No. 07-219

IN THE

Supreme Court of the United States

EXXON SHIPPING COMPANY, *et al.*,
Petitioners,

v.

GRANT BAKER, *et al.*,
Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Ninth Circuit

SUPPLEMENTAL JOINT APPENDIX VOLUME TWO

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Petition for Writ of Certiorari Filed August 20, 2007
Certiorari Granted October 29, 2007

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SUPPLEMENTAL JOINT APPENDIX
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Volume 2

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Liaison Counsel for Plaintiffs

Honorable H. Russel Holland

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ALASKA

In re:	)	
	)	Case No. A89-095-CV (HRH)
The EXXON VALDEZ	)	(Consolidated)
	)	
	)	
THIS DOCUMENT RELATES TO ALL CASES	)	
	)	

DECLARATION OF DAVID W. OESTING

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David W. Oesting declares as follows:

1. I am competent to make this Declaration and make this Declaration on the basis of facts known to me.

2. I am Lead Counsel for Plaintiffs in this litigation. I was appointed lead counsel by this Court for all of the Plaintiffs and all of their counsel on December 22, 1989, Pre-trial Order No. 9, Clerks Docket No. 748. I was charged with the duty to and have supervised, managed and directed all of the litigation related activities of plaintiffs and their counsel in these consolidated cases from that date to the date hereof. With respect to the facts set forth in this declaration, I have personal knowledge of the same either because I supervised the gathering and distillation of the information set forth in the performance of my duties as lead counsel or thoroughly investigated and confirmed the existence of such facts for purposes of fulfilling my duties and responsibilities as lead counsel. I make this Declaration in connection with Plaintiffs' submission concerning the Court's determination of the maximum punitive damage award permitted by the Constitution. In particular, I attach, for the Court's convenience, copies of some of the materials cited in Plaintiffs' Memorandum in Opposition to Renewed Motion of Defendants Exxon Mobil Corporation (D-1) and Exxon Shipping Company (D-2) for Reduction or Remittitur of Punitive Damages Award, submitted herewith.

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GENERAL

3. **Exhibits 1 and 2** are copies of this Court's Order Nos. 265 and 267.

EXXON'S CONDUCT

4. **Exhibit 3** contains excerpts from the testimony of Exxon witnesses in *Exxon Corp. v. Certain Underwriters at Lloyd's of London*, No. 93-40252 (Tex. D. Ct. May 28-29, 1996).

5. **Exhibits 5-10** are peer-reviewed professional journal articles and other reports summarizing the non-economic harm suffered by fishermen and Native Alaskans as a result of the Exxon Valdez oil spill. **Exhibit 4** is an excerpt of a similar paper presented at a symposium. Plaintiffs' Exxon Qualified Settlement Fund (EQSF) records indicate that there are approximately 14,000 fishermen (not counting unoiled fisheries) and approximately 4,300 Native Alaskans in the punitive damage class.

6. **Exhibit 11** is a representative example of the releases Exxon required commercial fishermen to execute in early 1989 before those claimants received any settlement from the Exxon Claims Program. This particular example was executed by Arne Berg on May 10, 1989 as a condition for receiving $12,736 for losses to his Prince William Sound herring season.

7. A total of 11.38% of any punitive damages recovery is being rebated to Exxon by virtue of the Seattle Seven and other processor cede-back agreements. Order No. 351 authorized the rebate of an 11% share in the wake of the Ninth Circuit's decision

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in *Icicle Seafoods, Inc., et al. and Exxon Corp., et al. v. Grant Baker, et al.*; *Icicle Seafoods, Inc., et al. v. Alaska Sportfishing Ass'n, et al.*, 229 F.3d 790 (9th Cir. 2000). Order No. 352 affirmed the proposed distribution of the 2.1% processor share to various processors, set out in Table 1 to the Amended Plan of Distribution of Allocations to the Processor Claim Category filed in support of All Plaintiff's Lead Counsel's Motion for Order Approving the Amended Plan of Distribution of Allocations to the Processor Claim Category and Approving Stipulation for Amendment of Processor Plan of Distribution and Fixing of Shares of Certain Signatory Processors, Clerk's Docket No. 7372, attached as **Exhibit 12** to this Declaration, including shares of 9.997% to Copper River Fishermen's Cooperative, 13.910% to Sea Hawk Seafoods, 7.213% to Kodiak Salmon Packers, and 6.161% to Western Alaska Fisheries, Inc. The shares Exxon was to receive from Western Alaska Fisheries, Inc. (100% of the 6.161%) and Kodiak Salmon Packers (95.42% of the 7.213%) were not contested, and were confirmed in the Order Approving Stipulation for Amendment of Processor Plan of Distribution and Fixing of Shares of Certain Signatory Processors, p.7, Clerk's Docket No. 7371. The shares Exxon is to receive from Cooper River Fishermen's Cooperative (16.02% of the 9.997%) and Sea Hawk Seafoods (23.92% of the 13.910%) were established in Order No. 352. The allocation to Exxon of 11.38% is summarized in the following table:

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Processor	Distribution Plan Share	Allocation Plan Share	Assignment %	Exxon Net
Seattle 7	11%		100%	11.00%
Cooper River	2.1%	9.997%	16.02%	.034%
Sea Hawk	2.1%	13.910%	23.92%	.070%
Western Alaska	2.1%	6.161%	100%	.130%
Kodiak Salmon	2.1%	7.213%	95.42%	.145%
TOTAL				11.379%

HARM

8. **Exhibit 13** contains excerpts from the Joint Reply Brief of Appellants filed April 21, 1997 in *Icicle Seafoods, Inc., et al. and Exxon Corp., et al. v. Grant Baker, et al.*; *Icicle Seafoods, Inc., et al. v. Alaska Sportfishing Ass'n, et al.*, Case Nos. 96-36038, 97-35036 (Consolidated), U.S. Court of Appeals, Ninth Circuit.

9. **Exhibits 14-30** provide support for the figures set forth in the Actual Harm section of Plaintiffs' brief, concerning verdicts and recoveries achieved thus far on behalf of eight groups of plaintiffs.

10. **Principal Fisheries.** The jury, in Phase IIA, determined that the harm to the principal salmon fisheries for the years 1989-1995 and to the herring fisheries for the years 1989-1994 totaled $286.8 million. Phase IIA Verdict. **Exhibit 14** is a copy of the Phase IIA Verdict. Of this amount, the jury awarded damages of $168.5 million for losses suffered by fisherman due to declines in prices paid for salmon and herring and for devaluation of permits, claims which Exxon never admitted and made no pre-trial

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payments to settle. See answers to Interrogatories 6, 16, 17, 23 and 25, Phase IIA Verdict.

11. **Seafood Processors.** As of the time of trial, seafood processors had recovered $123.0 million in settlements from Exxon. Amended Stipulation Regarding Impacts for Phase III at 5, ¶¶ 5-6. In general, these payments were in settlement of claims for 1989 only. Subsequently, the Seattle Seven group of processors settled their post-1989 claims for an additional $6 million. **Exhibit 15** is a copy of the Amended Stipulation Regarding Impacts for Phase III, setting forth the $123.0 million figure. **Exhibit 16** is a copy of the 1996 Settlement Agreement from Appellants' Joint Excerpts of the Record filed January 30, 1997 in *Icicle Seafoods, Inc., et al. and Exxon Corp., et al. v. Grant Baker, et al.*; *Icicle Seafoods, Inc., et al. v. Alaska Sportfishing Ass'n, et al.*, Case Nos. 96-36038, 97-35036 (Consolidated), U.S. Court of Appeals, Ninth Circuit, setting forth the $6 million settlement at p.4. Processors also received $5,007,094 from the TAPL Fund, see ¶ 13, for a total of $134,007,094.

12. **Native Alaskans.** The claims of the Native Alaskan class that would have been tried in Phase IIB were settled for $20 million. Amended Stipulation Regarding Impacts for Phase III at 2. Members of the class who opted out subsequently settled their claims for an additional $2.6 million. Order No. 307: Final Approval of Settlement Between Native Opt-Out Settlement Class and Exxon, filed January 19, 1996, Clerk's Docket No. 6600.

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13. **Data on Claims Paid from the Trans-Alaska Pipeline Liability Fund and from Exxon.** In connection with the administration of the Exxon Qualified Settlement Fund, the administrator sought and received information from the Trans-Alaska Pipeline Liability Fund regarding payments the Fund made to claimants during the Fund administration process and sought and received from Exxon regarding payments made to various claimants during its claims program. We have concluded that both sets of data, which were provided in electronic form, are reliable. See Affidavit of Timothy Petumenos filed in support of Plaintiffs' Memorandum Concerning the Maximum Punitive Damage Award Permitted by the Constitution on March 13, 2002, Clerk's Docket No. 7455. Further, the amounts Exxon reported it paid in its claims process have been almost uniformly confirmed by EQSF claimants who have been required to submit to the EQSF Administrator information regarding amounts received from the Exxon claims program as setoffs against their potential recoveries. To the extent there has been any difference between the payment amounts submitted by Exxon and those acknowledged by claimants, the administrator has thus far concluded in each case that the Exxon data is correct. In summary those data show the following payments by plaintiff group. The Fund made payments of $34,162,822 to Native Corporations, $33,191,344 of which was paid to the Native Corporations that ultimately tried their claims in state court (the "Chugach Group"), and $971,478 of which was to other Native Corporations. Processor workers received $1,787,232 from the Fund, and $10,787,886 from the Exxon

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claims program. See **Exhibit 17** which is an excerpt from January 13, 1995 letter from Richard M. Clinton to Michael Woerner. Municipalities received $1,340,178 from the Fund. Area businesses and others received $388,596 from the Exxon claims program, and $219,305 from the Fund. Tenders received $2,144,635 from the Fund, and $1,159,517 from Exxon claims. See **Exhibit 18** which is Exhibit C to Memorandum in Support of Motion of Defendants Exxon Corporation (D-1) and Exxon Shipping Company (D-2) With Respect to Judgment to be Entered on the Phase III Verdict, filed March 28, 1996, Clerk's Docket No. 6684. Brokers received $139,827 from the Fund, and $17,410 from the Exxon claims program. See **Exhibit 18**. Processors received $5,007,094 from the Fund. When Plaintiffs sought Court approval of their settlement with the Alyeska Pipeline Service Company, Clerk's Docket No. 3718, Exxon initiated independent litigation against Alyeska in an attempt to reconfigure the settlement with respect to Exxon's contribution rights that would have made the settlement unacceptable to Alyeska. Objections of Exxon Corporation (D-1) and Exxon Shipping Company (D-2) to Alyeska Settlement, Clerk's Docket No. 3971.

14. **Chugach Group Native Corporations and Associations.** Six Prince William Sound Native Corporations recovered a total of $33,191,344 from the Trans-Alaska Pipeline Liability Fund and were paid an additional $2,808,003 by Exxon. The source of the latter payments is a report prepared by Exxon Community Liaison Manager W. Monte Taylor (the "Taylor Report"), a portion of which is attached hereto as

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Exhibit 19. Taylor lists Exxon payments to the Chugach Corporations and Chugach Area Native associations as follows:

Corporation/Association	Claim Paid	Reference Page
Chugach Alaska Corp	$965,995	Z7301273492
The North Pacific Rim	$400,000	Z7301273431
Chugach Alaska Corp.	$289,616	Z7301273358
Chenega Village Corp.	$63,346	Z7301273358
The North Pacific Rim	$73,329	Z7301273358
Chenega Corp.	$1,015,717	Z7301273455
TOTAL	$2,808,003	

These PWS corporations also pursued their claims in Alaska Superior Court, obtaining jury awards totaling just under $9 million, **Exhibit 20** (Jury Verdict Forms), and settlements of additional claims totaling $592,500. **Exhibit 21** is the September 7, 1994 letter from Patrick W. Crumb to Ralph V.L. Ertz ($60,000) and **Exhibit 22** is the Settlement Agreement and General Release between ExxonMobil Corporation and SeaRiver Maritime, Inc. and English Bay Corporation and Port Graham Corporation dated June 1, 2000 ($532,500). To resolve issues concerning alleged overcompensation resulting from the overlapping Fund and jury awards, the Native Corporations received only $152,275 on the jury awards (representing the claim of Tatitlek (with interest), because Tatitlek recovered $243,948.60 from the jury and had received $94,090.55 from the Fund). Further, the other PWS corporations agreed to repay the Fund approximately $7.4 million. **Exhibit 23** is the Settlement Agreement and Release between the Native

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Corporations and the Fund. The net total amount recovered by the PWS Corporations and Associations is thus $29.34 million.

15. **Other Native Corporations and Associations.** Several other Native Corporations pursued their claims through negotiations with Exxon and claims against the Fund. They recovered a total $1,410,159, of which $971,478 was from the Fund, ¶ 13 above, and $438,691 is described in the Taylor Report, as summarized in the following table:

Corporation/Association	Claim Paid	Reference Page
KANA	$300,000	Z7301273353
KANA	$93,425	Z7301273358
KANA	$45,266	Z7301273359
TOTAL	$438,691	

Thus, the net total recovery for all Native Corporations and Associations is $30.75 million, summarized as follows:

Description	Amount
Chugach Group Initial TAPL Fund Recoveries	$33,191,344
Exxon Settlements With Chugach Group	$2,808,003
Additional Settlements	$592,500
Tatitlek Net State Jury Recovery	$152,275
Repayment to the Fund	-$7,400,000
Other Native Corporation Fund Recoveries	$971,478
Other Native Corporation and Association Recoveries	$438,692
TOTAL	$30,754,292

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16. **Municipalities and Villages.** Approximately two dozen municipalities and villages obtained $8.5 million in settlement payments from Exxon during 1989-1991, which are described in the Taylor Report. The sources of those payments and amounts are set out in **Exhibit 24**. Seven of these communities pursued additional claims against Exxon in Alaska Superior Court. Thus far, they have recovered $974,000 in settlements (composed of $245,000 received in 1995 by the cities of Seward, Old Harbor, Port Lions, Ouzinkie and Larsen Bay, **Exhibit 25**, attached; $255,000 for land claims of the cities of Old Harbor, Ouzinkie, Port Lions and Larsen Bay, discussed in paragraph (1) of **Exhibit 25** attached; $455,000 received in 1995 by the city of Cordova and Kodiak Island Borough, **Exhibit 26** attached; and $19,000 recovered by the City of Ouzinkie, **Exhibit 27** attached). Kodiak Island Borough successfully tried its land claims realizing $724,000 at trial. **Exhibit 28** is the jury's verdict. A group of municipalities pursued successful TAPL Fund claims totaling $1,340,178 (¶ 13, above) and another group of municipalities received $1,500,000 as part of the State of Alaska's recovery against Alyeska for their lost fish taxes. The Exxon Defendants successfully defended against several municipalities' claims in state superior court on the basis that Alyeska's payment to the state had satisfied these claims. The total recoveries for municipalities and villages is $13.059 million.

17. **Phase IV Plaintiffs.** Phase IV of the trial would have included claims by commercial fishermen in a variety of fisheries, as well as claims of landowners and

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aquaculture associations. The delay in waiting to try these claims, however, delayed the entry of judgment and, with it, the running of interest on the remainder of plaintiffs' claims. Ultimately, it became clear that plaintiffs stood to lose more in interest from delaying the entry of judgment than they stood to gain from trying these claims. Plaintiffs' Memorandum in Support of Joint Motion of Plaintiffs and Defendants for Preliminary Approval of Phase IV Settlement, Plaintiffs' Motion for Preliminary Approval of Plan of Allocation of Recoveries Obtained by Plaintiffs in Litigation Arising From the Exxon Valdez Oil Spill, and the Orders Requested in Those Motions Scheduling a Hearing on Final Approval of the Phase IV Settlement and Plan of Allocation, and Authorizing Notice to Class Members, pp. 32-33, filed January 12, 1996, Clerk's Docket No. 6592. Accordingly, the claims were settled, with no money changing hands, apart from the $13,357,000 that the Phase IV plaintiffs had previously been paid by Exxon and the TAPL Fund. Of this amount, $8,123,000 was paid to Prince William Sound Aquaculture Corporation by Exxon. Payments by the TAPL Fund provided $604,473, see ¶ 13, above. The balance, $4,629,418, is set forth in Appendix 3 to Settlement Agreement Between Exxon and Plaintiffs With Respect to Phase IV Claims, filed January 17, 1996, Clerk's Docket No. 6596, **Exhibit 29** ("Exxon Claims" column).

18. **Cannery Workers, Tenders, and Seafood Brokers.** These plaintiffs, whose claims have been restored by the Court of Appeals, have previously recovered

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$16.0 million in voluntary payments by Exxon and recoveries from the TAPL Fund. The amounts paid are summarized in the following table:

Category	Fund Award	Exxon Claim Payment
Processor workers	$1,787,232	$10,787,866
Tenders	$2,144,635	$1,159,517
Brokers	$139,827	$17,410
TOTAL	$4,071,694	$11,964,793

19. **Area Businesses and Others.** Though Order No. 189 dismissed the claims of these plaintiffs, it encouraged them to seek to recover for their harm from the Fund. These plaintiffs did, in fact, recover, from the TAPL Fund and from Exxon directly, approximately $607,901. **Exhibit 30** sets forth the $388,596 recovered from Exxon. $219,305 was recovered from the Fund by area businesses.

20. There are presently pending, in this Court, claims for additional compensatory damages on behalf of four categories of plaintiffs, whose claims were dismissed by this court but reinstated by the Ninth Circuit. Plaintiffs anticipate seeking damages on the claims for economic losses restored by the United States Court of Appeals for the Ninth Circuit in *In re: the Exxon Valdez*, 270 F.3d 1215 (9th Cir. 2001), of between $76,720,000 and $124,875,000 on behalf of tendermen and their crew, cannery workers, seafood processors, and seafood wholesalers/brokers, net of payments already received. The higher number of this range is derived in exactly the same manner as the damages figures were calculated for purposes of Plaintiffs' allocation and various

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distribution plans. The lower number is calculated to reflect the actual harvest losses awarded to Plaintiffs by the jury in the 1994 trial of this case.

21. **Exhibit 31** contains excerpts from the trial testimony of Exxon witness Otto Harrison on July 11, 2002 in *Kodiak Island Borough v. Exxon Corporation, et al.*, Case No. 3KO-89-264 and *City of Seward et al v. Exxon Corporation, et al.*, Case No. 3KO-92-134, all consolidated in *In Re: Exxon Valdez Oil Spill Litigation*, Case No. 3AN-89-2533 CI in the Superior Court for the State of Alaska, Third Judicial District.

PENALTIES

22. **Exhibit 32** is the Government's Memorandum in Aid of Sentencing, *United States v. Exxon Corp.*, No. A90-C15-CR (D. Alaska Sept. 30, 1991).

EXXON'S FINANCIAL CONDITION

23. **Exhibit 33** is an excerpt from the Declaration of Edgar A. Robinson in Support of Proposals of Exxon Defendants to Secure Payment of the Judgment, filed August 23, 1996, Clerk's Docket No. 6879, in this Court, stating that "both Moody's Investors Service, Inc. and Standard & Poor's Corporation have issued opinions stating that payment of the full amount of the Judgment would not have a material impact on the corporation or its credit quality."

24. **Exhibit 34** is an excerpt from Exxon's Motion Pursuant to Rule 8 FRAP for Stay of Execution Secured by Escrow of Exxon Corporation Commercial Paper, filed

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in the Ninth Circuit on March 31, 1997, stating that "Exxon's financial strength increased significantly" in the year following the verdict in this matter.

25. During the 13 years this litigation has been pending, over a thousand depositions have been taken, over 12 million documents produced and reviewed, and over 650 orders issued by the Court and Discovery Master. More than a dozen appeals have been generated. Plaintiffs' counsel have invested time over 13 years with a going value of $169,225,000 and incurred unreimbursed expenses of $21,919,000. Over the same period, Plaintiffs' records indicate that over 900 Plaintiffs have died (given normal life expectancies, plaintiffs suspect that the actual number is probably much higher), and many have filed petitions in bankruptcy.

26. **Exhibit 35** contains Exxon's Financial highlights through 2001, including Total Revenue, Net Income, Cash Flow from Operations and Asset Sales, and Shareholders' Equity at Year End. This document was obtained from Exxon's web site on July 12, 2002, in the section containing investor information, and is available at http://www2.exxonmobil.com/Corporate/InvestorInfo/Corp_InvestorInformation.asp. **Exhibit 36** lists the market capitalization for the ten larges New York Stock Exchange-listed companies and was obtained on July 15, 2002. This document is available in the Quick Facts section at http://www.nyse.com/marketinfo/marketinfo.html.

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DATED this 19th day of July, 2002.

DAVID W. OESTING

Certificate of Service

The undersigned certifies that on July 19th 2002, pursuant to Pretrial Order No. 9, § (2), dated December 29, 1989, a copy of the foregoing was served on the following attorneys or parties of record by:

( ) Mail
( ) Facsimile
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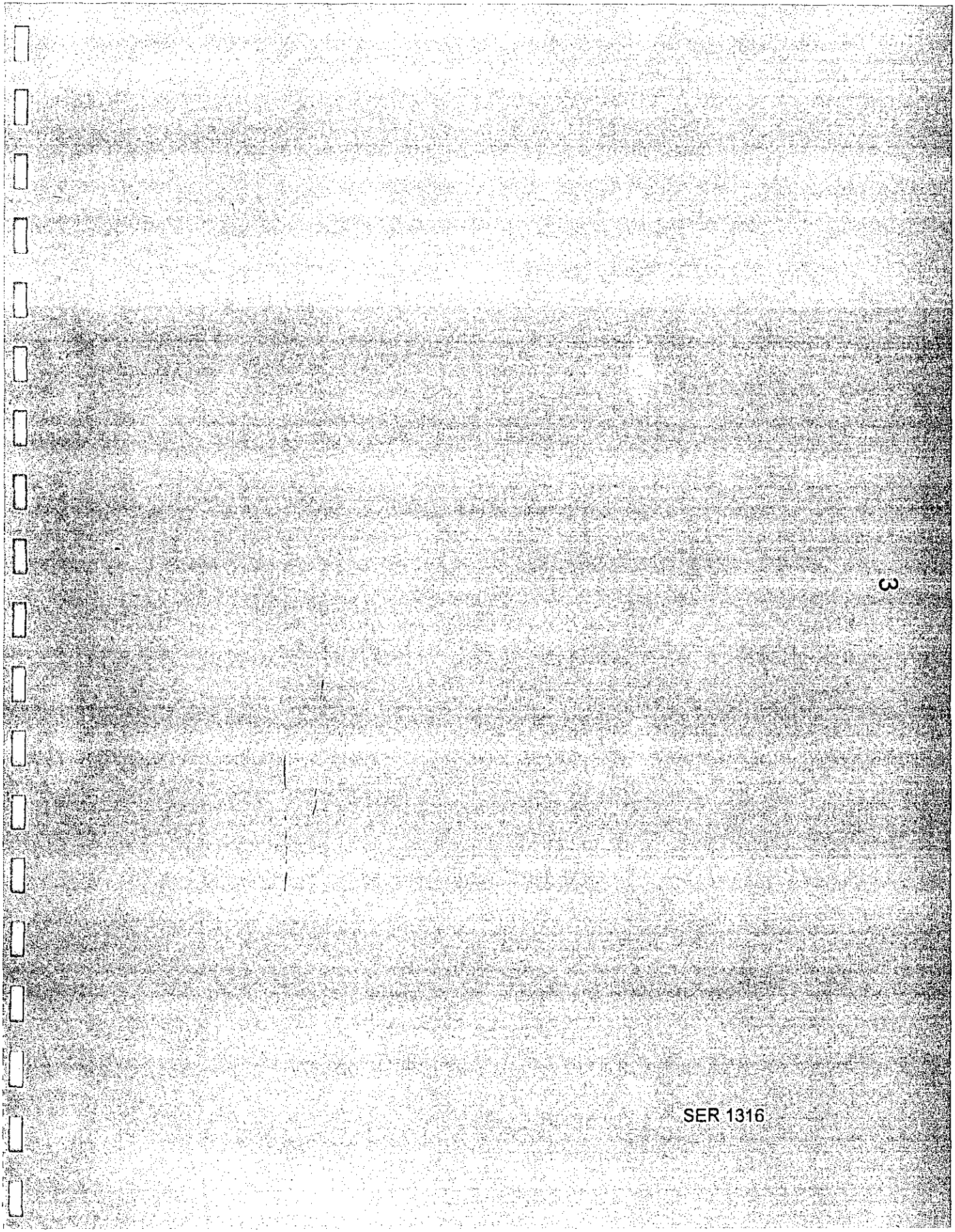

No. 93-40252

EXXON CORPORATION	:	IN THE DISTRICT COURT OF
	:	
vs.	:	HARRIS COUNTY, T E X A S
	:	
CERTAIN UNDERWRITERS AT LLOYDS OF LONDON	:	189TH JUDICIAL DISTRICT

STATEMENT OF FACTS

BE IT REMEMBERED that on the 28th day of May, 1996, before the Honorable Carolyn Marks Johnson, judge presiding, the following proceedings were had, to wit:

MARTHA C. ADAMS
OFFICIAL COURT REPORTER

EXHIBIT 3

A-P-P-E-A-R-A-N-C-E-S:

COUNSEL FOR PLAINTIFFS:

Mr. Don Bowen
Ms. Lynn Liberato
Ms. Eileen O'Neill
Mr. Robert Levy
Mr. John Tavormina

COUNSEL FOR DEFENDANTS:

Ms. Franci Crane
Mr. Harry Reasoner
Mr. John Murchison
Mr. Karl Stern

A Well, when we use the term "management," I want to be sure you understand that the courts have held that fleet managers, operational personnel, port engineers and superintendents have sufficient supervisory capacity to satisfy the privity or knowledge standard as a representative of the owner.

Q And with that clarification, there would be privity if management knew of Captain Hazelwood's incompetence due to use of alcohol?

A That's my understanding, yes.

Q And if you look down in the third paragraph on Page 10, you wrote: "Our inquiries leave no room for reasonable doubt that Exxon Shipping will never be able to sustain its burden to show lack of privity or knowledge with the use of alcohol by Captain Hazelwood."

A Yes, sir.

Q And that was your conclusion back in 1989?

A It was.

Q In the next paragraph you state, "The following facts which claimants will establish readily cannot be denied." Do you see that?

A Yes, sir.

Q You go on to write, "Exxon shipping obtained no

medical report indicating that Captain Hazelwood has been successfully rehabilitated from alcohol abuse and that he was physically and emotionally fit to resume command."

Did I read that correctly?

A You did.

Q You go on to state, "Exxon Shipping obtained no professional guidance from experts in the field of alcohol rehabilitation on the proper handling of Captain Hazelwood on his return to work."

Is that what you wrote?

A I did.

Q That's an additional fact?

A Yes, sir.

