US Army Corps
of Engineers

The U.S. Army Corps of Engineers Response to the *Exxon Valdez* Oil Spill

Janet A. McDonnell

THE U.S. ARMY CORPS OF ENGINEERS RESPONSE TO THE *EXXON VALDEZ* OIL SPILL

by

Janet A. McDonnell

Office of History

United States Army Corps of Engineers

Fort Belvoir, Virginia

1992

Library of Congress Cataloging-in-Publication Data

McDonnell, Janet A., 1952–

The U.S. Army Corps of Engineers response to the *Exxon Valdez* oil spill/Janet A. McDonnell.

p. cm.

Cover title.

Includes bibliographical references (p. 154–170).

1. Oil spills — Environmental aspects — Alaska — Prince William Sound Region. 2. United States. Army. Corps of Engineers. 3. *Exxon Valdez* (Ship) 4. Tankers — Accidents — Environmental aspects — Alaska — Prince William Sound Region. I. Title. II. Title: U.S. Army Corps of Engineers response to the *Exxon Valdez* oil spill.

TD427.P4M39 1992
628.1'6833'097983 — dc20 91–43183
CIP

Foreword

The *Exxon Valdez* oil spill was the largest and most destructive in United States history. In the wake of this disaster, the Army Corps of Engineers joined the team headed by the United States Coast Guard to mount a massive cleanup effort. This was the first time the Corps and the Coast Guard had worked together on such a grand scale, and the results were dramatic.

The record clearly indicated that Corps personnel, in concert with other federal, state, and local agencies, made significant contributions in all phases of the operation. Of particular note were achievements in the area of dredging, contracting procedures, and application of state-of-the-art remote sensing technology.

Dr. Janet A. McDonnell's account of events both during and after the March 24, 1989, spill provides valuable insight into the myriad complex problems that must be considered and overcome when confronting a disaster of this magnitude. The *Exxon Valdez* incident and other subsequent spills clearly indicate the need for better planning and improved cooperation among all agencies involved. By documenting these "lessons learned" from the *Exxon Valdez* experience, we now are able to learn from the past and to prepare ourselves for better response in the future.

NANCY P. DORN
Assistant Secretary of the Army
(Civil Works)

The Author

Janet A. McDonnell received her Ph.D. from Marquette University and is a senior historian with the U.S. Army Corps of Engineers. She has published *The Dispossession of the American Indian: Indian Land Policy, 1887–1934* as well as several articles on Indian land policy. She has also completed a history of the Corps of Engineers' response to the Loma Prieta earthquake. Currently she is writing a history of the Corps' support to U.S. forces during the Gulf War and a history of the Army's role in the reconstruction of Kuwait.

Introduction

The *Exxon Valdez* oil spill in March 1989 was the largest and most destructive in United States history. When the spill occurred, officials in the Pentagon could find little information on previous oil spills that would help them in planning a response. As a result, Assistant Secretary of the Army (Civil Works) Robert Page directed the Army Corps of Engineers to document its oil spill activities so that the "lessons learned" would not be lost. This history chronicles the Defense Department and Corps response to the spill and evaluates specific problems such as dredge operations, shoreline cleanup, and funding and reimbursement and the efforts to resolve these problems.

Although Exxon and the Coast Guard had responsibility for the cleanup operations and played a larger role than the Army Corps of Engineers, the Corps nonetheless made significant contributions. As part of the Department of Defense response, the Corps provided dredges, which proved to be the most effective equipment for recovering oil that had been collected on the water; advanced the ability to locate oil on the water surface and the shoreline using remote sensing; and provided officials in the White House and Pentagon with information on the scope of the problem that they could use in decision making.

In looking at the Corps' response, certain themes become apparent. Most striking is the proactive nature and flexibility of the Corps of Engineers as an organization. The response clearly indicated the Corps' willingness and ability to assume new missions. It also reflected the dedication and innovation of Corps personnel, particularly Alaska District staff and the dredge crews. They walked into a tense, confused situation, carved out a mission, and executed that mission successfully. The Corps proved itself to be a worthy partner in oil spill response.

Contents

		Page
Introduction		v
Chapter		
I.	The Grounding and Early Response	3
II.	Department of Defense/Corps of Engineers Response	11
III.	Growing Corps of Engineers Involvement	31
IV.	Command and Control/Communications	49
V.	Corps Dredge Operations	65
VI.	Shoreline Cleanup	83
VII.	Research and Development	93
VIII.	Funding and Reimbursement	103
VIX.	Conclusion	111
Epilogue		115
Notes		121
Appendix A: Oil Spills Since Exxon Valdez		133
Appendix B: Acronym Glossary		137
Appendix C: List of Oral History Interviews		139
Index		141

Photos and Illustrations

Exxon Valdez off-loading into the *Exxon San Francisco*	6
Alaska oil spill, command, control and coordination	18
Lieutenant Colonel Ray Carlson, John Elmore, and Colonel William Kakel	22
Army Corps of Engineers dredge *Yaquina* in Alaska	35
Typical hopper dredge components	41

Page

Inverted dragheads on the *Yaquina* 42

Oil skimming operations in Prince William Sound 43

Oil collection in "donuts" 44

Corps of Engineers officers Brigadier General Patrick Stevens, Brigadier General Patrick Kelly, and Colonel William Kakel 56

Captain Brice discusses shoreline cleanup operations 89

Shoreline cleanup operations 90

THE U.S. ARMY CORPS OF ENGINEERS RESPONSE TO THE *EXXON VALDEZ* OIL SPILL

CHAPTER I

The Grounding and Early Response

The Alaska pipeline carries crude oil from the Arctic coast south to the Port of Valdez on Prince William Sound, where it is loaded onto tankers for transport to refineries in the lower forty-eight states. Prince William Sound is in south central Alaska, about eighty or ninety air miles southeast of Anchorage. This transportation system had been in use since 1977 without any major oil spills. The pipeline and Valdez terminal are operated by Alyeska Pipeline Service Company, a consortium of the seven major oil companies, including Exxon, involved in North Slope oil production.

Shortly before 9:30 P.M. on Thursday, 23 March 1989, a tanker owned by Exxon, Inc., the *Exxon Valdez*, departed Valdez bound for Long Beach, California, loaded near capacity with 1.2 million barrels (53 million gallons) of Prudhoe Bay North Slope crude oil. The ship was 987 feet long, 166 feet wide, and 88 feet deep and traveled at about 12 knots. Turning or stopping required several miles to accomplish. As was customary, the ship was piloted by a local marine pilot and accompanied by a tug from the port to the three-mile neck known as the Valdez Narrows. At 10:17 it turned left into the narrows, which is less than a mile wide at its tightest point. At Rocky Point, five miles out of the narrows, the local pilot left the ship.

From the narrows to Hinchinbrook Entrance, the passage into the Gulf of Alaska, specially designated deep-water corridors were reserved for tanker traffic. There was an inbound lane, a buffer zone, and an outbound lane, each roughly three miles wide. Outbound tankers traveled in the west lane and inbound tankers in the east. Tanker captains were required to notify the Coast Guard before leaving their lanes.

A tanker that had left Valdez a few hours before the *Exxon Valdez* reported that ice from the Columbia Glacier had drifted into the shipping lanes. At 11:31 P.M. Captain

Joseph Hazelwood notified the Coast Guard that he was diverting his ship from the outbound lane to the inbound lane, and he retired to his cabin leaving his third mate in charge. The third mate was not certified to pilot through that particular part of Prince William Sound. The tanker passed through the inbound lane and into the vicinity of Bligh Island. The crew attempted to correct their course, but they were not able to turn the ship in time.

At 12:04 A.M. local time on a dark, drizzly Good Friday morning, 24 March 1989, the *Exxon Valdez* ran aground on a pinnacle at Bligh Reef in Prince William Sound. Eight of its eleven cargo tanks extending the full length of the ship were ripped open and three saltwater ballast tanks were pierced. At 12:28 Hazelwood informed the Coast Guard Marine Safety Office (MSO) in Valdez of the collision and spent an hour trying to maneuver the tanker off Bligh Reef despite warnings that his ship might be too unstable to float. Oil gushed from the ruptured tanks. Over the next day, the crippled ship would pour roughly eleven million gallons of North Slope crude oil into the icy waters of the Prince William Sound.

The Coast Guard Marine Safety Office at Valdez immediately began the state and federal notification process. At 12:30 the Coast Guard vessel tracking center in Valdez contacted Alyeska Pipeline Service Company, and Alyeska in turn notified Exxon officials, as well as state and federal officials. The ship was in danger of capsizing if it floated off the reef, so oil spill response and the removal of the remaining oil from the ship became the top priorities. In the first hour the Captain of the Port, Steve McCall, closed the Port of Valdez to vessel traffic and the rescue tug *Stalwart* was dispatched from the Alyeska Marine Terminal to aid the stranded *Exxon Valdez*. It took the tug two hours to make the twenty-five mile trip to Bligh Reef.

At 2:49 A.M. the Coast Guard put out an urgent call to its Pacific Strike Team for pumps and personnel to off-load the barge. Team members would arrive in Alaska that evening. Around noon Exxon relieved Alyeska of financial and logistical responsibility for the response.

Although the state-approved oil spill contingency plan called for a quick response, there were frustrating delays at

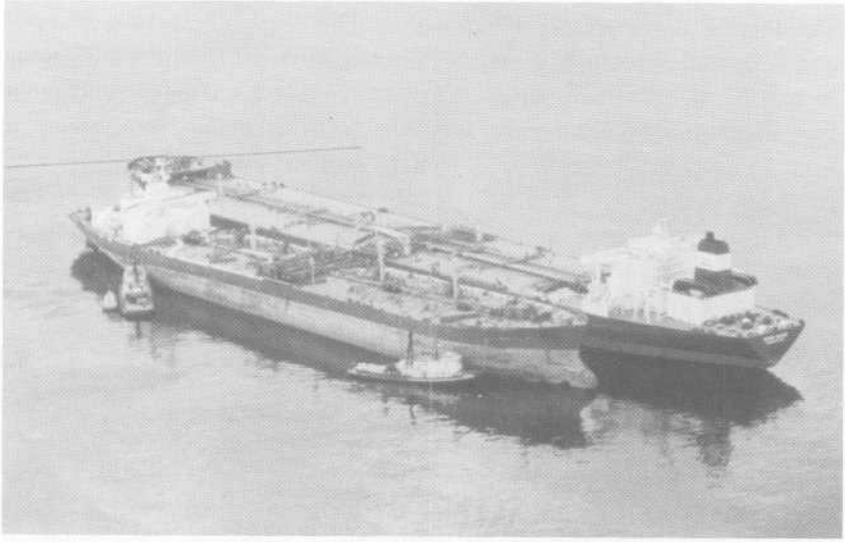
the Alyeska terminal. Employees and contract laborers who came to pick up their gear so they could head to the spill scene found that vital cleanup equipment had to be dug out of warehouses and loaded on vessels. Deep-water skimmers and booms designed for a spill in the sound, rarely brought out in the dozen years of pipeline operations, were buried under stacks of the heavy booms used to contain oil in a warehouse. Huge ship fenders — used to hold two ships apart while one takes on the other's cargo — could not be found initially. They were later discovered under several feet of Valdez snow.

A contingency barge that state and federal officials thought was always kept loaded with containment equipment so it could be launched at a moment's notice was empty. Its cargo had been stacked in a warehouse. Alyeska officials later contended that the contingency plan did not require the barge to be loaded, but state and Coast Guard officials were stunned to find that the barge was not ready.

Workers described the scene early that Good Friday morning as frantic as people ran around trying to get equipment ready. They had to fill boats with gas, patch booms, and load the barge. For several hours only one person was on hand to drive the forklift and operate the crane to load the barge. The barge finally left the terminal at 11:00 A.M. with 50,000 pounds of equipment onboard. Tugs carried another 22,000 pounds. Despite existing response plans that required Alyeska to be on scene and placing containment booms within five hours, it was between 12:00 P.M. and 5:00 P.M. on 24 March, twelve to seventeen hours after the grounding, before the first booms were deployed.

Later that evening a smaller vessel, the *Exxon Baton Rouge*, came alongside and began pumping oil off the *Exxon Valdez*. By then the oil slick covered roughly thirty square miles south and west of the reef.

All available oil spill response equipment was mobilized from the Alyeska Pipeline terminal and both Exxon and the Coast Guard began mobilizing equipment from other areas. Operators tested dispersants with little success; Prince William Sound was too calm for adequate mixing of the dispersant with the oil. On Saturday morning, 25 March, Exxon announced that 175,000 barrels had spilled. By noon this figure reached 260,000 barrels.



Exxon Valdez *off-loading oil into the* Exxon San Francisco *after the spill in Prince William Sound.*

On Easter Sunday morning, 26 March, Alaska Governor Steve Cowper declared a state of emergency. The slick stretched one hundred square miles, and only about three thousand barrels (126,000 gallons) had been skimmed off the water. State, federal, and Exxon officials made plans to use air-delivered dispersants, fire, and skimmers in a full attack on the spill beginning Monday, but early Monday morning, 27 March, high winds exceeding seventy miles an hour developed in the sound. The heavy winds grounded aircraft, prevented boat operations, and emulsified the oil so that both dispersants and burning became ineffective. The winds pushed the oil slick to the southwest in the shape of a forty-mile-long spear. The next day calm weather returned to the sound, but significant amounts of oil hit the shores of Smith, Green, Knight, Naked, and Eleanor Islands about 35 miles southwest of Bligh Reef. The spill was out of control. Following the prevailing currents, the oil would begin entering the Gulf of Alaska through Montague Straits on 30 March. It continued to follow the Alaska Stream, which flows southwest along the coast until it splits around Kodiak Island.

On 28 March operators abandoned the use of dispersants because of the size of the spill and the cold water temperatures. Attempts to burn the oil in concentrated slick

areas failed because the volatile ingredients had evaporated. The mixture in the burning areas was 23 percent oil and 77 percent water, which would no longer support combustion. At midnight a large group of distraught fishermen from Cordova, about eighty water miles southeast of Valdez, left by boat with oil containment booms provided by the state. They attempted to block the oil from entering the major fish hatcheries on the southwest edge of the sound (Main Bay, Eshamy Bay, Ester Bay, and Sawmill Bay). By 5:00 P.M. fishermen had deployed oil booms in the fish hatchery areas.

On Monday, 3 April, the Coast Guard reopened the port to tanker traffic during daylight hours only. Two days later the *Exxon Valdez*, drained of most of its oil, was refloated by Exxon and taken to Outside Bay on the west side of Naked Island for temporary repairs.[1]

On 5 April, Governor Cowper delivered a letter to Rear Admiral Edward Nelson, Jr., Commander, 17th Coast Guard District, requesting that the Coast Guard take over coordination of the cleanup under the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300). Exxon would continue to retain primary responsibility. Less than four percent of the spilled oil had been recovered, and the oil slick had moved into the Gulf of Alaska. "Under these circumstances," Cowper declared, "the State of Alaska, many of the federal agencies, and the participating citizen groups believe that a change in approach to the management of this disaster is necessary. . . .. Due to its formal responsibilities and familiarity with the Alaska coastline, we believe the Coast Guard is uniquely suited to coordinate the response to this disaster."[2]

A carefully crafted national contingency response system had been developed over a twenty-year period. In 1967 after the tanker *Torrey Canyon* grounded off the British coast, spilling millions of gallons of oil, the need for effective contingency planning to respond to the environmental threat posed by the bulk transport of oil became more apparent. The Federal Water Pollution Control Act Amendments of 1972 (33 USC 1321), also known as the Clean Water Act, provided for a National Oil and Hazardous Substances Pollution Contingency Plan.

The National Contingency Plan was developed to insure that the resources and expertise of the federal government would be immediately available for serious oil and hazardous substance incidents that required a regional or national response. It applies to all federal agencies and provides the framework for management of cleanup activities. Responsibilities are divided into two zones, inland and coastal. The Environmental Protection Agency (EPA) has jurisdiction in the Inland Zone and the Coast Guard has jurisdiction in the Coastal Zone (all U.S. waters subject to the tide, U.S. waters of the Great Lakes, and specified ports and harbors). If the responsible party does not take proper action or is unknown, under the Clean Water Act the on-scene coordinator determines whether the federal government should take over.

The National Contingency Plan requires three activities: planning and coordination, on-scene operations, and communications. Planning and coordination are done at the national, regional, and local levels. At the national level they are done by the National Response Team (NRT), which is usually chaired by a representative of EPA and made up of representatives of federal agencies that have responsibilities outlined in federal regulations or executive orders. The Coast Guard provides the vice chairman and manages the Revolving Fund established by section 311(k) of 33 USC 1321 that is used for the cleanup of oil and hazardous substances discharged into navigable waters of the United States.

The Defense Department provides expertise through the Corps of Engineers and the Navy. The Corps has specialized equipment and personnel for use in ship salvage, shipboard damage control, and diving. Fourteen federal agencies have roles in response.[3] Oil pollution response is not a new role for the Corps of Engineers. The Oil Pollution Control Act of 1924 gave the Corps primary responsibility for controlling problems caused by pollution of navigable waters. The Corps continued to play a leading role in regulating pollution until Congress passed the first Water Pollution Control Act (33 USC 1151) of 1948.[4]

At the regional level, the Regional Response Teams (RRT) provide regional planning and preparedness before a pollution incident occurs, and they coordinate and advise after an

incident. RRTs have two principal components, the Standing RRT and the Incident Specific RRT. The Standing RRT is comprised of representatives of departments and agencies on the NRT plus the involved states. The Incident Specific RRT is comprised of RRT members that have equipment and expertise that could help the on-scene coordinator (OSC) in combating a specific incident. There are thirteen RRTs with geographically defined zones of jurisdiction.

The next level of pollution response is performed by the OSC, usually Environmental Protection Agency or Coast Guard staff who have been trained to respond to pollution incidents. Coast Guard OSCs are the designated Captain of the Port for the various ports of the United States. Their jurisdiction is outlined in federal regulations. The OSC can draw on the expertise and resources of the RRT. His primary focus is to ensure a timely, effective response, and his duties include: assessing the extent of the spill, the potential hazards, the types of resources needed, and the ability of the spiller or local officials to handle the spilled oil; monitoring the cleanup activities of the spiller; and determining if federal management and federal funds are needed to handle the incident (i.e., whether to "federalize"). Once federal funds are activated, the on-scene coordinator is in charge of the response. Using the Oil Revolving Fund, the OSC can secure contractors and mobilize response equipment, resources, and personnel.[5]

The traditional role of the Corps of Engineers under the National Contingency Plan is to respond to requirements from the National Response Team and to provide general engineering and construction support to that body. In responding to the *Exxon Valdez* spill, however, the Corps would go beyond its traditional role.

CHAPTER II

Department of Defense/ Corps of Engineers Response

By 6 April the stage was set for a dramatic increase in the level of federal involvement in the cleanup operations. By that time there were roughly five hundred federal personnel in the Prince William Sound area, including four hundred Coast Guard (USCG) personnel and one hundred from other agencies. Government equipment on scene included three USCG cutters, six USCG aircraft, one National Oceanic and Atmospheric Administration (NOAA) aircraft, six USCG portable pumps which were used to offload the barge, one USCG open water skimming system, seven Navy skimmers, and over thirty-six thousand feet of boom. The spill, which now covered an area sixty by one hundred miles, was moving in a southwesterly direction into the Gulf of Alaska. The heaviest concentrations of oil extended south from Smith Island in a nearly continuous sheen with heavy patches of emulsified oil between Knight Island and Green Island and in the passages between Bainbridge Pass and Latouche Pass.

Although operators had used chemical dispersants and burning on a limited basis, the actual cleanup was being done by mechanical means. Exxon was performing all of the cleanup work through a contract with VECO, Inc., a large local construction contractor that specialized in the support of oil companies in Alaska. Through VECO, Exxon essentially cornered the market in Alaska and in the Pacific states on available oil booms, skimmers, oil barges, floating hotels, and small skiff-sized work boats.

The spill affected one of the largest and most productive fishing regions in the world. The livelihoods of hundreds of fishermen from Valdez, Cordova, Seward, and other small villages were at risk. With the assistance of local fishermen VECO had set up booms and skimming operations at four hatcheries located in Prince William Sound. The salmon

smolt were due to be released from the hatcheries into the sound within weeks. Cleanup work underway in critical seal pupping areas had to be completed within two or three weeks.

White House officials were following events in Alaska with keen interest. President Bush, who had been elected with the pledge that he would be the "environmental president," was under intense pressure from the media, the public, and Congress to respond. He directed Transportation Secretary Samuel K. Skinner and EPA Administrator William K. Reilly to evaluate the situation in Alaska first hand. Four days after the spill Reilly and Skinner hurried to Alaska where they spent a day and a half flying over the spill area and meeting with officials in Valdez. Secretary Skinner was briefed by the current on-scene coordinator and by Admiral Nelson. The delegation also met with Governor Steve Cowper, Director of the Alaska State Department of Environmental Conservation Dennis Kelso, and representatives of other interested organizations. They focused on the question of whether the federal government should assume control of the cleanup. Was Exxon doing everything that could be done or were there additional needs? Skinner and Reilly concluded that there was no need to federalize the cleanup operations. They later submitted a detailed report to the President with their assessment of the response and the effects of the spill.[1]

While White House officials tracked the spill, an outraged Congress debated the nature of Exxon's liability and questioned whether the spill should be federalized. At hearings on 6 April Admiral Paul A. Yost, Commandant, U.S. Coast Guard, assured the Subcommittee on the Coast Guard and Navigation of the House Committee on Merchant Marine and Fisheries that President Bush was "deeply concerned" about the environmental issues and "very interested" in the Coast Guard's marine safety and environmental protection missions. He also assured them that the Coast Guard was exercising more control over the cleanup. "Frankly, we want to take full advantage of Exxon's willingness to open their checkbook and fund this cleanup."[2] Admiral Yost indicated that the fund for oil spill cleanup contained only $3–$4 million, and he was reluctant to federalize a spill that was costing over $1 million a day with only $4 million in his pocket. If the spill was federalized the USCG would have

"massive" contracting problems. Exxon, which was not bound by federal procurement procedures, could simply write out checks. Rather than federalizing the spill, Yost observed, "it would be much better if we could manage this spill, using Exxon as the checkbook." In his testimony, however, Secretary Skinner now conceded that the response was "totally inadequate."[3]

Members of the Senate Committee on Science and Transportation meeting the same day also seemed anxious to determine who was in charge in Alaska. Representatives of the Bush administration (i.e., Reilly and Skinner) defended Exxon. Reilly observed that Exxon had done everything that it was told to do, though Senator Ted Stevens from Alaska disagreed. Skinner assured the committee that the Coast Guard was directing the operations. He reminded the committee that there was no magic fix to the problem: "When you get up there you watch how it has moved and the vastness of it and you understand it is not a problem that is fixed by throwing money and equipment at it at this point." The Coast Guard Commander was directing Exxon resources and telling Exxon officials what needed to be done. In a written statement to the committee, Admiral Yost noted that Exxon was "making every effort to fulfill its responsibilities in that area." Despite the optimistic testimony, some committee members continued to favor federalizing the cleanup. The American people, they observed, were concerned that the federal government was not doing enough.[4]

Officials in the Pentagon also followed the situation closely. Major General James D. Smith, Director for Operations, Readiness, and Mobilization for the Deputy Chief of Staff for Operations and Plans, Department of the Army, began monitoring the news reports as he would in the case of any catastrophic event in U.S. territory. Smith also served as Director of Military Support (DOMS) for the Defense Department in instances where the Secretary of the Army was designated as Executive Agent for a specific event, such as disasters or civil disturbances. As DOMS he took actions as directed by the Secretary of the Army and worked directly for the Secretary of Defense through the Secretary of the Army.

Early on Smith contacted the Chief of Engineers and Commander, U.S. Army Corps of Engineers (USACE), Lieu-

tenant General Henry J. Hatch, and Brigadier General Patrick J. Kelly, Director of Civil Works, USACE. Smith recognized that the Corps would be a key player if the Defense Department became involved and that it had tremendous contracting capabilities.[5]

Both the Army and the Corps were eager to respond to the cleanup operations aggressively. In an era of improved relations with the Soviet Union, some suggested that the Army should emphasize its traditional role over the past two hundred years as nation builder rather than focusing on the forty years of the Cold War. Officials in Washington perhaps saw an opportunity to go back to that early role of service to the nation. In addition to looking back at the Army's historic nation building role, General Hatch had established a vision of the Corps as an environmental engineer agency. Corps staff supported the Chief's vision and looked for opportunities in the environmental arena. The Assistant Secretary of the Army for Civil Works, Robert W. Page, also advocated a stronger role for the Corps in environmental areas. The day after the grounding he called Governor Cowper and Commandant Yost to offer the Corps' assistance.[6]

General Kelly met with President Bush's Chief of Staff, Governor John Sununu, before the President directed the Department of Defense to become involved in the cleanup and had followup meetings with Sununu's representative, Richard Breeden, Assistant to the President for Issues Analysis. A week after the spill Assistant Secretary Page, Kelly, and Smith attended a White House meeting with Breeden, Sununu, and Skinner at which Yost requested that the Army supply troops. Page, Smith, and Kelly argued against this. Using troops to wipe rocks was not good training for soldiers and would deprive civilians in Alaska of employment. In addition, supporting troops in Alaska would present great logistical problems.

At a meeting with Secretary Cheney, Smith and Kelly laid out a series of options that the Defense Department could take if it became involved. Smith and Kelly emphasized the Corps' contracting capability and its ability to set up the structure required for the cleanup. They needed to establish a way to control resources that DOD might place in the area. They discussed moving command and control facilities,

transportation resources, and medical evacuation assets to Alaska and putting Engineer brigades in until contractors arrived. In such an isolated area, they observed, the first requirement was to establish command and control and communications. The structure was needed whether troops were used or not. Smith and Kelly recommended the use of one or more Navy command and control ships with the proper radios and helicopter landing platforms and the use of landing craft.

Smith and Kelly argued that with the high unemployment in Alaska and on the western seaboard they would have little trouble finding contractors to do the work. Smith also argued that if it came down to wiping rocks with rags, it would be better to do that with contractors than with soldiers. Soldiers' pay was much less than what Exxon was paying contract workers. Secretary Cheney concurred. The strategy that DOD recommended was to keep Exxon in as a player and to provide Exxon with any special equipment and expertise that it might need.[7]

On 6 April Richard Breeden advised Secretary Cheney's assistant, David S. Addington, that Governor Sununu had instructed him to prepare an action plan and presidential statement for use that day on federal assistance for the Alaska oil spill cleanup. Breeden had been working with Secretary Skinner and Commandant Yost on the plan and had presented it to Sununu, but Sununu wanted to be sure that DOD was "on board." Breeden's plan called for the President to announce that he was directing the Secretary of Defense to make available DOD facilities, equipment, and personnel to assist in the cleanup. Breeden intended for DOD to participate as follows: Navy personnel would provide and prepare floating facilities for logistics, equipment storage, communications, and dormitory service; Air Force would provide airlift for equipment and personnel for the cleanup; Army would provide 1,500 men for "on-the-ground" cleanup duty. Breeden had not consulted anyone in DOD about this. Addington recommended that the Secretary of Defense assign the DOD focal point responsibility to the Secretary of the Army, whose DOMS had the proper coordination capability.[8]

On 7 April Kelly and Smith accompanied Secretary Cheney to a cabinet meeting at the White House. They found

the cabinet members gathered informally in a meeting room outside the Oval Office. It quickly became clear that Secretary Skinner, Admiral Yost, and Interior Department and EPA people favored "throwing the massive cleanup problem square into the hands of the Defense Department."[9] Smith and Kelly had already informed Secretary Cheney that they strongly opposed any plan to put uniformed soldiers on the beaches in Alaska to clean rocks.

Yet, the Alaska congressional delegation called loudly for increased federal activity to demonstrate to their constituents and the rest of the American people that the federal government was doing something. At the informal cabinet meeting Cheney stated very strongly that he would not put troops on the beaches, and he was countered by the strident voices of the other cabinet members who disagreed with him. Standing outside the Oval Office Cheney saw for the first time the planned policy statement for Bush's press conference, which provided for using troops, and he asked to see the President. After a minute's pause while someone went in to check with the President, Cheney was ushered into the Oval Office and Secretary Skinner followed.

A few minutes later Skinner came out and informed General Smith that Secretary Cheney had prevailed. There would be no troops on the beaches. As President Bush stepped out of his office, he was confronted by some of the Alaskan congressional delegation, who complained that DOD would not have an active enough role if troops were not put on the beach. Bush held firm. The room emptied, and after exchanging a few words with General Smith and General Kelly, Bush went on into his press conference."[10]

At the 7 April press conference President Bush announced that he was appointing Skinner to be responsible for mobilizing and coordinating all federal departments and agencies for the cleanup and directing DOD to assist by providing personnel, equipment, and facilities. Finally, President Bush named EPA Administrator William Reilly as coordinator of the long-term recovery of the ecology of the area.

