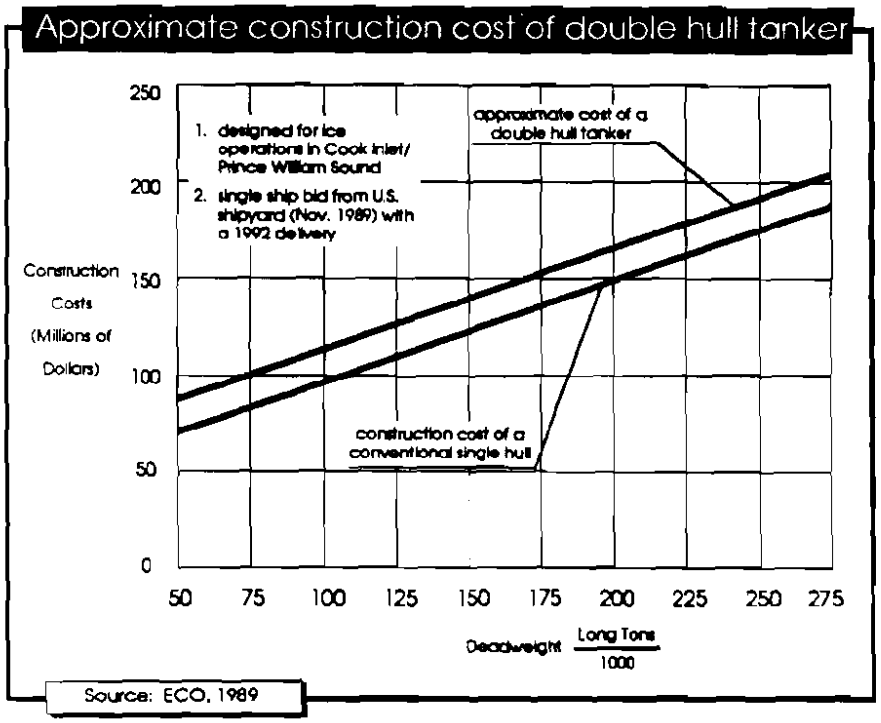
Group III recommendations concentrate on the tank vessel. They include:

- Double hulls
- Centralized bunker tanks
- Automated cargo control systems
- Auxiliary thrusters
- Precise navigation display system
- Improved lifeboats



The double hull has tended to outweigh consideration of other tanker improvements, perhaps because it is an old controversy in shipping circles. Implementation of this recommendation would insure that better ships are built in the 1990s. The tanker fleet serving Valdez is one of the oldest in average age in the world, and all vessels will have to be replaced before the turn of the century. The newest ships in the fleet, the *Exxon Valdez* and the *Exxon Long Beach* were built with 20 percent less steel weight than their predecessors, and concern is already being voiced about their longevity. Most of the other ships in the fleet are approaching or have exceeded their design life.

The commission carefully considered the difference between double hulls and double bottoms. After reviewing worldwide tanker statistics (Appendix J) that indicated 24 percent of the accidents were due to collision and 26 percent to groundings and that 32 percent of tanker spills were due to collisions and 28 percent



to groundings, it was obvious that system safety justified the extra expense of double hulls.

The commission reviewed arguments against double hulls and found them to be substantially without merit. The principal reason advanced against them has always been that they would hinder salvage crews by causing the ship to become unstable enough to capsize in worst case situations. The same compartmentalization that is used on single-hull tankers could also be used on double hulls to insure that massive flooding would not unbalance the ship.

Economic arguments against double hulls (primarily that they would limit cargo to 65 percent of present capacity) also appear to be specious. Commission contractor ECO suggested using ballast capacity presently required by the International Maritime Organization and the Coast Guard to adjust the separation between the inner and outer hulls so that the tanker carries only the required ballast. This solution offers maximum protection without sacrifice of cargo carrying capacity. The commission takes no position on whether this standard should be used or the Type I double hull, which industry finds objectionable. There was not enough data on high-energy collisions to make a firm decision between options, but the commission believes that the ECO version of double hulls should at least be the minimum standard.

"What happens if there are no salmon next year or the year after? The herring runs, it's something that is affected for years in the future and no way to predict until the year occurs."

Connie Taylor, Chair, Cordova Oil Spill Response Office
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

The commission found the arguments for centralized bunker tanks most persuasive and encountered no opposition to the recommendation. Simply put, the central position provides fuel economies, reduces the threat of oil pollution when the tanker carries no cargo of crude and bunker fuel is the only fuel aboard, and simplifies the piping systems aboard the tanker.

The idea of an automated cargo control system likewise encountered no opposition. Such systems increase ship safety, decrease vessel turnaround time, reduce paperwork and decrease the probability of an oil spill during loading and unloading operations.

Some shippers opposed auxiliary thrusters because they regard them as useless in insuring safer tanker operations. Others stated that they do save on tugboat fees. These shippers seemed unwilling to accept that in addition to the greater mobility and

Tankers cleared by state to use Alaska waters

No.	Vessel Name	Rating	Weight	Age	Hull
	AMERADA HESS				
1.	Mt. Cabrite	1	255 tons	18 years	Single
2.	Saint Lucia	1	255 tons	17 years	Single
3.	Seal Island	2	259 tons	16 years	Single
	ARCO MARINE INC.				
1.	Arco Alaska	3	188 tons	10 years	Double
2.	Arco Anchorage	3	120 tons	16 years	Single
3.	Arco California	4	189 tons	9 years	Double
4.	Arco Fairbanks	3	120 tons	15 years	Single
5.	Arco Independence	4	262 tons	12 years	Single
6.	Arco Juneau	3	120 tons	15 years	Single
7.	Arco Prudhoe Bay	2	70 tons	18 years	Single
8.	Arco Sag River	3	70 tons	17 years	Single
9.	Arco Spirit	3	262 tons	12 years	Single
10.	Arco Texas	3	90 tons	16 years	Single
	BAY TANKERS				
1.	Cove Liberty	1	69 tons	35 years	Single
2.	Stuyvesant	1	228 tons	12 years	Single
	CHEVRON SHIPPING				
1.	Chevron Arizona	3	39 tons	12 years	Double B&S
2.	Chevron California	3	70 tons	17 years	Single
3.	Chevron Colorado	3	39 tons	12 years	Double B&S
4.	Chevron Louisiana	3	39 tons	12 years	Double B&S
5.	Chevron Mississippi	3	70 tons	17 years	Single
6.	Chevron Oregon	3	150 tons	19 years	Double
7.	Chevron Washington	4	29 tons	13 years	Double B&S
	COVE SHIPPING				
1.	Cove Liberty	1	69 tons	35 years	Single
2.	Cove Trader	1	50 tons	30 years	Single
	EXXON SHIPPING				
1.	Exxon Baltimore	3	51 tons	29 years	Single
2.	Exxon Baton Rouge	3	76 tons	19 years	Single
3.	Exxon Baytown	4	58 tons	5 years	Double
4.	Exxon Benicia	3	173 tons	10 years	Single
5.	Exxon Boston	3	51 tons	29 years	Single
6.	Exxon Galveston	3	27 tons	19 years	Single
7.	Exxon Houston	2	73 tons	25 years	Single
8.	Exxon Jamestown	3	41 tons	32 years	Single
9.	Exxon Lexington	3	41 tons	31 years	Single
10.	Exxon Long Beach	5	211 tons	2 years	Single
11.	Exxon New Orleans	3	72 tons	24 years	Single
12.	Exxon North Slope	5	173 tons	10 years	Single
13.	Exxon Philadelphia	3	76 tons	19 years	Single
14.	Exxon Princeton	3	43 tons	7 years	Double
15.	Exxon San Francisco	3	76 tons	20 years	Single
16.	Exxon Valdez	5	211 tons	3 years	Single
17.	Exxon Washington	3	41 tons	32 years	Single
18.	Exxon Yorktown	5	43 tons	6 years	Double
	INTEROCEAN				
1.	Brooks Range	3	176 tons	11 years	Single
2.	Thompson Pass	3	173 tons	11 years	Single
	KEYSTONE SHIPPING				
1.	Atigun Pass	2	176 tons	12 years	Single
2.	Chestnut Hill	1	91 tons	13 years	Double
3.	Golden Gate	1	62 tons	19 years	Single
4.	Kenai	3	123 tons	10 years	Double B&S
5.	Keystone Canyon	3	173 tons	11 years	Single
6.	Kittanning	1	91 tons	12 years	Double
7.	Tonsina	3	123 tons	11 years	Double B&S

No.	Vessel Name	Rating	Weight	Age	Hull
	MARITIME OVERSEAS				
1.	Reunion	Single			
	MOBIL OIL				
1.	Mobil Arctic	3	125 tons	17 years	Single
2.	Mobil Meridian	3	49 tons	28 years	Single
3.	Syosset	3	32 tons	31 years	Single
	OMI CORPORATION				
1.	OMI Columbia	2	136 tons	15 years	Single
2.	OMI Dynacham	4	51 tons	8 years	Double
	OVERSEAS				
1.	Eastern Lion	4	265 tons	16 years	Single
2.	Northern Lion	4	265 tons	15 years	Single
3.	Overseas Boston	3	122 tons	15 years	Single
4.	Overseas Chicago	4	92 tons	12 years	Double
5.	Overseas Juneau	3	120 tons	16 years	Single
6.	Overseas New York	3	90 tons	12 years	Double
7.	Overseas Ohio	4	91 tons	12 years	Double
8.	Overseas Washington	3	91 tons	11 years	Double
9.	Southern Lion	3	265 tons	14 years	Single
10.	Western Lion	4	265 tons	15 years	Single
	SHELL OIL CO.				
1.	B.T. Alaska	2	182 tons	11 years	Double
2.	B.T. San Diego	3	182 tons	11 years	Double
	SUN TRANSPORT, INC.				
1.	American Sun	3	81 tons	20 years	Single
2.	New York Sun	4	34 tons	8 years	Single
3.	Nordic Sun	5	20 tons	8 years	Double
4.	Philadelphia Sun	5	34 tons	8 years	Single
5.	Prince William Sound	3	124 tons	13 years	Double B&S
6.	Texas Sun	2	53 tons	29 years	Single
7.	Tropic Sun	2	35 tons	32 years	Single
8.	Western Sun				Single
	TEXACO, INC.				
1.	Brooklyn	1	225 tons	15 years	Single
2.	Texaco California	2	39 tons	35 years	Single
3.	Texaco Connecticut	1	39 tons	36 years	Single
4.	Texaco Florida	3	39 tons	35 years	Single
5.	Texaco Georgia	3	26 tons	25 years	Single
6.	Texaco Mass.	2	27 tons	26 years	Single
7.	Texaco Minnesota	3	27 tons	46 years	Single
8.	Texaco Montana	3	27 tons	24 years	Single
9.	Texaco New York	3	39 tons	36 years	Single
10.	Texaco Rhode Island	3	27 tons	25 years	Single
	TOSCO CORP.				
1.	Lion of California	2	16 tons	35 years	Single
	TRINIDAD CORP.				
1.	Admiralty Bay	1	81 tons	18 years	Single
2.	Aspen	1	82 tons	18 years	Single
3.	Glacier Bay	1	81 tons	19 years	Single
	UNION OIL				
1.	Coast Range	4	40 tons	8 years	Double
2.	Sansinena II	3	265 tons	14 years	Single
3.	Sierra Madre	5	40 tons	8 years	Double

Source: Anchorage Daily News, Oct. 15, 1989.

turning capacity that thrusters provide in docking and other close maneuvers, they have a real role as a backup system in the event of loss of propeller power.

The most common design for the power system for new tankers will be twin diesels powering a single propellor. The commission considered the merits of twin propellers but accepted the industry argument that a single propeller was more efficient. There must be an auxiliary power system, however, and the commission believes the thruster could help keep the tanker from harm's way until tugboat support can arrive. A tanker could lose one diesel and its propeller, but the thruster could be operated by the remaining diesel. It is the most cost-effective means for a redundant power source that was discovered.

The precise navigation display system is being planned by those companies keeping on top of the state of the art. This system combines electronic positioning, radar and electronic charts on a single multicolor display useable in full daylight without a hood. The ship's position is continuously displayed and can be color coded with respect to being in safe waters or inside designated lanes.

ECO (Appendix J) recommended free-fall lifeboats as a necessary adjunct to crew safety. These are already used extensively in the North Sea. These lifeboats are especially useful for ships operating in rough seas, like the Gulf of Alaska, and also can operate amid burning oil.

The costs of tankers built to these standards would be 9.4 percent more for a 70,000-ton tanker, as used in Cook Inlet, and 9.8 percent more for a 250,000-ton tanker, as is common for Valdez.

"Any business, I don't care whether it's oil or anything else, any business that cannot function in a socially acceptable or environmentally acceptable manner doesn't have any reason to exist. No one here should miss it. It's important that we give a message to the oil industry. And that is yes, we're still willing to do business with you. But the business will no longer be prostitution."

Mike O'Meara, Homer area homesteader
Alaska Oil Spill Commission hearing, 7/15/89

Following all these recommendations would increase the interval between *Exxon Valdez*-size spills by some 400 percent. ECO's computer-generated spill projections (Appendix J) show dramatically the devastation that will occur, no matter where a spill occurs in Cook Inlet or Prince William Sound. As we learned from the *Exxon Valdez*, response to a catastrophic spill can be much more expensive.

Regional Spill Risks

Though the commission concentrated its efforts on Cook Inlet and Prince William Sound as the areas of greatest risk, it was able to undertake a quick survey of oil spill response readiness in other regions of Alaska.

Arctic

Generally, the Arctic can be broken down into two geographic regions for oil spill analysis—Prudhoe Bay and remote areas, including the Arctic Ocean and the Chukchi Sea. The survey examined response techniques for summer and fall periods

of shorefast ice and breakup. These terms define the ice seasons in the Arctic, the primary environmental factor in spill response there.

Conclusions reached for Prudhoe Bay were that in summer the spill response would be effective for small spills, but that there was insufficient equipment to contain and recover a large spill. Contingency planning at Prudhoe Bay relies heavily on the ARCAT skimmer, but there have been no tests to see how well it recovers oil, specifically how well it would recover highly weathered Prudhoe Bay crude.

During fall at Prudhoe Bay the spill response in a growing offshore ice field would be only marginally effective with present equipment. Spill response on shorefast ice would not be easy, but there would be more time to marshal heavy equipment and personnel out on the ice where scrapers and front-end loaders could recover the pooled oil. During breakup there could be a period of several weeks in which the only action response crews could undertake would be to watch the interaction of the ice and the spilled oil.

"NOAA consistently throughout the life of this spill has downplayed the impact on our resources."

Lee Glen, Habitat Division, Alaska Department of Fish and Game
Alaska Oil Spill Commission hearing, 7/15/89

The recommendations for Prudhoe Bay are to procure additional equipment that would provide a diversity of response methods. Offshore tests of the ARCAT skimmer should be conducted during cold weather and under severe ice conditions. This would enable some testing of response methods for use in growing ice and during breakup. A special regime of equipment should be developed for land-fast ice, such as open-pit burners, graders, tanks, pumps capable of moving highly viscous oil and downhole drills to remove oil under ice and oil trapped in the ice.

The picture is bleak for remote areas. An effective response effort for a large spill from a drill ship or a tanker accident very far from Prudhoe Bay or Barrow would be extremely difficult. If the drill ship or tanker were saved, the oil spill would probably be uncontainable by that time. Sacrificing the vessel by burning is the only option offered by most who have experience in the Arctic. The alternative of using airborne applications of chemicals, either dispersants or gelling agents, has received no testing whatsoever in these conditions, and none is known to work on heavy crude oils at typical arctic temperatures.

In dealing with remote spills on shorefast ice, contingency plans should recognize the difficulty of mobilizing from the nearest oil spill response depot or provide sufficient on-site response. The basic conclusion for remote areas at this time is that *in situ* burning using air-dropped igniters is the only real response alternative.

Bering Sea

The wreck of the Greek container ship *Milos Reefer* in November 1989 clearly demonstrated how difficult response is to an oil spill in a place as isolated as St. Matthew Island, where the ship went ashore. Oil spills occur frequently in the Bering

Sea and along the Aleutian Islands, but because of their remoteness they usually have been left to the sea to disperse.

The only reasonable alternative other than burning is the airborne use of chemicals to either disperse or gel the oil. C-130 aircraft from Adak, Kodiak or Anchorage could reach most spills within a few hours. The temperatures are not dissimilar to the waters around the United Kingdom, where airborne use of dispersants has been the first line of response against oil spills. (Use of the waters by wildlife in Alaska might preclude this method to some extent.) Gelling agents applied from airplanes have not received any testing that the commission could discover, but some testing in this area should be done simply to widen the range of possible alternatives.

"Each of the various interested parties is trying to pass on their own real or perceived costs to everybody else."

Professor Matt Berman, University of Alaska
Alaska Oil Spill Commission hearing, 9/21/89

Local response efforts in ports, primarily Dutch Harbor and Adak, should be developed as a part of a regional response plan that can handle a spill that would be generated by the largest tankers using those ports and others in the area. The Airborne Dispersant Delivery System is a unit developed for deployment on C-130 aircraft and is the only system that does not require permanent installation.

Gulf of Alaska

Fate narrowly kept Alaskans from having to deal with another major spill on the seaward side of Hinchinbrook Island in November 1989 when the tug *Commander* lost its barge laden with aviation fuel and could not find it until it was almost ashore. Open sea spills have traditionally been left to disperse naturally, as with the *Khark V* recently off the coast of Morocco, until they threaten to come ashore, when it is usually too late to do anything useful. Mechanical recovery of oil is usually ineffective in sea states greater than 6 to 8 feet. This is an almost constant condition in the Gulf of Alaska and is also generally true of the Bering Sea.

Due to the age of the fleet serving Valdez, high-seas spills in the gulf must be regarded as a real threat, and contingency plans should be developed for them. At present, airborne use of chemical agents or burning are the only solutions possible with today's equipment. If oil were to come ashore on the long beaches of the gulf coast, it would be as difficult to handle as on those beaches in the Barren Islands and the east coast of the Alaska Peninsula affected by the *Exxon Valdez* spill.

Southeast Alaska

In a recent oil spill in Southeast Alaska—when the *Frank H. Brown* spilled 36,000 gallons of gasoline into Wrangell Narrows—the spill recovery system worked reasonably well. A commission-sponsored simulation of a spill 75 miles off the northwest coast of Vancouver Island showed that within a week such a spill would sweep the entire outer coast of Southeast Alaska and proceed well up into the channels.

Contingency plans are needed for the supertankers as well as for the small product tankers and barges that serve Southeast Alaska communities. As long as the steady stream of tankers from Valdez passes this coast, it is at risk.

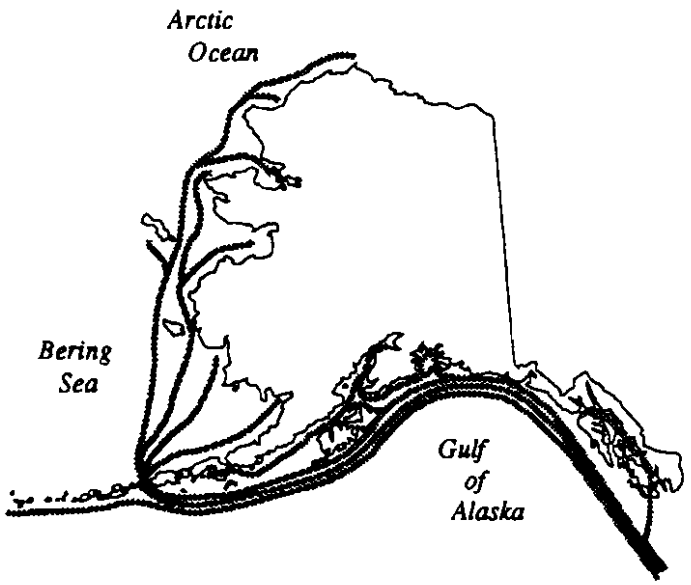
The increasing number of large ships that ply Southeast Alaska waters in the summer should lead to consideration of the use of a vessel monitoring system there. The advantage of knowing where other large ships are with one glance at the electronic chart would seem to be a valuable asset in insuring the highest possible level of marine safety at a reasonable cost.

Clearly, some level of risk will always be present in oil transportation, but ways to reduce that risk are available now, and new ones continue to be developed. All parties, private and public, must commit to minimizing that risk as the highest priority for it is only through prevention that we can hope to reduce the increasing pollution of the seas.

"You will not prevent tankers from going aground. You can't control storms. You can't control weather. You can't make a ship that won't go down. You can't control human error."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

Refined oil returns to state



Source: U. S. Coast Guard

"In regard to future oil response efforts by the state, I would recommend that we minimize the turnover among supervisory and field staff. High personnel turnover has created adjustment problems which had diluted our effectiveness. Some are in-house problems. The state needs to set up a standardized method to collect, store, and process evidence."

Lee Glen, Habitat Division, Alaska Department of Fish and Game
Alaska Oil Spill Commission hearing, 7/15/89

Comprehensive prevention policy

Prevention is the only way to protect the oceans and coastlines from oil spills. Once it reaches the water, spilled oil is extremely difficult to contain and collect, even under ideal conditions. And the conditions under which oil is spilled are seldom ideal.

General Accounting Office data suggest no more than 10 to 15 percent of oil lost in a major spill is ever recovered. The most recent data on recovery of oil spilled from the *Exxon Valdez* indicate no more than 6 to 9 percent was recovered, despite Exxon's oil skimming effort and summerlong beach cleanup.

The urgency of establishing strong prevention policies for Alaska is also suggested by computer-assisted simulations done for the Alaska Oil Spill Commission by ECO, Inc., of Annapolis, Md. Its report notes that more tonnage of crude oil is shipped through the Valdez Marine Terminal than through any other port in the United States. And according to the U.S Maritime Administration, the Valdez trade is the largest employer of U.S.-flagged vessels. ECO's simulations show that under typical winds and currents a catastrophic spill any time in Prince William Sound can be expected to coat the beaches of much of the sound and the Kenai Peninsula with oil. And its calculations indicate that under policies prevailing at the time of the *Exxon Valdez*, a similar occurrence can be expected in Prince William Sound approximately every 13 years.

Worldwide figures gathered by ECO show that during the past 20 years, tanker spills of the magnitude of the *Exxon Valdez*—more than 10 million gallons—have occurred approximately yearly. Spills of up to 1 million gallons have occurred approximately monthly. As this report goes to print, less than 10 months after the *Exxon Valdez* disaster, the *Khark-5* spill off the coast of Morocco has exceeded 30 million gallons, with the full cargo of 72 million gallons still at risk.

Both the frequency of oil spills and the failure of human capacity to clean them up argue for strong prevention regimes at every level.

Recommendation 1
Prevention as policy

Prevention of oil spills must be the fundamental policy of all parties in the maritime oil transportation system.

Worldwide experience has shown repeatedly that containing and collecting significant amounts of oil lost in a spill is beyond present technological capability except for relatively small amounts under optimum conditions. Data collected by the U.S. General Accounting Office suggests that no more than 10 to 15 percent of all spilled oil is ever recovered. Full repair of environmental and ecological damage caused by a major spill is similarly beyond human capabilities. Cleanup and containment technology remains primitive, although recent research and development initiatives offer promise of some improvement. With present technology, natural recovery often is the most effective recourse after a spill hits shore, but generations may lose the advantages of environmental quality during the recuperation.

These lessons were relearned in the response to the *Exxon Valdez* spill. Given the increasing capacity of supertankers carrying more and more oil through the world's oceans and the acknowledged shortcomings of cleanup methods, a sharpened focus on prevention is the key to environmental protection and, indeed, the only adequate response to the increasing risk in the system.