Q The next fact you write is, "Exxon Shipping Company did not require Captain Hazelwood to submit to any random tests for alcohol use or to participate in any continuing maintenance program usually associated with alcohol treatment."

Is that right?

A That is correct.

Q You then state, "Exxon Shipping conducted no private investigation or surveillance of Captain Hazelwood's alcohol consumption onshore or at sea."

Is that right?

A Yes, sir.
Q Next you state, "Exxon Shipping had no policy which was designed to encourage employees to report unsafe practices of others, including superiors, particularly in regard to drug and alcohol use."
Is that right?
What I read was yet another fact that supported your view that Exxon Shipping would never be able to sustain its burden to show lack of privity?
A It was one of the facts that we were reciting --
Q And so --
A -- in support of that conclusion.
Q Now, returning to some earlier parts of the memorandum, beginning on Page 1 and continuing on Page 4 or to Page 4, you discuss or set forth your understanding of the applicable facts?
A Yes, between Pages 1 and the top of Page 4.
Q And you discuss the circumstances surrounding the grounding of the VALDEZ?
A They are included in -- in those facts, yes.
Q And you also have a brief history of Captain Hazelwood's treatment for alcohol and subsequent monitoring by Exxon Shipping Company? I'm looking at beginning on page 3.

STATE OF TEXAS :

COUNTY OF HARRIS :

I, Martha C. Adams, official court Reporter in and for the 189th District Court of Harris County, State of Texas, do hereby certify that the above and forgoing contains a true and correct transcription of all proceedings directed by counsel to be included in the statement of facts in the above styled and numbered cause, all of which occurred in open court or in Chambers and were reported by me.

I further certify that this transcription of the record of the proceedings truly and correctly reflects the exhibits, if any, offered by the respective parties.

WITNESS my hand this the day of , 1996.

Martha C. Adams
Certified Shorthand Reporter
In and for the State of Texas

Certificate No. 1614
Expiration 12-31-96
301 Fannin, 2nd Floor
Houston, Texas 77002
(713) 755-6366

No. 93-40252

EXXON CORPORATION	:	*IN THE DISTRICT COURT OF*
	:	
vs.	:	HARRIS COUNTY, T E X A S
	:	
CERTAIN UNDERWRITERS AT LLOYDS OF LONDON	:	189TH JUDICIAL DISTRICT

STATEMENT OF FACTS

BE IT REMEMBERED that on the 29th day of May, 1996, before the Honorable Carolyn Marks Johnson, judge presiding, the following proceedings were had, to wit:

MARTHA C. ADAMS
OFFICIAL COURT REPORTER

A-P-P-E-A-R-A-N-C-E-S:

COUNSEL FOR PLAINTIFFS:

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COUNSEL FOR DEFENDANTS:

Ms. Franci Crane
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Mr. John Murchison
Mr. Jim Kronzer

you drinking again," was what I remember Herb telling me, his summary. And the response from Captain Hazelwood was, "No, I'm not drinking." "I'm clean," I believe was the term he used. And I recall Herb telling me that he put -- kind of put Captain Hazelwood on notice that if there was any drinking going on on the ship, that it had to stop. And if there was any alcohol on the ship, it needed to be removed. And that was what I remember him passing on to me.

Q You mentioned that Mr. Leyendecker told you that Captain Hazelwood denied that he was drinking. What was your reaction to what Mr. Leyendecker told you about that denial?

A I remember telling Herb that I'm -- that I wasn't sure that that was true.

Q And why were you not sure that that was true?

A I had -- I had been to lunch with a group from the vessel, I think, a week prior, early May, the 5th maybe, and -- at a local restaurant where I was -- I didn't really take notice specifically of what -- I wasn't keeping an eye on Captain Hazelwood, by any means, but I'm pretty sure that he had a beer with lunch, as most of the group did. So I passed that on to Herb at that time.

Q Was that the lunch that occurred at the Pal Shanty Restaurant?
A Yes.
Q Mr. Day, on May 19, 1988, five days after the Henry's incident, was there another occasion when you saw Captain Hazelwood and you believed him to be intoxicated?
A Yes.
Q On that occasion were you accompanied by Coast Guard Officer Greg Krivdo?
A Yes.
Q Tell us what happened on that occasion.
A The ship was preparing to sail on Friday. I believe it was the 20th. At the completion of the Coast Guard's inspection of the vessel, which occurred during that repair period, there was one outstanding requirement that the Coast Guard was issuing us. It's called a CG Form 835 is the -- is the term. And the ship was being required to reverify the maneuvering data, which is essentially the turning circles, how -- how much distance it takes to make a full circle at full rudder, part rudder. It's a requirement to have that information on board. So Chief Warrant Officer Krivdo and myself were -- arranged to meet on -- on

board the vessel and present this requirement to Captain Hazelwood. The master is required to sign the CG 835 form acknowledging it, accepting it. So that was what we went on board to do.

Q What time of day did you go on board?

A It was approximately 2:00 in the afternoon.

Q And did you -- did you go to Captain Hazelwood's cabin?

A Yes.

Q Tell us what happened then.

A My recollection is we came -- we came across Captain Hazelwood in the doorway of -- I believe the official name of the room is the file room that's adjacent to the master's quarters, and Chief Warrant Officer Kri·do, you know, presented Captain Hazelwood with the 835 form --, and it's a small maybe 5-by-8 size form -- for him to read and sign.

Q What condition did Mr. -- Captain Hazelwood appear to be in when he met you there?

A He appeared to me to be intoxicated.

Q What made you think he was intoxicated?

A His eyes were very bloodshot. His speech was quite slurred. His stance was a bit unsteady as he was standing there trying to -- trying to read the 835.

Q Could you smell alcohol?

A I don't recall smelling alcohol, no.
Q Was Captain Hazelwood able to discuss the information needed for the Form 835?
A Not very well. My recollection is he made a few statements like -- such as, "What's" -- "What's this about." And didn't -- didn't seem to me that he really understood or was able to comprehend what was on the paper.
Q What was your reaction to Captain Hazelwood's condition?
A I was quite embarrassed, you know, for the company in my position as a representative of the company.
Q What did you do?
A Well, I kind of stepped aside from the doorway, because it was primarily Mr. Krivdo who was trying to explain the requirement to Captain Hazelwood. So I stepped off to the side a bit as he tried to explain it for a couple of minutes.
Q Was Mr. Krivdo able to explain the form so that Captain Hazelwood ultimately understood it and signed it?
A I can't recall specifically if he signed it that day or not. I believe that Mr. Krivdo's parting, you know, statement was something to the effect, "Well, Captain, if you" -- you know, "If you have

any more questions tomorrow, we can go over it then. I'll be on board." But I can't remember specifically if he signed it that day or the following day.

Q I believe you testified earlier that you were embarrassed as a representative of the company. Did you have any other concerns?

A I was concerned that he might not be capable of piloting the ship down the river the following morning if his condition didn't improve from what I saw him that afternoon.

Q Was the VALDEZ due to depart soon after this incident?

A Approx -- at 7:00 a.m. on the 20th.

Q Were you concerned that you might have to take some kind of action with respect to Captain Hazelwood?

A Yes.

Q What did you think you might be required to do?

A I was concerned that I might have to stop the ship from sailing if he wasn't in a condition to -- to go down the river.

Q Did you have to take this action?

A No, I did not.

Q Why not?

A When I arrived on board the following morning at

approximately 6:00 a.m., from my best recollection, I immediately, you know, sought out Captain Hazelwood to determine his condition; and he seemed to be fine. He -- so I didn't have to intervene, and the trip down the river went -- went fine. No problems. He performed his job just as I would expect him to.

Q You sailed with the ship down the river?

A Yes, I did.

Q How long were you gone?

A Oh, it was about a -- it's about a 12-hour trip.

Q Did you report this May 19, 1988 incident in which Captain Hazelwood appeared to be intoxicated to anyone?

A Yes, I did.

Q To whom did you report it?

A To Paul Myers.

Q Anyone else?

A No, not at that time.

Q When did you report the May 19, 1988 incident to Paul Myers?

A My best recollection is that I talked to him on the 19th by -- over the telephone.

Q Where was Mr. Myers at that time?

A My recollection is he was in the Benicia office,

west coast fleet office.
Q What did you tell him when you talked to him on the phone that day?
A I informed him about the status of the repair, for one, you know, that the ship repairs were essentially complete and we were ready to sail the following morning. My recollection is that I also informed him of the incident with the 835 and Chief Warrant Officer Krivdo and of my concern that Captain Hazelwood may not be capable of performing his duties the following day.
Q And what did Mr. Myers say?
A My recollection is that he asked me to essentially monitor the situation and if there was something in the morning that -- if there was a problem in the morning with Captain Hazelwood's condition, that I -- you know, he had -- I had his support in stopping the operation and calling him or whatever I needed to could. That's my recollection.
Q Did Mr. Myers indicate at that time that he would make any attempt to talk to Captain Hazelwood before the ship set sail?
A No, he did not.
Q Do you recall if he ever indicated in that conversation that he would come up to the shipyard

and talk to Captain Hazelwood personally?
A I remember -- my recollection is that we discussed that, that it was my preference that he do that. And I recall -- my recollection is that the timing was such that there were no flights available or he didn't feel he could get there in sufficient time to do that.
Q Why was it your preference that he come to talk to Captain Hazelwood?
A He was Captain Hazelwood's direct operational supervisor. Also, as I said before, me being a fleet officer on a temporary shore assignment, when I returned to the fleet Captain Hazelwood could have potentially been my -- you know, my supervisor and responsible for evaluating my performance, and I felt it might have some very adverse career implications for me to be involved in intervening in this case.
Q Did you talk to Paul Myers on another occasion about this Form 835 incident?
A Yes, I did.
Q Did you talk to him in person?
A Yes.
Q Do you recall when that was?
A It was when I returned to the Benicia office after

the VALDEZ had sailed from Portland. Approximately -- probably would have been Monday. The ship sailed on a Friday. I left Portland on Saturday and went into the office the first time on Monday, I think it would have been the 25th. No. 23rd. 23rd. Well, the first day in the office after the vessel sailed.

Q And what did you do?

A I gave him a -- kind of a synopsis of the repair, you know, how the repairs went. And I also recall discussing these two incidents with Captain Hazelwood.

Q By "these two incidents," what do you mean?

A The Henry Weinhardts incident as well as the 835 incident.

Q Did you tell him about the lunch you had at Pal Shanty with Captain Hazelwood?

A I can't specifically recall that, no, at this point. I'm not sure.

Q What was Mr. Meyer's response to the information you gave him?

A I don't recall much of a response from Mr. Myers.

Q Not at all?

A No. He -- he has a very flat, you know, affect. He just kind of listened; and I don't really recall

much of a response, physical or verbal, you know, just listened.

Q Did you ever hear that Mr. Myers took any further action with respect to those incidents?

A No, I did not.

Q Mr. Day, I'd like to show you what's been marked as Exhibit 1 to your deposition. This is a document entitled interview with Steven M. Day that purports to be a taped interview of you by Bud Barnum on April 4, 1989. Do you remember being interviewed by Bud Barnum?

A Yes.

Q Did you understand who Mr. Barnum was?

A Yes.

Q Who did you understand him to be?

A An -- an investigator for an outside law firm retained by Exxon Shipping.

Q And for what purpose did you understand he was retained?

A To investigate any, I'd say, background information regarding the VALDEZ and Captain Hazelwood.

Q Have you ever seen a copy of this transcribed interview before?

A Yes.

Q Would you look at that Exhibit 1 and tell me if it

place in '88 on the VALDEZ with Hazelwood there -- I had the occasion to witness an incident in the doorway of the master's cabin between Paul Myers and Joseph Hazelwood where the -- Joe was acting, I thought, in somewhat a -- an erratic manner. He was gesturing and being loud and abusive towards Paul Myers. I had come upon the situation, thought it wasn't my place to hang around and overhear the situation, so I exited the area and they concluded their discussion.

Shortly thereafter I saw Paul Myers walking around in the superstructure of the VALDEZ and asked him, of course, "What was that all about," which was this behavior that I witnessed of Hazelwood's was, from my knowledge of Joe Hazelwood, uncharacteristic. And I thought it must be something very serious, and I was just curious as to what had brought this to pass.

During the conversation Paul Myers conveyed to me that it was some sort of a personnel-related matter that -- that Hazelwood didn't -- didn't agree with the way it had been handled, I suppose, by someone other than himself, perhaps shoreside staff. Joe also -- excuse me. Paul also mentioned to me that he thought that Joe had perhaps gone

back to drinking because of his behavior. And during that conversation he also mentioned to me that -- perhaps he had mentioned to me that Joe had been in some kind of a program to correct that situation.

Q With regard to your duties that day, did you have any other duties or responsibilities other than to participate in the stewardship review?

A None formally assigned before I got there, that's correct.

Q And sir, were any duties subsequently assigned to you once you boarded the EXXON VALDEZ?

A Yes, they were.

Q And what were those?

A It was a -- as I recall, a singular request from Paul Myers that after -- I came across him after the -- excuse me, after the incident between Myers and Hazelwood. Myers had asked me to try to find out if Hazelwood had been ashore prior to our being -- "our" being Harvey, Myers and myself -- coming on board that morning.

Q And did you do that, sir?

A I attempted to do that, correct.

Q What did you find out as a result of your investigation?

A It was totally inconclusive. I made an attempt to interview -- I interviewed the unlicensed person who was watching the gangway, the place that people come on board the ship from the launch, to see if he had any recollection of whether or not Hazelwood had been ashore and gotten back on board sometime before we came on board. The results of the interview were inconclusive. The person either did not know or wasn't willing to share with me any knowledge he had of Hazelwood's comings and goings.

Q What did you tell Mr. Myers at this subsequent meeting when you --

A I came back.

Q -- shared the results of your investigation when you came back?

A That it was inconclusive, that I didn't learn anything.

Q And what did -- how did he respond to that?

A "Okay. You did the best you could."

Q Did he request that you do anything else to follow up?

A No, he did not.

Q Did you have any other discussions with Mr. Myers other than the ones you have mentioned prior to the stewardship review?

A Yes.
Q And when did that conversation occur?
A That conversation occurred when I initially came on board the VALDEZ.
Q And what was said during that conversation?
A Oh, I sought Mr. Myers out after I got on board the VALDEZ and asked him why they had -- that he and Harvey had instructed the people who ran the launch service not to tell me that they weren't currently running launch service and left me sort of like, if you will, figuratively speaking, sitting on the dock, waiting for the launch to go out on the VALDEZ. During the conversation Paul apologized for having done that and explained that it was Harvey's idea. And that by way of explanation as to why Harvey did that, Paul said Harvey wanted to get on board first and be sure everything was okay before I came on board.
Q And did Mr. Myers explain as to what Mr. Borgen meant by "everything being okay"?
A He did not.
Q And, Mr. Pitman, what do you mean by "in good shape," the term "good shape"?
A I'm sorry, I can't remember what context I might have used that in.

Q You just used it in the immediate -- immediately prior to this --
A Oh, that "Joe was in good shape"?
Q Yeah. "That Joe was in good shape."
A I'm presuming here that not intoxicated, that he was on board available for -- being there for the meeting.
Q Had you ever heard of an incident before where the ship coordinator or supervisor wanted to go out to the ship prior to any other individuals coming out for the stewardship review?
A No, I have no knowledge of any other instance similar to this.
Q From the time you first saw Captain Hazelwood that day, and that was when he was talking to Mr. Myers, how did Joe Hazelwood appear in his address and appearance?
A He was ill-kempt, hair uncombed. The most distinct impression I got from seeing Joe at that first meeting was his behavior more than his appearance. He seemed agitated, loud, aggressive, uncharacteristic of the Joe Hazelwood that I knew from my brief sailing with him years before.
Q Do you recall what you observed concerning Joe Hazelwood's appearance --

A Yes, I do.
Q -- and dress when you first entered the cabin?
A Yes, I do.
Q And what was that?
A Joe entered the room from the master's bedroom on the starboard side of the vessel. He came in dressed in a shirt, blue jeans, no socks, no shoes, and as I mentioned previously, his hair was uncombed, what there was of it. He -- his beard wasn't trimmed. His physical appearance was very bad. The man appeared to be in extremely poor health. He was pale, haggard, his eyes were bloodshot. He looked listless, just devoid of any life energy at all.
Q How about when you previously met Joe Hazelwood back in the 1970's?
A When he was a chief mate on the PHILADELPHIA, the difference was dramatic. It was night and day. Joe was a picture of health and well-being when I sailed with him, so that also is why some of these memories stuck so much in my mind, is that the tremendous contrast between the Joe I remembered and the Joe that I saw on the VALDEZ stewardship review meeting.
Q How long did this meeting last?

A Approximately an hour. One hour.
Q Do you recall on a general basis what was discussed during this review?
A My best recollection is that I led off the discussion and went through my package of stewardship factors, I was responsible for tracking, assembling and presenting at the meeting. They were politely and quietly received. During my presentation Joe fell asleep in his chair, and I wasn't quite sure what to do at that stage, so I looked over to the area of Paul Myers and Harvey Borgen where they were sitting to seek some guidance. They made a gesture to me -- one or both of the other -- "Just keep rolling, go on with your presentation," as if nothing happened, and I did. My presentation would have taken about 15 to 20 minutes, and I believe that's how long it took. After I was done, the rest of the meeting, while Joe slept, involved the primary discussion between Paul Myers and the chief engineer regarding shipboard mechanical repair expense-type items.
Q How did Joseph Hazelwood appear to you once he fell asleep? What was his appearance and demeanor?
A Well, he was very relaxed, of course, being asleep. He was kind of slouched down in a vertical fashion

in the straight chair he was sitting in. He had a bottle of artificial beer in his hand that, after he fell asleep, the chief engineer got up, took it out of his hand and set it up on the table nearby so actually it wasn't fall and spill later on while he was sleeping.

Q When the chief engineer got up to take the artificial beer out of his hand, did Joseph Hazelwood wake up?

A He did not.

Q Did he appear to be in a deep sleep or a light sleep?

A He did not awake or arouse at having the bottle removed from his hand nor did he appear to be conscious or awake during any of the rest of the meeting.

Q And sir, when you use the term "artificial beer," what are you referring to? Is that a nonalcoholic beer?

A Yes. It's my best recollection is a small, squatty-looking, clear glass bottle that said "Moose" or "Moosy" or something like that on the side. The reason that sticks in my mind is that it seemed like a bit much for him to be drinking beer during this meeting. The front of it said beer on

it and thought, "it couldn't be." And then I read the fine print on the bottle that said something like, you know, .00 percent of alcohol. And so it appeared to be some sort of artificial beer product.

Q Did anyone at any point in time attempt to arouse Joseph Hazelwood during the meeting?

A They did not.

Q Did you make any attempt to arouse Joseph Hazelwood?

A I did not.

Q And why was that, sir?

A The fleet manager and the fleet superintendent saw fit to let him sleep and I felt like that was the decision that implicitly been made, so I went along with it.

Q Sir, in any of your previous experiences or subsequent experiences in this position, did a master ever fall asleep during a stewardship review?

A Not in my presence, no.

Q Did you recall this or did you view this as being, for example, an unusual incident?

A Yes, I did.

Q And did you believe at this point in the meeting

that Joseph Hazelwood might have been intoxicated or drunk?

A I had my suspicions that might be the cause of his behavior.

(End of video deposition excerpts.)

MR. GREEN: Your Honor, that concludes our offer for Mark Pitman.

THE COURT: Is there an additional offer from this deposition?

MR. LEVY: Yes, there is, your Honor.

THE COURT: Proceed, sir.

CROSS-EXAMINATION

(Video deposition excerpts.)

Q At any point other than the incident between Joseph Hazelwood and Paul Myers in the doorway of Joe Hazelwood's cabin, did you ever see Joe Hazelwood angry or upset during the rest of that day?

A No.

Q Now, sir, after the meeting concluded, what occurred next after that meeting and where was lunch?

A Lunch for me was in the officers' mess on board the EXXON VALDEZ.

Q And, sir, at some point you previously testified Joseph Hazelwood entered the lunchroom?

July 16, 2002

CAUSE NO. 93-40252

EXXON CORPORATION	:	IN THE DISTRICT COURT OF
v.	:	HARRIS COUNTY, TEXAS
CERTAIN UNDERWRITERS AT LLOYDS OF LONDON	:	189TH JUDICIAL DISTRICT

STATE OF TEXAS

COUNTY OF HARRIS

I, Martha C. Baldwin, Official Court Reporter in and for the 189th District Court of Harris, State of Texas, do hereby certify that the above and foregoing contains a true and correct transcription of all portions of evidence and other proceedings requested in writing by counsel for the parties to be included in this volume of the Reporter's Record in the above-styled and numbered cause, all of which occurred in open court or in chambers and were reported by me.

/s/ Martha C. Baldwin
7-16-02

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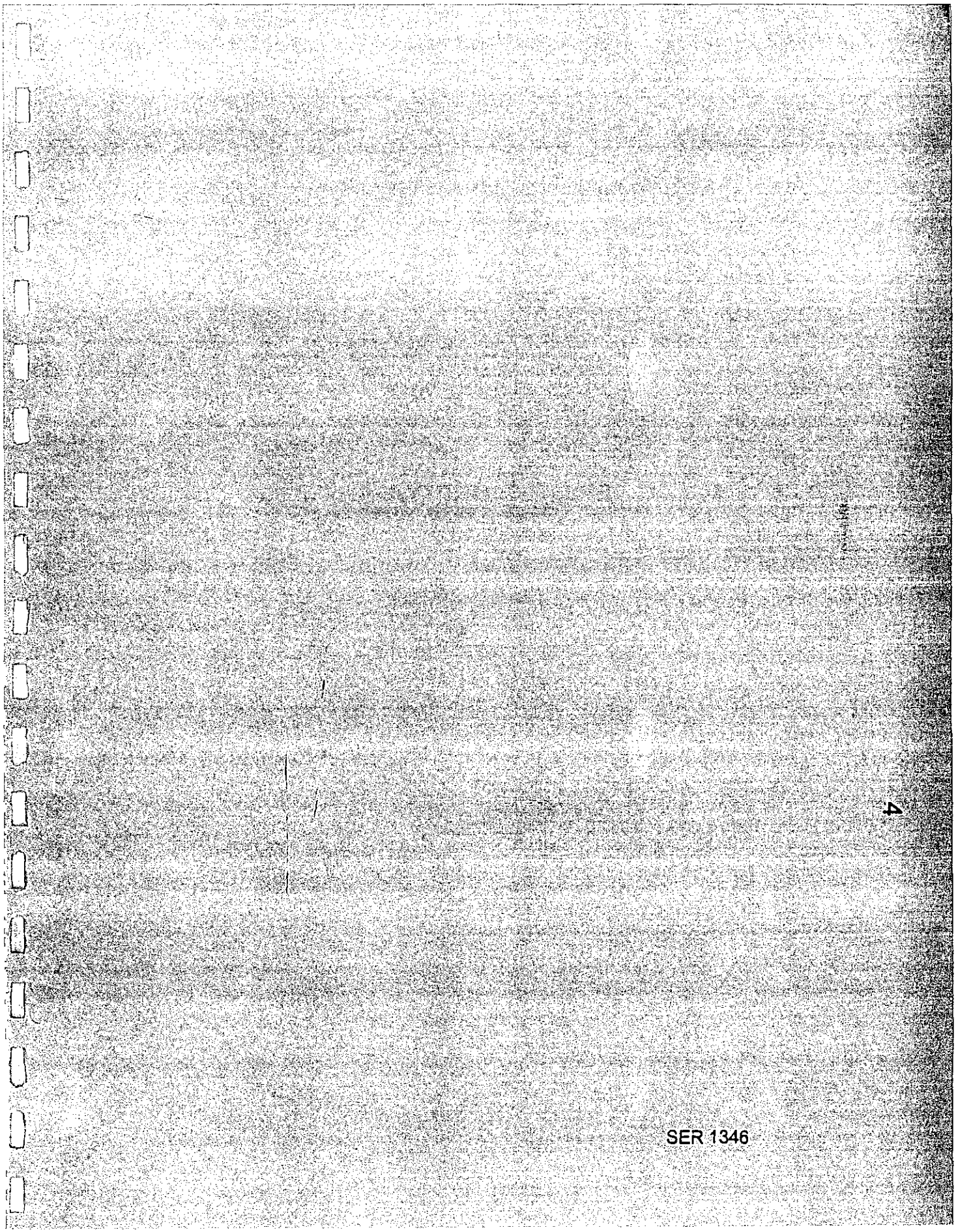

Community Recovery From the *Exxon Valdez* Oil Spill: Mitigating Chronic Social Impacts*

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EXHIBIT 4

Community Recovery From the *Exxon Valdez* Oil Spill: Mitigating Chronic Social Impacts*

Over the last 50 years, the human consequences of technological failure and environmental contamination have been documented in a variety of studies (Adler 1943; Erikson 1976, 1994; Couch and Kroll-Smith 1985; Baum, 1987; Kroll-Smith and Couch 1993A; 1993B; Freudenburg and Jones 1991; Brown and Mikkelsen 1988; Edelstein 1988; Baum and Fleming 1993; Green 1996). The preponderance of this research reveals that technological disasters impact communities in "new and strange ways," producing a unique pattern of social damages (Erikson 1994). The nature of this social damage is long-term, i.e. lasting for decades, and cumulatively degenerative, i.e., permeating both the collective social fabric and individual psyche (Erikson 1976; Baum 1987; Freudenburg and Jones 1991; Kroll-Smith and Couch 1993A; Green 1996). The concept of "corrosive community" frames these chronic negative outcomes in terms of increased social isolation, interpersonal antagonisms and distrust of groups and institutions (Freudenburg and Jones 1993; Horlick-Jones 1995; Freudenburg 1997; Picou and Gill 1999).

In terms of global environmental degradation, disasters of technology are viewed by European social theorists as one characteristic of "late modernity" or "risk society" (Giddens 1991; Beck 1992). According to Beck (1992), technological disasters pose transglobal threats to physical and social health, result in increased consciousness of environmental risks and emerge as one defining characteristic of social change in late modernity. Interestingly, Beck's macro theoretical system is illustrated by examples of localized technological disasters, such as Villa Parasi (Brazil), Bhopal (India) and Chernobyl (Ukraine) (Beck 1992). Technological failure and

toxic contamination produce social risks which are embedded in the institutions of modernity and whose consequences portend serious social problems for the future (Beck 1992; Erikson 1994).

However, this emerging research consensus in both the United States and Europe is not without its critics. For example, Drabek (1996) has noted that the field research on community impacts of technological disasters, most notably represented by Erikson's research, is characterized by a lack of systematic survey data and based primarily on a qualitative interpretive methodology. Along other lines, Quarantelli (1998) and others have suggested that the classification of disasters by "natural" and "technological" origins makes no contribution to theoretical and paradigmatic development, rather reflecting "old wine in new bottles." Indeed, recent evidence on the long-term impacts of natural disasters suggest that earthquake victims commit suicides at significantly higher rates, implying that chronic consequences of all disaster events, such as earthquakes, hurricanes, tornadoes and floods may simply reflect a lack of longitudinal research in disaster studies (Frederick 1980; Solomon 1989).