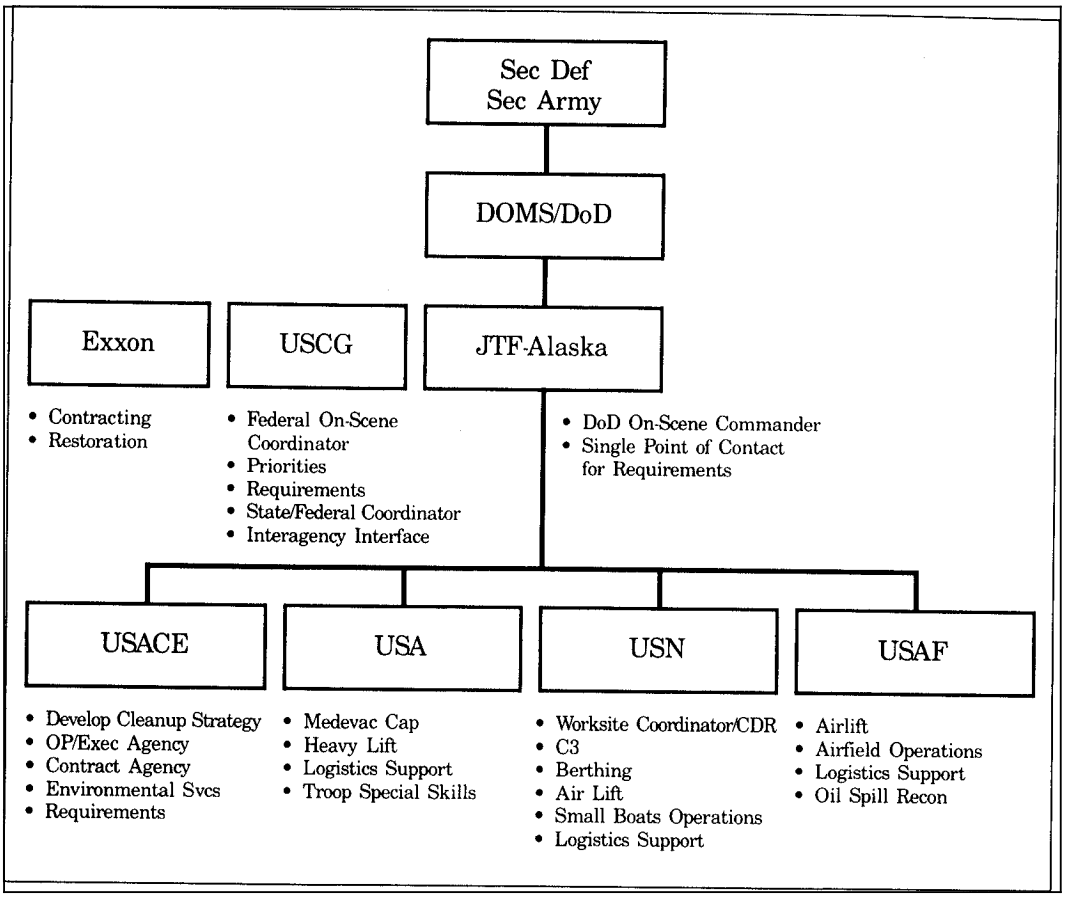
Smith was gratified that Cheney, a relatively new Secretary of Defense, had so staunchly defended the proposed policy that he and General Kelly had laid out earlier, a policy that did not include using Army troops for shoreline cleanup.

The result was, said Smith, "an intelligent application of DOD assets to assist in the oil spill."[11]

In anticipation of the Bush announcement, on 6 April Secretary of Defense Richard Cheney designated Secretary of the Army John O. Marsh, Jr., as Executive Agent for DOD assistance to the cleanup operations. As Executive Agent, Marsh would be responsible for planning, coordinating, and executing DOD participation. The Secretary of the Army has a long-standing responsibility for support to non-DOD agencies in the continental United States and its possessions. In 1968 the Secretary of the Army was designated Executive Agent for employment of federal resources during domestic civil disturbances. As Executive Agent, the Secretary of the Army acted with the full authority of the Secretary of Defense and was responsible to him and had full authority over all DOD components. At the same time Defense leadership created a separate office directly under the Secretary of the Army to provide adequate management—the Directorate of Civil Disturbance Planning and Operations, which was reorganized as the Director of Military Support (DOMS) in 1970. In 1973 the Director of Operations, Readiness, and Mobilization on the Army staff assumed additional responsibility as the DOMS.

At the time of the oil spill, in addition to the director, General Smith, and his deputy, there were seven officers in DOMS, including two from the Air Force, and one civilian secretary assigned to the Military Support Division of the Army Office of the Deputy Chief of Staff for Operations (ODCSOPS), which was responsible for the DOMS mission. DOMS normally established a multiservice task force to provide broad capabilities to plan, coordinate, and manage Defense support and to maintain adequate command and control. Although there was a basic task force structure, each task force organization changed depending on the current mission requirements.[12]

Later that day General Smith convened an oil spill DOMS joint task force (DOMS-JTF) with representatives from all the key elements of the armed services and set up business in the Army operations center in the Pentagon to coordinate military support at the DOD level. He told them what he thought the initial requirements would be and ordered



Alaska Oil Spill Command, Control & Coordination.

24-hour operations. The Secretary of the Army designated DOMS as the action agent to coordinate, manage, and task all DOD support to the Department of Transportation (DOT), and General Smith served as the Secretary's action officer to oversee the DOD effort. The DOMS staff then alerted the commands with potentially major roles: Pacific Command, Military Air Command, Army Forces Command (to which most Army units in Alaska were assigned), and the Corps of Engineers.[13]

Following established procedures DOD designated Lieutenant General Thomas G. McInerney, Commander of the Alaska Joint Task Force at Elmendorf Air Force Base, as the Defense Senior Representative (DSR) for Department of Defense assistance to the Coast Guard. Whenever a disaster strikes in the United States or its territories, DOD designates the senior flag level officer from the nearest military headquarters as DSR. As DSR, General McInerney provided on-scene DOD representation with the USCG for support requirements.

DOD officials activated the Alaska Joint Task Force (AK-JTF) on 7 April. The AK-JTF was a small standing nucleus of people assigned for planning purposes and for logistical operations and operations in general. General McInerney formed a task force around that nucleus. He augmented the team initially with people from the Alaska Air Command and then with additional personnel from the lower forty-eight states. The Joint Task Force was normally tailored to the particular emergency. Thus the Corps of Engineers, which is not normally a member of the task force, became involved. The JTF staff had recently gone through an exercise so it was relatively easy to pull together an effective operational staff quickly.[14]

General McInerney requested the assignment of a Navy flag officer as his deputy in anticipation of the major role projected for the Navy. Rear Admiral Edward B. Baker, Commander, Amphibious Group III in San Diego, was designated the Deputy Commander of the Alaska Joint Task Force.

On 7 April General McInerney, accompanied by the Corps' Alaska District (NPA) Engineer Colonel William Kakel, spent eight hours touring the oil spill area and met with Exxon and the Coast Guard representatives. He received briefings from Admiral Nelson, who served as the federal on-scene coordinator at the time. He determined that committing Defense Department personnel to perform cleanup would not be an effective use of that agency's resources. Both Kakel and McInerney saw clearly that they needed to do whatever they could to keep troops off the beaches because it would be very difficult to support them. McInerney's preliminary comments indicated that: everyone involved, including DOD, had to be prepared for extended operations; troops should be used as a last resort, only after all available local residents had been hired; early deployment of MEDEVAC assets might be desirable; and the U.S. Navy should be tasked to provide representatives on the assessment team with surface operations and oil spill salvage experience.[15]

When the President called upon the Defense Department to respond, the Corps became officially involved in the cleanup operations. On 6 April General Kelly and Brigadier General Patrick Stevens, Division Engineer, North Pacific Division, were attending a Department of Energy briefing in

Washington about the importance of oil from Alaska's North Slope when Kelly received an urgent call from General Hatch. Hatch informed Kelly that the Defense Department was going to be activated and directed him to contact General Smith about potential Corps involvement. Kelly and Stevens returned to Corps headquarters and then went to the Pentagon to meet with Smith.[16]

HQUSACE officials activated the Emergency Operations Center (EOC) at 3:00 P.M. on 7 April for 24-hour operation. All information entering or leaving headquarters concerning oil spill activity would be coordinated through the EOC. An hour later, after briefing General Hatch, officials in headquarters notified the divisions. A crisis management team made up of representatives of various HQUSACE elements began meeting in the Emergency Operations Center every morning at 8:00 to review situation reports that had come in and to prepare information for the center's own report. The EOC held briefings twice a week to keep headquarters command and staff informed and remained in operation until 16 June, when the Corps' oil spill response mission ended.

Meanwhile, General Stevens returned to North Pacific Division on 6 April and left the next day for Alaska to work with Colonel Kakel to determine the Corps' program. Kakel, who had just returned from his visit to Valdez with General McInerney, had a somewhat different perspective than Stevens, who had just come from Washington. The next day they went to Valdez and flew over the sound. They received briefings from Coast Guard and Exxon officials at Valdez and discussed potential Corps support. During the visit Kakel and Stevens reached agreement on what the Corps could do. They recognized that the Corps should be supportive without offending the Coast Guard. Stevens observed some confusion about who was in charge, how the operation was going to be conducted, the scope of the operation, and the nature of DOD support and how would it be rendered.

General Stevens activated a division task force in North Pacific Division to keep him advised of the oil spill activities. He decided not to activate the Division's emergency operations center, but rather to have Alaska District's EOC be the central point for disseminating information.[17]

On Thursday, 6 April, Alaska District formed a crisis management team for the oil spill cleanup and opened its

emergency operations center, a combination lunchroom and conference room that converted to an emergency operations center. Alaska District's emergency operations center went to 24-hour operation the next day. Much of the job of the NPA EOC was to coordinate activities and information. It was the channel for information and taskings in and out of the District. The District's EOC collected reports put out by Exxon, the Coast Guard, the Regional Response Team (RRT), and the Joint Task Force and generated its own report. It did contingency planning, evaluated the types of contracting mechanisms that would be available on short notice, and contacted suppliers to find out what kind of equipment was available for use in the cleanup. Alaska District's EOC would operate sixty-five days, from 6 April to 9 June, in its longest emergency operation.

Alaska District's deputy emergency manager, Emergency Management Section Chief Merv Mullins, had begun participating in RRT meetings on 27 March where he received information from the Coast Guard to pass on to the District's executive staff.

As the Army Corps of Engineers began to prepare its own response to the spill, the Director of Military Support made plans to send a team of experts to Alaska to assess the situation. There was pressure on the federal government and the Pentagon to pump money into the cleanup and to do something to provide quick visibility, but Pentagon officials did not want to commit a lot of resources and make mistakes that the media would pick up on. These officials needed to put experts in the field to observe the problems and make recommendations so that they could make intelligent decisions. The team was a means of getting the best information possible before making concrete recommendations for DOD involvement.

General Smith and his joint staff organized the team with help from General Kelly. They first identified specific skills that they thought would be required to clean up the spill and then designated certain types of people. General Kelly placed John P. Elmore, Chief of the Headquarters Operations, Construction, and Readiness Division, on the team, where Elmore would play a key role as the senior DOD civilian. He, in turn, obtained Corps assistance and expertise in areas where

Lieutenant Colonel Roy Carlson (left), John Elmore (center), and Colonel William Kakel (right).

he anticipated the Corps might be involved.[18] From North Pacific Division Elmore requested a biologist or environmental specialist (James R. Reese); a dredging expert (Robert J. Hopman); a contracting specialist (William J. Doran); and an emergency operations specialist (Paul Zepernick). Team members from the Division had little instruction beforehand, just one conference call with Alaska District. They met Elmore in the Seattle airport on Saturday, 8 April, and during the flight he briefed them and showed them the first oil spill documents that they had seen. Elmore instructed them that they were going to Alaska to look for a way for DOD to help in the cleanup effort. The five men arrived in Anchorage later that afternoon.[19]

The team, headed by Colonel Thomas Wilson, Deputy Commander and Chief of Staff, Alaska Joint Task Force, consisted of nineteen representatives from the Navy, Corps of Engineers, AK-JTF, Office of the Surgeon General, and USA Health Service Command, plus a Coast Guard liaison, Lieutenant Commander Glenn A. Wiltshire. Wilson and Elmore

emphasized that the mission of the DOMS team was not to take over the cleanup but to determine the available resources within their particular areas of expertise that could be brought to bear and to offer those resources to the FOSC and Exxon. If there were requirements for additional expertise, the members were to inform General Smith. Colonel Wilson conceded, however, that beyond this mission there were some "political aspects." It was important to have a "visible federal presence involved," and the team considered this in its assessment. Corps members of the assessment team had a dual mission: to evaluate DOD resources in general and look at possible roles for the Air Force, Army, and Navy, and to evaluate Corps resources specifically.[20]

The DOMS team focused on the following areas: logistical support, including billeting, messing, and morale support for military, civilian, contractor, and volunteer personnel; transportation requirements in Alaska; command and control requirements; communications presently in place and additional requirements; missions the Navy could execute; availability of docking facilities and support; air support, including airfield availability, air traffic management, and control requirements; assistance to decontamination efforts; the number of military personnel required and what missions they could perform; methods for disposal of contaminated materials; reimbursement for DOD efforts, including the procedures for recording DOD costs at the JTF level; and additional equipment requirements, specifically Corps dredges in Portland.[21]

The team met for the first time on 9 April and was briefed by General McInerney and his staff. The team would meet with Colonel Wilson every day at 8:00 A.M. Most of the interaction between team members from different service branches occurred at these morning briefings. Corps members gathered each evening to discuss possible Corps involvement and to work on contingency plans. The Division members worked closely with their Alaska District counterparts (Tom Carter, Kirk Shadrick, and Guy McConnell). The team worked eight days straight, fifteen hours a day, constantly observing, discussing, and planning.[22]

On 10 April the DOMS team had discussions with Coast Guard and Exxon representatives and state officials at Valdez

and toured the spill area by helicopter. Light snow, low visibility, and high winds in the spill area hampered the assessment. Around midnight that evening the last of the team representatives, Navy representatives from U.S. Pacific Command, arrived at Elmendorf.

John Elmore returned to Valdez on 11 April, accompanied by Colonel Kakel, Hopman, and Reese. There they coordinated with the on-site technical experts and made helicopter overflights in the spill area. Elmore, Kakel, and the DOMS team members discussed the possible deployment of an Army Corps of Engineers dredge and other items with Admiral Nelson. Elmore and Kakel presented an overview of Corps expertise and capabilities that could be made available. DOMS team representatives returned to Valdez and Cordova again the following day. Personnel in Cordova assessed the feasibility of staging and supporting Army MEDEVAC helicopters there. The team also provided input into the update briefings for Admiral Yost. Team personnel met with General McInerney to receive guidance and make recommendations about possible DOD support.[23]

Team members initially concluded that the cleanup strategy was satisfactory and effectively addressed local concerns, specifically economic and environmental issues. Colonel Morton V. Plumb, USAF, Director of Joint Operations for AK-JTF, reported, "The general consensus of the team members was that the strategy formulated by Exxon/USCG is thorough and represents the best efforts of a large group of very talented specialists." As details of their plan became known, he added, "much of the criticism leveled at their organizational effort will be allayed."[24]

Throwing in troops was the first action that the team considered, but they rejected that idea because of the infrastructure required to support those troops. The first possibility for Corps involvement that stood out was the use of the dredges. Team members recognized that the dredges would have to be converted in order to recover oil, but concluded that, once converted, they could be useful as skimmers, as containment barges, and as command and control platforms.[25]

In his initial observation, the Corps environmental specialist, James Reese, noted that the Corps could call in its archaeologists and environmental assessors and could help

move fish if hatcheries were threatened. Contracting specialists Bill Doran and Paul Zepernick observed that Exxon contracting with VECO was working well. Corps members were frustrated that they could not do more. Their recommendations were tempered by the stiff restrictions that the state of Alaska had put on the cleanup.[26]

On Friday, 14 April, John Elmore accompanied General McInerney to Valdez to brief Commandant Yost and Admiral Robbins on the team's findings and recommendations. The briefing covered the results of the DOMS team study and DOD resources available for possible support activity. After conducting final briefings with Assistant Secretary of the Army for Installations and Logistics John W. Shannon and General McInerney on 16 April, the team dispersed. Robert Hopman stayed behind for another week to help deploy the dredges.[27]

The team's final recommendations dealt with support in the following areas: communications, logistics and transportation, medical, naval support, aviation movement, and the Corps of Engineers. In the area of communications, the team noted that existing communications at Valdez met the current requirements. For ship to shore communications, there were enough UHF and VHF nets that linked the state, Coast Guard, and Exxon representatives and the control vessels at sea as well as beach parties ashore. More UHF satellite communications radios would be needed if additional forces were deployed.

In looking at logistics and transportation the team found that General McInerney had already dispatched a logistics liaison team to Valdez to handle requirements. An AK-JTF response team was in place at Elmendorf AFB to handle the requirements for the operations. The capability to support non-Alaska-based forces was "extremely limited." However, most Alaska-based forces had sufficient organic support to deploy within the operations arena. Using troops would require the establishment of base camps with appropriate support (i.e., billeting, messing, shower facilities, laundry, and associated sanitation facilities).

The team observed that naval support already consisted of 22 oil skimmers and a command, control, communications van for coordinating these skimmers. The Navy could provide,

if needed, the U.S.S. *New Orleans*, U.S.S. *Juneau*, U.S.S. *Fort McHenry*, LCM-8 landing craft, CH-46 helicopters, and two non-self-propelled barges. There was at that time a need to house roughly four hundred workers in Valdez. Rental of a Navy berthing barge would solve this problem.

In the area of aviation, the team found that space was limited at the Valdez and Cordova airports. Each could handle up to two C-141s or one C-5A aircraft. Valdez and Cordova would require aviation support personnel and equipment. Major activities could be supported from Elmendorf AFB and Seward, which could accept increased aviation support.

Finally, the team reported on potential Corps of Engineers contributions such as engineering services and design support. The Corps could manage large design projects and provide engineering support in these ways: develop initial and long range plans for cleanup operations; design temporary camp facilities and utilities; design incineration facilities for oil work and debris; provide photo surveillance and remote sensing; and provide sampling and testing of contaminated water, soils, and hazardous and toxic waste. The Corps dredging fleet of four could be used for oil skimming, as command and control centers, or to support a number of satellite oil skimmers while serving as a command and control center for the surrounding vicinity.

The Corps could also provide support in the areas of construction, contract administration, technical advice, and environmental evaluations. It could provide laboratory and research assistance from its five major research and development labs and eight Division labs, which performed a wide range of material, water quality, and chemical testing and sampling. These labs could provide oversight of the cleanup. In the area of power generation, the Corps had eleven emergency power generators, located at Fort Belvoir, Toole Army Depot, and Fort Monmouth, that could be in Prince William Sound in 56 to 104 hours.[28]

Although the team investigated and reported potential Defense Department contributions and costs, it never recommended that DOD take over the work. Secretary Skinner, EPA Administrator Reilly, Assistant Secretary Shannon, Breeden, Addington, and General Smith, as well as representatives from DOMS and from the Coast Guard, reviewed the

teams' recommendations on 17 April at a meeting at the Department of Transportation.[29]

By the time the DOMS team submitted its final report, the Defense Department was already providing considerable support to the cleanup operations. DOD support had actually begun on 25 March, the day after the grounding, when the Coast Guard asked the Navy for support. The first airlift of Navy equipment occurred on Sunday, 26 March, when two Marco Class V skimmers and associated equipment and operators were flown from Travis AFB to Anchorage. On Friday, 31 March, in response to a second Coast Guard request, the Navy arranged to fly five additional skimmers to Alaska. During the weekend, 1–2 April, one C-5A with two skimmer systems departed Travis AFB and one C-5A and one C-141 with three skimmer systems, 6,000 feet of offshore oil containment booms, and associated equipment left from Williamsburg, Virginia. On 4 April an additional 16,000 feet of containment boom departed Travis AFB, one C-5 from Norfolk Naval Air Station, and one C-5 from Travis AFB. The next day the Navy mobilized fifteen additional skimmers from Stockton, California, and Williamsburg for transport to Anchorage. This equipment was in place by 10 April. The Navy later established a management and support complex at Valdez to assist the Coast Guard and Exxon in effectively using Navy assets.

When DOD became involved General McInerney and Colonel Wilson sent logistics teams to Valdez to provide a link between Exxon, the Coast Guard, and DOD concerning defense resources. Exxon requested the equipment, USCG verified the need for the equipment, and the logistics people forwarded requests to the Pentagon and followed the movement of the resources until they got where they needed to go in Alaska. On 8 April, twenty-four hours after the Bush speech, General McInerney deployed Captain Greg Hellesto and Master Sergeant Steven Patterson of Alaska Air Command (AAC) logistics, Captain Monica Aloisio from AAC public affairs, and Master Sergeant William Reavis from the 1931st Communications Wing to Valdez to work with Coast Guard and Exxon officials. The 616th Aerial Port Squadron at Elmendorf AFB continued to receive and offload C-5 and C-141 aircraft from Europe and the lower forty-eight states.

By 27 April they had handled at least twenty-four Military Airlift Command transport aircraft bringing in over 1,063 tons of cargo for the cleanup. The 1931st Communications Wing established an extensive communications system using satellite radios and computers to aid coordination between Exxon command center, the Coast Guard Marine Safety Office in Valdez, the air operations center at the Valdez airport, and the Joint Task Force command center.

The largest DOD contributions were Navy berthing ships. Because of the remote location of the cleanup sites, there was a desperate need for floating facilities to house shoreline cleanup workers. In response the Navy provided amphibious transport docks (LPDs) or dock landing ships (LSDs). The U.S.S. *Juneau* left its home port, San Diego, California, on 18 April and arrived in Alaska on 24 April. The U.S.S. *Fort McHenry* left San Diego on 28 April and arrived in Alaska on 4 May.

Over the summer months the Navy replaced the *Juneau* first with the *Cleveland* and the *Ogden*, and then with the *Duluth*. Meanwhile, the U.S.S. *Mount Vernon* relieved the *Fort McHenry* and then left the cleanup operations on 18 July without a replacement, reducing the naval presence to one ship. The U.S.S. *Duluth* sailed without replacement on 16 September, ending the naval ship presence in the oil spill cleanup operations.

The ships functioned as "floating hotels" providing medical, laundry, housing, dining, and sleeping facilities for shoreline cleanup workers. They also provided communications support and functioned as command and control platforms and helipads for forward deployment of helicopters. They supported base operations of the landing craft, providing maintenance, fuel, and docking. Deployed with the ships were Marine Corps CH-46 helicopters and Army medical evacuation helicopters, which performed a variety of essential missions. Naval ship operations centered in Prince William Sound and were especially important in open sea areas because commercial berthing vessels could not operate in the rough water.[30]

DOD also provided military airlift support. U.S. Air Force airlift operations peaked during the period 4 to 9 April. The Air Force flew over forty sorties of C-141, C-5, and C-130

aircraft, ferrying more than 1,100 tons of cargo from as far away as Helsinki, Finland. They transported oil skimmers, communications trailers, tow boats, boom and rigging vans, boom mooring systems, general purpose boats, power packs, and generators.

In addition to Navy berthing ships and Air Force airlift support, the Army provided helicopters. With the arrival of the first Navy ship, a large contingent of military personnel were present in Alaska. This required that helicopters be on-site to provide emergency MEDEVAC. Initially two UH-1 (MEDEVAC) and two CH-47 (non-MEDEVAC) helicopters from the 6th Infantry Division, Fort Richardson, Alaska, met this requirement. Because most operations were over water, MEDEVAC aircraft with a twin-engine capability were required; three MEDEVAC UH-60 Blackhawk helicopters were deployed from Fort Benning, Georgia, to Alaska via Air Force cargo airlift on 19 April. By 21 April the Army had provided seven helicopters and thirty-six helicopter crews.

Helicopter crews underwent deck training to permit them to land and take off from helipads aboard ships at sea. Thus helicopters could operate from aboard ships and respond better in an emergency. These helicopters performed many functions ranging from utility missions, such as the transport of supplies, to the evacuation of military and civilian personnel. After the last Navy ship departed, the helicopters returned to Fort Benning.

DOD also contributed essential landing craft, which ferried crews from berthing/support vessels anchored offshore onto contaminated beaches. Nine Navy landing craft arrived with the U.S.S. *Juneau* on 24 April and ten more arrived with the U.S.S. *Fort McHenry* on 4 May. Exxon subsequently leased the following quantities of landing craft from the Army's reserve component: four from the California Army Reserve, eight from the Washington State National Guard, and three from the Alaska National Guard. These lease agreements required Exxon to transport them to the oil spill area (rather than them arriving under their own power) and to provide them with maintenance, fuel, and crews.

At the Coast Guard's request, DOD provided 251 Lightweight Decontamination Apparatus units for use by Exxon shoreline cleanup crews. These units are power driven,

portable devices capable of producing and spraying hot water to decontaminate personnel and equipment. They were carried on shore to provide high pressure heated water.

By 25 April, a month after the grounding, DOD had committed substantial resources to the cleanup effort. The Army had put into action three UH-60 Blackhawk helicopters, three UH-1H Huey helicopters, and two Army Corps of Engineers dredges. Three Army air traffic controllers, helicopter crews, and fifty crewmen on the dredges were involved in the cleanup. The Navy contributed 20 skimming vessels, 2 Voss skimmers, 10 tow boats, a 2,000-foot boom van, 20 mooring systems, 2 rigging vans, 2 cleaning vans, 4 inflatable boats, 3 Navy personnel, and 87 contract personnel in addition to the *Juneau* and *McHenry*. DOD support to the cleanup peaked in the week 4 to 8 May. On 4 May there were 854 DOD personnel assigned to the oil spill joint task force.[32]

Initially there was a great deal of uncertainty and controversy about the role that the Defense Department should and could play in the cleanup operations. Through weeks of discussions in Washington and the efforts of the DOMS Assessment Team in Alaska, the role became more clearly defined. The Defense Department ultimately provided a broad range of resources from berthing ships to decontamination units.

CHAPTER III

Growing Corps of Engineers Involvement

In the first weeks of April, Corps involvement in the cleanup operations grew rapidly. The most significant Corps resources involved in the operations were two dredges. The idea of using dredges in oil recovery operations was not new. In the 1970s Congress discussed equipping vessels for oil recovery as well as dredging but concluded that this would be too expensive. When the Corps designed its dredges in the mid to late 1970s officials discussed outfitting them for oil skimming. A few days after the spill, on 28 March, at a meeting of the National Ocean Pollution Policy Board, Art Hurme from the dredging branch in Corps headquarters informed Dave Barrows of the Office of the Assistant Secretary of the Army for Civil Works and other board members about past discussions.[1]

The next day Assistant Secretary Robert Page informed Alaskan Senators Ted Stevens and Frank Murkowski, Representative Don Young, and Governor Cowper that he had alerted the Corps of Engineers to review its capabilities "anticipating that we may be called upon to assist as part of a federal team." Secretary Page also notified EPA, DOT, the Department of the Interior, and the Federal Emergency Management Agency that the Corps had been monitoring the oil spill situation "in anticipation of being asked to assist in the recovery effort as part of a federal team." The Corps had "vast experience" in emergency response and environmental issues, technical expertise in contracting, and was investigating the use of its seagoing hopper dredge as an oil recovery means. Secretary Page received no response.[2]

On 30 March General Kelly informed the North Pacific Division that Secretary Page had agreed to use a Corps hopper dredge if called upon to assist in the oil spill recovery efforts. He directed NPD immediately to develop a plan of action so that the dredge could respond quickly once given

the word to deploy. The Division was to conduct an on-site investigation with dredge operations personnel to consider the following issues: availability of oil collection boom equipment and ways to use it effectively; availability of oil skimmers which could be used in conjunction with booms; estimated time required to outfit the dredge; estimated travel time to Prince William Sound; and estimated mobilization costs and daily rental costs. "It is particularly important," General Kelly explained, "that we have laid all the necessary groundwork to respond rapidly and effectively should the Corps be called upon to respond."[3]

Specifically, Corps officials considered using two dredges based in Portland: the *Yaquina*, which had come out of dry dock a few weeks earlier, and the *Essayons*, which was scheduled to begin work in San Francisco. The two dredges normally help maintain adequate navigation depths in river channels and harbors on the coasts of Alaska, California, Oregon, Washington, and Hawaii. Crews remove silt and sand off the channel bottom, move it into the hoppers, and later off-load it into a disposal site. Neither dredge had ever been used to recover spilled oil.

The *Essayons*, constructed in 1982, was the larger of the two dredges: 350 feet long with a 68-foot beam and a hopper capacity of 6,000 cubic yards. It had four dredge pumps: one 1,650 horsepower mounted on each dragarm and two 1,500 horsepower pumps mounted in the hull. The dredge could carry 26,000 barrels (over 1 million gallons) in its hopper and travel at 13.5 knots an hour fully loaded. The *Yaquina*, built in 1981, was 200 feet long and 58 feet wide with a capacity of 875 cubic yards and could carry 4,000 barrels (168,000 gallons). Both dredges were highly maneuverable, and the *Yaquina*, with its shallow draft, functioned well in small inlets. Each dredge had two dragarms used to suck up the dredge material. The pump horsepower per dragarm was 1,650 for the *Essayons* and 565 for the *Yaquina*. The *Essayons* pumped at a rate of 30,300 gallons a minute and the *Yaquina* at a rate of 5,454 gallons a minute.