Recommendation 2
Changed attitudes

All parties must work to change attitudes about oil spilled in water. The policy of the marine transportation industry worldwide should be that such spills are unacceptable.

The shipping industry historically has neglected the environmental costs to the public of oil spills. Maritime losses traditionally are measured only by the financial value of vessel and cargo. Economic calculations have emphasized short-term expenses over long-term protection. Attitudes in regulatory and response agencies, particularly the Coast Guard, tend to reflect a similar disregard for environmental costs. Protecting property has a long legal and practical tradition—witness the Coast Guard's longstanding focus on salvage of vessel and cargo—while protecting the environment still receives too little emphasis. Finally, cost-benefit analyses undertaken by public officials charged with regulating the maritime transportation industry sometimes assume that the costs and benefits accrue to industry alone, thus neglecting the interests of others affected by the risk of accident.

As public concern for environmental protection grows, industry and regulatory attitudes must change. The shipping industry has an incentive to adopt stronger approaches to prevention as increasingly it is being required to pay for environmental costs previously borne by society. What is required is a new meaning and commitment to the term "zero tolerance."

Because many individuals and communities are placed at risk by modern oil transportation systems, citizens should be involved in oversight arrangements at every level of government.

Recommendation 3
Citizen knowledge of risk

Shipping oil involves inherent risk. The risk cannot be eliminated, only reduced. Citizens deserve to know and make informed social judgments about what constitutes an acceptable level of risk. Reducing the risk involves costs, both public and private. Citizens may or may not be willing to pay the incremental costs of reducing particular risks, but to make informed choices they should be made aware of the tradeoffs involved. Present federal committees for oversight and policymaking are made up of industry and government representatives. There are no equivalent state committees.

Recommendation 4
Regulatory vigilance

The nation and the state need strong, alert regulatory agencies fully funded to scrutinize and safeguard the shipment of oil.

The notion that safety can be insured in the shipping industry through self-regulation has proved false and should be abandoned as a premise for policy. Alert regulatory agencies, subject to continuous public oversight, are needed to enforce laws governing the safe shipment of oil.

National and state agencies formally vested with responsibility for overseeing the environmental safety of oil transportation frequently have been complacent. Regulatory authority has been weak, and there has been a dramatic decline in vigilance since 1981. State authority has been further impaired by conflict with federal authority. Funding ordinarily furnished to protection agencies has left broad areas of concern without oversight. Between disasters, appropriations have tended to decline. As federal administrations have changed, funding and commitment have fluctuated as well. Missions have been attenuated by the addition of further responsibilities without further funds, as in the case of the U.S. Coast Guard, whose duties have greatly expanded without a commensurate increase in budget.

In such an environment the nation's maritime oil transportation system becomes more, not less, prone to risk of accident. The nation's regulatory agencies must be committed to the safe shipment of oil and other hazardous substances, and they must be encouraged by the regular oversight of citizens who have the greatest stake in the relevant environments. Without such an an invigoration of these agencies, accidents such as the *Exxon Valdez* are bound to increase.

Recommendation 5
Foreign-flag spill prevention

State laws protecting the environment from oil spills should be applied to foreign-flag vessels equally with other vessels engaged in the transportation of oil.

The state has been unduly deferential to constitutional limits supposedly restricting a state's ability to impose containment and cleanup planning and equipment requirements on foreign-flag vessels. A changing congressional intent will produce revised judicial interpretations of preemption doctrine. Though most vessel design features are subject to exclusive federal rule, the state is empowered to protect its environment by all reasonable, non-burdensome means.

Containment and cleanup planning and readiness regimes established under state authority should apply to barge or tanker traffic under any flag in the waters of a state.

Responsibilities of industry

Public authority can do a great deal to enforce safety standards in oil transportation, but industry promises, policies and practices are typically the starting point for discussion. Industry bears a heavy obligation to operate safely and responsibly, regardless of the regulatory structure imposed by government.

Alyeska Pipeline Service Company has demonstrated a commitment to safer operations since the spill by establishing new procedures, including escort vessels, new spill response equipment, speed limits for tankers and dictates that tankers stay in designated traffic lanes while pushing through ice. Some of these reforms were more sweeping and costly than required by government.

Private industry's task is to carry oil to market responsibly and efficiently. Government's task is to regulate that trade prudently in the public interest. The obligation to protect the safety of the public and the environment is mutual, and shared by both sides.

Recommendation 6
Industry commitment

The nation and the state need a private oil transportation system with management that is committed to environmental safety.

The *Exxon Valdez* incident refocuses attention on industry's obligation to operate safely and responsibly. Decision-making by private industry is the first and, in many ways, most important pressure point for safety in the oil transportation system. Government regulation and public oversight can help safeguard the system, but industry can—and should—move rapidly and effectively on its own to establish procedures to reduce the risk of oil spills.

Response to the *Exxon Valdez* disaster illustrated industry's ability to mobilize quickly after a disaster. Exxon, though unprepared for a spill so large, responded far more swiftly than any government agency. The company committed vast human and material resources and reportedly spent more than $1 billion to respond to the spill. (Luckily, Exxon was able and willing to bear this expense, but the industry would have had to spend comparatively modest sums to provide stringent prevention measures instead.)

Though the industry's safety record is mixed, by and large it has not been committed to environmental safety. Driven by competition and profit-maximizing goals, the industry has focused on economic efficiency and opposition to government regulation, claiming it could operate with as great or greater regard for safety without regulation. An industry ideology that regulation is a nuisance can drive an industry attitude that the objectives of regulation are also a nuisance.

In addition, maritime liability limits and low levels of accountability for oil spills have led to neglect of the interests of those who are not owners of vessels and cargo but whose exposure to risk makes them stakeholders in the system.

Historically, the industry has "externalized" the costs of environmental degradation—that is, shifted the costs to others. As concern about oil spills increases, however, industry will be forced to "internalize" more of these costs as incentive to protect the environment.

Properly motivated and funded, private industry can move more swiftly and effectively than any regulatory agency to correct deficiencies in the oil transport system. A tenacious commitment to environmental protection by industry could do more, quicker than any government inducement. Management and shareholders should insist that the traditions and operating assumptions of the shipping industry reflect this commitment.

Government and industry should strive to adopt the best available standard technology in establishing performance standards.

Recommendation 7
Best available technology

Consciousness of the importance of prevention, spill preparedness and corporate responsibility varies greatly among oil carriers. The blurring of responsibility within each oil company and within the Alyeska consortium, coupled with the independence of each shipping company and its owners, argues for uniform application of standards by government authority.

In the past the oil transportation industry has attempted to reduce virtually every performance standard sought, asking that government impose only minimum standards and claiming that most carriers voluntarily will exceed those minimums. But when accidents have occurred, industry representatives have frequently claimed that it has no obligation to go beyond those minimums. The public no longer should tolerate this double standard—and the conflict should be resolved as soon and as much as possible by the adoption of improved standards of performance by industry.

Every company shipping oil through the United States should identify a full-time environmental safety officer empowered to take recommendations to the highest level of the company.

Recommendation 8
Corporate safety executive

Corporate performance on safety issues can be significantly improved by making safety a specified goal and giving primary responsibility to identified managers charged with increasing awareness at the highest executive level. Such corporate structures operated effectively, for example, during construction of the trans-Alaska pipeline system and should be recreated for operations as the system ages and becomes more prone to risk.

The designated corporate safety officer should be required to report annually to shareholders and the public concerning the safety of the tanker fleet, accidents and near-misses, state-of-the-art technology, and company plans for bringing its fleet into compliance with the most appropriate standards.

Public pronouncements by Alyeska and its owners that the company employed the best available technology and committed adequate resources to safety purposes turned out to be false. These assurances were aided by corporate institutional advertising and a sense of well-being arising from the flow of oil revenue to Alaska's citizens which encouraged an atmosphere of laxity in state oversight of oil transportation.

A report to the public and corporate shareholders should provide accurate information about each shipper's spill prevention plan and preparedness posture to encourage greater corporate accountability for safety practices.

Recommendation 9
Tank farm

Tank farm capacity at Valdez should be increased to meet the original design requirement for maximum throughput.

Limited storage capacity at the Alyeska terminal can create undue pressure on loading and shipping schedules of tankers calling at Valdez. Shortage of storage capacity could lead terminal operators to load tankers under otherwise marginal weather conditions, for example, to avoid an expensive slowdown or shutdown of the pipeline.

It may be that the cost of tank farm construction is high enough that a slowdown or risk of slowdown is a preferred cost. If that is the case, standards for slowdowns and shutdowns should be clearly stated so that safety is not sacrificed to revenue or pipeline flow considerations.

STATE REGULATION AND OVERSIGHT

The State of Alaska carries primary responsibility for protecting the state's public resources. Neither federal nor local authority can take the place of strong state regulation of industries that vitally affect the economic and environmental welfare of Alaskans.

State authority must be exerted to protect fish and wildlife resources, to vouchsafe federal regulation, to oversee industry operations, to inform the public of risk, and to insure proper response capabilities in case of accident. State government was not fully prepared in any of these categories before the *Exxon Valdez* disaster.

Alaskans have benefited strongly from the production and transportation of oil in the state, but they have not invested commensurate resources and attention in regulating and safeguarding the operations of the industry. It is incumbent upon Alaskans, through their elected officials as well as their own efforts, to create workable and effective institutions to protect their interests in the production and transportation of oil in the state.

Recommendation 10
Obligation to manage and protect

The people of Alaska should recognize that as stewards of vast natural resources that are the mainstay of their livelihood and a national treasure, it is their duty to protect these resources from harm.

The State of Alaska has not spent an amount appropriate to the job of natural resource management and protection. There are many reasons for this, including low recognition of the magnitude of the task.

Compare the total amount spent by the people of Alaska to manage fish and game resources to that for overseeing the oil industry. Recognizing the importance of fish and game to the state, the people of Alaska have spent substantial sums on regulation, enforcement, research and development, as well as a statewide system of citizen advisory committees. The amount spent overseeing the oil industry and its safety practices, by comparison, is a fraction of that total.

Recommendation 11
Federal preemption

The state should adopt stringent standards regulating the transportation of oil in its own waters without fear of federal preemption.

Alaska has had unsatisfactory experience with federal preemption in the field of tanker safety and local navigational controls, but Congress no longer intends to override more stringent state regulation.

In 1976 the State of Alaska adopted a law giving broad authority to state agencies to oversee and regulate the safety of tanker traffic to Valdez. In 1977 the oil companies responsible for carrying Alaska's oil initiated a lawsuit (*Chevron v. Hammond)* challenging the state's right to regulate the safety of marine oil transportation on grounds that congressional action and Coast Guard regulation preempted the field. By 1979 the plaintiff companies had gained both a favorable ruling from the U.S. District Court and negotiated concessions from the state. The result was a gutting of key provisions in the legislation.

Industry encouraged the view that it should be allowed to take care of its own safety matters; that state activity was a needless and obstructionist interference with private prerogative; and that left to its own devices the industry would employ the best available technology with the optimum commitment of resources. This was not remotely the case.The evisceration of the state's regulatory framework and the antiregulatory temper of the times laid a foundation for repeal of the 1976 legislation and a slashing of state budgetary allocations for oversight. As a result, the role of the Department of Environmental Conservation was sharply reduced. The department's small staff was overwhelmed by technical licensing and permitting activities, leaving no opportunity for the agency to perform its role as overall environmental policy watchdog. Though the state retained certain powers over water quality, the overall effect of preemption through the federal courts was to reduce or eliminate the

state presence in the oversight of oil industry affairs and demoralize state personnel engaged in such activity.

In the absence of the state presence, the already weak federal regulatory presence declined further. In 1990 Congress is likely to adopt legislation that would eliminate any presumption of federal preemption in actions taken by the state with respect to safety and response. Thus, the way is open for the state to reassert its historic role in resource protection.

Recommendation 12
Oversight council

A citizens advisory council should be established in the Office of the Governor and given responsibility for overseeing the safe transportation of oil, gas and other hazardous substances.

No state agency has as its primary mission oversight of environmentally safe transportation of Alaska's resources. Regulatory authority over such transportation is spread among several agencies that do not always coordinate information or resources. The only overall view of the system is exercised by the governor, but he has no single designated officer or council to provide information or maintain consistent oversight.

The state should establish a citizens advisory council, supported by a full-time executive director and small staff, to provide focus to state oversight. Members should be chosen from among the general public, selected for their concern for environmental safety. The council should have power to subpoena information and witnesses, to inspect facilities, to conduct investigations, and to collect information and statistics on safety.

The council's duties should be to:

- Advise the governor and legislature on the environmental safety of the transportation of Alaska oil, gas and other substances posing environmental risks;

- Advise on potential initiatives in state and federal regulations and at the governor's request, represent the state's interests in the development of multistate compacts and national and international policy;

- Identify unmet needs and recommend priorities, strategies and obstacles to achieving them;

- Encourage coordination of spill prevention and response programs currently spread among several agencies that cumulatively deserve high priority;

- Make budget and resource allocation recommendations;
- Evaluate programs and recommend elimination of marginal activities;
- Recommend changes based on new technologies and scientific impacts;
- Designate advisory panels, if deemed necessary, including appropriate representation, ex-officio, of appropriate departments of the state and municipalities, regional oil spill authorities, representatives of fishing and environmental groups, and shippers, owners and residential groups on the pipeline route; and
- Issue an annual report and safety assessment. Reports to the governor should include regular statistical and special reports on accidents and near-misses, the status of major risks, the performance of state and federal agencies, and long-term options for improving safety.

Recommendation 13
Enhanced regulatory strength

The state should expand and exercise its regulatory authority over environmental safety. Measures voluntarily adopted by industry should be backed up by state regulation. Federal technical standards and safety requirements should not preclude more stringent state standards.

The State of Alaska currently does not exercise its full power under the U.S. Constitution to regulate environmental safety. Recent congressional enactments and judicial decisions make it clear that Congress does not intend that states should hesitate to protect local environments with greater stringency than the minimums established under federal law. The state should have the power, for example, to prohibit vessels from entering or departing Alaska ports and waters under unsafe circumstances.

Regulatory effectiveness also should be improved through assessment of administrative and civil penalties to encourage prevention, no preenforcement review of compliance orders, environmental audits, stronger criminal penalties, and statutory provision for citizen lawsuits. Private voluntary prevention measures, though commendable, are often ignored as memories fade unless backed up by state regulations.

Recommendation 14
Strengthened state inspections

The state should renew and strengthen its authority to conduct inspections and spill response drills on vessels calling at Alaska ports and marine terminals.

The Valdez tanker fleet, built in the 1970s is approaching obsolescence. Structural weaknesses, technical malfunctions and other equipment problems can be expected to increase in frequency and seriousness.

Inspections and reports, done in cooperation with the Coast Guard or alone, should include examinations for structural integrity and environmental hazards. Inspection duties may be allocated between the harbor administration office proposed in this report and the Department of Environmental Conservation. State authority should include the power to levy substantial summary civil fines for interfering with inspections or failing to cooperate with response drills.

The lack of any quality control or assurance program on tanker operations from Prince William Sound or Cook Inlet allows serious hazards to arise. Coast Guard authorities already perform inspections on tankers calling at Valdez, but state inspection would provide an added measure of safety. In the past, when the state and the Coast Guard both inspected vessels, the two agencies reenforced each other's effectiveness. When the state was stopped from making inspections on the grounds that the activity was exclusively federal, the quality of Coast Guard inspections declined. Inspection by two governments is not needless duplication but needed redundancy, providing a greater measure of safety.

The "two-tier" system of quality control was adopted during construction of the trans-Alaska pipeline. The value of the two-tier system has been reenforced by the National Aeronautics and Space Administration experience with space disasters. The official inquiry into the 1986 Challenger space shuttle explosion found that system capabilities had been stretched to the limit in the winter of 1985-86 to support the flight schedule of the shuttle program. System capabilities for shipping oil from Valdez were similarly stretched to accommodate increasing throughput of the trans-Alaska pipeline to a peak of 2.2 million barrels per day at the height of Prudhoe production without increasing other elements of the system, such as tank storage capacity. When systems are stretched thin, redundancy in oversight and inspection is doubly important to reduce the risk of catastrophic failure.

Recommendation 15
State presence at Alyeska terminal

Government agencies should be given space at the Alyeska terminal to carry out their duties.

State inspection efforts at the Alyeska terminal should be situated so as to maintain a continuing presence, instant response and constant vigilance over environmental safety at the terminal and on vessels calling there. Until the *Exxon Valdez* spill, various agency personnel were hampered by lack of quick and easy access to the terminal. Alaska Department of Environmental Conservation officials attempting to inspect Alyeska facilities were told they might be required to procure a warrant, a laborious and time-consuming process. A more cooperative posture by Alyeska staff might result if state personnel were seen not so much as an opposing force, but as a normal and integral part of the operation. Office facilities on-site might normalize relations between government and industry officials so that regulatory activities, which on occasion can be adversarial, need not become unnecessarily antagonistic.

Recommendation 16
State licensing of safety managers

A state licensing system should be established for oil transportation system safety personnel, including pipeline pump station and terminal managers.

Oil transportation safety managers should be required to show educational qualifications or equivalent experience and pass examinations reflecting an understanding of environmentally safe resource transportation in Alaska.

Mariners, captains, engineers and ship's pilots, all water-based transportation managers, already are licensed to encourage safety and public accountability. Similar practices should be established to insure that personnel meet a state standard of professionalism for all important managers in the oil transportation system. Few of the managers brought in to oversee contingency plan development or respond to the *Exxon Valdez* spill had significant prior knowledge of Alaska environmental laws, resources or local capabilities.

Licensing can significantly help assure knowledge of prevention and response capabilities as well as public accountability. For example, regardless of whether particular conduct may be tacitly approved or tolerated by an employer, a licensee who falsifies a report, bypasses a required procedure or otherwise violates the professional obligations covered by the license can lose his or her opportunity to engage in the employment.

Recommendation 17
Enforcement in state waters

To the extent it does not already have such authority, the state should seek from Congress authority to require and enforce prevention and response regimes on vessels trading in Alaska or adjacent waters.

Spilled oil recognizes no state boundaries. State jurisdiction is necessary because spilled oil may come ashore or ravage important local fisheries hundreds of miles from the point of the spill. The risk of breakup of a tanker or loss of a barge in the Gulf of Alaska is real. Gulf of Alaska shipping routes should be covered by an adequate regional response developed under the National Contingency Plan and backed by capabilities of the state, the Coast Guard, the carriers and other relevant authorities.

Recommendation 18
Interstate compacts

The State of Alaska should negotiate interstate compacts with other coastal states and provinces for the development of prevention strategies, storage of response capabilities and to effect coordination of assets in case of another major spill.

The western coastal states and provinces may share common environmental concerns about spilled oil. Compact agreements have the force of federal law and may enable these states to create an appropriate regional administration to oversee oil shipping.

The state should require maintenance and personnel audits at oil transportation facilities to provide information and pinpoint problems in spill prevention.

Recommendation 19
Maintenance and personnel audits

Accurate, timely information is central to the exercise of the oversight function and must be available to all government actors in prevention and response. The state can gather information on conditions relating to spill prevention through technical maintenance audits, thereby supporting the work of the state advisory council and regulatory agencies. Technical and personnel audits may be done by outside contract.

Training and experience standards for marine pilots in Alaska should be upgraded to require actual experience in Alaska operations of vessels at thresholds of 60,000 and 150,000 deadweight tons.

Recommendation 20
Marine pilot qualifications

Training and experience requirements have been reduced for pilots of large tankers in Prince William Sound and Cook Inlet since the late 1970s, allowing pilots to qualify for very large ship operations on insufficient experience. While no accidents have been caused by this circumstance, a system with multiple thresholds is inherently safer.

Insurance policies should identify the State of Alaska as an additional insured or named beneficiary.

Recommendation 21
State as co-insured

The shipping industry is responsive to economic incentives. Insurance premiums and premium requirements create incentives. The insurance industry is responsive to the needs of co-insureds. Such practices were required during construction of the trans-Alaska pipeline. There is every reason to revive them.

The state should set rigorous requirements for private oil spill prevention and response capability in remote locations. The state also should develop response plans for major spills and articulate a prevention program from the Aleutian Islands to the Arctic.

Recommendation 22
Remote spill response

Despite the state's obligation to respond to major spills, only if private resources are committed to prevention systems and response can an acceptable reduction in risk be achieved.

Marine traffic in arctic Alaska already poses unacknowledged risk. Fuel provisions delivered by sea and vessels fueled by oil create risks of damage in these hazardous and environmentally fragile waters. Spills are usually impossible or much more

difficult to contain and collect in arctic waters. Immediacy of response is the key to cleanup if a spill occurs.

Measures should be undertaken to reduce spill risk in the Arctic, including better vessel tracking and contingency plan requirements for all large vessels transiting the arctic, and for smaller vessels carrying oil or major fuel supplies.

Recommendation 23
Arctic prevention research priority

Given the high risk involved in arctic oil transportation, the options for developing systematic environmental safety protections for this region should be a priority for scientific authorities.

The long-term need to develop environmental safety regimes of great stringency cannot be ignored. Development of arctic oil discoveries dependent on maritime transportation should await the preparation of approved systems of oil transportation using experience gained from the trans-Alaska pipeline system. But any increase in traffic simply to accommodate increases in oil production should be accompanied by a major increase in preventive safety.

Recommendation 24
Pipeline evaluation

The state should establish a task force to review the environmental safety of the trans-Alaska pipeline system independently or in concert with a federal counterpart.

More than enough evidence is available regarding sharply increasing risk of a pipeline breach and raising questions regarding government response capability. On the advice of contractors showing evidence of massive corrosion problems with the pipe, Alyeska already has undertaken a review and reconstruction program of the trans-Alaska pipeline system. The state was intimately involved in oversight of the original design and construction of the pipeline. This pattern of oversight should be renewed to protect the same public interests.

The task force should make recommendations to better oversee the long-term safety of the pipeline and gathering system. Specifically, it should review the environmental safety of:

- the trans-Alaska pipeline and gathering system;
- applicable government and private contingency plans; and
- the response plans and capabilities of government agencies.

The commission endorses the concept of a presidential task force on pipeline safety as proposed by Congress and urges that provision be made for state participation.

Recommendation 25
State harbor administration

The state should create harbor administration offices for Prince William Sound and Cook Inlet to help regulate traffic and navigation and to implement terminal and vessel inspections.

Local oversight of navigation and port operations can improve conditions by bringing local perspectives to bear. A harbor administration office should have the power to:

- Regulate traffic and navigation issues not preempted by Coast Guard regulation to impose more exacting standards in the best interests of the state.
- Advise and oversee the Coast Guard's management of such issues and make recommendations for changes;
- Certify and declare disasters, and order state management of a spill in the port area; and
- Assume functions given under contract by the Coast Guard and participate in joint management arrangements.

The state asserted greater control over harbor activity in the mid-1970s, but conceded its management prerogatives in negotiations leading to a resolution of the *Chevron. v. Hammond* lawsuit. Pending legislation clarifies congressional intent that the state may undertake safety regulations relating to local harbor conditions, weather and the like, and that the vessel must follow the more stringent rule. Collaboration with federal authority is required to assure that no direct conflict with Coast guard regulations are involved and that optimum safety conditions are observed.

In the event of a spill, the harbor administration at Valdez probably would be the headquarters of the on-scene commander carrying out the governor's delegated emergency authority.

Oil transportation in Cook Inlet, a body of water widely noted for its extreme tides, currents, winds and ice conditions, faces a high risk of spills. Though smaller volumes of oil pass through Cook Inlet than Prince William Sound, similar oversight arrangements should be duplicated there, allowing for appropriate variations in representation and the difference in geographic circumstances.