Despite this controversy, it is obvious that any social event that takes on "extraordinary" or "extreme" characteristics is a potential stressor to communities and their residents. All disasters seriously disrupt the sociocultural and economic structure of communities. Community recovery from natural disasters has evolved to the systematic rebuilding of physical structures, medical service delivery and attending to acute trauma rehabilitation for victims (Tierney and Baisden 1979). The fact that there is a identifiable threat, which impacts the community and eventually culminates, structures the emergency response paradigm for natural disasters. Social support systems emerge with the rescue of victims and continues through the action of a host of informal groups, as well as formal organizations and institutions. In short, "therapeutic

communities" emerge within social collectives impacted by natural disasters, oftentimes resulting in an "amplified rebound" of material and human resources for affected populations. Programmatic delivery of psychosocial therapy to victims contributes significantly to social recovery.

One of the most consistently identified consequences of technological disasters is the failure of a "therapeutic community" to emerge because of chronic social impacts. Although some immediate emergency response does occur, programmatic intervention is absent over the long-term (Baum and Fleming 1993; Kroll-Smith and Couch 1993A; 1993B). Yet, environmental contamination can last for decades, if not centuries. This fact places individuals and communities under continuing distress for extended periods of time. Instead of progressing through a typical natural disaster stage model, from "warning", to "threat," to "impact," and subsequently to "recovery" and "rehabilitation", technological disasters become locked in the early stages. Over time, "warning," "threat" and "impact" are reported in a continuing sequence (Couch 1996). Furthermore, given that ambiguous and contradictory scientific evidence regarding contamination and its economic, social and health consequences characterize technological disasters, different segments of a community come to see the problem as being in a different stage, providing another source of internal community conflict (Couch 1996). Many members of the victimized community see the problem as "overblown" by their neighbors, while others believe that threats are not taken seriously enough (Kroll-Smith and Couch 1993A; 1993B; Couch 1996). Additional community strain is caused by the fact that, since the disaster agent is extended through time, individual and social recovery must be attempted while social and psychological impacts simultaneously persist.

This point can be illustrated by looking at the ultimate outcomes of environmental contamination situations (Couch 1996; Couch and Kroll-Smith 1985). Generally, we find that cases fall along a continuum between two situations. The first is relocation--impacted people are moved away from the problem. Personal safety is restored, but at the loss of a certain geographic area, environmental resources and social community. The second situation has been identified as a "techfix," that is, technological solutions render the community safe again and allow community recovery to proceed. However, effective technological solutions and scientific understanding of contamination and contamination-related problems (such as destruction of a natural resource) usually do not exist (Couch 1996). Therefore, both experts and victims disagree over whether technological solutions are adequate, or even possible. This results in further controversy and conflict over the definition of the problem and what to do about it. In other words, in the "corrosive community," a pattern of chronic social distress emerges and is constantly reinforced by an ongoing adversarial discourse over threats, risks and consequences for victims (Freudenburg 1997).

Technological disasters have a human cause or a "principle responsible party" and often involve some form of irresponsible contamination of the environment, home, workplace and/or person (Picou and Rosebrook 1993; Erikson 1994). The response of the community and victims often requires litigation which fosters continued conflict, mistrust, social deterioration and psychological stress (Gill and Picou 199; Picou and Rosebrook 1993; Picou et al 1998). Principle responsible parties exercise their legal rights of discovery and appeal, which takes decades to complete. As a consequence, social and psychological recovery from such disasters is further disabled by the uncertainty of protracted litigation.

The *Exxon Valdez* Disaster: Chronic Community Impacts

Ten years ago the largest and most ecologically-damaging oil spill in North American history occurred in Prince William Sound, Alaska (Spies et al 1996). It could be argued that this was the worst technological disaster in twentieth-century America. Since 1989, hundreds of millions of dollars have been spent by both the federal government and Exxon documenting the nature and extent of the ecological damages.

In contrast, our best estimate is that not much more than one and one-half million dollars has been spent studying the community impacts of the *Exxon Valdez* disaster. This fact becomes relevant for understanding the long-term adversarial pattern of conflict that is launched by low probability, high consequence technological catastrophes. Victims are required to "prove" in a court of law that someone, or some entity, was liable, that damages were real and that some payment or retribution is required by the responsible party. Social support structures fail to emerge for communities impacted by technological disasters.

Although research on the social and psychological impacts of the *EVOS* has been limited, the results from those studies that have been conducted are remarkably consistent. Furthermore, the results of these studies also provide convergent evidence regarding the social impacts of other technological disasters, particularly for Three-Mile Island and a number of localized toxic contamination sites (Edelstein 1988; Brown and Mikkelsen 1989; Kroll-Smith and Couch 1990; Gill and Picou 1991; Baum and Fleming 1993). In summary, *EVOS* studies reveal the following:

1) Immediate social impacts included the influx of large numbers of people into local non-native communities, increases in police responses, requests for mental health services and severe strain on local community resources (Rodin et al 1992).

2) High levels of psychological stress initially characterized residents of local communities (Donald et al 1990; Palinkas et al 1992; Palinkas et al 1993; Picou et al 1992).

3) Significant declines in subsistence harvests of Alaska Natives through 1991 (Dyer et al 1992; Fall and Field 1996).

4) Elevated levels of depression and psychological stress for Alaska Natives (Palinkas et al 1992; Picou and Gill 1999).

5) Severe disruption of social and cultural activities of Alaska Natives (Gill and Picou 1997).

6) Economic losses for commercial fishermen for 1989 and 1990 which totaled over 154 million dollars (Cohen 1995; 1997).

7) Estimates of an average economic loss for Cordova commercial fishermen from 1990-95 totaling nearly $200,000 per fishermen (Picou and Arata 1997).

8) The persistence of high levels of organizational distrust, litigation-related stress and perceptions of increased risks for future spills for Cordova residents through 1992 (Picou 1996; Picou et al 1998; Picou and Gill 1999).

9) High levels of social disruption and psychological stress for residents of Cordova and commercial fishers in Cordova from 1989-1997 (Picou et al 1992; Picou and Gill 1996; Gill and Picou 1998).

10) Symptoms of severe depression (40%), anxiety (20%), and post-traumatic stress disorder (34%) for male commercial fishers six years following the spill. Approximately one out of two commercial fishermen had symptoms of depression or PTSD or a combination of both (Picou and Arata 1997).

11) Deterioration of community social relationships, family relationships and the local community mental health service infrastructure in Cordova community through 1997 (Picou and Arata 1997; Picou and Gill 1999).

12) Significantly higher rates of alcohol admissions for mental health centers in Valdez and Cordova five years following the spill, when contrasted to admission rates five years before the spill (Picou and Arata 1997).

In summary, research on the community impacts of the *Exxon Valdez* Oil Spill clearly delineate a chronic pattern of economic loss, social conflict, cultural disruption and psychological

stress. These research findings provided the focus and rationale for developing a community intervention strategy designed to mitigate this long-term pattern of community disruption.

A Community Participation Intervention Model

It is the chronic nature of social deterioration and psychological stress that makes the mitigation of technological disasters a unique challenge for social intervention. Long-term recovery from technological disasters is a topic that has generally been overlooked by both disaster researchers and emergency management practitioners (Mitchell 1996). Bolin (1982) has suggested that recovery is multidimensional and includes economic, emotional, and quality of life dimensions. Technological disasters produce fundamental changes in culture and social structure which are based on social conflict over alternative social constructions of damage, liability and victimization (Couch 1996). As Edelstein (1988:9) has observed for technological disasters that result in the toxic contamination of the biophysical environment, "... recovery to a 'post-disaster equilibrium' is difficult if not impossible".

Indeed, most of what is known about community recovery from catastrophic events comes from the natural disaster literature (Mitchell 1996). Nonetheless, community recovery from any disaster must include the availability of knowledge, leadership and expert action (Rubin et al 1985). The development of our community education mitigation program utilized these components in a participatory program development model. Once all program components were finalized and reviewed by community residents, the "Growing Together" community education program was implemented in Cordova from January 1996 through February 1997.

Given that intervention program for reducing the chronic community impacts of technological disasters are virtually non-existent, a data-based model for program design was

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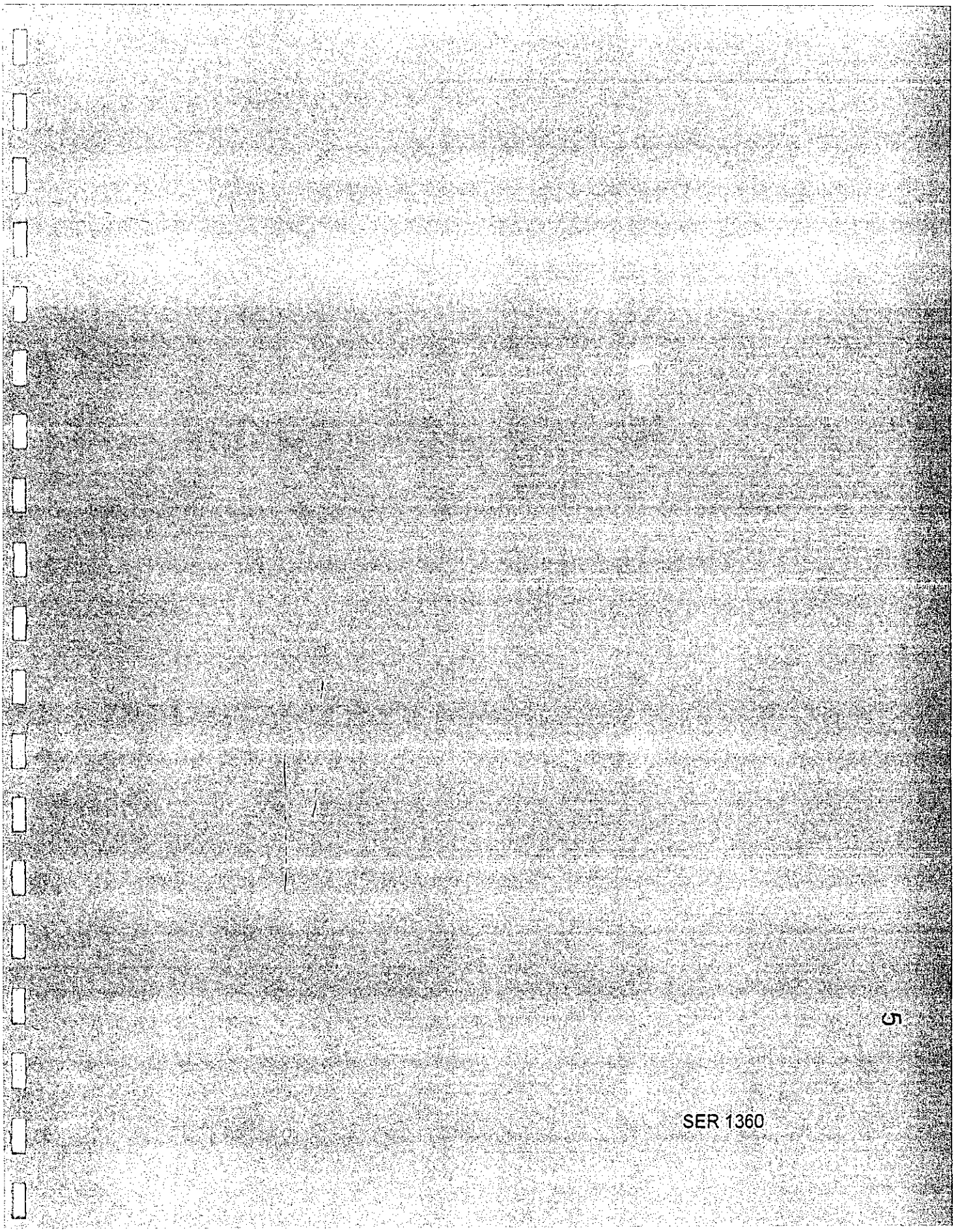

Folk Management in the World's Fisheries

Lessons for Modern Fisheries Management

Christopher L. Dyer *and* James R. McGoodwin, Editors

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8

Environmental Disaster and Fishery Co-Management in a Natural Resource Community: Impacts of the *Exxon Valdez* Oil Spill

Duane A. Gill

Introduction

On March 24, 1989, the supertanker *Exxon Valdez* ran aground in Prince William Sound, Alaska, spilling approximately eleven million gallons of North Slope crude oil. A massive oil slick formed and washed ashore on the western edge of the sound days later. Oil made its way south into the Gulf of Alaska, eventually oiling more than 1,300 miles of Alaskan coastline. This environmental disaster had a devastating effect on the natural environment and the human communities that rely on the area's renewable natural resources.

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In particular, the region's commercial fisheries were severely impacted.

Alaskan commercial fishing is based on co-management. Fishers' organizations work with state and federal agencies in formulating and implementing fishery policies. Current policies divide the state into various regulatory areas. A diverse number of commercial fisheries exist in each regulatory area, based on locality (riverine or marine area), target species, and gear type (e.g., gill net, seine). Permits are required to fish in a particular fishery within a regulatory area, and a limited number of permits are issued for each fishery. Individual fisheries are further regulated by restrictions on when and where fish harvesting can take place. The regulatory area directly affected by the *Exxon Valdez* oil spill was Area E, which covers the Prince William Sound and Copper River Delta bioregion.[1]

Fisheries co-management is rooted in community values, orientations, and perceptions. In Prince William Sound, co-management originated from local folk management traditions of Native subsistence culture. Folk management was based on the communities' inextricable link to the environment for survival and existence. Communities in the bioregion are still inextricably linked to natural resources and are active in co-managing resources. The cultural orientation of contemporary co-management communities is influenced by Western culture tempered by a blend of Native traditions and a bond to the environment.

This chapter assesses impacts of an environmental disaster, the *Exxon Valdez* oil spill, on fisheries co-management in the community of Cordova, Alaska.[2] Historically, Cordova has been a center for fishery co-management activities in the bioregion as well as the state. The chapter will explore some of the linkages between the community and fisheries co-management, with a particular focus on community impacts of the disaster.

Impacts of an environmental disaster are best understood in the context of the bioregional ecology and cultural history of the community. Thus, the chapter begins with a brief description of

the natural and human ecology of the bioregion. This is followed by a sociocultural profile of Cordova and an overview of fishery co-management activities. Next, a brief description of the oil spill and cleanup is presented, along with a description of some of the environmental consequences. Community impacts associated with the disaster are discussed next. Finally, some implications for co-management communities are identified and discussed.

Ecology of the Bioregion

Natural Ecology

Prince William Sound and the Copper River Delta constitute one of the world's most spectacular bioregions.[3] Rugged mountains capped with permanent ice fields provide the bioregion with natural boundaries to the north, east, and west, while the Gulf of Alaska borders the south. Large populations of several animal species annually migrate to the bioregion, which is rich in estuarine and marine food supplies. Annual salmon runs and the abundance of marine mammals gave rise to a 7,000-year-old subsistence culture among the Chugach Eskimo and Eyak natives.

The bioregion is located between 60° and 62° north latitude and 144° and 147° longitude. The area experiences nearly twenty-four hours of continuous daylight during the summer solstice and nearly twenty-four hours of continuous darkness during the winter solstice. The bioregion has a maritime climate characterized by heavy precipitation and moderate temperatures throughout the year. Vegetation generally consists of western hemlock and Sitka spruce, alpine tundra, and wet tundra. A variety of fish and shellfish are found in the bioregion, including salmon (king, silver, pink, red, and chum), herring, cod, halibut, crab (tanner, king, dungeness), shrimp, clams, and mussels. The bioregion is a habitat for marine mammals such as whales (finback, humpback, and gray), sea lions, harbor seals, and sea otters. The bioregion is inhabited by a variety

of birds, including bald eagles, ravens, and jays. The coastal and inland habitat supports bears (brown and black), moose, deer, wolves, mountain goats, beavers, mink, martens, and weasels.

Prince William Sound is encompassed by the northern reaches of North America's temperate rain forest. It is characterized as a fjord-type estuary consisting of more than 2,000 miles of intricate shoreline formed by bays, fjords, islands, and tidewater glaciers. The sound's coastal forest strip maintains high water quality in areas where fish spawn and are reared. The cold waters of the sound are among the world's most biologically productive. When exposed to prolonged daylight in the spring and summer, highly oxygenated, high-nutrient waters sustain a complex ecological network.

The Copper River Delta encompasses 700,000 acres of pristine wetlands and is the largest contiguous wetland on the Pacific coast. It is composed of estuaries, muskeg, mudflats, and channels, which provide a rich habitat for a diversity of species. Nestled between the rugged Chugach and Wrangell–St. Elias mountain ranges, the delta is fed by the Copper River and several streams and other rivers that constitute a total watershed of 24,000 square miles. The delta fans out in a 65-mile arc into the Gulf of Alaska, where it is broken up by a series of barrier islands and outer sandbars. Commercial species of salmon and herring are found in the delta. Red salmon from the Copper River typically set the world market price for this commercial species.

Salmon are an integral part of the bioregion's ecological cycle. The life cycle of salmon is a focal point of the natural and cultural cycles of the bioregion. Salmon lay their eggs in gravel nests throughout the bioregion's streams and lakes. Salmon fry spend time in fresh water prior to heading to the open ocean to feed until they reach maturity. Upon full maturity, salmon return to their natal streams to spawn and die, thus renewing the cycle. The amount of time spent in fresh water and in the ocean to maturity varies depending upon the particular subspecies. During their life cycle, salmon provide sustenance to a wide variety of life, including

other fish, birds, bears, and humans. Salmon have social and economic importance in every community in the bioregion.

Human Ecology

Prince William Sound is host to five human communities: Chenega Bay, Tatitlek, Whittier, Valdez, and Cordova. To varying degrees, these communities are reliant on the bioregion's renewable natural resources and can be classified as a natural resource community (NRC). An NRC is "a population of individuals living within a bounded area whose primary cultural existence is base on the utilization of renewable natural resources."[4] The predominate cultural relationship with the environment has evolved from the traditional subsistence culture of Alaskan Natives.

The subsistence culture of Alaskan Natives is based on the abundant renewable resources of the bioregion. Cultural cycles of anticipation, preparation, harvest, and utilization coincide with natural seasons and cycles of resource availability. Social and economic relationships in Native communities are shaped by folk traditions associated with natural resource utilization. A subsistence lifestyle creates patterns of family activities, religious and social ceremonies, cooperative social networks, and cultural identity based on the harvesting and sharing of natural resources.[5]

Cordova: A Profile of a Natural Resource Community

Cordova is a small, rural fishing community isolated from other communities by mountains, glaciers, rivers, and the sea. The community is located in an ecozone between Prince William Sound and the Copper River Delta. Historically, Cordova's beginnings are traced to four Eyak Native villages. Eyak villages in the region were exploited by Russian fur traders, and consequently, their populations were decimated. (As of 1990, there were only two living speakers of the Eyak language.) During the 1880s, salmon fishing

and processing grew, attracting a stable population to the area. Four canneries were established in the vicinity of present-day Cordova.

In 1900, significant deposits of copper ore were discovered in the Wrangell Mountains to the north. The name "Cordova" was given to the site designated to be the point of transfer for the ocean transportation of ore mined in the interior. Cordova was linked by railroad to the mines, and copper mining flourished in the area for three decades. Although local fishing enterprises continued during this time, growth in commercial fishing coincided with the demise of copper mining in 1939.

After the closing of the mine, Cordova's population stabilized at about 1,000. During the 1970s Cordova's population doubled due to diversification in the commercial fishing industry and a generally high immigration rate for the state. Cordova now has a base population of 2,500, which nearly doubles during the summer fishing season. The majority of the residents are Anglo, as are most of the fishers. Alaskan Natives (comprising Eyak, Aleut, and other groups) constitute about 20 percent of the population and are highly integrated into the community and fishing industry. There is also a smaller, less integrated Oriental population, many of whom are employed in local canneries.

Commercial fishing dominates the economy of Cordova. Cordovan fishers own 55 percent of all Area E salmon fishery permits and 44 percent of all Area E herring fishery permits. Other commercial fisheries include cod, halibut, rockfish, sablefish, crab, and shellfish. More recently, commercial interests have developed in a pound-net fishery and an oyster fishery.

In addition to hosting the region's largest commercial fishing fleet, Cordova is home to several canneries, various support businesses (e.g., electronics, refrigeration, machinist, mechanic, net mending), and fishing organizations. The fishing industry provides the basis for locating various government agency operations in Cordova (e.g., U.S. Forest Service, U.S. Coast Guard, Alaska Department of Fish and Game). As Payne observed, "Nowadays, many would argue that without the fishing industry Cordova could not

persist. Employment and other economic activities are so bound up in fishing that the very essence of the town depends on the fishery."[6]

Cordova maintains a subsistence heritage that is interwoven with the commercial fishing economy. The majority of Cordova's residents engage in subsistence activities that include harvesting and sharing fish, shellfish, moose, deer, berries, and so on. In a recent sample of Cordova households, 90 percent reported receiving subsistence resources, and households averaged more than 400 pounds of harvested resources.[7] As is found in most subsistence cultures, resource sharing in Cordova provides a basis for establishing and maintaining social relationships. However, subsistence is similar to the cash economy in that both are highly dependent on fishing.

Like other communities dependent on renewable natural resources, Cordova has developed a cultural cycle that corresponds with the biological cycle of fish, particularly salmon (see Figure 8.1). Although fishing is a year-round activity, the primary fishing season coincides with the season of highest biological productivity: March through September. In early February, the community symbolically awakens from the long winter with a celebration: the Cordova Iceworm Festival. Ceremonies include a blessing of the fleet, a parade, a local talent show, and a food fair. The festival marks the beginning of the preparation stage. Preparation involves readying the boat and gear, selecting and hiring crews, and identifying potential fishing areas for the upcoming season. This stage is characterized by a high level of optimism regarding the success of the impending harvest season.

The harvest cycle begins with the first herring runs in March. Harvesting continues with red salmon runs (May through June), pink salmon runs (July through August), and silver salmon runs (August through September). The harvest season continues for many year-round residents with the subsistence hunting of deer, moose, and waterfowl.[8] Utilization involves activities that convert the harvest into usable products, as well as the consumption of

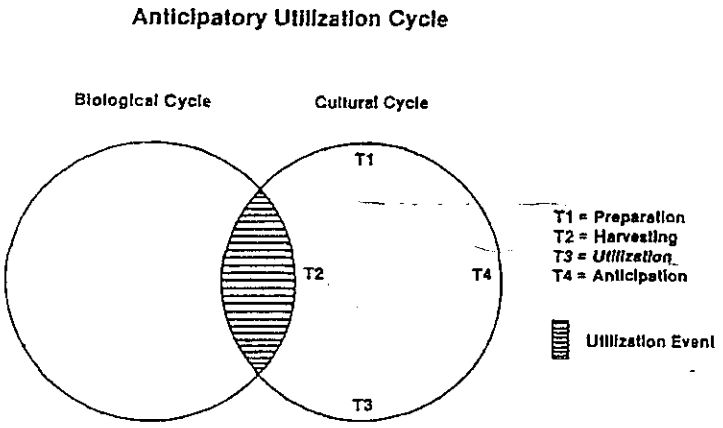

Figure 8.1 The cyclic relationship between cultural and natural events in a natural resource community.

these products. Utilization coincides with harvest (e.g., canning, smoking, and preserving fish and game as they are harvested) and extends into the fall and winter. The winter is marked by a period of reflection and anticipation. During this resting period, the previous harvest season is assessed, and plans for the upcoming season are contemplated and initiated.

The intertwinement of natural and cultural cycles leaves an imprint on the local inhabitants. They are acutely aware of their environment and the seasonal cycle. They become familiar with the currents of Prince William Sound and the shifting channels in the Copper River Delta. They develop a respect for the voracity of nature and an appreciation for the bounty nature provides. More importantly, they recognize the importance of stewardship. Stewardship forms a basis for co-management activities.

Fisheries Co-Management in a Natural Resource Community

As an environmentally aware community dependent on the natural resources of the bioregion, Cordova has traditionally been a leader in fisheries co-management. Commercial salmon fishing in the bioregion is 100 years old. In the beginning, commercial fishing had little impact on fishery populations, but as technology improved and fishers' numbers grew, signs of species stress and decline were observed. Fishers' organizations played an instrumental role in working with government agencies to co-manage the bioregion's fisheries.

Beginning with various fishers' unions in the 1920s and 1930s, fishers have been organized to have a voice in their business affairs. The Cordova District Fisheries Union (CDFU) emerged as fishers' representative in negotiations with canneries. The union was forced to disband in 1955 after a Department of Commerce ruling based on the Sherman Anti-Trust Act. However, the act did allow fishers to be organized as a marketing association through the Cordova Aquatic Marketing Association. CDFU continued as a representative in political and management issues and later changed its name to Cordova District Fishermen United.

CDFU has been an organizational leader in fishery co-management. When species stress and decline were observed, CDFU worked with branches of the state and federal government to manage the fishery. CDFU was a powerful entity during Alaska's transition into statehood and the ensuing development of fishery policies. CDFU represented fishers in developing co-management practices such as establishing limited entry, gear restrictions, and area closures.[9]

Statewide, Alaska's salmon harvest reached a low point in the late 1960s and early 1970s and threatened a collapse of the entire commercial fishery. In response, the 1971 state legislature created the Fisheries Rehabilitation, Enhancement, and Development (FRED) Division to ensure the perpetual use of Alaska's aquatic resources. Additional legislation in 1974 provided for the

establishment of private nonprofit hatchery programs. Cordova fishers initiated the formation of the Prince William Sound Aquaculture Corporation (PWSAC) in December 1974 to establish a hatchery program to produce an adequate supply of common-property fish for all user groups. The PWSAC structure included representatives from commercial, subsistence, recreational, and personal use fisheries, as well as from fish processors, Native villages and corporations, and local communities.[10] The financial structure of PWSAC is based on salmon-enhancement tax revenues collected from all salmon fishers and on proceeds from the sale of fish returning to the hatchery.

PWSAC reflects the nature of the co-management orientation in the Area E fishery. It was initiated by fishers who are integrated with the resource and recognize the up-and-down cycles of fishing. The hatcheries were built by the fishers, who donated time and materials. For example, the Armin F. Koernig hatchery was built in 1975 through a complete volunteer effort of commercial fishers. Currently, there are five hatcheries in Prince William Sound, three operated by PWSAC, one by the Valdez Fisheries Development Association, and one by the state's FRED Division. The effort to develop and enhance the relationship with the environment seems to have paid off.