The *Essayons* had just reached the Oregon–California border on its way from Astoria to San Francisco on 29 March when General Stevens ordered it to turn around. It returned to Astoria at 5:00 P.M. the next day. After being informed

that the *Essayons*' services would not be needed, however, General Stevens directed the dredge to return to San Francisco for dredging operations.[4]

Meanwhile Portland District staff went into action to prepare for a possible oil cleanup assignment. On 31 March Leroy Johnson from Portland District and Ron Henry, Master of the *Essayons*, traveled to Valdez to gather information and coordinate with cleanup officials. There they contacted the leader of the Coast Guard strike team as well as the head of Exxon operations in Valdez. Ken Patterson, Chief, Navigation Branch, Portland District, and his staff contacted contractors in Portland, San Francisco, and Seattle who were in the oil spill business to find out what they needed for oil cleanup operations. Without a formal mission, however, they did not have authority to make commitments to contractors, and when they later received word to send the dredges they found that most of the suppliers that they had contacted earlier had already shipped their equipment to Alaska.[5]

As Portland District staff struggled to locate supplies and equipment, officials in Alaska and in Washington, D.C., moved closer to a decision about sending the dredges. The decision was political as well as operational. Pentagon officials justified sending dredges on the purely functional lines of providing communications and command and control in a remote, harsh environment. They contended that their prime motive was a sense of responsibility. The President had indicated his desire for the Defense Department to become involved, and Pentagon officials felt a responsibility to take action. Yet, it should also be noted that the White House was under pressure from the media and Alaska's congressional delegation to take bold action and commit DOD resources, and Pentagon officials felt this pressure. As General Stevens explained, it was "very inviting to consider using Corps dredges to provide visibility of presidential support for the cleanup effort and getting valuable experience for possible future missions."[6]

As days passed after the President's press announcement and no major requests came from the Coast Guard, Generals Smith and Kelly became anxious. Smith had set up the joint staff at the Pentagon, designated General McInerney as the Defense Senior Representative, and made a number of trips

to the White House. He had set everything in motion to provide support. The Secretary of the Army had even given General Smith permission to issue warning orders on equipment that might be needed soon, such as Navy berthing vessels and Corps dredges. When Smith asked Coast Guard officials where the request for the berthing vessel was, they indicated that they did not want to request the ship because of the expense. Nor were they willing to pay for Corps dredges at that point. Smith and Kelly went back to the Secretary of the Army and the Secretary of Defense and explained that they were not getting any requests. They argued that the Defense Department should mobilize whether the Coast Guard made a request or not. Secretary Cheney agreed, and he directed General Smith to send the ships to Alaska. Smith observed that none of the dredges' success would have occurred if the military had not forced the issue. "As it turned out," he concluded, "it was a good decision." Admiral Robbins also acknowledged that if not for the political push, no one would have discovered the dredges' capabilities.[7]

Meanwhile in Alaska, DOMS team members discussed possible use of Corps dredges with General McInerney and with Coast Guard officials. John Elmore discussed the use of the *Yaquina* with Admiral Nelson. Elmore believed the dredge would be useful because it could chase the oil, boom it, pump it, put it in the hoppers, and off-load it. Although it had never been used to recover oil, Elmore said, "all the basic factors were there to make the machine work." On 12 April General McInerney requested the *Yaquina* and Nelson concurred. The AK-JTF sent the request to DOMS, and DOMS dispatched the message to the Corps.[8]

Since the dredges had never been used in oil recovery before, some Alaska District officials were not as confident about the potential contributions as Elmore, but once the decision was made they responded enthusiastically. Hopman and Elmore convinced Colonel Kakel that the vessels could be used as floating platforms and berthing ships if for nothing else.[9]

While officials debated the use of the dredges, General Stevens put the *Yaquina* on standby. On Friday, 7 April, word came to have the *Yaquina* ready to leave Portland at 8:00 A.M. on Monday, 10 April. Portland District staff quickly

Army Corps of Engineers dredge Yaquina *in Alaska.*

fitted the dredge with a thirty-day supply of fuel, rations, and water as well as 36-inch oil containment boom (the only kind available in Portland), absorbent pads and rolls, extra sleeping bags, extra foul weather and cold weather gear, heating coils, and steam hoses to keep the dredge clean. They stacked roughly two thousand yards of yellow rubber oil boom on the deck and placed on board petroleum products and repair parts needed for extended operations without support.

Portland District staff rented additional equipment necessary to support the operation including an air compressor and a three-inch submersible and a three-inch diaphragm pump. They fastened on the deck of the *Yaquina* a 34 foot by 10 foot belt-driven inland Marco skimmer rented from ChemPro Environmental Services in Seattle. This Marco skimmer was a standard skimmer design for oil recovery, but it would not be very effective because of the viscosity of the oil. The small pump on board the skimmer used to move materials from a collection tank to a larger holding tank was incapable of moving the thick oil. District personnel also placed on board a small survey vessel (survey boat 205) that had electronic positioning capability as well as normal

fathometers for hydrosurvey, but ultimately no hydrosurvey was required. They would supply both dredges with charts of the areas where they expected the dredges to work. They placed cold weather gear on board but were unable to locate the necessary exposure/flotation suits for either dredge.[10]

After a frenzied weekend of preparation, the dredge was ready. On 11 April DOMS informed Corps headquarters that the Coast Guard had requested the assistance of the *Yaquina* and directed the dredge to leave Portland for Valdez as quickly as possible. Upon arrival the captain was to report to the FOSC. After thirty hours of waiting, the crew departed for Alaska at 7:00 P.M. on 11 April. Late that night Charles W. Hummer, Chief of Dredging, HQUSACE, commended Ken Patterson and his staff: "You have done a superb job of being ready and also to arrive and make a difference." Early the next morning the dredge crossed the Columbia River bar into the Pacific Ocean, two hours behind schedule because of fog. Rough weather in the Gulf of Alaska forced the *Yaquina* to take the inside passage route, which added a day to her transit time.[11]

When the *Yaquina* left Portland it carried, in addition to its normal crew of twenty-two, a public affairs specialist, a safety officer to insure that there were no accidents related to handling the oil, two contractors for the skimmer, two for the survey boat crew, and one radio operator, for a total of twenty-nine. After arrival the crew would be augmented with a photographer and a wildlife biologist (Eric Braun).

Portland District Engineer Colonel Charles A. Cowan had organized Task Force Castle and assigned a young, energetic Army captain, Kevin Brice, who was deputy project manager for the Dredge and Plant Project in Portland District, as Task Force Commander to coordinate the dredges and insure that they were prepared to do what was needed. Cowan anticipated that Brice would handle the expected VIP visits, serve as liaison with Coast Guard and Exxon representatives, and coordinate with the command post on the ground. Brice met the dredge crew in Alaska.[12]

After the *Yaquina* departed, General Kelly placed the *Essayons* on standby for possible deployment to Alaska. Patterson initiated plans to lease and purchase equipment for the *Essayons* and to deliver it to Astoria where the

Essayons would change crews and take on fuel and stores.[13] Once again Portland District staff worked around the clock to procure pumps, hoses, cleanup gear, absorbent pads, chemicals, and fire protection equipment. They sent all of this material by truck to Astoria where it could be loaded on the *Essayons* when it arrived. Two trucks from Seattle brought an oil skimmer and booms to load, along with personnel to operate the skimmer. They ended up with a pile of support gear on the dock half as long as the ship and almost as wide.

On 13 April General Kelly directed that the *Essayons* be staged forward to Astoria and immediately provisioned and equipped for a possible mission in Alaska. The dredge left San Francisco that night. The next day General Kelly sent the following message: "Once the *Essayons* has arrived in Astoria, Oregon, she is to be immediately provisioned, equipped and sailed immediately to Seal Rock, Prince William Sound, Alaska, for use in oil spill cleanup and other duties to be determined upon arrival."[14]

Meanwhile, in Alaska, Elmore informed General McInerney that the *Essayons* had been staged forward and would be held at Astoria. McInerney responded that as long as the *Essayons* was that far forward, he would recommend bringing her to Alaska. On 14 April DOMS sent a message requesting the Corps to prepare the *Essayons* for "likely" deployment to Alaska. That same day in a videoteleconference between DOMS and AK-JTF, General McInerney requested that the *Essayons* be sent along with two Navy berthing ships. The *Essayons* left Astoria for Alaska early the morning of 17 April, its exact mission still undetermined. Weather conditions were good, and it made better time than the *Yaquina*.[15]

Coast Guard and Exxon officials, however, were not convinced that the dredges would be useful and felt the ships were being forced on them. Exxon was reluctant to enlist unproven equipment, and Coast Guard officials were afraid that if they brought the dredge up, Exxon would not pay for it. As the *Yaquina* headed toward Alaska, tension mounted. On 15 April, Otto R. Harrison, General Manager, Exxon Company, U.S.A., the Exxon official in charge at Valdez, informed Admiral Yost that at the current stage of Prince William Sound water surface oil recovery, "there is no use for these

vessels." The amount of surface oil in the Sound decreased daily. Nor were the Corps vessels needed in offshore Gulf of Alaska operations, he added.[16]

The reluctance of Coast Guard and Exxon officials to request the dredges is understandable. Cleanup managers at Valdez could see no use for the dredges. They had never been used or equipped for oil recovery, so they were not listed in the emergency oil spill manuals that Exxon and USCG operators consulted. Yet, the manuals did list a Soviet vessel, the *Vaydaghubsky*, which was equipped as a skimmer. At the recommendation of the Coast Guard, Exxon had already arranged for the use of the *Vaydaghubsky*, and it was on its way to Alaska. The *Vaydaghubsky*, built in 1984 at the Finnish shipyard Wartsila, was a special purpose vessel capable of carrying out hopper dredging, fire fighting, oil spill cleanup, and sewage disposal from offshore platforms. It was 425 feet long (compared to Navy skimmers that were 36 feet long) and reportedly could work in winds up to 30 knots and seas up to 8 feet.[17]

On 16 April Captain Brice, Robert Hopman, and other Corps officials went to Valdez to meet with Coast Guard representatives to define the dredge missions and to coordinate crew changes, communication and reporting requirements, and resupply needs. Their reception was chilly. Coast Guard representatives bluntly asked what the dredges could do and referred to Harrison's letter saying that Exxon did not want the dredges. After responding as diplomatically as possible that he was not sure exactly what the dredges could do, Brice proceeded to outline possible dredge activities, from collecting oil to serving as a command ship. There was apparently some confusion. Coast Guard officials seemed to have the impression that the dredges had been refitted for oil skimming and that they had high seas oil skimming capability. The DOMS team had apparently described the *Yaquina* as having "high seas" skimming capability. No one at the 16 April meeting, however, made that claim.[18]

When word that the dredge capabilities were unclear went up through Coast Guard channels, Coast Guard officials became upset that they did not have the super ocean-going skimmer that they said they were promised. The FOSC complained to DOMS that the assessment team had presented

the *Yaquina* as having "high seas skimming capability," when the 16 April meeting revealed little or no skimming capability. The FOSC reminded DOMS that Exxon had "firmly declined" the use of the dredges and said there was no need for them in the Prince William Sound recovery operations. Moreover no Coast Guard or Clean Water Act 311(k) funds were available to pay for them. The FOSC requested more information on the *Essayons*' cleanup capability before it sailed and requested that the *Yaquina* proceed to Valdez for an assessment of its oil spill cleanup capabilities.[19] In response to the USCG message, Corps dredging personnel prepared a white paper outlining Corps dredge capabilities. General Kelly also sent Charles Hummer to Alaska to help make the dredge operational. The potential contribution of the dredge, Kelly explained, was "too important a thing to risk." Specifically, he directed Hummer to assess the Corps' current role in the cleanup, help Colonel Kakel use the two dredges in oil recovery operations, and assess other potential Corps support. Hummer arrived in Anchorage on 18 April where he met with Colonel Kakel and his staff.[20]

DOMS responded to the Coast Guard with a message on 18 April indicating that both dredges could skim in waves of up to three feet and retain skimmed material (*Essayons*, 26,000 BBLs; *Yaquina*, 4,000 BBLs). Each vessel had command capability and could function as a repository for skimmed oil from other vessels.[21] A message from Captain Brice to Ted Hunt, the captain of the *Yaquina*, late on 17 April indicated the level of tension. Brice asked Hunt and his crew to find a way to pump oil from skimmers into the dredge hoppers; normal pumps were not working. He warned, "The climate up here is very political! Please be very, very cautious in your transmissions and discussions. The politics is on the Washington, D.C. level. Exxon does not want the dredges in Alaska. The dredges are being forced on the USCG by DOD."[22]

It was into this highly charged political environment that the dredge sailed. At 3:45 P.M. on April 18 the *Yaquina* arrived off Eleanor Point in Prince William Sound. A Coast Guard inspector boarded the dredge to evaluate its capabilities. He and Captain Hunt discussed skimming operations and berthing. Captain Brice and Robert Hopman, who had

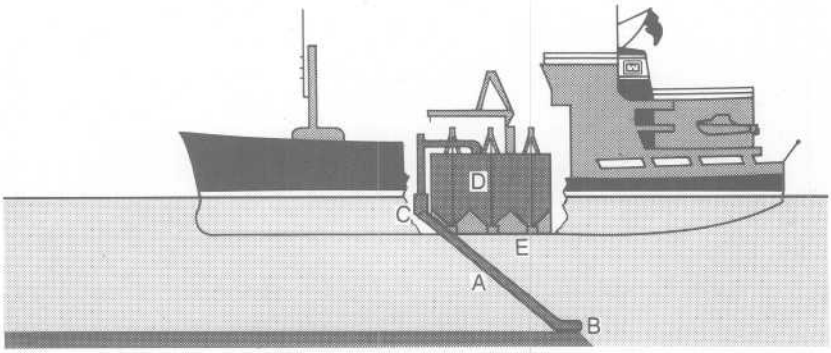
flown from Anchorage, were also on board. They invited the Exxon representative on site to use the dredge as his command post. Brice and Hopman told the crew that their mission was to "suck oil," enough oil to "make a difference." The crew was somewhat apprehensive because they were not sure they could recover oil, but they were optimistic and eager to find a way. After this initial meeting, the FOSC sent a message saying the dredge would be "most helpful" in the operations.[23]

The crew launched their skimmer and survey boat early the next morning and the launch followed. The launch and the survey boat dragged boom in a "v" formation away from the skimmer. At 7:45 A.M. the *Yaquina* edged into position close to two fishing boats that had a boom full of oil, the *Towhee* and the *Tres Suertes*. The two boats maneuvered their "donut" into position next to the dredge. To test the consistency of the oil, a bucket attached to a rope was thrown overboard. The bucket sat on top of the oil. The thick "mousse" was ten inches deep inside the boom and filled with debris and seaweed.

The crew first tried the centrifugal pump that they had brought to move oil into the hopper, but it worked too slowly. Their concrete pump also failed. The only thing left was the dredge pumps themselves. The crew did not know if this would damage the pumps and dragarms or how to adapt the dragarms to make it work. If the draghead sat too low in the water it sucked too little oil and too much water. If it sat too high on the water it would suck air and lose prime.

After tense hours of brainstorming and experimentation, at the suggestion of Chief Mate Jimmy Holcroft, crew members inverted the draghead. Around 4:00 P.M., workers cheered as they began sucking up as much oil in seconds as they had all day. In the first fifteen minutes using the inverted draghead, the dredge took an estimated 1,500 barrels of oil (63,000 gallons) into the hoppers. As it turned out, oil collecting was not very different from dredging. One captain called it "mirror image dredging" because the dragheads were inverted to suck oil from the top of the water instead of silt from the bottom.

With this remarkable success, Coast Guard and Exxon officials and others revised their assessment of the dredge



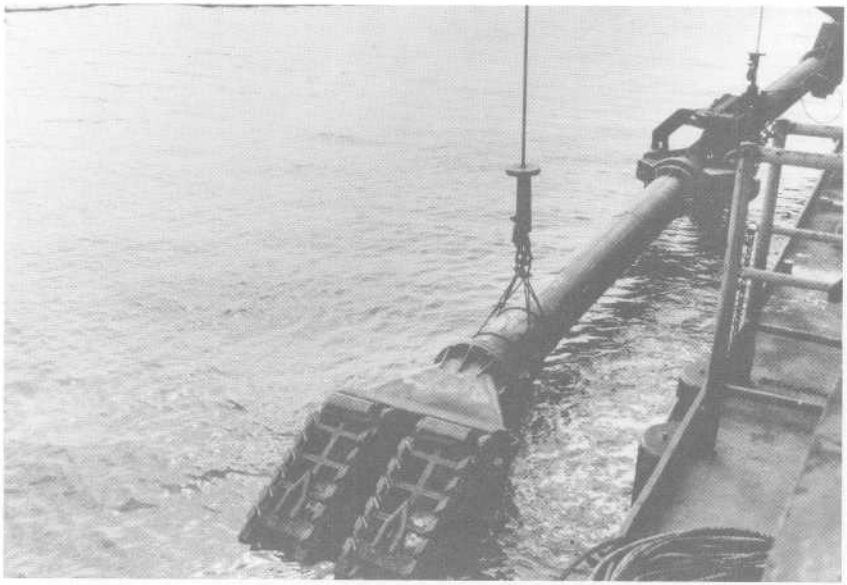
Typical Hopper Dredge Components: *Hopper dredges are seagoing vessels designed to dredge and transport dredged material to open-water disposal areas. The working of a hopper dredge is similar to that of a home vacuum cleaner.*

Dragarms (A) with dragheads (B) extend from each side of the ship's hull. The dragheads are lowered to the channel bottom and slowly pulled over the area to be dredged. Pumps (C) create suction in the dragarm and the silt or sand is drawn up through the arms and deposited in hopper bins (D) in the vessel's midsection. When the bins are full, the dredge sails to the designated disposal area and empties the dredged material through large hopper doors (E) in the bottom of the hull.

Hydrographic survey boats, using sophisticated electronic equipment, survey the river and harbor bottoms to determine if dredging is required and, after dredging is completed, to insure that the desired channel depths have been attained.

capabilities. General Kelly called their success a "miracle." It set the tone for the Corps' oil recovery mission. Colonel Kakel must have been particularly gratified because of the skepticism he had faced. In the face of stern questioning early that morning at a Joint Task Force briefing, he had been forced to admit his uncertainty about the dredge's capability. The Corps was now vindicated.[24]

On 19 April DOMS sent a message to the Corps directing the *Essayons* to depart immediately for Valdez and to contact the Coast Guard there for instructions. When the *Essayons* arrived in Alaska, the Coast Guard denied the Corps' request for the dredge to join the *Yaquina* long enough to witness the inverted dragarm technique, so the *Yaquina* crew explained the procedure by radio. Later Captain Brice "hitchhiked" to the *Essayons* to explain the procedures in person. The procedure, however, would be more difficult to implement in the Gulf of Alaska, where the *Essayons* would



Dragheads on the U.S. Army Corps of Engineers dredges were turned upside down to suck oil out of "donuts," or circles made of boom material. Normally, the dragheads dredge or "vacuum" sand from the bottoms of river and harbor navigation channels, primarily along the West Coast. The Yaquina, *the first of the two dredges to reach the spill, tried pulling in oil with the draghead in its normal, bottom-vacuuming position, but pulled in too much water in proportion to the oil pumped aboard. Crew members turned the draghead upside down to suck the oil from the surface of the water. That relatively simple innovation quickly and efficiently turned the hopper dredges from bottom-dredging vessels into oil-hungry pumpers.*

work, than in Prince William Sound because the high waves made it harder to hold the dragarms in the proper position.[25]

On 20 April Kakel, Miguel Jimenez, Captain of the *Yaquina*, Kirk Shadrick, and Hummer traveled by float plane and boarded the dredge to see the *Yaquina* in operation. They met with Hopman, Brice, Captain Hunt, Exxon representatives, and Coast Guard representatives to review the previous day's successes and to plan for the future. There was no more work in the immediate area of Perry Passage, so around 4:30 P.M. the dredge moved toward Hidden Bay to meet boats with boomed oil. There Captain Jimenez and his crew adopted new booming procedures. Instead of simply pulling in the oil collected by the two boats, one end of the 610-foot boom was tied to the *Yaquina*. One boat kept the other end out in front of the dredge and collected oil, using the dredge as a boom

Oil skimming operations in Prince William Sound.

ship. The oil was pumped into the hopper and the boom stayed attached to the dredge. Other boom boats in the area pulled their loads toward the *Yaquina* and released their oil into the giant boom created by the *Tres Suertes* and the *Yaquina*. At the end of the day the hopper held 1,100 barrels of oil. After the water decanted, the crew refigured the amount gathered on 19 April at roughly 500 barrels plus 600 collected on 20 April.[26]

The dredges quickly provided other support too. They loaned boom to smaller vessels and provided those crews with hot meals and showers and fresh water.[27]

As the dredges began to carve out their role in Alaska, the Corps of Engineers also became involved in contingency planning. While an anxious President and nation waited to see if Exxon would remain committed to effective cleanup operations, Corps personnel became more deeply involved in planning for the possibility that DOD and the Corps might assume a much larger role in the cleanup operations. Senior officials in the White House and the Pentagon needed reliable information that they could use to weigh options and make decisions about future actions. As DOD poured resources into Alaska in response to FOSC and Exxon requests, it prepared

In Prince William Sound, and off Kodiak Island and the Alaskan Peninsula, oil collected by small skimmers and fishing boats was contained in circles of boom material nicknamed "donuts." The oil collected in donuts such as this one was then pumped aboard two Corps dredges, the Essayons *and the* Yaquina, *where the oil was stored in the dredge hoppers until it could be off-loaded into barges. Neither dredge was equipped to work with oil, and both had to modify the dragheads by reversing them to pull in oil from the surface of the water instead of using them in the traditional way by vacuuming up from a channel bottom.*

for the contingency that it might be called upon to take over all or part of the cleanup if Exxon failed to meet its obligations. The Corps of Engineers, with its extensive engineering, construction, and contracting capabilities, played a major role in the contingency planning.

In the first weeks of April, Secretary Skinner, Secretary Cheney, Secretary Marsh, Admiral Yost, General Smith, and General Kelly held meetings in Washington to discuss Defense Department activities. At a White House meeting Kelly and Smith laid out a plan for the way DOD would approach the cleanup problem if it received the mission. At one point, they recalled, they were down on their knees at the coffee table in Governor Sununu's office spreading out their charts and maps and explaining how DOD would

conduct the cleanup operations. Both White House and Pentagon officials were committed to keeping Exxon as a player. If Exxon backed out, however, DOD would be ready to step in with a plan that Sununu had approved.[28]

In addition to the White House meetings, there was a series of teleconferences between Secretary Marsh, Addington, Breeden, Smith, and occasionally other officials in the Pentagon and General McInerney, Colonel Wilson, and Colonel Kakel in Alaska to discuss contingency plans for increased DOD involvement. During one teleconference Addington passed a note to General Kelly indicating that DOD and the Corps should be prepared to act. The Corps did not want to "come up short," as Kelly put it, if that happened.[29]

The Corps involved the Coast Guard in the planning process. A Coast Guard representative, Commander David Pascoe, came to Corps headquarters and reviewed a draft plan. Generals Kelly and Smith also met with Commandant Yost and Rear Admiral Joel D. Sipes, Chief, Office of Marine Safety, Security and Environmental Protection, around a table in Coast Guard headquarters in Washington to discuss the potential role of the Army.[30]

At a 21 April briefing, officials presented the White House with the outline of a proposed DOD contingency plan for the oil spill. DOMS, in turn, requested that AK-JTF use that outline to develop a detailed contingency plan for an increased DOD role in the cleanup and coordinate those sections related to the private sector with Alaska District. The next day the Joint Task Force initiated a contingency plan as directed.[31]

Part of the contingency planning involved determining the extent of the damage, the type of beaches affected, and the problems involved. Using this information, the Corps would then plan its response; i.e., equipment, manpower, and schedule. The Corps looked at how much of the work Exxon would retain and how much the government would take, the availability of contractors, safety and health measures, and ways to feed and house workers. It pulled all of these factors together in contingency plans that were briefed at the White House.

Most of the actual planning work fell to North Pacific Division and Alaska District. General Stevens' task force coordinated between Alaska District and headquarters. The

District and the Division supplied each other with such information as estimates of the number of miles of contaminated shoreline, discussed each other's estimates, and reached a consensus. District and Division staff continually grappled with the question of whether the Corps could be any more successful than Exxon given the restrictions on shoreline cleanup. They were also concerned that the Corps might not be able to provide adequate equipment and housing for workers.

HQUSACE requested cost, manpower, and logistics estimates daily. The responses were "best guesses" based on limited and sketchy information. For example, when asked to determine how much money, manpower, or time it would take to clear the shoreline, no one in the Coast Guard, Joint Task Force, or Alaska District had a clear definition of "clean" or an accurate assessment of the length of time it would take to reach "clean." NPD and NPA relied on Exxon reports and their own site visits for their figures and worried that officials in Washington would represent their numbers as fact rather than as their best guess. Colonel Kakel asked Colonel Wilson to remind DOMS that the estimates were based on assumptions and should not be used as positive indicators of later performance. He cautioned against reaching decisions based on miles of shoreline, slope of beach, and work rates.[32]

The requests for contingency plans occasionally frustrated District staff, who did not understand the decisions or motives at higher levels in the Corps or have a full picture of what was going on. The contingency planning between mid-April and mid-May went through three phases for Alaska District — the original engineering plan, the engineering annex to the JTF plan, and finally plan refinement and an analysis of Exxon's plans and procedures. In the first phase the District worked on the Corps' Engineer Task Force (ETF) operations plan. The task was difficult because the District had no reliable information on the amount of shoreline to be cleaned, quantity of oil to be removed, exact location of oil, funding, proven techniques for oil spill cleanup, or command and control organization.

In phase two the focus of the planning shifted from directing the oil spill cleanup to a support role for JTF, but the JTF did provide a mission statement to Alaska District. The

roles of the Navy, Air Force, Army, and NPA were not clearly defined. NPA was not sure whether JTF would get the mission to clean the entire spill area or just designated zones. Over time the mission was limited to designated zones and the role was more clearly defined. The ETF Plan of Operations (OpPlan) became an appendix to the JTF OpPlan.

If implemented, the contingency plan would have created an Engineer Task Force to provide open water and shoreline cleanup in a sector of the spill area. The ETF's mission would have been to contain and recover spilled oil, clean oil from the shoreline, protect sensitive areas from further damage, and restore the affected environment. The concept for operation was for ETF to provide command and control, contract administration, and coordination for shoreline and open water cleanup under the leadership of AK-JTF. The plan provided for extensive use of contractors and local labor and use of military resources for specific purposes to augment the contractor effort as necessary. The plan included an operating plan with a timeline for shoreline cleanup, floating oil recovery, contracting, and research and development. It also included plans for public affairs, service support, personnel requirements, and command relationships.

Because of the time constrictions, the plan required cost plus contracts that the Corps does not normally use. Contracts would have been negotiated on a cost plus profit basis. Under this type of contract there are no controls on the cost. The contingency plan called for five large contracts: three options for beach cleanup, one for hiring dredges, and one for waterborne cleanup.[33]

In addition to work on the OpPlan, the JTF asked the Corps to do technical assessments of Exxon's cleanup plan. With the possibility of greater federal involvement, the JTF wanted a government assessment of the effectiveness of Exxon's approach. The JTF requested an analysis of Exxon labor required on the shoreline. In response Alaska District developed a paper entitled "Shoreline Cleanup Analysis."

General McInerney asked Colonel Kakel to provide him with an assessment of effective shoreline cleanup methodologies. He also wanted to know what role the Corps dredges might play in this cleanup or techniques the dredges could apply on their own. He was especially interested in knowing

the practicability of dumping large amounts of hot water on the oiled shorelines. McInerney wanted all of this information tempered with what the Shoreline Priority Committee had reviewed up to that time, and how they were making their decisions about what shoreline cleanup methods to allow. Colonel Kakel asked James Reese and Jake Redlinger from NPD to respond to this tasking. North Pacific Division submitted three sets of papers: one on the use of dredges in shoreline cleanup, one on hot water flushing systems to clean shoreline, and a paper on other shoreline cleanup techniques written by scientists at the Waterways Experiment Station.[34]

Although DOD never received responsibility for the cleanup and the contingency plans were not activated, Corps personnel learned from the process. After they submitted their contingency plans, they continued to refine their estimates as more information became available. Their estimate of miles of contaminated shoreline was close to what the number actually turned out to be — roughly 1,500 miles.[35]

In the first weeks of April, then, the Corps searched for ways that it could contribute to the cleanup effort. No one knew with certainty how to equip the dredges for oil recovery or if they could function as oil skimmers, but officials were eager to respond to the President's call. This same desire to respond and to be prepared for a possible expanded role led to weeks of frenzied contingency planning. The value of the dredges was quickly apparent, but assessing the value that the information provided in the contingency plans had for decision makers in the Pentagon and White House is more difficult.

CHAPTER IV

Command and Control/Communications

One of the most significant problems in the oil cleanup operations was confusion in the command and control structure. The problem was compounded by the remoteness, the difficulty of communicating between all the key players, the mixture of the civilian and military worlds and the Coast Guard, and the high level of national attention. The confusion sometimes hampered operations and left the public with the impression that nothing was being done and no one was in charge.

The Coast Guard altered its traditional response structure in the Alaska operation because of the immense size of the spill and the intense presidential and media interest. Normally the local on-scene coordinator assumed responsibility for the cleanup. In this instance, however, the predesignated on-scene coordinator, the commanding officer at the Marine Safety Office in Valdez, was quickly overwhelmed by the scope of the spill and the cleanup effort and the high-level interest. The on-scene coordinator at the time, Steve McCall, was a commander in the Coast Guard, and officials with higher rank outside the Coast Guard were reluctant to deal with him. Moreover, McCall had to devote much attention to public and media concerns about the potential environmental and economic impacts of the spill. To alleviate some of the pressure on the on-scene coordinator, Vice Admiral Clyde E. Robbins, Commander of the Pacific Area, directed that the Commander of the Coast Guard's 17th District in Alaska, Rear Admiral Edward Nelson, take charge of the operations. Robbins and Nelson were in daily communication from 24 March until 7 April. Robbins traveled to Alaska once during this period, but he was not directly responsible for the day-to-day operations.

At one point President Bush directed Commandant Yost to take charge in Alaska personally, but Yost did not believe

this would benefit either the Coast Guard or its constituencies. He suggested that Admiral Robbins, who had previous oil spill experience, go to Alaska instead. After a meeting at the White House on 7 April, Admiral Yost directed Robbins to go to Alaska, and two days later Robbins flew to Valdez with directions from the White House to get the spill off the front pages of newspapers. After working with Admiral Nelson for a week, Robbins officially assumed responsibility as the federal on-scene coordinator on 16 April and would remain in that post until 30 September. Nelson returned to Juneau to resume command of the 17th Coast Guard District.[1]

The function of command and control in Alaska was made more difficult for Robbins because he had to assume a dual role. He not only had to direct the day-to-day operations of the cleanup, but he also had to handle a steady stream of visiting dignitaries, representatives from the media, and representatives from federal agencies, some of whom arrived uninvited. Political posturing and publicity seeking at times seriously affected operational decisions.[2]

Because of the large number of state and federal agencies involved and the complexities of the cleanup problem, the FOSC had difficulty creating an organizational structure for command and control. "Putting that structure together so that you had a nice, clean flow in determining how a beach or shore area was to be cleaned," Robbins observed, "is a monumental task for people who have not been organized like that before." The Coast Guard and Defense Department routinely wrote operations orders and followed them, but civilian agencies had their own agendas and procedures. Robbins' greatest challenge was to create an organization that worked smoothly and then insure that everyone understood how that organization worked. The tendency to rotate people every thirty days or so made it difficult to keep people adequately trained and informed.[3]

The National Contingency Plan failed to give the federal on-scene coordinator adequate authority to direct the cleanup operation. Robbins was frustrated by the lack of authority and believed that it impeded operations. No matter what the public might have perceived or wanted, the FOSC was a "coordinator," not a "commander." He could suggest that

Exxon do something, but could not coerce Exxon. Exxon was, after all, paying the bill. If Exxon refused a request, the only enforcement mechanism that the FOSC had was to "federalize" the cleanup.