Research done for the Alaska Oil Spill Commission indicates that a major spill of between 300 and 1 million gallons can be expected in Cook Inlet approximately every 2.2 years, a spill of between 1 million and 9 million gallons about every 24 years, and a spill of 9 million gallons or more about every 66 years. Oversight arrangements should be created to provide appropriate public accountability and awareness of spill risks.

Recommendation 26
Regional advisory committees

A system of regional advisory councils should be formalized under state authority to oversee harbor administration, state and federal regulation and private safety functions.

The people living closest to a danger have the most to risk and are the most likely to insure that readiness and alertness are maintained. As a Prince William Sound resident told the commission, "People take care of the things they love."

Regional oversight councils can both encourage protection of local resources and provide an opportunity to make use of local residents' knowledge of conditions and needs in crafting workable spill prevention and response policies. Regional advisory councils should provide advice to the statewide policy council proposed in this report and respond to its recommendations. A similar council should be considered for permanent oversight of the trans-Alaska pipeline system.

Recommendation 27
Local government representation

Local governments should be represented on the regional advisory councils and the harbor administration.

Local residents complained that their views and knowledge often were ignored. Residents in small villages, in particular, believed they were bypassed despite their great, direct interest in events. Villagers rarely are able to send delegates to advisory boards, even though their lives may be severely traumatized by a spill. Special provisions should be made to insure no neglect of these stakeholders.

FEDERAL REGULATION AND OVERSIGHT

Congress has mandated a comprehensive system to protect the safety of oil and gas transportation, but for lack of enthusiasm and underfunding enforcement has been a failure. The quality of federal oversight of oil transportation in Alaska was typified by the U.S. Coast Guard, whose safety and regulatory efforts gradually declined for most of the decade leading up to the *Exxon Valdez* disaster.

The Coast Guard supported safe traffic monitoring systems and design standards, including double-hulled tankers, when the trans-Alaska pipeline system was approved in 1973. But by 1978, after strong industry opposition to double hulls in international regulatory forums, the Coast Guard backed off its support. The Coast Guard also imposed stringent safety inspections and vessel monitoring practices during the early years of tanker operations after the opening of the pipeline in 1977. Inspection and monitoring efforts waned noticeably after parallel state inspections were stopped in 1979, and gradually thereafter as Coast Guard funding and resources for these activities declined.

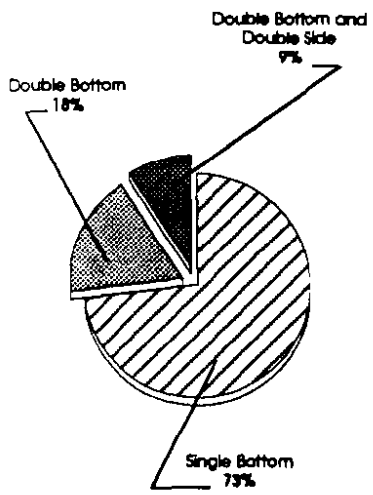
Some federal agencies performed admirably in events surrounding the spill—notably the U.S. Army Corps of Engineers and the U.S. Navy in cleanup response efforts and the Coast Guard itself in successful measures to salvage the ship and the unspilled cargo. As a rule, however, federal authority must be reinvigorated in several ways if it is to provide significant leadership in the safety and oversight of maritime oil transportation.

Recommendation 28
Double hulls and vessel design

Double hulls and other technological advances in tank vessel design should be required on an accelerated timetable, including prohibition of nonqualifying vessels, regardless of flag registry, in all U.S. waters.

Hull designs

Hull designs of tankers registered for Alaska trade



Source: Anchorage Daily News

The loss of oil from the *Exxon Valdez* wreck would have been substantially less if the vessel had had a double hull of appropriate design. A U.S. Coast Guard study undertaken after the accident indicated that up to 60 percent less oil — about 6 million gallons — would have entered the water if the *Exxon Valdez* had been equipped with a double hull. Double hulls already are required for chemical tankers and gas carriers to provide maximum protection to cargo tanks. A study for the Alaska Oil Spill Commission by ECO, Inc. (Appendix J) says double hull design "provides the highest probability of surviving damage, either from a collision or grounding, with no loss of cargo."

Technical measures to reduce risk of accident and oil spillage have been advocated by naval engineers and others over the past two decades, but this advocacy has not produced significant voluntary changes in the way the industry does business. Suggestions regarding multiple screws, horsepower enhancement and other design overbuilding proposals to enhance safety have received only a negative response. Required changes are necessary, particularly as the size and carrying capacity of modern supertankers has increased.

Recommendation 29
Mandatory traffic control

Mandatory traffic control systems should be installed in due course in Cook Inlet, Prince William Sound and all waters of the United States where an equivalent or greater risk occurs.

Any of several common practices relating to positive vessel traffic control would have prevented the *Exxon Valdez* from straying so far off course as to run aground on Bligh Reef. The grounding would not have occurred

- a traffic control system had coverage operations to Hinchinbrook Entrance, as was promised by owners of the trans-Alaska pipeline system at the time the system was approved;
- Loran-C retransmit or radar had provided reliable coverage to Hinchinbrook Entrance, as was promised by the owners;
- the Coast Guard had not, according to regular, informal practice, given permission to the vessel to move outside established tanker lanes;

- the vessel had been traveling at lower speed, to slowly push through ice in the traffic lanes, as was more common practice in the early years of operation of the Valdez terminal.

A mandatory vessel traffic control system operated by personnel more experienced than those now posted to the advisory system would require strict monitoring of a vessel's position in relation to traffic and known hazards and would prevent corner-cutting to save time, a conspicuous cause of the well-known *Torrey Canyon* disaster.

Recommendation 30
Crew levels

Tanker crew levels must reflect needs under emergency conditions, not just normal operating circumstances, and recognize the need to avoid fatigue and excessive overtime among those responsibile for safe navigation.

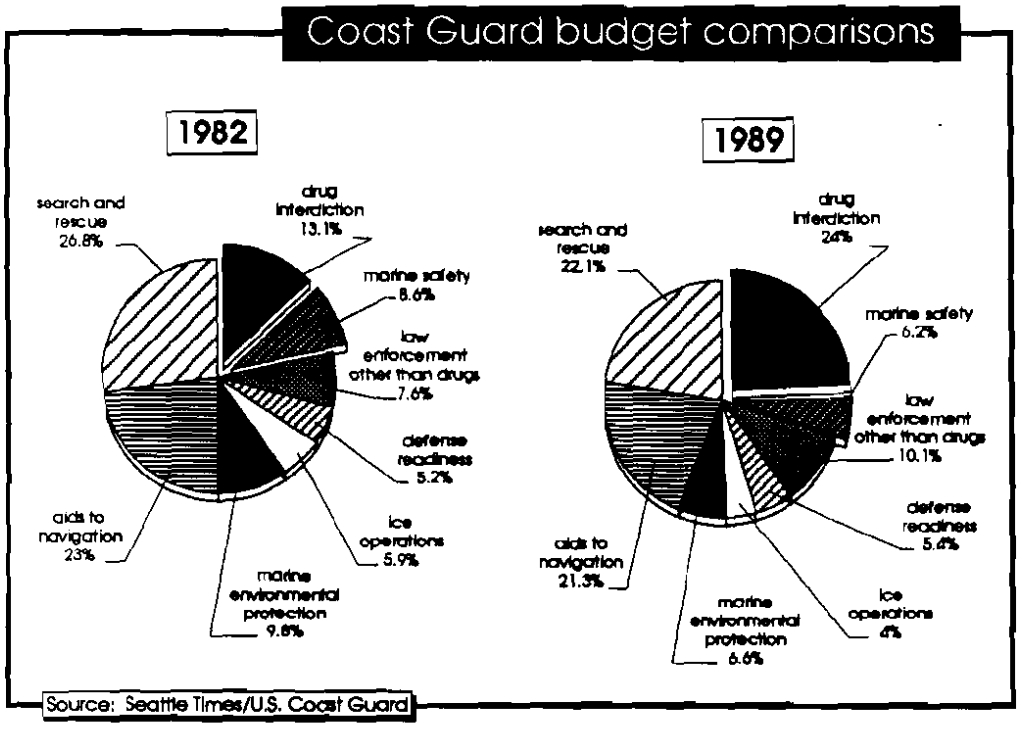
Crew sizes and fatigue factors have been subjects of investigation since the *Exxon Valdez* accident. A second qualified officer on the bridge would have made the wreck substantially less likely by increasing the likelihood that the bridge would have been alerted to the ship's errant position, the impact of the automatic steering mechanism, or to alternative last-minute navigation strategies for avoiding the reef, in time to avert the accident. Similarly, the wreck would have been less likely if crew members and ship's officers required to do double duty in Valdez harbor during loading operations had not been subject to fatigue.

A 1984 survey indicated that the ability to make schedules is viewed as the single most important factor in a company's evaluation of a captain's performance. Under such circumstances, a captain is strongly motivated to run whatever crew he has as long and as hard as necessary to meet the required schedule, despite formal duty time limitations. National Transportation Safety Board hearings on the *Exxon Valdez* accident showed that several crew members—including Third Mate Gregory Cousins, who was at the helm at the time of the accident—had worked extraordinarily long hours the day of the wreck. This practice is not rare in the trade.

Crew training standards must be strengthened and retraining and reexamination reviews tightened. Physical standards, in addition to those proscribing alcohol or drug abuse, must be met. A captain having a "predictable" heart attack is of no more use than one under the influence.

Recommendation 31
Coast Guard role

The mission of the U.S. Coast Guard to protect the safety of navigation should be defined specifically to include the safe transportation of oil by sea. Sufficient funding, resources and institutional support should be given to insure the strengthening of these purposes.



For reasons that include not only underfunding, but also confusion of mission and an unduly friendly relationship with industry, the Coast Guard has failed the American people in providing oversight of the country's oil transportation system. Enforcement must be strengthened and the penalty structure raised to a point where it weighs in the economic calculations of each company.

While various Coast Guard units have operational responsibilities for tanker safety, the Coast Guard's primary mission is not the environmentally safe transportation of oil by sea. There is a general disposition in the agency to keep commerce moving without regard to all environmental or social costs. This disposition may be in conflict with the need to "follow the book" to insure safety. The lack of particular focus on the environmental risks of oil transport was revealed in the system weaknesses that permitted the wreck of the *Exxon Valdez*.

The Coast Guard commandant is selected by the president and accordingly is likely to reflect the philosophical perspective of the times. After President Nixon's declaration of a policy of oil independence, which President Carter pursued through establishment of a Department of Energy, the national mood under President Reagan moved to industrial self-regulation. This mood was reflected in a greater resonance with industry wishes in Coast Guard performance. Relaxed regulation has contributed to a lack of progress in maritime environmental safety. Safety does not do well in a laissez-faire environment.

Underfunding and relaxed attitudes toward regulation increased the likelihood of the *Exxon Valdez* wreck in several ways. The junior Coast Guard personnel posted to Valdez did not think they had the authority to instruct tanker operators in navigation or to require frequent position reporting. Only one Coast Guardsman was on duty at

the time of the accident. The wreck would not have occurred if the Coast Guard had prioritized the installation of up-to-date vessel monitoring systems. The wreck would have been less likely if the Coast Guard had exercised strong oversight of tanker crews and manning practices.

The Coast Guard's power to determine required crew levels is of little consequence as exercised. The determination is largely a paper exercise in which the shipper submits a proposal that typically is routinely approved without inspection, sea trials or a determination of need under foreseeable emergency or unusual conditions.

In the normal course, Coast Guard personnel retire or transfer to the shipping industry in large numbers, particularly at the executive level. It may be that the prospect of working for industry is reflected in the attitude of some Coast Guard personnel. The "revolving door" and the resulting sympathy of interests between regulators and the regulated is a common problem in other areas of government service.

Recommendation 32
Insurance premiums to reflect risk

Congress should revisit the antitrust exemption granted to marine industrial insurance to require that premiums reflect design and operational considerations in accident prevention and pollution abatement.

The shipping industry is responsive to economic incentives. Insurance premiums and premium requirements create incentives. Congress has adopted special provisions concerning the conditions under which marine insurance is exempt from antitrust regulation. Various requirements must be observed as a condition of the exemption. These conditions should require additional features affecting premium structure and loss control to encourage design improvements and operational practices that enhance environmental safety in the shipment of oil.

Recommendation 33
Corporate safety reporting

Congress should require corporations transporting oil or hazardous substances to file environmental safety reports as part of their Securities and Exchange Commission 10K filing. These corporations also should include a separate environmental report card in their annual reports to shareholders.

Safety is a factor in long-term profitability that may be neglected in management preoccupation with annual profit. Safety is a factor of cost and accountability. SEC requirements are intended to inform investors of facts needed to assess risk. A company's record and status concerning environmental safety should be available to inform such assessments.

A company responsible for oil transportation should report to its shareholders on the safety of its operations in addition to their profitability. The report should include an

account of accidents, close encounters, technological developments, goals and objectives. This information should also be collected for the government's report.

The meaning of corporate democracy should involve full discussion of all matters shareholders may care about. Environmental responsibility is a large part of corporate social responsibility for most large corporations, and certainly for companies carrying oil or hazardous substances. Shareholders should be kept informed of the corporation's stance toward its environmental record.

Recommendation 34
International action

The United States should pursue an aggressive policy in bilateral and international regulatory forums to demand safety improvements. The practice of deferring to international transportation safety standards in U.S. waters should cease. Environmental regimes established by state or federal government should apply to tanker or barge traffic under any flag in U.S. waters.

U.S. law should provide for the protection of U.S. waters, resources and regulatory standards regardless of whether international standards are consistent with them. Trade with the United States is at a high enough volume that this country should set the standard for environmental safety rather than accept a lower standard set by other nations.

Improvements in international safety standards have not been commensurate with growth in maritime oil transportation. The policy of the United States in international forums has been cautious, and forums have been dominated by U.S.-based multinational corporations to the disadvantage of environmental protection. American policy should be reoriented toward leadership in the establishment and maintenance of rigorous standards of safety and environmental protection. The United States should pursue bilateral agreements with its North American neighbors and its trading partners to provide cooperative standards, enforcement and spill response. The need for international spill response systems is shown dramatically by the 30 million-gallon spill from the Iranian supertanker *Khark-5* off the Morocco coast in December 1989. International standards should be viewed as a floor beneath which U.S. requirements will not fall rather than a ceiling above which they cannot rise.

Recommendation 35
Offshore tanker lanes

Tanker lanes should be established to keep tankers and fuel barges in the Gulf of Alaska and North Pacific trade at least 100 miles offshore.

Time is critical in efforts to protect coastlines from oil spill damage. In the event of tanker collision or breakup at sea, sufficient distance from imperiled coastlines can provide time to prepare defenses for key resources or habitats before oil reaches them.

A system of tracking large vessels in the North Pacific should be developed.

Recommendation 36
Tracking vessels in the North Pacific

The technology exists at modest cost to take the "search" out of search and rescue by tracking vessels broadcasting a signal on the high seas. Similar systems are required on all commercial air carriers and should be done for vessels. The system would not only enhance the environmental safety of tankers but also for modest marginal cost would enhance life safety systems in one of the most hazardous areas in the world.

Congress should ask the president to require the administrator of the Environmental Protection Agency and the secretaries of Transportation and Commerce to issue a special report on the safety of oil transportation by sea. Annually thereafter, the Office of Science and Technology Policy or the Council on Environmental Quality should report on progress made by all parties, close encounters and accidents during the year, and emerging issues in the field.

Recommendation 37
Presidential report

No federal agency has as its primary mission oversight of the environmentally safe transportation of oil. The focus provided by a presidential-level report on the safety of maritime oil transportation would help alert the nation and the federal government to shortcomings in the system, as well as emphasizing the importance of safeguarding this system.

The report to the president should include:

- A history of accidents involving oil, gas and hazardous substances;
- An assessment of current risks and safety practices with reference to national energy policy;
- An assessment of prospects for progress in the enhancement of prevention technologies and techniques;
- An account of the activities of all federal agencies with responsibility for maritime safety, including a report on maritime recommendations of the National Transportation Safety Board, actions taken on them and reasons recommendations may have not been followed;
- An account of penalties levied for violations of oil, gas and hazardous substance transportation safety regulations;
- A specific report on the safety of the trans-Alaska pipeline system, the preparation of which should include adequate provision for state participation; and

- An overview evaluation of the effectiveness of private contingency and public response plans to oil spills in U.S. waters.

The Alaska trade is substantially less than a fifth of the maritime oil transportation system requiring national oversight. Either a strengthened Council on Environmental Quality or a more focused new agency as a watchdog over national environmental protection might better serve the nation's interests in reporting on the protection of the marine environment.

GOVERNMENT RESPONSE POSTURE

Alaska and other states have depended upon the National Contingency Plan to organize catastrophic spill response, but the *Exxon Valdez* incident illustrated the emptiness of its promises. The NCP provided neither the resources nor the manpower for effective action against a 10.8 million-gallon spill.

What is required in a successful oil spill response is to blend the resources of state, federal and industry response teams into an effective organization, and to provide sufficient manpower and resources to make a significant attack on the spill within 24 hours.

The greatest weakness of the NCP, as revealed in the *Exxon Valdez* incident, was that it failed to establish the firm, predesignated working relationships that are vital to a successful emergency response. Yet if that had been accomplished, it only would have revealed the weaknesses in the rest of the plan: lack of matériel, lack of trained manpower and lack of established common goals.

Recommendation 38
Government in charge

The spiller should not be in charge of response to a major spill. A spiller should be obligated to respond with all the resources it can summon, but government should command that response.

Response should be a cooperative effort of government and industry under the direction of either the state or federal government, depending on which one has the stronger interest or can marshal resources more quickly and effectively.

The spiller was obliged to respond to the spill under contingency plans in effect at the time of the *Exxon Valdez* wreck. Neither Alyeska Pipeline Service Company nor Exxon Shipping Company was prepared to respond to a spill of such magnitude. The handoff of spill response authority from Alyeska to Exxon was not anticipated by all authorities and contributed to command confusion. Key decisions, such as the focus on "Corexit," an Exxon dispersant, were unduly influenced by the fact that the spiller was in charge of the spill.

Spill response regimes should provide for government direction of the response effort, with the full participation and resources of both the spiller and government. Small spills, according to DEC regulations, can continue to be handled by the spiller.

Recommendation 39
Coast Guard role in response

Congress should either strengthen the Coast Guard's oil spill response capability or transfer oil spill containment and cleanup responsibilities to the U.S. Army Corps of Engineers.

Two of the real and relatively unsung success stories in the response to the *Exxon Valdez* disaster were the work of Exxon and the U.S. Coast Guard in lightering crude oil off the grounded vessel and later moving the ship safely off the reef. Those successes are in marked contrast to the failure of all efforts to contain and collect the oil that escaped in the accident.

By tradition and practice, the Coast Guard has developed considerable expertise and experience in salvage and rescue, but comparatively little ability in oil spill response. The Coast Guard is seriously underfunded and underdirected in the the field of oil spill response. The Coast Guard has been given one mission on top of another—most recently drug interdiction, a critically important task—without proportionate increases in appropriations. Thus the Coast Guard is obliged to do too many things for too many people and is not doing at least this one well.

U.S. Army Corps of Engineers and Navy equipment and workforces were the largest component of public response to the *Exxon Valdez* spill. There is a long history of cooperation between the Corps of Engineers and the Navy, and the Navy has experience in spill cleanup. Approved career patterns in the Corps of Engineers allow the development of careerlong expertise and professionalism in a particular spe-

cialty. The Corps of Engineers' dredging capacity (which can be converted to skimming and oil recovery) and its nationwide mission involving the movement of water, soils, the management and preservation of wetlands, give it an unmatched spill response presence in all regions of the country.

Transferring spill response duties to other agencies would allow the Coast Guard to focus on tasks it does well—salvage and rescue—while permitting greater expertise of other agencies to be brought to bear on cleanup. Short of a formal transfer of functions, the Coast Guard should consider entering into delegation agreements for spill response functions.

Recommendation 40 Role of Environmental Protection Agency

The Environmental Protection Agency is not adequately funded and staffed for oil spill prevention and response. Unless the agency receives sufficient resources, these functions should be delegated to the states or transferred to agencies better able to perform them.

The Environmental Protection Agency commitment of staff and funding to activities in Alaska does not support the public perception that the agency oversees protection of the environment. EPA has little Alaska presence and is unfamiliar with local conditions. The agency performs its mission in Alaska only by delegation; for example, it has contracted with the Bureau of Land Management for spill response duties in the trans-Alaska pipeline corridor.

EPA's response to the *Exxon Valdez* disaster was limited, though it did provide expertise in water sampling and environmental analysis. Only a narrow range of approvals and disapprovals of chemical response techniques were asked of EPA in this incident. But it did not perform well even this limited task due to a lack of adequate testing and a backlog of approval authorization actions.

EPA had no capacity to propose response strategies to the *Exxon Valdez* wreck, only to pass on the proposals of others. For example, the agency was in no position to propose alternatives to Corexit, Exxon's patented dispersant, or to challenge its use. The causes of this performance lapse include inadequacies in the research and development budget of the agency.

Although it is formally identified as the federal government's lead responder on land spills, the role of EPA in such events has not been conspicuous. The agency has no capability in Alaska to regulate oil spill prevention or plan for contingencies and has only a limited capacity to respond to a spill by flying people into the state in an advisory role.

Recommendation 41
State takeover of oil spills

The state should empower itself to take over direction of the response to any spill in Alaska waters.

There is no indication the federal government is inherently better suited than the State of Alaska to respond effectively to an oil spill in Alaska waters. Indeed, the state often will have more response resources than the federal government as well as a greater knowledge base concerning local circumstances. The state's resources and expertise generally will be more readily available in the crucial early hours of a spill.

The state has a constitutional obligation to protect its own resources and the primary responsibility to assist its own citizens. Considering the limited capabilities of federal agencies to respond to a variety of contingencies and the industry's conflict of interest, the state can never rely completely on the United States government or on industry to protect the resources of the state, whether on federal or state lands.

The state's authority should include the power to command the spill cleanup, to apportion scarce public and private resources, and to set in motion an emergency procurement process that will bypass the red tape that was a conspicuous element in the response to the *Exxon Valdez* wreck.

Recommendation 42
State role under federal authority

Even when the federal government maintains authority over a spill, the scheme for direction and command should permit full cooperation with state authorities.

Though primary responsibility for the salvage of vessels and the safety of crews should remain with the Coast Guard, pollution abatement may be left to the direction of state authorities indicating a willingness and capacity to do so with the support of federal resources. In particular, the state on-scene commander should be empowered to give binding directions to a spiller concerning particular response strategies. Community impact functions should be left to the standard emergency response command system.

Recommendation 43
State response depots

The state should establish community-based response depots under the management of the state Department of Military and Veterans Affairs.

A major oil spill is in many respects analogous to emergencies such as floods, forest fires and earthquakes. Persons trained in emergency systems to mobilize a large workforce quickly and with the required urgency tend to be better equipped to respond to a major spill. Those specially trained in environmental protection perform better in advice on establishing goals and objectives and in evaluating the impact of the operation.

A state response committee made up of representatives of the appropriate state and federal agencies should be created to review state response plans and participate in periodic drills.

Recommendation 44
Immediate local response

Local volunteer and part-time spill response units should be established, trained and equipped under the direction of the state Department of Military and Veterans Affairs.

