

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILE 8672
1990 SCOMM 77: SENATE SPEC. COMM. EXXON VALDEZ OIL SPILL... 1991

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UNITED FISHERMEN OF ALASKA

211 4th Street, Suit 112
Juneau, AK 99801
907-586-2820
Fax# 907-463-2545

April 26, 1991

MEMBER ASSOCIATIONS

Alaska Crab Coalition
Alaska Independent Fishermen's
Marketing Association
Alaska Longline Fisherman's
Association
Alaska Trollers Association
Bering Sea Fishermen's Association
Bristol Bay Driftnetters Association
Concerned Area 'M' Fishermen
Cook Inlet Aquaculture Association
Copper River Fishermen's Cooperative
Cordova District Fishermen United
Kenai Peninsula Fishermen's Association
North Pacific Fisheries Association
Northern Southeast Regional
Aquaculture Association
Peninsula Marketing Association
Petersburg Vessel Owners Association
Prince William Sound
Aquaculture Association
Prince William Sound Seiners Association
Seafood Producers Cooperative
Southeast Alaska Seiners
Southern Southeast Regional
Aquaculture Association
United Cook Inlet Drift Association
United Southeast Alaska Gillnetters
Western Alaska Cooperative
Marketing Association

Alaska State Legislature
P.O. Box V
Juneau, Alaska 99801

Dear Legislator:

The United Fishermen of Alaska is pleased with Judge H. Russell Holland's decision to reject the proposed criminal settlement in the Exxon Valdez oil spill case.

In addition, our organization is opposed to the proposed civil settlement as it now stands. We and our affected members believe there are items which must be included in a civil settlement offer before it would be acceptable to Alaska's fishers. These include:

- * the release of all spill data which have been financed by public funds;
- * payment for cleanup and restoration should originate from two different funds;
- * settlement funds should be used for restoration, rehabilitation and acquisition of equivalent resources, not for capital construction projects;
- * removal of clause which allows the use of settlement funds outside of Alaska;
- * retain state's right to pursue criminal and civil charges against Alyeska, including claims for natural resource damages; and
- * any monetary funds arising from a settlement should be paid in full or with interest.

This settlement offer, like most first offers, presents the Legislature a good starting point. We hope that future offers will include those items which we feel are currently lacking. In the meantime, the United Fishermen of Alaska remains available if we should be of assistance to you in any further negotiations.

Very truly yours,

Greg Seider MB

Greg Seider
Executive Director

mb



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United Southeast Alaska Gillnetters
Western Alaska Cooperative
Marketing Association

Testimony of
Greg Seider, Executive Director
United Fishermen of Alaska
before the
House Special Committee
on the
Exxon Valdez Spill Claims Settlement
April 15, 1991

Mr. Chairman and members of the Committee, my name is Greg Seider. I am the Executive Director of the United Fishermen of Alaska and I am here to testify on their behalf.

The United Fishermen of Alaska, at this time, supports the concept of a negotiated settlement for the Exxon Valdez spill damages. However, we cannot in good conscience support this settlement agreement.

Many of these problems hinge on the release of the spill data. It is impossible for either the legislature or the public to truly understand whether the dollar value that has been assigned to this settlement is valid. Without release of the data, it is impossible for the public to adequately weigh the cost of future oil development against the cost to the fisheries habitat upon which the fishing industry and the economic well-being of Alaskan coastal communities are so absolutely dependent.

The lock on the data is, ostensibly, to keep the state from showing its hand so it can best protect itself from suits against it and to perhaps further pursue claims against Alyeska.

This is an unfortunate dilemma, but many of the suits, if not most, have been filed against the state since this settlement was made public. These suits are no doubt in part due to the failure of the agreement to protect the state from accusations by Exxon - Alyeska that the state is negligent in this grounding or the failure of the agreement to indemnify the State for any liability. This failure could, if this settlement is accepted, prevent the scientific data from seeing the light of day for the foreseeable future. This is unacceptable public policy.

The failure of the agreement to protect the State from third party claims through indemnification would not have been nearly as innovative as Exxon's championing of the release of liability for Alyeska; and, had it been incorporated, would not have pitted the State against her citizens. Not only are the citizens of the State pitted against the State, they have been deprived of their strongest ally in their damage claims against Exxon.

The expenditure of the settlement funds is an unresolved issue. There are simply too many overwhelming questions for which there have been no satisfactory answers. Pointing either to 1991 State/Federal Natural Resource Damage Assessment and Restoration Plan for the Exxon Valdez Oil Spill or the Clean Water Act does absolutely nothing to resolve how the monies will be spent or how adequate, representative and meaningful public participation will occur in the process of fund expenditure. Quite frankly, the thoughts which we have heard expressed by the probable state trustees have proved to be more alarming than enlightening on the expenditure of monies which are to be "used to restore, rehabilitate, or acquire the equivalent of such natural resources." The terms are noble but empty until the citizens of this State and especially those in the effected areas are satisfied with what they will actually mean.

There has also been some comment that continued scientific and economic studies could be curtailed as early as this year. This is unconscionable. No one wants to see, as one gentleman has stated, "an institutional feeding frenzy," that is the funding of frivolous studies. There are, however, certainly worthwhile lines of research which must be pursued in order to better understand the effects of this spill. It might also be appropriate to point out that much of the so called "record run" in Prince William Sound during the 1990 season was due in large part to the effectiveness of the hatchery program and not the wild stock return. This, from the fishing industry perspective, is a strong case for further study of the long term effects of the spill on fish and habitat.

The fishing industry, in the effected areas, is also concerned about tying future clean-up efforts to the settlement monies that are to be used for the hallowed: restore, rehabilitate, or acquire equivalent natural resources. The date of the occurrence is not in the dim past. The true effects of the Exxon Valdez spill are as yet undetermined, to tie clean-up funds in the same package with monies which are to be used for compensation for resource damages is an unacceptable precedent which should not be set. We may find we will be forced to make undesirable trade offs between continued clean-up and restoring, rehabilitating and acquiring.

The day the settlement was made public, the bird in the hand is worth two in the bush analogy was applied to the unknowns of this agreement. A colleague observed, "It remains to be seen if it is a swan or a dodo."

Unfortunately, at this time, it appears to the United Fishermen of Alaska that if it walks like a dodo and talks like a dodo it is a dodo. Mr. Chairman and members of the committee, we urge you to reject this settlement agreement. Let it be a starting point for a more acceptable agreement.

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TESTIMONY

OF

RICHARD B. STEWART
ASSISTANT ATTORNEY GENERAL
ENVIRONMENT & NATURAL RESOURCES DIVISION
UNITED STATES DEPARTMENT OF JUSTICE

BEFORE THE SPECIAL COMMITTEE ON THE
EXXON VALDEZ OIL SPILL CLAIMS SETTLEMENT

OF

SENATE
STATE OF ALASKA

CONCERNING

PROPOSED SETTLEMENT OF CIVIL AND CRIMINAL LIABILITY
ARISING FROM THE EXXON VALDEZ OIL SPILL

APRIL 17, 1991

Mr. Chairman and Members of the Subcommittees:

Good afternoon. I am Richard B. Stewart, the Assistant Attorney General in charge of the Justice Department's Environment and Natural Resources Division. I am pleased to have this opportunity to appear on behalf of the Department to discuss the proposed settlement of the federal government's claims of civil and criminal liability arising from the Exxon Valdez oil spill.

Background to the Litigation

Mr. Chairman, I am sure that it is unnecessary before this body to recite the events that gave rise to the claims against the Exxon Corporation and the settlement that now is pending. As you know, the tanker vessel Exxon Valdez was outbound from Port Valdez, Alaska on the night of March 23-24, 1989, carrying 50 million gallons of Alaska North Slope crude oil. The tanker, which was owned by an Exxon subsidiary and commanded by Joseph Hazelwood, left the sound's designated shipping lanes and went hard aground on Bligh Reef, a well-known and well-marked navigational hazard.

The grounding pierced the ship's hull, and best estimates are that 11 million gallons of oil spilled into the pristine waters of Prince William Sound and the Gulf of Alaska. The oil fouled those waters and much of the 1100 miles of adjacent shoreline. In the weeks and months following the spill, Exxon began an extensive campaign to clean up the oiled beaches,

which continued through the fall of 1989. In response to public pressure, Exxon resumed cleanup work in the Spring of 1990, and is expected to undertake further cleanup this spring. Exxon reports that so far it has spent more than \$2 billion in cleanup activities.

Both the federal government and the State of Alaska have asserted claims against Exxon. Initially, the Justice Department successfully sought the criminal indictment both of Exxon Shipping, the owner of the Exxon Valdez, and the parent Exxon Corporation. We regard the spill as a classic example of culpable corporate management failure. A ten-count indictment was returned in February 1990, including felony charges for knowing violations of the Ports and Waterways Safety Act and the Dangerous Cargoes Act, and misdemeanor counts under the Clean Water Act, the Refuse Act and the Migratory Bird Treaty Act. The criminal charges were scheduled for trial this month.

The federal government also has a number of civil claims, particularly on behalf of those federal agencies that serve as trustees for natural resource damages under the Clean Water Act and other federal statutes and common law. These claims have been asserted in a complaint that was filed along with the proposed settlement documents last month. The State of Alaska has had civil claims pending since August 1989, when the state filed a complaint in Alaska Superior Court seeking damages under state law.

In support of both the civil and criminal claims, the federal and state governments together have undertaken extensive scientific studies to assess the impact of the spill and the probable damage to natural resources. By June, the two governments will have spent a total of more than \$80 million in such studies. This investigation was necessary because the damage issues lie at the frontiers of scientific knowledge concerning the effect of oil spills on marine and coastal resources.

While the spill presents factual issues that lie on the scientific frontier, the case also presents many issues on what can only be described as a legal frontier. Many if not most of the legal issues that would be litigated against Exxon are issues of first impression in the federal courts. By way of example, the Exxon defendants' exposure to criminal fines could range from \$600 million to a meager \$3 million, depending on whether and how the court were to apply the Alternative Fines Act in this case.

Settlement Objectives

Because of these daunting uncertainties, both the Justice Department and the State of Alaska recognized the desirability of resolving their respective claims that would eliminate the uncertainty and expense of protracted litigation and permit early funding of restoration work for the Sound, but only if Exxon would come to the table ready to recognize its

responsibility for the spill and the magnitude of the damage to natural resources in and around Prince William Sound.

Accordingly, the Justice Department and the federal trustees, together with EPA, concluded from the outset that no settlement would be acceptable without three elements: first, there would have to be sufficient recovery of damages for the trustees to undertake a prompt and thorough restoration program for the Sound; second, any settlement would have to be made public and include an appropriate opportunity for public comment; and third, Exxon would have to acknowledge its criminal conduct and pay a substantial criminal penalty that reflects the seriousness of the offenses that led to the spill.

I am happy to report to the committee that all three of these elements have been met by the proposed civil settlement and the criminal plea. A vital impetus for this favorable settlement was the Justice Department's aggressive prosecution of the criminal charges, and early favorable rulings by the court in the criminal case. These established the seriousness with which the government has regarded Exxon's criminal responsibility for the spill as a binding principle for settlement.

On the civil side of the case, considerable credit must go to Alaska Governor Hickel's initiative, this past January, for talks between the corporation and the state and federal governments. These talks began with direct bargaining among the principals, involving Exxon Chairman Lawrence Rawl, Governor Hickel and Alaska Attorney General Cole, and the heads of the

federal agencies concerned -- the Departments of Agriculture, Interior, and Transportation, the Environmental Protection Agency, and the National Oceanic and Atmospheric Administration. NOAA General Counsel Tom Campbell, on behalf of the natural resource trustees, provided crucial leadership in ensuring that these early negotiations forged a suitable framework for an agreement in principle.

Eight weeks of hard bargaining with Exxon resulted, finally, in the settlement proposed last month. Those negotiations were marked by extraordinary cooperation among Governor Hickel and Attorney General Cole of Alaska, Interior Secretary Lujan, NOAA Administrator Knauss and General Counsel Campbell, EPA Administrator Reilly, Transportation Secretary Skinner, and Agriculture General Counsel Raul. Their collective leadership helped shape a settlement that should be regarded as an unprecedented win for the environment.

Settlement Terms

Under the settlement, Exxon will pay \$900 million over ten years to satisfy the state and federal governments' civil damage claims. Exxon also may be liable for an additional \$100 million if the future discloses currently unforeseen damage that was not discovered by the extensive damage survey the two governments have undertaken to date. These amounts will be used both to reimburse the state and the federal government for past expenses and restoration costs, and to fund a thorough program to

restore Prince William Sound's natural resources. These funds also may be used to fund additional cleanup work by Exxon in 1991. The schedule of payments under the settlement agreement is expected generally to coincide with the future funding needs for restoration work now being planned by the federal trustees.