The FOSC had to coordinate with Exxon and with many federal and state agencies and create a consensus rather than dictate to them, which was a difficult and time-consuming process. Often other agencies did not fully understand how the National Contingency Plan operated or the FOSC's role, so Robbins had to educate them. For example, a controversy developed over the use of incinerators. The Environmental Protection Agency labeled the waste from the spill a hazardous substance and it had to be removed, but it could not simply be dumped anywhere. It had to be burned or go into a hazardous waste landfill. Operators soon decided that the best way to dispose of the waste was to burn it, and Exxon spent $5 million to bring in two incinerators. However, since EPA had the final authority on incineration, Robbins could not order Exxon to burn the contaminated materials.[4]

In another instance, Exxon and USCG officials were concerned about transporting workers to a remote island and back to their hotel boats in bad weather. At Robbins' request, Exxon purchased tents for a campsite on the beach. At that point, Occupational Safety and Health Administration (OSHA) officials complained that the tents violated regulations because they had no windows. Robbins pressed the issue with the OSHA commissioner in Juneau, threatening to go to the news media, and the commissioner relented. Yet so much time had passed that the tents were never used.

In any kind of operation, Robbins observed, there are two types of people — the operator in the field who is making the decisions and trying to get the job done and the bureaucrat back in the office. The bureaucrat wants to make "no risk" decisions, and the operator knows that there is no such thing as a "no risk" decision if he is going to get the job done. The bureaucrat does not have to make the fast on-the-spot decisions, and yet he feels responsible and refuses to delegate that authority to the operator in the field. Robbins found some agencies to be "very bureaucratic" and unaccustomed to making quick risk decisions on a daily basis.[5]

Robbins often had to delay operations while he waited for decisions to go up through agency channels. He tried to get agencies to delegate authority to their local representatives, but officials such as the Director of Alaska's Department of Environmental Conservation (DEC) did not do this well.[6] The DEC on scene representative felt that he had to refer most of his decisions to his superiors and never had any real control over what would come out of the decision-making process. Meanwhile, the higher level official was being pressed by many political interests.

Robbins decided to involve local communities in the decision-making process. Rather than making the decision for local communities, he preferred to give them time to study the situation and make their own recommendations. Once they became part of the decision-making process, they could see some of the problems and feel some of the frustration. If they could not make a decision by the deadline that Robbins set, then he acted.[7]

Another aspect of the command and control problem involved the relationship between the Coast Guard and the Defense Department. The President directed DOD to "assist" DOT but there was confusion over what this meant. Initially some Coast Guard officials had the mistaken impression that DOD was coming in to take over and that they would become a "back seat player." There were heated discussions between General Smith and Admiral Yost. Yost argued that DOD resources should be placed under the USCG, but Smith refused to place military assets under an outside organization. "You give the military the mission," Smith explained, "put somebody in charge up there and give that person the mission to work directly with the Coast Guard. But you don't pull units out and assign them to another organization that doesn't normally command DOD assets." When Yost realized that DOD resources would not come under the USCG, he relented and an "efficient" relationship evolved.[8] However, some confusion remained. General McInerney was supposed to provide support to the Coast Guard, but what happened if the Coast Guard did not ask for the support?

Despite the occasional confusion between the Defense Department and the Coast Guard, Admiral Robbins had experience working with DOD in exercises and was comfortable

with the military structure and discipline. As soon as Army officers understood the organizational structure, Robbins asserted, they were very cooperative. General McInerney told his officers that if Robbins requested something, he was the only person who could turn Robbins down. McInerney never turned Robbins down.[9]

Command and control and communications between the FOSC and JTF worked well. Using the telefax and phone, Robbins received good, timely information. To promote coordination and communication, he maintained a watch staff of four Coast Guard officers at Elmendorf AFB. A Coast Guard liaison to the JTF, Commander Robert Luchen, provided Admiral Robbins with current information on the status of FOSC requests for equipment. Colonel Wilson in turn provided logistics support to the FOSC to facilitate the movement of cargo. These logistics people arranged flights from all over the world. Wilson also placed JTF representatives on site at the combined FOSC/Exxon headquarters in Valdez so that they could talk directly about capabilities and clarify requests.[10]

The FOSC operations center submitted requests to General McInerney in writing. The JTF validated them and occasionally went back to the FOSC to insure that they were exactly what he wanted. The JTF preferred that the FOSC tell the JTF his requirements rather than ask for specific resources. If General McInerney agreed that the request was valid and involved resources under his control, he sent it down the line, or if the request involved resources outside his control, such as a berthing ship or dredges, he sent it on to DOMS for action. McInerney's staff also dealt directly with Robbins' staff because many requirements did not have to be handled at the three star level.

Although the relationship between the FOSC and the JTF was generally good, Robbins and McInerney did not always agree on the need for particular resources. For example, when McInerney requested some H-60 helicopters, Robbins told him that DOD would have to pay for them. Normally Robbins directed Exxon to acquire certain equipment, and Exxon contracted with a company or organization to get it. In other instances, Exxon requested the FOSC to get particular equipment (i.e., Air Force decontamination units). In both instances,

Exxon was obligated to pay for the assets. If DOD or any other organization provided something that Robbins had not requested or that Exxon had not requested from Robbins, then Robbins could not approve the request and submit it to Exxon. If DOD or another agency sent a bill for Robbins to forward to Exxon, and if the bill included something that Robbins had not asked for but he honestly believed was needed, then he directed Exxon to pay. But if organizations provided items that Robbins specifically told them were not needed, they were on their own. McInerney agreed to pay for the H-60s because he believed they were important for safety reasons.[11]

Under the chain of command, decisions and directives went from the FOSC to the JTF to DOMS, and DOMS was the action agency that had the authority to task any of the services for resources and to coordinate DOD operations. Technically, General Smith was not in the direct chain of command. He was staff for the Secretary of the Army, so in effect General McInerney went to the Secretary of the Army with his requests. Smith functioned as a conduit, packaging the request and sending it to the Secretary for decision. Generals Smith and McInerney communicated often, sometimes three or four times a day.

General Smith had clearly defined authority and with his ready access to Secretary Cheney could get quick decisions. As the action agent for the Secretary of the Army, he had the authority to task all the major commands and services directly. According to Smith, it was "a very efficient organization because the responsibility lines are very clear. I don't have to go around and discuss whether I have the authority to do this." Smith had the direct authority as long as the request came to the Secretary of the Army staff.

Early in the crisis, Smith conducted a briefing in the Army Operations Center in the Pentagon for all the leadership and all the services, and the Secretary of Defense and his staff explained what DOMS was doing. After that DOMS distributed daily information memorandums to other agencies and the White House.[12]

Confusion existed not only in the command relationship between DOD and the Coast Guard, but within the Corps of Engineers as well. General Stevens was named AK-JTF

Engineer to provide Engineer advice and support to General McInerney and to take his directions from the AK-JTF. Stevens in turn designated Alaska District Engineer Colonel Kakel to fill this role, and Kakel personally attended the Joint Task Force meetings every morning for two months. Operating under a JTF in a peacetime emergency operation was unusual for the Corps. Ordinarily in an emergency, such as a flood, the Corps has authority to mobilize and act on its own. The Alaska operations were more like a wartime organization with Kakel answering to the commander of a special joint task force.

The official chain of command then went from the FOSC to AK-JTF to DOMS to Alaska District. If McInerney asked Kakel for a resource that he did not have (e.g. laboratory assistance or dredges), Kakel forwarded the request to North Pacific Division and the Division either furnished it or sent the request on to HQUSACE. Colonel Kakel and his staff believed their mission was to assist in the cleanup as much as possible. Kakel's directive from headquarters was to get in the game and make Alaska District "players." Officials in headquarters sometimes pressured District staff to do things that they might not have done on their own because they were sensitive to angering the people they worked with in the field. Kakel tried to be as diplomatic as possible, skillfully balancing the pressure he and his staff were under to make things happen with the need to maintain the cooperation of the Coast Guard.[13]

In effect, the Corps had two lines of command and control, which at times caused conflicts. General Kelly, as Director of Civil Works, supported the AK-JTF commander and, as part of the DOMS task force, advised the Secretary of the Army. Colonel Kakel had two bosses: AK-JTF (McInerney) and HQUSACE (Kelly). On some issues, such as shoreline cleanup, Kakel gave General McInerney a different opinion than the one Kelly expressed to DOMS. As JTF Engineer, Kakel might suggest to McInerney that a particular resource was not needed, and McInerney would report that to DOMS. The DOMS task force, on the other hand, concerned with showing the flag, might disagree over the assessment. Kakel was now in conflict with Kelly, who represented the Corps on the DOMS task force and viewed the matter from a DOMS

Corps of Engineers officers Brigadier General Patrick Stevens (left), Brigadier General Patrick Kelly (center), and Colonel William Kakel (right).

perspective. General Stevens sometimes found himself caught in the middle. General Kelly was constantly concerned that the Corps be prepared to assume a larger role in the cleanup in case Exxon's response was inadequate. He appreciated Kakel's difficulties and later observed that Colonel Kakel handled the awkward situation "superbly."[14]

Although Kakel and his staff officially worked for the JTF, they continued to receive taskings from North Pacific Division and Corps headquarters. General Kelly requested information from North Pacific Division and Alaska District in order to fulfill his staff role for the Secretary of the Army. Field personnel, particularly the staff of Alaska District's EOC, were confused about where the taskings were coming from and had difficulty establishing clear priorities.[15]

Confusion also characterized the command and control structure for directing the dredges in the actual oil recovery operations. Dredge crews had difficulty determining who was in charge, for whom they worked, and who controlled their efforts. Normally, the dredges belonged to Portland District for administrative and logistical purposes but were under the

operational control of the Civil Works Directorate, which determined their priorities and programs. When the Director of Civil Works sends dredges to a District, their operations are the District's responsibility. Thus, when they reached Alaska they came under the operational control of Colonel Kakel. Yet some confusion existed initially about who controlled the dredges. Colonel Kakel correctly maintained that the dredges came under his control when they entered Alaskan waters, but Portland District Engineer Colonel Cowan took a different view. When Captain Brice arrived in Alaska, he was unsure whether the dredges worked for Alaska District, Portland District, or the Coast Guard.

Colonel Kakel insisted that an officer be on board each vessel to serve as liaison between the dredge and the numerous organizations involved and to relieve the crew of reporting requirements and other details so it could concentrate solely on the operation of the dredge.[16]

Exxon and the Coast Guard placed representatives on board the dredges, and the dredge crews took orders from both. Much seemed to depend on the strength of the personalities of these representatives and the Corps personnel. Some Coast Guard officials were aggressive about making decisions and taking action; others were more passive. Sometimes the Exxon representative gave the crew direction; sometimes the Coast Guard representative did; and sometimes neither did. Coast Guard and Exxon representatives and Corps personnel usually decided together what to do, but the chain of command was never refined. It was never clear who ran the dredges.

In one instance a dredge was near a bay on its way to Seward. Enroute there were several small bays where the oil had been collected in booms. The Coast Guard personnel on site told the dredge to pick up the oil, but Coast Guard officials in Anchorage became upset when they found out. The confusion was compounded initially by the fact that two Coast Guard Marine Safety Offices (Anchorage and Valdez) gave directions, but on 17 April, the day after he took charge, Robbins changed the organization, placing all the cleanup activities directly under his control in Valdez.

Much of the time the dredges functioned on their own as independent task groups, organizing fishing vessels to pull

boom, working with aircraft to spot oil, and sending out the Corps' launch to track oil. When neither Exxon nor Coast Guard representatives were on board, the dredges made their own decisions. Captain Brice and others on the dredges quickly created a role for themselves by providing command and control for fishing vessels in the area where the dredges were working. Fishing vessels gravitated to the dredges not only for the hot showers and meals but for direction. The fishing vessels were eager to stay with the dredges when the dredges were successfully locating and recovering oil.[17]

Robbins conceded that at times the great distances hampered command and control. Having the dredges direct their own operations, he said, "is probably the best way to do it." His first concern was that the dredges be in the oil as much as possible. Robbins recommended that in the future operators put a landing pad on the dredges, assign them a small helicopter, and equip them with boom and skimmers so that they can conduct their own operations. He maintained that operators in Valdez would not be as effective as on-site crews in running oil removal.[18]

Dredge crews found that Exxon and the Coast Guard were not organized well enough for such a large operation. Exxon had people in charge who did not know how to handle fishing vessels and did not have a readily available communications system. When the Corps arrived, operators were relying on Marine Band radio to communicate with the fishing vessels. Initially, the cleanup operation was very disorganized with some boats not doing anything and some boats going to the wrong locations.

The dredge crews complained about delays and imprecise instructions. The dredges were not used as constructively as possible. In some instances the crew would hurry to some location fifteen miles away only to find the oil gone. Because of the urgency, the emphasis was on getting the dredges to Alaska, not on establishing effective command and control. In future emergencies, Captain Brice cautioned, the Corps must clarify the command and control structure early on and establish who directs the dredges.[19]

While the dredge crews struggled to sort out the confusion, command and control problems surfaced within HQUSACE. Under current standard operating procedures, when the

Emergency Operations Center in HQUSACE is activated, it becomes a staff level organization and receives the authority to task other functional elements in headquarters without going through the established chain of command. The EOC becomes the conduit for all taskings and information to other elements within the command. A crisis management team with representatives from various functional elements in headquarters is activated to handle the requests for information and the taskings.

During the oil spill response, however, the EOC did not operate according to standard procedure. Officials established a special task force to develop a plan for a DOD response to the spill, but they did not activate the crisis management team. General Kelly and John Elmore issued requests for information and directives for action directly to other functional elements. Responses sometimes came back to the EOC and sometimes went directly to Kelly or Elmore. At times Elmore personally ran the EOC operations. He and General Kelly attended high-level interagency meetings, and sometimes neglected to provide adequate feedback on what transpired at those meetings. Thus, Robert Fletcher, Chief of the Readiness Branch, who was responsible for the day-to-day operations of the EOC, had difficulty executing his traditional responsibility as the single point of contact for headquarters concerning emergency operations.[20]

Readiness Branch personnel usually represent the Corps at National Response Team (NRT) meetings, but the Corps had no formal representative on the NRT at the Coast Guard Response Center. Fletcher, however, sent one of his staff, a Coast Guard reserve officer, Michael Hartley, to function as an unofficial liaison in the Coast Guard Command Center.

Kelly and Elmore might well have been so consumed by the intensity of the operation that they overlooked the emergency management staff's need for more information. They might also have felt that the Readiness Branch would only respond within its traditional scope, within existing plans and procedures, when new initiatives were needed. Centralized management of the operation may have been necessary in part because of the heavy media attention. Most agencies were directing the effort from the national level. Fletcher, however, recommended that in the future the senior

officials either take along operational people or provide better feedback on what transpired at their interagency meetings.[21]

In addition to the confusion in command and control at almost every level of the cleanup operation, there was the problem of providing and maintaining adequate communications in a remote, harsh environment. Radio operators had to work through repeaters to relay information and had to place retransmittal stations on top of mountains to communicate from Valdez out into Prince William Sound or into the Gulf of Alaska. Operators learned that they had to be flexible and willing to adapt the technology at hand and use every resource available.[22]

To improve communications, Exxon, state, and federal officials adopted a computer system designed to help wartime military commanders deploy troops, aircraft, and armor in battle. The Alaskan Command and Control Military Automated Network (ACCMAN), which was based on 120 Apple MacIntosh II computers installed several months before the spill, served as the primary means of coordinating the military's response to the oil spill. As DOD units became increasingly involved in assisting in the cleanup, the Alaska Air Command (AAC) adapted its ACCMAN system to the oil spill and developed the Oil Spill Computer Aided Response program (OSCAR) for channeling information about the cleanup effort.

The AAC installed OSCAR in the Exxon headquarters in Valdez and set up a central command and control facility at Elmendorf Air Force Base. With the graphics capabilities of the MacIntosh computers interconnected by the OSCAR network, DOD could send information almost instantly. Military and Exxon computer programmers entered the location of environmentally sensitive areas, bird rookeries, hatcheries, monitoring stations, and oiled beaches, as well as statistics which showed the number of barrels still at sea and the number recovered. Next they put in the location of the skimmers, fishing vessels, and cleanup crews.

The Alaska Air Command used the OSCAR system to give morning briefings to General McInerney. McInerney and senior staff sat in a darkened secure room, the "command bridge," around a huge computer screen while an operator projected information from the system on a screen: assets

deployed, weather, daily oil recovery. The AAC relayed this data to a MacIntosh in the Pentagon that served as a focal point for coordinating support from Washington.

The *Anchorage Daily News* called the system "one of the more tangible results of President Bush's decision to employ the military in the cleanup." Anyone from a crew member on a Coast Guard cutter in Prince William Sound to an Exxon official in Houston or a general in the Pentagon could use OSCAR to pull up the latest information on the location of the oil and the status of the cleanup. It provided timely information on oil spill activities and allowed operators to track the large number of vessels involved. The system gave USCG and Exxon operation centers current information (at two minute intervals) that included maps and graphic displays of affected areas, and locations of oil booms, cleaning crews, wildlife areas, and hatcheries. By late April over three hundred vessels were being tracked by OSCAR.[23]

Early in the response, Colonel Kakel discovered that the Alaska Air Command had three computer systems to coordinate the AK-JTF effort, two of them running only on an Apple MacIntosh. Kakel directed that the District link into the system, and the District installed a MacIntosh to communicate with the AK-JTF. The computer provided the District with access to JTF maps, chain of command charts, and weather reports.

Briefing slides generated at the JTF were hand-carried on a floppy disc to Alaska District where they were loaded on the MacIntosh and presented during the EOCs briefings. OSCAR provided mail, taskings, and daily log information. District staff could enter the coordinates of any location in Alaska into the computer and the computer would provide a full color map of the area. It could also display the area where the dredges were working and change the dredge location. OSCAR allowed the District to track all the vessels and determine where they were, what they were doing, and who they were working with.

HQUSACE EOC used a MacIntosh II and a 9600 modem to access OSCAR, so it could maintain current data on the oil spill in the form of data and graphics, an incident log, taskers, and maps which indicated the current location of the spill. An electronic mail feature allowed EOC to communicate with other OSCAR users.

Although the computer system provided a valuable communications link, it was only as accurate as the information it received. Bill Lamoreaux of the Alaska State Department of Environmental Conservation charged that in the first weeks Exxon officials in Valdez provided inaccurate information. They reported several skimmers working in Resurrection Bay, but when the department flew out, it could not find them.[24]

In addition to computers, decision makers relied on video teleconferences to improve communications. When General McInerney became the Defense Senior Representative, he quickly contracted with a local television station in Anchorage to get a direct line into his headquarters and tied it to the existing video teleconference facility in the Army Operations Center (AOC) at the Pentagon. On 14 April the link was complete, and in the first video teleconference General McInerney provided Secretary Marsh with his assessment of DOD support to the cleanup effort. This was the first time that Pentagon officials used video teleconference capability to coordinate an ongoing operation in the field.[25]

At critical stages in the cleanup operations, video teleconferences occurred once or twice a week. On a number of occasions when there was great political interest in a particular action or decision, General Smith set up video teleconferences between Secretary Marsh, Richard Breeden, senior Coast Guard representatives, and senior Transportation Department officials in the AOC and General McInerney and his staff in Alaska. At times the participants were limited to Marsh, Smith, and one or two others with McInerney on the other end, and they candidly discussed what they would recommend to Secretary Cheney. After a video teleconference, Marsh and Smith could walk down the hall and quickly lay out for Secretary Cheney the information they had just received from General McInerney. The capability simplified and accelerated the decision-making process.

In addition to expediting the decision-making process, Colonel Wilson observed that the video teleconferences greatly improved the quality of communication. Looking at someone rather than just hearing his voice gave participants a better feel for the person's credibility. Video teleconferencing was not a new technology but it had not been widely accepted

or widely used before the oil spill. Wilson believed the Alaska experience demonstrated how effective it could be in the decision-making process.[26]

Despite OSCAR and the teleconferences, the Corps of Engineers continued to face communications problems. General Stevens decided early that reporting would be done from Alaska District's EOC rather than North Pacific Division, with simultaneous reports going to the Division and headquarters. As the reports came in, District staff was supposed to send them to Portland and Washington via ONTYME, an electronic mail system, but sometimes they could not send information to the headquarters EOC on this system because no one there knew how to get the information off ONTYME. So the District EOC had to fax documents — a very time-consuming process. Alaska District's EOC was "severely overburdened" by the necessity to use different methods of communication to forward its pollution reports to headquarters, AK-JTF, the Division, and Seattle District.[27]

No one in headquarters or in Alaska District apparently considered whether every office on the distribution list actually needed copies of each of the six or seven reports generated each day. The EOC simply tried to get out as much information as it could. Initially, it took Regional Response Team reports and others, digested them, and incorporated them in its own Pollution Report — a cumbersome undertaking. Later the EOC simply attached the entire RRT report to its pollution report. Offices interested in this report could have gotten it quickly on computer. One District official observed that there were too many reports and misinformation was passed from one report to another. There were RRT reports, Exxon reports, Alaska District pollution reports, Coast Guard reports, JTF reports, EOC situation reports, and all these reports came from the same basic sources. If the District did not have anything to write beyond what it had collected from the other reports, Kirk Shadrick concluded, then it should not write anything.[28]

In addition to keeping NPD and HQUSACE informed, NPA also had to maintain communications with the dredges. When the spill occurred, Alaska District's information management personnel had already begun installing a 1,000-watt, high frequency, single side band (SSB) radio transmitter in

the EOC. A radio control unit installed in the EOC and a transmitter installed in a converted semi-trailer parked in the District's storage yard interfaced with a computer. Signals from the EOC bounced off the ionosphere to get to Prince William Sound. Because of solar activity there were several times when the District could not communicate with the dredges. Communication was difficult when weather was poor or when dredges were in sheltered coves.

The *Yaquina* was equipped with SSB, UHF, VHF, and bridge-to-bridge communication. The *Essayons* had one SSB radio on board that worked. When Coast Guard and Exxon representatives were on board, eleven reports had to be transmitted (four Corps, four Coast Guard, and three Exxon). The radio was also used for contact and coordination with fishing boats.

Initially Alaska District had four radio checks a day for the dredges, and later two. The dredges called up at the designated times and provided the information the Coast Guard required, such as weather, location, how much fuel they had used, future plans, and master's concerns. The District EOC sent the dredge reports directly to the Coast Guard's Anchorage and Valdez Marine Safety Offices. Later it transmitted the information directly to the JTF through OSCAR.[29]

Command and control and communication remained serious problems throughout the operation. The FOSC never had adequate authority to direct the response. There were too many agencies involved in the decision-making process and too many competing interests. In addition, there was confusion in the Coast Guard's relationship with the Defense Department and within the Defense Department itself, which filtered down to the operators in the field. Using new technology, officials improved communications, but the command and control problems persisted.

CHAPTER V
Corps Dredge Operations

In addition to the overall problems of command and control and communication, the Corps of Engineers faced operational problems in the dredge oil recovery activities. Alaska District staff had difficulty providing logistical support to the dredges while they operated in remote areas of the Gulf of Alaska and Prince William Sound. Even more significant were the problems that the dredge crews faced in locating significant amounts of oil, collecting oil off the water, accurately measuring the amount of recovered oil, and removing the oil from the dredge hoppers.

Political sensitivities sometimes prevented the dredges from coming to port, so crew changes, VIP visits, and the delivery of supplies were conducted in unprotected waters via float plane, thus exposing Corps personnel to increased risks. Sudden relocations of the dredges forced Alaska District staff to devise logistical support plans for each resupply operation.

In normal operations, crews changed weekly with a complete rotation of the crew on the *Essayons* every Tuesday and on the *Yaquina* every Thursday. For the Alaska operation, however, the crews elected to work on a two-week rotation schedule (as they do in overseas operations) to minimize their transportation costs.

The first crew change in Alaska was one of the most innovative, challenging, and dramatic that the Corps had ever conducted. When the *Yaquina* arrived in Alaskan waters, the crew's two-week tour was ending and they were due for a change. Crew changes were normally done while a dredge was in port, but General McInerney ordered the dredge to bypass port and go directly to work.[1]

The decision to send the dredge directly to work was prompted by both operational requirements and public relations concerns. The surface oil was dissipating rapidly, and it was important to get the dredge into the field as quickly

as possible. Moreover, it did not look good to have the dredge go all the way to Alaska and then go into port. On leaving Anchorage, John Elmore had instructed the District to "hit the beaches running." A Soviet skimmer had just arrived in Alaska and officials in HQUSACE and in the Pentagon were anxious that the Corps dredges reach the oil first. "There is no doubt that our mission was to get there before the Russians did," Colonel Kakel explained.[2]

Alaska District quickly developed new plans and procedures to conduct the crew change at sea. The replacement crew for the *Yaquina* arrived from Portland and went from the Anchorage airport to the District office where Colonel Kakel briefed them. The next morning they boarded a one-car train that the District had chartered for the 65-mile, three-hour trip to Whittier. There is no road from Anchorage to Whittier. In addition to the crew, the train carried provisions, baggage, District officials, and Charles Hummer. On 20 April two float planes, which Alaska District chartered out of Cordova, flew to Whittier and shuttled the crew back and forth to the dredge, which was working three hours away near Perry Island.

The process took most of the day because the float plane could ferry only four to six men at a time. Meanwhile, two fishing boats rented by District staff transported supplies to the dredge. Although not coming into port for the first crew change created what one official called a "logistical nightmare," it was also beneficial because the crew was in the process of developing a technique to recover the oil and its work could continue uninterrupted.[3]

Gradually a firm procedure for conducting crew changes evolved. Corps personnel first located a town where the dredge could connect with the new crew, and then got approval through the AK-JTF, Exxon, and the Coast Guard to let the dredge take half a day to run to one of these towns for a crew change. Initially Joint Task Force and Coast Guard officials resisted this interruption, but they came to understand the necessity. After that the only problems involved logistics and transportation.

The procedure varied only slightly depending on the location. Corps personnel used several towns for crew changes — Homer, Seward, and Whittier once. Alaska District rented

a Greyhound bus to transport the crew to Seward. The bus waited while one crew went on board and exchanged information with the other, and then it returned to Anchorage with the old crew. The bus usually pulled into Anchorage about 7:00 P.M. and some of the crew flew out on the "red eye special." Others left the next day. When the crew change was in Homer, NPA chartered a plane to shuttle crews back and forth.

A major resupply occurred every two weeks with the crew change. Alaska District staff arranged for groceries and other supplies to be available on a certain date and then used the District's vans or a flatbed truck to run the supplies from Anchorage to the location of the crew change. Between crew changes, District staff sent emergency goods via float plane.[4]

Logistical support to the dredges in the oil spill operations was further complicated by changes in the command structure. Officially, the dredges were under the operational control of the Alaska Joint Task Force. As the engineering agency of the AK-JTF, Alaska District became responsible for supporting the dredges. Thus the established support relationship between the dredge and the owning District (Portland) was severed and replaced with a system unfamiliar to both organizations. Alaska District did not have the organization and staff necessary to handle the volume and variety of requirements for supporting the dredges. Nor did it have experience with this type of work. Moreover, the dredges changed location constantly. "The most significant revelation of this exercise," Alaska District staff conceded, "was that we did not have a well-thought-out plan on how to equip our dredges or keep them supplied during remote operations."[5] Although Portland District sent personnel to augment Alaska District's staff, the difficulties continued.

While Alaska District grappled with the problem of providing logistical support, the dredge crews struggled to locate and recover oil. By the time the dredges arrived on scene, the oil had dispersed throughout Prince William Sound and the Gulf of Alaska to such an extent that locating and containing it was a significant problem. Oil on the water was very difficult to spot from the surface. People on the fishing vessels and dredges had to be in the oil in order to see it.

Because of the vast distances and the difficulty in spotting oil from the surface, it was essential to employ aircraft that could fly at speeds low enough so spotters could distinguish oil from other floating debris. Yet there were never enough aircraft available, and low cloud cover and severe weather conditions often made aerial reconnaissance impossible. Also, the aircraft and the vessels they supported were often on different radio frequencies so that communications were impaired or nonexistent.

In early April, Exxon provided morning and evening overflights through Prince William Sound and along the slick past Seward to the leading edge of the spill. Exxon aircraft had infrared capability to verify the presence of the oil. A Coast Guard airplane also conducted overflights twice daily to track the movement of the slick down the coast. The *Essayons* had a helicopter pad, which it could have used to provide aerial reconnaissance, but it was not operational. The crew was not certified, nor did the dredge have the qualified personnel on board to operate the landing pad: helicopter officer, flight deck officer, landing officer, and mate on watch.[6] There was reluctance to bring in trained non-Corps personnel to man the pad.

Infrequent air support meant that the collection equipment was often in the wrong place. Dredge crews often hurried to locations only to find that the "oil" was not oil. They were frustrated by the days without oil recovery assignments. As the weeks passed it became increasingly difficult to find significant amounts of oil on the water surface.

After locating the oil, cleanup workers faced the problem of collecting this thick, sticky substance. The weathering of crude oil in cold climates involves a number of physical, chemical, and biological processes including evaporation, dissolution into the water, dispersion, and emulsification. In the first few days after oil is spilled, the lighter components of the oil rapidly evaporate, the volume of the spill decreases, and the physical and chemical properties of the oil change. The amount and rate of evaporation decreases with time as the lighter components diminish, leaving only the heavier, less volatile components. With Prudhoe Bay crude oil, approximately 23 percent of the content is a relatively light component (i.e., octanes, benzene) that evaporates quickly. Most

of this component is gone within one to two days, and the evaporation process is essentially complete in five days.