Trained volunteer and part-time spill response units, properly trained, supervised and mobilized, should be prepared to protect critical habitat by keeping oil from reaching the shore or protected areas. The work of the Cordova fishing community mobilizing a small armada to protect fish hatcheries after the *Exxon Valdez* wreck is an instructive example. The local experience, knowledge and equipment of a trained volunteer corps should be put to work to help protect local resources.

Recommendation 45
Regional response plans

The state should develop regional response plans reviewed by appropriate regional advisory committees. Private contingency plans should be developed that presume and mesh with regional plans.

Regional committees should be made up of local community members, state and federal agencies and industry. They will prepare the regional response plans and participate in drills to insure readiness. When a spill occurs this committee makes decisions regarding the region and reports to the on-scene commander. During the aftermath of the *Exxon Valdez* wreck the best example of a coordinated response was the response in Seward. The incident command system was fully employed and was able to carry out a well-managed, organized response.

These committees need to be predesignated before spills so they can participate in the planning process and be even more effective in responding to spills when they occur.

Recommendation 46
Regional response capability

The regional response capability should be able to respond to a major spill with the speed of a fire department to protect habitat and contain, transform, recover or destroy a major spill before it reaches shore.

Time is the critical factor in all attempts to limit the environmental damage in a major spill by keeping oil off the shore. Regional response organizations must perform swiftly and with clear command and control to maintain the hope of keeping oil off the beach.

Recommendation 47
Emergency economic maintenance

The state should sponsor a system of emergency economic maintenance for persons immediately and seriously affected adversely by a spill.

The financial victims of a spill should not be subject to economic pressures to settle their claims quickly. Victims whose injury is indirect also should receive some early relief. The economic maintenance system should follow the pattern of unemployment insurance but would cover all classes of people injured by a spill, not just insured unemployed. This program should be funded from spill impact funds.

Concern for fish and wildlife resources was the dominant concern in the response of state agencies and federal environmental agencies. Impacts on people were given relatively lighter attention, despite the toll in human misery on those whose livelihood and way of life had been severely disrupted or effectively destroyed for the foreseeable future.

Exxon did set up a system for the early compensation of claims and settled a large number of them, an activity it was not required by law to undertake. A smaller and less financially capable company may not have been willing or able to provide such a system.

Exxon was able to mitigate claims against it by hiring large numbers of people put out of work by the spill in cleaning up after it. The injured and economically benefited, however, were far from congruent groups. The principal economic beneficiaries of the spill were the two corporations hired by Exxon to manage the cleanup.

Many fishers or other injured parties believed they were disadvantaged in dealing with Exxon on claims.

The private system was incomplete in that many people who suffered severe income loss received no compensation because their claims were not against Exxon or were not legally cognizable. For example, seafood processing workers and crews of fishing vessels that were not hired according to their annual expectation were left to their own resources. Some were successful in obtaining employment with Exxon or its contractors. Others were not.

IMPLEMENTING THE RESPONSE

Eventually, another major oil spill will occur in Alaska. Just as inevitably, there will be surprise and chaos. But unpredicted circumstances and the disarray of managers caught off guard can be sharply reduced if a plan is in place that sets out in a coordinated fashion what people should do in emergency circumstances.

The failure of response to the *Exxon Valdez* disaster was made more poignant by the location of the accident. Bligh Reef is in protected waters, only 20 miles from one of the world's major oil terminals. Most of the cleanup equipment in the state was stored at the terminal, and the weather for the first three days after the spill was extraordinarily good.

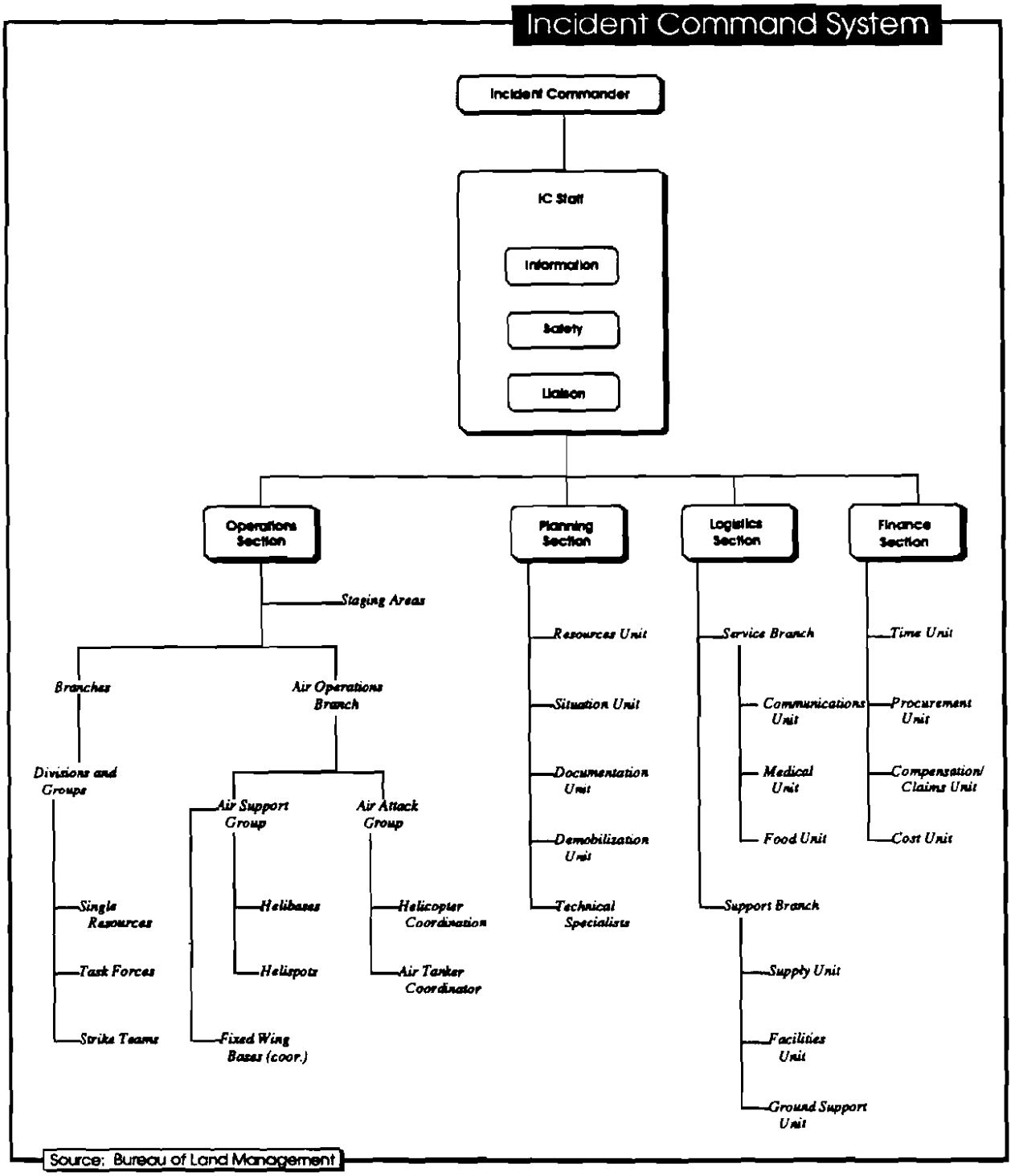
Command and contingency plan changes contributed to the chaos. When it became obvious that Alyeska's contingency plan was inadequate, the local response commanders—the Coast Guard captain of the port, the Valdez field office chief for the Alaska Department of Environmental Conservation, and the manager of the Alyeska marine terminal—were replaced, even though they were the most familiar with the spill area and the existing contingency plan. Within 48 hours, the spill was being managed by a Coast Guard admiral, the head of Exxon Shipping Company and the commissioner of the Alaska Department of Environmental Conservation, none of whom had particular knowledge of the area or its response planning. Eventually the Exxon worldwide contingency plan took priority, even though it had no specific relationship to Prince William Sound.

Response to the *Exxon Valdez* wreck revealed confusion and unpreparedness on a massive scale. But because plans do not work perfectly does not mean that they don't work at all. There is no reason why the chaos of the *Exxon Valdez* response should be repeated.

Recommendation 48
Incident Command System

A formal command structure known as the Incident Command System should be used to direct response to oil spills.

The safety of the crew and salvage of the ship and cargo should be left primarily in the hands of the Coast Guard and the owner. The Incident Command System, which is familiar to many state and federal agencies, appears to be the optimum command and control system for other oil spill response functions. The system allows for training and management by state emergency and environmental authorities to cover three major responsibilities:



Source: Bureau of Land Management

- Containment and recovery of the spill on water.
- Treatment of beaches and recovery of oil from the intertidal zone.
- Management of onshore impacts, primarily a responsibility of emergency response authorities.

The local on-scene commander can be predesignated under this system. The function of higher officials such as a federal "czar" should be to see that resources are mobilized and provided, not to replace the on-scene commander. Pre-incident agreements and the Incident Command System should guide the allocation of labor and equipment to communities.

A confusion of command and responsibility handicapped response in Prince William Sound, despite the good faith efforts of all parties. Similarly, a confusion of mission resulted in a division between the very successful focus on the safety of the crew and salvage of the vessel and its cargo and the much less effective effort to contain and recover the oil. Shore operations were often marked by chaos, misallocations of resources and neglect of the interests and wishes of residents.

In almost every command structure surrounding the *Exxon Valdez* spill, the individual most knowledgeable about the circumstances of the spill and theoretically charged with response was quickly replaced by a person who may never have read the local contingency plans. The Coast Guard appears to have rotated personnel through Prince William Sound for the experience.

Recommendation 49
Enlarged community role

A substantive role should be given to the affected communities in any response system.

Communities near to the spill and in the shadow of the oil were not given a proportionate role in the response system after the *Exxon Valdez* accident. Frequently they were ignored. Often they devised their own strategies for response, for instance acquiring or manufacturing boom by themselves. Yet local interests, local knowledge and experience with the ocean often made the community-based work force the most efficient available.

Recommendation 50
Allocation of state response authority

The state Department of Environmental Conservation should continue to insure spill response capability. For smaller spills this responsibility can be carried out or supported through private contract. In a major spill, where mobilization of private resources and multigovernmental agency response is required, the Department of Military and Veterans Affairs, with the advice of DEC, may determine that the spill be taken over by the state.

Confusion of command in response to the *Exxon Valdez* disaster grew out of the state's failure to focus response activity in a single agency with an operational capacity.

Distinctions were blurred in the *Exxon Valdez* disaster between the system for making decisions and responsibility for carrying them out. DMA is better suited than DEC to carry out operational decisions. DEC is better suited to provide quality assurance auditing functions and to give advice, as is the role of DEC in relation to the private spiller in charge.

Logistic support agencies were not sufficiently utilized in the *Exxon Valdez* spill as a result of a confusion between the decision-making process and execution command.

Recommendation 51
Enhanced role for Department of Military and Veterans Affairs

Responsibility for the management and preparedness of emergency local response activity should be vested in the Department of Military and Veterans Affairs.

Regional depots, now privately controlled under a Regional Response Agreement, should also be managed under the Department of Military and Veterans Affairs or as the department delegates. This may require some redelegation of authority vested in the Department of Environmental Conservation in the last session of the Alaska Legislature.

The usual professional complement of DEC consists of persons primarily professionally trained in the measurement and evaluation of environmental quality. Such personnel are not as well trained in the skills of maintenance and mobilization of a workforce and equipment, communications, procurement and the like.

The personnel of DMA are primarily trained in emergency response, the mobilization of a workforce and equipment, emergency procurement and similar tasks. DMA's management of emergency response gives DMA a standing outreach into all Alaska communities including personnel, equipment, a command structure, a work force, buildings, planes, vehicles, etc.

DEC, a regulatory agency, though far better equipped and staffed than EPA, did not have a disaster response capability sufficient to meet a spill of large magnitude.

An immediate funding mechanism must be available after a spill to allow the earliest commitment of response resources.

Recommendation 52
Emergency response funding

Procurement limitation was the first reason the Coast Guard did not take command of the *Exxon Valdez* spill, though other reasons, including presidential directive and Exxon's willingness to participate in and fund response, followed.

An immediate funding mechanism would permit authorities to contract resources, mobilize a workforce, purchase supplies, etc. Procurement procedures normally followed to insure accountability make response efforts ineffective under emergency conditions. Until the governor is notified, the on-scene commander should be empowered to authorize the expenditure of funds. When notified of a spill, the governor should authorize the release of funds and determine their allocations among agencies. Both federal and state contingency fund sources are required for an effective spill response capability.

Public agencies were substantially handicapped by their inability to quickly commit themselves financially. In contrast, Exxon was the most effective responder because its officers on the scene had authority to commit the corporation. The Coast Guard is required to determine whether to federalize a spill based on whether the spiller is doing an adequate job. In fact, the Coast Guard determines whether the spiller can do a more effective job than the Coast Guard. This is almost always the case because the Coast Guard is handicapped by procurement limitations.

The EPA has no significant presence in Alaska capable of responding to a major spill on the uplands, notwithstanding that the response planning assumes the EPA will be in charge. In Alaska, this responsibility has been transferred by contract to the Bureau of Land Management.

A declaration of emergency should trigger the ability of the governor or other appropriate officials to release funds collected from state oil revenues to cover all impact costs, including economic maintenance programs and local impacts which become an extra burden on local services, whether provided by state or local government.

Recommendation 53
Local service impact funding

Indirect government service costs can be as important as direct spill expenditures in meeting a spill emergency. Local governments in particular were hard hit by lack of funding for increased burdens which hit everything from phone service to mental health during the crisis following the *Exxon Valdez* spill.

Exxon released some funds to communities for service needs, which it was not obliged to do. But the availability of such funds should not depend on the policy of the spiller.

Recommendation 54
Full-cost reimbursement

As a prevention incentive, existing regulations should be broadened to insure that in future spills the state can recapture all expenses directly or indirectly incurred by the state, its subdivisions and private parties to whom the state owes reimbursement or who have benefited under the state's oil spill disaster economic-maintenance program.

Disagreement on reimbursable costs that resulted in an economic loss to the state resulted in the cancellation of a contract by which, on the pipeline route, DEC exercised EPA authority over spills, all to the detriment of environmental protection. Reimbursability became a criteria for state response in the *Exxon Valdez* spill, to the detriment of the environment and people injured by the spill. A fund should be created in state government to help local governments cover public spill costs caused by oil and hazardous substance releases that cannot be charged back to responsible parties.

Recommendation 55
Private contingency plans

Private parties carrying oil must have a state-approved plan of response to spills of all sizes, including a worst-case scenario, that can be used under either private, federalized or "Alaskanized" spill response.

The state requirement that Alyeska's contingency plan respond to the "most probable" spill, however, put a lid on expectations about response to a worst-case spill. Alyeska did not prepare beyond the state's minimum standard and did not advocate a higher one.

The risk of a catastrophic spill cannot be reduced to zero as long as oil is carried in large quantities. But the interval between spills can be lengthened and the impact mitigated.

Under known and approved technology, it is also incorrect to assume during contingency and response planning that nearly all oil will be recovered. Under extreme circumstances of weather and location, no oil may be recovered. Here the emphasis should be on critical habitat protection.

In reviewing plans for unfavorable circumstances, DEC should determine a standard of "good effort" rather than one based on a fully successful result.

We know of no effective way to prevent major damage once oil reaches the intertidal zone and shore. To be most effective spill response must be immediate to keep oil from spreading or reaching shore and critical habitat. In the case of a spill near shore, it is not the magnitude of the response over time but what is done in the first few hours that offers the most protection.

Exxon Corporation ultimately marshaled an impressive array of resources and spent great sums of money in the *Exxon Valdez* cleanup. As each hour from the time of the wreck passed, however, the worth of each resource commitment and dollar rapidly declined. After two days, the spill managers were effectively incapable of preventing the spill from reaching shore and destroying major habitat areas.

Though containment and cleanup actions were undertaken at great cost and eventually with massive participation by many parties, containment was fundamentally flawed and failed as a result of insufficient resources being applied too slowly to prevent the oil from hitting the beaches.

The lack of resources was compounded by the absence of a standardized system of information transfer in the first few hours and confusion in the command and response system that resulted in decision-making and mobilization lapses in the first critical hours.

Beach treatment, a major investment by Exxon, was too late to touch more than a small percentage of the spill. Large quantities of oil remain in the substrata of beaches and continue to exact a toll on the biosphere. Technologies used to get large quantities of substrata oil out tend to take a high toll on the environment. Assessment of beach condition in Prince William Sound is problematic since the treatment had a cataclysmic effect, if not on the magnitude of the oil, on intertidal life.

RESEARCH & DEVELOPMENT

The *Exxon Valdez* disaster has awakened industry, government and public interest in oil spill research. The May 1989 report to the president on the *Exxon Valdez* by Transportation Secretary Samuel Skinner and Environmental Protection Agency Administrator William Reilly bluntly concluded that "oil spill cleanup procedures and technologies are primitive." That view was echoed by the American Petroleum Institute, an industry group that issued a report calling for new private investment in research and development of spill response methods. Federal agencies are preparing research and development initiatives in spill response techniques, technology, training and deployment systems. There is also increasing interest in coordination and collaboration with other countries, particularly Canada, to provide faster progress, faster dissemination of research results, and less unnecessary duplication of effort.

Legislation now pending in Congress provides for the establishment and funding of oil spill research and development programs. One proposal would create a Prince William Sound Oil Spill Recovery Institute to identify and develop the best technology for dealing with spills in arctic and subarctic marine environments. Another would establish a minimum of six regional centers to address research needs.

Government-supported research and development should insure that public priorities are met, that government agencies expected to direct future oil spill response will be knowledgeable about new technologies and techniques, that regulation is appropriate and effective and that up-to-date response capabilities are maintained. Coordination and cooperation in research and development programs is in the interest of all concerned.

Alaska's interests in oil spill research should focus on specific Alaska marine habitats, the characteristics of oil and dispersant methods in arctic and subarctic waters, prevention research and training programs to ensure that Alaska response authorities will be fully prepared to understand and cope with future spills.

Recommendation 56
Knowledge transfer

The United States, the State of Alaska and Canada should establish cooperative research programs to develop and disseminate knowledge on oil spill prevention and response.

Despite two decades of rising public concern for the environmental consequences of oil spills, research on the subject is still in its infancy. Prevention systems are haphazard. Spill response technology is untested and underdeveloped. Research investment is low, and institutional commitment to this field is scarce.

For a variety of reasons—including, predominantly, ignorance—the latest technologies were not used in the *Exxon Valdez* cleanup. Much of the available cleanup equipment had not been tested in the various circumstances facing cleanup crews. Due to caution or uncertainty, untested techniques were not quickly implemented.

The response effort was handicapped by the absence of a rapid, accurate and comprehensive system, available to all, for information on local conditions, habitat, fish and wildlife, currents and weather.

The primitive state of development of both prevention and response methods holds out some hope that, given sufficient investment, dramatic strides will be made in a short time.

Research dedicated to improving the state of knowledge in oil spill prevention and response should be undertaken to remedy information gaps. Among the topics that should be pursued are the relevant regional geography, environmental assets, weather, technological systems and basic research on the behavior of oil in water. Information management should be included in the agenda for response and contingency plans. Resources should be committed to ensure adequate information systems and services in emergency response efforts in the future.

Recommendation 57
State research center

The state should establish, in the University of Alaska system, an institute for research on oil spill prevention and response policy, technology, testing and evaluation.

An Alaska-based institute should be created and encouraged to strengthen its programs through consortium agreements with other institutions studying the safe transportation of hazardous substances. Research topics should include locality-specific investigations of marine habitat and the impact of oil, as well as prevention policy and response technology. The institute also could develop and administer education, training and safety licensing programs for participants in oil transportation and handling. The institute's efforts should be coordinated with similar programs developed under federal authorization. Its functions should include making recommendations to appropriate authorities regarding changes in standards and requirements in oil and gas and hazardous substance transportation.

The research program should be established independently of that conducted in support of fault-oriented litigation. Research since the Exxon *Valdez* wreck has been noticeably distorted by its litigation orientation.

Recommendation 58
Pretesting

Authorities responsible for testing and approval of response technologies such as dispersants, coagulants, burning and bioremediation should evaluate and decide whether to preapprove these technologies more rapidly.

Parties responding to the spill were handicapped to varying degrees by a lack of scientific knowledge concerning what was available, the properties and effectiveness of various technologies under varying conditions, and the lack of prior approval of response strategies. Those responsible for containment and cleanup were not fully advised on state-of-the-art methods or regularly provided with appropriate technology.

The system for testing and approving new response technologies is haphazard and slow and should be improved. Many emerging technologies hold promise, but they were untested and undeveloped at the time of the *Exxon Valdez* wreck.

The U.S. Navy's use of coagulants in containing and cleaning up shipboard fuel spills—fully tested for Navy use but no other—was of particular interest to the commission. The commission also was intrigued by reports of proposed vessel-based coagulant systems capable of jelling cargo in the vicinity of a breach and of vacuum-based systems for containing oil in a damaged vessel. Such avenues of development call for early and thorough exploration for possible use.

Key public agencies, notably the federal Environmental Protection Agency and the state Department of Environmental Conservation (both of which are involved in Regional Response Plans and the oversight of industry contingency plans), are charged with approving or disapproving response technologies for oil spill cleanup. A continuing, visible process for study, analysis and application of emerging technology is required.

Recommendation 59
Tanker simulator training

West Coast states should create a training center using simulators to advance the knowledge of masters, mates, pilots and shipboard bridge crews in the operations of very large vessels in West Coast ports.

There is currently no place on the West Coast where mariners can receive real-time simulation training in the bridge operations of very large ships. Maintaining an adequate pool of ships' officers and pilots fully trained in up-to-date circumstances will enhance safety and efficiency in the maritime industry.

Analysis of commission process

This chapter sets out the course of reasoning the commission followed in reaching its recommendations and explains how the recommendations fit together. The commission divided its work into the categories of prevention, response and institutions. Institutions was subdivided during information gathering into prevention and response segments and then remerged for developing recommendations. These divisions will be used to further explain how the recommendations came to be adopted. Some supplementary recommendations also are presented for amplification.

Insitutions

Characteristic of rare, catastrophic events, whether man-made or natural, is the tendency for the event to fade rapidly from individual and collective memory. Those with titular responsibility for prevention or response also follow the public's natural inclination—to relax and forget. Day-to-day responsibilities take over. Short-term goals squeeze out consideration of long-term issues. Attitudes prevalent before the catastrophe tend to reassert themselves.