The settlement also includes a number of releases and covenants by the parties not to bring certain claims. Exxon has agreed not to sue the United States for any claims arising from the spill. The United States and Alaska have agreed not to sue Alyeska Pipeline Service Company for natural resource damages, because the settlement satisfies all of those claims and because Alyeska could seek to recover any liability to the United States for such damage from Exxon. This covenant reasonably protects Exxon from having to pay twice, in effect, for the same claims. In turn, Exxon has agreed to indemnify Alaska and the United States for any claims Alyeska might assert against the two governments. The United States has preserved all other claims against Alyeska, (including potential claims for civil penalties,) that do not involve natural resource damages.

Apart from the civil settlement, the two corporate defendants -- and here I mean Exxon Corporation and Exxon Shipping -- have agreed to plead guilty to four serious criminal charges arising from the spill. Exxon shipping will plead guilty to three counts under the Clean Water Act, the Refuse Act, and the Migratory Bird Treaty Act, and Exxon Corporation will plead guilty to one count under the Migratory Bird Treaty Act. Exxon

will pay a \$100 million fine, half of which will be remitted, and Exxon will pay of \$50 million as restitution to the State of Alaska for restoration of damaged natural resources.

These sums -- totalling a billion dollars -- represent the largest environmental liability settlements in history. Based on the survey of damage to natural resources undertaken by the natural resource trustees, this recovery should provide sufficient funds to undertake and complete the needed restoration program for the Sound. And Exxon will have to pay up to \$100 million more if future exposure discloses additional damage that cannot be discovered now. More importantly, these funds will be available to the trustees far sooner than would have been possible through protracted and complex litigation that would have taken years. More than seven years of intensive litigation have been necessary to recover for natural resource damage to New Bedford Harbor from PCB contamination. Restoration there is only now getting substantially underway; this case exemplifies the protected nature of litigating large natural resource damage cases.

Standing alone, the criminal fine against Exxon will be the largest ever paid for an environmental crime. This meets our objective of securing a fine that is commensurate with the seriousness of the underlying offenses. When Exxon's past cleanup costs are taken into account, the spill will have cost Exxon considerably more than \$3 billion.

Finally, the committee should know that the agreement with Exxon fully meets our objective of having this be a public settlement, one that affords an opportunity for public comment and participation. For the federal government, public participation has been a paramount concern throughout the process of litigation and restoration planning. The civil settlement is conditioned on court approval following a public comment period. Let me emphasize that this step was not required by law; the concerned federal agencies and the State of Alaska have insisted that the settlement be incorporated into a consent decree that will be subject to a thirty day public comment period in federal court. Judge Holland, who oversees our criminal case against Exxon, is following a similar procedure with respect to the plea agreement. The court has set April 24th as the date it will render its judgment on whether to accept the plea agreement. If the court accepts the plea, sentencing will proceed on the 24th.

The United States and the State will have the right to withdraw from the agreement if the public comment period shows that the settlement is inappropriate or inadequate. The State of Alaska also may withdraw if the Alaska legislature disapproves of the agreement. Exxon does not have a comparable right of withdrawal based on public comment or other information, but may withdraw if the court modifies the agreement.

We have provided the court, the legislature, and the Congressional Subcommittees overseeing the settlement with information concerning natural resource damage and restoration

costs that should remove any doubt that the settlement meets the objectives that I previously set forth. But there remains the possibility that both the state and federal governments might return to full-scale criminal and civil prosecution of their claims against Exxon if the settlement ultimately is rejected by the court or one of the parties. Both the Justice Department and the trustees, therefore, are constrained not to present any information that might tip the government's hand concerning specific evidence it has against Exxon. After the decree is finalized and scientific studies have undergone peer review, disclosure of most of the resulting information will, of course, be possible.

Finally, I think it important for the committee to understand that despite the federal and state governments' success in meeting the federal government's objectives in this settlement, that success has not been achieved at the expense of any of the many other parties who may have lawsuits pending against Exxon. As the committee is aware, the spill has spawned an immense amount of litigation. Private plaintiffs ranging from environmental and Native American groups to commercial fishermen and cannery workers have filed suits for damages and/or injunctive relief.

To ensure that the settlement would not prejudice those claims, the settlement specifically provides that it is not intended to affect legally the claims of third parties against Exxon. Paragraph 13 of the proposed consent decree has even more

explicit protection for Alaska Native villages to recover natural resource damages, as well as protection for those who hold any property interest affected by the spill.

Administering Settlement Monies

The objectives of thorough natural resource restoration and public participation have been protected not only by the Agreement with Exxon but also in the Agreement between the federal government and the State of Alaska that will govern use of the settlement monies. Under the Agreement, expenditures for restoration must be approved unanimously, and must be for natural resource restoration and enhancement. The Agreement specifically provides that its governance structure, which will be further developed by the trustees, must incorporate procedures for meaningful public participation. Of course the trustees already have been true to this spirit of public involvement by submitting their initial restoration plan for public comment; the plan was published in the Federal Register on March 1, 1991. The trustees remain committed to sustaining public participation in the restoration planning process.

I would be happy to answer any questions you may have.

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**TESTIMONY
OF
MR. THOMAS A. CAMPBELL
GENERAL COUNSEL
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE**

BEFORE THE

SENATE COMMITTEE ON THE EXXON VALDEZ OIL SPILL CLAIMS SETTLEMENT

APRIL 17, 1991

Mr. Chairman and Members of the Subcommittees:

I appreciate the opportunity to participate in this oversight hearing concerning the Exxon VALDEZ settlement. My name is Tom Campbell, and I am the General Counsel of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. NOAA is the lead Federal trustee for the Exxon VALDEZ damage assessment, and I am here today on behalf of the other Federal trustees - the Department of the Interior and the Department of Agriculture and on behalf of the EPA who is coordinating the federal side of the restoration effort.

Under the Clean Water Act, NOAA, the Department of the Interior and the Department of Agriculture act as stewards for the Nation's natural resources. An equal grant of authority was granted Alaska for state resources. The spill of 11 million gallons of oil into the pristine environment of the Prince William Sound on a dark night in March 1989, brought our respective trust responsibilities into sharp focus. For the past year and 11 months, Federal and State trustees have done everything in their power to assess injuries to natural resources and determine the economic damage done to the Sound and other areas of Alaska, and to

prepare to present our claim in court.

NOAA first became involved in assessing injuries to marine resources and their habitats with the grounding of the AMOCO CADIZ which occurred in 1978. In that case the vessel AMOCO CADIZ, two, spilling 68 million gallons of crude oil on the coast of France, France. Claims arising from this environmental disaster have been in litigation for 13 years. On July 24, 1990, a Federal judge in Chicago order Amoco to pay \$105 million in damages to the French Government. Amoco has appealed, and the litigation process continues.

Litigation is wasteful and protracted. Litigation is like war and litigation like war should be avoided if reasonably possible. Litigation also represents failure -- failure of one party to properly assess his position in a conflict.

In the fall of 1990, NOAA was made the lead Federal trustee on the Exxon VALDEZ spill. Under the leadership of Administrator Knauss we have tried to act as the "honest broker." Our first responsibility was to fully assess the natural resource injuries and prepare for possible litigation. Our second responsibility was to explore the possibility of an equitable out of court settlement.

It is the Federal trustees' belief that the settlement achieved with Exxon represents a fulfillment of our stewardship responsibility. It provides us with money this year to do necessary restoration instead of 5 to 10 years from now.

As the trustees weighed the benefits of settling with Exxon and grappled with the proper range of negotiating values, we

considered a myriad of factors such as the extent of the injury demonstrated thus far, the likelihood of translating those injuries into provable damages, the value of beginning restoration now rather than 5 - 10 years later, and the estimated cost of restoration. The settlement that was announced last month falls well within the range of values estimated by the trustees.

Finally, let us not lose sight of the fact that this represents the largest environmental settlement in the world -- one billion dollars -- ten times that recovered in Amoco CADIZ, a spill that was six times larger. It is a very good deal for Prince William Sound, and it is an outstanding deal for the United States and Alaska. The State of Alaska and the Federal trustees have exercised their trusteeship responsibly and with considerable imagination in bringing these complicated negotiations to fruition.

Mr. Chairman, this concludes my testimony. I would be pleased to answer any questions concerning the settlement.

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FILED

APR 16 1991

UNITED STATES DISTRICT COURT
DISTRICT OF ALASKA
By ~~_____~~ Deputy

CHARLES A. De MONACO
 Assistant Chief
 Environmental Crimes Section
 Environment and Natural Resources
 Division
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Attorney for the United States of America

IN THE UNITED STATES DISTRICT COURT
 FOR THE DISTRICT OF ALASKA

UNITED STATES OF AMERICA,)	No. A90-015-CR
Plaintiff,)	
v.)	
EXXON CORPORATION AND)	GOVERNMENT'S MEMORANDUM
EXXON SHIPPING COMPANY,)	IN AID OF SENTENCING
Defendants.)	

I. INTRODUCTION

United States v. Exxon Corporation and Exxon Shipping Co. is a criminal prosecution arising out of this nation's largest oil spill. The 11 million gallons of oil that spilled from the Exxon Valdez polluted a vast expanse of the previously pristine waters and shores of Prince William Sound and the Gulf of Alaska, and killed a multitude of wildlife. The disaster was caused by egregious failings that could and should have been foreseen and prevented.

Consequently, the United States in the plea

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agreement seeks imposition of the largest criminal fine in an environmental case to date. This fine would reflect the seriousness of the conduct that caused the grounding of the Exxon Valdez, and the resulting environmental injury, and would send a strong message that companies that violate environmental statutes face serious punishment. In addition, the plea agreement provides for immediate payment of special compensation to the State of Alaska. This payment will provide needed funds for the rehabilitation of Prince William Sound and other areas affected by the spill.

The plea agreement addresses more than punishment and compensation. It also acknowledges that the defendants made substantial efforts to rectify the consequences of their conduct by financing oil spill clean-up efforts. Consequently, the plea agreement does not ask that either defendant be placed on probation, and provides that one-half of the fine be remitted. It thus provides a message that the government will take into account steps voluntarily taken by responsible parties to correct the consequences of acts that constitute environmental crimes.

This criminal prosecution and the resulting plea agreement cannot resolve all the issues relating to the oil spill. However, the government believes that the purposes of criminal prosecution -- conviction of the guilty, just punishment for wrongful conduct, deterrence of future criminal conduct, and the need to provide compensation to

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victims -- are effectively addressed by the plea agreement, and the United States respectfully urges the Court to approve it.

II. FACTUAL BACKGROUND

Most of the significant facts that underlie the criminal charges in this case have been set forth in prior pleadings.¹ Consequently, this memorandum does not provide a lengthy factual background of the grounding, but summarizes briefly what the government's evidence would have shown if the case had gone to trial. While most of this evidence relates to conduct of Exxon Shipping's employees, the government would have been prepared to prove that Exxon Shipping was acting as Exxon's agent, making Exxon liable under this Court's ruling upholding the government's theory of agency liability.

The VLCC tanker² vessel Exxon Valdez departed Valdez on March 23, 1989 at about 9:20 p.m., transporting crude oil owned by Exxon Corporation. Assigned to direct the ship through the initial portion of Prince William Sound was

¹See e.g., Bill of Particulars, July 31, 1990; Government's Consolidated Opposition to Motions of Exxon Corporation to Dismiss Counts One, Two, Three, Four and Five, Sept. 20, 1990; Government's Opposition to Motion of Exxon Shipping Company to Dismiss Count Four for Failure to Charge an Offense, Sept. 20, 1990; Factual Basis for Guilty Plea of Exxon Shipping Company, March 22, 1991.

² Very large crude carrier, a tanker exceeding 160,000 dead-weight tons. The Exxon Valdez had a capacity of more than 60 million gallons of crude oil.

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Captain William Murphy, a certified marine pilot. The master of the Exxon Valdez was Captain Joseph Hazelwood. Prior to leaving port, Captain Hazelwood had consumed several alcoholic beverages with two of his shipmates.³

Captain Murphy disembarked at 11:24 p.m. Before doing so, he informed Captain Hazelwood of the presence of glacial ice blocking the shipping lanes. Captain Hazelwood, who was the only person on the vessel who had the required pilotage certification for Prince William Sound, then resumed responsibility for navigating the ship. In order to avoid the ice, Hazelwood ordered the ship to alter course to 180 degrees, a course out of the shipping lanes and directly toward Bligh Reef. He placed the ship on autopilot and ordered the ship to "load program up."⁴ After the course was changed, the individuals on the bridge with Captain Hazelwood were Third Mate Gregory Cousins and helmsman Robert Kagan, a "step-up" (or temporary) able-bodied seaman (AB).

Captain Hazelwood instructed Cousins to turn the ship back into the shipping lanes when it reached a point

³Ten hours after the grounding of the Exxon Valdez, blood and urine samples were taken from Captain Hazelwood. The blood sample showed an alcohol concentration of .061 percent and the urine sample showed an alcohol concentration of .09 percent. The government has no evidence that Captain Hazelwood consumed alcohol between the time of the grounding and the time the blood and urine samples were obtained.