In a high wave energy area, roughly twenty-four hours after an oil spill, depending on temperature and wave action, the oil and seawater emulsify, forming a highly viscous material called "mousse" that contains roughly 70 percent water and exhibits properties very different from the original oil. This very sticky material adheres to almost all objects it encounters (i.e., rocks, ships, birds, sea otters). Mousse developed during many major tanker spills, including the *Amoco Cadiz.* The time it takes for mousse to form is a function of the type of oil spilled. In the *Amoco Cadiz* spill, mousse formed quickly — soon after leaving the ship. Experience has shown that conventional spill response equipment is not very effective with mousse.[7]

The dredge crews developed two reasonably effective methods for collecting the surface oil. Either the crews used the dragheads and dredge pumps to suck up oil that smaller vessels had collected inside the booms, called "donuts," or they strung boom between the dredge and one or two support vessels and slowly sailed through the large concentration of oil, funneling the oil toward the dragheads to be drawn up. The best configuration was to have two booms, one on each side of the dredge with associated crafts. The vessel could theoretically make a swath of four hundred feet, perhaps more if workers attached additional boom. They were limited by the strength of the booms, their heights and stability with respect to speed, and the horsepower of the associated craft.

Towing the booms was a slow process. The booms contained many parts (air bags, metal struts, 36-inch facing, and nuts and bolts) that required a great deal of maintenance. Unlike simple containment boom that can be patched easily, these booms required special parts and trained personnel for repairs. Air-filled sacks held the booms upright; each sack had a square bag on the end to act as a weight that prevented the bag from going vertical. When towing, the air bags were perpendicular to the booms, and the combined resistance when towing fifty to sixty air bags "significantly slowed the boats."[8] In addition, the dredge could tow the heavy booms no faster than four knots or the booms would flip over. The dredge had difficulty going slow enough to work with

smaller vessels in skimming operations. The *Yaquina* had no space to carry the booms on board, so the crew used the craft towing the booms to load each ninety-pound section, a few bags at a time, across its stern. They righted each bag manually. This arduous work required four people.

The crew quickly discovered that the 36-inch booms they brought were too small and flimsy to hold the oil in the choppy waters of Prince William Sound and the Gulf of Alaska. The 84-inch roll booms (Swedish booms) worked best. Booms with bridle around them did not work because the bridle would catch in the dragarm. The *Yaquina* crew contended that if they had been assigned the proper booms permanently, with a craft capable of maintaining them, they could have recovered 20 percent more oil.[9]

The thickness of the oil and the fact that it contained kelp and debris made the task more difficult. The original plan had been to pump oil out of small skimmers, but the actual work evolved differently. The centrifugal and concrete pumps that the dredges brought proved to be ineffective at loading the thick product.

In normal operations, dragheads are drawn across the channel bottom with the dredge pumps creating a vacuum which discharges a slurry mixture of sand and water into the dredge hopper. The hopper contents are later emptied through bottom gates or doors. The crews modified the dredges in order to recover oil. They inverted the dragheads and constructed a cage around the dragheads to prevent booms and debris from being sucked into the dragarm. The inverted draghead proved to be the best readily available configuration that did not require extensive structural modification. Bolt holes on the draghead did not match up in that configuration so the crew turned the dragarm 180 degrees at the swivel point in the center of the arm. This made it impossible to reconnect the dragarm wire, so the crew wrapped straps of heavy wire around the pipe and attached a shackle. Using this procedure, it was possible to maneuver the dragarm as usual.

After this technique proved successful, the crew refined it. The crew discovered that effective use of the new system required at least five people: a ship handler to control the vessel alongside the boom; a dragarm/pumpman to control

vertical draghead position and pump speed; a hopper bin tender to insure that no overflow occurred; an on-site draghead coordinator; and boom skirt tenders to keep the boom from being sucked into the draghead, remove large debris, and help shift the flow of material into the draghead. The on-site coordinator, usually on the main deck, would have charge of the vessel's position only for boom operations. The ship handler retained overall control of vessel safety and traffic matters.[10]

The crew lowered the draghead into the water and then raised it to within a few feet of the surface and turned on the pumps to full capacity. Then the dragtender raised the head slowly until the oil moved into it. The proper placing of the draghead was the most critical part of the on-loading process. If the draghead came above the surface and pumped air, it lost prime; if it was too far below the surface, too much water went into the hopper.

The *Essayons* tended to work in open water with rougher seas while the smaller *Yaquina* operated in more protected areas. The *Essayons* started work at Gore Rock and moved as far north as Resurrection Bay and as far south as Sutwick Island in Shelikof Strait west of Kodiak Island, primarily along the Alaskan Peninsula. The *Yaquina* began work around Knight Island in Prince William Sound. As difficult as sucking oil into the dredges was in heavy seas, on 8 May the *Essayons* pulled in 200 barrels in five-foot waves. The *International Dredging Review* observed: "Corps dredge crew members are among the heros of the cleanup effort. They overcame the frustration of equipment that would not work and found a way to make it do the job. . . the Corps hopper dredges *Essayons* and *Yaquina*, along with the Russian dredge, are the most effective cleanup devices on the site, and their crews are doing an outstanding job."[11]

A Portland District photographer, Billy Johnson, boarded the *Essayons* to make a video of the dragarms in operation. The Alaska Oil Spill Multi-Agency Coordination group at Seward watched video footage of the *Essayons*' inverted draghead in operation, and after seeing the footage, some members of the group dubbed the dredge "mega-sucker." The video was flown to Washington where President Bush viewed it. Later United States Park Service spokesman John Quinley

told the media that the Corps dredge "has proved to be one of the most effective machines" in the oil recovery operations. By 27 April the two dredges had collected 3,271 barrels of oil, representing 36 percent of the oil collected since their arrival. By 10 May they had collected 5,016 barrels.[12]

The *Yaquina* crew recommended a new design for the dragheads with smooth features rather than angular lines, oil boom preventers, consistent 360 degrees draw of material, and removable quick cleanout grates. They suggested using lightweight plastic for construction material.[13]

The Corps dredges were clearly the most successful oil recovery vessels in Alaska. The *Vaydaghubsky* was configured somewhat like the dredges, but it was equipped with its own boom which it deployed from its hull. A cross beam attached to the end of the boom allowed the vessel to hold its own boom rather than have fishing vessels pull it. The huge skimmer can create a catch width of sixty meters when the booms are fully extended. The oil accumulating inside the boom is transferred on board the vessel by two free-floating type FRAMO oil skimmers which collect an aggregate rating of 800 cubic meters an hour. Oil can be stored in the hopper or in four multipurpose tanks. Water settling from the recovered oil and water mixture is pumped back to the sea through a 300 cubic meter an hour separator that draws the remaining oil from the water before letting it overboard.[14]

Although the Soviet skimmer had been tested in the field, this was its first major oil spill. Initially Coast Guard and Exxon officials considered the costly Soviet skimmer the best hope for cleaning up oil on the high seas, but it did not meet those expectations. By the time it arrived, the oil had either dissipated or become too viscous for the skimmer to pick it up. The ship spent much of its time chasing small patches of oil in the Gulf of Alaska and in Shelikof Strait. Its pumps continued to choke on the thick, debris-laden oil, and cleanup officials appealed to the Corps. Late one night Colonel Kakel received a call from Captain Rainey at the Coast Guard Marine Safety Office in Valdez asking the Corps to help the skimmer. In response, the *Yaquina*'s captain offered the skimmer advice about on-loading techniques, and the skimmer made some modifications. The skimmer, however, was designed in such a way that operators could not unbolt the draghead and invert it as the dredges had done.[15]

In addition, the operations of the *Vaydaghubsky* were significantly curtailed by severe weather and the lack of aerial reconnaissance. The presence of the skimmer created some tension. There was a tendency to compare the performance of the Soviet skimmer with the Corps dredges even though the vessels functioned differently and had different opportunities for oil collection. White House, State Department, and Coast Guard officials were anxious that the skimmer be successful. Yet Colonel Kakel, his staff, and the dredge crews felt pressure from senior officials in the Pentagon and HQUSACE to perform better than the Russians. Although he was placed in an awkward position, Colonel Kakel continued to downplay the competitive aspect and to encourage his staff to function as "team players." Dredge crews felt that they were held back at times so that the Russians could collect oil, but Coast Guard officials denied this.[16]

After the dredge crews loaded the oil, they faced yet another problem: how to measure and report the amount of oil recovered accurately. The oil mixture contained a great deal of water and, as time passed, the oil and water in the hoppers separated and the amount off-loaded would be less than what was previously reported as stored in the hopper. The Corps calculated the oil off-loaded from the dredges by measuring the difference between oil in the hoppers before and after the oil transfer. Exxon, however, based its figures for off-loaded oil on the total liquid pumped into storage barges and did not include the debris and water with the oil. Dredge crews began letting the oil settle in the hoppers before measuring it to permit the oil and water to separate. Headquarters, however, pressured the crews to turn in barrel counts quickly before the oil and water mixture had had time enough to decant. Speculative figures became etched in stone. The crews simply tried to provide the most accurate figures possible.[17]

The crew based their initial calculations of oil spoils in the hoppers of the *Yaquina* on the assumptions that the oil had a consistent viscosity and that water separated from the spoils in a "reasonable" time. The crew developed special techniques for measuring the ever changing mixture in their hoppers. Initially the crew used a procedure that was much like putting a dip stick in the oil tank of a car. They measured

the mixture in the hoppers by pushing a metal tape coated with water-sensing paste through the oil. This method failed because water in the spoils activated the tape prematurely.

The oil soon became too thick for the tape to penetrate, so the crew began to lower a weight into the hopper to determine the boundary between the oil and water layers. This method was not very effective because the densities were not consistent and separation did not occur within a reasonable time. The crew discovered that the material was hardening not only on the surface layer, which was expected, but throughout the mixture. Results of additional tests and new measurements confirmed that the oil and water were still separating and the mixture was hardening and condensing in volume over time. They also confirmed that earlier measurements were inaccurate because they did not allow enough time for the oil and water to separate.

Captain Jimenez observed that to get an accurate measurement, operators must use a consistent methodology and give the material enough time to separate. Also, the larger the volume of spoils, the faster that volume will shrink; the longer the spoils are left in the hopper, the harder it will be to remove them. Jimenez recommended that the material be left in the hopper no longer than forty-eight hours and be agitated or broken up occasionally to prevent block solidification, and that water be introduced into the spoils before discharging. Also, by lowering the spoils below the center line separator, the product was forced to flow and break up. Water should be added at this time.[18]

After the oil in the hopper was measured, there were problems and discrepancies in reporting the quantities of skimmed oil. Initially, quantities of oil were reported at different times of the day because reporting times differed for various chains of command. This problem was later resolved by establishing a standard time (3:00 P.M.) for all reporting. The Corps itself had problems coming up with accurate figures. For example, on 28 and 29 April there were large discrepancies in the amount of oil product reported as remaining in the hopper. On 28 April the *Yaquina* reported 805 barrels and on the 29th it reported 53 barrels. Investigation revealed that the *Yaquina* and the Alaska District EOC were using different methods to account for the oil

product remaining in the hopper at the end of each reporting period. The problem was eliminated by modifying the EOC system to conform to the *Yaquina* system.[19]

The *Yaquina* crew recommended the development of a daily form for reporting which included reporting time, total amount of product carried, vessel location, vessels on-loading and off-loading, and amount discharged. They also suggested that reporting be done in the evening prior to off-loading.[20]

Even more challenging than loading and measuring the oil was the task of removing the oil from the dredge hoppers. The process of off-loading the heavy oil mixed with seaweed, kelp, and debris in both Prince William Sound and western Alaska was slow and difficult. The plan was to pump the collected oil from the dredge hoppers into Exxon barges. Over time, however, the weathered oil in the hopper changed from a viscous liquid to a substance the consistency of tar, axle grease, or asphalt.

Operators in Alaska tried using various pumping systems to move the mixture: Super Vac (a vane driven air mover designed to move grain and modified for this operation), Super Sucker (a high volume air conveyor), Hyde-Vac (an air mover used in moving fish), archimedes screw-driven pumps (includes GT-185, DESMI 250, DESMI 250A), and the Vac-All (both truck and portable units similar to Super Sucker but with lower volume). The systems that Exxon provided worked but they were very slow because of the thickness and debris in the oil. For example, in an eight-hour period the Hyde-Vac pumped about 4,200 gallons (or 100 barrels) of oil out of the *Yaquina*'s 180,000-gallon hopper. Dredge crews simply did not have the right equipment for off-loading the viscous mixture.

Captain Jimenez and his crew eventually discovered that the Vac-U-Vator, a system sometimes used to throw chips on sawdust piles, was the most effective pump for discharging the oil mixture. Initially no one knew how to use it, so they had to rely on the Super Vac, a truck type system used to vacuum out sewage tanks. Super Vac's biggest drawback was its discharge rate. The truck filled quickly, and the crew had to stop operations to empty it. The truck's contents were discharged from an opening in back through a hose into a hole in the barge. The opening would clog with oil, thus

slowing the discharge rate. The *Yaquina* crew increased the discharge rate 20 percent by constructing a large rectangular box around the hatch opening that allowed the truck to open its back and, like a dump truck, empty its load quickly. Exxon adopted the same technique on other barges. The Vac-U-Vator was a smaller machine, half the size of the Super Vac truck, but it functioned constantly so the crew never had to stop. Also, it did not require a source of air because it brought air from the outside. It required a 50/50 mixture of air/material. The system broke down because of mechanical failure.

Submersible pumps did not have enough power to handle the thick mousse. The worm types developed by Destoil were very powerful. They could chew up the debris in the oil, but their pulse volume was too short. The product moved too slowly into the cavities so water quickly bypassed the product. As a result, the crew had to float the pump at a critical water boundary layer, which was difficult. Another problem was that both Vac-U-Vator and Super Vac require that the crew remove the deck grating and insert a 10-inch or 12-inch hose down into the product. With the machines on, the hose ends "danced" because of the powerful vacuum forces. Too deep into the product and the hoses drew water, too high and they drew air.

The thick mixture clogged the pumps and would not flow toward the vacuum draw. Several pumps proved unsuccessful, including diaphragm pumps and submersible pumps, both of 3-inch hose diameter. Other pumps proved more successful, specifically air vacuum pumps, where the suction could be moved around the product surface, and worm pumps that could be submerged and their surface height varied.[21]

Portland District staff had anticipated problems removing the oil. They knew that the crude oil would be "chunky" and that because of the cold water it would congeal. Therefore they had equipped the dredges with special steam coils to heat the oil, but the coils were not very effective, in part because the dredge hoppers were too exposed on top. Heated coils were usually put into enclosed barges. The dredge boilers were not powerful enough to supply the steam necessary to heat the coils to the point where they would liquify the oil. The crew had to pump seawater into the hopper to keep the mass of oil moving into the barge, and the steam coils could

not produce enough heat to counterbalance the constant influx of the cold waters.

Captain Jimenez and his crew later recommended that an internal hopper steam heating system be developed. (Electrical heaters could pose safety hazards.) The simplest way to implement such a system would be to have a "Donkey Boiler" with the associated steam coils and lines. Another possibility would be to build steam pipes in the hopper or as a quick add-on feature. They also recommended that officials upgrade the vessel's steam plant or install an auxiliary plant.[22]

In addition to steam coils, Corps officials purchased a 12-inch centrifugal pump for the *Yaquina*. When the crew attempted to start the pump they found that the shaft was bent and would not rotate. The crew later tested the 12-inch pump and found that it was too small. Although the pump was portable and powerful, the veins inside the pump were too narrow. Twigs and other debris got caught in the veins, which caused the pump to vibrate and reduced its efficiency. Also, by the time the pump arrived, the oil had become even more viscous. If brought earlier, it might have been more valuable. Although the pump did not work, the crew created an innovative design to hook the pump up. Although they spent $50,000 for a pump that did not work, from it they learned a new off-loading process.[23]

Faced with a painfully slow off-loading process and a 12-inch pump that did not work, *Yaquina* Chief Mate Neal Nyberg and other crew members devised a way to use the dredge's own pumps to remove the mixture from the hoppers, a process called self-off-loading. They put their plan on paper and sent it to officials in Portland for their reaction. When no response came, the crew decided to go ahead and make the adaptations themselves. They "pirated" the necessary materials. The Exxon representative on board helped them get the hose and other equipment. Removing the starboard draghead, they attached the suction hose to a flange over a hole cut at the top of the hopper wall. Adding water to the hopper, they floated the oil up to that opening, then turned on the port side discharge pumps, bypassing the sidecast route and diverting the oil into the barge. Using this method, they off-loaded 1,200 barrels in five hours. The only limitation was

that the oil had to be mixed with water, so the barge filled up quickly and the Corps had to decant it by pumping the water back to the dredge.[24]

Unlike the *Yaquina*, the *Essayons* had pumpout capability, a separate internal system to remove material from the hopper. The *Essayons* did not attempt to use its internal system to off-load because of the high percentage of water which would have had to be utilized in order to slurry the oil and pump it. This would require a large barge with the capacity to decant and none was available.

There were other aspects to the off-loading problem as well. Exxon's barges had trouble decanting quickly because of the amount of water being pumped with the oil. Off-loading efforts were also hampered by the fact that barge personnel were inexperienced and overworked. Workers were very tired, some having worked eighteen-hour shifts for three weeks. Barge personnel also lacked adequate knowledge of how to use the proper equipment for each job.[25]

The *Yaquina* crew made various recommendations to enhance off-loading in the future. Exxon barges were not available when the *Yaquina* arrived. The crew recommended that the Corps acquire its own barge, which could be used for containment rather than the hopper. The *Yaquina* had the internal piping for a process called sidecasting, which involves taking dredge material from the river bottom through its pumps and then shooting it off to the side without placing the material in the hopper. The sidecasting piping could be routed directly into the barge so that when boom off-loading began, the product would go directly from the boom through the vessel's pumps and into the barge. This was the best procedure because the vessel transit time to an off-loading barge was eliminated; vessel cleanup time was cut 50 percent; and the product could be safely contained off the vessel. The dredge's overall production could be doubled.

The crew also recommended the addition of hopper screens. When the hopper doors were opened and closed to decant the water, debris tended to catch in the hopper doors and prevent a tight closure. Large screens of "baseball fence size openings" could be fitted above and across each of the hopper doors to screen out any large debris that would keep the door from closing. A stripper pipe could be installed in

the hopper rather than installing screen and decanting through the door.[26]

By mid May the amount of recoverable oil on the water surface had decreased significantly and dredge activities declined. The focus of the cleanup had shifted to the shoreline. FOSC and Exxon representatives concluded that the *Yaquina* was no longer needed, and on 26 May it arrived in Seward for cleaning. Local contractors labored to clean the dredge, often using high pressure hot water with detergent. Much of the work, however, involved wiping down and scraping by hand.[27]

By 5 June the *Yaquina* was nearly clean and the FOSC recommended that it be released for return to normal duty. JTF requested that DOMS authorize the dredge to leave Alaska and release it to USACE upon arrival in Portland. DOMS directed that the *Yaquina* be returned to USACE no later than 15 June and commended the crew for their dedication: "Their achievement has been a significant contribution in the national interest." The *Yaquina* arrived in Portland on 15 June. Although environmentalists expressed some concern that the returning dredge might contaminate the Columbia River, Captain Brice countered that it was the cleanest it had been in two years.[28]

Meanwhile, cleaning crews continued work on the *Essayons*. A decision had been made in mid May to allow the oiled debris collected by shore operations to be dumped in the *Essayons*' hoppers in order to ease the disposal problem. The *Essayons* was used as a "collection barge," for contaminated materials from shoreline cleanup. Workers on-loaded roughly 180 cubic yards of the material during operations at Katmai National Monument. On 17 May Colonel Kakel, who had objected to the dredge's use as a "garbage scow," formally requested that the *Essayons* be released on 20 May. Exxon requested that the *Essayons* remain until a hopper barge arrived at the end of May to perform basically the same function. Exxon estimated the final release date to be 15 June. The *Essayons* arrived in Seward for cleanup on 31 May.[29]

Cleaning the *Essayons* at Seward proved to be a long, tiring, messy task. The oily sand, gravel, and debris mixture hardened like asphalt. The Super Sucker broke down; the clam

shovel did not work because there was not enough room in the hopper for it or the personnel to operate it. Cleanup started on the topside and outboard hull areas first and work progressed from the top down. Dangerous gases in the hopper forced workers to wear breathing apparatuses. The smell of decaying matter and the oil mixture was likened to a septic tank. Workmen became ill, and work was occasionally stopped for safety reasons. Labor disputes also hampered the cleanup.

By the end of June, eight to ten feet of rock remained in the starboard hopper #1. The crew met with Exxon on the 27th and Exxon officials agreed that it was their decision to put rock in the hoppers and they promised to remove it no matter how long it took.[30]

On the bottom of the hopper there are twelve double-hung doors roughly eight feet square with a linkage in the middle. The seals on the hopper doors leaked because debris had clogged in them and damaged the gaskets. Exxon contended that the vessel owner (the Corps) was responsible for the quality of the door seals and that it should complete the repairs and pay the repair costs that had been incurred since 1 June. An Exxon official concluded, "We propose to take no further action and consider the vessel released." The Corps responded that the leakage was minimal. The *Essayons* finally left for Portland on 19 July and JTF released it to the Corps when it arrived in Portland on 24 July.[31]

On 13 June Secretary Marsh wrote a letter to Commander, USACE, commending the dredge crews. The *Essayons* and *Yaquina* crews, he said, performed "magnificently," working long hours and providing maximum support. "Your initiative and ingenuity to extend the capability of the dredges to collect and skim oil from the water surface," he said, "greatly assisted the skimmer forces in collecting the maximum amount of oil in the shortest possible period of time. I am proud of each and every team member and their collective accomplishments and contributions to overcoming this major environmental disaster."[32]

A very proud Portland District officially welcomed the crew of the *Yaquina* with a ceremony on 20 June at which Colonels Cowan and Kakel and Captain Miguel Jimenez spoke. Captain Brice and Colonel Cowan handed out awards.

The District held a similar ceremony for the *Essayons* crew on 28 July with remarks by Colonel Cowan and dredge captains Ronald Henry and John Gallagher.

The dredge crews traveled to Alaska without any established procedures for oil recovery operations or previous experience. They faced severe problems in locating, loading, and measuring the oil and removing the thick, sticky substance from the hoppers. Yet, through experimentation and hard work, they devised techniques to minimize these problems and to maximize their contributions.

CHAPTER VI
Shoreline Cleanup

Cleaning contaminated shoreline areas proved to be more challenging and costly than cleaning oil off the water surface. The affected shorelines in Alaska were in a remote area characterized by abundant rainfall, gale-force winds, low cloud cover, and high waves that was difficult and dangerous to reach and presented more severe working conditions than anywhere in the contiguous United States. The coast, carved by glaciers, was steep with little shoreline development. Roughly 90 percent of the shoreline of the affected region consisted of rugged bedrock and boulders that stretched from below low tide mark to well above the high tide limits. The steep, short "beaches" consisted of heavily weathered materials ranging from sand to boulders in size.

In the remote, harsh environment of Prince William Sound and the Gulf of Alaska, officials had difficulty placing and supporting shoreline cleanup workers. Environmental objections prevented Exxon from establishing camps for workers on the beaches, so Exxon transported them back and forth to work sites from two Navy berthing ships. The 569-foot U.S.S. *Juneau*, for example, at one point housed 353 civilian technicians and laborers just off Smith Island. A flotilla of six flat-bottomed landing craft ferried workers to beaches.

In addition to logistics problems, the cleanup effort was hampered by confusion about responsibility. With so many state and federal agencies involved it was sometimes unclear who had the final authority for determining which beaches would be cleaned and when. When the oil was on the water, responsibility for the cleanup was comparatively well-defined. Under the National Contingency Plan, the Coast Guard, through the federal on-scene coordinator, had authority to decide how the cleanup would be handled. After the spill reached the beach, however, other agencies and interest groups joined in the process of deciding how the oil should

be removed and from which shores it should be removed first. While the responsibility presumably still rested with Exxon and oversight remained with the Coast Guard, the oil now rested on beaches owned by the state of Alaska, and the fish, mammals, and birds that might be affected were the special province of the National Marine Fisheries Service and U.S. Fish and Wildlife Service. Several federal agencies were responsible for regulations based on the Coastal Zone Management Act, Clean Water Act, Clean Air Act, and National Historic Preservation Act that determined what could or could not be done to clean the beaches.

Each agency had some veto power over cleanup actions that might adversely affect the resources it regulated. No single decision maker had complete authority to weigh the benefits and adverse effects of possible cleanup methods and decide on a course of action. Concern about the possible effects of beach cleanup on the marine environment and the fishing industry made decision makers cautious about adopting methods that would put dispersants in the water or physically disturb the beaches. Coast Guard officials often had difficulty weighing competing authorities and dealing with the shifting requirements of environmental groups and other interested parties. For example, if Exxon washed the contamination off the beaches back into the sea, the fisheries people objected, while environmental groups who were interested in protecting seal pupping areas preferred to have the contamination washed off the beaches.

Early in the cleanup officials created a Shoreline Cleanup Committee, which included representatives from the Coast Guard, Exxon, Alaska Department of Environmental Conservation, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Chucagh Alaska Native Corporations, U.S. Environmental Protection Agency, U.S. Forest Service, and other state agencies, to weigh the competing authorities and establish shoreline priorities. On 8 April these agencies developed and signed shoreline cleanup priority guidelines.[1]

Although media accounts left the impression that the decisions were being made by committee, Admiral Robbins made the final decision about cleanup priorities. Exxon teams evaluated a particular shoreline and submitted a proposal

to the Shoreline Cleanup Committee about how they would clean it. The committee then made a recommendation to Admiral Robbins, and if he agreed, he directed Exxon to do the work on that particular beach. Two FOSC representatives inspected the beach to determine if it had been adequately cleaned and then asked the state representative for his opinion. Regulations required the FOSC to "consult" with the state of Alaska in his decision-making process, but Robbins quickly added that "consult" did not necessarily mean "concur." If the FOSC and state representatives disagreed about what should be done, the FOSC had the final decision-making authority. Robbins explained, "It had to be that way. There was no other way it would work. You can't have a committee out there making decisions."[2]

There were many variables affecting how and when a specific shoreline would be cleaned. Officials prioritized shorelines according to the degree of oiling (heavy, moderate, or light), the presence of biological or ecological resources (pinnipeds, fisheries, aquaculture), and the presence of social resources (historical or archaeological). They ultimately developed a general strategy for cleaning shorelines. The first priority was pinniped haulouts at Agnes, Smith, Little Smith, Seal, and Green Islands and at Applegate Rocks where seal and sea lion pups would soon be present. The second, third, and fourth priorities were shorelines with biological resources present and social resources absent. The only variable was the level of contamination, the second priority having the heaviest contamination and the fourth priority the lightest.[3]

Devising a detailed strategy for the cleanup operations was complicated by the fact that no accurate information existed on the scope of the problem. Policymakers had no exact figures on the miles of contaminated shoreline. It was difficult to determine the degree of contamination from the air, because the gray lava rocks on the shoreline appeared black when wet.

As part of the effort to develop an effective overall strategy for the cleanup, Admiral Nelson directed Exxon to provide a shoreline cleanup plan by 14 April, with timelines, long-term manpower requirements, and support requirements. By that time the oil had already reached the western side of Cook Inlet. Exxon officials submitted their plan on Saturday,

15 April. When Admiral Yost reviewed the plan, he gave it his blessing, but he later expressed "serious reservations" and demanded more work on the plan. The Shoreline Cleanup Committee complained that the 21-page plan, which called for Exxon to clean 305 miles of shoreline (mostly by flushing with cold seawater) by 15 September, was too "sketchy" and optimistic, based as it was on good weather conditions.

Admiral Yost gave Exxon until 1 May to come up with a revised plan that would deal with oil contamination outside Prince William Sound and the disposal of oily waste. The plan that Exxon submitted on 1 May called for 3,400 cleanup workers on the shoreline in Prince William Sound plus an unspecified number outside the sound and targeted completion by 15 September. The May plan proposed that workers use cold water flushing and hot water pressurized hoses to clean 85 miles of shoreline by 1 August and that 191 miles of lightly oiled beach be left for natural cleansing. It called for the cleanup of 364 miles of shoreline as opposed to 305 in the 15 April plan. Alaska District staff and Corps laboratory personnel who were on temporary duty in Alaska spent days evaluating the 1 May plan for the AK-JTF.

Dennis D. Kelso, Commissioner of the Alaska Department of Environmental Conservation, complained to Admiral Yost that the revised plan did not adequately address the significant weaknesses that the state of Alaska had identified in the initial 15 April plan and demanded that Exxon correct these deficiencies. The plan should address affected areas outside of Prince William Sound that had received considerable oiling since mid April, such as shorelines along Kenai Peninsula, Kodiak Island, and the Alaskan Peninsula. Kelso contended that Exxon's estimates on shoreline cleanup rates were rooted in overly optimistic assumptions. The proposed method, cold water washings, he argued, would not clean the shoreline adequately or even be appropriate for many shoreline areas. Finally, Kelso requested that Exxon provide more detail about milestones and how it reached its conclusions.[4]

Admiral Yost observed that the plan was "a little light, and a little thin on facts and substantiation." Admiral Robbins also expressed reservations. After carefully reviewing the plan, he wrote Otto Harrison, General Manager, Exxon Company, "The approach you describe is a sound one, but

I remain seriously concerned that the investment of resources you describe will not be able to clean the 300+ miles of shoreline in the time allotted." The plan was a "well designed approach," he added, but "needs elaboration." Robbins requested that Exxon substantially increase its workforce to increase the cleanup rate; provide an inventory of potentially critical path equipment items that they would need to accelerate their effort so that Robbins could help them locate such equipment; submit a plan for beach cleanup work outside Prince William Sound; anticipate a review of the cleanup in the spring of 1990; and retain the U.S.S. *Fort McHenry* and the U.S.S. *Juneau* as hotel and support ships for the duration of the high level cleanup effort. In response to intense pressure from the Bush administration, which called the 1 May plan inadequate, Exxon later agreed to increase the number of workers from 3,400 to 5,000.[5]

Developing and implementing an effective shoreline cleanup strategy was also hampered by the lack of a clear definition of "clean" and acceptable standards. As Exxon devised its ambitious shoreline cleanup plans for Prince William Sound and the Gulf of Alaska, federal and state officials grappled with the question, "What is clean?" Scientists said they were working in a gray area where there were no generally accepted standards. Some cleaning could go too far. Peter McGee, the on-site coordinator for the state environmental agency, complained that there was no fast, objective method to determine a standard of cleanliness for the beaches. With no time to take samples and do the normal kind of analysis, operators had to rely on visual, on-the-spot determination.