As plans for hatcheries were being developed, another plan, the construction of a pipeline from the rich oil fields of the North Slope to a terminal in Valdez, began to unfold.[11] CDFU actively opposed the location of a pipeline terminal in Valdez because of the high risks associated with terminal activities and with tanker transportation in the environmentally rich waters of the bioregion. An alternative overland trans-Canadian pipeline was proposed. The CDFU joined forces with Alaskan Native and environmental groups, and together they forced the issue to the Supreme Court, which upheld the CDFU coalition's position. In late 1973, however, a special right-of-way legislation was introduced in the U.S. Congress to circumvent the court rulings. In the U.S. Senate, the vote was a 49–49 tie, which was broken in favor of the Valdez terminal

plan by Vice President Spiro T. Agnew. A similar bill passed the U.S. House, and President Nixon signed the Pipeline Authorization Act on November 16, 1973.

Payne's description of the organization dynamics of CDFU and the community of Cordova during the pipeline controversy reveals four fundamental orientations toward resource management.[12] First, fishers are keenly aware of the local ecology and potential threats to their natural resource base. The fishery permit structure promotes a sense of ownership and stewardship over the economic base. They are in constant contact with the ecosystem.

Second, CDFU emerged out of a strong sense of solidarity vis-à-vis resource stewardship. Solidarity was enhanced by the democratic orientation of the organization and the respected leaders, who come from the ranks of the fishers themselves. The strong organization effectively channels the fishers' concern for managing fishery resources. Further, CDFU has been influential with fishers' organizations throughout the state in shaping co-management strategies and policies.

The nature of fishing also affects management orientations. Fishing promotes innovation to improve equipment and techniques and to make do with the resources at hand. Although fishing is an individualistic competitive activity, it also promotes cooperation. Fishing is dangerous work involving machinery, a threatening environment (sudden violent storms, cold, ice, wind, etc.), and a high degree of unpredictability. Each year is marred by occupational fatalities. Each individual fisher realizes the high likelihoc of needing help someday, and thus, fishers as a group come to rely on each other.

Finally, the social fabric of a small community facilitates cooperative face-to-face relationships. The physical isolation leads to innovation, volunteerism, civic participation, and interest in community affairs. This fabric is further strengthened by subsistence networks that bind people to each other and the environment.

The community empowerment and co-management orientations of CDFU, PWSAC, and the Cordova community generated

success. By the mid-1980s, commercial fishing appeared to be secure. Hatchery fish were plentiful, fishers were active in the management of the fishery, and they were earning a good income. But this security would be threatened at the end of the decade with an unprecedented environmental disaster: the *Exxon Valdez* oil spill.

The *Exxon Valdez* Oil Spill and Cleanup: A Brief Overview

The Oil Spill

The *Exxon Valdez* oil spill was a severe blow to the local fishery and its co-management structure.[13] The spill occurred at the beginning of the most biologically active season of the year, thus maximizing the threat to the bioregion. The 1,300 miles of impacted coastline included parts of Prince William Sound, Cook Inlet, and the Alaskan Peninsula. Kodiak Island was surrounded by oil. Coastal and subtidal habitats in these regions were exposed to oil and further disrupted by cleanup operations.

The oil spill had an immediate impact on the bioregion's marine and terrestrial life. Tens of thousands of birds died from exposure to oil and more than 1,000 otters were confirmed to have died. Mussels and clams were contaminated, as were various other marine subsistence resources. The oil contamination entered the food chain as predators and scavengers consumed carcasses tainted with oil. An extensive effort to remove dead birds and otters limited the impacts to the food chain, yet ecological damages did occur.

The fishery experienced disruption in the aftermath of the oil spill. Initial efforts were made by commercial fishers to secure the hatcheries, although it became apparent that hatchery fry were likely to be impacted. The fry and the oil would travel the same current out of the sound and into the Gulf of Alaska. Many fishers feared the impact on fisheries would be felt for years to come.

The Alyeska Pipeline Service Company, which was responsible for containing and cleaning up oil spills, was unprepared to handle a spill of such magnitude.[14] Further, the response was hampered by poor coordination among the corporate organizations, state and federal agencies, and local communities.

Controversy and outrage were generated within impacted communities and among the public regarding the slow response, effectiveness of cleanup techniques, and compensation strategies employed by the responsible corporate and government entities.[15] There was public sentiment that the spiller should not have been in charge of the cleanup effort. Local residents were incensed that their local expertise was ignored. Some felt cleanup efforts were futile, the job being too great to be undertaken by human hands. There were also concerns about the impacts of cleanup, secondary spills, and the disposal of waste beaches.

The Cleanup

Exxon and its primary contractor, Veco, took command of the cleanup operations and initiated a series of actions to contain and clean up the oil. These included subcontracting fishing vessels and hiring thousands of people to participate in the cleanup. Fishing vessels were used to lay containment booms around oil slicks while skimmer vessels collected the oil. Fishing vessels were also used to transport materials, wastes, and personnel. Oil was removed from beach surfaces by hand and by using cold and hot water from high-pressure hoses. Bioremediation processes, which entail the application of bacteria and fertilizer to oiled beaches in order to accelerate the natural breakdown of oil, and chemical dispersant were used in some areas.

Cleanup activities continued throughout the summer, ending in mid-September. At that point, nature was commissioned to clean the shores with its savage winter storms. Limited cleanup efforts would be made in subsequent years, but the ecological recovery

was left to nature. However, there was uncertainty about the time needed for recovery.

Local communities experienced a boomtown phenomenon as an army of cleanup workers and media reporters inundated the area. The population of Valdez temporarily increased from 3,500 to more than 10,000 in two months. Cordova's population increased from 2,500 to more than 6,000. Population booms impacted housing, business patterns, mental health services, government services, and the judicial system. Community officials reported dramatic increases in violent crimes and drug and alcohol abuse.

The oil spill and cleanup disrupted community, family, and occupational lifestyles. For many residents, the spill lingers through litigation, poor fishing, and resource recovery uncertainty. Compared to the number of studies on ecological impacts, however, few studies were conducted on the impacts of the *Exxon Valdez* oil spill on humans. The critical question remains, What happened to the communities?

Analyzing the *Exxon Valdez* Oil Spill

Shrivastava's stakeholder model of industrial crises is an appropriate model for analyzing the *Exxon Valdez* oil spill.[16] Primary stakeholders in industrial crises are corporations, government, and affected communities. The public, public interest groups, and the mass media are secondary stakeholders. Each stakeholder operates from a self-interest frame of reference that determines its response to a crisis.[17] Primary stakeholders compete with each other to have their respective perspectives accepted by the public as "truth," with the corporate view of reality prevailing in most cases. The tendency in industrial crises is for corporations and government to minimize the extent of damage, appeal to scientific knowledge, and exclude victims from participating in critical decisions.[18]

Affected communities operate from a frame of reference based on personal experience and knowledge and are typically

powerless to form a proactive response. Further, there may be a lack of community consensus as to the nature and extent of impact. These communities tend to vent anger, frustration, and bitterness toward the corporation and government.

The affected community is ultimately responsible for self-protection. Because corporations and government tend to resist changes in their frame of reference, even when such changes are in their best interests, community-based organizations must ultimately force such changes. However, communities and community-based organizations may be weakened in the aftermath of an industrial crisis.

Community Impacts of the *Exxon Valdez* Oil Spill

Industrial crises can be thought of as technological disasters. Social science research indicates a pattern of community disruption following a technological disaster. Because co-management is linked to the community, community disruption can lead to co-management disruption. Following is a brief summary of the literature on technological disasters.

An environmental disaster such as the *Exxon Valdez* oil spill poses problems that are unique when compared to natural disasters such as earthquakes, hurricanes, floods, and volcanic eruptions. Like other technological disasters, oil spills involve a *loss* of control over an activity that was perceived to be controllable, as oppos to natural disasters, which involve a *lack* of control over processes that are uncontrollable. Loss of control includes mechanical and structural failures as well as breakdowns in social organization.

Most communities are not experienced in or prepared for a technological disaster; thus, responses, information flows, and expert intervention patterns prove inadequate. Further, victims of technological disasters exhibit more anger, rage, and hostility than do victims of natural disasters. Social-psychological impacts tend to be more widespread and persistent in technological disasters than

in natural disasters. Indeed, stress associated with technological disasters may actually increase over time. The initial technological disaster can be exacerbated by a series of secondary disasters fueled by litigation, uncertainty, and continued disruptions.[19]

In a natural disaster, social support networks and a therapeutic community atmosphere typically emerge, whereas a technological disaster may be accompanied by an abrasive community atmosphere. Internal segmentation of community groups typically develops along lines reflecting relative threats to property, livelihood, family, and the individual. Furthermore, "social conflict characterizes the 'spacial interaction' of *technology* and community as opposed to social cooperation characteristic of the 'spacial interaction' of *ecology* and community."[20]

The literature on technological disasters indicates that negative community impacts are the norm. When examining the community of Cordova, various types of impacts can be attributed to the *Exxon Valdez* oil spill. Community impacts can be broadly categorized as follows: economic disruption, fishery disruption, recovery uncertainty, community divisiveness, litigation, and social-psychological stress. As in other technological disasters, there is overlap between these categories, as well as interactive and cumulative effects.

Economic Disruption

Like other communities impacted by the oil spill, Cordova experienced tremendous economic upheaval. First, there was an economic bonanza as Exxon spent more than $2 billion in the cleanup effort. A significant portion of the money passed through the Prince William Sound economy. Some fishers were able to lease their boats to Veco at more than $1,500 per day to assist in the cleanup effort. This "money spill" created a temporary bonanza whereby some individuals made much more money cleaning up oil than they could have made from fishing. However, not all fishers received leases, or wanted them.

The local economy experienced occupational disruptions. The hourly wages for shoreline cleanup exceeded $16 an hour. With the fishing season in jeopardy, those relying on fishing-related occupations faced uncertain options. Fishing crew members and cannery workers had to decide between their occupation and cleanup employment. The $16-an-hour rate was significantly higher than most local jobs paid. Thus, a temporary labor shortage in lower-paying service occupations was created as people quit jobs to work on the cleanup.

The local economy was impacted further as traditional business patterns were interrupted. Buying and service patterr changed as oil spill cleanup temporarily replaced fishing as the dominant economic activity. The oil spill and cleanup also took a toll on the budgets of the town government, Native American–run corporations, and other established organizations as they incurred debt struggling to respond to the spill and cleanup.

Economic upheavals resulted in downward economic trends during 1990, 1991, 1992, and 1993 due to disruptions in the fishing industry. The price of fish dropped dramatically in 1990 and generally stayed depressed from 1990–1993.[21] Many individuals who made "spill" money in 1989 overinvested in their fishing business (new boats, equipment, etc.) and were unable to make the payments in the lean years that followed. Foreclosures and bankruptcies have recently become a more common occurrence. Occupational disruption continues as the future of fishing remains uncertain.

Fishing Disruption

The spill severely disrupted the 1989 commercial fishing season. The herring season was essentially closed, as was more than one-third of Prince William Sound fishing grounds. Those who chose to fish received a lower price for their product. In addition, there was concern that oil-contaminated fish might enter the market and damage public demand for the product.

The fisheries continue to be disrupted. Although 1990 was a banner harvest, the price for fish declined. The 1991 and 1992 seasons were marked by poor returns of herring and salmon and by low prices. The seine fishery for pink salmon was limited in 1991 and closed in 1992 due to weak returns. The 1993 herring season essentially was canceled. Although there is considerable scientific and public debate regarding the extent to which these seasonal disruptions are attributable to the oil spill, there is a strong perception among many fishers that the spill is the root cause of the problem.

Recovery Uncertainty

The patterns of disruption in the commercial fishery reinforce an underlying uncertainty regarding resource recovery. There is uncertainty about the oil's long-term effects on the region's natural resource base. There is uncertainty about whether the fish will come back, whether there will be enough fish, and how long it will take for the numbers to return to normal levels.

Science has been unable to adequately respond to critical information about bioregion impacts and recovery.[22] Experts have varying and conflicting reports regarding the degree of impact and recovery. Because they are unable to provide a consensus, there is a sense that scientific experts represent the interests of those who write the check rather than the interests of objective science. This fuels the uncertainty about resource recovery.

There is also a sense of uncertainty about community recovery. When will the local economy recover? When will community schisms heal? When will the litigation be settled? When will the aftershocks stop? When will it all be relegated to history?

Community Divisiveness

Every community is characterized by group conflict and fault lines where conflicting groups mesh. Conflict is ordered by consensus, which serves to diminish conflict by emphasizing the common good. Cordova contained preexisting conflict groups based on demographics (race, sex, occupation, age), attitudes (political, religious, regarding development), and residential status (permanent or seasonal, inside or outside city limits).

The oil spill weakened the social fabric of Cordova by creating deep schisms along various community fault lines. First, the community became divided because some received or accepted "Exxon money" and others did not or could not. People were cast as being greedy or labelled as "Exxon whores" or "spillionaires" as a result of their participation in the cleanup effort. This strained and sp' family relationships and long-term friendships. The community was further divided by a series of lawsuits within the town government that placed an additional financial burden on the town.

Another source of community conflict derives from a decision by the local Chugach Alaska Native Corporation to engage in clear-cut logging of local corporation land. The logging decision was spurred in part by financial problems incurred during the oil spill and the ensuing economic difficulties in the community. Many residents view logging as a threat to the fishing industry and an affront to a healthy bioregion. Yet, some feel a need to diversify the local economy through this type of development.

Finally, a twenty-five-year-old conflict regarding the construction of a road to Cordova has reemerged. Half of the community is for such a road, and the other half is against it. Proponents cite the economic benefits of cheaper transportation costs and the e economic diversity of recreation and tourism industries. Opponents see the road as a threat to their traditional way of life and lament the potential of a steady stream of tourists in Winnebagos interrupting their way of life. Others are suspicious that the road might speed up resource extraction and pose further threats to the bioregion.

Litigation

Litigation activities are another source of community impact. More than two thousand lawsuits have been filed in the case. Several Cordova businesses and residents are involved in litigation activities. Legal action by the federal and state government against Exxon were settled in 1992. The settlement included the establishment of a $900 million restoration fund and a Trustee Council to develop and implement restoration plans.[23] Although intended to restore the community, the fund and council have generated controversy and conflict, further dividing the community.

Various class-action and individual lawsuits remain unresolved. Native corporations, fishers and their crews, and oil spill cleanup workers are three major class action groups. Individual lawsuits have been filed by fishers, business owners, and other residents impacted by the spill. The ongoing litigation creates additional uncertainty regarding individual and community recovery.

The high stakes have heightened the traditional antagonistic posturing found in our legal system. Subpoenas and depositions can be intimidating and can be used as "weapons" to discourage plaintiffs from pursuing the suit. Further, a corporate cost-benefit approach leads to a strategy of delaying resolution of litigation over a long period of time.[24] Such a tactic prolongs the secondary disaster, the negative social impacts to the community.

Social-Psychological Stress

The *Exxon Valdez* oil spill took an immediate emotional and psychological toll on people and communities. Pain, anger, frustration, depression, betrayal, anxiety, despair, sadness, and grief were common emotions experienced by residents of the bioregion. Tremendous stress was created as livelihoods were threatened or destroyed. The social fabric was torn by broken friendships and business relationships. There was a sense that a way of life had been lost.

Impacted communities reported increased incidences of alcohol and drug abuse, domestic violence, mental health problems, and occupation-related problems. Individuals in impacted communities experienced clinically measurable levels of generalized anxiety disorder, post-traumatic stress disorder, and depression.[25] These conditions placed increased demands on mental health services.

In Cordova, social-psychological stress was exacerbated by turnover in the community mental health administration and staff during this period of increased demand. Staff turnover in other community support agencies (e.g., law enforcement, town government) added to the sense of personal disruption.

Long-term social-psychological stress has been documented in the community and has actually increased over time among certain groups.[26] The combination of litigation, recovery uncertainty, and disruptions in the economy, fishery, and community maintains a higher-than-expected level of stress in Cordova.

In many respects the community is still grieving the environmental destruction and community disruption caused by the spill. Many individuals, particularly fishers and those connected to the industry, find it difficult to gain a sense of closure before the fisheries are clearly recovered and the litigation is resolved. This sets a stage for continued social-psychological stress within the community.

Summary of Community Impacts

Like other technological disasters, the Exxon Valdez oil spill had negative impacts on the community. Cordova experienced initial disruptions in its economy, commercial fishery, and way of life. Continuing economic and commercial fishing disruptions, along with uncertainty regarding resource recovery, contribute to a secondary disaster experience. Litigation provides another secondary disaster experience, as the legal process creates additional frustration and hostility for community victims. The abrasive

community atmosphere resulting from the various schisms adds to the secondary disaster.

These community impacts have an affect on the ability to co-manage resources. The ongoing social disruption undermines the community's co-management network. This makes co-management more difficult and places additional stress on organizational leadership. Crises become politicized, with various special interests competing to influence the outcome. As a result, community leadership has different requirements placed upon it. One of the requirements is to respond to vulnerabilities exposed by the crisis.

Conclusions

The *Exxon Valdez* oil spill provides an important case study of environmental disaster impacts on a co-management community. The event created an abrasive community atmosphere characteristic of technological disasters. It also undermined trust between the local community and government, industry, and science. It underscored the conflict between state "progress" and local control. More importantly, the ecosystem, which is the base for community existence, was severely disrupted. These factors are threats to co-management and represent obstacles to recovery.

More generally, the oil spill provides an awareness of the need to think bioregionally in the co-management of resources. It demonstrates the vulnerability of single-resource economies and the inability of the scientific community to reach conclusions and consensus. The spill also shows that community empowerment is essential to obtaining greater control over resource management decisions.

Cordova continues to experience the *Exxon Valdez* disaster. The economic and fishing disruption, uncertainty, community segmentation, and social-psychological stress are predictable patterns of community impacts. There have been few attempts at cultural/community restoration. However, Cordova is a spirited

community that has withstood previous disasters and crises. Recovery and restoration are difficult processes, but the community will prevail.

Lessons for Modern Fisheries Management

1. Natural resource communities should develop local strategies to ensure the protection of renewable resources against technological disasters.
2. Co-management communities need to be empowered by having a role in decisions regarding hazards and risks to their bioregion.
3. In the event of an environmental crisis, and where there is an absence of credible science, folk management strategies should be given particular attention.
4. In regions that are at risk for loss of natural resources, proactive diversification of the economy should be undertaken by local communities to provide an economic buffer in the event of a disaster.

Notes

1. "A bioregion is a part of the earth's surface whose rough boundaries are determined by natural rather than human dictates, distinguishable from other areas by attributes of flora, fauna, water, climate, soils and landforms, and the human settlements and cultures those attributes have given rise to. . . . The general contours of the regions themselves are not hard to identify, and indeed will probably be felt, understood or sensed, in some way known to many of the inhabitants, and particularly those still rooted in the land, farmers and ranchers, hunters and fishers, foresters and botanists, and most especially, across the face of America, tribal Indians, those still in touch with a culture that for centuries knew the earth as sacred and its well-being as imperative" (Sale 1974:227).
2. This description is based on information collected over the course of the four years since the oil spill. The author was part of a social science research team

that conducted research in Cordova with regard to community impacts of the oil spill. The study employed a variety of data collection methods such as ethnographic interviews, standardized household surveys, participant observation, archival searches, and retrieval of secondary data. Although at this time the research project is not complete, to date, the project has yielded five publications and a dissertation (Cohen 1993a, 1993b; Dyer, Gill, and Picou 1992; Dyer 1993; Picou and Gill 1993; Picou et al. 1992).

3. For a more detailed description of the regional natural and cultural ecology, see Thomas et al. (1991) and the Alaska Geographic Society (1993).
4. See Dyer, Gill, and Picou (1992).
5. Walter Meganack, traditional village chief of Port Graham Native Village, described the native natural resource community and the impacts the *Exxon Valdez* oil spill had on the Native way of life in an editorial entitled "The Day the Water Died." The text has been reprinted in Levkovitz (1990:44–45).
6. See Payne (in press).
7. See Stratton (1989).
8. Most hunting is done under the guise of recreation/sport, but the utilization and distribution of these resources typically follow subsistence networks.
9. A more detailed description of the legislative action toward limited entry and gear restrictions can be found in Cooley (1963), Kruse (1988), Morehouse and Hession (1972), Morehouse and Rogers (1980), and Royce (1989).
10. In 1976, the state of Alaska adopted the user-group structure established by PWSAC.
11. Payne (in press) provides a detailed description of the role of CDFU in the pipeline controversy.
12. See Payne (in press).
13. The spill was actually predicted hours before it occurred in a teleconference linkup with Mayor John Devens and a town meeting in Valdez. Cordova resident Riki Ott stated, "When, not if, the big one does occur and much or all of the income from a fishing season is lost, compensation for processors, support industries, and local communities will be difficult, if not impossible, to obtain" (Keeble 1991:24–25).
14. Indeed, at the time of the accident, Alyeska's primary response vessel was in dry dock, its supply of boom material and dispersant was inadequate, and only a handful of its personnel who were skilled in operating the needed equipment were available.
15. For a more complete description of the accident and cleanup activities, see Davidson (1990), Keeble (1991), and Lethcoe and Nurnberger (1989).

16. Shrivastava (1987). "An industrial crisis is a complex system of interdependent events and involves multiple conflicting stakeholders" (1987:19).
17. "A frame of reference is the method people or organizations use to select and process information" (Shrivastava 1987:87).
18. See Gephart (1984) and Shrivastava (1987).
19. For additional information on technological and natural disasters, see Ahearn (1981); Baum, Fleming, and Singer (1983); Couch and Kroll-Smith (1985); Edelstein (1988); Freudenburg and Jones (1991); Gill (1986); Gill and Picou (1989, 1991); Kroll-Smith and Couch (1991); Picou (1984); and Picou and Rosebrook (1993). For an alternative view espousing the existence of no distinguishable difference between technological and natural disasters, see Quarantelli (1985, 1987).
20. See Picou and Gill (1993).
21. As Cohen (1993b) notes, there was an economic recession at the national level during this time, as well as a general downturn in fisheries economies for the state.
22. For example, compare the proceedings from the *Exxon Valdez* Oil Spill Symposium in Anchorage Alaska (February 1993) and the Third Symposium on Environmental Toxicology and Risk Assessment: *Aquatic, Plant, and Terrestrial*, in Atlanta, Georgia (April 1993).
23. The $900 million will be paid over a ten-year period as specified in the settlement with the United States and the State of Alaska. As of 1993, approximately one-third of the fund had been spent.
24. It should be noted that litigation connected with the 1978 *Amoco Cadiz* oil spill remains unresolved as of this writing.
25. See Donald et al. (1990) and Palinkas et al. (1993).
26. See Picou and Gill (1993).

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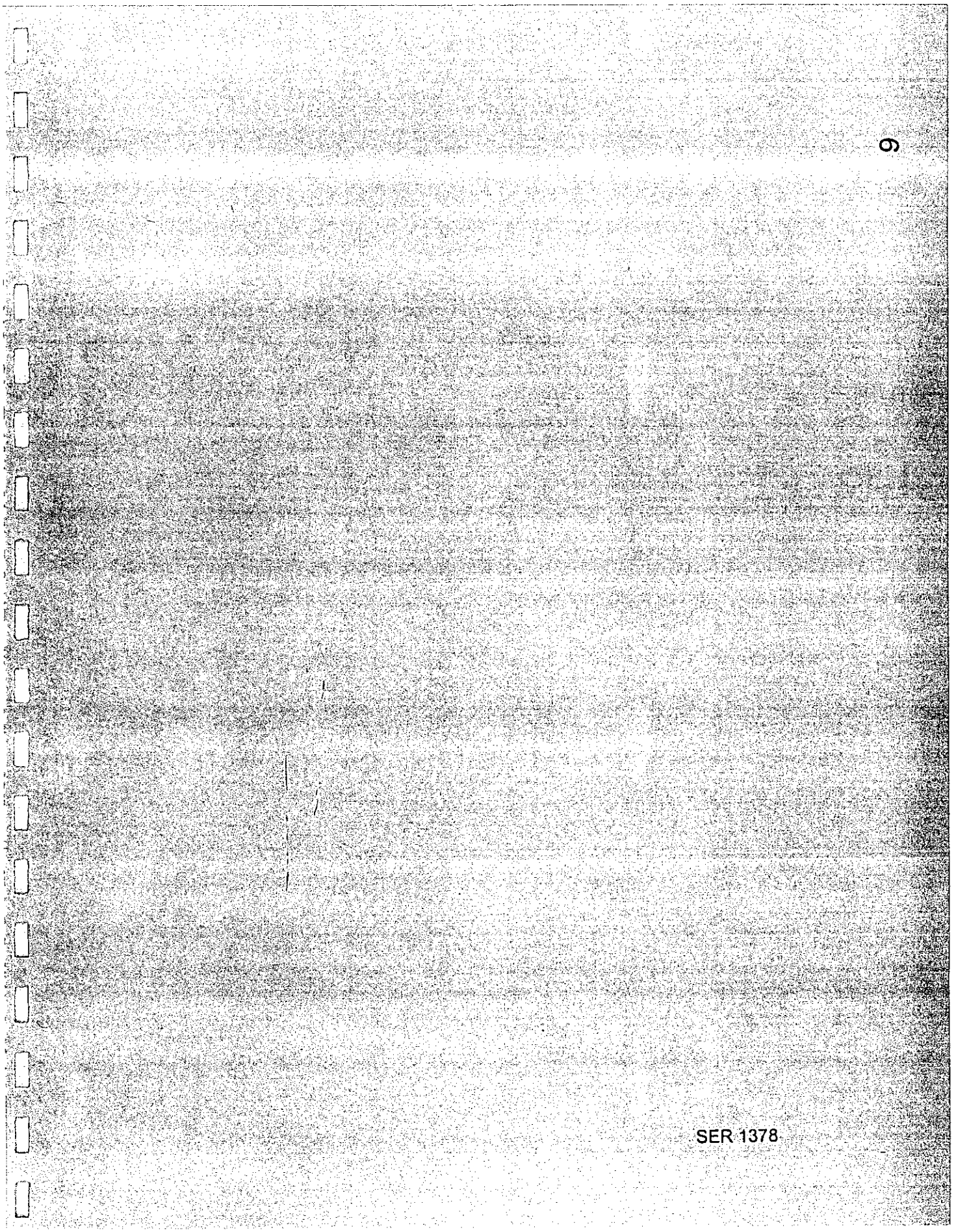