⁴ At "load program up," the speed of the main engine was being increased slowly by a computer from maneuvering full ahead (55 rpm) to full-ahead sea speed (78.9 rpm). It would have required about 43 minutes to attain the maximum speed.

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about three minutes to the south. He then left the bridge and went to his cabin to "get out some messages," leaving the bridge critically undermanned while Cousins had to perform a dangerous nighttime maneuver around ice and near reefs.⁵

After Hazelwood left the bridge, Cousins disengaged the autopilot, took navigational fixes, and ordered a series of rudder commands intended to route the ship between Bligh Reef and the leading edge of the glacial ice, a distance estimated by Cousins to be .9 mile. As a result of errors by Cousins and Kagan, the Exxon Valdez ran aground on Bligh Reef shortly after midnight on March 24, 1989, rupturing eight cargo tanks and discharging approximately 11 million gallons of crude oil into the pristine waters of Prince William Sound, causing the death of several hundred thousand migratory birds.⁶

The person with the primary responsibility for safely navigating the Exxon Valdez was Captain Hazelwood. He was known to both defendants to be an alcoholic. Medical records provided to both defendants in 1985 showed that he was hospitalized in an alcohol rehabilitation facility and diagnosed as suffering from episodic alcohol abuse and dysthymia and that he needed aftercare treatment. After

⁵ There is no evidence that Captain Hazelwood sent out any messages that evening.

⁶As stated at page 8 of the government's Summary of Damage to Natural Resources, preliminary estimates of the total number of birds killed range from 260,000 to 580,000.

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Hazelwood's hospitalization and a three-month leave of absence, Exxon Shipping's managers returned him to duty as a ship's master. Unfortunately, his rehabilitation proved unsuccessful; he continued to use and abuse alcohol on and off duty up to the time of the grounding. Exxon Shipping failed to respond to reports and evidence that it received of Captain Hazelwood's ongoing alcohol use and abuse, and to take adequate steps to monitor his fitness to serve as a master in light of his history of alcohol abuse.

Robert Kagan was the helmsman at the time of the grounding. He had been an ordinary seaman with Exxon Shipping since 1974. In 1985, Kagan was "stepped-up" to AB for a few months, but then returned to ordinary seaman because of his unsatisfactory performance. In late 1988, Mr. Kagan was again "stepped up" to AB and assigned to serve on the Exxon Valdez. After serving 30 days on the ship, the chief mate prepared a written evaluation of Mr. Kagan's performance as an AB, which was received by the Exxon Shipping Fleet Manning Department prior to the grounding. This performance evaluation stated that "Mr. Kagan lacks the necessary skills to do the AB's job" and rated him "unsatisfactory" in his ability to work without supervision. A few weeks before the grounding, the alternate master of the Exxon Valdez told Captain Hazelwood that Mr. Kagan could not steer a ship and required too much supervision.

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III. THE PLEA AGREEMENT

Pursuant to the plea agreement, Exxon Corporation has pled guilty to a violation of the Migratory Bird Treaty Act, 16 U.S.C. §§ 703 and 707(a), and Exxon Shipping has pled guilty to violations of the Clean Water Act, 33 U.S.C. §§ 1311(a) and 1319(c)(1)(A); the Refuse Act, 33 U.S.C. §§ 407 and 411; and the Migratory Bird Treaty Act, 16 U.S.C. §§ 703 and 707(a). The total maximum statutory fines that the court could impose for these violations as to both defendants is \$420,000.00, unless the loss-doubling provision of 18 U.S.C. § 3571(d) is applied. However, in the plea agreement, Exxon Shipping has agreed to the imposition of a fine of \$75 million, with \$37.5 million remitted, and Exxon has agreed to a fine of \$25 million with \$12.5 million remitted. In addition to the agreed-upon fines, the defendants have agreed to make compensatory payments of \$50 million to the State of Alaska. The parties have agreed that the provisions of Rule 11(e)(1)(C), Fed. R. Crim. P., apply to the plea agreement.

IV. FACTORS TO BE CONSIDERED IN IMPOSING A SENTENCE

The court has asked the parties to address succinctly the plea agreement in light of the sentencing factors in 18 U.S.C. § 3553. The relevant factors are discussed below.

A. § 3553(a)(1) - The nature and circumstances of the offense

A significant factor in the grounding of the Exxon

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Valdez was Captain Joseph Hazelwood's decision to leave the bridge while the ship was executing a critical nighttime maneuver around glacial ice in the vicinity of Bligh Reef. In the face of increasing danger, which demanded greater precaution, Captain Hazelwood's decision to leave the bridge was a dereliction of his duty to supervise the safe navigation of the vessel. His unsound judgment in leaving the bridge undermanned set into motion a chain of events that culminated foreseeably in the ship running aground.

Third Mate Gregory Cousins, the junior officer left alone in charge of trying to guide the VLCC tanker, travelling at approximately 12 knots, through a .9 mile passage separating a field of glacial ice and Bligh Reef, was overwhelmed by the task that confronted him. As a result of having to do both the job of conning the vessel and fixing the vessel's position frequently, he failed to ensure that his rudder commands were properly executed and failed to assess the increasingly dangerous situation as the vessel approached Bligh Reef. The failure of the third mate and the helmsman to exercise due care in directing the ship safely past the reef were proximate causes of the grounding.

Neither Exxon Corporation nor Exxon Shipping should find refuge in the fact that Captain Hazelwood's conduct

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violated company policy.⁷ Both defendants were aware that Captain Hazelwood had a history of alcohol abuse and dysthymia. After returning him to command of one of the world's largest oil tankers, it was incumbent upon them to monitor him carefully for alcohol abuse. This was not done. Had effective monitoring occurred, Captain Hazelwood would have been relieved of duty prior to the grounding. As Lawrence Rawl, C.E.O. of Exxon Corporation said after the grounding, "The first drink the captain had after he had (been) rehabilitated was a basis for dismissal."

The Fleet Manning Department of Exxon Shipping, which made the decision to temporarily assign Robert Kagan as an AB to the Exxon Valdez, was notified prior to the grounding that he lacked the skills necessary to do an AB's job. In light of this evaluation, and a long history of poor performance ratings, he should not have been retained in that capacity on the Exxon Valdez.

B. § 3553(a)(2)(A) - The need of the sentence to reflect the seriousness of the offense

The Exxon Valdez oil spill is the largest oil spill in United States history. As an aid to the Court in determining whether the sentence set forth in the plea agreement is appropriate, the United States filed a "Summary of Effects of the Exxon Valdez Oil Spill on Natural Resources

⁷ In a 1987 performance evaluation of Captain Hazelwood, the evaluator noted that he "does not proactively support co. policies at times."

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and Archaeological Resources" on April 8, 1991. This document summarizes the injuries to natural resources that have been documented to date. Based on the seriousness of the harm resulting from the oil spill, the fine contained in the plea agreement is appropriate.

C. § 3553(a)(2)(A) - The need of the sentence to promote respect for the law

More than any other case in environmental litigation, this case has riveted the attention of the nation, and has been a sobering lesson that the environment is a vulnerable victim that requires great care in the conduct of environmentally hazardous activities. Acceptance of the plea agreement should heighten the business community's and the public's awareness of and respect for laws designed to protect the environment.

D. § 3553(a)(2)(A) - The need of the sentence to provide just punishment for the offense

The maximum statutory penalties allowable for the crimes to which the defendants have pled guilty total \$420,000.00. The fine agreed to in this plea agreement is \$100 million with \$50 million remitted. This fine would be the largest criminal fine ever imposed in an environmental criminal case. A fine of this magnitude is warranted in light of the egregiously deficient conduct of the defendant's employees and agents, both aboard the Exxon Valdez and in management, and of the tremendous harm to the environment and the people of Alaska caused by those failings.

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E. § 3553(a)(2)(B) - The need of the sentence to afford adequate deterrence to criminal conduct

Criminal violations of environmental statutes have the potential to and often result in enormous injury. The United States believes that the fine imposed in this case must send a strong message to businesses and individuals alike. As the government's evidence would have shown, the discharge of nearly 11 million gallons of crude oil was directly related to criminally negligent conduct by Exxon Shipping in failing to exercise the high standard of care required in transporting crude oil through a pristine environment. Imposition of the statutory fines that would apply in this case, amounting to no more than \$420,000.00, would utterly fail to send that message. For that reason, the United States believes that the loss-doubling provision of 18 U.S.C. § 3571(d) should be applied. The fines contained in the plea agreement and agreed to by the defendants are of a magnitude that should deter future corporate carelessness with the environment.

F. § 3553(a)(3) - The kinds of sentences available

Only two sanctions apply to an organization convicted of a crime. Those sanctions - a fine or a term of probation - are set forth in 18 U.S.C. §3551(c). In considering whether to impose a fine and the amount of the fine, the court should consider, in addition to the factors set forth in § 3553(a) and described elsewhere in this

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sentencing memorandum, the factors set forth in 18 U.S.C. § 3572. Those factors, which are discussed below, amply support imposition of the \$100 million fine set forth in the plea agreement as well as the remission of a portion of it.

The first of those factors is whether the defendant is an organization. If so, the Court should consider its size. Exxon Corporation is one of the largest and most profitable corporations in the world, and its wholly owned subsidiary, Exxon Shipping Company, has assets worth hundreds of millions of dollars.

The next factor to be considered is any measure taken by the organization to discipline any employee responsible for the offense. In this case, Exxon Shipping fired Captain Hazelwood for his conduct of using alcohol four hours before assuming duty and for his leaving the bridge during a hazardous maneuver. Mr. Cousins was reassigned to the status of AB as disciplinary action for his role on the grounding.⁸

The last factor the court can consider in determining the amount of the fine are any measures taken by the defendants to prevent a recurrence of the offense. Since the grounding, Exxon Corporation has revised its substance

⁸ Following the grounding, Mr. Cousins' license was suspended for nine months by the USCG. The government is unaware of any other disciplinary action taken against Exxon Shipping employees as a result of the events related to the grounding.

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abuse policy substantially. Specifically, employees who have had or are found to have a substance abuse problem will not be permitted to work in safety sensitive positions and employees who have returned from rehabilitation will be required to participate in an aftercare program. The policy subjects persons in safety sensitive positions to unannounced periodic or random drug and alcohol testing and permits the defendants to conduct unannounced searches for drugs and alcohol on property owned or controlled by the defendants.

In addition, the defendants have created the position of loading mate in the Ports of Valdez and San Francisco. The loading mate has the responsibility of loading and unloading cargo from tanker vessels in port. The creation of this position should eliminate a significant source of fatigue. The National Transportation Safety Board concluded that the third mate's fatigue and excessive workload contributed to the grounding of the Exxon Valdez, and that Exxon Shipping's personnel policies encouraged marine employees "to work long hours without concern for debilitating fatigue."

A primary reason the government would request a term of probation in this case would be to serve as a vehicle for the Court to order restitution as a condition of probation. Since the terms of the plea agreement include a payment of \$50 million in compensatory payments to the State of Alaska by the defendants, the United States does not

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believe probation is required in this matter.

G. § 3553(a)(6) - The need to avoid unwarranted sentence disparities among defendants guilty of similar conduct

There have been only a few other prosecutions for negligent oil spills, and none have involved environmental harm as widespread as that caused by the Exxon Valdez spill. The only other case that approaches this one is United States v. Ashland Oil Co., No. 88-146 CR (W.D. Penn. 1988), where the court imposed a fine of \$2.25 million for a negligent spill of about 700,000 gallons of diesel oil into the Monongahela River. That spill was the largest inland oil spill in U.S. history. The present case involves a spill about 16 times larger than the Ashland spill, and Exxon Corporation is several times larger than Ashland Corporation. Thus, it is appropriate that the fine in this case be much larger than in Ashland. The government believes that the record \$100 million fine agreed to in this case, with \$50 million remitted, appropriately reflects the seriousness of the offenses to which defendants have pled guilty, and is not inconsistent with other fines for oil spills.

H. § 3553(a)(7) - The need to provide restitution to any victim of the offense

While restitution is an important consideration, the criminal sentence cannot provide relief to every victim of the oil spill. However, many of those injured by the spill have been compensated or will be compensated. For

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example, the plea agreement provides \$50 million in compensatory payments to the State of Alaska and a separate civil settlement requires the defendants pay up to \$900 million over the next ten years, and possibly an additional \$100 million if reopener conditions are met, for the restoration of Prince William Sound. The defendants have also paid more than \$300 million to third parties in settlement of claims resulting from the oil spill and there are presently pending, in federal and state court, a multitude of claims requesting various forms of relief. It would be extremely complicated, in light of all the pending litigation, for this Court to fashion an order of restitution for all those who claim to have suffered losses resulting from the oil spill.