State officials and the media criticized Admiral Robbins for calling the shorelines "clean." After the crews finished their work, the beaches were not as "clean" as they were before the spill, so the Alaska Department of Conservation refused to let the Coast Guard use the word "clean." When Exxon officials suggested using the word "treated," Robbins agreed. "Clean," he observed, is a relative term. The shorelines were not totally "clean," but a level of contamination had been removed. Robbins believed the ultimate goal in cleaning up a spill was to stabilize the shoreline to the point where it would not cause more damage to the surrounding

environment (i.e., to prevent winter storms from carrying the oil offshore and redepositing it), and to clean the shoreline as much as possible without damaging it more than you would by letting the oil degrade naturally. The standards for "clean" depended to some extent on the area. Cleanup officials had to decide, Robbins observed, how much they were going to do on each shoreline segment. Did they want to clean a beach with such intensity that they chased away all of the wildlife or just stabilize the oil?

As FOSC, Admiral Robbins decided when Exxon could move on to another shoreline. Robbins, however, never told Exxon that it would not have to return to a particular beach at some time in the future. He believed that Exxon did as much as could reasonably be expected. Exxon needed to treat a beach to a certain point and then move on to one with more environmental impact or else it would spend the entire summer on one beach.[6]

In mid May the FOSC established a three-phased approach to aid in determining cleanup priorities in Prince William Sound and western Alaska. In phase one operators stabilized the beach and removed gross contamination to the extent that the oil would not migrate from the site. The site would have to be reassessed at a later date to determine if further treatment was necessary. Phase two marked the removal of the majority of surface oil contamination. The site required reassessment later. During phase three, all contamination was removed and no further treatment was required unless the beach was re-oiled. The phased approach allowed cleanup crews to make progress while maintaining the ultimate goal of removing all contamination. A Coast Guard operations analysis team worked with the FOSC staff to design a system of tracking and productivity reporting that would clarify what had been done and what remained to be done.[7]

An even greater problem than priorities and strategies was the primitive and ineffective techniques for shoreline cleanup. To a great extent the techniques mimicked those used after the 1978 *Amoco Cadiz* spill. In the *Amoco Cadiz* cleanup 10,000 workers, including sailors, soldiers, hired labor, volunteers, and the local population, struggled to clean 250 miles of contaminated French shoreline. They worked

Captain Brice (in uniform) discusses shoreline cleanup operations.

with their hands, wielding rakes, shovels, plastic buckets, brooms, and garbage cans. They painstakingly poured the contaminated matter from small buckets into larger buckets and lugged them to gathering points. Workers were not always environmentally sensitive, however. On the bird sanctuary of the Ile Grande, for example, bulldozers scraped away topsoil and ground cover, which promoted the erosion of the marsh they were trying to clean. Some mayors sent fleets of bulldozers and earth-moving equipment to do work that should have been done by hand. The equipment destroyed substrata life and contributed to further erosion of the shoreline.

Workers tried nine different sorbent products on the French beaches: sawdust, vegetable fibers, leather scraps, rubber powder, polyurethane foam, plaster, pine bark, perlite, and shredded paper strips. The rubber powder proved most useful. There were also inconclusive experiments with chemicals to promote biodegradation of the oil. Cleanup crews washed beaches with water pumps. High pressure equipment (400–900 kilograms per square centimeter) was quickly abandoned as too expensive, damaging to concrete structures, and a danger to operators. Medium pressure (140 kilograms

Shoreline cleanup operations.

per square centimeter) hot (80–140 degrees Celsius) water pumps were more effective, cheaper, and safer.[8]

In the Alaska cleanup operations, state officials restricted the cleanup operations to the following methods: wiping individual rocks by hand and absorbing surface oil from depressions and crevices, flushing the oil from the beaches with the application of warm or cold seawater, and collecting the oil-contaminated seaweed and other organic matter on the shores by hand. Other cleanup methods were tested with varied results but were not widely used, including the spot application of hot water to beaches or rocky shoreline, burning, vacuum collection of pooled oil, and bioremediation.

The most prevalent method was to pump huge amounts of cold saltwater from landing craft offshore to the top of the beaches, so it flooded the rocks as it ran back to the sea. Meanwhile, workers with fire hoses squirted the surface of the beach to knock oil off the rocks. The flood of water kept the oil suspended while it was carried to the ocean where the oil was captured in booms and retrieved by skimmers.[9]

This technique proved ineffective. Oil seeped to a depth of several feet. Each night the tide lifted oil to the surface or washed the oil cleaned off the day before back ashore.

Thus, despite six washings, a stretch of rocky beach on McPherson Bay on Naked Island remained black. Five days of intensive washing on Smith Island shortly before Vice President Quayle's visit decreased the amount of oil, but each morning discouraged workers found that the rocks they had washed with such effort were black again.

As weeks passed the idea of using hot water rather than cold became more popular. The vegetation on the beaches was already dying, some reasoned, so it was time for more drastic measures. The units that Exxon brought to the scene, however, could not produce enough hot water to work continuously. When they did work, they only applied hot water to an area "the size of a postage stamp." Hot water pumps from France, built for use in the *Amoco Cadiz* spill, worked better. In the seal pup birthing areas, Exxon was allowed to cut and remove seaweed from the rocks instead of washing it. Exxon had also tried spreading peat moss on the rocks to absorb the oil. Removing seaweed was easier than cleaning it and prevented oil-soaked vegetation from polluting the water, but seaweed was an important food source.[10]

By 25 May there were 386 Exxon employees, 4,306 VECO contractors, 1,177 Norcon contractors, and 2,603 other workers involved in the cleanup. By 15 September, when Exxon stopped its shoreline cleanup operations for the winter, a total of 1,632 miles of shoreline (including 708.7 miles in Prince William Sound) had been treated and approved for demobilization by the FOSC.[11]

The 708.7 miles, however, were not completely free of contamination. Operators were never able to find an effective technique for cleaning shorelines. Despite Exxon's huge investment in time, money, and manpower, after months of intensive cleanup work, much contamination remained.

CHAPTER VII

Research and Development

The clear inadequacy of existing methods for locating and cleaning spilled oil on the water and for cleaning the shoreline led the Corps of Engineers to focus its research and development expertise and resources on these problems. Soon after President Bush called on the Defense Department to support the cleanup efforts, the Research and Development Directorate, HQUSACE, asked all Corps laboratories to provide information on the kind of expertise they could offer and the potential contributions they could make to the cleanup.

Two Corps laboratories, the Waterways Experiment Station (WES) in Vicksburg, Mississippi, and the Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire, were particularly well qualified to provide technical assistance to the cleanup. WES had conducted research on the disposal of contaminated materials and the long-term effects of dredging operations and had provided support to DOD and EPA in hazardous and toxic waste cleanup activities. The laboratory had extensive experience dealing with hazardous and toxic materials and contaminated sediment.

CRREL had conducted studies of the biodegradation of Prudhoe Bay crude oil in Arctic environments and had been involved with the Environmental Protection Agency in Alaska in the long-term evaluation of crude oil spills on terrestrial environments. It was also studying a naturally occurring bio-organism that fed on oil seeps on the North Slope. In 1976 CRREL participated in two experimental spills in Alaska. Scientists applied two thousand gallons of hot Prudhoe Bay oil through a thirty-foot-long perforated pipe to one plot in February and the same amount to another plot in June. For the next three years they carefully monitored the sites to determine the effects on vegetation and soil properties.

CRREL also had ongoing research in the area of remote sensing. Through the Civil Works Remote Sensing Research Program, CRREL had developed a technology that could be applied in Alaska. The program sought to expand the use of data from remote sensing in implementing the Corps' water resource mission. At the time of the spill the Corps could process, store, analyze, integrate, and retrieve aircraft and satellite data quickly and then display graphically the products using prototype software. The system was already being used in a flood impact study in the Corps' Baltimore District and in a real-time flood forecasting model under development in Little Rock District.[1]

HQUSACE designated CRREL as the lead laboratory to coordinate all Corps research activities relating to the Alaska oil spill and to insure that all relevant laboratory resources were considered. Robert Oswald, Director of Research and Development, HQUSACE, directed CRREL to develop a proposal to support the National Oceanic and Atmospheric Administration's long-term environmental monitoring program, a strategy for direct technical support to the Coast Guard in areas of remote sensing and oil spill dispersion modeling, and a strategy for direct support to North Pacific Division and Alaska District, along with Corps headquarters EOC activities.

The Corps' research and development community outlined potential contributions that laboratories might make to the cleanup. WES said it could do some advisory work on shoreline cleanup, and CRREL offered to do remote sensing. At briefings in HQUSACE on 11 April and 27 April, research and development officials outlined their plan to process remote sensing data available in Alaska and use it to highlight the oil slicks on a ship's radar. General Kelly and Assistant Secretary Page enthusiastically supported the plan.[2]

In a spill the size of the *Exxon Valdez* spill, it was much easier and less expensive to recover oil while it was on the water, before waves and currents and natural dispersion made recovery more difficult. Use of multispectral sensors (sensors that simultaneously sense data in a number of energy bands) would enable scientists to locate and map the distribution of oil over large areas and therefore enable operators to recover it more rapidly.

Oil on water can be detected through a combination of sensors. Side-looking radar detects oil because oil damps the wave action and reduces radar return. Optical sensors, which measure reflected light in the ultraviolet, blue-green, and intermediate infrared bands, allow the detection of oil because of the differences in the amount of solar energy reflected from the oil and from uncontaminated water. Thermal infrared sensors have also been successful in detecting oil. Using a mixture of these sensing techniques in a multispectral sensing package offered the greatest probability of accurately detecting oil.

Multispectral sensors on satellites, such as Landsat Thematic Mapper, had the appropriate spectral bands for sensing oil over a large area, but satellite sensing did not occur on a daily basis, which was essential. However, for oil spill operations, aircraft-based multispectral systems could provide data appropriate for processing with the CRREL capability. The aircraft that had both the proper sensing capabilities and video capability were a Falcon jet owned by Innotech, Ltd., which had MEIS II and a Daedalus multispectral scanner, and two Twin Otters with dual ultraviolet and thermal infrared images. Exxon had contracted these aircraft, which were in Valdez flying on almost a daily basis. The Innotech aircraft concentrated on beach and shoreline, while the Twin Otters flew over open water.

Exxon hired the Innotech Falcon jet, which had been flying for Environment Canada, to survey shorelines in Prince William Sound and the Gulf of Alaska. It was collecting all of the frequency range spectral data that the Corps scientists needed for their image processing system. The Falcon recorded a portion of the information on a VHS videotape, which had to be digitized before it could be entered into CRREL's processing system. Although Exxon collected the remote sensing data, it had no capability to process that data in Alaska, so it relied primarily on visual sightings.[3]

CRREL proposed that its personnel periodically receive imagery from the Exxon-directed aircraft in a VHS videotape format. Then CRREL and Joint Task Force officials would review the videotape information and enter the appropriate data into CRREL's Apple MacIntosh computer system. CRREL would correlate the tape outputs with LANDSAT

data through its software program to develop a map indicating the degree of shoreline contamination and oil contamination on the water. Once processed, the data would be entered into the JTF's computer system for use in decision making. The goal was to install the necessary computers on large vessels, such as the dredges, and then to use the computer programs to guide the vessels toward large concentrations of oil. Scientists, however, did not yet have the ability to image the data and put it rapidly into a management system for decision makers. No procedure had been devised to get information on the location of oil to cleanup vessels in a timely manner.[4]

At the request of the Corps, on 27 April the Director of Military Support issued a formal tasking to CRREL to use its remote sensing research and available resources to delineate the extent and relative thickness of the oil on the water and shoreline. After verifying the information obtained from the aircraft scanners and from photographs taken by helicopters, it was to process the data and produce and display graphic images indicating the distribution and relative thickness of oil. CRREL was then to provide this information to the Joint Task Force.[5]

The next day CRREL began establishing a support team at the Joint Task Force headquarters at Elmendorf AFB to carry out its mission. Other team members, headed by Dr. Harlan "Ike" McKim, arrived in Anchorage over the weekend 30 April–1 May and began setting up and testing their equipment. Meanwhile, the technical director of CRREL, Dr. Lewis E. Link, Jr., contacted the Division Engineer in North Pacific Division, General Stevens, to make sure that CRREL got the necessary aerial support to obtain the imagery they needed to provide remote sensing products tasked by DOMS. Proper aerial support, he explained, was "critical" to the successful completion of their mission.[6]

The CRREL people quickly arranged for a room to set up their equipment at Elmendorf AFB. Most of the equipment arrived in Anchorage late in the afternoon on 4 May, and team members spent the next few days setting up their systems. The biggest problem that CRREL personnel faced was their inability to obtain data from aircraft and satellite sensors in a compatible format and the lack of an automated

system to transmit the final oil spill map to the vessels doing the cleanup.[7]

In addition to the CRREL team, General Kelly sent two scientists from WES to Alaska to provide technical assistance. Their specific mission was to assess the effectiveness of current shoreline cleanup methods. Dr. Ray Montgomery, Chief, Environmental Engineering Division, and Dr. Conrad J. Kirby, Chief, Environmental Resources Division, went to Alaska on 2 May. The high rank of the scientists was an indication of the importance that officials in headquarters placed on their mission.

On 3 May Kirby and Montgomery met with Jacob Redlinger and James Reese from North Pacific Division and CRREL's Ike McKim. They visited the Alaska District offices where officials briefed them on the status of the cleanup operations and the District's involvement. Colonel Kakel expressed concern that the presence of the research and development people would worsen an already tense situation. The scientists had arrived at a politically sensitive time because of Vice President Quayle's visit and because of friction between various government agencies. They quickly became aware of the political sensitivities in Alaska and found it difficult to coordinate with other agencies. One CRREL team member cautioned, "The political situation here is one of vast fields of eggshells."[8]

Despite their best efforts, the Alaska District staff was unable to get the scientists into the field for the first few days because of Quayle's visit and because the logistics were difficult. Team members were frustrated by the delays, but they quickly went to work helping District personnel review the newly released drafts of Exxon's 1 May Waste Management and Shoreline Restoration plans.[9]

On 4 May the WES scientists continued to review potential methods for shoreline cleanup and acquired more information on Exxon's cleanup activities. The next day Kirby, Montgomery, McKim, Redlinger, Reese, and Guy McConnell flew by float plane to the U.S.S. *Juneau*, anchored a short distance from the Smith Island shoreline cleanup activities. The team went from there on a Navy boat to Seal Rock Cove and another beach on Smith Island that crews had flushed for days with hot and cold water. Crews had also wiped the

beach by hand with absorption materials. Both beaches had a high priority because they would be used for seal pupping. Because of Vice President Quayle's visit to Smith Island the previous day, the cleanup crews had worked long hours, so they did not leave the *Juneau* until about noon and then took a lunch break when they got to the beach. As a result, the team did not witness any actual cleanup work. Conversations with workers, however, indicated that they did not think their cleanup efforts were effective.

The Corps' scientists concluded that the hot water flushing and cold water flushing methods had been somewhat effective in removing surface ponded oil but not in cleaning oil that had seeped into the cobble and gravel materials below the surface. When they dug into the beaches, they found significant amounts of oil below the surface. Despite six to eight passes of hot and/or cold water flushing, considerable amounts of oil remained on the beach. Thus the team concluded that the effectiveness of the cleaning methods was "marginal." The team also observed that it was difficult to provide for the health and safety of workers in this harsh environment. They discussed various mechanical, chemical, and biological cleanup methods and mitigation with North Pacific Division and Alaska District representatives.[10]

The team returned to Alaska District Friday evening to report to Colonel Kakel, but he was still meeting with General McInerney. The team returned to the District office Saturday morning, shared their observations, and left Anchorage that day without seeing the colonel. Colonel Kakel and his staff were upset by what seemed to be an abrupt departure. The WES officials, however, believed that they had completed their mission and there was nothing more that they could contribute because Exxon had all the scientific expertise needed. They concluded that cold water wash was ineffective and that unless restrictions were removed the Corps would be no more effective at cleaning the beaches than Exxon. Reese and some others favored natural cleansing, but they realized such a recommendation would be politically unacceptable.[11]

Reese and Redlinger returned to Portland with bags of rocks from a "clean" beach and from one not yet cleaned. When they showed the rocks to General Stevens, he could

not tell the difference. The rocks effectively illustrated the ineffectiveness of cold water washing.[12]

In their trip report, Montgomery and Kirby concluded that the Corps would find it "very difficult" to provide effective cleanup support during the short time remaining until mid-September. The contaminated shorelines were in remote areas where housing was limited and transportation to worksites was dangerous. The short-term cleanup, they concluded, provided no "winning opportunities" for the Corps. However, they recommended that the experience be documented in case the Corps was asked to support future oil spill cleanup activities. The team saw opportunities for future research and development but cautioned against getting involved in short-term cleanup activities that had little chance of success. Exxon had the experts, equipment, and manpower to do the "best possible job" on the cleanup. Reese and Redlinger concurred. They too saw contributions that the Corps could make in research and development, such as remote sensing mapping techniques, but recommended against Corps involvement in shoreline cleanup. In interviews with the local press when they returned to Vicksburg, Kirby and Montgomery reiterated that the Corps could do little to help because Exxon had hired most of the experts and purchased most of the cleanup equipment.[13]

Corps officials were disappointed in the results of both laboratory visits, but especially the WES visit.[14] Kirby and Montgomery's blunt report and conservative statements to the press did not fit in well with the Corps' proactive approach to the cleanup. CRREL successfully established a data management system used in Alaska District and the JTF, but it had not accomplished its basic mission because the scientists could not get the instrumented aircraft data they needed from Exxon. Exxon refused to release any data that it had on the extent and location of the oil.

After the site visit, CRREL continued its efforts to get the data that it needed. At the Corps' request, General Smith informed General McInerney on 10 May that the Corps needed the following Exxon tape output: VHS tape output from the Innotech Falcon jet that flew over the spill area daily and videotape output from the Twin Otters flying each day. Smith requested seven days of output.

General McInerney asked FOSC Robbins to prod Exxon to surrender the data. The alternative was to task Navy or Air Force planes for a special imagery collection mission, which would be very expensive. The Air Force, Navy, Coast Guard, and NOAA each had aircraft that could collect the data, but none had aircraft available in Alaska. Nor was any agency willing to expend operational funds to send an aircraft to Alaska.[15]

In late May Exxon agreed to provide copies of video and computer tapes. Dr. Hugh Brown, Exxon Director of Surveillance and Tracking in Valdez, authorized Innotech to prepare some examples of the tapes and transmit them to CRREL. Innotech agreed to mail by 22 June 1989 two or three tapes for three or more sites, which would represent data for both open water and shoreline, at a cost of $2,000 to $3,000. The data would come from flight lines on or near 7 April, so that CRREL could compare this to data they had already analyzed from LANDSAT imagery for that date.[16]

Months later the Corps received directly from Exxon a video cassette on which Exxon had recorded samples of the infrared and ultraviolet images collected during the daily surveillance flights. The images on the tapes were of poor quality and were not documented as to where, when, and what they depicted. The data was for the most part unusable. CRREL was able to put the data into its system to insure that the system worked. CRREL also received samples of Innotech data on computer compatible tapes.[17]

In addition to the remote sensing technology, Corps elements made other contributions. At the time of the spill there was no good accurate measurement of the miles of shoreline in Prince William Sound and the Gulf of Alaska. A team from the Engineer Topographical Laboratory's Terrain Analysis Center at Fort Belvoir measured 6,000 miles of Alaska coastline and offshore islands that were affected by the spill. They also determined the general composition of the measured coastline (i.e., sand, gravel, or large rocks) to help the Corps estimate the extent of the damage and the amount of effort required for the cleanup. In addition, the Navigation Data Center, part of the Water Resources Support Center, provided information about crude petroleum handling in general and details specific to Valdez. With its new data base management

system, the center was able to program, produce, and distribute this information within two hours.

WES's Coastal Engineering Research Center provided statistical wind and wave information from the Wave Information Studies to CRREL to help predict the movement of the oil slick. The wind and wave data covered a twenty-year period for the months of April and May at a site near the disaster.[18]

The Corps was also involved, if only to a minor extent, in another oil spill cleanup technology, bioremediation. Bioremediation is the digestion or degradation of oil by naturally occurring microorganisms (bacteria). Bacteria degrade the hydrocarbon molecules of oil into fatty acids, bacterial protoplasm, and other by-products. The process of hydrocarbon degradation is going on continuously in nature using various sources of hydrocarbon to include oil and products of photosynthesis among many others. For years scientists have been developing techniques to increase the number of organisms per unit area and increase their effectiveness by adding certain fertilizers — nitrogen and phosphorus — to accelerate the digestion of hydrocarbons. Fifty tons of commercially prepared microbes existed and were available for large scale application in Alaska.

Dr. Carl H. Oppenheimer, professor at the University of Texas and owner of Alpha Environment, Inc., testified before a subcommittee of the House Committee on Merchant Marine and Fisheries that he wanted to test a bioremediation program on three miles of representative shoreline and adjacent waters in Alaska.[19]

A briefing was held at the Pentagon on 14 April featuring Dan Kirkendall (a retired congressman from Memphis, Tennessee) in support of work being done by Oppenheimer. Kirkendall told the Corps' research and development people about a workshop sponsored by EPA to consider bioremediation technologies. At General Kelly's request, William R. Rushing from the Research and Development Directorate in Corps headquarters arranged to attend the workshop as an observer and to involve E.A. Theriot, a WES expert in biotechnology.

The "Bioremediation of Oil-Contaminated Aquatic Environments" workshop was held on 17–18 April in Crystal City,

Virginia. The purpose was to assemble a panel of experts to assess the feasibility of bioremediation in Alaska and to make recommendations to the EPA Administrator for further action. The participants decided to recommend to the EPA Administrator that the Alaska oil spill situation be treated as a laboratory to increase the nation's knowledge and readiness for action in future oil spills. Workshop participants agreed that test plans should be developed for using fertilizer in a small-scale experimental project to study the impact. These test plans would be reviewed by participants and final recommendations would be made to the EPA Administrator. Rushing recommended that the Corps offer engineering assistance to EPA.[20]

Rushing concluded that bioremediation could be effective, especially if used immediately after the spill, and that the risk factors were minimal. The engineering aspects of bioremediation studies contemplated by EPA were "seriously lacking" in application, techniques, equipment, etc. He recommended that the Corps offer assistance to EPA in the engineering/research and development aspects of projects because the Corps had the technical and logistical capabilities that EPA did not have. He also recommended that the Corps appoint a rapid response team to address future capability to respond.[21]

Research and development officials noted that it was too late to consider using bioremediation to clean up the Alaska oil spill but not too late for serious consideration of developing a program to do field tests of existing technology in preparation for future emergencies. "The situation in Alaska presents a unique opportunity for research on this technology at a field scale which should yield significant results and ultimately provide a capability to use this method of oil spill cleanup."[22]

The results of the laboratory visits were not as successful as Corps officials had hoped in that the scientists could do little to improve the current situation in Alaska. The problems of locating oil and cleaning the shoreline persisted. The Corps efforts, however, revealed that CRREL had an effective remote sensing technology that could be used in future cleanup operations.

CHAPTER VIII

Funding and Reimbursement

In addition to all of the problems presented by water and shoreline cleanup operations, a shortage of funds and confusion about procedures and authorities made it difficult for the Corps of Engineers and other federal agencies to obtain reimbursement for their expenditures. When the spill occurred, officials in HQUSACE grappled with two difficult questions: Did the Corps have the authority to commit resources to the cleanup effort? If so, what was that authority and could the Corps expect to be reimbursed for its expenditures? It was clear that the Corps of Engineers had no authority to act unilaterally and spend military or civil funds on the oil spill cleanup. Under the Federal Water Pollution Control Act (33 USC 1321), also known as the Clean Water Act, the Department of Transportation, specifically the Coast Guard, was responsible for the cleanup and had the authority to request resources from other federal agencies.

Some Corps officials assumed that the Economy Act supplied the authority to provide support to the Coast Guard and that the Clean Water Act would be the vehicle for reimbursement. The Chief Counsel for the Corps of Engineers, Lester Edelman, however, maintained that the Clean Water Act, which he had helped draft in the 1970s, alone provided enough authority. The DOMS invoked the Economy Act, informing the Coast Guard, "It is our understanding under the national contingency plan, authority to provide military support to the Coast Guard (or to DOT) is provided for by the Economy Act, 31 USC Sect. 1535."[1]

The Economy Act allows one federal agency to provide services and goods to another and to be reimbursed, based on a signed agreement or order. In the case of the oil spill, however, the Department of Transportation had not made such an agreement with the Defense Department and the Corps of Engineers.

The Clean Water Act stipulates that the spiller is liable for all cleanup costs and costs of restoration or replacement of natural resources damaged or destroyed as a result of the discharge of oil. Exxon accepted this liability. Section 311(k) of the Clean Water Act established a revolving fund in the U.S. Treasury to be maintained at the level of $35 million to carry out the provisions of the Clean Water Act. The 311(k) account is funded mainly from appropriations, with the spiller reimbursing the federal government for the agency costs. The Coast Guard administers the fund and is responsible for recovering the costs on behalf of the federal government. It has the authority and responsibility to determine which agency costs were "reasonable" except where an agency's actual costs had to be reimbursed under some other law. Coast Guard regulations require that the Federal On-Scene Coordinator preapprove activities stemming from the spill in order to be reimbursed.

In the case of the *Exxon Valdez* spill, agencies submitted their costs to the Coast Guard for approval, and the Coast Guard passed the approved costs on to Exxon. Exxon was expected to reimburse the 311(k) account for amounts approved by the Coast Guard, and the Coast Guard would then reimburse the agencies from the 311(k) account for the submitted and approved costs. Initially federal officials were not sure that Exxon would pay into the revolving 311(k) fund, and without the fund, the Secretary of Transportation might not have had sufficient funds to write an Economy Act order to the Defense Department. The account was badly depleted at the time of the spill. The Economy Act worked only if there was money going into the 311(k) account. Despite the fact that there was no Economy Act order, no formal guarantee of reimbursement, Corps officials were determined to commit resources.[2]

The Coast Guard began using the Clean Water Act reimbursement process after the spill because, although Exxon remained in charge, federal involvement was substantial and from the outset Exxon had been paying the cleanup costs. Moreover, the 311(k) account was an existing and readily accessible fund that the Coast Guard had authority to administer. The Coast Guard notified agencies that would be involved in the cleanup to prepare "sufficient, complete, and correct" reports for all cleanup costs.[3]

One of the Corps' first tasks was to establish procedures for recording and reporting costs. On 8 April E. Scott Chronister, Executive Director, Resource Management, HQUSACE, recommended that all Corps staff members, command-wide, keep careful records of all labor time spent on the Alaska oil spill cleanup project, as well as records of travel orders, purchase orders, and any other relevant financial documents. When it completed its efforts, Chronister emphasized, the Corps would need "clear, accurate, unambiguous financial information" in order to respond to all questions about costs and to seek reimbursement.[4]

Resource Management set up three categories for recording costs: dredge operations, including logistical and administrative support; other support to JTF, including laboratory operations; and command operations, including the emergency operations centers. The first category included the cost of the dredges plus any logistical and administrative support to them. The second covered on-site miscellaneous logistical support to the JTF and Alaska District and eventually Corps laboratory involvement. JTF officials later indicated that they wanted an object class breakdown (i.e., personnel costs, supplies, equipment, travel). They also wanted military costs separated out and a listing of the accounts to which the Corps would charge them.

Pending resolution of the funding issue, the Corps used the Civil Works Revolving Fund to pay for the dredge and the laboratory costs. It charged the direct costs of the Alaska District EOC to Flood Control and Coastal Emergencies and the cost of regular command and control activities at headquarters and North Pacific Division to General Expenses. Costs that did not fit any of these categories were put in a deferred account.[5]

Meanwhile, anxious officials in Alaska District waited for funding guidance. On 11 April Lieutenant Colonel Roy Carlson, Chief of Alaska District's Crisis Management Team, reported that the District's funding was "at a critical stage." "We will continue to perform our mission to the extent possible," he added, "however, an urgent requirement exists for funding guidance." By 19 April the costs for the District's EOC operations, support to the DOMS team, and coordination with the Joint Task Force had reached $1,105,000.[6]

On 13 April DOMS reminded all DOD activities to capture and record all Alaska oil spill cleanup costs, including both fixed costs such as salaries at standard rates as well as variable costs. General McInerney planned to establish procedures to ensure that bills were submitted to the Coast Guard in a timely manner and with adequate documentation. All bills had to be based on statements of expenses that were validated and approved by the FOSC.

In a 20 April memorandum, Secretary Marsh urged Secretary Cheney to resolve the funding issue with Secretary Skinner. Marsh observed that the only authority available to DOD for its support was the Economy Act and that the Transportation Department was reluctant to enter into an Economy Act arrangement because it might not have enough funds to cover projected obligations. DOT, he added, had at least three sources of funding: its own regular appropriations, the 311(k) account, and another fund authorized by the Trans-Alaska Pipeline Authorization Act (TAPAA). DOT believed the 311(k) funds should be used only for certain directed expenses. Marsh received no reply.[7]

The Corps activated emergency operations centers, outfitted two dredges and sent them to Alaska, and took other actions in HQUSACE, North Pacific Division, various Districts, and Corps laboratories. It had received three written taskers from DOMS: one for each of the dredges and one for CRREL. The Corps' claims for reimbursement provoked controversy. Exxon and Coast Guard officials contended that they had not requested the *Yaquina* initially. Although the 11 April DOMS tasker for the *Yaquina* said "the Coast Guard has requested" and "report to the Coast Guard for reimbursement," Coast Guard officials claimed that they had not asked for the dredge and that Exxon did not want it. The Corps activated the dredge on 11 April, but the Coast Guard did not officially approve its use until 18 April, so the costs for that period were disputed.