Risk in the Modern Age

Social Theory, Science and Environmental Decision-Making

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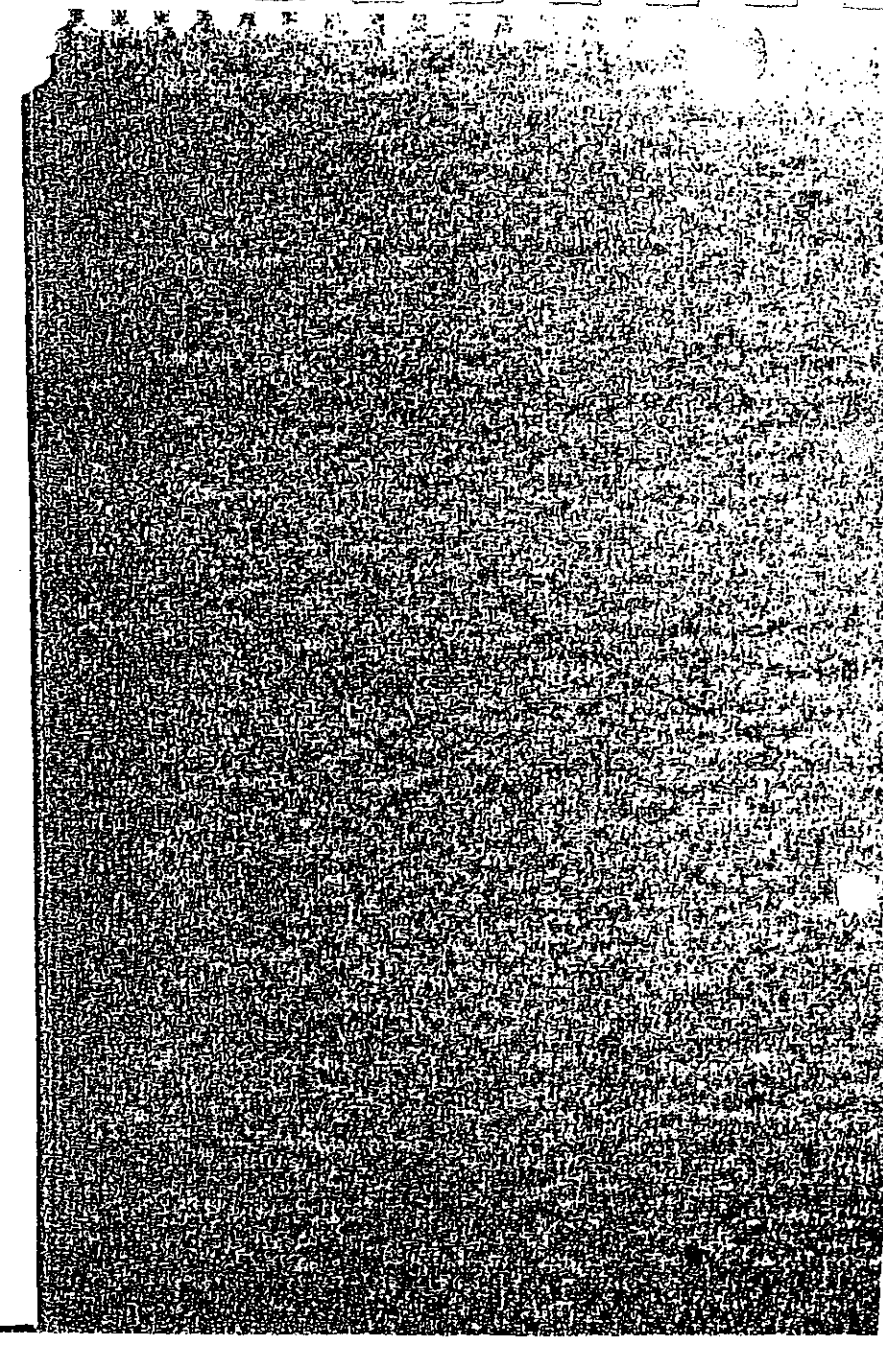

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> This . . . transformation of threats to nature from culture into threats to the social, economic, and political order is the concrete challenge of the present and the future.
>
> Ulrich Beck, *Risk Society*

INTRODUCTION

Contemporary social theorists have begun to devote increasing attention to the sources, nature, and consequences of ecological degradation in the modern world.[1] This work has begun to amend the historically conditioned social science view of the natural environment as an 'objective reality.' The pre-existing perspective legitimized opportunities for control by human social organization and created a theoretical void concerning the social risks posed by massive environmental catastrophes and global environmental damage.[2] As such, recent conceptualizations of the environment–society relationship have provided both theoretical and empirical direction regarding the economic, social, and psychological consequences of contamination to the biosphere. The emergence of environmental harm as a barometer for the distribution of technological risks represents a paradigmatic shift in social theory to a more 'analytical heuristic' concern with global environmental degradation and its attendant social consequences. Although the latter issue is inextricably interwoven with postmodern thought, several European sociologists have begun to focus on technological risk and catastrophe, as well as on the emergence of a modern 'consciousness of threat,' as one perspective for explaining the demise of classical industrial society.[3]

In particular, the German sociologist Ulrich Beck argues that the broad contours of this social malaise of modernity include a variety of known risks, dangers, and impacts produced by industrial society and transformed through the process of 'reflexive *modernization*.' This transformation signals that, ultimately, the entire planet may succumb to the 'juggernaut of modernity,' the runaway train that leads down the 'road to hell.'[4] Toxicity in modernity is more threatening and ominous because it introduces new forms of uncertainty, posing decisive risks to humans which are irreversible and cumulative, and environmental degradation that can be disastrous in scope. These modern risks are often both physically and socially invisible, therefore inviting debate and conflict over the calculation of alleged impacts and damage claims.[5]

Beck also asserts that through a process of so-called 'organized irresponsibility' the institutions and calculus of classical industrial society fail to restore catastrophic damage in the risk society. The insecurity of the present is further elaborated by ongoing scientific debate and social criticism, mediated by reflexive modernization, which results in the unbinding of both science and politics. As Beck suggests, until now, 'sociology . . . has not asked what the threat of self-annihilation means to society.'[6] In his writings, environmental degradation becomes the focal point for a theory of modern society. This theoretical development out of European sociology is relevant to American environmental sociology, particularly that line of research concerned with the social effects of human-caused environmental contamination.[7]

As outlined in this volume's introductory chapter, environmental sociology in the United States has been rather atheoretical in its development through its failure to address adequately environmental degradation and to build a theoretical consensus.[8] Although issues of political economy, environmental values, social movements, and environmental attitudes have traditionally provided the content of courses on environmental sociology in American universities, none of these approaches conceptually integrates social structure and change with the biophysical environment.[9] Indeed, one can argue that the significance of the social is completely overlooked in environmental risk assessments that, as Beck asserts, '[R]esult in a sometimes trivial and meaningless discussion of nature without people.'[10]

John Hannigan criticizes this 'nonreflexive realist' position and proposes in its place a social constructivist paradigm for environmental degradation and the emergence of social movements around such issues.[11] Given that ecological consciousness and action show variation over the course of time, Hannigan argues that 'environmental problems do not materialize by themselves; rather they must be "constructed" by individuals or organizations who define pollution . . . as worrisome and seek to do something about it.'[12] Hannigan applies his constructivist model to environmental problems, communications, science, and risks through case studies of acid rain, biodiversity loss, and biotechnology, providing a conceptual framework for environmental sociology. However, this model ignores any realist account of environmental degradation and is limited by an 'oversocialized' conception of the environment.[13]

A more 'reflexive realist' view recognizes that the physical destruction of the environment can be empirically measured and scientifically monitored, thus avoiding an extreme form of naive constructivism. Both perspectives – constructivist and realist – are relevant and necessary for understanding the human consequences of environmental degradation. We need to view the physical deterioration of the natural environment, the social construction of this demise, and the subsequent consequences for the human community within a dynamic socio-cultural context. Culturally based relationships between the biophysical environment and human communities connect realist and constructivist positions. As Szerszynski and his collaborators have recently noted, risk society is characterized by 'the problematization of objective physical-biological dangers.'[14]

Contamination of the biophysical environment results in 'a social crisis in the relationship to nature.'[15] Risk society theory frames this crisis in terms of localized hazards and reinterprets them through global concepts such as 'organized irresponsibility,' 'anxiety community,' and 'reflexive modernization.' In this chapter, we will review selected themes from these macro-theoretical concepts and contrast them with data from a more localized catastrophic event.

The verification of elements of risk society theory for environmental catastrophes should provide important information for understanding social change in late *modernity*. As such, the remainder of this chapter will focus on an evaluation of the appropriateness of selected themes from Beck's theoretical approach for explaining community responses to catastrophic environmental degradation. Specifically, we will use longitudinal social impact data from the 1989 *Exxon Valdez* oil spill to illuminate the utility (and indeed non-utility)

of themes from risk society theory for explaining community responses to the most environmentally destructive oil spill in North American history.

ENVIRONMENTAL CATASTROPHE AS TECHNOLOGICAL DISASTER

Beck elaborates a model of social change that moves from premodern through classical modern to late-modern society.[16] This global model identifies a historical shift from natural hazards to technological hazards for the risk society, as well as a corresponding transformation from local to global threats. Beck is rather adamant about the dire invisible, irremediable, and irreversible consequences of catastrophes arising from chemical, nuclear, and genetic technologies. Risks emanating from these industrial activities are also socially explosive and contribute to organized public mobilization efforts.

This perspective has commonalities with recent social science research concerning technological disasters in the United States. In particular, case studies of localized contamination have documented social conflict and disruption, psychological pathology, and negative health impacts.[17] These slowly evolving 'chronic technical disasters' and more sudden 'technological disasters' typically result in toxic contamination of the environment through organizational agency and involve the identification of a principle responsible party for legal reparations.[18] Researchers have debated the utility of distinguishing technological disasters from natural disasters and it is increasingly apparent that untoward events resulting from the failure of technology are coming to occupy key theoretical and empirical positions among scholars working in this field.

Although any type of disaster may impair a social system's ability to maintain biological survival, social order, social meanings, and social interaction, research has revealed some fundamental differences between the consequences of natural and technological disasters. Erikson describes these technological catastrophes as a 'new species of trouble,' in that these events 'contaminate rather than damage; pollute, befoul, and taint rather than just create wreckage' and 'scare human beings in new and special ways.'[19]

Whereas the literature defines events such as floods, volcanic eruptions, earthquakes, hurricanes, drought, blizzards, and tornadoes as disasters caused by 'nature' or 'acts of God,' the causes of technological disasters are frequently traced to human culpability or technological malfunction. Natural disasters involve a lack of control over processes perceived to be beyond human dominion, while technological disasters engender a loss of control over technical processes generally thought to be subject to management. Accordingly, technological disasters involve the identification of certain entities that can be blamed and held accountable for malfeasance. It is also worthwhile to observe that historical experiences with natural disasters have led communities to develop emergency preparedness and planning procedures, as well as disaster subcultures (sets of cultural defenses grounded in knowledge, norms, values, and technology) with which to respond to hazardous situations arising from the forces of nature. Society cannot wholly prevent adversity from such sources, but it can anticipate, predict, prepare, defend, and recover from nature's most extreme environmental events.[20] In contrast, we tend to perceive technological disasters as preventable and thus the organizations whose actions are ultimately responsible for these situations rarely anticipate them in advance. Government has certain responsibilities in all untoward events, but the plot thickens when industrial corporations become the focus of public blame and acrimony. The complexity of organizational and technological operations, combined with the secretiveness in which many firms shroud their manufacturing operations, confounds local efforts to prepare for a technological disaster.[21]

Because toxic contamination threatens assumptions about environmental safety, technological disasters frequently sever the relationship between people and the natural environment. This loss of 'lifescape' (i.e. the personal security of the biophysical surround) leads to the erosion of institutional trust among victims.[22] Natural disasters produce obvious physical damage to the built environment (e.g. buildings, roadways, bridges), but communities typically rebuild and recover quickly.[23] However, many technological disasters do not result in physical damage to infrastructure, but rather contaminate the local ecology. We cannot observe these agents through conventional means and, as Vyner notes, 'it is quite impossible for humans to determine if and when they are being exposed.'[24] The intractability of these events is further compounded when physicians using sophisticated equipment are unable to confirm cases of exposure. The undetectability of contaminants and the complex etiology of resulting health effects contribute to lingering uncertainty concerning

the personal threats of exposure (see also the chapter by Michael Edelstein in this volume).

Within this milieu of indeterminacy, potential victims often advance rival interpretations of the situation. Kroll-Smith and Couch observe that, 'What emerges are competing views of the same local world: It is dangerous and uninhabitable; you should be concerned. No, the environment is safe and habitable; you should get control of yourself.'[25] Contamination engenders numerous risks – for instance to family and personal health, financial security, social relationships – and creates considerable distress among victims as they respond as best they can to these novel threats.[26]

As researchers have frequently observed, natural disasters follow a predictable pattern in which a community moves from a state of equilibrium through a series of stages: warning, threat, impact, inventory, rescue, remedy, recovery, and rehabilitation.[27] Technological disasters rarely follow such a linear pattern. Although some of these events have an identifiable beginning (e.g. Three Mile Island, Chernobyl, Bhopal), others originate long before people develop an awareness of a specific problem. Many instances of slow-onset chemical contamination, in which hazardous substances can remain buried underground and can seep slowly into homes and water sources over extended periods of time, fall into this latter category. Kroll-Smith and Couch contend that such cases of contamination 'trap portions of the population in the warning, threat, and impact stages.'[28] Efforts to secure assistance and gain recompense after a technological disaster typically require affected communities to enter into class-action litigation. Responsible organizations generally react defensively and attempt to minimize the perceived amount of damage for which they (and their insurers) could be financially liable. Protracted legal wrangling and processes of restoration following technological disasters may continue for decades and this creates ambiguous endings and deprives individuals of a sense of event closure.[29] These unsettling features usually give rise to a subsequent disaster – an emergent stressor that victims continue to experience over time. Such secondary disasters keep people locked into a state of long-term distress by evoking recurrent reminders of the original event and perpetuating incertitude regarding future outcomes. In short, this chronic pattern creates a 'corrosive community,' an important analogue to Beck's concept of the 'anxiety community.'[30]

The corrosive community is characterized by the deterioration of social relationships resulting from apprehension, fear, anger, confusion, and stress. This breakdown of the social fabric occurs in a milieu of anxiety and unease, facilitated by competing definitions of contamination, environmental damage, and pending threats. Victims also become distrustful of institutional offers of compensation and support. In some cases, as occurred at the infamous Love Canal, the community consequences of technological disasters are ultimate – residents disappear, although homes and buildings might remain intact.

This point is instructive because it suggests that American environmental sociologists have independently been investigating the outcomes of Beck's notion of 'localized self-annihilation,' providing micro-level evidence of themes found in contemporary social theoretical literature. In the following section we outline some of the global concepts from risk society theory that are relevant to environmental sociologists' empirical understandings of technological disasters.

CATASTROPHE IN MODERNITY: COMMUNITY IN RISK SOCIETY

Technological disasters are clearly part of the landscape of the twenty-first century. The modern age signals a shift in the nature of risk. 'Modernity is risk culture' and the acknowledgment of late and high modernity phases, or even a postmodern society, identifies a sociological concern with the 'unthinkable' or the 'dark side' of progress. This theme is embodied in the recent work of both Ulrich Beck and Anthony Giddens, who pose the 'risk of societal self-annihilation' and a social dynamic that creates doubt regarding incalculable high-consequence risks as characteristics of the present era. 'Risk society is catastrophic society' and Beck distinguishes a class of novel, contemporary hazards that are different from the natural disasters which have customarily threatened humanity.[31]

Beck's conceptualization of catastrophe is global in scope. Modern concerns such as anthropogenic climate change and ozone depletion have a holistic impact on all organic matter and extend across both time and space to encompass distant others and future generations. Importantly, these new threats preclude the provision of compensation for victims (or at least make this task very difficult given prevailing institutional mechanisms).[32] Such situations are technological breakdowns that harm the physical environment in

largely invisible and unknown ways. Accountability for the social problem of environmental degradation cannot be determined and victims confront corporate, government, and legal institutions engaged in weaving webs of 'organized irresponsibility.'[33]

Although for Beck catastrophes are supra-national, he notes that the social risks of late modernity have both short- and long-term consequences for plants, animals, and people. Furthermore, in building his theory of risk society he uses the chronic mercury contamination of Villa-Parisi (Brazil) and the explosive industrial accident at Bhopal (India) to illustrate actual technological disasters in developing countries.[34] Elsewhere, he evokes Chernobyl as the classic example of the tendency of the risk society for self-annihilation.[35] Beck has also written that the risks of modernity can be geographically localized and forecasts their unpredictable social consequences to be tortuous.[36] He describes the emergence of a 'solidarity of anxiety' among victims and how such a condition contributes to the 'anxiety community.' Beck skirts the details concerning the anxiety community because, in his estimation, the ability of such a collectivity to withstand stress and not self-destruct is unknown. As he observes, 'anxiety has not been a foundation for rational action.'[37]

Beck's theoretical treatment contains occasional reference to more situated contexts. Specifically for our current purposes we suggest a more focused definition of catastrophe, relative to the concept of disaster. Furthermore, Beck's notion of the anxiety community, and his subsequent questions regarding this construct, suggests that environmental disasters may very well range in scope from ultimate global self-annihilation to instances of smaller-scale destruction. The accumulation of thousands of small-scale incidents of environmental harm could give rise to a pattern of collective anxiety in the culture of the risk society. Accordingly, an understanding of localized catastrophes and their social impacts, as well as the identification of either mobilized 'anxiety' or depressed 'corrosive' communities and subsequent patterns of social change, provides a pathway for verifying empirically aspects of Beck's theoretical work.

We are particularly interested in several of Beck's macro-level themes and his occasional examples of concrete, localized catastrophes. Our discussion will attempt to bridge these abstract theoretical concerns to the micro-context of the 1989 *Exxon Valdez* oil spill in Alaska. This objective is, at best, a hazardous undertaking. Nonetheless, Beck describes the articulation of risk society as

containing 'some empirically oriented, projective social theory without any methodological safeguards,' and such a statement suggests relevance to the social impacts of localized environmental destruction. We derive some middle-range interpretations of risk society theory and contrast these themes with data on the *Exxon Valdez* disaster.

Beck's notion of catastrophe connotes an unthinkable and irreversible risk of environmental harm that threatens the lives and livelihoods of present and future generations of people, flora, fauna, air, water, and soil. Researchers have traditionally viewed the concept of 'catastrophe' in terms of extreme events in which the vast majority of residents of an area suffer dislocation. The incident disrupts normal, everyday routines for an extended period of time and strains the local social and cultural infrastructure with continuing threats to vulnerable human groups.[38] In short, we can differentiate catastrophes from disasters by the fact that they produce social damage for entire communities and this impairment can persist over an extended period of time.

Localized environmental catastrophes are highly probable in the risk society. Concrete experiences of technological failure from Chernobyl, Bhopal, Three Mile Island, and Love Canal, as well as a host of other less ignoble places, alert us to the possibility of the 'ultimate catastrophe,' that is the destruction of all organic life on the planet. However, the global risk society – particularly in a post-Cold War era – will in all likelihood come about through the accumulation of an ever-growing number of smaller-scale incidents. The proliferation of novel threats will occur within situated sociocultural contexts engaging in processes of reflexive modernization and producing communities that are self-conscious of present and impending dangers.[39]

For Beck, it is this 'reflexivity of self-destruction' that drives people together, generating a 'solidarity of anxiety.' At this point, Beck becomes rather vague about the nature of the anxiety community. Initially, it seems to be a critical prerequisite for political action (i.e., a response of reflexive modernization), yet he acknowledges that it is unclear how such mobilization will occur.[40]

The important question at present is whether the anxiety community associated with the risk society is able to mobilize residents for collective action. Alternatively, will it generate a pattern of local social fragmentation and distress? Studies of the community impacts of technological disasters in the United States point to an important parallel with the concept of the corrosive community.

This socially destructive process tends to emerge during the aftermath of technological disasters, thereby denying the possibility of recovery or mobilization for recovery. Such collectivities are characterized by: (1) the ambiguity of biophysical damage, (2) the likelihood of a debilitating (rather than a therapeutic) process of social response, and (3) the overall tendency toward socio-cultural disruption.[41] In contrast to the solidarity of Beck's anxiety community, the conflict, uncertainty, fear, and distrust in the corrosive community loom as the 'tortuous' path for localized victims traumatized by these untoward events.

We turn our attention toward exploring these themes in the light of data on the social impacts from the *Exxon Valdez* accident. This examination will give a hearing to people Beck describes evocatively as the 'voices of the side-effects,' in this case those individuals who bear the risks of the sprawling technical system responsible for the global transport of oil. Industry experts estimated that an oil spill of catastrophic proportions would occur in Alaska only once every 227 years.[42] However, this low probability event did take place and it had profound consequences for the three small communities in the surrounding vicinity that are economically and culturally dependent on renewable natural resources.[43]

THE *EXXON VALDEZ* DISASTER AS LOCALIZED CATASTROPHE

On March 24, 1989, the supertanker *Exxon Valdez* ran aground on Bligh Reef in Prince William Sound off the southcentral coast of Alaska resulting in an oil spill that caused extensive ecological damage. The vessel released over 11 million gallons of crude oil that over the course of the following weeks and months inundated a vast intertidal area and eventually spread south into the Gulf of Alaska. Alyeska, the consortium of multinational oil companies that operates the pipeline and the oil transport facility located in the coastal town of Valdez, was responsible for containing the spillage. Corporate officials, however, missed numerous opportunities to limit the effects of the accident within the first 72 hours due to inadequate communications and a lack of readily available equipment. Ultimately, the initial organizational response proved to be a complete failure. Ensuing storms and high seas over the next three-month period washed oil across approximately 1900 kilometers of rugged Alaskan coastline. Controversial clean-up methods, including the

use of hot water and chemical detergents, resulted in further damage to the surrounding ecological resources and alarmed local residents.

Because the oil spill occurred during the season of greatest biological productivity, it had an immediate and devastating effect on both the natural environment and the human communities that rely on the region's renewable natural resources. The casualty list of most visible damage included more than 250 000 seabirds, 144 bald eagles, approximately 3500 sea otters, 300 seals, and 22 whales. Furthermore, marine scientists have linked declines in populations of pink salmon and herring to destruction of the bioregion's food chain and to contamination of spawning areas.[44]

Needless to say, the oil spill severely impaired the isolated local communities that are economically dependent on commercial fishing. Furthermore, the Prince William Sound area is home to several groupings of Alaska Natives, and village life, largely arranged around the subsistence gathering of fish and wild game, was severely disrupted.[45] These local residents could not conduct their traditional harvests of herring, seal, salmon, and clams because of fears of contamination (and a state-imposed moratorium). We have elsewhere described these settlements as *renewable resource communities*, that is localities with cultural, social, and economic structures organized around the collection and exchange of renewable natural resources.[46] There are three such communities in Prince William Sound – two Alaska Native villages (Chenega Bay and Tatitlek) with populations of less than one hundred persons and a primarily non-Alaska Native town (Cordova) comprising approximately 2500 people. All three communities are located in an extremely remote area and are accessible only by airplane or boat. Given their distinct dependence on renewable natural resources, these communities are extremely vulnerable to perturbations of the biophysical environment. In addition to its obvious immediate social dislocation, the oil posed longer-term threats to the cultural and economic viability of these communities due to the damage sufffered by local biota.

Commercial fishers in Prince William Sound have experienced a succession of unusual seasons since the accident. State authorities canceled the annual herring season five times during the seven years following the oil spill. Although there was a limited herring harvest in 1997, prospects for the recovery of this fishery remain uncertain. Pink salmon have experienced sporadic returns during most years since the accident and the stability of this species is questionable. Among local residents, economic hardships resulting from disruption of commercial fishing and uncertainty regarding

resource recovery have contributed to ongoing cultural, social, and psychological stress.

The *Exxon Valdez* oil spill exemplified the basic features of a localized technological catastrophe for these Prince William Sound communities. The accident was the result of a loss of control over complex organizational and technical activities involving corporate, political, and societal arrangements.[47] The public variously assigned blame to the tanker captain, Exxon, Alyeska, oil corporations, and government agencies.[48] Litigants (many from the Prince William Sound communities) filed hundreds of lawsuits and the legal proceedings will likely continue well into the next century.[49] The biophysical damage stemming from the oil spill directly disrupted local environment–community relationships. Differing definitions of the amount of ecological damage, the threat to future economic viability, and the legal responsibility of corporate and government actors created deep schisms and sharp conflicts. Some community members earned considerable sums of money working on the clean-up during the oil spill's immediate aftermath, while other local residents did not, would not, or could not gain employment. Such inequity intensified internal disputes.[50]

For many local residents, the early announcements of a catastrophic oil spill virtually within sight of their homes served to give the event an identifiable beginning. However, few people living in the Prince William Sound area have experienced a sense of closure and, indeed, the accident's residual effects continue to take their toll. The aftermath of the oil spill, in the form of failed fisheries and protracted litigation, have contributed to a continuing pattern of social anxiety and distress. Over the past eight years, we have used survey and ethnographic methods to systematically collect data in several Alaskan communities on the accident's social impacts. In the following section, we draw upon this research to highlight selected themes in Beck's risk society theory.[51]

*DIS*SIMILARITIES TO REFLEXIVE MODERNIZATION: SCIENCE, COUNTER-SCIENCE, AND ORGANIZED IRRESPONSIBILITY

The extent of the ecological damage caused by the *Exxon Valdez* oil spill has been the subject of numerous scientific debates that continue to be socially constructed nearly a decade after the actual

event. Although it is indisputable that the *Exxon Valdez* spilled more than 11 million gallons of oil into Prince William Sound, it has been impossible to apply rigorous scientific models to determine unambiguously the accident's immediate and continuing ecological damages. This feature has given Exxon, the principle responsible party, a moral and legal rhetoric to avoid ultimate accountability.[52] During the four years following the oil spill, a judicially ordered moratorium prevented data pertaining to biological effects from being publicly released and this caused many local residents to question both the legal and scientific rationale for perpetuating uncertainty. Once researchers working for the state and federal governments made public their initial findings at an Anchorage symposium early in 1993, Exxon utilized one month later the annual meeting of an industrial research association, the American Society of Tests and Measurements, to present and promote the results of its own studies. While the evidence aired at the Anchorage conference described a pattern of serious – albeit in certain instances uneven and indistinct – damage, Exxon's investigations suggested that the oil spill had minimal, if any, ecological impacts.[53] More recently, a researcher who was working under Exxon sponsorship, suggested that because of 'environmental advocacy,' early calculations overestimated the oil spill's impacts, thereby exaggerating Exxon's moral and legal obligations. This assertion appeared in a peer-reviewed academic journal, adding credibility to the oil company's assessments of the damage caused by the accident.[54]

The socially constructed 'spill science,' or research into the event's effects premised on preconceptions, resulted in two distinct – and contradictory – bodies of purportedly objective data. Ott describes this incompatible discourse in the following manner:

> Something went terribly wrong with 'science' in the aftermath of the *Exxon Valdez* oil spill as illustrated by the extreme differences in the findings of key studies between government and industry. These differences are symptomatic of underlying problems with the scientific and regulatory processes that were designed to produce quality science.[55]

After the *Exxon Valdez* accident, as has become routine for large oil spills, the federal and state trustees for natural resources and the principle responsible party (i.e. Exxon) designed and executed studies to collect data to support their partisan positions. For the government, the claim was that the spillage injured resources and

the relevant agencies conducted research to determine the extent of those damages. In contrast, Exxon held the position that resources may have been impaired, but natural recovery would be rapid and the company (and its contractors) proceeded to determine what and how much was unharmed to minimize its liability.[56]

For many residents of the Prince William Sound area this pattern of science and counter-science continues to be disconcerting and frustrating. A leading marine scientist residing in Cordova noted:

> The local people do not understand the complexity of determining spill impacts on the salmon and herring fisheries. There has been more variation in catch totals in the years preceding the spill than the years since the spill. So how can you absolutely say that poor salmon runs are due to the spill?[57]

Local residents interpreted this spill science as politics and the resulting litigation, in Beck's terminology, as 'institutional political discourse.' The following statements by Cordova residents illustrate this point:

> The whole mess – the spill, studies of impacts and the lawsuit – is all about money. Exxon's too powerful and rich – they will buy their own science and through their PR [public relations] make it real. We are just a gnat on an elephant's leg.
>
> I don't understand why scientific information hasn't been released. Decisions are being made that could be clarified by information.
>
> I think that it is all politics. Exxon is not really out to pay for what it has done. Exxon will fill a few pockets to avoid paying. It has also made money as a tax write-off.
>
> Exxon and politicians put pressure on the news media to suppress the news. What they claim to be real is not. It's all hype to make money.