Under 18 U.S.C. § 3663(d), the Court may decline to make a restitution order if the Court determines that the complication and prolongation of the sentencing process resulting from the fashioning of an order of restitution outweighs the need to provide restitution to any of the victims. A protracted hearing to determine restitution for every victim of the oil spill may run afoul of Fed. R. Crim. P. 32(a)(1), which generally requires that sentence shall be imposed without unnecessary delay.

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V. LEGAL AUTHORITY TO IMPOSE THE FINE SET FORTH IN THE PLEA AGREEMENT AND TO THEREAFTER REMIT A PART OF THE FINE

The Court asked the parties to address the Court's authority to impose the agreed fine, and to remit a portion of a fine once the fine has been imposed. The plea agreement calls for imposition of a \$75 million fine on Exxon Shipping, and a \$25 million fine on Exxon Corporation. The Court's authority to impose these fines rests on 18 U.S.C. § 3571(d), which permits a fine of up to double the gross pecuniary loss to persons other than the defendant caused by the offense. If sentencing under this statute were litigated, the government would be prepared to prove that the offenses to which the defendants have entered pleas of guilty caused pecuniary losses to others in excess of \$50 million, providing a basis for a fine of \$100 million. In the plea agreement at page 4, defendants agree that there is a legal basis for the Court to impose the agreed fines.

The plea agreement calls for remission of \$37.5 million of Exxon Shipping's fine, and \$12.5 million of Exxon Corporation's fine, in recognition of defendants' conduct following the spill. The Court has the authority to order remission of part of a fine it has imposed, because the Court has the inherent authority to reduce a sentence it has imposed. In United States v. Benz, 282 U.S. 304 (1931), the Supreme Court upheld a district court's reduction of a

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defendant's prison sentence after it began, stating:

The general rule is that judgments, decrees and orders are within the control of the court during the term at which they were made. They are then deemed to be "in the breast of the court" making them, and subject to be amended, modified, or vacated by that court. The rule is not confined to civil cases, but applies in criminal cases as well, provided the punishment be not augmented.

Id. at 306-07 (citations omitted). More recent decisions of the Supreme Court on sentencing authority have cited the rule laid down in Benz without question. See United States v. DiFrancesco, 449 U.S. 117, 138 (1980). Lower courts following Benz have distinguished between a court's power to reduce a sentence, which is inherent, and a court's power to suspend execution of a sentence, which a court may do only by imposing probation. See United States v. Ellenbogen, 390 F.2d 537, 540-41 (3d Cir. 1968), cert. denied 393 U.S. 918.

The distinction between reduction and suspension is logical: reduction of a sentence is unconditional, while a suspended sentence may be reimposed at some future date. A defendant whose sentence is suspended is entitled to be placed on a term of probation with a definite ending date and express conditions, so that he knows what conduct, during what period, will subject him to reimposition of his sentence. A defendant whose sentence is reduced without

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condition has no such need.

VI. RESPONSE TO COMMENTS FROM THE PUBLIC

The Court has directed the parties to respond to the public's comments on the plea agreement. The Court received 87 comments in response to the Court's invitation to the public to express their views on the criminal plea agreement in this case. Almost all the comments were from private citizens residing in Alaska. The Audubon Society, the Green Party, and the National Wildlife Federation also submitted comments, as did two attorneys representing plaintiffs in the civil oil spill litigation. Finally, three Alaskan villages and one native corporation submitted comments.

Many of the comments raise similar objections or concerns about the plea agreement. Hence, instead of responding to each comment separately, we have grouped the comments into several categories sharing common themes, and have responded to each of those themes. One characteristic that almost all of the comments share is that they address both the criminal plea agreement and the proposed consent decree, often confusing the two. Many of the objections concern the adequacy of the civil recoveries under the consent decree, rather than the sentence proposed under the plea agreement. The proposed consent decree is independent from the plea agreement; consequently, it is not appropriate for the government to respond here to objections to the

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consent decree.

A. Comments Favoring the Plea Agreement

Eleven commenters urged the Court to accept the plea agreement. In general, those commenters cited the value of obtaining a certain result in this case immediately, rather than an uncertain result after years of litigation. Some commenters also cited a desire to give Exxon credit for its efforts to clean up the spill. The government agrees that the definite sentence set forth in the plea agreement is preferable to the uncertain sentence that could result even if convictions were obtained after trial. The range of uncertainty in this case is particularly broad, because of the dramatic difference between the normal maximum fines and the level of fines that the Court could, in its discretion, impose under the Alternative Fines Act.

B. Comments Opposing Agreement Not to Prosecute Alyeska

Representative George Miller, Vice-Chairman of the Committee on Interior and Insular Affairs of the U.S. House of Representatives, wrote to the Court to say that he objects to the provision in that plea agreement in which the government agreed not to prosecute Alyeska Pipeline Service Company for any offense arising from Alyeska's preparation of oil spill contingency plans. The National Wildlife Federation raised a similar objection. Vice-Chairman Miller stated that Alyeska knew that it could not and would not

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respond effectively to a major oil spill, and suggested that the government could charge Alyeska with violating the false statement provision of the Clean Water Act, 33 U.S.C. § 1319(c)(4), or the false statement provision at 18 U.S.C. § 1001.

At the outset, it is necessary to clarify the meaning of the non-prosecution provision of the plea agreement and respond to this comment. First, the plea agreement preserves the federal government's right to prosecute any employees of Alyeska for any criminal conduct that may have been associated with the spill plan. This would, of course, include the government's ability to prosecute any individuals for possible false statements in violation of 18 U.S.C. § 1001. Moreover, the State of Alaska retains full authority to prosecute Alyeska and its employees for any criminal violation of state law that may have occurred.

The government conducted a thorough investigation of possible criminal conduct associated with Alyeska's submission of spill plans. The evidence would not support a prosecution for false statements under the Clean Water Act, 33 U.S.C. § 1319(c)(4), because that section applies only to documents required to be filed under the Clean Water Act. Alyeska's spill plans were not required to be filed under that Act. After carefully weighing the evidence, the relevant law and attendant litigation risks, the possible

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sanctions for any criminal charges that might have been brought against Alyeska,⁹ and the unprecedented criminal fines and guilty pleas the government would obtain from Exxon under the plea agreement, the government concluded that it was in the best interests of the public to include a non-prosecution agreement for Alyeska in the plea agreement.

C. Objections to Lack of Data on Spill Damage

In order to assist the Court in reviewing the plea agreement, the government filed a summary of preliminary results of a number of extensive oil spill damage assessment studies. That summary does not purport to offer a definitive tally of the tremendous damage done by the spill to the waters, wildlife and people of Alaska. It does, however, provide the government's present best estimate of these damages, based on all the information they have collected over the two years since the spill. This assessment of the harm caused by the spill was available to responsible government officials who negotiated the plea agreement and consent decree. While the full scope of that harm may not be known for several years, there are no present indications of significant long term injury to resources other than those specifically identified in the summary.

⁹The maximum corporate fine for a false statement in violation of 18 U.S.C. § 1001 is \$500,000, pursuant to 18 U.S.C. § 3571(c).

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Notwithstanding the government's release of a full summary of the natural resource damage assessment study results, a number of commenters object that they cannot evaluate the plea agreement without access to all state and federal studies on injury to natural resources caused by the spill. However, the plea agreement does not seek to redress all injury caused by the Exxon Valdez spill; it seeks only to affix criminal responsibility for the spill, to impose just punishment, and to begin a flow of restitution that will continue in the civil context. In order to determine whether punishment in this case is just, it is enough to know that Exxon and its subsidiary, in violation of applicable environmental laws, caused an environmental disaster of unprecedented proportions, warranting a fine of unprecedented proportions.

D. Objections to Dismissal of Felony Charges

A few letters opposed the plea agreement because it calls for the dismissal of Counts 4 and 5 of the Indictment, which charged felony offenses. The decision by the Department of Justice to dismiss certain counts in an indictment at the time of sentencing is one committed to the discretion of the prosecutors.

E. Objections That Fine Is Insufficient

A number of letters ask the Court to not accept the plea agreement on the basis that the fine and the restitution called for in the agreement are inadequate. The plea

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agreement provides for the largest criminal fine ever imposed in an environmental prosecution. To date, the largest criminal fine for an oil spill is \$2.25 million, paid by the Ashland Oil Company in a Clean Water Act prosecution arising out a serious river spill, which contaminated drinking water in several states and disrupted the lives of thousands of people.

The size of the proposed fine in this case is much greater than that imposed on Ashland just over two years ago. The magnitude of the fine reflects both the larger size of these corporate defendants and the damage created by the Exxon Valdez oil spill. The record fine and the concomitant restitution are designed to punish both defendants for their actions and send a strong message of deterrence to other potential polluters.

F. Objections That the Settlement Deprives Public of a Public Trial

A few of the comments oppose the plea agreement because it means that there will be no public trial of the criminal charges. This is the result of any plea agreement, and is the manner in which most convictions in federal criminal cases are obtained. The commenters misconstrue the purpose of a criminal trial, which is not to satisfy the public's curiosity, but to determine guilt.

In any event, unlike most criminal cases, most of the evidence of the defendants' criminal conduct in this case

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has been made public. This evidence was aired in inquiries by the National Safety Transportation Board, several Congressional committees, and the Alaska State Oil Spill Commission, as well as in U.S. Coast Guard proceedings to suspend the licenses of Joseph Hazelwood and Gregory Cousins, and the State of Alaska's six-week trial of Joseph Hazelwood, much of which was broadcast on radio and television.

G. Objections to Payment of Civil Damages Over Ten-Year Period

Comments that the plea agreement should not be accepted because of the payment schedule set forth in the settlement of state and federal civil claims have no relevance to this separate criminal case. The fines and restitution specified in the plea agreement will be paid within thirty days of the Court's acceptance of the agreement.

H. Objections By Alaska Native Villages

Three Alaska Native Villages, a council of elders, and one Native corporation submitted comments objecting to the plea agreement. For example, Mr. Patrick Norman, President of the Port Graham Corporation, objected to the agreement because the fine monies will go into a national fund for victims of crime. Mr. Norman stated that since the money compensates for crimes committed in Alaska, "the money should be spent on the cities, and villages that were traumatized emotionally and physically by the oil spill and

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the clean up efforts."

By statute, federal criminal fines are deposited in the fund established by the Victims of Crimes Act, 42 U.S.C. § 10601, et. seq. There is no mechanism for a federal criminal fine to be used as compensation for a particular class of victims, or for natural resource damages. For this reason, the plea agreement imposes a substantial criminal fine as punishment and then specifies that an additional \$50 million be paid as restitution to the State of Alaska. Paragraph IV.A. expressly provides that: "Such [restitution] monies are to be used by the State of Alaska exclusively for restoration projects relating to the 'EXXON VALDEZ' oil spill." By this provision, the plea agreement provides generally for redress of injuries similar to those sought by Mr. Norman and the Port Graham Corporation. The restitution monies will be paid soon after the acceptance of the plea agreement, and will be earmarked for the restoration of areas adversely affected by the Exxon Valdez oil spill.

I. Objections to Lack of Provision Regarding Damage to Archeological Resources

Seven commenters objected to the plea agreement because it does not address damage to cultural resources protected by the Archeological Resources Protection Act. None of the commenters suggested how such damage might be addressed. There are extensive pending civil claims by private parties that rest on damage to cultural resources.

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Issues concerning possible archeological damage are issues concerning the civil settlement, and not the resolution of the criminal prosecution.

VII. CONCLUSION

This prosecution was brought after investigation determined that criminal conduct was involved in the grounding of the Exxon Valdez. In a plea agreement submitted to the Court for approval, both defendants have offered guilty pleas and have agreed to pay a fines totalling \$100 million, \$50 million of which would be remitted, and have agreed to pay \$50 million in compensatory payments to the State of Alaska. The government believes that this would be a just resolution of the criminal charges, and respectfully urges the Court to accept the plea agreement.

Dated this 16th day of April, 1991, at Anchorage, Alaska.



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Attorney for the United States of America

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ALASKA

UNITED STATES OF AMERICA,	)	No. A90-015-2CR
	)	
Plaintiff,	)	
	)	CERTIFICATE OF SERVICE
v.	)	
	)	
EXXON CORPORATION AND	)	
EXXON SHIPPING COMPANY,	)	
	)	
Defendants.	)	

The undersigned hereby certifies that he is an employee of the United States Department of Justice and is a person of such age and discretion as to be competent to serve papers.

That on April 16, 1991, he served one copy of the attached:

GOVERNMENT'S MEMORANDUM IN AID OF SENTENCING
by hand delivery on Robert C. Bundy and Douglas J. Serdahely,
Bogle & Gates, 1031 West 4th Avenue, Suite 600, Anchorage,
Alaska to effect service on Exxon Shipping Company and by

overnight express service on John F. Clough, III, Clough & Associates, 431 North Franklin Street, Suite 202, Juneau, Alaska to effect service on Exxon Corporation.