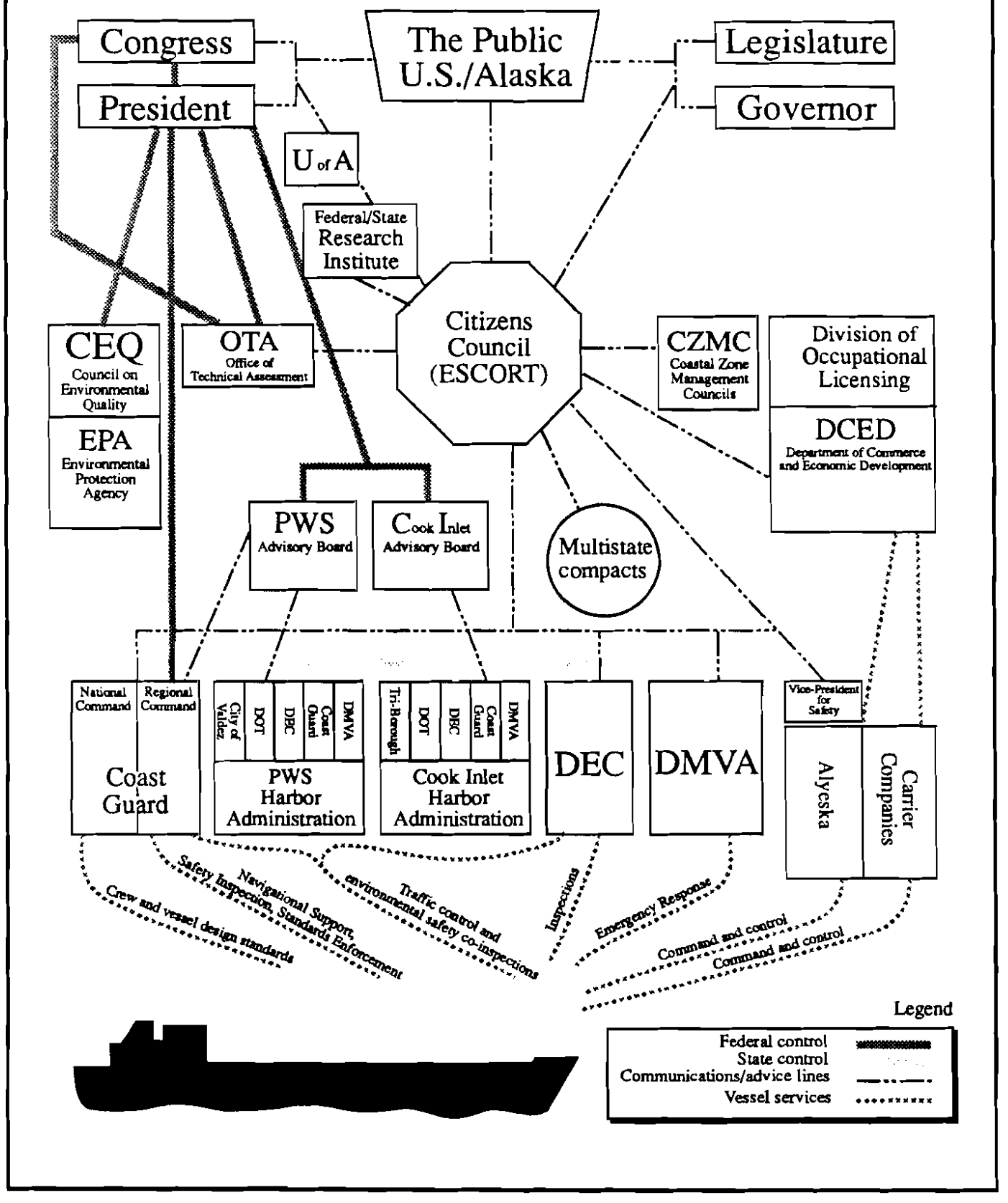
Immediately after the *Exxon Valdez* disaster, the shocked disbelief of the Alaska public was reflected in the attitude of the Coast Guard commandant who expressed amazement that such an event could have happened at Bligh Reef, one of the best-known navigational hazards in the region. Some people had been jarred out of their earlier complacency by such events as Alyeska's regional manager crowing in an annual report how he had cut costs without loss of effectiveness. The Alyeska emergency response team at Valdez was disbanded in 1981 to save the cost of warehousing cleanup resources that were called "a tremendous waste of city money" in testimony before the U.S. House Committee on Merchant Marine and Fisheries, April 6, 1989. The Alaska Department of Environmental Conservation (DEC), absorbed in questions involving ballast treatment and air quality at the terminal and municipal subdivision approval of wastewater treatment, lost focus on tanker safety oversight. Pleas for more funding from the lower echelons of the state bureaucracy, at one time so eloquent, lost their desperate edge as time wore on. The Alaska Legislature routinely ignored categorically stated needs for prevention and response resources.

There is plenty of blame to go around for complacency, neglect and ignorance. Finger pointing, however, has not been the commission's mission. In many ways the lapses of all involved are understandable in that they reflect predictable human motivation. It is all too human to assume that nothing extraordinary will happen on one's own watch. The question for the commission, looking for lessons in prevention, was: How do you maintain attention, diligence and vigilance in the absence of an imminent threat?

"The best way to keep the oil from becoming a problem is to keep it in the ship, because historically ... we clean up very little of the oil. ... So I guess prevention is one of the things that we certainly would look at as the strongest avenue to avoid having a catastrophe."

Commander Dennis Rome, U.S. Coast Guard
Alaska Oil Spill Commission hearing, 8/31/89

Proposed oversight/regulation of oil transportation



The commission's strategy involved creation of a system of citizen oversight (Recommendation 12: Oversight council, and Recommendation 26: Regional advisory committees) grounded in the proposition, simply stated by one of the witnesses, that "people take care of the things they love." To bring about grass-roots involvement, the commission proposed that the entire state be divided into regions, each with a citizens' oversight council at the local level. Those living closest to the problem and the resources at risk are those most likely to act, given adequate information.

The local councils would provide a constituency to support the statewide council and eyes and ears to aid it. The statewide council would oversee the safe transportation of oil, gas and other hazardous substances. It would coalesce many voices in the state and provide expertise and linkage to the centers of power in industry and state and national government. The statewide council also would have information-gathering horsepower through subpoena power and a small staff, presumably an executive director with clerical support.

"We should look beyond ineffective sticks and consider some carrots as well. I think we should consider paying the industry to stay ready and to stay on top of technology—with their money, of course."

Professor Steve Colt, University of Alaska Alaska Oil Spill Commission hearing, 9/21/89

The commission was aware of the potential for a negative reaction to its recommendation of what might seem an excessive number of advisory bodies. The fact that different regions of the state have different problems and geographic imperatives means that a single, regional organizational format would not work. Some regions are sparsely populated and poor, others are more densely populated and powerful. No single pattern of regional council composition seemed appropriate.

Two embryonic regional councils were already in existence at very different levels of development. Various persons and communities with interests in Cook Inlet had already met to discuss common concerns in prevention and response. This meeting had not yet gelled into a formal organization. Alyeska has responded to a community initiative to establish an advisory council to the Valdez terminal and its operations. This regional council has 15 active members, and more would like to belong. In February 1990 Alyeska approved the council's ambitious budget of $2 million, based on contractual obligations with Alyeska that presumably would include research and investigatory functions. Congress is considering institutionalizing one or both of these arrangements. Recognizing that congressional authorization would give added weight in dealing with federal agencies as well as implying more resource support, the commission was inclined not to advocate establishing a counterpart under state law, creating the possibility of confusion. Instead, the commission urges Congress to adopt a form of council that will make sense according to the rationale advanced by the commission.

The commission believes that operating functions should be kept separate from citizens' advisory functions. If representatives of operating agencies are included in the membership of advisory committees, the fact that they are often paid to be there and have access to supplemental resources tends to make their influence dominant;

and the agenda turns to operational issues and costs. Citizen focus on environmental safety may be driven out. For busy waterways like Prince William Sound and Cook Inlet, user groups must be involved in common planning and administrative issues, but they should have their own forum. Harbor users seldom need government initiative to assist with organizational arrangements or transactional costs. Only democratically elected officials specifically concerned with public protection should participate *ex officio*.

"If you had an enforcement unit in place, staffed by the people who were solely charged with it and not distracted by some of the other responsibilities, they would be able to take the time to account for what are our main polluters in the state."

Sue Libenson, Executive Director
Alaska Center for the Environment
Alaska Oil Spill Commission hearing, 9/21/89

The commission received many complaints during the spill hearings that local elected officials had not been consulted about problems posed by safety practices and were ignored during response operations. Under Recommendation 27 (Local government representation), local governments, including tribal councils or other traditional arrangements, are mandated for participation.

Outside the two high-traffic, high-risk areas of Cook Inlet and Prince William Sound, the commission was concerned that environmental safety has been given short shrift over the years, notwithstanding the safety mandate of government agencies. During the commission's deliberations a freighter grounded itself on St. Matthew Island in the Bering Sea and lost a substantial quantity of its fuel. Though the island is part of the Bering Sea National Wildlife Refuge, critical habitat to walrus and other sea and island life, the remoteness of the location and difficult climatic conditions meant that there was effectively no response to this spill. A regional council, concerned with environmental and human safety, would create pressure to require contingency plans and a response capability as well as improved navigational systems to reduce the risk of this type of event, now treated like a routine cost of doing business.

The Coastal Zone Management Act provided for a system of regional councils addressing issues intertwined with oil spill prevention and response. As long as the CZM council is not overloaded, and considering the small pool of citizens in remote regions with time to devote to important public tasks, the commission suggests that the advisory role with respect to maritime safety might be given to these existing councils. The question of establishing an independent council structure or using CZM councils should be left to the regional political leaders to suggest for each region.

The advisory responsibilities of the statewide council constitute a broad and exciting mandate. The commission knows that any oversight council is no stronger than those who serve on it, but the commission believes that many competent, dedicated citizens would be attracted to the privilege of service, notwithstanding that issues before it may seem less important as the grounding of the *Exxon Valdez* fades into history.

The council is also properly a pulpit for public safety education. It must broadcast the policies reflected in Recommendation 1 (Prevention as policy) and Recommendation 2 (Changed attitudes) and in the imperative reflected in Recommendation 10

(Obligation to manage and protect), which also reflects Article VIII of the Constitution of Alaska. The commission was also educated and persuaded of the vitality of the public resource trust concept now flourishing in court-developed doctrine, as a motivator of the state in protecting resources.

The oversight council system has a public education responsibility—reflected in Recommendation 3 (Citizen knowledge of risk)—to make citizens aware of the risks involved in the transportation system so they understand the tradeoffs. The councils will look over the shoulder of industry to make sure that corporate leadership is moving in a responsible direction and doesn't stop as the spotlight of publicity passes to new subjects.

The commission also was concerned that adequate oversight be maintained on the overland segments of the oil transportation systems in the state. An advisory committee serving the Interior overland route of the trans-Alaska pipeline was called for with oversight responsibility for the transmission and gathering lines if these two were not to be watched by separate committees on the north end and Interior segments.

"We're going to have to make a concerted effort to collect more information and inform the public and the people out in the communities to just exactly how these options can play into a practical oil spill response."

Jim Butler, Kenai Peninsula Borough
Alaska Oil Spill Commission hearing, 9/7/89

Major pipeline corrosion problems began leaking into the news during the commission's deliberations, and a spill occurred in Prudhoe gathering fields, reminding the deliberators that maritime spills are not the only risk. The pipeline corrosion problems may involve hundreds of millions of dollars of replacement and repair costs. Though Alyeska was obviously reluctant to share information or to acknowledge the extent of the state's interest, commissioners who were involved in the state's original oversight of pipeline construction could not see why there would be less public interest in reconstruction and repair.

The commission recommends a multimodal approach to resolving environmental safety issues, including encouragement of private initiatives; direct state action in statutory enactment and regulation; formal initiation of federal rule-making through Section 553 (e) of the Administrative Procedures Act (5 USC sec. 553(3)); petitioning the president and Congress; and encouraging interstate compacts. The commission noted that interstate compacts are a logical extension of federalism when larger regional issues must be addressed. Joint initiatives by the states also have the effect of encouraging Congress and the president to look at the issues being addressed from the perspective of federal responsibility. Since success is not certain, these avenues all could be tested simultaneously, even though only one or two approaches may provide the framework for the eventual resolution of issues. These efforts to achieve substantive goals also reenforce each other.

The commission struggled with the problem of how to get the industry to improve its attitude toward environmental safety without appearing to merely preach. The commission was aware of great differences in performance between oil companies

based on the contrasting perspectives of the board of directors and top management. The commission was impressed by the speed with which Exxon moved and the scale of the resources it made available, if not with the corporation's readiness and prevention activities. The industry is no monolith in its attitude toward environmental responsibilities, though it is sometimes necessary to make generalizations about dominant forms of behavior. The commission considered mandating public members on boards of directors but stopped short of adopting this as a recommendation, partly from skepticism concerning who would be chosen and how vigorously such people might proceed. Nonetheless, the commission encourages these corporations and others having such a broad impact on the quality of life to chose directors with a vision beyond corporate profits. Otherwise we may expect public pressure for mandated participation to rise. Whether or not it constitutes preaching, the result of this objective needs to be stated: Shipping and oil industries devoted to the environmentally safe transportation of oil could make the difference (Recommendation 6 Industry commitment).

"The emotional healing will come to people through making decisions."

Connie Taylor, Chair, Cordova Oil Spill Response Office
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

In a changing world, the requirement that technological knowledge be constantly updated is usually a given. For prevention and response to oil spills, however, the commission was startled by the low level of effort by both private and public institutions. Recommendations 56 (Knowledge transfer), 57 (State research center), 58 (Pretesting) and 23 (Arctic prevention research) are intended to create involvement, but private resources also must be committed. Commissioners hoped that the industry would recognize this spontaneously or as by public outcry. The American Petroleum Institute has announced a program of investment in response research (and resource depots), which might be appropriate if a maintenance level of support is needed for ongoing research work. The commission believed, however, that the private commitment was too little with so much catching up to do. The commission was impressed by the relative indifference of the industry and the Coast Guard with respect to vessel traffic system technology as well as response technology. A backlog of untested, but promising approaches has been allowed to molder in an environment of red tape and no or low budget.

One of the spurs to knowledge utilization in industry is the requirement, imposed by regulation, that private operators use the best technology coming out of the laboratory (Recommendation 7: Best available technology). The commission was aware of the considerable controversy generated by use of best available technology as a standard under the Clean Water Act of 1973 and elsewhere. The commission carefully proposed that the regulators and the industry "strive" to adopt the best technological standards, keeping in mind the tension between the "best" and the "best practicable," or proven, on the frontiers of knowledge. The commission's view was that these are decisions that should not be made on the interpretation given a word; rather, they require a best consensus judgment considering a complex of factors.

"I would promote that there is a state group that deals with marine transportation, kind of a one-stop shopping group."

Jerry Aspland, President, ARCO Marine, Inc.
Alaska Oil Spill Commission hearing, 9/1/89

Regulation initiation is already a soft process; that is, a drafter of proposed regulations will commonly take into account the need for balance in meeting a regulatory objective. The industry generally has dragged its feet, advocating no or minimum regulation. Initial compromises are made in the agency's councils and the drafter's head. The government administrator must consider the economic impact on the tail end of the industry as well as its leaders. The commission noted a great deal of career overlap and sympathy between the Coast Guard and the industry (Appendix I) and even more at the level of international regulation, where the industry is the dominant force. The effect of industry advocacy for watered-down regulation on top of this internal process frequently produces a lowest-common-denominator result.

When an emergency occurs, the party responsible (though perhaps capable of a much higher level of response or preparedness) often points to the lowest common denominator as a standard. In this atmosphere, voluntary compliance with higher standards is obviously of great importance to overall safety in the industry. Without examining the motivation that went into its response, there can be no doubt that Exxon's willingness to go beyond minimums of legal obligation made a great difference in the *Exxon Valdez* spill. This raises a formidable question, however. What would happen if a vessel without the backing of Exxon's resources and policies were responsible for a disaster of this magnitude? Obviously, it is not enough to leave response to corporate *noblesse oblige*.

"The tradeoff in risk involved with a double hull is that to carry a given amount of oil, you now have to have 60 percent more tankers, and if you do the arithmetic that's the way it comes out."

Frank Iarossi, President, Exxon Shipping Company Alaska Oil Spill Commission hearing, 9/1/89

Though the commission made no specific recommendations about the regulatory atmosphere, the commissioners obviously believe that more members oriented to public safety should be involved in the regulation-making process to relieve the "stacked deck" atmosphere that is too often a characteristic of safety deliberations.

The commission believes that though corporate executives could not be made to drink of the waters of belief in environmental safety, a corporation could be brought to the water through requiring the designation of safety personnel. This concept was implemented in part through Recommendation 16 (State licensing of safety managers), which puts the managers of terminals and pump stations on land under an equivalent regime of training and accountability with masters, mates and pilots. The commission considered mandating safety officials at the corporate level. The commission was convinced that safety attitudes must start at the top if they are to work their way through the whole corporation. But the commission was loathe to mandate what might occur spontaneously through a renewed interest on the part of the great corporations to show environmental conscientiousness. Americans should watch to see whether a voluntary response is forthcoming.

Recommendation 8 (Corporate safety executive), expresses the commission's strong belief in this measure. Since the executive summary of the commission's findings and recommendations of this report was issued in January 1990, Exxon appears to have followed this recommendation, though the designation of a marketing person

caused some skepticism. The Alyeska consortium has moved on this issue, too, by appointing a vice president for environmental planning and control. The description of the officer as a person responsible for making sure that regulations are followed appears to reflect the old attitude that what is needed is more attention to following the letter of the law. As evidenced by the testimony of this officer before the state legislature, it would appear that the notion that the industry knows best and should operate with the minimum of government involvement dies hard.

"In spills of this kind the Coast Guard has primary jurisdiction, and it is only when, as I understand the law, only when the responsible party either refuses to clean up or fails to do the job that the Coast Guard has the ability to step in."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Alaska Oil Spill Commission hearing, 8/31/89

The commission believes that the statewide oversight council needs to monitor changes within the industry and report to Alaska and the nation on voluntary actions within the industry that enhance environmental safety. Undoubtedly, industry leaders will take many actions not mandated or recommended, and they should be publicly commended as they are taken.

The commission also considered and rejected statutory mandating of changes in piloting regulations, having in mind that fine tuning might be better styled by the State Board of Marine Pilots. (AS 98.62.010; Recommendation 20: Marine pilot qualifications). The commission explored generalized complaints about the piloting system emanating from industry testimony. On further investigation, it appeared that the issues do not lie with the Alaska pilots, whose experience, qualifications and training are satisfactory. Problems that might exist in other regions were beyond the commission's investigatory role. The commission believes that the system of federal and state licensing should be continued. In general, for Alaska exclusive federal licensing would have the effect of lowering standards. Since *Cooley v. Board of Wardens* [53 U.S. 299 (1851)], the need for local control of piloting knowledge and standards has been a feature of the maritime industry, constitutionally recognized. Instead of mandating changes in piloting, the commission believes the statewide citizens' oversight council could be involved with improvements in piloting undertaken by the Board of Marine Pilots.

The oversight of piloting is one of several illustrations of the scope of this mode of activity. The council is the watchdog not only over the private sector's response to safety but also over state and federal agency activities. The absence of independent oversight was a significant contributing factor to the decline in budgets of both state and federal oversight agencies. Faced with cuts and impossible operational demands, the Coast Guard is all too ready to keep a stiff upper lip and demonstrate the much-admired "can do" attitude. The commission quickly rejected the alternative option of attempting oversight through executive line agencies for this reason: citizen leadership is required for independence and the ability to talk straight about government performance.

"There has been a real attempt not to look at boundaries, but to look at the Seward zone as an ecological zone."

Ann Castellina, Superintendent, Kenai Fjords National Park Alaska Oil Spill Commission hearing, Seward, 7/14/89

To keep abreast of technological developments and requirements, the council would need the benefit of impartial, high-quality technical advice. The establishment of an independent university-based research institute is essential to the oversight function.

Recommendation 57 (State research center) was the final building block to complete an institutional base to the oversight function. Congress appears also to be recognizing the importance of such a knowledge development and dissemination center for all parties at interest. Proposed congressional legislation includes provision for a research institute. The commission supports this proposal. The commission believes that ties to university governance will in the long run provide better compliance with scholarly performance. By contrast, an independent, free-floating institute may come under dominance of privately contracted research or otherwise become the focus of a power struggle among contending interests.

Such an institution should be a center for northern studies in this area of concern, pursuing strong ties to Canada and research efforts going on elsewhere internationally and in the United States (Recommendation 46: Knowledge transfer). Cold water and low temperature research is a defined field of study in which linkages can be made with existing programs operating under the University of Alaska system. The institute could assist the EPA and other agencies in the development and testing of cold water response systems, now in backlog condition (Recommendation 58: Pretesting). Continuing cleanup and followthrough studies in Prince William Sound from the *Exxon Valdez* disaster can naturally be wrapped into the scientific program of the institute as the litigation emphasis subsides or as proprietary and litigation secrecy wraps are removed.

The commission was aware of the long-term development prospects in arctic Alaska for oil and gas, particularly in the maritime environment of the Arctic Ocean and the Chukchi, Bering and Beaufort seas, said to contain more than a third of U.S. reserves. Though the commission wholeheartedly endorses the adoption of national goals for reduced dependence on hydrocarbons, realistically it anticipates considerable pressure for the development of these underseas resources. Yet little research and development have been done on safe transportation of hazardous substances in the Arctic. Vessels now traveling in the area are rarely equipped with the kind of prevention technologies that prudence would suggest. Response capability in most places in the Arctic is nil. The commission sees the Arctic as becoming an area of risk of the magnitude of Prince William Sound or greater if oil and gas are produced with no greater investment in safety research than the present. Action on this front is required now if delay is not to be experienced when major discoveries occur (Recommendation 22: Remote spill response).

"An oil spill volunteer force should be trained, just like a volunteer fire force, so that you have qualified people in the villages ... that are prepared and ready to go."

Jim Sykes
Alaska Oil Spill Commission hearing, 9/21/89

Prevention

The commission has used the lessons of the *Exxon Valdez* to recommend changes that will improve general safety in oil transportation. The grounding highlighted the need for certain technological innovations that would help prevent future accidents, but there is no substitute for prevention through changes in underlying institutions and attitudes.

From the beginning the commission differentiated between causes of the *Exxon Valdez* spill and those important to the safety of the oil transportation system worldwide. The same combination of system flaws that produced the Good Friday spill probably won't recur. Although inadequate technologies and poor management practices on the *Exxon Valdez* "caused" the tragedy, behind these problems were flaws in corporate management and regulatory policies should have protected the public. These flaws at the top resulted in problems at the operational level that can not be cured with technical fixes or reshaping local practices. Policies and attitudes at the top which they reflect are the principal causes of spills and wrecks, and they, too, must change.

Most simply put, the *Exxon Valdez* spilled its cargo because it hit Bligh Reef. It was traveling outside designated tanker lanes at a higher rate of speed than should have been permitted under the circumstances. The speed reduced the time for making discretionary judgments on steering and aggravated the extent of the damage when the reef was hit.

Various technologies well past the experimental stage could have helped avoid the disaster or at least reduced its magnitude. The vessel was not equipped with navigational aids that clearly would have identified through display on the bridge the dangerous situation approaching after the tanker left designated lanes. Other devices could have provided electronic light and sound warnings. The size of modern vessels as well as operating conditions make additional equipment more necessary than ever.

"I can't quantify the losses that occurred because no in-place, quick studies were made as to what was happening to the economy at that time. We have lost the economic history."

Vince O'Reilly, City of Kenai Alaska Oil Spill Commission hearing, 9/7/89

The *Exxon Valdez* was not accompanied beyond Valdez Narrows and only to within 5 miles of Potato Point by a pilot vessel, either of which could have provided a double check on the navigation of the tanker and aided it in the event of a power loss (which was not involved here), including providing immediate communications and cleanup resources. A double hull could have reduced the size of the spill by as much as 60 percent, according to a Coast Guard study after the accident.

The tanker grounded on the reef because the helmsman steering was not sufficiently trained to know the hazards of the ship's position or to question the judgment of his superior officers. He was directed by the third mate, who was not qualified to be in control of the vessel alone at that time and place. The captain was not on the bridge, although he was required to be. The reason he was not on the bridge—which contributed to the late course correction of the vessel—was not given by the captain and appears to reflect fatigue and, perhaps, alcohol consumption. The lookout, who eventually noticed and reported that the vessel was off course in relation to Bligh Reef light, was off station for a period of time while the vessel strayed out of designated lanes and could have reported the location problem earlier.