Spill science created a sense of distrust among local residents. Many Cordovans soon after the accident became sensitive to this loss of control and lack of institutional trust. For example, a majority of respondents from a community-wide survey expressed skepticism about Exxon's ability and willingness to clean up the oil spill, the science of ecological damage assessment, and the legal system set up to distribute compensation. In August 1989, only five

months after the accident, roughly seven out of ten Cordovans felt that the legal system would not require Exxon to conduct a satisfactory clean-up. Furthermore, 83 percent of our respondents thought that the company had publicly presented misinformation, 55 percent opined that Exxon was not telling the truth, and 51 percent asserted that there was a lack of public information about the oil spill and its ecological impacts. Most residents also maintained that Exxon's activities following the accident and the ensuing clean-up reflected 'legal advice' rather than a sincere effort to restore Prince William Sound and the surrounding vicinity.

This disenchantment with institutional responsibility is further reinforced by the survey data in Table 7.1. We found that the overwhelming majority of both community residents and commercial fishers were dissatisfied with corporate, government, scientific, legal, and media responses to the oil spill. Perhaps surprisingly, only one out of three respondents expressed satisfaction with local government activities, suggesting estrangement from both primary and secondary institutions responsible for managing risks associated with the local transport of oil. The pattern of organized irresponsibility observed by local residents, as well as issues of uncertainty associated with incomplete scientific accounts of ecological damages, contributed to a loss of institutional trust among community residents.

These observations also relate to the 'unbinding of science' that Beck discusses as part of the process of reflexive modernization. For the *Exxon Valdez* oil spill, competing social constructions of ecological damage were correlated with institutional interests and local residents quickly lost faith in science's ability to measure impacts objectively. For many of our respondents the ecological damage and the long-term threat to Prince William Sound was obvious and logical. The community-wide consensus regarding dissatisfaction with the accounts emanating from the full range of institutional actors is clearly indicative of a lack of trust in experts and their relevant support systems. This pattern of 'social recreancy' deters participation in community social movements and restricts the emergence of the subpolitical structures Beck foresees as emerging out of the anxiety community.

Table 7.1 Community satisfaction with institutional truth regarding the *Exxon Valdez* oil spill in Cordova, Alaska, 1992

	Total community	*Commercial fishers*
Federal government	14.9	8.3
Alaska state government	14.1	14.6
Alyeska Corporation	5.2	2.1
Exxon Corporation	6.1	2.7
VECO Clean-Up Corporation	6.3	0.0
United States Coast Guard	31.9	17.0
Local government	30.4	22.9
Scientists	19.9	20.5
Lawyers	8.5	8.7
Local newspapers	26.5	23.4

*DIS*SIMILARITIES TO THE ANXIETY COMMUNITY: SOLIDARITY OR CONFLICT?

Although the *Exxon Valdez* oil spill did not pose a direct threat to the human residents of Prince William Sound, it placed in jeopardy the viability of Alaska Native subsistence culture and the economic resources of commercial fishers. Local renewable resource communities faced both immediate and long-term ecological damage from the unknown consequences arising from the sizeable release of 'a toxic, persistent chemical' in waters so necessary for their way of life.[58] One Alaska Native stated, '[The spill] is hurting more than anything else we ever experienced. Its like losing everything you had.'[59]

The late Chief Walter Meganack, a widely respected Alaska Native elder, expressed the trauma of the unthinkable in the following manner:

> The excitement of the season had just begun, and then, we heard the news, oil in the water, lots of oil killing lots of water. It's too shocking to understand. Never in the millennium of our tradition have we thought it possible for the water to die, but it's true.[60]

Residents active in the local fisheries also felt immediately the impact of the oil spill. Following exceptional seasons during the two years prior to the accident, many commercial fishers invested their profits in additional capital equipment (e.g. boats, electronic equipment, nets). One of our respondents remarked in 1995:

> I made a lot of money in [19]88, so I bought a warehouse to start a new business, a new boat, and a pick-up truck. In six years I've lost everything – three [fishing] permits, the boats, the warehouse, my wife, my family – everything! I don't think I'll get anything from the court, either – if I do its way too late to help me.

Some especially prescient local residents began to recognize the seriousness and the enduring quality of the oil spill's economic impacts as early as 1992. Several of them described to us the financial dislocation that the accident produced:

> Since the spill I've lost a house in Montana, a lot in Montana, a new fishing boat, 25-foot Boston Whaler, 21-foot Munson Aluminum, 15-foot Boston Whaler, boat trailers, all my savings and my credit. Need I say more?

> Cordova is suffering economic disaster at this time and is causing extreme hardships here. These surveys do not accurately portray the fear and despair that many of us are feeling. We have always been highly independent and now seem to have no control over our lives.

> Since 1985 my husband and I have fought very hard to get ahead. We have worked very hard to get ahead. In 1988 we had $180,000 saved to build a new boat and since that time we have had to sell everything – crab pots, property, one boat – just to stay afloat which we are not. Last year we couldn't even make our [fishing] permit payment for the first time since we got it in 1985. Fishing is only opened half as much. We just can't make it.

Our survey data from 1995 reveals that from 1990 to 1994 the per capita economic loss (projected less actual earnings) for local commercial fishers was nearly $215 000. This continuing economic loss spiral severely affected the fishing economy of Cordova and is a major source of continuing social disruption and mental health impairment in the community.[61]

Beck acknowledges that anxiety communities are stressed. He also notes that it is an empirical question whether or not these communities can withstand stress, become politically mobilized, organize, and exert a reflexive political force. Table 7.2 addresses this theme by providing insight into the patterns of oil spill-related stress in Cordova over the last eight years. Data pertaining to the

Table 7.2 Intrusive stress and avoidance behavior scale means for the *Exxon Valdez* oil spill in Cordova, Alaska, 1989–97

	Intrusive stress	*Avoidance behavior*
Cordova community		
1989 (n = 117)	16.5	11.1
1990 (n = 68)	10.1	9.6
1991 (n = 221)	9.4	7.3
1992 (n = 151)	8.5	8.1
Cordova Commercial Fishers		
1989 (n = 49)	19.3	12.1
1990 (n = 27)	10.1	9.7
1991 (n = 73)	13.1	10.1
1992 (n = 48)	11.8	11.4
1995 (n = 88)	13.2	13.0
1997 (n = 65)	13.1	11.3
Cordova Alaska Natives		
1991 (n = 62)	13.4	11.5
1992 (n = 40)	14.6	10.7
Clinical cases[1]		
Clinical patients (symptoms due to bereavement from death of a parent 3–6 weeks after death)	21.6	n.a.
Clinical patients (6 months after therapy for symptoms due to bereavement from death of parent)	13.8	n.a.
Rape victims (2 years after incident)	11.4	n.a.

1. Data for clinical patients obtained from Horowitz (1976) and data for rape victims obtained from Scidner et al. (1988).

'impact of events' scale are available for the entire community and two high-impact groups: commercial fishers and Alaska Natives. The impact of events scale is a standardized psychological scale that measures two components of stress: (1) intrusive thoughts and recurrent images of a traumatic event, and (2) active attempts to avoid discussions or reminders of a traumatic event. This scale uses a specific event, in this case the *Exxon Valdez* disaster, to identify oil spill-related stress responses.[62] As noted, intrusive stress refers to the extent to which individuals endure recurrent memories of troublesome events. This component of the scale is informative

because the frequent mental repetition of distressing experiences over long periods of time may indicate an increased vulnerability to disease progression and the deterioration of both physical and mental health.[63]

Table 7.2 clearly reveals a chronic pattern of collective stress. However, as presented these measures may not capture the full dimensions of the anxiety community because groups within such aggregates are affected differently. For instance, commercial fishers and Alaska Natives – two groups intimately linked to local environmental systems – experienced higher levels of intrusive stress. These incidences of stress among Cordovans appear substantial when contrasted to clinical patients (e.g. rape victims), further underscoring the scope of the chronic, debilitating consequences of this event for local communities.

Social disruption and psychological stress from the accident also affected utilization patterns for mental health facilities in the Prince William Sound area. Rates of mental health and alcohol counseling during the post-accident period in two local clinics (Cordova and Valdez) were significantly higher than those recorded for the pre-oil spill years. Despite this trend, mental health service delivery was severely restricted after 1989 by high personnel turnover (during an eight-year period Cordova's mental health center had five directors and over 14 staff members) due to heavy client loads and 'professional burnout.' Such evidence raises questions about whether anxiety communities are able to mitigate the long-term collective stress produced by technological catastrophes solely with local resources.

As previously described, event-related stress characterizes most communities that have suffered the effects of technological failures. In the case of the *Exxon Valdez* oil spill we have been concerned primarily with the psychological symptomology of members of vulnerable groups. We collected psychological data for commercial fishers in Cordova in July 1995 and included in our survey instrument items designed to ascertain respondents' psychological symptoms and interpersonal relationships.[64]

The results reveal that commercial fishers experienced relatively high levels of psychopathology – 20 percent of our sample evidenced severe anxiety and we classified 40 percent as having severe depression. Six years after the oil spill, we found 37 percent of commercial fishers had symptoms of spill-related Post-Traumatic Stress Disorder (PTSD). PTSD is a psychological disorder that identifies a delayed response

to a traumatic event characterized by intrusive thoughts and images, avoidance behaviors, and hyper-vigilant reactions. These psychological symptoms result from a specific traumatizing event. Even more significant was the finding that one out of every two commercial fishers manifested either severe depression, PTSD, or a combination of these symptoms of psychological impairment.

The identification of severe depression and PTSD among commercial fishers provides an indication that within the anxiety community, serious emotional disorders are associated with vulnerable groups and this may preclude the emergence of collective political responses. Furthermore, our data identify two additional factors that may limit the politicization of the anxiety community, specifically the breakdown of social support systems and severe economic dislocation.

We found that commercial fishers who experienced severe depression and PTSD encountered difficulty with their interpersonal relations. Problems with relatives and within families were correlated with severe levels of psychopathology. Additionally, commercial fishers with severe levels of depression and PTSD also reported deterioration of their physical health since the oil spill.

These results clearly suggest that residents of anxiety communities may be preoccupied with resolving internal social conflicts, grappling with economic losses, and (for some) dealing with the effects of severe psychopathology. Beck notes that in risk society the 'quality of community begins to change' – indeed, our analysis of data from the *Exxon Valdez* accident suggests that the quality of community deteriorates sharply in the aftermath of an environmentally destructive event and the transformed collectivity resembles more the conflict-based corrosive community than it does the politically charged anxiety community.[65] This situation is apparent from our respondents' descriptions of community changes over a seven-year period:

> It is not the same small town with everyone pulling for each other. Now we are small groups going our own ways. Some old timers just couldn't handle the aftermath and moved away. The new people mostly seem to want to make a pocket full of money and leave for somewhere else.

> The oil spill has permanently changed our lifestyle, our community will never be the same. There is a different feeling to me; more stress, less open, less everyone helping each other. The community does not feel as safe.

> The food prices are atrociously high. Thirty families have moved away. People are drinking more – more alcoholism and more fights. Some friendships are only seasonal now.

> More harsh feelings. More separation of the town. Oil spill issues have affected the community.

> My husband got cancer three months after the spill. We believe that the stress from the oil spill caused cancer. There are many cancer cases in Cordova. The oil spill divided a lot of people, and it also reunited a lot of friendships. The spillionaires [residents who made sizable sums of money during the accident's immediate aftermath] caused a lot of resentment between those who helped and those who did not. Prices of groceries doubled and never went back down.

> The town remains split because of the spill and those who made too much money from it. Also, a lot of people have died – seems like more than usual – stress?

> Everyone got along well before, but now the city government and everybody else are fighting. There is a lot of bickering in the community.

> When asked this question, my immediate response is tears welling up. I don't know why, but the pain and loss I felt two years ago can suddenly come forth. The spill and the subsequent disfunctionalism of many people in this town feels like a horrible killing cancer has been planted in our community and I feel ineffectual in bringing a positive change. I even feel a diminished energy to seek solutions.

> The people in Cordova used to be so upbeat, but now they're so negative. There's a big split between the haves and have nots, particularly those who worked on the cleanup. Businesses are being told by banks to stop extending credit. Also backstabbing is going on, but before people were more congenial.

Other data collected from Cordova in 1992 do not support Beck's hypothesis that the anxiety community will evolve into a more active, politicized locality. This survey found that only 26 percent of our respondents had become more involved in community affairs since the oil spill. In contrast, over 40 percent indicated that they had become less active during the same time period. These findings

point to patterns of social fragmentation, distrust, and isolation that are characteristic of corrosive communities.

While social and economic instability continue to plague Cordova, Exxon's legal strategy has perpetuated divisiveness and uncertainty.[65] Rather than enhanced community solidarity, a significant proportion of Cordova residents have experienced since the oil spill *continuing social conflict, economic loss, deteriorated social relationships, increased social isolation, severe psychopathology,* and loss of trust in self and others. A long-time Cordova resident summarized his corrosive situation as follows:

> I won't be the same, my family won't be the same, the community won't be the same. I don't go out on the Sound much any more. When I go, I don't see oil. (Unless you dig on the beaches) the scenery is just as nice as before, but is like someone turned off the sound. The [animals] are few, as are the birds. You cannot go two blocks in town without seeing some leftover from the spill. The papers, radio, and publications of any group talk about the oil spill, the environment, and our health. Every group has its own scientists, lawyers, and reports (none ever agree with anyone else). Mostly I'm just mixed up, I don't know who to believe or why. I don't trust my fellow man much any more and I don't know why. My life isn't as much fun and I don't know what to do about it.

CONCLUSIONS

Modern, high-consequence catastrophes are a critical element in Ulrich Beck's theoretical writings on risk society. We have attempted in this chapter to identify certain themes from Beck's oeuvre and to contrast his macro-level contentions with the micro-level formulations emerging from field studies of technological disasters. The conceptual dissimilarity between the anxiety community and the corrosive community provides one avenue for examining the social responses to the *Exxon Valdez* oil spill in the light of Beck's predictions concerning an emergent risk society. As we noted above, Beck is rather ambivalent about the outcomes of the anxiety community. Political mobilization, or meaningful subpolitical action, is also associated with other structural changes contained in his wide-ranging risk society theory. In this chapter, however, we have focused solely on the issue of technological catastrophe and subsequent community response. Our analysis suggests that the contrasting concept of the corrosive community is more applicable to victims of the *Exxon Valdez* oil spill. The lay public's loss of trust in relevant institutions, prolonged economic dislocation, chronic patterns of psychopathology, and continuing community conflict has not created a social context conducive to political mobilization, community solidarity, or social movements.

We observe that when viewed as a macro-level theory of social change, Beck's writings may be temporally bound to the post-World War II period, geographically limited to northern Europe, and (as noted by Jeffrey Alexander) subject to cultural modification.[67] Our analysis of the aftermath of the *Exxon Valdez* oil spill reveals that some aspects of Beck's theory are simply not generalizable to localized hazards. Nonetheless, other insights from his work – such as the unbinding of science and politics – appear to be outcomes that correspond quite favorably with our findings from the *Exxon Valdez* case. However, local responses to competing scientific claims of ecological damage resulted in hostility to institutional claims and less participation in community organizations. For this localized catastrophe, we witnessed a pattern of internal conflict and social isolation rather than a mobilized consensus for subpolitical change.

Current social theorizing with respect to the environment provides an abundance of hypotheses that require detailed sociological analysis. In this chapter we have attempted to draw on certain themes from Beck's writings and to evaluate their applicability in terms of one localized disaster. This daunting objective invariably involved some 'theoretical slippage' to transform macro-level heuristics to plausible middle-range empirical outcomes. We acknowledge this limitation and urge others to pursue empirical inquiries into the viability of the ambitious work now being produced under the rubric of environmental social theory. Through these efforts we may be able to establish the macro–micro linkages between these discourses.

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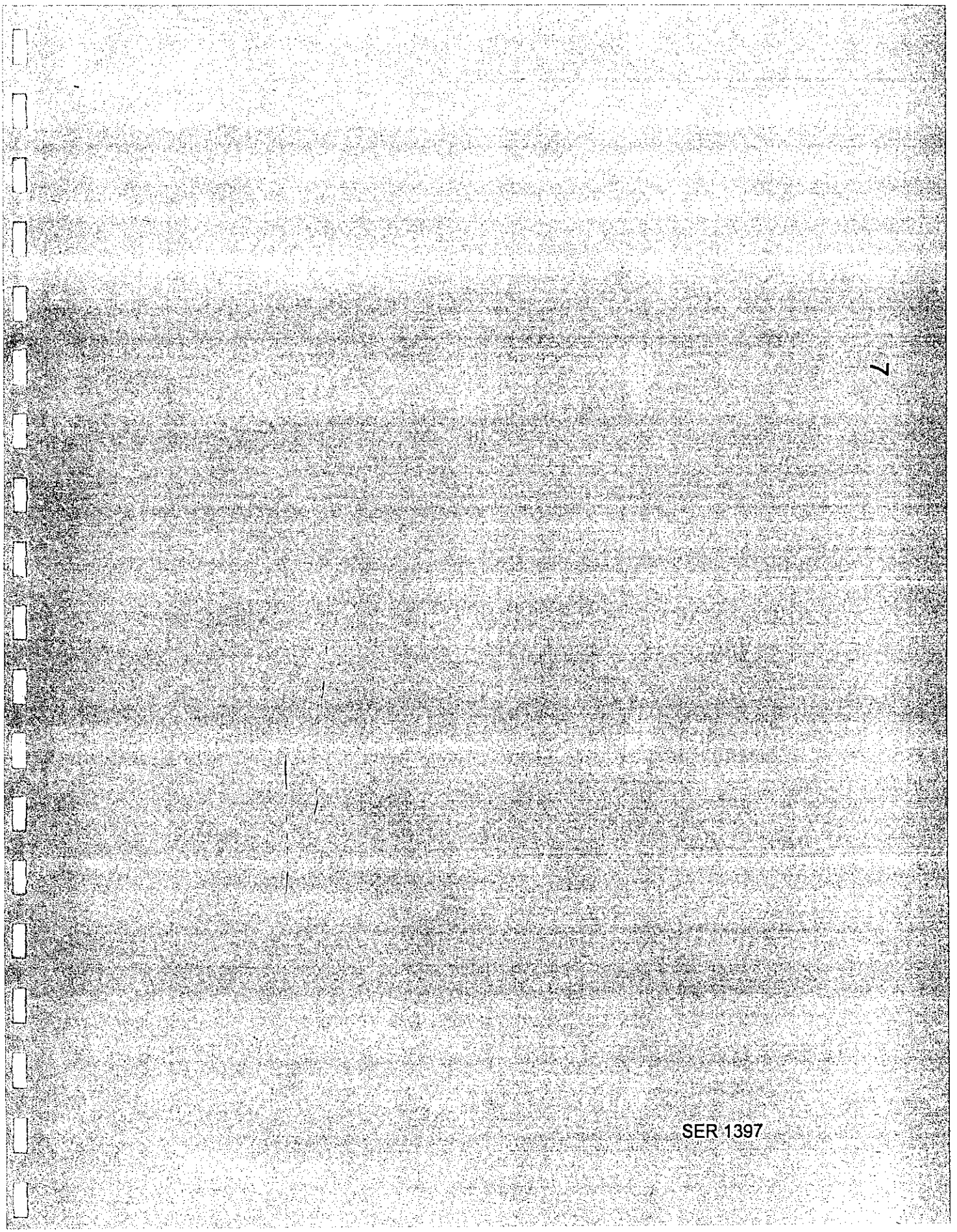

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Social, Cultural, and Psychological Impacts of the Exxon Valdez *Oil Spill*

LAWRENCE A. PALINKAS, MICHAEL A. DOWNS, JOHN S. PETTERSON, and JOHN RUSSELL

The sociocultural and psychological impacts of the *Exxon Valdez* oil spill were examined in a population-based study of 594 men and women living in 13 Alaskan communities approximately one year after the spill occurred. A progressive "dose-response" relationship was found between exposure to the oil spill and the subsequent cleanup efforts and the following variables: reported declines in traditional social relations with family members, friends, neighbors and coworkers; a decline in subsistence production and distribution activities; perceived increases in the amount of and problems associated with drinking, drug abuse, and domestic violence; a decline in perceived health status and an increase in the number of medical conditions verified by a physician; and increased post-spill rates of generalized anxiety disorder, post-traumatic stress disorder, and depression. Alaskan Natives, women, and 18–44 year olds in the high- and low-exposed groups were particularly at risk for the three psychiatric disorders following the oil spill. The results suggest that the oil spill's impact on the psychosocial environment was as significant as its impact on the physical environment. The results also have important theoretical and pragmatic implications for the understanding and mitigation of adverse impacts of long-term processes of sociocultural change.

Key words: Alaska, disasters, psychosocial stress, sociocultural change, subsistence

ON FRIDAY March 24, 1989, the 987-foot supertanker *Exxon Valdez* ran aground on Bligh Reef (about 25 miles from the city of Valdez, Alaska), spilling over 11 million gallons (260,000 barrels) of crude oil into the once-pristine environment of Prince William Sound. Under the direction of Exxon and its prime contractor, VECO, a sequence of actions designed to contain and clean up the spill was initiated. Fishing vessels were hired to help lay containment booms, transport equipment, and ferry refuse to disposal or transshipment sites. Thousands of residents and non-residents were hired to participate in the cleanup effort. In some instances, entire communities such as Tatitlek were hired to protect their own beaches. Beaches were scoured with high-pressure water hoses, and countless numbers of rocks were scrubbed to remove surface oil. Hundreds of fishing vessels boomed floating oil slicks while larger vessels ("skimmers") siphoned off collected oil. The highly advertised wages ($17.69 per hour) attracted both the employed and unemployed—initially from within Alaska, but later from all over the United States. Such high wages for unskilled workers made it difficult for local hotels, shops, restaurants, grocery stores, and canneries to retain their employees. Local governments were also drawn into the response, committing the use of local community facilities (offices, meeting places, equipment services) to organize, coordinate, and perform cleanup activities. A chain reaction had begun that was to affect virtually every aspect of social and economic relations in the region.

The primary focus of public concern and subsequent mitigation efforts by Exxon and federal, state, and local agencies was initially on the direct environmental and economic impacts of the oil spill. There was also, however, concern about the indirect social and psychological impacts. This concern stemmed from the community conflict created by the unequal distribution of cleanup jobs and compensation for the use of boats and equipment owned by local residents, and the influx of outsiders and resulting strain on community services. This conflict was accompanied by a dramatic increase in visits to community clinics for primary care and mental health services reported throughout the affected region. Significantly increased rates of physical health symptoms and psychiatric disorders have been found in previous studies of other natural (Logue, Melik, and Hansen 1981; Shore, Tatum, and Wollmer 1986a, 1986b) and technological (Baum, Gatchel, and Schaeffer 1983; Bromet et al. 1980; Smith et al. 1986) disasters.

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EXHIBIT 7

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But the story of the *Exxon Valdez* oil spill is more than an account of diaster-related psychosocial impacts. It is also an vent of sociocultural change. For both Native and non-Native esidents of the small, rural communities in the affected region, the event represents the alteration of a traditional way of life in response to contact with the larger Euro-American social system. In this particular instance, this contact assumed two distinct forms. The first was the oil itself: physically, during participation in cleanup efforts; culturally, in terms of effects on traditional subsistence harvesting activities; and economically, in terms of the subsequent closure of certain commercial fisheries. The second form of contact was the involvement of residents in the affected communities with the management and personnel of Exxon, VECO, representatives of numerous federal and state agencies, and a barrage of outsiders interested in participating in cleanup efforts for a variety of monetary or altruistic reasons.

The social and psychological impacts of the *Exxon Valdez* oil spill provide a model of the anticipated impacts of similar events which are increasingly likely to occur in circumpolar regions in particular as the quest for oil expands in response to the uncertainty of supplies from the Middle East, and in developing nations in general as they become dumpsites for toxic waste from the industrialized nations. These impacts extend beyond the event itself, however, for they provide an opportunity to examine the impacts of long-term processes of sociocultural change. It remains to be determined whether disasters result in severe long-term psychological impacts and provide the impetus to social change, or whether the social and psychological impacts are merely short-term and minimal (Shore, Tatum, and Wollmer 1986a). We contend that such events serve as a paradigm of long-term processes of sociocultural change in two respects. First, they provide case studies of individual and community responses to changes in the social and natural environment. These responses may be temporary, designed to establish some level of equilibrium with the environment, or they may be radical or permanent, resulting in a fundamental transformation of one or more components of the sociocultural system (Palinkas, Harris, and Petterson 1985). Second, they provide an opportunity to examine the association between processes of sociocultural change and subsequent health and wellbeing.

This paper presents data collected from a household survey of 594 residents living in 13 different communities in the Prince William Sound, Kenai Peninsula, Kodiak Island, Alaska Peninsula, and Southeast Alaska regions. Its focus is on the changes in patterns of social relations, traditional subsistence activities, and the prevalence of physical and mental disorders since the oil spill event. The objective of this study was to examine the association between levels of exposure to the oil spill and subsequent cleanup efforts and these social and psychological impacts.

Background

The *Exxon Valdez* oil spill covered a wide geographical area ranging from the upper Prince William Sound to southern Kodiak Island and west to the Alaska Peninsula area of Chignik Bay (Figure 1). Not all areas within this immense region were equally affected, however. In some areas, miles of shoreline and other areas used by local residents for fishing and other activities were heavily oiled while other areas were relatively untouched.