MARK R. DAVIS
Special Assistant U.S. Attorney

SCOMM

77:65

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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ALASKA

UNITED STATES OF AMERICA,	)	Civil Action No. A91-082 Civ.
	)	
Plaintiff,	)	
	)	
vs.	)	NOTICE OF LODGING BY EXXON
	)	CORPORATION AND EXXON SHIPPING
EXXON CORPORATION, EXXON	)	COMPANY OF SUMMARY REGARDING
SHIPPING COMPANY, ALYESKA	)	NATURAL RESOURCES
PIPELINE SERVICE COMPANY,	)	
AMERADA HESS PIPELINE	)	
CORPORATION, ARCO PIPE LINE	)	
COMPANY, EXXON PIPELINE	)	
COMPANY, MOBIL ALASKA PIPELINE	)	
COMPANY, PHILLIPS ALASKA	)	
PIPELINE CORPORATION, BP ALASKA	)	
PIPELINES, INC., UNOCAL ALASKA	)	
PIPELINE COMPANY, and the T/V	)	
EXXON VALDEZ, <u>in rem</u> ,	)	
	)	
Defendants.	)	
	)	
	)	
AND COUNTERCLAIM	)	
	)	

Please take notice that defendants Exxon Corporation and Exxon Shipping Company are lodging with the Court the attached summary and appended studies regarding natural resource injuries and recovery arising from the Exxon Valdez oil spill.

These materials, which have been publicly available for some time, are lodged to assist the Court in evaluating the pending consent decree and to provide the Court with information which both supplements and contrasts with views contained in the government summary of effects on natural resources filed on April 8, 1991.

DATED this 16th day of April, 1991.

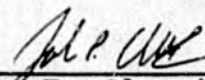
BOGLE & GATES
Attorneys for Exxon Shipping Company

By: 
Douglas J. Serdahely

DATED this 16th day of April, 1991.

JOHN F. CLOUGH, III
CLOUGH & ASSOCIATES

WARREN CHRISTOPHER
PATRICK LYNCH
O'MELVENY & MYERS

By: 
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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ALASKA

UNITED STATES OF AMERICA,	)	Civil Action No. A91-082 Civ.
	)	
Plaintiff,	)	
	)	
vs.	)	
	)	
EXXON CORPORATION, EXXON	)	
SHIPPING COMPANY, ALYESKA	)	
PIPELINE SERVICE COMPANY,	)	
AMERADA HESS PIPELINE	)	
CORPORATION, ARCO PIPE LINE	)	
COMPANY, EXXON PIPELINE	)	
COMPANY, MOBIL ALASKA PIPELINE	)	
COMPANY, PHILLIPS ALASKA	)	
PIPELINE CORPORATION, BP ALASKA	)	
PIPELINES, INC., UNOCAL ALASKA	)	
PIPELINE COMPANY, and the T/V	)	
EXXON VALDEZ, <u>in rem</u> ,	)	
	)	
Defendants.	)	
	)	
AND COUNTERCLAIM	)	
	)	

BOGLE & GATES

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AFFIDAVIT OF SERVICE

STATE OF ALASKA)
 : ss.
THIRD JUDICIAL DISTRICT)

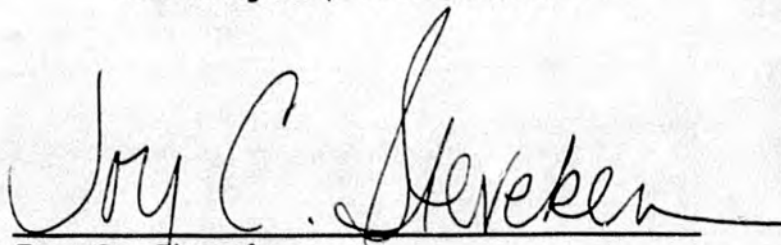
Joy C. Steveken, being duly sworn, upon oath, deposes and says: that she is employed as a legal secretary in the offices of Bogle & Gates, 1031 West 4th Street, Suite 600, Anchorage, Alaska 99501; that she has hand served or sent overnight delivery on April 16, 1991 the following document:

**Notice of Lodging by Exxon Corporation and
Exxon Shipping Company of Summary Regarding
Natural Resources**

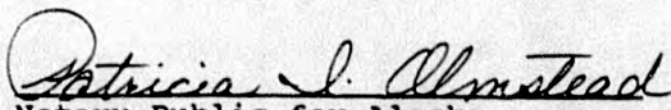
upon:

Joseph W. Bottini, Esq.
Assistant U.S. Attorney
222 West Seventh Avenue, #9
Anchorage, Alaska 99513

William Brighton, Esq.
Environment Enforcement Section
Environment and Natural
Resources Division
Room 1541 (EES Dockets)
U.S. Department of Justice
Main Justice Building
Tenth and Pennsylvania
Ave., N.W.
Washington, D.C. 20530


Joy C. Steveken

SUBSCRIBED AND SWORN to before me
this 16th day of April, 1991.


Notary Public for Alaska
My Commission Expires: 5-11-93

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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ALASKA

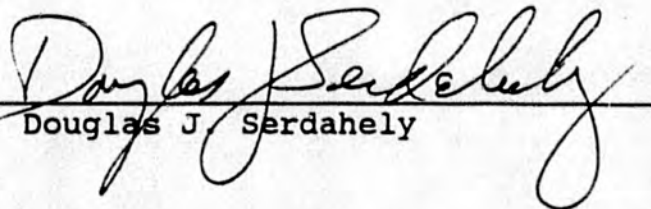
STATE OF ALASKA,	)	
	)	
Plaintiff,	)	
	)	
vs.	)	Case No. A91-083 Civil
	)	
EXXON CORPORATION, a New Jersey	)	
corporation, and EXXON SHIPPING	)	
COMPANY, a Delaware corporation,	)	
	)	
Defendants.	)	
	)	
_____	)	
AND COUNTERCLAIM	)	
_____	)	

Please take notice that defendants Exxon Corporation and Exxon Shipping Company are lodging with the Court the attached summary and appended studies regarding natural resource injuries and recovery arising from the Exxon Valdez oil spill.

These materials, which have been publicly available for some time, are lodged to assist the Court in evaluating the pending consent decree and to provide the Court with information which both supplements and contrasts with views contained in the government summary of effects on natural resources filed on April 8, 1991.

DATED this 16th day of April, 1991.

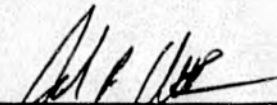
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By: 
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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ALASKA

STATE OF ALASKA,	)	
	)	
Plaintiff,	)	
	)	
vs.	)	Case No. A91-083 Civil.
	)	
EXXON CORPORATION, a New Jersey	)	
corporation, and EXXON SHIPPING	)	
COMPANY, a Delaware corporation,	)	
	)	
Defendants.	)	
	)	
_____	)	
AND COUNTERCLAIM	)	
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AFFIDAVIT OF SERVICE

STATE OF ALASKA)
 : ss.
THIRD JUDICIAL DISTRICT)

Joy C. Steveken, being duly sworn, upon oath, deposes and says: that she is employed as a legal secretary in the offices of Bogle & Gates, 1031 West 4th Street, Suite 600, Anchorage, Alaska 99501; that she has hand served or sent overnight delivery on April 16, 1991 the following document:

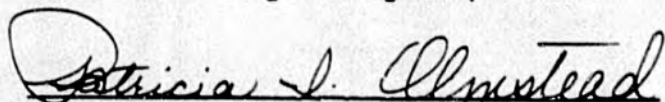
**Notice of Lodging by Exxon Corporation and
Exxon Shipping Company of Summary Regarding
Natural Resources**

upon:

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SUBSCRIBED AND SWORN to before me
this 16th day of April, 1991.


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My Commission Expires: 5-11-93

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SUMMARY OF PUBLISHED STUDIES ON THE EFFECTS OF THE EXXON VALDEZ OIL SPILL ON NATURAL RESOURCES

April 16, 1991

Introduction

Following the grounding of the Exxon Valdez on March 23-24, 1989, Exxon commissioned scientific studies for publication on the consequences of the oil spill. These studies have been available to the public for some time and now form the bases for this summary. These and other published studies describing the state of the ecology in the affected area demonstrate, among other things, that the water is clean, fish are abundant and safe to eat, and wildlife is thriving. Taken together, these studies characterize the robust state of recovery of the area affected by the oil spill.

This summary addresses broad categories of natural resources by providing the conclusions reached by the named scientists and by appending full copies of their studies, which have been publicly available for sometime.

Water is Clean

Effects of the oil spill on the waters of Prince William Sound and the western Gulf of Alaska are of critical importance to Alaskans and visitors. They provide a habitat for large commercial and recreational fisheries and a source of subsistence foods for native villagers. Recognizing its significance, immediately following the spill a water quality study of unprecedented scope was begun. The study, conducted by five leading environmental assessment firms and led by Dr. Jerry Neff, provided a concise evaluation of water quality in the affected area in the months following the spill.

Results from over 5000 water analyses, covering the period from March 1989 through March 1990, indicated the average concentrations of potentially hazardous hydrocarbons in the water remained well below State of Alaska standards. Furthermore,

"A comparison was made of the measured VOA (Volatile Aromatic) and PAH (Polycyclic Aromatic Hydrocarbon) concentrations in the water column and on the water surface (in sheens) of Prince William Sound with the published literature on the toxicity of petroleum to marine organisms, particularly Alaskan species. Average concentrations of petroleum hydrocarbon . . . are well below (approximately 10 to more than 1000 times below) concentrations that have been shown to be toxic or cause harmful sublethal effects in marine animals." [1]

[] Technical references listed in Attachment A.

In summary, Dr. Neff concluded that,

"It is extremely unlikely that hydrocarbon concentrations resulting from the spilled oil have had or will have any adverse effects on plants and animals living in the water column of Prince William Sound and the western Gulf of Alaska, including commercial fishery species."

As noted below in the Fishery Resources section, subsistence foods were found to be safe to eat as would be anticipated based upon the results of the water quality study.

In response to public and agency concern about the sheens observed in Prince William Sound, Dr. Neff discussed a special sheen study in his report, conducted as part of the overall water quality effort. As background, Dr. Neff provided technical detail on sheens (i.e., their typical thickness and how their color indicates thickness), noting that they are very thin. For example, a sheet of paper is typically 450 times thicker than a rainbow-colored sheen. He also noted that a tablespoon of oil would form a sheen of 625 square feet. Further, he stated,

"Oil sheens are patchy, short-lived phenomena in western parts of Prince William Sound. Surface waters covered with oil sheens derived from spilled oil washing off oiled shores contain low concentrations of highly weathered oil (crude oil which has lost its lighter, more toxic components)."

He further reported that,

"Crude oil is not the only source of sheens in Prince William Sound. Natural organic material from decaying vegetation or from heavy schooling of some fish, such as herring, can cause sheens that are difficult to distinguish from oil."

He also noted that National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service had revealed that some Prince William Sound fisheries closed in 1989 because of sheens which were later shown to be caused by bilge oil, diesel oil, and hydraulic fluid -- not Valdez crude oil. He also observed that by late summer 1990 sheen monitoring reports showed that only a small percentage of the sheens observed were identified to be from the spill. He concluded,

"It is unlikely that marine organisms in Prince William Sound are being adversely affected by sheens of spilled oil."

Habitat Recovery is Well Underway

The biologic habitat most acutely affected initially by the spill were those shorelines impacted by floating oil. The cleanup program conducted by Exxon in 1989 and 1990 under the direct supervision and approval of the U. S. Coast Guard, which incorporated advice of various federal, state, and local entities, dealt directly with the shoreline. The cleanup program on which Exxon has expended more than \$2 billion was, like the water evaluation,

unprecedented in its extent. [19,20] Exxon's successful cleanup program along with the widespread use of bioremediation techniques hastened the restoration and recovery process.