Questions also arose about reimbursement for Corps laboratory activity because the Coast Guard had not requested laboratory involvement. The DOMS request for CRREL's involvement differed from the other taskers. It did not say "the Coast Guard requests" or provide an account number. Thus, when the Corps received the tasker, Resource Management

officials informed DOMS that they would treat the tasker as a reimbursable order. They also requested billing instructions from DOMS and sent an initial cost estimate, but DOMS did not respond. Initially the Corps billed only for dredge costs; later it billed for all costs. The Corps' negotiating position was to claim full reimbursement for all dredge and laboratory costs, which amounted to roughly $11 million, including the cost of hiring dredges to complete the work that the *Yaquina* and *Essayons* had been scheduled to do before they were diverted to Alaska.[8]

At a meeting at Elmendorf AFB on 25 April, Coast Guard Captain Anderson indicated that Exxon had agreed to pay the "incremental" costs of the Army, including Corps of Engineers dredges, and the Air Force. Costs such as military salaries that are funded by other appropriations would not be reimbursed. Corps representatives gave Anderson the estimated rental rates for the dredges (fourteen days of *Yaquina* at $23,000 a day for a total of $322,000 and nine days for the *Essayons* at $51,500 a day for a total of $463,500). Additional costs such as labor, equipment, and supplies brought the total to $436,687 for the *Yaquina* and $602,732 for the *Essayons*. The estimated cost of demobilization for the dredges was $238,000 and $509,000. Thus the total costs would be $674,687 for the *Yaquina* and $1,111,732 for the *Essayons*.

One Corps official observed that Anderson "appeared reluctant to authorize payment of the expenses." Anderson argued that the Army, not the Coast Guard, had requested the services of the dredges (despite the DOMS taskers) and implied that the Corps should look to the Army for reimbursement if Exxon refused to pay.[9]

As the reimbursement problems dragged on, Corps headquarters once again directed the field offices to keep accurate records of oil spill cleanup costs. HQUSACE also provided the following general guidance on costs: JTF taskers and similar orders from the Coast Guard and the Transportation Department would be considered reimbursable; activities on the Corps' own initiative were chargeable to appropriations currently available to the Corps; and costs could be reallocated pending legal and fiscal determinations at Army headquarters and JTF.[10]

By 15 May the Defense Department and the services had spent approximately $15 million, using their Operations and

Maintenance funds to pay for their cleanup efforts. DOD now requested that the Coast Guard begin reimbursement from the 311(k) account in compliance with the Economy Act.

In early August the Corps submitted a bill for $9,730,000, which included dredging operations ($7,500,000), alternative dredging costs ($1,955,000), and other support to JTF including laboratory operations ($275,000). The actual costs through 14 July totaled $10,045,967, and John F. Wallace, Director of Resource Management, HQUSACE, projected $479,033 more through 1 October. So the total estimated costs were $10,525,000. The amount on the bill represented the minimum amount that the Corps required to protect the integrity of its civil works accounts.[11] Captain Anderson suggested that the Corps negotiate a dollar amount for reimbursement for the dredges rather than require the entire $7,500,000 in light of the fact that "Exxon requested skimmers not dredges and the dredges did not perform at the level the Corps had promised."[12] Exxon wanted to reimburse the Corps at the lower rate for skimmers rather than at the dredge rates that the Corps quoted.

The Corps of Engineers was not the only federal agency with reimbursement problems. On 10 April Representative Earl Hutto, Chairman, Subcommittee on Readiness, House Committee on Armed Services, asked the General Accounting Office (GAO) to conduct a review of federal costs incurred as a result of the Alaska oil spill. The review would focus on the accounting systems and methods that federal agencies, including DOD, used to track the costs associated with the federal cleanup effort. GAO auditors went to Valdez a month later.

GAO auditors investigated what the various federal agencies had spent, whether the agencies had procedures to seek reimbursement from Exxon, and the extent to which they had been reimbursed. GAO's interim report, which was completed in January 1990, covered the estimated costs reported by agencies as of 30 September 1990 and reimbursements received through 15 November 1989.

Nine federal agencies had incurred costs — costs totaling $125.2 million during this time period. Of this total, $111.8 million was for the cleanup, $12.3 million for damage assessment, and $1.1 million for other costs resulting from

the spill. DOD incurred the greatest costs of any federal agency — $62.8 million. DOT was second with costs totaling $33.3 million. Seven of the nine federal agencies had sought reimbursement under Section 311(k) of the Clean Water Act; and three of the agencies established direct agreements with Exxon. Two of the three agencies also used the 311(k) process for costs not covered under direct agreements.

As of 15 November 1989 Exxon had reimbursed $80.8 million of the $125.2 million. The unreimbursed balance — $44.4 million — included amounts that agencies were still processing and had not yet billed to Exxon or amounts that the Coast Guard and/or Exxon challenged. Recovery of half of the $44.4 million ($21.6 million) was uncertain. Either the Coast Guard or Exxon was questioning the allowability of $17.8 million in costs, which included charges for the Corps of Engineers dredges "which Exxon considers excessive"; activities that the FOSC did not approve in advance; and costs for which the Coast Guard had requested more detailed documentation.

Department of Defense costs totaled $62.8 million, of which Exxon had reimbursed $41.5 million and $4.6 million was still being processed. GAO indicated that the remaining costs, $16.7 million, were either uncertain or had not been reimbursed. DOD payments that were uncertain included $7.4 million, the cost of the two Corps dredges; $1.8 million for MEDEVAC equipment and personnel; and $0.4 million for Air Force telecommunication services used to coordinate DOD activities. Exxon disputed the $7.4 million dredging cost because it wanted to pay skimmer rates rather than the higher dredging rates that the Corps charged. In addition, Coast Guard officials contended that the FOSC had not requested or authorized either the MEDEVAC services or the Air Force telecommunication services.[13]

The Corps committed resources before its authority to do so was clearly defined and before a proper mechanism for reimbursement was in place. The uncertainties about authorities and funding procedures created reimbursement problems for the Corps and for other agencies that have not yet been fully resolved.

CHAPTER IX
Conclusion

The *Exxon Valdez* spill was the first time that the Coast Guard had ever worked with the Army or the Corps in large-scale oil recovery operations. DOD and Corps officials at times became impatient waiting for political decisions when they saw a job that needed to be done. They were uncomfortable in the "support" role, especially when the command structure was unclear. The military prefers to be given a mission and complete authority to carry out that mission. In the Alaska operations, the National Contingency Plan forced the Coast Guard to deal with a large cast of players using consensus and cooperation, but military organizations do not normally function this way. Colonel Kakel compared the operation to a mass casualty exercise in which hard decisions have to be made about who lives and dies (or in this case, hard decisions about resources and priorities). The Coast Guard, Exxon, Defense Department, and Corps all performed triage.[1] With so many agents involved in the decision-making process, however, Corps personnel at times found the mission and the command structure to be muddled.

In the first weeks after the grounding, as the oil spread, Assistant Secretary Page, General Kelly, and other officials in headquarters became increasingly frustrated by the inactivity and the failure of Exxon and the Coast Guard to request resources. These officials aggressively sought ways for the Corps to contribute to the cleanup. They were confident of the Corps' capabilities and eager to respond to President Bush's call for action. If they had not been so aggressive about committing resources, the dredges would not have recovered as much oil as they did and their capabilities would not have become known. The proactive approach, however, sometimes created confusion and tension with Exxon and the Coast Guard and within the Corps of Engineers itself, and it placed added strain on field personnel.

In addition, there was an element of risk in pushing for missions before the Corps was fully prepared.

Because of the urgency of the situation in Alaska, at DOD's request, Corps officials sent the dredges before the issues of command and control, funding, and authority could be resolved. In the future decision makers must clarify the authority and funding issues beforehand to avoid the confusion and the reimbursement problems that the Corps experienced. Before committing resources and personnel, they must define the command structure and mission as much as possible so that personnel in the headquarters and the field know exactly what is expected of them. The Alaska experience revealed a need to construct new response relationships, command and control channels, and communications channels, but this should not be done during the tension and frenzy of an actual response. The Corps not only needs to establish agreements with other agencies but also needs to develop its own standard operating procedures for how orders are given, how to mobilize, and how to equip the dredges.

General Hatch observed that the Corps can make its greatest contribution as part of a federal response team, providing its dredges, skimmers, contracting capabilities, and other resources. There should be comprehensive plans to respond that put all appropriate talent from federal agencies and the private sector under the control of one responsible party. Any proposed Corps standard operating procedures, he added, should be subordinated to the overall operational control of some other agency. The Corps task, he concluded, was "to press within the bounds of propriety for the preparation of regional response plans, to be a very proactive supporter of those plans, and to be prepared to execute any role that we might have emerging therefrom."[2]

Despite some confusion, the Corps responded well. Colonel Kakel and his staff handled a steady stream of visitors and provided valuable support to other Districts, North Pacific Division, Corps laboratories, headquarters, and the dredges. General Stevens praised Colonel Kakel and his staff for their diplomatic approach and for demonstrating a "team effort" unmatched by other agencies. General Smith observed that Kakel and his staff played an important role in helping the Defense Department "make wise support decisions." Perhaps

John Elmore expressed the sentiment best when he explained that occasionally a single District or Division gets the opportunity to "carry the flag" for the Corps of Engineers, and in this instance Alaska District carried the flag well.[3]

The dredge crews have been called the "heroes" of the Corps' oil spill operations. They went to Alaska without understanding what they were to do and with no experience in an oil recovery mission and within days became key players. Their initiative and innovation led to the recovery of significant amounts of oil. "Inside of a week," Colonel Wilson concluded, "they were probably one of the most effective assets we had out there for really bringing in large amounts of free floating oil." General McInerney observed that the *Yaquina* crew "acquitted themselves admirably and were superb representatives of DOD." "The *Yaquina*," he added, "quickly became a valued asset in the oil spill cleanup and earned the respect and admiration of the Federal On-Scene Coordinator and Exxon officials."[4]

Hatch and Page also praised the dredge masters and crews for their innovativeness and dedication. "It is this caliber of extraordinary performance in the face of unknown and severe conditions," Page wrote, "that contributes to the Corps' outstanding reputation." Dredge captain Miguel Jimenez aptly asserted that the dredges set a new standard for the oil recovery industry. "The dredge has proven its capability to be used in an oil spill scenario," he wrote. "Given proper air support, at least one sea skimming boom with craft for towing and being deployed at the earliest possible time, the dredges are without equal."[5]

The Alaska experience provided ample evidence that the Army and the Corps can make substantial contributions in future oil spills and that the Corps should be involved in response planning. The number of major oil spills that have occurred since the *Exxon Valdez* is appallingly large (see Appendix I), and inevitably there will be more in the future. Perhaps a greater tragedy than the Alaska spill itself would be for the Corps and other agencies to fail to use their experience to develop more effective procedures and relationships and better response capabilities.

Epilogue

The *Exxon Valdez* spill was 265 times larger than the average spill that the Coast Guard deals with on a day-to-day basis and occurred in one of the most remote areas of the United States. The capability to respond adequately to a spill of that magnitude in that place simply did not exist. Prince William Sound was an area with a potential for a large spill, but there was a feeling that it would not happen at Valdez. Valdez had roughly nine thousand ship transits during its fourteen years of operation. Eight to nine billion gallons of oil had been shipped out, and the largest spill prior to 1989 was 2,000 gallons which occurred at the dock. Thus the reaction to the 24 March spill was one of disbelief. In discussing the complacency of Alaska, Exxon, the federal government, Congress, and the state of Alaska, Governor Cowper compared it to a nuclear attack — everyone realizes that it is possible, but it is not very likely, so they divert their attention to more pressing problems.[1] The General Accounting Office called the response "inadequate" and indicated that the *Exxon Valdez* and other recent oil spills had raised concern about the capability of current oil containment and recovery technology.[2]

As a result of the Alaska spill, the Coast Guard has taken certain initiatives. It is currently trying to define better the organization that the federal government should put in place in a catastrophic spill and the role not only of the Coast Guard but of other agencies. The Coast Guard had memorandums of understanding in place with the Navy that helped provide much of the equipment that Exxon requested. It is now in the process of reviewing its agreements with other agencies and revising some. Coast Guard officials plan to clarify their new relationship with DOMS.

In addition, the Coast Guard is evaluating both its existing worldwide pollution response equipment and new

equipment and techniques that are available and its strike team's adequacy. It is developing legislative proposals on merchant vessel personnel; reviewing all national, regional, and local contingency plans; and studying the need for additional authorities under the Clean Water Act and the Port and Tanker Safety Act. The Coast Guard hopes to establish a "workable disaster management type super response mechanism" for use in other catastrophic spills.[3] USCG officials would like more authority to direct the activities of the spiller without federalizing the cleanup.

The Coast Guard has also stepped up its effort in oil spill research and development. After the *Argo Merchant*, *Torrey Canyon*, and *Amoco Cadiz* spills, interest in cleanup technology increased. Between 1972 and 1984, the Coast Guard spent roughly $68 million a year on oil spill research and development. Other agencies also spent significant amounts. After 1984, however, interest in research and development declined and the Coast Guard's research and development budget dropped to $4–$8 million a year. The *Exxon Valdez* spill sparked renewed interest, and the Coast Guard research and development budget climbed to $150 million in fiscal 1989.[4]

On 26–27 September 1989 the Coast Guard sponsored an interagency planning workshop on oil spill research and development at the University of Connecticut campus in Groton. Thirty-six participants from government and private industry met to exchange information, strengthen working relationships, and initiate the development of a coordinated national plan for oil spill research and development. William Rushing from the Research and Development Directorate represented the Corps, and because DOD sent no representative, he unofficially served in that capacity as well. Secretary Skinner directed the Coast Guard and representatives from other federal agencies to develop a document on federal plans for future research and development. The draft document, which includes Corps items, will be finalized in 1991 and submitted to Congress. A Department of Transportation research and development committee was created to coordinate research among agencies and present a plan to Secretary Skinner. Rushing is the Corps' representative on that committee.

The Alaska operations have led to reassessment and planning not only by the Coast Guard but also by the Corps. Corps officials, support staff, and the dredge crews have made recommendations to improve the effectiveness of the dredges. They first emphasized the need for an early decision by HQUSACE to get the dredges to the oil quickly before it is widely dispersed and weathered (though not so quickly that there is still a risk of explosion from the volatiles left in the oil). In addition, the Alaska operations illustrated that reconnaissance capability is essential to keep auxiliary vessels from wandering aimlessly. Corps personnel recommended that the Corps get certification for the helipad on the *Essayons* and that operators use a coordinate system to direct the dredges. They also suggested that booms and a barge be dedicated exclusively to the Corps dredge, as well as a fishing vessel or two to put out the boom.

The dredges also need to have the proper equipment. The Corps should purchase 84-inch containment booms and cold weather suits that it could put on-board if needed. Oil recovery equipment could either be carried on the dredges or stored in centralized warehouses. Carrying the equipment on the dredges might create problems because of space limitations and might result in a vessel that is capable of doing a little of everything but nothing well. Some officials recommend storing 84-inch booms and pumps in centralized locations on each coast. Furthermore, if the Corps brought all the equipment and stored it, someone would still need to exercise it and make sure that it was the kind that was needed. Different types of spills require different equipment, and the Corps should have the flexibility to go to various vendors to get what it needs. Rather than actually purchasing and storing equipment, the Corps could keep a list of vendors/suppliers that it could call or have a memorandum of understanding with the Coast Guard or Air Force to fly equipment for the Corps with two to four hours notice.

Finally, the Corps needs to develop better off-loading procedures, including perhaps a way to put the oil through the dragarms directly into a barge, bypassing the hopper completely. The Corps is presently studying ways to retrofit the dredges to make them more effective at recovering oil. The Marine Design Center has a major role in this feasibility study. The Corps, however, has no legislative

authority to make changes to the dredges, only to study them.[6]

It is cheaper and environmentally safer to catch the oil while it is on the water than after it reaches shore. The Corps has available four government-owned dredges and fifteen industry dredges that are part of the reserve fleet that represents the potential for quick response in most areas of the nation. All Corps minimum fleet dredges and industry hopper dredges are monitored for their location on a weekly basis. The large hopper dredges are usually within four days sailing time of any area of the continental United States.

In addition to the efforts to improve the dredges' effectiveness, CRREL continues its remote sensing activities. CRREL has processed the Innotech MEIS-II multispectral, Landsat Thermatic Mapper, and certain NOAA data and demonstrated the usefulness of its equipment. Without ground verification it has not been possible to determine explicitly what the various image segments are showing. To gain some criteria for interpreting the Innotech data, CRREL had Alaska District send some oil samples to the Engineer Topographical Laboratory for spectral analysis, and CRREL completed some basic spectral measurements for oil, oil contaminated soil (simulating beach sands), and uncontaminated soils. That data indicates that detecting oil contaminated beaches will not be straightforward because oil seeps into the soil and the spectral signature becomes a mix. CRREL also sent an analyst to Prince William Sound to make spectral measurements on the beaches. She visited the University of Alaska, studied the image data there, and brought back additional samples of crude so that CRREL could do spectral analyses.

With additional resources devoted to the remote sensing program, CRREL expects to refine the Corps' remote sensing capability in 1991. Although it is too late for the *Exxon Valdez* spill, the work will provide the Corps with a greater response capability in the future. One ongoing CRREL project seeks to define a practical and optimum package for remote sensing of oil spills. The goal of the second project is to develop data recording and rapid data management techniques to exploit remote sensing for emergency operations.[7]

Although the planning and research efforts of the Coast Guard, the Corps, and other agencies are promising, Coast

Guard officials and others warn that there is no panacea, no simple method that will greatly improve our capability to clean up a spill. Rather, USCG Captain Richard Larrabee noted, "We continue to stress the area of prevention as the primary means of dealing with oil spills such as the *Exxon Valdez*."[8] After studying the Alaska operations, GAO analysts also concluded that the nation's limited ability to deal with large spills such as the *Exxon Valdez* indicated a need for greater emphasis on prevention.[9]

Notes

Unless otherwise noted, all records cited below are located in the Research Collections of the Office of History, U.S. Army Corps of Engineers, Fort Belvoir, Virginia.

I. Grounding and Early Response

1. *Anchorage (Alaska) Daily News*, 25 Apr. 1989; NPA *Oil Spill Special Edition*, vol. 13, no. 1, Jan. 1990, p. 2, hereafter cited as NPA Special Edition Newspaper; "The Exxon Valdez Oil Spill: A Report to the President from Samuel K. Skinner and William K. Reilly, May 1989," National Response Team, appendix, pp. 1–5; NPA, POLREP #2, 9 Apr. 1989; U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, Hearing, *Topics Concerning the Exxon Valdez Oil Spill into the Prince William Sound of Alaska*, 101st Cong., 1st sess., 6 Apr. 1989, pp. 132–35.

2. U.S. Congress, Senate, Committee on Commerce, Science, and Transportation, Hearing, *Exxon Valdez Oil Spill and Its Environmental and Maritime Implications*, 101st Cong., 1st sess., 6 Apr. 1989, p. 5.

3. U.S. Coast Guard, "Situation Three: Environmental Emergencies, The National Response System," n.d.

4. Joseph Pratt, "The Corps of Engineers and the Oil Pollution Act of 1924," unpublished manuscript, Office of History, U.S. Army Corps of Engineers.

5. USCG, "Situation Three."

II. Department of Defense/ Corps of Engineers Response

1. Interview with Capt. Richard Larrabee, USCG, USCG Headquarters, Washington, DC, 30 Mar. 1990. All interviews cited herein were conducted by the author. "The Exxon Valdez Oil Spill: A Report to the President from Samuel K. Skinner and William K. Reilly, May 1989," National Response Team.

2. House, Subcomm. on Coast Guard and Navigation, *Exxon Valdez Oil Spill*, 101st Cong., 1st sess., pp. 19, 22.

3. Ibid., pp. 22–23, 62.

4. Senate, Comm. on Commerce, Science, and Transportation, *Exxon Valdez Oil Spill*, 101st Cong., 1st sess., pp. 20, 24, 29–30, 33, 71.

5. Interview with Maj. Gen. James D. Smith, DOMS, Pentagon, Washington, DC, 17 Dec. 1989; interview with Lt. Gen. Henry J. Hatch, HQUSACE, Washington, DC, 6 July 1990.

6. Interview with ASA/CW Robert W. Page, Pentagon, 5 Dec. 1989; interview with John Elmore, HQUSACE, 28 Sept. 1989; interview with Brig. Gen. Patrick Stevens, NPD, Portland, OR, 19 June 1989; Lt. Gen. Henry J. Hatch, "Our Vision," n.d.; Lt. Gen. Henry J. Hatch, "Beyond the Battlefield: The Other Dimension of Military Service," 1989 Kermit Roosevelt Lecture, n.d.; Hatch interview.

7. Interview with Maj. Gen. Patrick Kelly, HQUSACE, 8 Feb. 1990; Smith interview; Page interview.

8. Memorandum for the Secretary of Defense from David S. Addington, 6 Apr. 1990, in Initial Information Memorandum, DOMS.

9. Smith interview.

10. Kelly interview; Smith interview.

11. Smith interview.

12. "Script for Secretary of Defense Briefing Revised 31 March."

13. Smith interview.

14. Interview with Col. Thomas Wilson, AK–JTF, Elmendorf AFB, Anchorage, AK, 15 June 1989.

15. Information Memorandum #69, 28 Sept. 1989, DOMS; ibid. #2, 10 Apr. 1989; interview with Col. William Kakel, NPA, Anchorage, AK, 13 June 1989.

16. Page interview; Kelly interview; Smith interview.

17. Kakel interview; RRT Report #58; OSC PWS POLREP #32, 9 Apr. 1989; Stevens interview; interview with Paul Zepernick, NPD, 24 June 1989.

18. Smith interview; Kelly interview; Elmore interview.

19. Interview with James Reese, NPD, 20 June 1989.

20. Reese interview; Wilson interview; Smith interview.

21. Information Memorandum #2, 10 Apr. 1989, DOMS.

22. JTF–AK, Information Memorandum: Findings and Recommendations of DOD Assessment Team, 20 Apr. 1989; Reese interview; Elmore interview.

23. NPA POLREP #4, 11 Apr. 1989; Information Memorandum #5, 13 Apr. 1989, DOMS.

24. USCG HQ Telecommunications, 11 Apr. 1989, EOC #88; Memorandum, Col. Morton J. Plumb, USAF, Director of Joint Operations, JTF to DOMS, 10 Apr. 1989, in JTF SITREP #2, 10 Apr. 1989; Report to Brig. Gen. Stevens from NPA, 1 May 1989, NPA EOC #55/56.

25. Wilson interview; interview with Kirk Shadrick, NPA, 12 June 1989.

26. Reese interview.

27. NPA POLREP #8, 15 Apr. 1989; ibid. #8, 15 Apr. 1989.

28. Commander McInerney JTF–AK to OAS/DAMO–ODS (Office of the Secretary of the Army/Operations Readiness and Mobilization Directorate–Operations and Contingency Plans Divisions), Information Memorandum: Findings and Recommendations of DOD Assessment Team, 20 Apr. 1989, DOMS.

29. Information Memorandum #8, 18 Apr. 1989, DOMS.

30. Ibid. #40, 2 June 1989; ibid. #69, 28 Sept. 1989.

31. Memorandum for Director of Military Support from Capt. Paul A. Cassiman, USN, 10 Apr. 1989, in Information Memorandum #5; NPA Special Edition Newspaper; U.S. Congress, House, Committee on Public Works and Transportation, Subcommittee on Investigations and Oversight, Hearing, *National Oil Spill Contingency Planning and Response Capabilities*, 101st Cong., 1st sess., 10 May 1989, p. 145; Information Memorandum #11, 21 Apr. 1989, DOMS.

32. *Anchorage (Alaska) Times*, 28 Apr. 1989; Information Memorandum #69; ibid. #20, 4 May 1989.

III. Growing Corps of Engineers Involvement

1. Notes from conversation with Arthur K. Hurme, HQ-USACE, 6 Sept. 1989; interview with Robert Hopman, NPD, 4 Aug. 1989.

2. ASA/CW to TAG AK Anchorage, Sen. Stevens, Sen. Murkowski, Rep. Young, Gov. Cowper, 29 Mar. 1989, EOC #70; ASA/CW to EPA, DOI, Secretary of Transportation, FEMA, 29 Mar. 1989, ibid.; Page interview.

3. CECW–D (HQUSACE, Directorate of Civil Works, Dredging Division), Memorandum for the Commander, NPD, 30 Mar. 1989, NPD.

4. Interview with Charles Puch and Ronald Henry, 14 June 1989; Brig. Gen. Stevens, Memorandum for CECW–ZA (HQUSACE, Director, Civil Works), 3 Apr. 1989, NPD.

5. "Preparations for Alaska Oil Spill Recovery Mission," 24 Mar.–10 Apr. 1989, NPD; videotape, "Dredge *Yaquina*"; interview with Leroy Johnson, NPP, Portland, OR, 21 June 1989.

6. Smith interview; Page interview; Stevens interview.

7. Smith interview; interview with Vice Adm. Clyde E. Robbins, USCG, Coast Guard Island, Alameda, CA, 17 Apr. 1990.

8. Elmore interview.

9. Kakel interview.

10. Stevens interview; Kakel interview; NPA, "After Action Report Review and Analysis: Alaska 1989 Oil Spill," pp. 5–6, #33.

11. Message, DOMS JTF to CDRUSACE, 11 Apr. 1989, EOC #79; Message #273, Chuck Hummer to Ken and Jake, 11 Apr. 1989, NPA EOC I–541; NPA POLREP #4, 11 Apr. 1989.

12. NPP SITREP #3, 11 Apr. 1989, EOC #76; NPP, Public Affairs Office, *Task Force Castle*, Onboard the *Yaquina*; Sunday April 16, memorandum, Ken Patterson, Chief, Navigation Branch for Master, *Yaquina*, 14 Apr. 1989.

13. CECW–D, (Chuck Hummer) memorandum to NPP, 11 Apr. 1989, NPA EOC I–932; message #267, reply from Patterson, 11 Apr. 1989, ibid.

14. Message, CDRUSACE (Larry Kissell) to CDR NPD, 13 Apr. 1989, NPA EOC I–220; message CECW–EOC (Larry Kissell) to CDR NPD, 14 Apr. 1989; message, DOMS to CDRUSACE, 14 Apr. 1989, HQ EOC #250.

15. Elmore interview; NPP SITREP #8, 14 Apr. 1989.

16. O. R. Harrison to Adm. Yost, 15 Apr. 1989, NPA EOC I–690.

17. "Warsila Builds Special Purpose Dredges for USSR," *World Dredging and Marine Construction*, Oct. 1986, pp. 18–23.

18. Message, Capt. Kevin Brice to George Kona, 16 Apr. 1989, NPP; NPP SITREP #9, 15 Apr. 1989, EOC #160; interview with Capt. Kevin Brice, 12 June 1989, Anchorage, AK; memorandum, Bob Hopman to Paul Zepernick, Jake Schmidt, Gen. Stevens, 18 Apr. 1989, NPD.

19. Message, USCG Marine Safety Office, Valdez/FOSC to RUEADAD/DOMS JTF, 17 Apr. 1989, EOC #171.

20. HQ EOC tasker to CECW–D, 18 Apr. 1989, EOC #207; Kelly interview; Chuck Hummer memorandum, 21 Apr. 1989.

21. Message, DOMS to MSO Valdez/FOSC, 18 Apr. 1989, EOC #189.

22. Message, Brice to Ted Hunt, 17 Apr. 1989, NPD.

23. Chuck Hummer Memorandum, 21 Apr. 1989; message, USCG Marine Safety Office, Valdez to AIG Nine Nine One, 18 Apr. 1989, EOC #197; interview with Capt. Miguel Jimenez, Portland, OR, 20 June 1989; Brice interview.

24. *Task Force Castle*, April 19, Onboard the *Yaquina*; Brice interview; Kelly interview; Shadrick interview.

25. Message, DOMS to CDRUSACE, 19 Apr. 1989, EOC #250; NPA POLREP #13, 20 Apr. 1989; Brice interview.

26. See *Task Force Castle*, 19 and 20 Apr. 1989, Onboard the *Yaquina*, pp. 12–13.
27. Ibid.
28. Elmore interview; Kelly interview; Smith interview.
29. Information Memorandum #14, 26 Apr. 1989, DOMS; ibid. #19, 3 May 1989; Elmore interview; Kelly interview.
30. Elmore interview; interview with Commanders David B. Pascoe and Robert Luchen, USCG Headquarters, Washington, DC, 30 Mar. 1990.
31. Message, DOMS JTF to AK JTF, 22 Apr. 1989, NPA EOC I–795; Report to Brig. Gen. Stevens from NPA, 2 May 1989, NPA EOC I–56–57.
32. Elmore interview; Stevens interview; interview with George Zeiler, NPD, 22 June 1989; NPA EOC to Stevens, n.d., NPA EOC I–839; NPA, After Action Report, p. 18.
33. NPA, After Action Report, pp. 16–17; Shadrick interview; NPA Special Edition Newspaper.
34. Message, Zeiler to Elmore, 10 May 1989; Memorandum, George J. Zeiler to CDR NPA, 12 May 1989, NPA EOC I–256; Reese interview.
35. Elmore interview; Stevens interview.