Within this wide-ranging area reside a number of distinct cultural groups of Native and non-Native origin. Non-Natives living in this region are predominately Euro-American but also include Filipinos, African Americans, and Hispanics employed in the seafood processing industry. The Native ethnic groups represented in the affected area include the Koniag, the Chugach, and the Unegkurmiut of the lower Kenai Peninsula, with all three groups identifying themselves as Aleut (Davis 1984:198). These groups possess distinct cultural traditions, but share two characteristics with Alaskan Native groups in general when contrasted with non-Natives: a history as indigenous peoples with a common experience of contact with the Euro-American sociocultural system; and a set of social relations and values based on practices of subsistence production and distribution.

Since contact with Russian fur traders in the late 18th century, the cultural history of the Native communities in the region has been one of intensive pressure for sociocultural change. Central to this process have been: an increasing involvement in the wage-labor economy; dependence upon federal, state, and local government for personal welfare and community services; and exposure to the Euro-American sociocultural system through the educational system, media, and interaction with non-Native residents (Braund and Benkhe 1979; Davis 1979; Petterson, Palinkas, and Harris 1982). Alas-

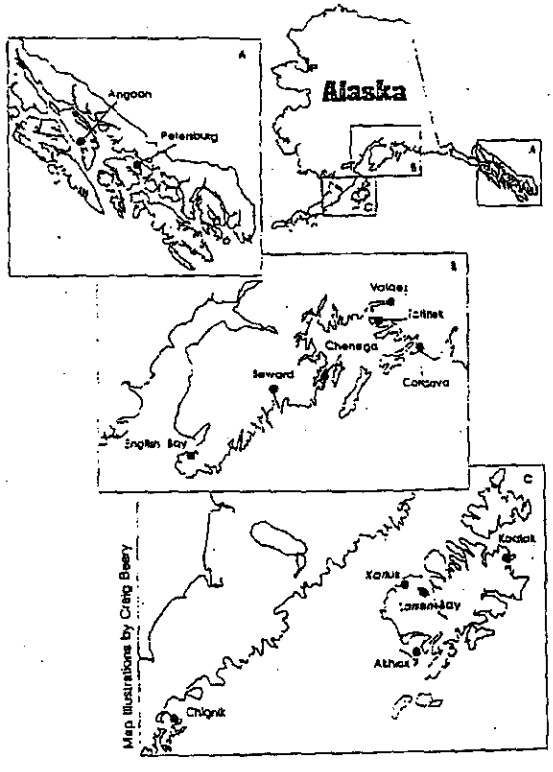

FIGURE 1. *EXXON VALDEZ STUDY* COMMUNITIES

kan Natives have also experienced a significant increase in accidental and intentional injuries, alcohol and drug abuse, and other mental disorders (Kraus and Buffler 1979, Palinkas 1987). This increase in Native morbidity and mortality has been attributed to a number of factors associated with sociocultural change, including: migration to cities and towns (Bloom 1973, Chance 1968, Parkin 1974); greater social complexity of modern community life with its demand for social conformity and group-oriented action (Chance 1965); discrimination, producing lack of self-esteem and cognitive conflict (Chance 1968, Parkin 1974); and the elimination of traditional, culturally sanctioned techniques for coping with these stressors (Foulks 1980, Kost-Grant 1983).

Associated with recent sociocultural changes is the disruption of traditional family bonds and the breakdown of organized, consistent, traditional relationships by the stresses of living in a cash economy (Parkin 1974). This disruption has taken three forms: the generational conflicts emerging between traditional Native value placed on "familism" and Euro-American value placed on individualistic success (Parker 1964); emerging conflicts of class stratification, resulting from increased cash and bureaucratic power being concentrated in the hands of a few (Klausner, Foulks, and Moore 1980); and loss of traditional male status associated with increasing numbers of women in the wage labor force (Travis 1984).

Rapid sociocultural change in rural Alaska has also led to conflict between rising expectations and limited wage labor opportunities (Parkin 1974, Travis 1984), and between the political and economic structures which constrain individual and community attempts to construct meaningful and rewarding social environments (O'Neil 1986). This conflict is particularly evident in small rural communities where Natives committed suicide at a rate 1.8 times that of their urban counterparts (Hlady and Middaugh 1986). Combined with the loss of traditional male status, these factors may also account for the fact that young Native males between the ages of 15 and 24 experience the highest rates of suicide (Blackwood 1978, Hlady and Middaugh 1988).

In addition to their experience with sociocultural change and the larger Euro-American society, the communities in the affected region share a common link to the ocean and its resources through commercial fishing, subsistence harvesting, or recreation. Commercial fishing constitutes the dominant sector of the economies of communities like Kodiak and Cordova, and plays a lesser but still important role as an economic sector in communities like Seward and Valdez. Furthermore, the lifestyle and quality of life of residents in these communities is tied to the ocean and its resources. For both Natives and non-Natives, the commercial harvest of these resources is essential to the purchase of culturally valued goods and services.

These marine resources, however, have varying degrees of cultural significance. Subsistence production and distribution play an important part in the lives of rural non-Native Alaskans as well, but such activities lie at the core of Alaskan Native culture and identity and provide the framework for traditional social relations (VanStone 1962, Fienup-Riordan 1983, Jorgensen 1990). In Native communities, marine life provides important foods that are valued and preferred over "western" foods. These foods include fish (e.g., salmon, halibut, rockfish, Dolly Varden trout); shellfish (crabs, clams); marine mammals (seals, sea lions); birds; and wild plants. Furthermore, the social processes of taking, processing, and distributing these foods has cultural significance beyond the importance of the food consumed. These activities form the basis for networks of social relations that link household members, community residents, and communities throughout the region. These activities also underlie certain values and patterns of behavior, including a disdain for social, political, or economic status differentiation, the practice of giving without expectation of reciprocity, and a respect for the physical environment to insure the renewal of its resources.

Methods

SAMPLE. A survey of 599 households in 13 communities, 11 in the region directly exposed to the oil spill itself and two control communities, was conducted by a research team of applied anthropologists between March 30 and May 15, 1990.[1] Sampling frames were developed in the field from a variety of sources, including Census Bureau tract maps, other city maps, and maps developed by interviewers and local experts. In each community, however, the number and location of households was verified by a census conducted by a research team member. After listing the addresses of all domiciles in the community, numbers were assigned to each household in the sampling frame.

Random samples of households were then drawn at a predetermined ratio using computer generated tables of random numbers.[2] Once each household was selected, a respondent within the household was randomly selected on the basis of birthdate. A household member at least 18 years of age whose birthday was closest to the date of the interview was selected as the respondent. If for some reason that person was unable to be interviewed, then the person with the next closest birthdate was selected. Informed consent was obtained from each respondent after the interview procedures were fully explained. Interviews were conducted by 15 trained fieldworkers and lasted between 45 and 120 minutes.

Incomplete information resulted in the elimination of five respondents, leaving a total sample size of 594. Approximately 84% of all randomly selected subjects agreed to participate. The sociodemographic characteristics of the sample were compared to those reported for each community in the most recent local census available. A high degree of correspondence was found, suggesting that overall the sample was representative of the population of each community. In addition, survey responses were cross-validated with data obtained from informal interviews with respondents, detailed interviews with key informants in each community, and participant observation of community activities by trained fieldworkers.

MEASURES. Demographic variables examined included age, gender, ethnicity, education, and total household income in 1988. Age was measured in years and grouped into two categories: 18–44 years and 45+ years old. Ethnicity was measured using a 12-item variable including: white/Caucasian, Koniag/Aleut/Sugpiaq, Eyak, Athapaskan, Yup'ik/Inupiaq, Other Alaskan Native, Filipino, Hispanic, Asian/Oriental, Black, American Indian, and Other. These categories were further classified into Alaskan Native and non-Native groups. Education was

measured using an eight-item variable ranging from less than sixth grade to a graduate degree, and further classified into two groups on the basis of graduation from high school. Household income for 1988 was measured using a 13-item variable ranging from less than $5,000 to more than $150,000 and further classified on the basis of a median income of $40,000 into two groups.

Exposure to the oil spill and subsequent events was assessed on the basis of responses by residents of the affected communities to six different questions: 1) Did you or anyone in your household use, before the spill, areas along the coast that were affected by the spill; 2) Did you work on any of the shoreline or water cleanup activities of the oil spill; 3) Are there any other ways that you came into contact with the oil spill or cleanup activities, such as during recreation, hunting, fishing, or gathering activities; 4) Did you have any property that was lost or damaged because of the oil spill or cleanup; 5) Did the oil spill cause any damage to the areas you or other household members fish commercially; and 6) Has the oil spill directly affected the hunting, fishing, or gathering activities of any members of this household? Each response was coded 0 for a no response and 1 for a yes; the responses were then summed to provide a continuous measure of exposure with a range of 0 to 6. The Exposure Index was found to have an inter-item reliability (Cronbach's alpha) of .73 for this population. The mean exposure score for residents in the affected communities was 2.54 (S.D. = 1.69).

Following the procedure utilized in other cross-sectional studies of disasters (Robins et al. 1986; Shore, Tatum, and Wollmer 1986a, 1986b; Smith et al. 1990), subjects were classified into three groups on the basis of maximum level of exposure. Residents in the affected communities were classified as being either high-exposed or low-exposed, depending on whether their Exposure Index Score fell above or below the group median (3.00 for non-Natives and 4.00 for Natives). Residents living in the two control communities were classified as being not-exposed.

The oil spill's impact on social relations was examined by asking respondents if relations with spouse or partner, children living at home, other relatives, neighbors and friends, people from other communities, and co-workers had improved, stayed the same, or declined since the spill. Respondents were also asked whether they had experienced any problems with outsiders or with friends since the spill, and whether the spill had influenced patterns of social visitation, participation in religious activities and community events, and volunteer efforts.

The oil spill's impact on traditional subsistence production and distribution activities was assessed by asking respondents about time normally spent hunting, fishing, and gathering, time spent with people from other households on these activities, the amount of harvested resource foods shared with others and with elders, the amount of harvest resource foods received from other families, the number of household members engaged in subsistence production activities, and the opportunities for children to learn subsistence production skills. Respondents were asked whether these activities increased, stayed the same, or decreased since the spill compared with the same time in 1988.

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression scale, the CES-D (Radloff 1977).[3] In this population, the CES-D was found to have an inter-item reliability (Cronbach's alpha) of .90 among Native respondents and .86 among non-Native respondents. A modified version of the Diagnostic Interview Schedule (Robins et al. 1981) was used to detect cases of "generalized anxiety disorder" (GAD), based on criteria outlined in the DSM-III (Diagnostic and Statistical Manual of Mental Disorders, Version III) (APA 1980). A modified version of Version III of the Diagnostic Interview Schedule was used to identify cases of post-traumatic stress disorder (PTSD), based on DSM-IIIR criteria (APA 1987, Robins et al. 1989).

Because of the cultural sensitivity in rural Alaskan communities over the issues of alcohol and drug abuse and domestic violence (Shinkwin and Pete 1982), respondents were not asked about changes in their own patterns of drinking or drug usage, or about their involvement in episodes of domestic violence. It was felt that such questions would not lead to useful response rates or meaningful results. Instead, respondents were asked if they thought people in their particular community and their close friends and family were drinking, using drugs, and fighting more than before, about the same, or less than before the spill. They were also asked if the amount of drinking, drug use, and domestic violence was leading to problems that weren't there before the spill.

None of the residents in the sample incurred injuries as a result of direct exposure to the oil spill, but the stressful nature of the events might be expected to have affected various aspects of their physical health. To explore this possibility, subjects were asked whether they had experienced a number of chronic conditions since the spill and whether or not these conditions had been verified by a physician. Chronic conditions verified by a physician were summed to provide a measure of illness. Self-perceptions of health status before and after the spill also

TABLE 1 Exposure Status by Community and Subregion, 1990

Subregion/Community	Number of subjects	Exposure status: % High exposed	% Low exposed	% Not exposed
Prince William Sound	156	46.8	53.2	0.0
Chenega Bay	11	81.8	18.2	0.0
Cordova	66	50.0	50.0	0.0
Tatitlek	14	85.7	14.3	0.0
Valdez	65	29.2	70.8	0.0
Kenai Peninsula	84	57.1	42.9	0.0
English Bay	24	95.8	4.2	0.0
Seward	60	41.7	58.3	0.0
Kodiak Island	163	53.4	46.6	0.0
Akhiok	11	54.5	45.5	0.0
Karluk	11	54.5	45.5	0.0
Kodiak	119	48.7	51.3	0.0
Larsen Bay	22	77.3	22.7	0.0
Chignik	29	51.7	48.3	0.0
Chignik Bay	29	51.7	48.3	0.0
Southeast	162	0.0	0.0	100.0
Angoon	60	0.0	0.0	100.0
Petersberg	102	0.0	0.0	100.0
TOTAL	594	37.6	35.1	27.2

were assessed by asking respondents to rate their pre-spill and current health status as excellent, very good, good, fair, or poor. These indicators were then compared by exposure status.

STATISTICAL ANALYSIS. Post-spill prevalence rates of depression, generalized anxiety disorder, and post-traumatic stress disorder were calculated on the basis of percentage of respondents or groups of respondents meeting the criteria for these conditions. Diagnostic Interview Schedule algorithms were used to identify cases of generalized anxiety disorder and post-traumatic stress disorder, based on respondents' recollections of having experienced the symptoms within the past year (i.e., after the oil spill).[4] Comparison of prevalence rates and proportional distributions between residents of exposed and not-exposed (control) communities were based on chi-square tests.[5] Comparisons across the three exposure categories were based on a chi-square test for trend in proportions (Fleiss 1981). Comparisons of mean scores were performed using an analysis of variance procedure. Nonparametric tests (Wilcoxen) were used to compare changes in perceived health status before and after the spill in each exposure group.

Results

SUBJECT CHARACTERISTICS. The distribution of subjects by exposure status within each of the 13 communities and five subregions is provided in Table 1. The Kenai Peninsula subregion had the highest percentage of residents in the high-exposed category, followed by the Kodiak Island and Chignik subregions. In general, small, predominately Native communities like English Bay, Tatitlek, Chenega Bay, and Larsen Bay had a larger percentage of residents in the high-exposed category than large, predominately non-Native communities like Valdez and Seward.

Approximately half (50.1%) of the study subjects were male, and 68.8% of the population were between the ages of 18 and 44. More than 84% of the study population were high school graduates, and 47.5% had a median 1988 household income of $40,000 or more. The proportions of high school graduates and households with a 1988 median income of $40,000 or more were significantly greater among non-Natives than Natives ($\chi^2 = 87.43$; $d.f. = 1$; $p < 0.0001$; and $\chi^2 = 45.99$; $d.f. = 1$; $p < 0.0001$, respectively). Among non-Natives, there were significantly more men living in the affected communities than in the control communities ($\chi^2 = 4.10$; $d.f. = 1$; $p < 0.05$). There were no other significant differences with respect to age, gender, and socioeconomic status (as assessed by education and median 1988 household income) between study subjects living in the affected and control communities for either Natives or non-Natives.

CHANGES IN TRADITIONAL SOCIAL RELATIONS. The oil spill event dominated daily life for many in the affected communities. One-fourth of those interviewed actually worked on the cleanup. Another 40% had various other direct contacts with the cleanup activities, including those made during the course of commercial fishing, recreation, and subsistence activities. In addition, the spill and cleanup was a daily topic of discussion for more than two-thirds of the households in the study, indicating the level of involvement, both voluntary and involuntary, among residents in the affected communities.

One consequence of this community-wide preoccupation with the spill was the divisiveness and conflicts over participation in the cleanup. The impact of the oil spill and subsequent cleanup efforts on patterns of social relations among Alaskan Natives and non-Natives in the affected communities is illustrated in Table 2. The percentage of residents reporting a decline in relations with family members, relatives, co-workers, and friends and neighbors was significantly associated with exposure status.

Some of the statements taken from household surveys were exemplary of the types of interpersonal disruptions the cleanup created in various communities:

TABLE 2 Percentage of Respondents Reporting Declines in Traditional Social Relations by Ethnicity and Exposure Status, 1990

	Ethnicity					
	Natives			Non-natives		
Not getting along as well compared with the same period in 1988	% High exposed ($n = 60$)	% Low exposed ($n = 76$)	% Not exposed ($n = 52$)	% High exposed ($n = 130$)	% Low exposed ($n = 160$)	% Not exposed ($n = 109$)
Spouse or partner	17.8**	8.9	0.0	10.8***	3.1	0.0
Children living at home	14.3*	4.3	2.4	5.4**	2.5	0.0
Other relatives living at home	18.8*	8.0	0.0	4.6**	1.2	0.0
Relatives not living at home	13.6***	5.5	0.0	9.2**	5.6	0.0
Neighbors and friends	14.0**	8.1	0.0	12.3***	4.3	0.9
People from other communities	14.8*	8.6	2.0	11.5**	7.4	0.9
Co-workers	7.8	3.6	0.0	11.5*	8.6	4.6
Increased conflicts with						
Outsiders	53.3***	21.1	3.8	51.2***	23.6	1.8
Friends	40.7***	16.4	1.9	44.6***	14.8	2.8

χ^2 test for trend * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

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Yes, as a family we kind of lost it . . . my husband . . . we were so close. Then the oil spill came and he is drinking more and [we] separated.

. . . the loss of earnings of my husband [was bad] . . . and the fact that he wasn't here this summer. It was a burden on our relationship.

My husband's alcoholism got worse. He had quit before the spill. Now we're separated because of the spill.

[The cleanup] contributed to my break-up with my fiancee. The spill caused lots of pressure for me to keep my business going. I was stressed and it affected my relationship.

In some instances, those people who worked long hours on the spill simply had less time and energy to devote to their family relationships. In other instances, the cleanup created tensions related to family roles. For example, in Native communities the oldest child was often placed in charge of siblings as parents worked on the cleanup. When mothers and fathers returned home there were conflicts over the eldest child once again assuming a "child" rather than a caretaker role.

Exposure status was also significantly associated with the number of residents who reported conflicts with outsiders and with friends. Arguments between community members and outsiders who came to work on the spill cleanup were common in most of the communities. Between 30% and 50% of the respondents in all the affected communities indicated they had "problems" with outside cleanup workers in their communities. Many of the problems mentioned involved drunkenness and obtrusive behavior on the part of outsiders. In some communities respondents noted a very sharp cleavage in the community between insiders and outsiders, a cleavage accompanied by conflict and resentment.

Not all the social conflict caused by the cleanup occurred between residents and outsiders. There were also a number of conflicts reported among friends, sometimes resulting in the dissolution of friendships. One-fourth (24%) of the respondents said they knew of instances of conflict among friends in their communities; in several of the smaller Native villages, more than 40% reported cases of friendships ending over cleanup issues. Twenty-five percent of the respondents reported arguments with others over the spill. These disputes covered a range of topics including: the environmental effects of the spill, issues of fault and responsibility, whether to work on the cleanup or not, and related monetary and employment issues.

Money was the source of much of the friction experienced in the affected communities. In Kodiak, for example, disagreements among fishermen concerning the distribution of monetary compensation for lost fishing to permit holders and crewmen by Exxon were unresolved as late as the winter of 1989 and the spring of 1990. Instances of crew members who did not hold permits or receive any crew shares led to animosity toward those captains who declined to sign for their would-be crew members. These same kinds of concerns were problems in other communities as well.

Opinion of the unequal distribution of earnings from cleanup employment were also assessed in the survey. While the majority believed it was good that people were able to make money on the cleanup, there was significant variation of responses by community. For instance, 25% to 33% of the respondents in several of the small Native communities said that the unequal distribution of income derived from cleanup activities was bad. The resulting divisiveness and factionalism generated by the nature and organization of the cleanup process was further illustrated in the following statements taken from the household survey:

It was both good and bad because older people couldn't do anything. Exxon should have given everyone something because it affected everyone from elders down to babies.

Both good and bad—some people needed the money. Some people who made big money didn't know how to use it. One [person] would be gone for days and days working on the spill. When she got back she'd spend her time at the bar instead of with her children.

Related to explicitly monetary conflicts were those associated with the bureaucratic organization of the cleanup imposed on affected communities. Smaller communities were not used to working within such a hierarchically organized structure. In one Native village an informant reported significant interpersonal problems in the community associated with VECO employment.

Just because of a job title attached to your name gave you the reason to be somebody who turned on the rest of your community people . . . you earn the same amount of money as everybody else but . . . it just made you tend to be a lot more arrogant, which is so unnatural for [the community], it's so unnatural for community members in that way.

Positive changes resulting from the oil spill and cleanup were indicated in some responses, and these often had to do with either economic benefits or an increased sense of communities pulling together in times of adversity. However, a dominant theme in the household survey responses was that when volunteer response groups formed, the increased sense of solidarity that often resulted was subverted by Exxon's efforts to provide monetary compensation for participation in cleanup activities. That is, volunteer efforts were turned into efforts for pay, and who got paid was often perceived to be inequitably distributed, thus creating conflict.

The spill and ensuing disruptions also resulted in a significant reduction in the frequency of social visits among families and friends. The extent of disruption in this activity was revealed in the fact that 20% to 40% of those interviewed indicated less time spent visiting with friends. Those who actually worked on the cleanup reported a 42% reduction in social visits with friends, compared to a 19% reduction for those who did not participate in cleanup activities. In two Native villages, more than 70% of those interviewed reported decreased social visitations.

Cleanup workers also had significantly less time available to participate in religious activities and community festivals and celebrations. Thirty-eight percent of those participating in cleanup activities reported reduced participation in community celebrations, compared to 12% of respondents who did not work on cleanup; and 28% of those participating in cleanup activities reported reduced participation in religious activities, compared to 6% of respondents who did not work on cleanup.

Another indicator of the decline in levels of social interaction was the fact that between 10% and 30% of the respondents in each of the affected study communities indicated less time spent in volunteer activities. In small communities, volunteer activities often provide otherwise non-existent social services and thus any reduction can be disruptive of those services. Overall,

27% of those who worked on the cleanup reported a drop in lunteer activities compared to 8% of those who did not.

CHANGES IN SUBSISTENCE ACTIVITIES. Exposure to the *Exxon Valdez* oil spill and subsequent cleanup efforts had a dramatic effect on subsistence activities for both Natives and non-Natives (Table 3). The association between exposure status and decline in subsistence activities is to be expected since the Exposure Index included questions pertaining to subsistence-related contact with the oil spill and the spill's impact on household subsistence activities. It is noteworthy that residents in the high-exposed groups reported a decline in these activities at more than twice the rate as residents in the other two groups.

This reduction in subsistence activities can be attributed to three factors. First, many areas were closed to subsistence activities. Second, the safety of subsistence foods was a major issue, and many local residents voluntarily abstained from consuming subsistence products. Because the appearance of oil was sporadic in many villages, the testing of portions of beaches was not considered completely valid by residents. Marine life was not the only subsistence food threatened. Hunting was curtailed in many communities because deer had been seen eating kelp from oiled beaches and people were afraid the meat would be toxic. Conflicting information concerning the testing process, confusing messages about the safety of foods, and technical information that was not adequately interpreted for the affected communities increased anxieties, fears, and confusion about the potential toxicity of subsistence foods. The following is typical of the concerns ressed about the safety of subsistence foods:

> There's no telling to what degree that shellfish is tainted. Until you get some real comprehensive results back from all the testing going on, they could go into a clam bed and take a sample here, and a sample there, and not get any tainted clams. But 15 feet over here, where a couple of (oil) mousse patties [blobs of oil slightly thicker in texture than oil in a barrel] sat down and went and sunk into the ground a little bit, you're gonna have a section of tainted shellfish.

A third reason for the decline in subsistence activities was that local residents had less time for traditional subsistence activities (ranging from 45% to 86% of those interviewed by village) because of the high level of participation in cleanup in most Native villages. As a result, they did less resource gathering, and had less food to share with kin and elders, thus reducing an important social activity between households.

Native villages in general were the most heavily impacted by disruptions in subsistence activities. The reduction or cessation of subsistence activities affects not only food supplies but an entire set of social relations and practices that are an essential part of kin group and community integration. Interruption of the cycle of activity associated with subsistence has important symbolic significance for continuity in maintaining Native culture. For example, according to one local resident:

> It was very stressful because, you know, in the summertime that's when a lot of the elderly or a lot of the women are left behind to tend to their family, tend to their children. This is a time to share, a time to gather. This is how you show them this is how you survive in a village. You go down to the reef and you pick the bidarkies (chitons), you pick seaweed, you eat snails, you taught your kids the way life used to be . . . this summer you couldn't do that.

TABLE 3 Percentage of Respondents Reporting Declines in Traditional Subsistence Activities by Ethnicity and Exposure Status, 1990

	Ethnicity					
	Natives			Non-natives		
Compared with the same period in 1988	% High exposed (n = 60)	% Low exposed (n = 76)	% Not exposed (n = 52)	% High exposed (n = 130)	% Low exposed (n = 160)	% Not exposed (n = 109)
Time normally spent hunting, fishing, and gathering	89.5***	47.4	8.5	74.8***	38.0	8.4
Time normally spent with people from other households hunting, fishing, and gathering	83.3***	50.0	6.3	66.1***	30.5	1.2
Amount of harvested resource foods shared with others	72.4***	47.3	8.3	60.9***	34.0	6.0
Amount of harvested resource foods shared with elders	69.6***	36.5	6.3	50.6***	23.6	0.0
Amount of harvest resource foods received from others	68.4***	37.0	6.1	49.0***	25.3	3.9
Number of household members participating in hunting, fishing, and gathering	60.3***	29.4	2.1	42.7***	13.9	1.2
Opportunities for children to learn hunting, fishing, and gathering	76.5***	40.9	4.4	54.5***	18.9	1.4

χ^2 test for trend * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

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TABLE 4 Post-Spill Prevalence of Psychiatric Disorders: Exposure Status and Sociocultural Characteristics, 1990

Diagnostic category and sociocultural characteristic	Exposure status: % High exposed	% Low exposed	% Not exposed
Post-Spill GAD			
Native	41.7**	23.7	19.2
Non-native	24.6**	14.8	10.1
Male	25.4***	10.4	5.5
Female	36.9**	19.6	19.1
18–44 years old	35.2***	15.2	13.0
45+ years old	18.3	14.3	13.0
Post-Spill PTSD			
Native	25.0**	5.3	5.8
Non-native	10.0	6.8	8.3
Male	8.5	6.6	2.7
Female	20.2*	5.9	11.2
18–44 years old	15.4	6.5	9.3
45+ years old	10.0	5.7	3.7
Post-Spill Depression			
Native	28.8	21.6	17.6
Non-native	17.3	12.7	10.2
Male	16.1	12.7	7.1
Female	29.8*	13.9	16.9
18–44 years old	24.5*	14.8	13.9
45 years old	17.2	10.3	9.8

χ^2 test for trend * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Another person speaking about the disruption of subsistence indicated similar concerns:

> When we worry about losing our subsistence way of life, we worry about losing our identity . . . It's that spirit that makes you who you are, makes you think the way you do and act the way you do and how you perceive the world and relate to the land. Ninety-five percent of our cultural tradition now is subsistence . . . it's what we have left of our tradition.