Several observers have noted the obvious extent of nature's recovery. Drs. J. M. Baker, R. B. Clark, and P. F. Kingston in describing the biological recovery of shorelines in April and September, 1990, noted:

"Only a portion of the shoreline had been oiled (by the spill in 1989) and, as with most other oil spills, the bulk of the damage had disappeared during the first year. The area has retained its natural beauty; there are abundant signs of plant and animal life, and recovery is well under way on even the most severely impacted beaches." [17]

"The summer settlement and growth of the organisms we saw was good biological evidence that the sea and the shores were clean enough for recovery to take place. Mussels, barnacles and rockweed that were abundant on the shores as newly settled juveniles in Spring had become established as young adult populations by the Fall. Such development had taken place even where there had been no clean-up or there was still residual oil on the shore." [2]

This observation of recovery was confirmed by a July 5, 1990, NOAA report which found:

"there was evidence of recolonization of biological communities and that the small amounts of remaining subsurface oil were not causing a serious impact on the environment." [3]

Dr. E. H. Owens has monitored recovery of the oiled shorelines since 1989. In spite of focusing on a set of study sites which were biased toward worse-case conditions, Owens found

"The combined result of treatment and natural cleaning was that the majority of shorelines retained little or no oil by the end of the summer of 1990 . . . The combined average surface oil cover area of all the Prince William Sound study sites dropped drastically between May 1989, from 46 percent of the total observed area to less than 2 percent by September 1990." [6]

With respect to the general nature of recovery of shoreline biologic communities, he observed,

"Key organisms were observed to be similar in abundance and distribution on most oiled and non-oiled sites in September 1990." [6]

In its consideration of 1991 cleanup requirements, NOAA stated, " . . . even where there is direct contact with weathered oil, intertidal organisms have shown remarkable recovery," in a report released to the Coast Guard on March 15, 1991. [4]

NOAA further observed in its report on its 1990 Shoreline Monitoring Program that, "Evidence of intertidal recovery was observed at all impacted sites." [5]

Fishery Resources are Abundant, Productive, and Safe to Eat

The Alaska fisheries support the state's second largest economic component, second only to the oil industry. As such, the potential impacts of the spill on fishing resources required evaluation. The water quality study provides strong evidence that those resources were virtually unaffected. Perhaps, the most persuasive indications of the viability of the resource are the record 1990 harvests of pink salmon and herring, the two most significant commercial fish in Prince William Sound. Over 44 million pink salmon were caught (51 percent of the state's total), far exceeding the prior record of 29 million fish. Similarly, approximately 8300 tons of herring, more than the entire year's "harvest quota," were caught in a 20 minute period although the season typically lasts several hours. Early reports on the 1991 herring fishery indicate another highly successful season.

Further, a number of experts have directly assessed the potential spill effects and have confirmed the view that impacts are likely minimal and the fisheries resources remain safe for human consumption. Royce, et al, in assessing the condition of the fisheries resources, stated that,

"The potential long-term impact of the oil spill on fish is under careful study, but it is unlikely that any significant adverse effects on finfish populations will be discovered. Throughout 1989 and 1990, there were no confirmed reports of large fish mortalities, oil tainting, or contamination of commercial seafood products from the spill. In addition, long-term damage to finfish has not been documented in the hundreds of studies of earlier oil spills -- many of which were larger than the Exxon Valdez spill." [8]

Minerals Management Service (MMS) of the Department of Interior has summarized the results of studies of Exxon Valdez spill effects on herring in Prince William Sound. Robert M. Meyer with MMS delivered a paper to the International Herring Symposium in Anchorage in October 1990 noting,

"Results from studies of herring eggs and larvae conducted following the Exxon Valdez oil spill indicated that the presence of spilled oil had no measurable effect on hatching success, occurrence of abnormal larvae, or larval growth and mortality rates (McGurk, 1990 a, b). These results suggest that the developing eggs and resulting larvae were exposed to levels of dissolved and dispersed oil less than that needed to elicit an acute response, i.e., death, deformity, or reduced growth rates." [7]

In commenting on the risks associated with an oil spill near Port Moller, MMS pointed out,

"... the observation that spawning populations of Pacific herring are found in areas where chronic hydrocarbon pollution is endemic, i.e., San Francisco Bay, Pudget (sic) Sound, etc. suggests that herring populations are able to tolerate exposure to sublethal concentrations of hydrocarbons that exceed those expected to occur (sic) in Port Moller following an offshore oil spill."

This observation is obviously applicable where there is a transitory exposure, as was the case with the Valdez spill.

The NOAA report of March 15, 1991, found no evidence of residual oil causing sublethal effects by progressing up the foodchain. Results from their 1990 Shoreline Monitoring Program noted,

"Chemical analyses of tissues from selected intertidal organisms indicated accumulation of hydrocarbons from the environment but no evidence of magnification through predator-prey interactions." [5]

Both NOAA and the Food and Drug Administration (FDA) have tested the safety for human consumption of subsistence foods (particularly salmon, bottomfish, and shellfish; but including seals, deer, ducks, and sea lions). Neither agency has identified unsafe foods from the impacted areas. [9]

Wildlife is Abundant and Thriving

With respect to seabird impacts, it is important to understand there are about 67 million birds in the Gulf of Alaska and Prince William Sound (NOAA, "The Gulf of Alaska, Physical Environment and Biological Resources", 1986). While the spill caused initial mortality of seabirds, the populations remain abundant. Moreover, the spill mortalities are well within the range of impacts frequently sustained by seabird populations due to natural events and chronic pollution without apparent long-term detriment. Drs. Baker, Clark, and Kingston note,

"Seabirds are among the most conspicuous casualties of oil slicks and, as such, attract considerable public attention. But there is no reason to suppose that, from a biological point of view, this mortality is damaging to seabird populations. Arctic and sub-Arctic seabirds also suffer heavy mortality from natural causes and from fishery practices. Even the auks (family including murre), which because of their very low reproductive rate might be expected not to be able to make good these losses, have sustained their population; and there is no evidence that other seabirds with a greater reproductive potential have declined in numbers." [16]

Eagles and sea otters were the subject of much public concern after the spill. While both species suffered initial mortalities, there are strong indications that both are recovering quickly and thriving. [12,14] M. J. Gibson and Dr.

J. White, who worked on eagle and bird rehabilitation in 1989 and visited Prince William Sound in 1990 reported,

"accumulating evidence indicates the area's eagle population is generally healthy and thriving" [11]

Moreover,

"We observed numerous eaglets and recent fledglings throughout the area. In 1990, many pairs were not only occupying previously oiled territories, but they had also nested, laid eggs, incubated, and hatched chicks that had developed normally." [11]

With regard to sea otters, the observations in 1990 are also encouraging. More than 16,000 sea otters inhabited the portions of Prince William Sound and the Gulf of Alaska that were impacted by the oil according to A. R. DeGange in a U.S. Fish and Wildlife Service symposium in April 1990. Drs. T. M. Williams and R. W. Davis, who organized and worked in Exxon's otter rehabilitation program in 1989, visited Prince William Sound in 1990 to gauge the recovery of the otters in impacted areas. [10] From their observations they noted,

"Large numbers of adults and pups were found in previously oiled areas, and they appear to feed and behave normally. These results suggest that many of the previously contaminated areas are able to support sea otters." [13]

Drs. Baker, Clark, and Kingston also commented on the recovery of sea otter populations,

"Sea otters are abundant in Prince William Sound. With a potential for the population to grow at nearly 20% per year, we have concluded that whatever losses suffered in the oil spill are likely to be rapidly made good by natural reproduction." [2]

Ecological Overview

These observations on individual species and habitats are indicative of the health of the overall ecosystem in Prince William Sound and the Gulf of Alaska. Drs. Baker, Clark, and Kingston have commented on the relative rate of ecological recovery from their perspective which reflects the study of numerous past spills. They note,

"There is a wealth of information about the recovery of cold water marine ecosystems following oil spills in various parts of the world. In all cases recovery events have been similar to those seen in Prince William Sound. If anything, because of the exceptionally thorough clean-up measures and natural cleaning processes, biological recovery has started sooner and proceeded further in Alaska than might have been anticipated." [2]

Dr. A. W. Maki, Exxon's lead environmental scientist on the Valdez spill, integrated the observations on parts of the ecosystem into an overall

assessment in his article in Environmental Science and Technology. Among his findings he noted,

"Field counts of plants, fish, and mammals from throughout the spill area provide convincing data that wildlife species are surviving and reproducing, thus confirming that biological recovery is rapidly taking place." [15]

Recovery Consistent with Historical Observations

The quick and robust recovery of Prince William Sound and the Gulf of Alaska is consistent with scientific observations made following previous spills over the last 25 years. Dr. J. E. Mielke summarized the technical literature on spills in his 1990 Congressional Research Service report, "Oil in the Ocean: The Short- and Long-Term Impacts of a Spill." He found,

"Short-term impacts on marine animal life are dramatic but recovery of species populations in almost every case studied has been swift." [18]

The recovery in Prince William Sound and the Gulf of Alaska conforms to this pattern. Drs. J. M. Baker, R. B. Clark, and P. F. Kingston have personally worked on many previous spills; they visited spill impacted areas in April and September, 1990, to assess the recovery in comparison to previous spills. They found,

"Our examination of the spill area confirmed our expectations, based on knowledge gained from previous accidents, that natural recovery is proceeding in Prince William Sound and the Gulf of Alaska. We expect the recovery to continue and to be relatively rapid." [17]

"Although isolated patches of weathered oil may still be found, nearly all of the beaches in Prince William Sound and the Gulf of Alaska are of clean appearance. Some small and isolated portions of the shoreline may retain oil for several years, but our investigations of previous oil spills indicate that the long-term impact on plants and animals should be minimal."

"The recovery process is well under way. Once started, if it is allowed to proceed without interruption, it will continue and be robust, as it has been following other spills throughout the world."

Cleanup is Essentially Complete

The cleanup of the spill is also in an advanced state. Little additional work remains to be done. The Owens report cited earlier clearly portrays the rapid disappearance of oil from the shoreline [6] and, as early as July 1990, NOAA noted that, "... deeply buried subsurface oil (i.e., oil beyond the reach of near-term bioremediation and other less-intrusive cleanup methods) poses little risk of causing further significant environmental injury." In addition, in its March 15, 1991 letter to the Coast Guard, NOAA stated,

"We are rapidly reaching the point of diminishing returns where the amount of effort, and the associated impacts, required to further reduce the total amount of oil remaining on, or in, a beach cannot be justified based solely on the assumption that the presence of oil poses a threat to the overall health of the local environment." [4]

In addressing the environmental threat of remaining oil, NOAA stated,

"The bulk composition of the remaining oil is comprised primarily of the residual or asphaltene fractions which have negligible solubility and little demonstrated toxicity, and thus pose little environmental risk to intertidal and water-column organisms, even if there were routine releases."

Given the minimum remaining oil, Drs. Baker, Clark, and Kingston addressed further cleanup from the perspective of those who have closely monitored past oil spills.

"There have been continuing public discussions about whether further clean-up of remaining oil on the beaches in Prince William Sound and the Gulf of Alaska is necessary." [2]

"Whether or not further clean-up measures to remove this residual oil are justified largely depends on the human use a beach is put to. Our judgement is that where recovery of animal and plant life is already well established, the residual oil is obviously doing no harm and the organisms established on the shore will hasten the final removal and degradation of the oil residues."

Conclusion

The extensive cleanup program conducted by Exxon, in combination with natural processes, removed the threat of further injury to wildlife by direct contact, substantially restored the aesthetic appeal of the area, and facilitated biologic recovery, particularly in the heavily oiled areas. Furthermore, the studies summarized herein demonstrate a rapid recovery of the impacted resources.

Attachments

Attachment A
Technical References

Water

1. Neff, J. M. (Senior Consultant, A. D. Little). "Water Quality in Prince William Sound and the Gulf of Alaska." Cambridge, Massachusetts: Arthur D. Little; 37 pp.; March, 1991.

Habitat Recovery

2. Baker, J.M.(Independent consultant, former Director of U.K. Field Studies Council); Clark, R.B.(Prof. Emeritus of Zoology, University of Newcastle Upon Tyne); Kingston, P.F. (Asst. Director of U.K. Institute of Offshore Engineering). "Two Years after the Spill: Environmental Recovery in Prince William Sound and the Gulf of Alaska." Presented at American Association of Petroleum Geologists Convention; 31 pp.; Dallas, TX, April 7-10, 1991.
3. National Oceanic and Atmospheric Administration. "Excavation and Rock Washing Treatment Technology: Net Environmental Benefit Analysis. Compiled by the Hazard Materials Response Branch, National Oceanic and Atmospheric Administration, Seattle, Washington; Contributions from Exxon Company, U.S.A., National Oceanic and Atmospheric Administration, State of Alaska; Submitted to the United States Coast Guard, Anchorage, Alaska, July 9, 1990. 218pp.
4. National Oceanic and Atmospheric Administration. "NOAA Review of Status of Prince William Sound Shorelines Following Two Years of Treatment by Exxon." In: March 15, 1991, letter to RADM D. E. Ciancaglini by D.M. Kennedy.
5. National Oceanic and Atmospheric Administration. "Exxon Valdez Shoreline Monitoring Program: 1990 Results" Pentec Environmental, Inc. and Environmental and Energy Service Co. Released April 9, 1991, in Washington, D. C. by NOAA.
6. Owens, E.H. (Senior Consultant, Woodward-Clyde). "Changes in Shoreline Oiling Conditions 1-1/2 Years after the 1989 Prince William Sound Spill." Unpublished report. Seattle, Washington: Woodward-Clyde; 116 pp.; March, 1991.