IV. Command and Control/Communications

1. Robbins interview; USCG videotape, "*Exxon Valdez* Oil Spill: The First Forty Days."
2. Robbins interview; Pascoe/Luchen interview.
3. Robbins interview.
4. Ibid.
5. Ibid.
6. Ibid.
7. Ibid.
8. Smith interview.
9. Robbins interview.
10. Robbins interview; Pascoe/Luchen interview; Wilson interview.
11. Robbins interview.
12. Smith interview.
13. Stevens interview; Kakel interview.
14. Kelly interview; Stevens interview.
15. Kelly interview; interview with Richard Gutleber, NPA, Anchorage, AK, 13 June 1989; Shadrick interview.
16. Kelly interview; Kakel interview; NPA, "After Action Report," p. 52.

17. Brice interview; interview with Eric Braun, NPP, Portland, OR, 21 June 1989; Kakel interview; NPA, "After Action Report," p. 51.

18. Robbins interview.

19. Brice interview.

20. Interview with Robert Fletcher, HQUSACE, 2 Mar. 1990.

21. Ibid.

22. Wilson interview.

23. Bob Brewin, "Military Network Takes Lead in Oil Spill Response," *Federal Computer Weekly*, 24 Apr. 1989; Information Memorandum #10, 20 Apr. 1989, DOMS; CG CC Incident Memo. #32, 30 Apr. 1989.

24. HQUSACE EOC SITREP #7, 18 Apr. 1989; *Anchorage Daily News*, 27 Apr. 1989.

25. Information Memorandum #7, 17 Apr. 1989, DOMS; Smith interview; Wilson interview.

26. Ibid.

27. Stevens interview; Gutleber interview; NPA, "After Action Report," p. 47.

28. Shadrick interview.

29. NPA Special Edition Newspaper; NPA, "After Action Report," p. 40.

V. Corps Dredges Operations

1. NPA, "After Action Report," pp. 26, 42; Johnson interview; Brice interview; *EnginEars*, May 1989.

2. Brice interview; Shadrick interview; Elmore interview; Kakel interview.

3. Kakel interview; Braun interview.

4. Braun interview; Brice interview.

5. NPA, "After Action Report," pp. 25–26.

6. Ibid., p. 32; memorandum, NPA EOC to Col. Plum, JTF, 23 Apr. 1989, NPA EOC I–781.

7. "Weathering of Crude Oil," 12 Apr. 1989, EOC #97; "Oil Spills," *Science*, vol. 244, no. 4905, 12 May 1989, p. 629.

8. Miguel Jimenez, Memorandum For Record, "Report on the Recovering and Discharging Methodology United States Army Corps of Engineers Dredge Yaquina," 3 May 1989.

9. Ibid.; Jimenez interview.

10. Ibid.

11. *International Dredging Review*, vol. 8, no. 6, June 1989, p. 7.

12. *EnginEars*, May 1989; *Pentagram*, "Corps of Engineers Helps Clean Up Alaska Spill," 4 May 1989.

13. Miguel Jimenez, "Memorandum of Improving Hopper Dredge Production When Used in Surface Contaminant Recovery," 18 May 1989.

14. "Warsila Builds Special Purpose Dredge for USSR," *World Dreding and Marine Construction*, Oct. 1986, pp. 18–23.

15. Kakel interview; Robbins interview; Brice interview.

16. Kakel interview; Robbins interview; Brice interview; Braun interview.

17. NPA POLREP #18, 25 Apr. 1989; Brice interview; conversation with Neil Neihburg, 20 June 1989.

18. Jimenez, "Memorandum of Change of Ullage Methodology," 23 Apr. 1989; Jimenez, Memorandum, 18 May 1989.

19. NPA, "After Action Report," pp. 38, 45.

20. Jimenez, Memorandum, 18 May 1989.

21. Message, FOSC to AIG Four Nine Nine One, 27 Apr. 1989, HQ EOC #340; Jimenez, MFR, 3 May 1989.

22. Johnson interview; Puch/Henry interview; Daily Report for MSO Valdez, *Yaquina*, 14 May 1989; Jimenez interview; Jimenez, Memorandum, 18 May 1989.

23. Daily Report for MSO Valdez, *Yaquina*, 12 May 1989; NPA, "After Action Report," p. 12; Jimenez interview; Brice interview.

24. Conversation with Neihburg; *International Dredging Review*, vol. 8, no. 6, June 1989, p. 6.

25. Daily Report for MSO Valdez, *Yaquina*, 17 May 1989.

26. Jimenez, Memorandum, 18 May 1989.

27. Memorandum, Col. Jouni Keravouri, DOD JTF, for CDR Corps, 26 May 1989.

28. NPD, *Nor'wester*, vol. 12, no. 3, July 1989.

29. Kakel interview; memorandum, Col. Kakel for CDR JTF–AK, 17 May 1989; M. J. Friesenhahn, Exxon Co., to FOSC, 22 May 1989.

30. Daily Report for MSO Valdez, *Essayons*, 26 June 1989; ibid., 28 June 1989.

31. Puch/Henry interview; Carpenter to Capt. J. G. Schmidtman, 17 June 1989, USCG; NPA POLREP #66, 20 July 1989.

32. Secretary Marsh to CDRUSACE, 13 June 1989, EOC #689.

VI. Shoreline Cleanup

1. Message, CG MSO Valdez to ZEN/CCGD Seventeen, Juneau, 8 Apr. 1979, EOC #55.

2. Robbins interview.

3. Message, CG FOSC and AIG Four Nine Nine One, 2 May 1989, EOC #430.

4. Dennis Kelso to Adm. Yost, 4 May 1989, NPA EOC I–260.

5. *Anchorage (Alaska) Times*, 3 May 1989; Vice Adm. Clyde E. Robbins to Otto Harrison, 9 May 1989, NPA EOC I–260; *New York Times*, 11 May 1989.

6. Robbins interview.

7. Message, FOSC to AIG Four Nine Nine One, 21 May 1989; message, CDR Luchen to Corps 1, 24 May 1989, NPA EOC I–899.

8. Frank N. Schubert, "The *Amoco Cadiz* Cleanup," Office of History, HQUSACE; Rudolph Chelminski, *Superwreck, Amoco Cadiz: The Shipwreck That Had to Happen* (New York: William Morrow and Company, Inc., 1987), p. 155.

9. *Anchorage (Alaska) Daily News*, 23 April, 4 May, 13 May 1989.

10. Ibid.

11. Message, FOSC to JTF, 25 May 1989, NPA EOC I–387; Information Memorandum #69, 28 Sept. 1989, DOMS.

VII. Research and Development

1. WES Fact Sheet, "Effectiveness of Cleanup Methods," n.d.; Elena B. Sparrow and Stephen D. Sparrow, "An Oil Spill Study Ten Years Later," *Agroborealis*, vol. 21, no. 1, Jan. 1989; CRREL Fact Sheet.

2. Robert Oswald to CDR and Director, CRREL, n.d.; memorandum, Lewis E. Link to CECW–O, 11 Apr. 1989, EOC #112; oil spill briefings, EOC HQUSACE, 11 Apr. 1989 and 27 Apr. 1989.

3. Lewis E. Link, Memorandum for CERD–ZA (Robert Oswald), 8 May 1989.

4. Message, CECRL–CD–TR (CRREL Counsel) to CERD–C1 (HQUSACE Research and Development Directorate), 28 Apr. 1989; interview with William Rushing, HQUSACE, 16 Mar. 1990.

5. Message, DOMS to USACE, 27 Apr. 1989, EOC #342.

6. Message, CECRL–PP to CERD–C1, 28 Apr. 1989, Research and Development Directorate, HQUSACE.

7. Message, CECRL–TD (Lewis E. Link) to CECRL–PP, 4 May 1989; message, Joe to Greg, 5 May 1989.

8. Shadrick interview; Kakel interview; message, Joe to Greg, 4 May 1989.

9. Shadrick interview.

10. Pete Kirby and Ray Montgomery, Memorandum For Record, 16 May 1989; Jacob F. Redlinger and James R. Reese, Memorandum thru Chief, CENPD–CO–C for Division Commander, 11 May 1989.

11. Reese interview; conversation with Ray Montgomery, WES, 31 May 1989; Kakel interview; Rushing interview.

12. Reese, Memorandum for Chief, CENPD–PL–ER, 26 Nov. 90.

13. Kirby and Montgomery, MFR, 16 May 1989; Reese and Redlinger memorandum, 11 May 1989; *Clarion (Mississippi) Ledger*, 18 May 1989; *Vicksburg (Mississippi) Evening Post*, 18 May 1989.

14. Kakel interview; Kelly interview.

15. Memorandum, Maj. Gen. J. D. Smith to Lt. Gen. McInerney, 10 May 1989, NPA EOC I–209; message, McInerney to Vice Adm. Clyde E. Robbins, 16 May 1989, EOC #559; memorandum, Col. Keravuori, Chief, DOD–JTF for CDR US Corps (EOC), 26 May 1989, EOC #613.

16. Memorandum for CDR, USACE, Daily Staff Journal, 26 Apr. 1989.

17. Lewis E. Link, Memorandum for CDR USACE (William Rushing), n.d.

18. Memorandum for CDR, USACE, Daily Staff Journal, 26 Apr. 1989; James R. Hanchey, Memorandum for the Director of Civil Works, 18 May 1989; *Tech–Tran*, vol. 14, no. 3, summer 1989.

19. Fact Sheet, 24 Apr. 1989, WES; U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, Hearings on H. R. 2158, *To Provide Better Maritime Safety For Prince William Sound, Alaska, and For Other Purposes*, 101st Cong., 1st Sess., 11 May 1989, pp. 97–109.

20. William Rushing, Memorandum for Record, 15 Apr. 1989, R&D.

21. Rushing, Fact Sheet, 24 Apr. 1989, WES.

22. Information Paper, "Bioremediation of the Alaska Oil Spill," EOC SITREP #27, 16 May 1989.

VIII. Funding and Reimbursement

1. Hatch interview; notes from conversation with Lester Edelman, HQUSACE, 14 Sept. 1990; message, DOMS–JTF to Commandant USCG, 15 May 1989, EOC #543.

2. Interview with Dale Ringer, HQUSACE, 1 Sept. 1989.

3. General Accounting Office, "Federal Costs Resulting From the *Exxon Valdez* Oil Spill," Jan. 1990, p. 19.

4. E. Scott Chronister, Memorandum for John Elmore, 8 Apr. 1989, EOC #37.

5. Ringer interview; CERM–B (Bronel Jennell), Information Paper, 11 May 1989.

6. Lt. Col. Roy Carlson, Memorandum for CDR, USACE, 11 Apr. 1989, EOC #77; POLREP #12, 19 Apr. 1989.

7. Message, DOMS JTF to RUEADWD/DIRMILSPT DCSOPS, etc., 13 Apr. 1989, EOC #167; Ringer interview.

8. Ringer interview.

9. Memorandum, CENPD–RM–B (Tim Hiller) to Brig. Gen. Stevens, 26 Apr. 1989.

10. Message, HQUSACE to NPP, NPD, and other field offices, 1 May 1989.

11. Message, DOMS–JTF to Commandant USCG, 15 May 1989, EOC #543; memorandum, John F. Wallace, Director Resource Management, to Michael Melburne, Director of Financial Management, DOD, 4 Aug. 1989, RM.

12. Phone conversation, Capt. Anderson with Tim Hiller, NPD, 14 July 1989, copy of phone log in records of Resource Management, HQUSACE.

13. GAO, "Federal Costs Resulting from the Exxon Valdez Oil Spill," pp. 2–3. 23–24.

Conclusion

1. Kakel interview; Robbins interview; Stevens interview; Elmore interview.

2. Hatch interview.

3. Smith interview; Stevens interview; Elmore interview.

4. Wilson interview; message, Lt. Gen. Thomas G. McInerney to CDR NPP, 13 June 1989, NPA EOC I–531.

5. Robert W. Page to Lt. Gen. Henry J. Hatch, 8 June 1989, NPA EOC I–945; notes from conversation with Capt. Miguel Jimenez, 20 June 1989; Jimenez, MFR, 3 May 1989.

Epilogue

1. Larrabee interview; U.S. Congress, Senate, Subcommittee on Environmental Protection, Hearing, *Adequacy and Effectiveness of the Oilspill Cleanup in Prince William Sound, Alaska,* 101st Cong., 1st sess., 19 Apr. 1989, p. 46.

2. GAO, "Adequacy of Preparation and Response to *Exxon Valdez* Oil Spill," Oct. 1989, p. 1.

3. Larrabee interview; U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, Hearings on H.R. 2158, *Prince William Sound Oil Spill Response Act,* 101st Cong., 1st sess., 11 May 1989, p. 5.

4. Larrabee interview.

5. "Interagency Planning Workshop: Oil Spill Research and Development, Report of the Workshop Conducted September 26–27, 1989, Coast Guard Research and Development Center, Groton, Connecticut," Revised 1990; interview with William Rushing, HQUSACE, 16 Mar. 1990.

6. Kakel interview; Wilson interview; Shadrick interview; Johnson interview; Jimenez conversation; Brice interview.

7. Lewis E. Link, Memorandum for CDR USACE (William Rushing), n.d.; Rushing interview.

8. Larrabee interview.

9. GAO, "Response to *Exxon Valdez* Oil Spill," p. 1.

Index

A

Addington, David S.: 15, 26, 45
Aerial reconnaissance: 68, 73, 95, 96, 99, 100, 117
Air vacuum pumps: 76
Alaska, Gulf of: 3, 6, 7, 11, 36, 38
Alaska, state of: 25, 84, 85, 86; Department of Environmental Conservation, 52, 62, 84, 87
Alaska Air Command: 19, 27, 60, 61
Alaska Command and Control Military Automated Network (ACCMAN): 60
Alaska District (NPA): 19, 22, 23, 34, 45, 46–47, 55, 56, 57, 61, 65, 66, 67, 86, 94, 97, 98, 99, 105, 113; Emergency Operations Center, 20–21, 56, 61, 63, 64, 74–75, 105
Alaska Joint Task Force: 18, 19, 21, 22, 24, 25, 34, 37, 45, 54–55, 56, 61, 66, 67, 79, 86, 95–96, 99, 105, 107, 108
Alaska Oil Spill Multi-Agency Coordination group: 71
Alyeska Pipeline Service Company: 3, 4, 5, 6
Amoco Cadiz oil spill: 69, 88–90, 91, 116
Anchorage Daily News: 61

B

Baker, Rear Adm. Edward B.: 19
Barges: 26, 75, 78
Berthing ships: 26, 28, 29, 34, 37, 83, 87
Biologists: 36
Bioremediation: 101–102
Bligh Island: 4, 6
Breeden, Richard: 14, 15, 26, 45, 62
Brice, Capt. Kevin: 36, 38, 39, 40, 41, 42, 57, 58, 79, 80; *photo*, 89
Brown, Hugh: 100
Burning of spilled oil: 6–7, 11
Bush, George: 12, 15, 16, 17, 19, 49, 61, 71, 93

C

Carlson, Lt. Col. Roy: 105; *photo*, 22
Carter, Tom: 23
Centrifugal pumps: 77
ChemPro Environmental Services: 35

Cheney, Richard: 14, 15, 16, 17, 34, 44, 54, 62, 106
Chucagh Alaska Native Corporations: 84
Civil Works Remote Sensing Research Program: 94
Clean Air Act: 84
Clean Water Act (Federal Water Pollution Control Act): 7, 8, 84, 103, 116; 311(k) revolving fund, 39, 104, 106, 108, 109
Coastal Zone Management Act: 84
Cold Regions Research and Engineering Laboratory (CRREL): 93, 94, 95–96, 97, 99, 100, 101, 102, 106, 118
Communications: 25, 28, 58, 60–64, 109
Computers: 28, 60–64, 95–96, 99, 100–101
Containment booms: 5, 6, 7, 11, 27, 29, 30, 35, 37, 40, 42–43, 57–58, 61, 71, 72, 117; maintenance of, 69–70; *illus.*, 44
Contaminated materials, research on disposal of: 93
Contingency planning for oil spill response: 43–48
Contract workers: 15, 36, 91
Cordova, AK: 7, 24, 26
Cost accounting: 105–109
Cowan, Col. Charles A.: 36, 57, 80–81
Cowper, Steve: 6, 7, 12, 14, 31, 115
CRREL. *See* Cold Regions Research and Engineering Laboratory

D

Debris, problems with: 40, 70, 72, 75, 76, 77, 78–79
Destoil: 76
Director of Military Support (DOMS): 13, 15, 17, 21, 23, 24, 25, 26, 27, 34, 36, 37, 38, 39, 41, 45, 46, 53, 54, 55, 79, 96, 103, 105, 106, 107, 115; Joint Task Force, 17–18, 28, 30, 41, 46, 47, 53, 54, 64
Dispersants, use of: 6, 11
DOMS. *See* Director of Military Support
Doran, William J.: 22, 25
Dredges: 24, 25, 26, 30, 31–48, 65–81, 112, 113, 117–118; air supply support, 68; cleaning of, 79–81; command problems, 56– 58, 67; communications with, 63–64; costs, 105– 109; crew changes, 65–67; dragarm alterations, 40– 41, 70–71; problems off-loading oil, 75–78; reporting problems, 74–75; resupply operations, 65, 66, 67; tracking of, 61; use as boom ship, 43; use as command post, 40; use for skimming oil, 31, 69–72, 111; use for storage of oil, 39, 79; volume of oil collected, 73–74; *illus.*, 41, 42

E

Economy Act: 103, 104, 106, 108
Edelman, Lester: 103
Elmendorf Air Force Base: 18, 25, 26, 27, 53, 60, 96
Elmore, John P.: 21–22, 24, 25, 34, 37, 59, 66, 113; *photo*, 22
Environmental groups: 84
Environmental monitoring: 94
Essayons: 32–33, 36–37, 39, 41, 64, 65, 68, 71, 78, 79–81, 107, 117
Exxon: 3, 4, 6, 7, 11, 12, 13, 15, 19, 20, 21, 23, 25, 28, 33, 37, 38, 39, 40, 43, 44, 45, 46, 47, 51, 53, 54, 56, 57, 58, 60, 61, 62, 64, 66, 68, 72, 73, 75, 76, 77, 78, 79, 80, 83, 84, 85, 87, 88, 91, 95, 98, 99, 100, 104, 106, 107, 108, 111; plan for shoreline cleanup, 85–87, 97; reimbursements to federal agencies, 103–109
Exxon Baton Rouge: 6
Exxon San Francisco: *photo*, 5
Exxon Valdez: 3–4, 6, 7; *photo*, 5

F

Federal on-scene coordinator (FOSC): 19, 23, 36, 38, 39, 40, 43, 50, 51, 53, 54, 55, 64, 79, 83, 85, 88, 91, 100, 104, 106, 109. *See also* Rear Adm. Edward Nelson, Jr., and Vice Adm. Clyde E. Robbins
Federal Water Pollution Control Act. *See* Clean Water Act
Fish hatcheries: 7, 11, 25, 61, 84
Fishermen: 7, 11
Fishing boats: 40, 57–58, 64, 66
Fletcher, Robert: 59
Float planes: 65, 66, 67
FOSC. *See* Federal on-scene coordinator
Funding problems: 39, 54, 103–109, 112

G

Gallagher, John: 81
General Accounting Office: 108–109, 115, 119
Green Island: 6, 11, 85

H

Harrison, Otto R.: 37, 38, 86
Hartley, Michael: 59
Hatch, Lt. Gen. Henry J.: 14, 20, 112, 113
Hazelwood, Joseph: 4
Helicopters: 15, 24, 26, 28, 29, 30, 53, 54
Helipads: 15, 28, 29, 68, 117
Henry, Ron: 33, 81
Holcroft, Jimmy: 40
Homer, AK: 66, 67
Hopman, Robert J.: 22, 24, 25, 34, 38, 39, 40, 42
Hummer, Charles W.: 36, 39, 42, 66

Hunt, Ted: 39, 42
Hutto, Earl: 108
Hyde-Vac: 75

I
Incinerators: 51
Innotech, Ltd.: 95, 99, 100, 118
International Dredging Review: 71

J
Jimenez, Miguel: 42, 74, 75, 77, 80, 113
Johnson, Billy: 71
Johnson, Leroy: 33

K
Kakel, Col. William: 19, 20, 24, 34, 39, 41, 42, 45, 46, 47, 48, 55, 56, 57, 61, 66, 72, 73, 79, 80, 97, 98, 111, 112; *photo*, 22, 56
Kelly, Brig. Gen. Patrick J.: 14, 15, 16, 19, 20, 21, 31, 32, 33, 34, 36, 37, 39, 41, 44, 45, 55, 56, 59, 94, 97, 101, 111; *photo*, 56
Kelso, Dennis: 12, 86
Kirby, Conrad J.: 97, 99
Kirkendall, Dan: 101
Knight Island: 6, 11, 71

L
Lamoreaux, Bill: 62
Landing craft: 15, 26, 28, 29, 83
Landsat Thematic Mapper: 95, 100, 118
Larrabee, Capt. Richard: 118–119
Link, Lewis E., Jr.: 96
Luchen, Comdr. Robert: 53

M
McCall, Capt. Steve: 4, 49
McConnell, Guy: 23, 97
McGee, Peter: 87
McInerney, Lt. Gen. Thomas G.: 18, 19, 20, 23, 24, 25, 27, 33, 34, 37, 45, 47, 48, 52, 53, 54, 55, 60, 62, 65, 98, 99, 100, 106, 113
McKim, Harlan "Ike": 96, 97
Marine Design Center: 117
Marsh, John O., Jr.: 17, 44, 45, 62, 80, 106
MEDEVAC: 19, 24, 28, 29, 109
Media influence: 33, 49, 50, 51, 59
MEIS II: 95, 118
Military Airlift Command: 18, 28
Military airlift support: 28–29, 53
Montgomery, Ray: 97, 99
Mousse: 69, 76
Mullins, Merv: 21
Multispectral sensors: 94–95
Murkowski, Frank: 31

N
Naked Island: 6, 7, 91
National Historic Preservation Act: 84
National Marine Fisheries Service: 84
National Ocean Pollution Policy Board: 31
National Oceanic and Atmospheric Administration: 11, 84, 94, 100, 118

National Oil and Hazardous Substances Pollution Contingency Plan: 7–9, 50–51, 83, 111. *See also* Clean Water Act
National Response Team: 8, 9, 59
Nelson, Rear Adm. Edward, Jr.: 7, 12, 19, 24, 34, 49, 50, 85
North Pacific Division (NPD): 19–20, 22, 23, 31, 45, 46, 48, 55, 56, 63, 94, 97, 98, 105
NPA. *See* Alaska District
NPD. *See* North Pacific Division
NPP. *See* Portland District
Nyberg, Neal: 77

O

Occupational Safety and Health Administration: 51
Off-loading oil: 75–78, 117
Oil: assessment of spill, 24, 30; distribution of spill, 94–96, 101; problems locating spill, 67–68, 95; research on biodegradation of, 93, 101; solidification of, 74; viscosity, 35, 40, 73–74, 75, 76; volume collected, 72–74; weathering of, 68–69
Oil Pollution Control Act of 1924: 8
Oil Spill Computer Aided Response program (OSCAR): 60–64
Oil spill contingency barge: 5
Oil spill dispersion modeling: 94
ONTYME: 63
Oppenheimer, Carl H.: 101
Optical sensors: 95
Oswald, Robert: 94

P

Page, Robert W.: 14, 31, 94, 111, 113
Pascoe, Comdr. David: 45
Patterson, Ken: 33, 36
Photographers: 36, 71
Plumb, Col. Morton V.: 24
Political considerations: 23, 39, 50, 65, 73, 97, 98, 111
Port and Tanker Safety Act: 116
Portland District (NPP): 33, 34, 35, 37, 56, 57, 67, 71, 76, 80–81; Task Force Castle, 36
Pumps: 11, 32, 35, 39; problems with, 40, 70, 75–76

Q

Quayle, Dan: 91, 97, 98
Quinley, John: 71

R

Radio communications: 25, 58, 60, 63–64, 68
Redlinger, Jake: 48, 97, 98, 99
Reese, James R.: 22, 24, 48, 97, 98, 99
Regional Response Teams: 8–9, 21, 63
Reilly, William K.: 12, 13, 16, 26

Remote sensing: 68, 94–96, 99, 100, 102, 118
Robbins, Vice Adm. Clyde E.: 25, 34, 49, 50, 51, 52–53, 54, 57, 58, 84–87, 88, 100
Rushing, William R.: 101–102, 116

S

Safety issues: 36, 51, 54, 80, 98
Satellite radios: 28
Satellite sensors: 95–96
Seal pupping areas: 12, 84, 85, 91, 98
Seal Rock, AK: 37, 85, 97
Seward, AK: 26, 66
Shadrick, Kirk: 23, 42, 63
Shannon, John W.: 25, 26
Shore decontamination apparatus: 29–30
Shoreline, measurement of: 100
Shoreline cleanup: 29, 46, 55, 83–91, 94; absorption, 90, 98; assessment of area to be cleaned, 85; assessment of Exxon plan for, 47–48, 85–86, 97–98; cold water flushing, 84, 86, 90–91, 97, 98, 99; disposal of contaminated materials, 79, 86; hand-wiping, 90, 97–98; hot water flushing, 48, 86, 90, 91, 97, 98; natural cleansing, 86, 98; priority guidelines, 84–85, 88; progress reports, 88; responsibility for, 83–84; standards of cleanliness, 87–88; workers, 28, 61, 83, 86, 87, 91, 98
Shoreline Cleanup Committee: 48, 84, 85, 86
Side-looking radar: 95
Sipes, Rear Adm. Joel D.: 45
Skimmers: 5, 6, 11, 25, 27, 29, 30, 35, 37, 38, 40, 72
Skinner, Samuel K.: 12, 13, 14, 15, 16, 26, 44, 106, 116
Smith, Maj. Gen. James D.: 13, 14, 15, 16, 17, 18, 20, 21, 23, 26, 33, 34, 44, 45, 52, 54, 62, 99, 112
Smith Island: 6, 11, 83, 85, 91, 97, 98
Stalwart: 4
Steam heat, use in dredge hoppers: 76–77
Stevens, Brig. Gen. Patrick: 19, 20, 32, 33, 45, 54–55, 56, 63, 96, 98, 112; *photo*, 56
Stevens, Ted: 13, 31
Sununu, John: 14, 15, 44, 45
Super Sucker: 75, 79
Super Vac: 75, 76
Surgeon General, Office of the: 22
Survey boats: 35–36, 40

T

Theriot, E.A.: 101
Thermal infrared sensors: 68, 95, 100
Towhee: 40

Trans–Alaska Pipeline Authorization Act: 106
Tres Suertes: 40, 43

U

U.S.S.R.: 66. *See also Vaydaghubsky*
U.S. Air Force: 15, 23, 28, 47, 100, 107, 109
U.S. Army Corps of Engineers: 8, 9, 13–15, 18, 19–21, 24, 26, 54–55, 58–59, 63, 103; HQ Emergency Operations Center, 20, 59, 61, 94; Engineer Task Force, 46–47; Engineer Topographical Laboratory, 100, 118; laboratory costs, 106, 107, 108. *See also* Alaska District; Cold Regions Research and Engineering Laboratory; North Pacific Division; Portland District; Waterways Experiment Station
U.S. Coast Guard: 3–4, 6, 7, 8, 9, 11, 12, 18, 19, 20, 21, 22, 23, 26, 27, 29, 33, 34, 36, 37, 38, 40, 45, 51, 52, 54, 55, 57, 58, 59, 61, 62, 64, 66, 68, 72, 73, 83, 84, 85, 87, 88, 94, 100, 103, 104, 106, 107, 108, 109, 111, 115–116, 118–119; Marine Safety Office, 4, 28, 49, 57, 64, 72
U.S. Department of the Army: 13, 15, 23; use of troops in shoreline cleanup, 15, 16, 24, 25, 29, 30
U.S. Department of Defense: 8, 13–30, 60–64, 103, 104, 107–108, 109, 111, 112; Defense Senior Representative: 18, 62; relations with Coast Guard, 52–54. *See also* Director of Military Support
U.S. Department of Transportation: 18, 103, 104, 106, 107, 109, 116
U.S. Environmental Protection Agency: 8, 9, 51, 84, 93, 101–102
U.S. Fish and Wildlife Service: 84
U.S. Forest Service: 84
U.S. House of Representatives: Committee on Merchant Marine and Fisheries, Subcommittee on the Coast Guard and Navigation, 12, 101
U.S. Marine Corps: 28
U.S. Navy: 8, 15, 19, 22, 23, 24, 25–26, 27, 34, 37, 47, 83, 100, 115
U.S. Pacific Command: 18, 24
U.S. Senate, Committee on Science and Transportation: 13
U.S.S. *Cleveland*: 28
U.S.S. *Duluth*: 28
U.S.S. *Fort McHenry*: 26, 28, 29, 30, 87
U.S.S. *Juneau*: 26, 28, 29, 30, 83, 87, 97, 98

U.S.S. *Mount Vernon*: 28
U.S.S. *New Orleans*: 26
U.S.S. *Ogden*: 28
USA Health Service Command: 22

V

Vac-All: 75
Vac-U-Vator: 75–76
Valdez, Port of: 3, 4, 7, 115
Vaydaghubsky: 38, 72–73
VECO, Inc.: 11, 25, 91
Video teleconferences: 62–63
Videotaping: 95, 99, 100

W

Wallace, John F.: 108
Water Pollution Control Act of 1948: 8
Water Resources Support Center, Navigation Data Center: 100–101
Waterways Experiment Station (WES): 48, 93, 94, 97–99; Coastal Engineering Research Center, 101
Weather problems: 6, 68, 73
WES. *See* Waterways Experiment Station
Whittier, AK: 66
Wilson, Col. Thomas: 22, 23, 27, 45, 46, 53, 62, 113
Wiltshire, Lt. Comdr. Glenn A.: 22
Worm pumps: 76

Y

Yaquina: 32, 34–36, 37, 38–39, 40, 41, 42, 43, 64, 65–66, 70, 71, 72, 73, 74–75, 76, 77, 78, 79, 80, 106, 107, 113; *photo*, 35
Yost, Adm. Paul A.: 12, 13, 14, 15, 16, 24, 25, 37, 44, 45, 49–50, 52, 86
Young, Don: 31

Z

Zepernick, Paul: 22, 25

EP 870-1-41
April 1992

US Army Corps
of Engineers