Crew numbers have a relationship to safe management of a vessel through redundant responsibilities to reduce the chance of accidents. The specific causal factors described above reflect corporate attitudes regarding outlays for training, equipment

and vessel design, attitudes that allowed the creation and tolerance of crew fatigue through undermanning and winked at failure to follow rules, particularly if money was saved as a consequence. Each of the causes of the accident cited here also has a counterpart in the failure of government to adopt adequate regulations or to enforce them through adequate surveillance and inspection and disciplinary proceedings under public authority.

To the extent that government has assumed responsibility for navigational support systems or has established such systems through regulation, the failure to provide the best available technology is a cause of the accident. In this case the Coast Guard did not have adequate radar to cover the full length of a hazardous passage. Nor had it adopted regulations or made equipment such as Loran-C Retransmit available to better identify the location and course of vessels in relation to hazards of the region.

"The states must establish navigational safety advisory groups ... of people that live in the local areas, that understand navigation, and understand ship operation."

Jerry Aspland, President, ARCO Marine, Inc.
Alaska Oil Spill Commission hearing, 9/1/89

Even had the Coast Guard been aware of the vessel's peril, it appears unlikely from the testimony of those in charge that the watchtanders on duty would have felt obliged to notify the tanker that it was in danger. The members of the unit viewed it as an information service rather than as a participant in a safety management system. Only one Coast Guardsman was on duty—which was not a factor in this case because more people would not have known where the vessel was, either. Nor is the competency of that person a factor.

The most obvious deviation from safe operations on the vessel's disastrous trip to Bligh Reef was the *Exxon Valdez* departure from designated tanker lanes (a practice that had become routine) by giving notice to the Coast Guard rather than by seeking permission. If the tanker had not left the tanker lanes completely, it would not have been on its way to Bligh Reef. In this case permission to leave the tanker lanes was not given, but probably would have been if requested. No directive vessel traffic control system existed for Prince William Sound, and its absence contributed to the grounding of the *Exxon Valdez*. A Coast Guard directive system probably would not have permitted the type of course deviation that occurred.

The vessel left the tanker lanes because it was behind schedule and working its way up to sea speed. The advantage of the deviation was that it cut the dog leg in the tanker route and allowed the vessel to avoid a field of small icebergs for which it might otherwise have had to slow down. Small icebergs are a threat to vessels only at high speeds. At low speeds, a tanker can safely push its way through the type of ice usually found in these waters. Exxon Shipping had put officers and crew under some pressure to maintain schedule, since time, with a big tanker, is definitely money. Time pressure also encourages fatigue in port since the longer the crew works, the quicker it will turn around and be off to sea again. Safety turns on a matter of dollars and cents. Time pressures are put on all tanker masters, but some companies emphasize keeping schedules. Both the *Torrey Canyon* and the *Metulla* disasters were initiated by masters cutting corners to save time.

"I think that the literature will also reveal that the corporate culture is a factor in how an organization responds to a crisis including an oil spill."

Rick Steiner, University of Alaska Marine Advisory Program
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

A contributing cause of the grounding of the *Exxon Valdez* was the absence of a state presence either in the regulation of the traffic, in vessel or crew inspection, or generally in the oversight or participation in the safety regulatory regimes governing vessels. (Piloting, which is subject to state regulation, is an exception.) Vessel inspection could have included an interview with the captain of the vessel and may have resulted in an awareness of drinking, thus intercepting a contributing cause of the grounding. A specific testing program for drugs and alcohol would have been even more likely to eliminate this as a contributing factor.

"There was never a question in my mind about whether to incur a commitment or enter a contract because of worries about funding."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation Alaska Oil Spill Commission hearing, 8/31/89

The state-licensed pilot had been dropped off moments before the vessel departed from its traffic lane. This practice had begun out of concern that dropping the pilot farther out, nearer Hinchinbrook Entrance where Prince William Sound meets the open sea, creates a safety hazard in heavy seas. At the time of the accident seas were close to calm and visibility good. There was no reason to drop the pilot early except precedent. The absence of the pilot from the bridge and the practices that caused this also were causes of the wreck.

Many people told the commission that when the state had participated with the Coast Guard in a "two-tiered" system of regulation during the first few years of Valdez operations, the joint effort kept both forces more alert. The state had pulled back from this with a series of decisions—executive, administrative, judicial and legislative—encouraged or instigated by the shippers. The shippers claimed that federal activity in the regulation of vessel and navigational safety had preempted the potential for and utility of a state role. The correctness at the time of the legally controlled aspects of court decisions excluding state participation is debatable, and it was questioned by the commission's own review. The passage of time, intervening congressional action and the adoption of Executive Order 12612 in 1987 (about which more will be said) made curtailment of state activities less defensible. Still, in the current post-spill era ARCO maintains that the state can act only in an advisory role and that all regulatory authority should be vested at the federal level only.

Of the technical fixes proposed after the *Exxon Valdez*, the two most conspicuously useful are the design requirement for double hulls and the installation of a full-service vessel traffic control system equipped with contemporary technologies. The hazard and risk assessment contractor retained by the commission (Appendix J) identified these in priority order as the most effective prevention measures that could be taken. The industry, through Alyeska, responded in the post-spill period to enhance prevention, dramatically and at great cost, by providing an escort vessel service and cleanup response crew said by it to require $50 million per year and a capital investment of a quarter of a billion dollars. This was done apparently before any hazard evaluation or risk-assessment studies were undertaken. Subsequently, the industry has cautioned the Alaska Legislature to consider carefully the cost of measures involving an expanded state regulatory role at a cost not likely to exceed 10 percent of these expenditures. Though Alyeska has called for more funding of the

state Department of Environmental Conservation, it wishes no interruption to the traditional, exclusive and cordial relation of the industry and the Coast Guard with respect to the prevention of accidents. Opposition has also been voiced by shippers to double-hull requirements.

The commission is recommending, for the most part, no more than was promised by the U.S. government and the owners of the trans-Alaska pipeline system to Alaskans and to the American public at the time the system was authorized through the granting of state and federal right-of-way permits in the early 1970s. At that time it was clearly stated by representatives of the owners that double-bottomed tankers would be built for the route and that the Coast Guard would be supported in providing the most modern systems for shore-based vessel guidance that America's technical genius could produce. Nothing much different is proposed by the commission. The passage of 15 years has only served to confirm, as did the spill itself, the wisdom of these sensible measures and folly of the money-saving stubbornness and resistance of both industry and government to even the wisest and most obvious of changes.

Two years of careful study and negotiation between the state and Alyeska's owner companies in the mid-1970s resulted in agreements that tankers would proceed in designated lanes through Prince William Sound; that they would have tug escorts in the sound; that a vessel traffic system would monitor tanker traffic to Hinchinbrook Entrance; that pilots would be on board while in the sound; that redundancies in radar and other navigational systems would be on board the tankers; and that ice problems would be handled by slowing to minimum safe maneuvering speed while remaining in the tanker lanes.

"Cost avoidance also occurs through the efforts of managers of all agencies to try to control information in order to keep other people from finding out whether you might be able to do a better job. Public policy can improve organizations so that they do what we want."

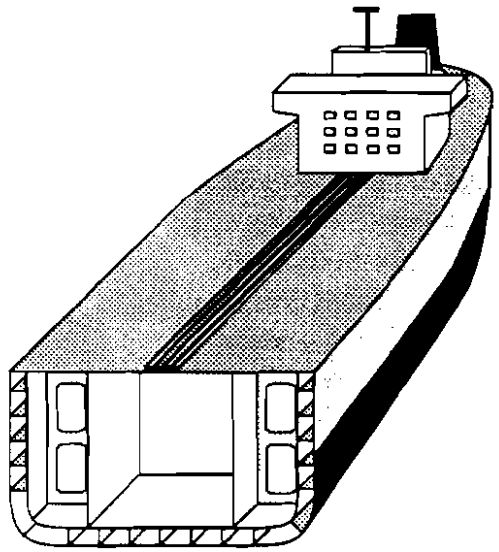
Professor Matt Berman, University of Alaska
Alaska Oil Spill Commission hearing, 9/21/89

Sea trials were held to check the system in April 1977 using the *ARCO Fairbanks*. The trials were successful. The key to the system was the tanker lanes, which had been designed through the first simulation exercise ever conducted for a North American port. This was done under the auspices of the State of Alaska and was funded by the state under the terms of the Pipeline Authorization Act.

Meanwhile, the Alaska Legislature had passed SB 406 (Ch. 226, SLA 1976), which established risk charges paid by operators of tank vessels and oil terminals into the Alaska Coastal Protection Fund. The mandates of AS 30.20 and AS 30.25 established, by class, standards of construction and operation for tankers and terminals and permitted reductions in the charges to be levied by the state, tied to specific improvements which brought a vessel's operations into a higher class. The aim, to minimize risk in operations, was carried out under this mandate until 1979. The Valdez terminal was operational with a permanent response crew in position and with response vessels and equipment on constant standby.

Tankers with double bottoms were constructed in this period to meet the state's requirements. The Department of Environmental Conservation set its budget year

Proposed double hull design



Source: ECO, Inc. 1989

objectives for fiscal year 1979 to have 10 tankers in the fleet serving Valdez with double bottoms. But in 1977, almost as soon as the Valdez terminal opened, Alyeska owners filed suit against the state to overturn AS 30.20 and AS 30.25 on the basis that the federal government preempted most of the areas the state was attempting to regulate. At the trial level the plaintiffs in *Chevron v. Hammond* were successful. The state appealed parts of the decision, but the major elements of the statutes were removed from the case by agreement between the oil companies and the state—either before trial or before appeal—and they were subsequently repealed. The state appealed on only one point, the state's right to regulate ballast discharge, on which point it prevailed in the Circuit Court of Appeals, where the case ended.

After 1979 no new double bottoms were built by the industry. The only new ships, the *Exxon Valdez* and the *Exxon Long Beach*, were designed not only with single hulls but with 20 percent less steel weight than tankers designed in the 1970s for the Valdez trade. These ships were launched in 1986. Structural failures already have been reported.

Ships operating in the Valdez tanker trade are an aging, somewhat decrepit fleet, of which 73 percent are single bottom hulls. The commission wrote to Exxon Shipping Company asking that it consider refitting the *Exxon Valdez* with a double bottom while it was in for repairs. No reply was received to this letter. The cost of repairing the *Exxon Valdez* is reported to be about $25 million. The commission's consultants report a double bottom would have cost from $5 million to $7 million more. The *Exxon Valdez* will return to service soon—without a double bottom and with power plants and safety systems that are below both national and international age standards. The commission has recommended that the fleet be replaced, despite arguments about Alaska's declining oil production.

"There needs to be a continued strong state and local role. The state should not be preempted."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

There is no substitute for regulatory vigilance in government agencies or for corporate attitudes that put safety first. Much of the effectiveness of regulation depends on attitudes of those in charge at the very top. These attitudes will enfeeble or invigorate the front line (Recommendation 4: Regulatory vigilance), but strength of purpose means little if budget and appropriations do not follow. The commission found a low level of vigilance and a discomforting level of comfort between the industry and Coast Guard regulators. State regulation had been withdrawn.

The commission found that if reasons for the state's withdrawal from regulatory oversight were ever valid, they are not today. Of particular interest with respect to

the changed atmosphere is Executive Order 12612, promulgated by President Ronald Reagan on Oct. 26, 1987:

> To restore the division of governmental responsibilities between the national government and the states that was intended by the Framers of the Constitution ... Executive departments and agencies shall construe, in regulations and otherwise, a Federal statute to preempt state law only where the statute contains an express preemption provision or there is some other firm and palpable evidence compelling the conclusion that the Congress intended preemption of state law, or where the exercise of state authority directly conflicts with the exercise of Federal authority under the Federal statute.

It is also apparent from the repeated inclusion of specific anti-preemptive clauses in legislation now before the Congress, that the legislative branch is in full agreement with the executive order, particularly with respect to state laws designed to protect the environment.

"There is no mandate to a government body that when an incident like this occurs they shall go gather data. There's no mandate in place and there's obviously no funding for that mandate."

Vince O'Reilly, City of Kenai
Alaska Oil Spill Commission hearing, 9/7/89

In the interest of avoiding litigation, the commission has not recommended the reimposition of the previous classification scheme and variable fee schedule relating to vessel safety. The cents-per-barrel charge adopted by the Alaska Legislature to fund safety measures raises sufficient revenue. The industry's preference for a revenue system that subsidizes more risk-prone vessels can be left in place. The state can exercise special regulatory vigilance with respect to higher-risk vessels.

The commission proposes a three-pronged approach to federal regulation: First, the commission recommends that preemption be avoided through negotiation of cooperative agreements between the state and the Coast Guard or other authority to insure congruity of local practice. The commission advocates cooperative state-federal rule making and enforcement.

Second, to the extent this proves difficult for the Coast Guard, because an existing tradition or practice that the agency is loathe to change, the State of Alaska should initiate a rule change under the federal Administrative Procedures Act. The agency would be required to give a well-reasoned justification for rejecting the state's proposal, which would allow judicial review of the denial of the state's proposal.

Third, the commission encourages development of a common policy with other coastal states through formation of an interstate compact. That procedure would result in a rule that overrides a conflicting federal regulation and has the weight of an Act of Congress. Specific questions of preemption must be taken up with the details of specific proposals rather than treated as a generic question.

Both the potential impact of federal preemption and the ability of concerned parties to avoid confrontation on such issues arises in Recommendation 17 (Enforcement in

state waters), which addresses the potential damage to state resources that could result from a spill outside the 3-mile limit that washes onto the state's beaches. The commission was particularly concerned by the real possibility of structural failure occurring in the sometimes exceptionally stormy waters of the Gulf of Alaska. A spill a few miles off the Alexander Archipelago could soak beaches and destroy fisheries along the coast of Southeast Alaska and would be carried by the Japanese Current into Prince William Sound.

"I personally am rather skeptical that there will be as much scientific value gotten out of this situation as would otherwise be possible. That's partly because the work is confidential and partly because the work is focused on determining the extent of environmental injury, which is not the same as understanding in ecological or social terms the impact of this event on Prince William Sound or southcentral Alaska. ... It's seemingly driven all other activities off the map."

Professor David G. Shaw, University of Alaska
Alaska Oil Spill Commission hearing, 9/21/89

That spill scenario illustrates only one such risky situation. Though for some technical purposes the state has no regulatory nexus with events in waters outside its 3-mile limit, if the vessels involved are heading for an Alaska port, such as Valdez, the state can require that the vessel adopt a contingency plan that protects the environment while the vessel is en route. To bolster that state objective, which supports federal objectives, the terminal can require that such a plan be in effect. The commission also was particularly concerned about barge traffic in the Inside Passage of Southeast Alaska. In its winding, narrow waterways the greatest risk is of grounding and collision. The commission urges DEC and the Coast Guard to work together to provide more effective measures in both areas for spill prevention and response.

For many purposes, the state and the United States need have no jurisdiction over events on foreign flag vessels vessels in Alaska waters. But if the conduct or preparedness of such vessels constitutes a threat to the Alaska environment, there is no reason to hold off on the enforcement of uniform regulation (Recommendation 5 Foreign-flag spill prevention).

Though the commission does not advocate unilateral regulation by the state that might disrupt foreign or interstate commerce, it does not consider it an undue burden to require safety equipment such as electronic gear, for instance, and English-speaking technicians, to allow such vessels to participate in a coastal traffic control system. Nor is it an undue burden that such vessels develop a response plan at least as effective as U.S.-flag ships. If the state determines that vessels operating in its arctic waters should carry special gear to contain spills because onshore capabilities are limited, the commission believes that that requirement will help protect the environment and that it is not an undue burden. The Coast Guard should cooperate with the state in establishing and enforcing such a system.

Although the commission recognized the importance of moving collectively with international partners in establishing protective rules—or, in this case, tanker design standards—in international trade, this should not be perceived as limiting the right of a state to impose higher standards to protect its own environment. The commission was disturbed by the evidence that the shippers—not consumers, not safety advocates, not any other trustees of a public interest—historically have dominated international conventions where such rules are established. The commission urges

the president and Congress to insure that future American participation in such conventions represents broader interests. As long as the concerns of private interests continue at historical levels, the states have every reason to be suspicious of the output.

In addition to risks in open seas areas off Alaska's coast, the commission became aware of substantial hazards and a lack of the required public participation in assessing the risk associated with the pipeline and North Slope gathering fields. Although most spills in this zone have been small, cumulatively a little more than 3 million gallons have been spilled, and the risk increases as the pipeline nears the end of its design life. Recently, a DEC officer in Fairbanks, noting the risk of a wintertime discharge of hot oil at the Yukon River crossing, said, "This is our nightmare scenario, it would be our *Exxon Valdez*." The time it takes to bring a 2 million-barrels-a-day throughput to a stop as it hurtles through a steel pipe jacket, plus the amount of oil in the pipe between valves, makes the potential for a multimillion-gallon spill on land or water a prospect deserving of worst-case scenario planning. The threat is as serious as in the sound, though the probability interval may be longer.

Corrosion of the pipe is now a major concern. Tests conducted by the Nippon Kokon Company of Japan at Alyeska's request after the *Exxon Valdez* spill show that the line is decaying at an alarming and unanticipated rate. The state participated in pipeline construction oversight, along with the federal government. With a major rebuilding job in the offing, once again the federal and state governments should set up a joint task force to monitor Alyeska's program of rejuvenation, including the retention of an independent technical audit team for internal and external corrosion and slumping stress. (Recommendation 24: Pipeline evaluation). The state should require continued monitoring at regular intervals, complete disclosure of records and adequate worst-case spill disaster plans.

Likewise, the commission noted the effect of aging on the tanker fleet and the state's need to inspect and, on occasion, prohibit the use of higher-risk vessels (Recommendation 14: Strengthen state inspections). Though the commission believes state interests are best served by presenting its views on design in a national rule-making forum, it is under no obligation to tolerate deteriorating vessels that pose particular environmental risk. The actual condition of vessels and the extent to which a vessel complies with rules for the protection of the environment is local and bears much more strongly on state interests.

Inspection of vessel spill-readiness plans, including environmental safety and electronic navigation features that will complement state-licensed pilot activities, requires a state presence. Responsibilities clearly overlap with those of the Coast Guard, creating an opportunity for cooperation. The commission believes that the best way to carry out these cooperative functions would be through local agreement, not in conflict with national polices, that would provide for a jointly manned harbor

"As it stands today, under the guidelines of the National Contingency Plan, the planning for spill response arises from within the federal government, the industry and the states. The federal government also develops regional contingency plans in conjunction with affected states, and the states have the opportunity to comment on these plans. The states may have their own statewide contingency plans. States also require plans from industry that must be consistent with the federal contingency plans."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Coast guard and Navigation, July 1989

administration office and function—a one-stop location for administration of these issues from dockside to Hinchinbrook Entrance in the case of Prince William Sound and between other points for Cook Inlet (Recommendation 25: State harbor administration; Recommendation 29: Mandatory traffic control).

Several European ports receiving tankers have established more effective vessel traffic control systems than has Valdez. They gather more and better information about a ship's location, course, speed and intentions; exchange more information between the shore-based office and the bridge; keep better track of other vessel movements in the vicinity through use of electronic display for locating vessels and shore; and demand a higher level of proficiency among shore-based controllers, who are essentially the peers of the masters with whom they deal.

The commission believes this type of system should be required for Cook Inlet and Prince William Sound. In the interest of efficiency and one-stop regulatory convenience for the industry, the office should be jointly sponsored by the state, local authorities and the Coast Guard. The particulars of such arrangements should be developed in a cooperative agreement by all parties. The commission envisioned that the harbor administration would be governed by a group of directors consisting of people from DEC, DES and the Coast Guard. Technical advisors would be recruited from port and terminal operators within the system. The harbor administration's role would be quite different from that of a port authority, which issues bonds and provides for port development, or a harbor master, who would normally assign berths for small boats.

"Two and a-half years ago the Glacier Bay spilled approximately 84,000 gallons of crude oil into Cook Inlet. The Standard Oil Company (now BP) provided a financial guarantee to the state for all the state's costs and damages, but that guarantee only kicks in after a court judgment is obtained. The Glacier Bay at the time of the spill had an owner, a primary vessel operator, a time charterer, a bareboat charterer, an oil shipper, an oil owner, an English insurance company, and a financial guarantor. Two and a-half years later, the state has yet to receive a dime, even in reimbursement of expenses."

Michele D. Brown, Assistant Attorney General Alaska House of Representatives Resources Committee, January 1990

Whether or not this office should be located at a terminal is an issue for local participants to determine. The Alyeska oil terminal at Valdez did not seem to the commission to be the most practical location for a Prince William Sound Harbor Administration. The commission believes that Alyeska should set aside office space within the huge Alyeska terminal complex for government inspectors (Recommendation 15: State presence at Alyeska terminal). The relationship, while unmistakably regulatory, need not be uncooperative. Physical proximity and easier association would result in safer operations.

The commission considered several auditing functions to strengthen DEC's present authority (Recommendation 13: Enhanced regulatory strength). In an environmental audit DEC assesses the overall operations of a location like the Alyeska terminal, including potential environmental risks and how they might be addressed. This prevention function enables the operator to identify problem areas and develop plans to meet them. Similar functions are carried out by fire departments, for example, to assess potential fire hazards in buildings.

Through Recommendation 19 (Maintenance and personnel audits) the commission advocated two other forms of audit. A technical maintenance audit is what the

commission recommended for the pipeline itself in Recommendation 24 (Pipeline evaluation), a thorough, scientifically based review of the condition of the line. The same kind of audit should be performed periodically on tankers and other major oil storage and transportation facilities. The Coast Guard is supposed to perform audits of a similar nature every two years in vessel certification procedures, but lack of resources for this task encourages the Coast Guard to rely on owners. For older vessels, with an increased level of metal fatigue, a two-year audit, now the Coast Guard practice, is not frequent enough. Serious flaws can grow more quickly to become the cause of a disaster.

"Make your institutional recommendations flexible ... Be on the record that the oil industry is a potential benefit as well as a potential problem. We need to create an institutional structure that can institute policies that can adapt to all of the potential challenges to the people of Alaska and the Pacific Rim."

Professor Harry Bader, University of Alaska
Alaska Oil Spill Commission hearing, 11/14/89

Maintenance and personnel audits can help insure that response equipment actually exists where it is supposed to and is in usable condition. When the *Exxon Valdez* spill occurred, neither personnel nor equipment conformed to the paper plan. Audits should be chargeable against the owner to avoid the debilitating effects of budget limitations or a hidden subsidy to the owner.

Without risking a penalty for noncompliance with planning requirements, Alyeska had little incentive to bring oil spill response plans and promises to fruition (Recommendation 13: Enhanced regulatory strength). The state's regulatory oversight function needs muscle. Existing administrative and civil penalties are insufficient. The governor should not feel compelled, as he did, to threaten to close down the pipeline to get the attention of management. As with EPA, compliance orders should insist on instant compliance rather than allowing the errant company to remain out of compliance so the agency involved must resort to laborious, expensive adjudicative relief. When this has happened in the past, the state position often was upheld, but too late to do any good.

A private citizen also should have the right to bring an individual or class action lawsuit to require compliance with environmental codes when the citizen has a legally cognizable interest. The commission observed that the state had a negligible capability to monitor all of Alaska simultaneously. One witnesses few felonies when a police officer is around. Compliance through legal enforcement appeared to be an almost random circumstance. Citizen enforcement is likely to produce a more uniform industry effort to comply with regulations.