Fish and Subsistence Recovery

7. Meyer, R.M. (U.S. Department of Interior Minerals Management Service). "Assessing the Risk to Pacific Herring from Offshore Gas and Oil Development in the Southeastern Bering Sea" Paper presented at the International Herring Symposium, Anchorage, Alaska, October 1990.
8. Royce, W.F. (Prof. Emeritus Fisheries, University of Washington); Schroeder, T.R. (Fisheries Consultant, former Fisheries Management

Technical References (Continued)

Biologist Alaska Department of Fish & Game); Olsen, A.A. (Fisheries Consultant, Alaska); Allender, W.J. (Prince William Sound sport fishing operator and owner, former commercial fisherman). "Alaskan Fisheries Two Years after the Spill." Unpublished report. Homer, Alaska: Cook Inlet Fisheries Consultants; 35 pp.; February, 1991.

9. U.S. Food and Drug Administration. "Report of the Quantitative Risk Assessment Committee: Estimation of Risk Associated with Consumption of Oil-Contaminated Fish and Shellfish by Alaskan Subsistence Fishermen Using a Benzo[a]pyrene Equivalency Approach." Advisory Opinion on the Safety of Aromatic Hydrocarbon Residues Found in Subsistence Foods that were Affected by the Exxon Valdez Oil Spill. Submitted to the Alaska Oil Spill Task Force by the U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition, Washington, D.C; August 9, 1990.

Wildlife Recovery

10. Davis, R.W. (Head of Department of Marine Biology, Texas A & M University). "Advances in Rehabilitating Oiled Sea Otters: The Valdez Experience." Presented at a special symposium, "The Effects of Oil on Wildlife," held in conjunction with the 13th Annual Conference of the International Wildlife Rehabilitation Council, October 17-18, 1990, Herndon, Virginia; 20 pp.
11. Gibson, M.J. (Independent Raptor expert); White, J. (Doctor of Veterinary Medicine, International Bird Rescue Center). "Results of the Eagle Capture, Health Assessment, and Short-term Rehabilitation Program Following the Valdez Oil Spill." Presented at a special symposium, "The Effects of Oil on Wildlife," held in conjunction with the 13th Annual Conference of the International Wildlife Rehabilitation Council, October 17-18, 1990, Herndon, Virginia; 16 pp.
12. Gibson, M.J. (Independent Raptor specialist); "The Abundant Bald Eagles of Prince William Sound, Alaska." Unpublished Summary. 4 pp.; February 1991.
13. Williams, T.M. (Research Physiologist, Naval Ocean Systems Center). "Evaluating the Long Term Effects of Crude Oil Exposure in Sea Otters: Laboratory and Field Observations." Presented at a special symposium, "The Effects of Oil on Wildlife," held in conjunction with the 13th Annual Conference of the International Wildlife Rehabilitation Council, October 17-18, 1990, Herndon, Virginia; 13 pp.
14. Williams, T.M.; Davis, R.W.; "Sea Otters Thrive in Prince William Sound." Unpublished Summary. 4 pp.; February 1991.

Ecological Overview

15. Maki, A.W. (Environmental Advisor, Exxon). "The Exxon Valdez Oil Spill: Initial Environmental Impact Assessment." Environmental Science and Technology. 25(1): 24-29; 1991.

Technical References (Continued)

Historical Perspective on Oil Spill Impacts

16. Baker, J.M. (Independent consultant, former Director of U.K. Field Studies Council); Clark, R.B. (Prof. Emeritus of Zoology, University of Newcastle Upon Tyne); Kingston, P.F. (Asst. Director of U.K. Institute of Offshore Engineering); Jenkins, R.H. (Deputy Director of U.K. Institute of Offshore Engineering). "Natural Recovery of Cold Water Marine Environments after an Oil Spill." Thirteenth annual Arctic and Marine Oilspill Program, June 6-8, 1990, Edmonton, Alberta; 111 pp.; June, 1990.
17. Baker, J.M. (Independent consultant, former Director of U.K. Field Studies Council); Clark, R.B. (Prof. Emeritus of Zoology, University of Newcastle Upon Tyne); Kingston, P.F. (Asst. Director of U.K. Institute of Offshore Engineering). "Environmental Recovery in Prince William Sound and the Gulf of Alaska: Field Observations." Presented at the Thirteenth Annual Arctic and Marine Oilspill Program, June 6-8, 1990, Edmonton, Alberta; 12 pp.; June 1990.
18. Mielke, J.E. (Specialist on Marine and Earth Sciences, Congressional Research Service). "Oil in the Ocean: The Short- and Long-Term Impacts of a Spill." Congressional Research Service Report for Congress. CRS Report 90-356 SPR; Washington, D.C.: Library of Congress; 34 pp.; July 24, 1990.

Oil Spill Cleanup

19. Carpenter, A.D. (Alaska Operations Manager, Exxon); Dragnich, R.G. (Alaska Operations Waste Management Coordinator, Exxon); Smith, M.T. (Alaska Operations Technology Development Exxon Production Research). "Marine Operations and Logistics During the Exxon Valdez Spill Cleanup." In: Proceedings of the 1991 International Oil Spill Conference (Prevention, Behavior, Control, Cleanup), March 4-7, 1991, San Diego, California. Washington, D.C.: American Petroleum Institute Publication 4529; 205-212; 1991.
20. Harrison, O.R. (Alaska Operations General Manager, Exxon). "An Overview of the Exxon Valdez Oil Spill." In: Proceedings of the 1991 International Oil Spill Conference (Prevention, Behavior, Control, Cleanup), March 4-7, 1991, San Diego, California. Washington, D.C.: American Petroleum Institute Publication 4529; 313-319; 1991.

4/15/91

**WATER QUALITY IN
PRINCE WILLIAM SOUND
AND THE
GULF OF ALASKA**

MARCH 1997

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Cambridge, Massachusetts

Principal Participating Companies:

American North Inc.

Arthur D. Little, Inc.

Battelle Ocean Sciences

Dames & Moore

Kinnetic Laboratories, Inc.

**WATER QUALITY IN
PRINCE WILLIAM SOUND AND
THE GULF OF ALASKA**

MARCH, 1991
(An update of the April, 1990 report)

Jerry M. Neff, Ph.D.

Arthur D Little

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CORRECTION

**THIS DOCUMENT
HAS BEEN REPHOTOGRAPHED
TO ASSURE LEGIBILITY**

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SUMMARY

This report describes detailed water quality measurements for Prince William Sound and the Gulf of Alaska taken over about a 12 month period following the *Exxon Valdez* oil spill. It significantly expands on material first presented in an April, 1990 report on the topic. Since publication of the April, 1990 report, the number of available water sample analyses has more than doubled, representing an expansion of coverage in both geographical area and time period. The extent of the water quality studies presented in this report is unprecedented in the oil spill literature. Conclusions presented are based on water analyses conducted using the best available methods; in some cases detection limits for these methods had to be substantially improved in order to detect the very low concentrations of hydrocarbons present.

The water quality investigations described in this report were undertaken to address concerns expressed about the effects the spill would have on the marine ecosystem of the Sound and the adjacent Gulf of Alaska following the crude oil spill in Prince William Sound on March 24, 1989. The marine plants and animals living in the intertidal zone of heavily oiled shores or on the water surface were, of course, immediately affected by direct contact with bulk oil. However, populations of plants and animals living below the water surface in the water column (the area between the ocean surface and above the sea floor) probably were not adversely affected, even after long periods of time, because measured concentrations of petroleum hydrocarbons in the water column have remained below toxic levels since the spill. There have been no verified mortalities or other adverse effects of the oil in animals living in the water column, including many commercial fishery species. Further, record salmon and herring fishing seasons were experienced in 1990.

This report contains a summary of the results of several studies on the distribution and concentrations of petroleum hydrocarbons in the water column, from the surface to depths of up to 42 meters (138 feet), and in surface oil sheens. It includes results of samples analyzed from areas where the spilled oil moved as well as areas not impacted by the spill, that served as reference sites. Samples were obtained at times when concentra-

tions should have been highest, immediately after the spill and following shoreline treatments, as well as up to about one year following the oil spill. These results are discussed with relation to information from the scientific literature on the toxicity of crude oil to marine organisms living in the water column.

The report published in April, 1990 summarized the results available at that time of extensive field surveys to monitor the concentrations of petroleum hydrocarbons in the water column of Prince William Sound in the months following the oil spill. Because of the large number of samples obtained and the time required to conduct the analyses, only about half of the samples taken had been analyzed and could be included in that report. Samples that were included covered the time period from March to October, 1989. More than 5,000 analyses of the concentrations of petroleum hydrocarbons in the water column of Prince William Sound and the western Gulf of Alaska, and more than 2,400 quality control samples are included in this update. The additional data available since the April, 1990 report include results of analysis for water samples collected in offshore waters of Prince William Sound in February-March, 1990, additional results for nearshore waters of Prince William Sound, and extensive data on water quality of offshore and nearshore waters of the western Gulf of Alaska in areas where some of the spilled oil drifted. In addition, some of the data discussed in the April report were reprocessed to make methods consistent among laboratories that conducted the analyses. This updated report includes a discussion of the April report data as well as the newly-available and reprocessed data.

Within a few days after the spill, Exxon engaged independent contract research organizations (Arthur D. Little Marine Sciences, Battelle Ocean Sciences, Kinnetic Laboratories, Inc., Dames and Moore, and an Alaskan firm, America North Inc.) to monitor the distribution, concentrations, and changes over time of petroleum hydrocarbons in the water column throughout Prince William Sound and the western Gulf of Alaska. Additional measurements were made of the concentrations and compositions of petroleum

hydrocarbons in surface sheens of weathered crude oil occasionally observed in the Sound.

Measured concentrations of petroleum hydrocarbons in the water column of Prince William Sound have been consistently low since measurements began in late March, 1989, about a week after the spill. For a brief period in April, in regions of the Sound where the oil spread, there was a measurable increase in the upper water column in the average concentrations of volatile aromatic hydrocarbons (VOAs) and polycyclic aromatic hydrocarbons (PAHs), the potentially toxic fractions of oil. Highest concentrations of PAH usually were in surface water samples that often contained floating sheen material. However, these slightly elevated concentrations were well below the State of Alaska standard for aromatic hydrocarbons in marine waters. Concentrations of petroleum hydrocarbons in the water column of a few heavily oiled, sheltered bays remained slightly above background through June, 1989. Concentrations of VOAs and PAHs remained low in the offshore and nearshore water column of the western Gulf of Alaska. Throughout most of the open waters of Prince William Sound, concentrations of VOAs and PAHs returned to near background levels by the end of May and have remained there since.

Oil sheens can occur from weathered crude oil washing off the shore. Oil sheens also are common in boat harbors and areas of heavy boat traffic and fishing. However, unlike these boat sheens which usually contain fuel oil, sheens of weathered crude oil have lost most of the toxic fractions of the oil and are much less toxic. Crude oil sheens were sampled in several heavily oiled bays of western Prince William Sound and found to contain only traces of potentially toxic PAHs. These sheens do not pose a hazard to water column organisms or to wildlife occupying the sea surface.

A comparison was made of the measured VOA and PAH concentrations in the water column and on the water surface (in sheens) of Prince William Sound with the published literature on the toxicity of petroleum to marine organisms, particularly Alaskan species. Average concentrations of petroleum hydrocarbons measured in more than 5,000 water column samples from Prince William Sound and the western Gulf of Alaska are well below (approximately 10 to more than 1,000 times below) concentrations that have been shown to

be toxic or cause harmful sublethal effects in marine animals.

It is extremely unlikely that hydrocarbon concentrations resulting from the spilled oil have had or will have any adverse effects on plants and animals living in the water column of Prince William Sound and the western Gulf of Alaska, including commercial fishery species.

WATER QUALITY IN PRINCE WILLIAM SOUND AND THE GULF OF ALASKA

INTRODUCTION

Within a few days after the March 24, 1989, crude oil spill, Exxon initiated an extensive field sampling program to measure the concentrations and distribution of the spilled petroleum in the water column (the area between the ocean surface and above the sea floor) of Prince William Sound and the Gulf of Alaska. As part of this program, several private contract research laboratories (Arthur D. Little Marine Sciences Laboratory, Battelle Ocean Sciences Laboratory, America North Inc., Kinnetic Laboratories, Inc., and Dames and Moore) collaborated to collect and analyze water samples from many locations and water depths throughout this area. These samples were intended to provide a basis for an assessment of potential effects of the spilled oil on the marine plants and animals (including species important to the commercial and subsistence fisheries) of the Sound and the adjacent Gulf of Alaska. Water samples were collected periodically through the spring, summer, fall, and winter months of 1989 and 1990 at up to 35 offshore locations (generally more than one-quarter mile from shore) and at 65 nearshore locations (within a few hundred yards of shore) throughout Prince William Sound, particularly in areas through which the spilled oil moved. Additional water samples were collected at 95 offshore and nearshore locations in the northwestern Gulf of Alaska.