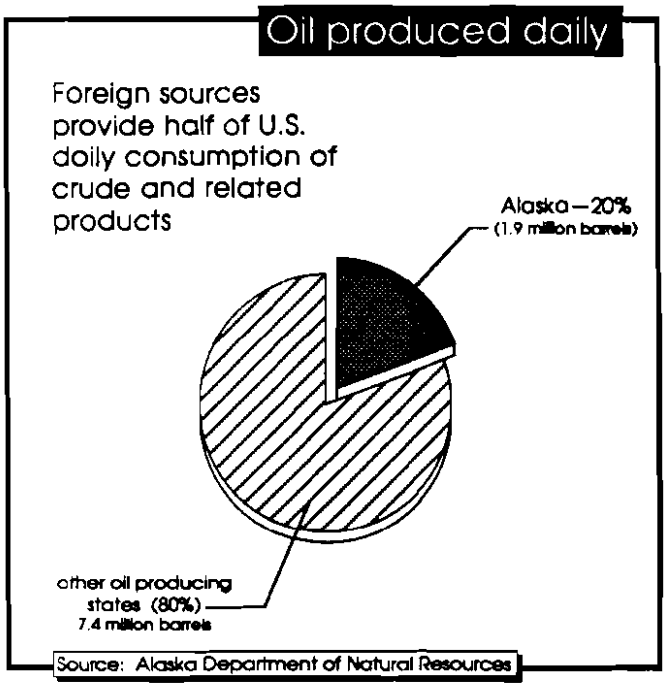
The commission noted a rapid turnover in pipeline management personnel, reflecting company rotation policies designed to prevent bonds of loyalty developing between staff and the community in competition with loyalty to the firm. It certainly is not in the interests of the state to have managers in key positions affecting public and environmental safety who feel no responsibility to local institutions. The commission also noted that managers and supervisors with important pipeline safety responsibilities often have minimum (or less) knowledge and experience for the job. Familiarity with contingency response plans and state environmental protection laws seem neglected as well.

"It is extremely important that there not be arbitrary ceilings on liability."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

In contrast to this situation, the commission noticed that those responsible for safety during the maritime stage of the transportation system were periodically tested by public authority, licensed and bound by professional codes. A licensing board, for example, would not employ a person who falsifies records. From a company standpoint, however, falsification may be an expedient saving larg ums of money or careers. A licensed person presumably would think long and har efore jeopardizing his career rights for the sake of an employer. A license action is an excellent way for the state to inquire into the causes of an accident involving a broad public interest, where misconduct or negligence may be at stake.

The commission decided that the best way to meet these issues was to add to the state's extensive list of licensed professions, the managers of oil transportation equipment (Recommendation 16: State licensing of safety managers). Though the primary focus was on terminal operators and pump station managers, DEC has indicated the need to identify a somewhat broader professional designation. The commission believed that an advisory board might be helpful in setting up the system. No permanent board would be necessary, and administration could funnel through the professional licensing office that regulates explosive handlers and others to protect the public. The commission intends that the licensing scheme clearly cover employees above the technician level.



The Alyeska terminal oil storage capacity should be increased. Up to 2 million barrels of oil a day pour into the facility. Ships take oil out at approximately the same rate. Obviously, any major interruption in tanker traffic can cause a crisis in storage capacity. Slowing the column of oil moving down the pipeline is not a matter of turning off the spigot. The inertial force of the moving oil calls for a gradual slowdown and requires a similar slow buildup. Thus the signal to reduce thoughput must begin a long time before the storage capacity of the terminal is reached.

At the time the oil terminal was designed, several tanks were proposed that were never built. Other tanks were not built because the original throughput of the line was far below the 2-million-barrel-per-day design. When throughput rose to the design level, the additional tanks still were not built. The safety effect is that there is great pressure on all concerned to make sure the oil moves out on schedule. Even a slowdown in throughput costs everyone millions of dollars. Thus, taking chances on foul weather that has blockaded the port or on a vessel whose equipment is found to be below par when storage is in short supply provides a multimillion dollar payoff—or loss if the risk is not taken.

The commission recommends that the original design of tank farm capacity be built (Recommendation 9: Tank farm). Throughput of the line is expected to begin to decline in a year or two, and unless there are major new oil developments in the north, it will continue to decline indefinitely. The argument of the owners is that the expense of adding tanks, which is considerable, will cover a short-term risk. The risk stays level for a few more years and then declines with throughput.

The original terminal design estimated a quantity of required storage, assessing studies of weather conditions and delay factors which might occur and a level of acceptable risk, which implies an unacceptable level of risk. Owners should have been called on this long ago when throughput was increased to 2 million barrels per day. But the situation was overlooked. Now that change, carrying with it the acceptance of a level of risk once thought to be unacceptable, is glaring. The danger will only decline as throughput declines and, considering the volume of storage foregone by Alyeska, it will be some years before the risk is reduced to the original design level as volume declines to 1.6 million barrels per day. Meanwhile, risks created by bad weather are only marginally affected by improvements now being put in place. The most satisfactory solution from a safety perspective would be to build the storage to design capacity. Less acceptable because of the difficulty in guaranteeing its application, is to design a publicly monitored decision track for temporary reductions in throughput which would sacrifice volume rather than safety in the event storage capacity becomes critical.

"Because if I take it over, it's like the dog that chases the front tire of a car; what does he do when he's caught it? Well, that's the way I would feel. I could federalize, but with only three million dollars in the kitty, I wouldn't get very far in terms of the size of the spill."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

Throughout its deliberations the commission knew that all prevention strategies depend upon adequate funding. The taxpayer should not be expected to shoulder this burden. Since industry opposed the state's earlier proposal that costs be assessed in proportion to risk, it should pay the price through a cents-per-barrel fee. These costs should be calculated and assessed comprehensively. To the extent that any cost is externalized—that is, paid by someone other than the oil carriers—it becomes that much more economic for the industry to assume a risk. Issues involving liability to private parties were determined by the commission to be beyond its current capability to investigate.

The commission knows that liability rates are among the strongest incentive for industry to make environmental safety a priority corporate goal. To the extent that liability is put under a lid, society is expecting others, rarely able to protect themselves, to subsidize the risks associated with this traffic. Otherwise, the industry is in effect taxing the environment itself. Before the present era, this was precisely the case. The industry was allowed to pass off costs to the environment on the public or on the environment. The conclusion of that era of legal permissiveness is creating the single strongest impetus for reform. The end of permissiveness should be made complete. Every dead bird, every oiled pebble on the beach, every job displaced by pollution, every habitat disrupted, every enjoyment of nature destroyed should be given a price and assessed as a cost.

The safety of oil transportation can be improved greatly. The industry is operating well below safety standards routine in many other industries, even though its profit margins are higher than most. Somewhere, of course, increasing margins of safety sharply increases costs. The public should be made aware of these costs and then choose which ones to bear directly, a decision that should include consideration of the cost of failed prevention. Oil transportation safety influences national energy policy, and the nation should take a look at costs of alternatives. The prevention recommendations of the commission do not require close calculation. There are clear margins of benefit over cost, and the public is entitled to have these reforms swiftly implemented.

Response

"The state had a contingency plan in place that dovetailed with the regional plan and the national contingency plan. Those plans were implemented as envisioned. Communication channels worked. Federal on-scene coordinator came aboard, initially Cmdr. McCall, we named our state on-scene coordinator, and different agencies played the roles they were supposed to. I'm separating that now from the Prince William Sound plan, which was Alyeska's responsibility."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 6/3/89

Never again should the spiller be in charge of a major spill. This position (Recommendation 38: Government in charge) was supported by testimony from almost every quarter, including veterans of the response to the grounding of the *Exxon Valdez*. Ultimately, even the American Petroleum Institute agreed with this conclusion, which tops the commission's list of suggested innovations in the way the United States responds to major spills.

Response to this particular spill and others reveals basic misunderstanding of what happens during a spill crisis. When a disaster occurs, everything that anybody has to throw at it must be mustered as quickly as possible, notwithstanding laws which put the "capable" spiller in charge. The answer to the question of who is in charge suggest that other institutions and people should back off, but that is a mistake. Since optimum response time is in minutes, the regional response can be most effectively mobilized (Recommendation 46: Regional response capability). Local community resources are the first line of defense because of proximity and local knowledge (Recommendation 49: Enlarged community role). But no government or private entity with resources should hold back.

A major spill is a rare event. The first-line response team may be dedicated to handling other events than a large spill. Firefighters, fishermen and National Guard troops may train for a catastrophic spill, but they cannot often practice on one. To the extent that questions of liability interfere with regional resource commitments, laws must be changed to give limited "good Samaritan" immunity to responders as well as relief from responsibility for leaving a primary obligation less protected.

Large cooperative response efforts need an experienced, trained public official in charge rather than a private person. Obviously, whenever possible, the person in charge should be designated by name and be familiar with the local environment. He or she should be immediately empowered for the emergency and not be subject to constant permission requirements and overdirection. One of the first bad ideas advanced after the spill was the suggestion that a federal "czar" of high degree be in

charge. A federal czar to support a national procurement process is one thing. A boss who doesn't know the local situation, however, constitutes yet another disaster in the making.

The trigger for government involvement should be the declaration of emergency by a regional response officer. The standard should be either of two factors. If the spill engages a substantial national or state environmental interest, then the federal or state officer should make his declaration. If substantial state or federal resources are to be committed to the response, then the emergency should also be declared. In administering this standard, the federal government is more likely to defer to the state if resources of joint concern are involved and it is clear that the state will be making the greater resource commitment. Deferring to command performance by a sovereign state is easier than deferring to a private party.

A designated on-scene commander, as opposed to a person nominally in charge but without real power, was a conspicuous unmet need in Prince William Sound. As Coast Guard Cmdr. Rome testified at the August 1989 hearing of the commission, the decision to put the government in charge should be made immediately, certainly not later than an hour after the spill. The trajectory of the spill should be calculated within the first four hours, and adequate spill resources should be on hand in eight hours. After the grounding of the *Exxon Valdez*, it turned out very quickly that Alyeska, the institution which had been expected to respond and which had formal interfaces with government agencies under a plan, was incapable of accomplishing much of anything. After it took over, Exxon had great power, which it did not immediately apply, with no link to public accountability.

What happens in the first minutes and hours after a spill determines whether the response will be successful or not. The Coast Guard had a statutory mandate to take over response if the spiller was not fully capable of responding. As a practical matter, the Coast Guard misinterprets this statute. According to the testimony before the commission of Adm. William Kime, the Coast Guard looks at the resources it has, which are precious little in most cases, and it looks at what the spiller has. Then it makes a comparative analysis in which the Coast Guard rarely gets to be in charge of the cleanup.

Any spiller with access to money looks adequate to the Coast Guard, strapped for funding and personnel. Its ability to access adequate funding, to enter into immediate procurement arrangements and to provide spill response resources is rarely, if ever, up to the level of the corporate spiller. Here again, human nature tends to take over. When in doubt, the Coast Guard admiral in charge may think, "If resources are inadequate, who is going to be blamed?" The Coast Guard won't be tarred for doing badly if the spiller is the focus of responsibility.

"We now have the authority to establish a statewide response plan, regional response plans, equipment depots. ... We have the authority to work with local people to establish volunteer corps and to train them. All are essential to strengthening the ability to contain and recover oil."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

No one in the federal government from the Coast Guard to the White House wanted to federalize the *Exxon Valdez* spill, notwithstanding the apparent national interests involved, combined with a level of nationwide public attention without precedent. Unless a spill is federalized, as Adm. Clyde Robbins testified, the Coast Guard has no power with respect to the spiller. The commission was puzzled by this since the Coast Guard should be able to remedy this situation through regulations under existing authority. For the first several days there was understandable confusion about who was in charge since brigades of reenforcements were coming in from a multiplicity of agencies, at least 13 on the federal side alone, according to one witness (AOSC hearings of August 14, 1989) while Exxon was the designated responder. Eventually, the federal officers realized it should be at least made clear who was in charge of federal forces.

"The state has a separate set of authorities here, and we need to make sure that both are operative because we can do things that the Coast Guard can't and the Coast Guard certainly won't be able to handle every spill of whatever size, and that's why it's important to have both of those horses in harness."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, Anchorage, 8/3/89

In hindsight the United States should have federalized command of the spill. This should not take the spiller off the hook for participation or cost. If this is the result of federal law, it should be changed. Federalization is no reason for the spiller to take a walk if its resources can help, any more than the federal government should walk away if a spill is not federalized. Regardless of whether the overall command is with a state or federal officer, or the sector command is divided between state and federal officers, the spiller should be under a mandate to respond to the orders of the officer in charge with appropriate and substantial penalties for failing to respond (Recommendation 42: State role under federal authority).

The State of Alaska, or any other state confronted with a serious spill, must make its own decisions regarding protection of its resources. There is no time for lengthy deliberation, from office to office all the way up to the White House and governor's mansion. An immediately declared state of emergency is required that allows governmental authority to override and command private actions and releases public funds. The emergency status may be terminated on review by higher authority as the capabilities of parties or the seriousness of the event clarifies, but until that happens those who support the response must know that the local person in charge has real power, particularly to make financially binding commitments. The first declaration decision must be made locally by a person preagreed upon to hold that responsibility for the state. If the United States is to play its appropriate part, it too must have an officer regionally identified to make a similar determination as the emergency facts come to that officer's attention.

The federal officer may determine that it is in the best interests of all concerned that the United States take charge of the spill, whether or not the state has taken over. If the disaster engages a substantial national interest or the response needs to draw on federal resources only tapped through the federalization of the spill, then it should be done. If the federal officer is first to bring the facts together, then the spill may be federalized before the state acts, and that ends the question of state management. All forces will still participate, but the federal officer will be the on- scene commander.

At the beginning of the Prince William Sound disaster the general expectation was that response would proceed under a contingency plan prepared by Alyeska under state legal requirements. A side agreement between Exxon and Alyeska, however, provided for a handoff of response to Exxon in the event one of its vessels was involved in a major spill. Exxon had no regionally relevant contingency plan, only a vessel plan. After a few days of initial confusion, which reverberated through the response community for several more, the response coordination began to gel under a triumverate of a Coast Guard officer (frequently and disruptively replaced), DEC Commissioner Dennis Kelso and Otto Harrison, response coordinator for Exxon. This command structure was informal. Each member was basically in charge only of the persons under his control. Cooperation was voluntary and did not always follow.

Whatever else may be said about command, it was readily apparent that the resources to be commanded were gathered almost from scratch. Preparedness was at a ridiculously low level in relation to the magnitude of the disaster. In examining why the response was hopelessly inadequate, the commission looked at the processes that were supposed to create a ready response force capable of doing the work.

The commission did not share the public's perspective on what was important in the response. The news media naturally lingered on the drawn-out process of beach cleanup, which distorted the relative importance of this work. In the view of the commission the only time for effective response was while the oil was still in the water. By the time the oil was on the beaches, the damage was done. Thus the job of effective response lies in minimizing the size of the spill, prompt containment of the spill in the water, effective retrieval of the spilled oil, protection of critical habitat, and neutralization or destruction of the oil that is not recoverable.

Though cleanup is certainly necessary, the focus of emergency response is on the earlier stages. Therefore, the most important concern in preparedness for the next disaster is immediate response capability. This is also the test of quality of performance by the spiller and other responders, not the ability to mobilize after the emergency is over.

Given this clear understanding of what was needed and what was actually done in Prince William Sound, the commission recommended that a proven form of emergency response command structure be adopted for future use (Recommendation 48: Incident Command System). This system is already widely used in the federal government, though not in the Coast Guard, and works to coordinate the efforts of multiple agencies, federal and state, and private parties. In view of the reluctant role of the Coast Guard, the commission recommended a much more active state role (Recommendation 41: State takeover of oil spills). Even if the Coast Guard were more prepared to take over a spill in the future, state resources could probably be mobilized immediately in most cases, though this is a regional decision. For vast reaches of Alaska, the Coast Guard is a far distant warrior.

"I went over and visited the terminal [Sullom Voe] in Scotland. The most important thing that differs from here is that they have trained certified pilots operating the ports. It's not a farm kid from Iowa who's never even seen a boat before sitting in front of a radar screen trying to assess the difficulty of the situation or whether the boat is where it's supposed to be."

Rick Steiner, University of Alaska Marine Advisory Program
Alaska Oil Spill Commission hearing, Cordova, 6/28/89

The Incident Command System allows for an appropriate role for the Coast Guard. Even when no incident has occurred, the Coast Guard should actively cooperate in training exercises. Rescue is always a part of the Coast Guard mission in an environmental crisis. Whether pollution abatement aspects of the incident should be federalized is quite a different question. Usually the state will be in a better position to undertake leadership in this sector under the Incident Command System, though this was not actually the case with the *Exxon Valdez*. As it turned out the state was basically unprepared.

Spill response is best understood as reaction to an accident's threast to vessel, cargo and crew; critical habitat; land support systems and communities. Lastly, there is the cleanup of the damage done when earlier strategies have failed. Each sector needs its own command system. An overall on-scene commander should be responsible for the allocation of resources among the sectors.

Whether or not a spill is federalized, to the extent that a vessel, cargo or crew is endangered the Coast Guard is still the agency best able to respond if its resources can reach the vessel in a timely manner. The Coast Guard and Exxon can be proud of their salvaging of the *Exxon Valdez* and its cargo and of protecting the crew. Problems arose in another sector—management of oil in the water.

The commission was impressed that the little heralded (in publicity on the spill) Corps of Engineers actually picked up most of the oil in the water. The commission believes that the corps, if it had been given immediate command and responsibility for the oil in water sector, would have done an even better job (Recommendation 39: Coast Guard role in response).

The commission was not impressed by the role of either the Environmental Protection Agency or the National Oceanic and Atmospheric Administration (Recommendation 40: Role of Environmental Protection Agency). EPA had only one person in Alaska on regular assignment, basically committed to a desk. To the extent that the American public believes that EPA has a role in protecting federal natural resources in Alaska, it is the victim of fraud. Statutory duties have been delegated to other federal agencies. EPA did fly in various personnel to look at the spill and give advice. The EPA processes for assessing and certifying chemical and biological tools to contain and clean up spills are backlogged, slow and lack quality information.

"If the cost of mitigating the potential damage to our environment, if that becomes a cost of extracting oil, if that becomes a cost of industry, if that's a cost we have to pay every time we buy a plastic cup or every time we buy gasoline at the service station, then that's what it's going to take if we are going to leave anything behind here."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

The heavy reliance in planning on dispersants is probably a mistake. A dispersant strategy means that new and potentially toxic chemicals are added to oil in water to get it to drop beneath the surface, out of sight. The heavy emphasis on Corexit in the Exxon Valdez spill may well have been because Exxon had a small amount of it available and it is a patented Exxon product. The amount of dispersant available would have been of little use in relation to the size of the spill. Burning may well have been a better strategy, but it must be used early before the volatiles evaporate. In this

case, it is unlikely that extensive burning could have been used without endangering the ship, which contained millions of additional gallons of oil that were eventually salvaged. The governments should have their own plan for what to use in the water and not be in the position of responding to conflicting suggestions in the height of the crisis. EPA's approval program is oriented to the marketing of products, not the needs of spill responders.

Testimony gathered by the commission indicates that the technologies of response to oil in the water generally were primitive. Dispersants and various other strategies worked only under ideal or specific conditions. Skimmers often clogged. A Soviet vessel with impressive capacity was called in too late, pointing up the lack of preparedness information and the ineffectiveness of Exxon's private command. Thus, the commission found that prevention was practically "the whole game" under existing circumstances. But the deplorable state of current research, the commission lacked the information to determine if modest investments in research would produce a quantum jump in effectiveness.

The commission was impressed particularly with a demonstration of coagulants used by the Navy. Coagulants appear to have a potential both for oil in water and as a method of gelling oil in a breached tank. On the water they make spilled petroleum and products into a film that can be recovered in sheets "like cellophane." They can cause spilled oil to gather into a more solid, floating mass that is easier to pick up in the water or on the beach. Residue does not percolate down through sand or gravel beaches. Currently, coagulants are quite expensive.

The commission also heard some discussion of the use of vacuum retention in vessels, a system for holding oil in a breached tank by making sure no air gets into the tank. This works only if the tear is below the water line and nothing in the crash breaks the vacuum. It puts a heavy stress on the vessel since the weight of oil retained will pull down on the top deck, requiring a redesign of each tank to absorb the stress. For the return, this sounded like an expensive process. From the commission's perspective, the availability of little beyond these technologies demonstrated how little preparedness research had been done by the government.

A research program is essential to the planning process. Inadequacies mean that any response is going to be substandard. But research was hardly the only problem with response. The planning process itself failed. Response was grossly inadequate because the parties did not plan effectively for response or implement effectively the plans that were formed. These failures included an inadequate understanding of both the necessary command structure and the resources that should be available. It also included a failure of will or interest on the part of Alyeska and Exxon and probably Alyeska's other owners as well. The commission believes that complacency was industrywide, though there are clear differences among owners. In a sense one can say that British Petroleum's leadership essentially was "asleep at the switch" since,

"Where in hell was the plan a year ago? This tells us that the technology was there, this tells us that the skimmers that Exxon couldn't find were some place. But they couldn't get them. All of a sudden BP can. The resources that they couldn't lay their hands on weren't there, then lo and behold they magically appeared. Now, what about Cook Inlet? Nikiski [Drift River]? Those terminals? The first thing I heard was these marginal fields cannot afford the cost of a protection plan like this. This may not be a real popular statement, but maybe we can't afford that oil. Maybe it means that you have to shut those wells down, and maybe it means that some people are out of jobs until the price of oil goes up high enough that those marginal fields become profitable, until they can afford adequate protection."

John Calhoun, Mayor of Homer
Alaska Oil Spill Commission hearing, 7/15/89

in corporate terms, it knew better than most from its own European experience how a competent prevention and response effort is organized. The commission was impressed, even dismayed, at how far American preparedness lagged behind Europe.

"Dealing with this grand organization, that's supposed to work, the Regional Response Team and the National Response Team. It looks good on paper, but when one gets down to the operating level, or where the rubber meets the road, on a big spill like this, you have different jurisdictions, different concerns."

Vice Admiral Clyde Robbins, U.S. Coast Guard Alaska Oil Spill Commission hearing, 7/15/89

The failure of response preparedness also reflects the fact that the federal government had stopped taking oil spill response seriously, at least in Alaska. It reflects that the upper echelons of state government, executive and legislative, had largely given up on this subject, outflanked by the national mood against government regulation and for privatization, worn down by industry stubbornness and resistance to change, cut off by preemption arguments and facing attack from the rear on budgets from the friends of the industry in the legislature. The record does reveal that there were people in the regional ranks of the state bureaucracy that had a clear-eyed vision of the hazards, the risks that were being taken and, even, the inevitability of disaster.

State Oil Spill Coordinator's Office Director Robert LeResche (whose office was created well after the spill was beyond the immediate crisis stage) testified that mass confusion and improvisation are always the rule in disasters. That assumption is no doubt shared by many in industry and government. The industry appeared to act on it, at least in part. The person put in charge by Exxon, Otto Harrison, was a "take charge" general field commander and troubleshooter for the company with only limited expertise in either oil spills or disaster response. Exxon hired VECO to be the principal contractor in charge of its cleanup operations. VECO is a political ally, an oil service company with no experience in oil spill response or cleanup.

The commission believes that planning and training can play a crucial part in response, even though according the literature, mostly from analysis of warfare, indicates that real events do not go quite as expected and that some degree of chaos must be expected as an inevitable partner of disaster. This does not, however, obviate the utility of battle plans and training, which make systematic response a reality and work to counter the expansion of chaos.

At the heart of the *Exxon Valdez* response lies confusion between a regional response plan and the contingency plans required by state government. A contingency plan includes instructions to the holder concerning its role in case of a particular emergency. A regional response plan sets out the whole program into which each contingency plan should fit. A contingency plan for a vessel, for example, typically will say, "First try to save the crew and the ship while calling corporate headquarters for further instruction." This puts some person in charge at a distance, often unidentified or incommunicado to others, who is present only by phone. Contingency plans also are developed for government agencies to instruct the members of the agency on what they are to do. Grabbing a phone is again first or close to first on the list. Though the phone is essential to bring additional response forces, it is no substitute for response informed by training.

By contrast, a regional response plan (Recommendation 45: Comprehensive Regional Response Plans), would have the advantage of being prepared in conference with other concerned agencies. Planners look to see who has what and how their actions fit together. The planning group can decide who ought to be in charge, considering various broad contingencies of emergency scenarios. These scenarios and the definition of response goals (Recommendation 46: Regional response capability) will determine the resources that must be stockpiled and the allocations of responsibility that will drive the formation of private contingency plans (Recommendation 55: Private contingency plans).

Goals must be realistic considering spill location, weather, time of year, etc.. A plan that proposes, without regard to economics, that all spilled oil will be picked up anywhere is not going to be taken seriously. There are some tough tradeoffs to be made here in determining what will be an acceptable effort. In the Arctic, response will have to be largely self-contained to the vessel (Recommendation 22: Remote spill response). This suggests a heightened standard for vessels in both prevention and response for such areas. The commission does not think that oil should be developed to production in any arctic area without a substantial planning effort on the transportation leg. The planning deficits and loss of followthrough that were allowed to develop for trans-Alaska pipeline system oil should not be permitted to recur if arctic oil is further developed.

"Cook Inlet is the place that has been most likely for it to happen for a long time because there's more tanker traffic in Cook Inlet than there is in Prince William Sound. The average age of those vessels is older. Many of them are junk tankers like the Glacier Bay. The oil terminals are amongst the most exposed in the world, unlike Valdez which is among the safest. Drift River is a facility for offloading oil unlike those usually seen in the civilized world, according to ship pilots I know."

Larry Smith, Kachemak Bay Subsistence Group
Alaska Oil Spill Commission hearing, 7/15/89

Confusion of knowledge as well as command is also inevitable in major disasters, but the level can be controlled by advance planning. All too often major players during the *Exxon Valdez* disaster started from ground zero searching for knowledge of currents, weather, behavior of oil, utility of response techniques and availability of equipment and its characteristics. The commission received several complaints that the information base provided by NOAA was inaccurate and out-of-date. Basic oceanographic information later obtained from the University of Alaska was more accurate. The commission concluded that NOAA has a lot of make-up work due in Prince William Sound and hypothesized that this agency is at least as far off in other areas of the state. The commission was surprised that in a computer age, little relevant data was computer retrievable.

A good regional response plan will include background data and resource inventories (Recommendation 56: Knowledge transfer). The regional response planning team should include a specialist in information management and retrieval so that current information can be made available systematically and rapidly to appropriate spill managers. This function should be independent of the responsibilities of a central public information officer. Knowledge dissemination was confused by the proliferation of information officers and the lack of a central information source for command purposes and the public. Management of response in repose is different from management in action when a spill occurs. This difference should be reflected in planning. Separation of functions reflects the distinction between regulatory and operating agencies.

"I believe that the spiller should be liable for the payment but the state needs to be responsible for the cleanup."

Sonja Karaza, Prince William Sound seiner
Alaska Oil Spill Commission hearing, 7/15/89

In its hearings and deliberations the commission learned a good deal about the difference between operating and regulatory agencies. DEC, for example, is a regulatory agency. It provides audits, checks on whether the equipment is there and works, critiques readiness exercises and makes sure that personnel are appropriately trained. Most DEC employees are educated as scientists and are trained in measurement, oversight and evaluation. Employees of the Department of Military and Veterans Affairs, and the Division of Emergency Services within it, are likely to be less well educated but more experienced in hands-on activity, command structures, emergency procurement procedures, directing bulldozers and vessels, requisitioning the use of National Guard vehicles and aircraft, moving cargo and directing a large workforce. One person will know the nameplate characteristics of a piece of equipment and the situations where it should be used. Another will have more operating experience in actual deployment. These state roles and the experience that comes with the roles have parallels within EPA, a regulatory agency, and the Coast Guard, BLM or National Park Service, which are operating agencies. Some overlap exists in descriptions of personnel and training but this should not blur the essential differences.

The commission concluded that the Division of Emergency Services and the resource backup available to it from the Department of Military and Veterans Affairs were not sufficiently used in the spill response (Recommendation 50: Allocation of state response authority). This also resulted in slower use of federal resources that can be mobilized by the department under existing procedures. New spill response resources must be made available at specific locations under state control to give realistic support for a state response. The commission believes that the overall system would work better if these resources were under the management of the DES, subject to DEC audit.

In some ways the *Exxon Valdez* disaster presents a highly misleading spill response scenario for state planning. The State of Alaska must be prepared to respond to an emergency when the Exxon Corporation cavalry can't make it. The state needs its own credible response capability. The commission suggested further implementation of the proposal, adopted in part by the legislature in its 1989 session, that a state regional response force supported by trained part-time personnel be established like a volunteer fire department around a system of state equipment depots (Recommendation 44: Immediate local response; Recommendation 43: State response depots). This is analgous to the systems used by Norway and other European nations recognized for their advanced oil spill response preparedness.

The commission believes that the Division of Emergency Services would usually be the best agency to care for standby equipment in depots, maintain supply warehouses and conduct deployment and readiness exercises (Recommendation 51: Enhanced role for Department of Military and Veterans Affairs). The DEC, on the other hand, should evaluate the readiness of emergency services personnel and the effectiveness

of its training exercises. DEC should continue its oversight role over government and private resources to insure that the regional response plan will work. In the aftermath of the spill, the two departments have been working at creating a better coordinated system through interagency agreement. The legislature should review these developments to see if statutory change would enhance preparedness and effectiveness in response.

The commission heard many complaints from the communities about misallocation of resources. In the hours and days after the spill Exxon quickly contracted for vehicles, aircraft, building space and telephone and communication equipments. Public officers, state and federal, got the leftovers at the same time that demand for urgent public services increased. Local authorities lacked the financial resources to match increased demand for police, social welfare, health and sanitation and virtually every other type of service required of a municipality. They were also squeezed by private sector supply allocations.

The commission determined that future declarations of an emergency must promptly allocate funds to local communities. In addition, the state or federal command structure must have the power to reallocate all resources in short supply (Recommendation 53: Local service impact funding). This should include the power to use or command private resources, which would be an extension of the power the DES already has in natural disasters so that it also covers man-made environmental disasters.

As suggested by the commission's supplemental legal studies (Appendix M) an incentive should be considered to encourage cooperation under this power to obtain or reallocate resources. For selfish or other reasons a person still might withhold private resources to command a higher price, meet a contract obligation, etc. If the person who refuses to acknowledge a requisition were liable for a fixed fine plus consequential damages resulting from the loss of the use of the facility or equipment, it would create a practical incentive for cooperation in a climate where physical force would rarely be appropriate.

"The idea of requiring the spiller to do the work orders has not been very effective. There's no financial incentive for them to do that, other than public relations."

Russ Kucinski, Science Coordinator, National Park Service
Alaska Oil Spill Commission hearing, Seward, 7/14/89

The state appeared inhibited in taking many actions because it was unsure about reimbursability of response expenses under the state's liability laws. Though these laws seem to cover virtually every exigency, language could be made more inclusive (Recommendation 54: Full-cost reimbursement). The reimbursement of community public expenditures appeared to be one area where response was limited for funding reasons. The commission recommends that this and all other costs associated with the spill be covered and believes that a better adjustment of these claims and less of a burden on public funds would ensue if the state were named as a co-insured on policies required of shippers under approved contingency plans (Recommendation 21: State as co-insured).

Extensive uncompensated loss and immediate suffering were found by the commission to be borne by those whose regular employment was interrupted. Fishermen and fish processing personnel in particular are ordinarily not covered by unemployment insurance. Some persons, otherwise eligible, might not have had enough qualifying quarters of employment. Yet these persons are injured as much an any if they are without an expected job as crew, dock worker, fish processor, etc.. The commission has recommended that the state sponsor a supplementary program of emergency unemployment to cover persons in this category (Recommendation 47: Emergency economic maintenance).

An emergency economic maintenance program could be administered by the state Department of Labor as an extension of unemployment benefits otherwise available and should extend to individuals only. Such persons have little or no bargaining power with the spiller, unlike corporate victims. They may not fit into a category in which legal liability attaches to the spiller for their employment loss. They have no way of planning or insuring against such disasters. Home mortgages, family support payments and a myriad of costs that make for human misery lie behind these losses. Such persons should not have to depend on the largesse of a spiller, who may be much less generous, conscientious or present than Exxon.

The state's responsibility to protect its resources has been reawakened through the *Exxon Valdez* disaster, and steps are underway to make sure that if "never again" cannot be, at least the state can be more prepared. The neglected victims of the *Exxon Valdez* spill are not the birds and sea mammals, nor the fish and crustaceans, which have been given so much attention by the media, they are the people. Certainly, some profited from the spill, but none as handsomely as VECO International. Gains from the spill were uneven. There were losers as well as winners, and even among the short-term winners there is the future to contend with and the sense of loss. The natural harmony of Prince William Sound, the relationship of people to its lands and waters, its bountiful resources and its beauty have been disturbed indefinitely. Though response strategies are important and much remains to be done, the people want and must have prevention.

"Virtually all the pilots that work these waters live in Homer. These guys can tell you stories that will curl your hair. ...We have unsafe terminals, difficult navigating conditions, some of the highest tides in the world and some of the fastest currents. ...If a tanker were to lose power in the inlet, it would be no more than an hour or two before it would be breaking up. Eight days later the oil would be in the Bering Sea, through Unimak Pass. ...Would you ask the governor tomorrow for protection in Cook Inlet?"

Larry Smith, Kachemak Bay Subsistence Group
Alaska Oil Spill Commission hearing, 7/15/89

Conclusion

Eight fundamental points emerged from the work of the Alaska Oil Spill Commission:

I. ***Moving oil by sea involves a complex, high-risk megasystem whose breakdown can threaten the welfare of entire coastlines.***

II. ***Risk is unavoidable in modern oil transportation. It can be reduced but not eliminated.***

III. ***Prevention of major oil spills must be a fundamental goal in the oil trade, for cleanup and response methods remain primitive and inadequate.***

IV. ***Enforcement zeal in government and industry has declined over the last decade. Rigor flagged, complacency took root. Prevention was neglected, with disastrous results.***

V. ***Without continuing focus on the safety of the entire system by government and industry leaders, the oil transportation system poses an increasing risk to the environment and people of Alaska.***

VI. ***The State of Alaska has primary responsibility for protecting the resources of the state and the welfare of its people, who bear the risk of unsafe conditions in oil transportation.***

VII. ***Privatization and self-regulation in oil transportation contributed to the complacency and neglect that helped cause the wreck of the*** **Exxon Valdez.**

VIII. ***The safety of oil transportation demands review and overhaul. Not just new technology, but new institutions and new attitudes in old institutions are required.***

These are the basic premises we believe policymakers should understand in designing remedies for a flawed system of oil transportation. They are the foundation for this report.

Risk is an unavoidable part of any complex technological system. The magnitude of risk facing the Valdez tanker trade became powerfully apparent in the wake of the *Exxon Valdez* spill. That should have been no surprise. The losses suffered along Alaska's coasts had been anticipated for 20 years, and safeguards had been installed to prevent such a disaster, or at least mitigate its impact. Those safeguards had eroded dangerously by the time the *Exxon Valdez* set sail last March 23. Shortsighted

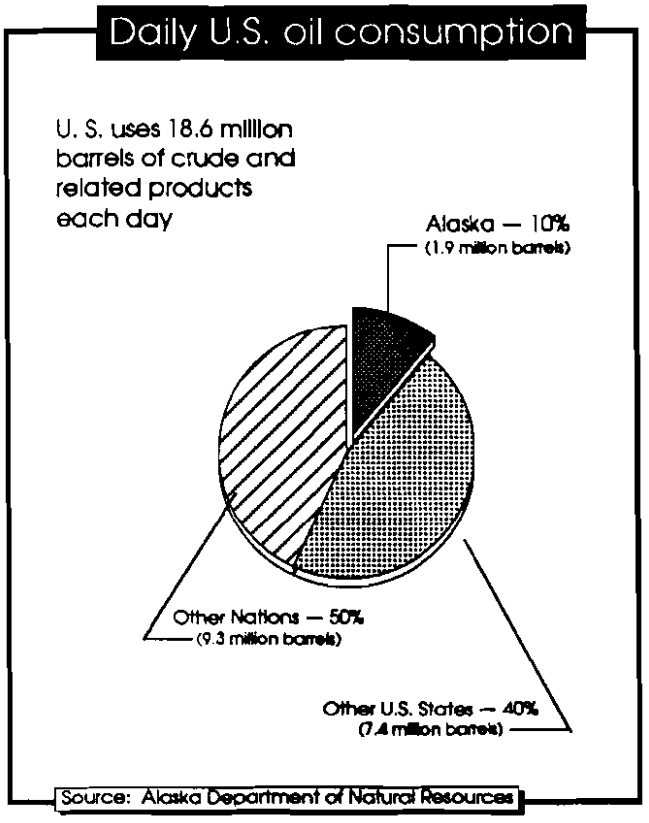
"The goal of public policy towards oil spills, I believe, as with all environmental risks should be to minimize social costs."

Professor Matt Berman, University of Alaska Alaska Oil Spill Commission hearing, 9/21/89

decisions or simple neglect at the highest levels of the oil industry, the state and the federal government brought on serious lapses in the oversight and preparedness promised for the trans-Alaska pipeline system when it was approved in 1973.

But neglecting such a serious risk eventually brings a heavy cost. The bill came due at Bligh Reef.

Where it may come due next has been a matter of considerable discussion in recent months, and properly so: Corrosion problems in major portions of the trans-Alaska pipeline threaten the integrity of the land system. The Valdez tanker fleet is aging—and weakening—in the grueling conditions of the Gulf of Alaska. The risk of further disaster remains high. Alaskans, who are both stewards of a wondrous natural environment and partners (through their royalty share) in the production of North Slope oil, must confront that risk honestly and prudently—or they will be lulled again into complacency and neglect, to their continuing peril.



Experienced mariners express astonishment that a modern, well-equipped supertanker ran aground at Bligh Reef. The *Exxon Valdez* was traveling through well-charted waters in conditions of moderate weather and visibility. Bligh Reef was a well-known hazard, and all mechanical and navigational systems on the ship were working properly. Coast Guard Commandant Paul Yost engaged in only slight hyperbole when he said after inspecting the accident scene that his 10-year-old son could have steered the tanker safely through the area.

Yet the events leading to the grounding, and the institutions and procedures reflected in them, revealed a situation where the risk of disaster had increased steadily through years of relatively incident-free tanker trade. Success bred complacency; complacency bred neglect; neglect increased the risk—until the right combination of errors finally led to an accident of disastrous proportions. All parties—the shippers, Alyeska, the Coast Guard and the State of Alaska—shared in the complacency that produced this result.

At one level it is obvious that a combination of human actions and errors led to the *Exxon Valdez* disaster. Many have been scrutinized in the public record, particularly the proceedings of the National Transportation Safety Board. Students of maritime disaster will not be surprised; human error is involved in 85 percent of all marine

casualties. The root of this disaster—departing from traffic lanes—was not unique: The 1967 *Torrey Canyon* grounding off England took place when the captain left the traffic lanes to save time.

Yet behind all human actions in the Valdez tanker trade, supporting the men and women who load and operate the tankers, is a system—one whose design and function clearly failed that night in Prince William Sound.

"We therefore are guinea pigs within a giant experiment, where facts are made to fit the hypothesis made. In our frustration of our loss, we fight an invisible enemy, and suffocate in the air polluted with politics."

Dolly Reft, Kodiak native
Alaska Oil Spill Commission hearing, 8/11/89

The system includes hardware in the form of pipelines, terminals, storage tanks, loading facilities, tankers and all the associated gauges, meters and machinery that operate them. It also involves operating instructions in the form of technical and design standards, international protocols, capacity ratings, terminal procedures, loading instructions, contingency plans, pilotage rules, maritime rules of the road, local navigation regulations, vessel traffic monitoring and economic and career pressures on all participants. Finally, the system involves institutional oversight in the form of corporate management, private insurance systems, state inspection and enforcement, local port management and Coast Guard regulation.

The objective is to move oil safely across the seas regardless of inevitable human error. System design must provide for redundancy—backup systems to prevent error from becoming disaster, and overbuilding to provide for wider margins of error. Proper functioning of the whole system requires constant testing, inspection vigilance, cooperation, discipline, expertise and commitment of organizations at every level of government and industry.

Yet for reasons of maritime tradition, economics, politics, public policy and modern practice, the maritime oil transport system is relatively more error-prone than safety-inducing. Industry tends to measure success as operating the biggest vessel with the thinnest hull and the smallest crew at the highest speed with the quickest port turnaround consistent with meeting minimum government requirements. Efficiency in a competitive world dominated by profit is all-important in the oil transportation business, even in the Alaska trade where transportation competition is muted.

A comparison between the nation's passenger air transport system and the maritime transport system is instructive, if not exact. Air transport safety is better reinforced, backed up and institutionally safeguarded than maritime transport.

- Mistakes in the cockpit are more easily challenged than on the bridge. Air pilots share responsibility with co-pilots and foster teamwork in the cockpit. Marine masters hold absolute authority, sharing little command responsibility with other ship officers.

- Air traffic control is mandatory, and ground controllers share responsibility with air pilots for safety of takeoffs, landings and approaches. There is no

equivalent to ground control in marine transport, and vessel traffic systems are typically only advisory.

- The federal government imposes strict standards and enforcement carried out by the Federal Aviation Administration in air transport. Federal presence in the marine environment falls to the Coast Guard, already stretched thin.

- Strong international cooperation governs air transport practices. Competition reigns in the maritime field, and cooperation and safety suffer.

- Air transport crew working conditions reflect strictly enforced limits on numbers of hours. Overwork and long hours are routine aboard ship and resulting fatigue considered part of the job.

- Airline accidents get extensive media coverage, partly because most of us travel by plane from time to time and can identify with the victims and their families. Victims of marine accidents—crew, fishers, villagers, wildlife—are more likely to be anonymous.

"The State of Alaska believes that we must have firm control of the contingency planning process, and that government should have an even greater role in directing the implementation of response plans."

Dennis Kelso, Commissioner Alaska Department of Environmental Conservation House Subcommittee on Coast Guard and Navigation, July 1989

The analogy to air transport is not perfect. The issues described here reflect institutional settings, demands and traditions that go beyond considerations of safety. But two points illustrate the relevance of the comparison.

First: Every day there are approximately 17,000 airliner departures in the United States. Ordinarily, every single one arrives safely at its destination. The *Exxon Valdez* was a catastrophic failure—the oil transport equivalent of a major airliner crash. Studies performed for the commission indicate that a catastrophic failure such as the *Exxon Valdez* disaster can be expected to occur in the Valdez tanker trade approximately every 13 years, or about once every 11,600 transits. At a similar rate of catastrophic failure, the air transport system would produce 1.5 airliner disasters every single day, or 550 per year. If an average of 150 people died in each airline crash, such an accident rate would result in the loss of about 82,500 human lives per year—an unthinkable carnage that is prevented by a tight, safety-reinforcing system of regulation and oversight.

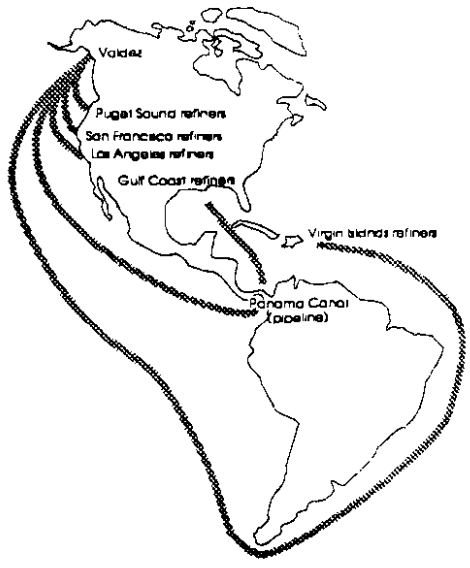
Technological and human systems aren't perfect: Airliners occasionally do crash. But we have built a system that does not tolerate in air traffic anything like the catastrophic failure rate we can expect in the Valdez tanker trade. Because of that system, air travel can be considered safe and reliable. Risk cannot be eliminated, but it can be reduced—if we accept the costs involved.

Second: As vessels carrying oil and other hazardous materials impose higher and higher risks upon the world's oceans and coastlines, the environmental and social costs of marine transport accidents increase. The growth of a massive international

system of transportation of oil by sea since World War II has not been accompanied by the development of organizations and active constituencies of those affected by the environmental hazards inherent in the trade. Those stakeholders, however, deserve increasing attention, for the risks they suffer are growing as the world's oil transportation system grows. And the marine transport system must become tighter and more safety inducing as the costs of failure grow more serious and more pervasive.

Prince William Sound, like most of Alaska, is a gift of to us all—"God's finest creation," in the words of one commission witness, "next to human beings." As stewards of Alaska's resource wealth, natural beauty and environmental integrity, Alaskans (indeed all Americans) have an obligation to account for both risks and benefits in the development of the state and its resources. For a time, the *Exxon Valdez* disaster shocked sensibilities, numbing confidence that oil can be transported with a decent respect for both environment and economic opportunity. As the shock fades, however, what matters is our ability to face present risks squarely.

Valdez oil trade tanker traffic



Source: Alyeska Pipeline Service Company

In the realm of oil transportation, the social tradeoff that must be faced is this: How much risk to the environment are we willing to tolerate in order to gain the benefits of inexpensive, efficient delivery of crude oil to market? What is the cost of that risk? Who pays? For more than a decade before the wreck of the *Exxon Valdez* the managers and overseers of the Valdez tanker trade looked away while tanker safeguards decayed. They behaved as though the risk had been overcome, as though tunnel vision and luck somehow could protect us from disaster. The oil industry and the Coast Guard established policies that pursued this myopic vision; Alaskans and their leaders tolerated them. But the fantasy of a risk-free, high-tech world is just that: a fantasy we cannot afford. The risk is real and serious; the *Exxon Valdez* disaster is a powerful demonstration that as a people we must carefully review that risk and choose a balance between remedies and benefits.

The grounding of the *Exxon Valdez* was not an isolated, freak occurrence, but simply one possible result of policies, habits and practices that for nearly two decades have infused the nation's maritime oil transportation system with increasing levels of risk. The *Exxon Valdez* was an accident waiting to happen, the link that broke first in a chain with many unreliable couplings. The specific lapses that permitted the *Exxon*

Valdez to run aground on Bligh Reef are being remedied, but similar circumstances easily could be repeated insome other combination to allow some other disaster. What is required now is comprehensive action to reduce overall risk in the system.

The recommendations in this report—safety inspections, crew levels, double hulls, traffic control systems, responses depots, training policies, citizens oversight and all the rest—are intended to accomplish just that. Alaskans, indeed all Americans, must insist that these safeguards be implemented to protect an increasingly threatened natural environment.

"These tankers are 14 or 16 years old, and the only thing that gets better with age is wine. You know, it isn't true for old pickup trucks or tankers or anything else."

Lance Trasky, Southcentral Regional Supervisor
Alaska Department of fish and Game
Alaska Oil Spill Commission hearing, 11/14/89

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