Results of the chemical analyses of these water samples indicate that the amounts of petroleum hydrocarbons per unit volume of seawater (concentrations) have remained very low from shortly after the spill through early March, 1990. The discussion that follows first describes the distribution and concentrations of petroleum hydrocarbons in offshore waters of Prince William Sound. Then it describes the distribution of hydrocarbons in nearshore waters of the Sound, particularly adjacent to heavily-oiled shores. Finally, it describes the distribution of petroleum hydrocarbons in offshore and coastal waters of the northwestern Gulf of Alaska.

After publication of the April, 1990 water quality report (Neff, 1990a), substantial additional water quality data became available. These data included the results of analysis of water samples from the February-March, 1990 Prince William Sound offshore water quality survey, additional analytical results from other offshore and nearshore surveys in Prince William Sound, and results of analysis of water quality samples from offshore and nearshore waters of the northwestern Gulf of Alaska in areas where some of the spilled oil moved. In addition, some of the raw data discussed in the April report were reprocessed to make methods consistent among analytical laboratories. This updated report includes a discussion of all the data, including the new and the reprocessed data.

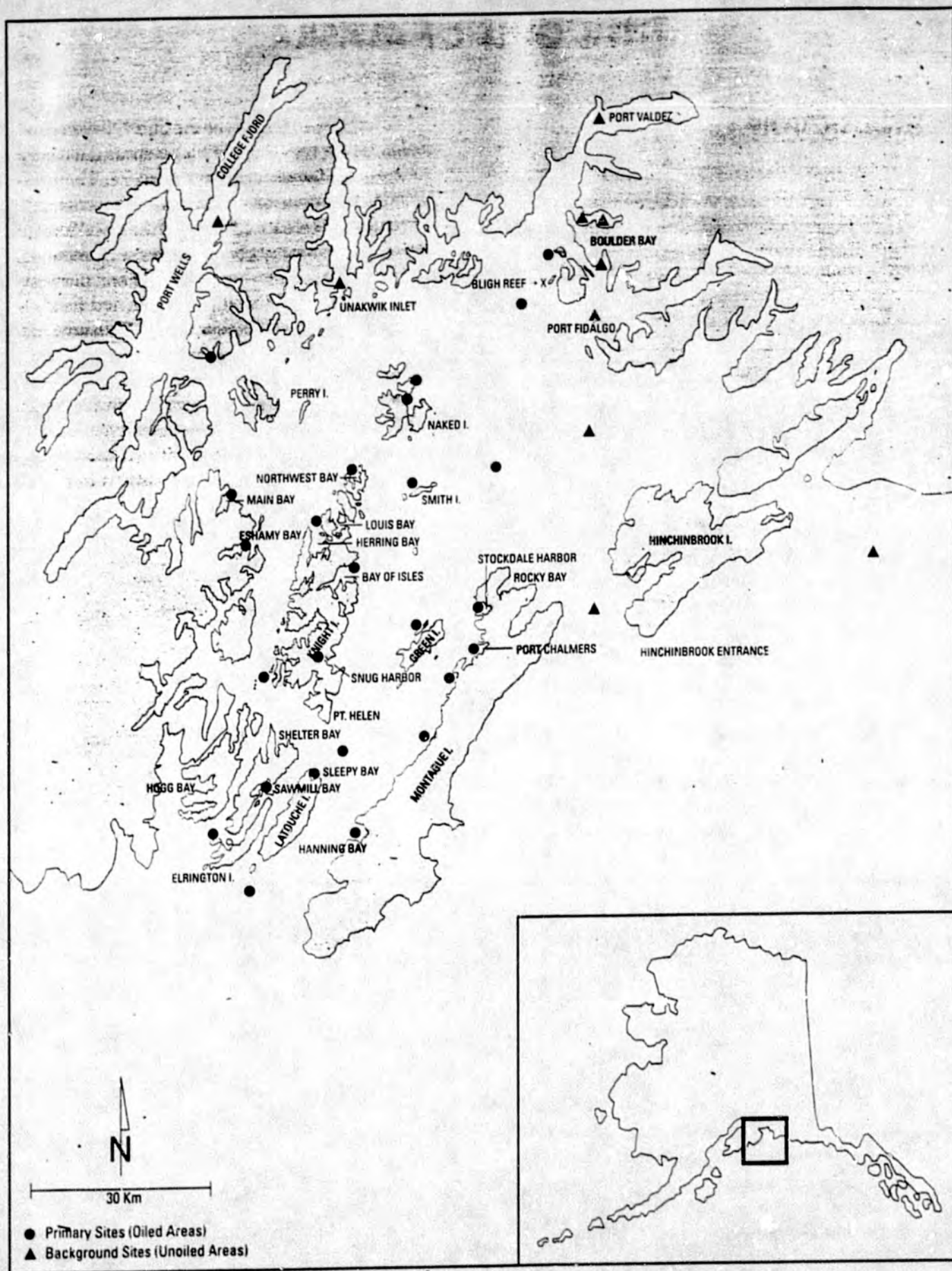


Figure 1. Station Locations in Prince William Sound Where Offshore Hydrocarbon Concentrations Were Measured.

WATER QUALITY IN PRINCE WILLIAM SOUND

OFFSHORE WATER QUALITY

FIELD PROGRAM

The first of Exxon's eight offshore water quality field surveys in Prince William Sound began on March 30, 1989. The most recent survey was completed in March, 1990. This section of the report contains a summary of the results of analysis of the 2,319 water samples (plus 845 quality control samples) collected in 1989 and early 1990 as part of the Prince William Sound offshore field surveys.

Sampling sites for the offshore water quality program were selected after discussions with state and federal agency personnel. A particular effort was made to identify and include areas important to wildlife and fisheries. About 40 percent of the sampling locations were in bays, and 60 percent were in more open waters of Prince William Sound. Several sampling sites also were selected in areas where the spilled oil did not go; these served as background or reference sites.

Sampling was performed at 35 stations (Figure 1), 29 of which were intended as primary sampling sites (locations where oil slicks or sheens had been reported or where oil was expected to drift). The other six stations were chosen in locations where it was apparent a few days after the spill that the oil would not go. These sites were designated as background or reference stations. Four of the original primary stations were located in areas where surface oil was never reported; thus, the offshore water quality program had 10 background and 25 primary stations. These are shown in Figure 1 as triangles and circles, respectively.

Water samples were collected from the water surface and from 1, 3, 9, and in some cases, 30 meters (approximately 3, 10, 30, and 98 feet, respectively) below the water surface, a depth interval believed to be sufficient to characterize oil contamination that might be present in the water column. From the third field survey onward, surface water samples were taken of any surface slicks that might be present in the general vicinity of a fixed sampling site. These samples were intended to represent the "worst-case" situation for oil contamination of surface waters of Prince William Sound.

Samples were collected, preserved, stored, and transported using well-established procedures. Rigorous quality assurance and quality control procedures were followed in all phases of the program, which included strict chain-of-custody procedures to ensure sample integrity from the time of collection through analysis in the laboratory and reporting of the final data. All samples from both primary and background stations were handled in the same way. Representatives of the Alaska Department of Environmental Conservation were included as observers on most of the water quality field surveys.

Quality control samples were collected during each field survey to ensure the reliability, accuracy, and precision of the sampling and analysis procedures. One sampling method was found to compromise sample integrity when quality control samples (called blanks) of high purity reference water that came in contact with the sampling device contained unreasonably high concentrations of some of the hydrocarbon classes. This sampling method was used to collect about 30 percent of the water samples from the first two field surveys; its use in the offshore Prince William Sound water quality study was discontinued after the second field survey. The results of some analyses of samples collected by this method are not included in this report, as discussed further in the Appendix.

PETROLEUM HYDROCARBON ANALYSIS

During the last 20 years, methods for the analysis of petroleum hydrocarbons in seawater have improved substantially. The methods used in Exxon's water quality program are either the latest EPA-approved methods or modifications of approved methods intended to increase the sensitivity of the analysis so that even very low concentrations of petroleum hydrocarbons can be detected and quantified. These sensitive and accurate methods are also able to distinguish between hydrocarbons from the spilled crude oil and those from other sources (e.g., diesel fuel, engine exhaust, or natural biological hydrocarbons).

Crude oil is a complex mixture of thousands of organic compounds of fossil biological origin. Most of these compounds are hydrocarbons (organic

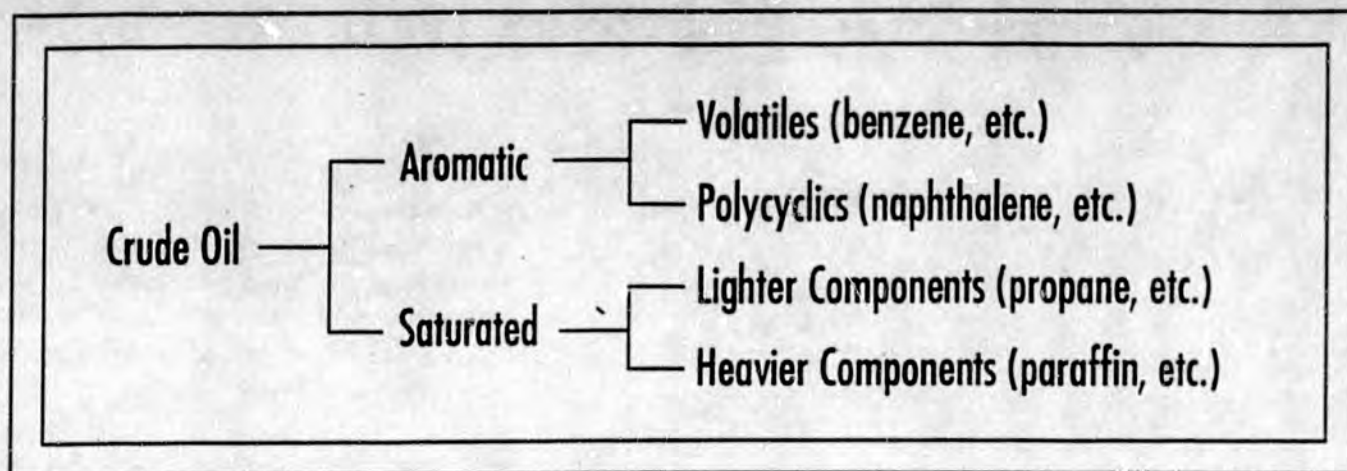


Figure 2. Crude Oil Hydrocarbon Groups

compounds made up of only carbon and hydrogen). There are two main groups of hydrocarbons: saturated and aromatic (Figure 2). In both groups, individual compounds range from low molecular weight, very volatile compounds such as propane (saturated) and benzene (aromatic) to high molecular weight, less volatile compounds like paraffin (heavy saturates) and naphthalene (polycyclic aromatic hydrocarbons).

Although crude oils may contain large amounts of volatile hydrocarbons, these volatile components evaporate so quickly from spilled oil on the water surface that they rarely cause adverse biological effects in water column plants and animals. Some of the medium-size polycyclic aromatic hydrocarbons (such as naphthalene) are slightly soluble and cause most of the toxicity of crude oil to marine organisms after a spill (Neff, 1990b). These compounds gradually disappear from the spilled oil through weathering (e.g., evaporation into the atmosphere, dissolution into and rapid dilution in the water column, microbial degradation, and degradation by sunlight). Some of the products of microbial and photodegradation of petroleum hydrocarbons are quite soluble and toxic. However, scientists at the National Marine Fisheries Service have shown that these degradation products are produced slowly and lost so rapidly through dissolution and dilution that they do not increase the toxicity of weathering oil (Malins et al., 1983). Thus, the toxicity of oil decreases continuously with time after a spill.

The concentrations in the water column of petroleum hydrocarbons resulting from oil spills usually are very low and it is difficult to visualize what the reported concentrations mean. A con-

centration of 1 part per million (ppm) is approximately equivalent to one cup of oil mixed uniformly in 50,000 gallons of water. Similarly, 1 part per billion (ppb) and 1 part per trillion (ppt) are equivalent to one cup of oil dissolved in 50,000,000 and 50,000,000,000 gallons of water, respectively. These volumes correspond to cubes approximately 19, 190, and 1,900 feet on a side.

ANALYTICAL RESULTS

Four types of analyses were performed on water samples collected for this study. Each type of analysis measures a different group of hydrocarbons and has a different sensitivity and ability to distinguish between petroleum hydrocarbons and organic compounds from other sources, as described below.

• Volatile Organic Analytes (VOA)

The VOA analysis is specific for measuring the concentrations of the low molecular weight, volatile aromatic hydrocarbons such as benzene, toluene, and xylene. Although these compounds are abundant in petroleum, there are many other sources of VOAs in the environment. (The concentration of benzene in the atmosphere, including remote regions of the globe, ranges from 0.1 to 14 ppb: Fishbein, 1984. Atmospheric benzene and other VOAs are derived from evaporation of petroleum products, industrial emissions, burning of wood and other organic materials, and natural decay of organic matter: Fishbein, 1984, 1985 a,b,c. VOAs may enter the ocean, even in remote areas, in rainfall.) These volatile aromatic hydrocarbons evaporate very rapidly from the water surface and from the upper water column.