The disruptions to maintaining Native culture raised pervasive fears and increased fundamental concerns about cultural survival for many in the affected Native villages.

PSYCHIATRIC DISORDERS. The post-spill prevalence of generalized anxiety disorder, post-traumatic stress disorder, and depression for the study communities with all degrees of exposure (including the control communities) was 20.0%, 9.7%, and 16.6%, respectively. Exposure status was significantly associated with the post-spill prevalence of generalized anxiety disorder (χ^2trend = 20.06; $d.f. = 1$; $p < 0.0001$), post-traumatic stress disorder (χ^2trend = 6.64; $d.f. = 1$; $p < 0.01$), and depression (χ^2trend = 7.44; $d.f. = 1$; $p = 0.006$). When compared with the control group, members of the high-exposed group had a 2-fold relative risk of post-spill PTSD and GAD, and a 1.8-fold relative risk of post-spill depression. Approximately 43% of the high-exposed group had one or more of these disorders in the year after the spill, compared with 22.7% in the low-exposed group and 22.7% in the not-exposed group.

Each of these psychiatric disorders was further examined to determine if certain social or cultural factors contributed to the excess risk. Among Alaskan Natives, exposure to the oil spill was significantly associated with the post-spill prevalence of GAD (χ^2 trend = 7.15; $d.f. = 1$; $p < 0.01$) and PTSD (χ^2 trend = 10.55; $d.f. = 1$; $p < 0.01$) (Table 4). Among non-Natives, level of exposure was significantly associated only with the post-spill prevalence of GAD (χ^2 trend = 9.21; $d.f. = 1$; $p < 0.01$). Exposure status was significantly associated with post-spill prevalence of GAD in both men (χ^2 trend = 11.00; $d.f. = 1$; $p < 0.001$) and women (χ^2 trend = 9.76; $d.f. = 1$; $p < 0.01$), and the post-spill prevalence of PTSD (χ^2 trend = 3.93; $d.f. = 1$; $p < 0.05$) and depression (χ^2 trend = 5.34; $d.f. = 1$; $p < 0.05$) in women. Among younger adults between the ages of 18 and 44, significant associations were found between level of exposure and the post-spill prevalence of GAD (χ^2 trend = 20.65; $d.f. = 1$; $p < 0.001$) and depression (χ^2 trend = 5.44; $d.f. = 1$; $p < 0.05$). Among older adults, no significant associations were found between level of exposure and prevalence of any of the psychiatric disorders.

SUBSTANCE ABUSE AND DOMESTIC VIOLENCE. The oil spill's impact on community perceptions of patterns of substance abuse and domestic violence is presented in Table 5. Exposure to the spill and subsequent cleanup efforts was significantly associated with percentages of Natives and non-Natives who reported an increase in drinking, drug use, and domestic violence. There was also an increase in problems associated with these activities, both within the community and among family and friends, since the spill.

HEALTH STATUS. Perceptions of health status among Natives and non-Natives before and after the spill are presented in Table 6. Perceived health status prior to the spill was not associated with exposure status, indicating that the three exposure groups were fairly well matched with respect to their baseline health status among both Natives and non-Natives. Exposure status was, however, significantly associated with the number of physician-verified illness conditions occurring since the spill in each ethnic group and with perceived current health status when the two ethnic groups were combined ($p < 0.01$). Approximately 7.2% of the study subjects believe they had a medical condition that was a direct result of the oil spill. Moreover, a significant decline in perceived health status (indicated by the larger mean score) was found in the high-exposed and low-exposed groups but not in the control group among both ethnic groups.

Discussion

These results document the profound impact that exposure to the oil spill had on social relations, traditional subsistence activities, the prevalence of psychiatric disorders, community perceptions of alcohol and drug abuse and domestic violence, and physical health of Alaskan Native and non-Native residents of the affected communities. As with any cross-sectional study, it is not possible to determine causality in the observed relationships. The consistent pattern of increasing impacts with increasing exposure to the spill and subsequent cleanup efforts

TABLE 5 Percentage of Respondents Reporting Substance Abuse and Domestic Violence by Ethnicity and Exposure Status, 1990

	Ethnicity					
	Natives			Non-natives		
Social unit and problem	% High exposed (n = 60)	% Low exposed (n = 76)	% Not exposed (n = 52)	% High exposed (n = 130)	% Low exposed (n = 160)	% Not exposed (n = 109)
Community						
More drinking	57.7***	45.6	4.3	54.2***	43.3	5.3
More drinking problems	51.0***	39.7	14.0	42.0***	31.1	3.2
More drug use	45.7**	45.5	10.8	50.6***	44.4	5.0
More drug problems	47.5**	32.7	15.4	38.5***	29.6	6.8
More fighting	45.2***	16.3	5.3	44.9***	38.7	2.7
More fighting problems	48.6***	14.9	6.8	29.6***	30.8	3.8
Family and friends						
More drinking	47.3***	37.1	2.1	18.0***	9.7	3.2
More drinking problems	46.9***	25.8	6.0	16.1**	9.5	5.1
More drug use	42.1***	24.4	5.3	11.1**	6.5	0.0
More drug problems	42.5***	14.9	4.8	11.6***	6.1	0.0
More fighting	35.1***	8.7	2.7	14.7***	3.9	0.0

χ^2 test for trend * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

does, however, suggest a dose-response relationship. A similar relationship has been reported in other studies (Baum, Gatchel, and Schaeffer 1983; Bromet et al. 1980; Gatchel, Schaeffer, and Baum 1985; Shore, Tatum, and Wollmer 1986a, 1986b). Research on the impacts of the Three Mile Island accident by Baum and his colleagues found that residents reported significantly higher levels of somatic complaints, depression, anxiety, fear, suspiciousness, and alienation than controls (Baum, Gatchel, and Schaeffer 1983; Gatchel, Schaeffer, and Baum 1985). Exposure was associated with increased rates of generalized anxiety disorder, post-traumatic stress disorder, and single-episode depression among victims of the Mount St. Helen's disaster (Shore, Tatum, and Wollmer 1986a, 1986b). One study of the Times Beach flood and dioxin contamination found no significant increase in rates of depression, anxiety, and post-traumatic stress disorder in high-exposed individuals (Robins et al. 1986). But another study of this disaster found that exposed residents had higher rates of reported health decline than indirect exposure and no exposure groups (Smith et al. 1986).

Another potential limitation of this study lies in the assessment of exposure. The measures used to assess exposure are at best crude, overlapping, and incomplete approximations of the types of exposure to the oil spill and subsequent cleanup efforts in the affected communities. Because of the complex and overlapping nature of social relations in the study communities, especially in the small, predominately Native villages, the degree of exposure of an individual resident is also dependent on activities of other residents tied to the individual through these relationships. Individuals who are identified as low exposed may be affected by the high exposure of their family, friends, and neighbors. For instance, individuals who

TABLE 6 Physical Health Status by Exposure Status and Ethnicity, 1990

	Health status					
	Prior to spill		Since spill		Verified by M.D.	
Exposure status	Mean	S.D.	Mean	S.D.	Mean	S.D.
Natives						
High exposed (n = 59)	2.66	1.09	3.07**	1.29	1.42	1.60
Low exposed (n = 74)	2.68	1.07	2.93**	1.15	1.47	1.74
Not exposed (n = 52)	2.64	1.07	2.73	1.09	0.67	1.15
TOTAL (n = 185)	2.66	1.07	2.92	1.18	1.23‡	1.58
Non-natives						
High exposed (n = 125)	2.05	0.98	2.45***	1.12	0.94	1.36
Low exposed (n = 162)	2.27	1.06	2.38*	1.13	1.14	1.43
Not exposed (n = 108)	2.15	1.07	2.16	1.01	0.64	0.83
TOTAL (n = 395)	2.16	1.04	2.34	1.10	0.94‡	1.29

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ compared to health status prior to spill.
† $p < 0.01$; ‡ $p < 0.001$ by exposure status.

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receive subsistence items may be influenced by the inability of subsistence producers to distribute such items either because they were afraid to harvest such items or they were too busy working on cleanup activities.

As described above, exposure was assessed at the level of both the household and the community (affected and control) rather than the individual level. As noted in Table 1, assessment of household exposure was closely associated with a community's size, ethnic composition, and proximity to the source of the spill. Moreover, these measures were selected because they were identified by local residents during the ethnographic phase of the study as the most salient aspects of the oil spill. Similar results were also obtained when exposure was determined on the basis of proximity of community to the source of the spill (Prince William Sound) and on the basis of informants' assessments of percentage of coastline near the community that was contaminated by oil from the spill.

Younger age groups, women, and Alaskan Native residents of these communities appear to have been especially vulnerable to these negative impacts as evidenced by higher rates of psychiatric disorders. An inverse association between age and psychological distress has been reported in other studies of disaster victims (Logue, Melik, and Hansen 1981; Murphy and Cowan 1985). A study of the psychological impacts of the Mount St. Helen's disaster found that female disaster victims had significantly higher rates of psychiatric disorders than males (Shore, Tatum, and Wollmer 1986a, 1986b). Differences in the prevalence of psychiatric disorders in Alaskan Natives and non-Natives may have been due to culturally determined patterns of response to standardized diagnostic instruments (Kinzie and Manson 1987). A more likely explanation is that the Natives in this study were more exposed to the spill and subsequent cleanup efforts than non-Natives, and Alaskan Natives in general have higher rates of psychiatric disorders than non-Natives, reflected in significantly increased rates of suicide, alcohol-related morbidity and mortality, and inpatient psychiatric admissions (Hlady and Middaugh 1986, Kraus and Buffler 1979).

The *Exxon Valdez* experience provides a quantitative analysis of only one limited example of the social and psychological consequences of rapid sociocultural change, albeit an increasingly important example for the reasons discussed earlier. Furthermore, there are several aspects of these social and psychological impacts that conform to general models of psychosocial stress associated with rapid sociocultural change.[6] These factors include: the breakdown of traditional patterns of behavior, in this case the disruption of traditional social relations and subsistence activities; the increased social differentiation resulting from the wide disparity in income earned from cleanup activities; and the uncertainty over the long-term consequences of the spill. The fragmentation of traditional social relations is particularly noteworthy because it reflects an overall decline in social integration and hence the social support on which individuals and families rely in times of personal and communal distress. The disruption of subsistence activities is particularly salient for Alaskan Native communities because these activities lie at the core of Alaskan Native identity, ideology, and social organization.

It remains problematic whether the impacts identified in this study are short-term and transient, or long-term and permanent. On the one hand, the results reported in this paper represent the prevalence of psychiatric disorders and adverse social and cultural impacts approximately one year after the spill. Research documenting the delayed presentation of post-traumatic stress disorder in Vietnam war veterans (Van Putten and Emory 1973), however, suggests that a prolonged follow-up of any diaster-affected population may be necessary before conclusions are reached about the absence of disorder (McFarlane 1986). Horowitz and Solomon (1975) have emphasized that the detection of psychiatric disorders caused by stressful experiences is characteristically delayed or often missed. These data may therefore represent only a fraction of the psychosocial impacts of the *Exxon Valdez* oil spill.

On the other hand, a number of investigators have pointed to the enduring and adaptive nature of traditional subsistence production and distribution activities of Alaskan Natives in the face of increasing exposure to and participation in the Euro-American wage labor economy (Jorgensen 1990). With the cessation of cleanup activities by Exxon and the reduced presence of toxic levels of oil in the natural environment in time, local residents may gradually return to pre-spill levels of subsistence activity. In fact, the income earned from cleanup activities may be used to purchase new equipment for subsistence production and increase the level of sharing within kin-based distribution networks (Jorgensen, McCleary, and McNabb 1985; Little and Robbins 1984; Luton 1985).

But whether the psychosocial changes resulting from exposure to the oil spill and cleanup efforts are temporary or permanent, they illustrate the importance of three specific components essential to an understanding of the relationship between health-related stress and sociocultural change: the characteristics of the "pre-contact" sociocultural system; the nature of the environmental changes, whether they represent alteration of the physical environment or contact with another sociocultural system; and the degree of exposure to these environmental changes. Certain psychosocial characteristics such as precontact physical and mental health and social and economic status may influence individual and community responses to long-term patterns of sociocultural change in a way which is similar to responses to natural and technological disasters. Certain segments of the population (the young, women, minorities) may be as susceptible to adverse psychosocial impacts of long-term processes of sociocultural change as they are to the adverse psychosocial impacts of disasters (Bromet et al. 1980; Shore, Tatum, and Wollmer 1986a; Smith et al. 1990). Other investigators have attributed this risk to the larger Euro-American capitalistic system, which places certain segments of the population in a subordinate position and restricts their "access to and control over the basic material and non-material resources that promote life at a high level of satisfaction" (Baer, Singer, and Johnsen 1986:95).[7]

The psychosocial impacts of a disaster are influenced by the nature of the event itself (e.g., whether it involves loss of lives and property destruction, is sudden and unexpected) (Bolin 1985). In the same way, changes in the sociocultural system and resulting impacts on mental and physical health are influenced by the nature of the change in the social and physical environment. Environmental changes that are sudden and unexpected are more likely to result in more profound sociocultural changes with significant adverse impacts on health and well-being than changes that are gradual and expected. Nevertheless, both the environmental changes and the resulting psycho-

social impacts represent a continuum. At one extreme, they ·y be as acute and as devastating as the massive loss of life :r a nuclear conflict. At the other extreme, they may be as .nronic and as prolonged as the increased incidence of leukemia resulting from long-term exposure to low-level radioactive wastes. As in the case of exposure to ionizing radiation, whether the "dose-response curve" of the relationship between exposure to less dramatic forms of environmental change and health and wellbeing is linear or quadratic, or whether it occurs after a certain threshold level is attained, remains to be determined by further research. It appears, however, that the same processes explaining the impacts at one end of the continuum of sociocultural change are evident at the other end as well.

Finally, just as the psychosocial impacts of a disaster are influenced by the degree of exposure to the event (Bromet et al. 1980, Quarantelli 1985), changes in the sociocultural fabric of a community and the mental and physical health of its individual members are influenced by the degree of exposure to the changes in the social and physical environment. This degree of exposure, in turn, is influenced directly by the precontact sociocultural system and the nature of the environmental changes.

The *Exxon Valdez* experience also contains a number of implications for managing the impacts of rapid sociocultural change. Rapid sociocultural change leading to increased rates of psychiatric disorders can be expected to lead to substantial increases in utilization of health care and social services. In the Medical Outcomes Study, Wells and his associates (1989) found that patients with depressive symptoms, even in the ab·ce of clinical depression, had poor functioning as assessed physical limitations, role performance, social activities, and number of bed days; their symptoms were thus of considerable clinical significance. A poor sense of wellbeing and impaired functioning are also of policy interest because of the societal costs due to loss of productivity, increased family burdens, and any associated use of health services (Lehman, Ward, and Linn 1982). This utilization does not extend merely to mental health services. Most persons suffering from clinically significant depressive symptoms do not receive treatment, and most in treatment consult a primary care physician rather than a mental health service (Weissman and Myers 1980). Reluctance to seek mental health services is particularly salient among Alaskan Natives because of the shame and cultural stigma associated with alcohol abuse and mental disorders (Klausner, Foulks, and Moore 1980; Kost-Grant 1983) and the constraints imposed on access to mental health care, especially in villages, by the necessity of leaving one's home, often for long periods. Respondents meeting criteria for somatization (those reporting a decline in perceived health status since the spill) are more likely to use health services than nonsomatizers; of those respondents meeting criteria for a psychiatric diagnosis, somatizers preferentially use medical over mental health services (Escobar et al. 1987).

Conclusion

When the *Exxon Valdez* ran aground in Prince William ·nd, it spilled oil into a social as well as a natural environment. That spill resulted in a decline in traditional social relations and subsistence activities and increased rates of depression, anxiety, and post-traumatic stress disorder. It also resulted in perceived increases in the amount and problems associated with drinking, drug abuse and domestic violence and declines in perceived health status. Only further research will determine whether these impacts are transient or whether they are consequences of permanent changes in the sociocultural fabric of these communities.

NOTES

[1] Dr. Robert Bolin participated in the design and administration of the household survey.

[2] For communities with more than 650 households (e.g., Valdez, Cordova, Seward, and Kodiak) approximately 7% of the households were selected for interviewing. Smaller communities, such as Tatitlek, Chenega Bay, Chignik, and Akhiok, were intentionally oversampled at a 50% or higher ratio in order to obtain sufficient numbers of Alaskan Natives for intra-ethnic comparisons. Replacement households, necessitated in the case of refusals or unoccupied dwellings, were also selected from the same sampling frame using a table of random numbers.

[3] Respondents describe their mood over the past week by rating each of 20 items on a scale from 0 (rarely or none [less than 1 day]) to 3 (most or all [5–7 days]). A depression score was calculated for each respondent by summing the ratings, after first reversing the ratings of four reverse-worded items. If a respondent had completed 85% or more of the CES-D items but less than 100% (n = 10), responses to missing items were imputed by using the mean of that person's answers to the nonmissing items. Respondents with scores of 16 or above were classified as being depressed for the purpose of calculating prevalence rates. A number of studies have documented the validity of this cut-point in distinguishing groups with high depressive symptomatology from those with low depressive symptomatology (Roberts and Vernon 1983, Weissman and Myers 1980). The use of this cut-point does not, however, provide sufficiently accurate measure to ascertain rates of clinical depression as defined by the DSM-III or III-R criteria in the general population.

[4] The authors wish to thank Drs. James Shore and Spero Manson for their advice and assistance in the administration of the Diagnostic Interview Survey questions.

[5] The comparisons between exposed and not-exposed subjects revealed an association between exposure and measures of health and well-being, but they are not reported in this paper because they do not provide as satisfactory an indication of causality as the dose-response relationship suggested by comparisons across the three exposure groups (Schlesselman 1982).

[6] Janes (1986:177–178) notes that research on the stress process in the contexts of social change can be divided into three broad categories: "cultural incongruity" studies (e.g., Cassel and Tyroler 1961); "status inconsistency" studies (e.g., Dressler 1982); and "stressful life event" studies (e.g., Dohrenwend and Dohrenwend 1974, Gunderson and Rahe 1974). The notion that mental and physical disorders are a consequence of unfulfilled needs subsequent to environmental change is derived from the work of the Leightons and their associates (A. Leighton 1959, D. Leighton et al. 1963).

[7] James O'Neil (1986) has been a forceful advocate of this perspective in his analysis of colonial stress and sociocultural change in the Canadian arctic.

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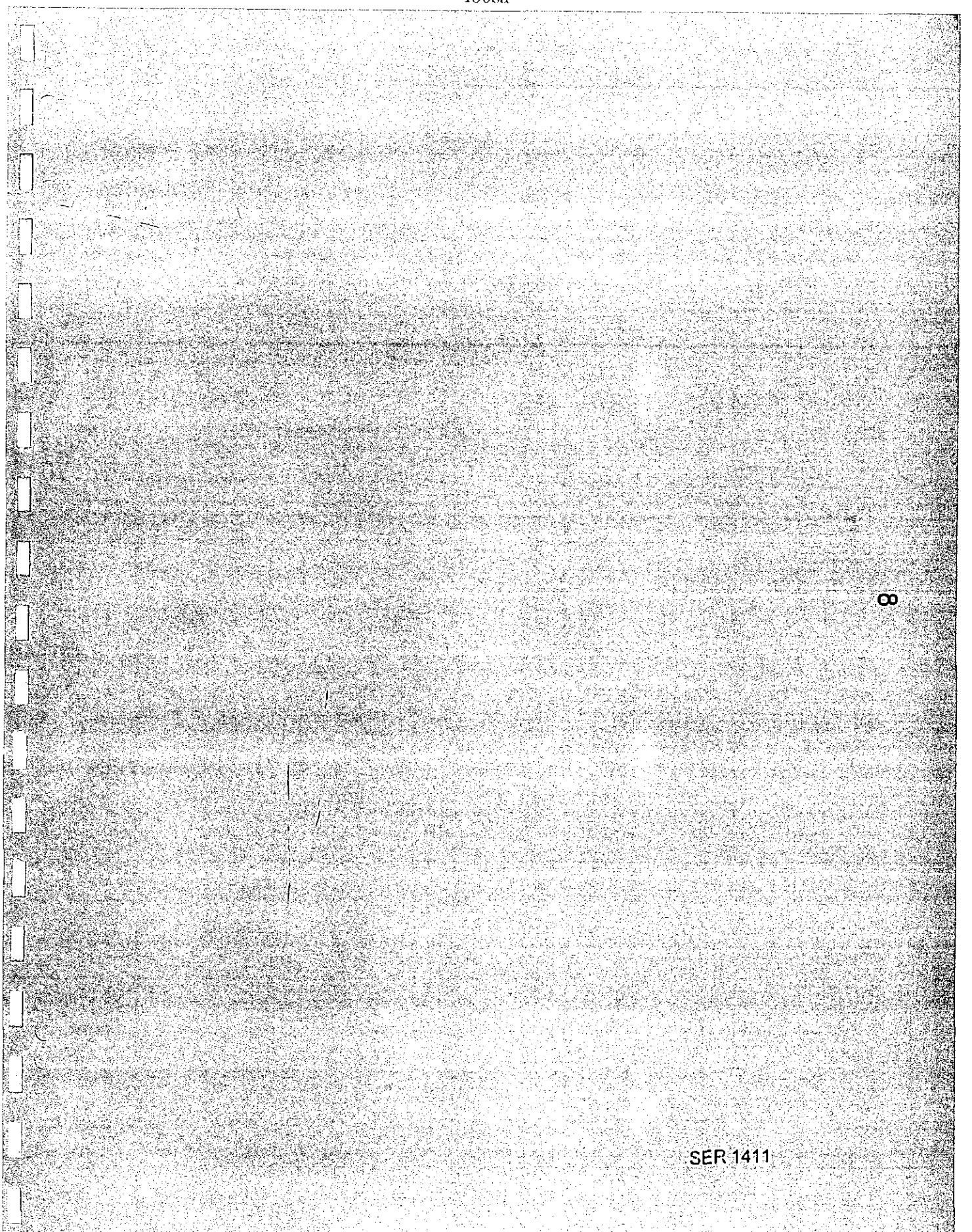

The Exxon-Valdez Oil Spill: Social, Economic, and Psychological Impacts on Homer

By

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EXHIBIT 8

THE EXXON-VALDEZ OIL SPILL: SOCIAL, ECONOMIC, AND PSYCHOLOGICAL IMPACTS ON HOMER

INTRODUCTION

In the late fall of 1989 and early spring of 1990, a random sample of adults and a representative sample of community leaders were personally interviewed with respect to the effects of the Exxon-Valdez oil spill on Homer. This paper focuses on selected findings from that survey and follow a paper sent to various community leaders in the spring of 1991. Whereas the original paper focused on a comparison of responses from Homer, Port Graham and Seldovia community leaders, this paper focuses on a comparison of various groups within the Homer community.

SAMPLE

One hundred twenty-six residents in Homer were personally interviewed, or interviewed by telephone in the fall of 1989 and spring of 1990. Twenty-eight respondents were classified as community leaders (CL) --e.g., the mayor, fire chief, police chief, emergency medical personnel, social service providers, and business owners/employers. For purposes of this report, seventy-five residents represent the group labeled adults/seniors (A/S). Twenty-three adolescents (high school students) were also interviewed, and for the most part were sons and daughters of some of the adults who were surveyed. Herein this group will be referred to as the Youth (Y) group.

The CL sample was about equally divided between males (54%) and females (46%) with an age range of 20 to 75. The majority of

the sample (60%) fell within the age range of 36-50 years old. Ninety-three percent of the CL's were white (26), with the exception of one Native Alaskan (4%) and one Hispanic (4%).[1] Overall, this group is well distributed on all demographic variables except ethnic status; the sample is almost all white.

For the A/S sample, 35% were males and 65% were females. About 24% of the residents were between the ages of 30-40; 31% were between 41-50; and 42% were 60 years or older. About 93% indicated they were white, while 6% indicated they were Alaska/American Natives. Overall, the A/S sample is somewhat overrepresented by females and caucasians.

The Y sample was comprised of 54% females and 46% males. The majority (57%) of the sample was 15 years old at the time of the spill, while 35% of the respondents were 16 years of age. A smaller proportion (4% each) were 14 and 17 years of age. Eighty-two percent of the youth were white, 9% Alaska Natives, 5% American Indian and 4% identified themselves as being from "Other" ethnic groups. Overall, this portion of the sample depicts a fairly good distribution, for the Homer community, with respect to gender and ethnic status.

WHERE WERE PEOPLE AT TIME OF SPILL AND WHERE DID THEY GET INFORMATION ABOUT SPILL?

Of the community leaders (CL), about 50% were at home when they learned about the oil spill, 32% were somewhere else, and 18% couldn't remember. Of the adults/seniors (A/S), 61% were at home

and 39% were somewhere else. Forty-four percent of the youth (Y) were at home at the time of the spill, 26% where somewhere else and 30% couldn't remember where they were when they learned about the spill.

ECONOMIC EFFECTS

Community Leaders

As one of the areas that appeared to be of greatest concern to communities after the disaster was the economic impact, a number of questions that focused on economics were included in the surveys. The first question focused on the extent to which gross family income was affected. The largest percentage of community leaders (52%) responded to the question with "no difference", while 33% reported "a gain in income", and 15% reported an "income loss". Of all leaders reporting a loss or gain, the anticipated long term losses or gains ranged from a $700,000 loss to a $750,000 gain.

A view of Table 1 indicates the largest number of CL (39%) perceived the greatest economic impact of the spill on the community as a "cash gain". The second greatest financial impact perceived by the CL was that it would be "good for some, bad for others" (21%), "with some kind of change" (11%) ranking third. The fourth largest category (7%) reflects the CL's perceptions that there had been economic gain from money that community organizations/government had received. The remaining responses were distributed among effects such as "boom than bust", "various forms of change", and "economic benefits and/or losses".

TABLE 1 ABOUT HERE

Adults/Seniors

Similiar to perceptions of the CL group, the largest percentage of adults and seniors (50%) believed that there would be "no difference" in their personal income. However, about 25% reported there "would be a loss", and about 21% reported that the oil would "generate a gain" in their personal income. Three percent "didn't know" what the impact would be. The range of reported losses or gains was from a decrease of $20,000 to an increase of $150,000. This range is substantially lower than that reported by the CL group.

When residents were asked about any property damage to boats, businesses, cars, etc., most responded negatively. However, about 8% responded that they had suffered damages to their businesses and about 1% had suffered damages to their boats.

When residents were queried about whether they had taken out any loans in the past several years and whether the loans had been related to the oil spill, about 43% of the sample said they had taken out a loan. Of that number, only 3% responded that it was related to the oil spill.

When the A/S were asked about the long term economic effects of the oil spill on Homer, 42% thought it "would be harmful", 24% believed it "would benefit" the community, 24% said it would have

"no effect", and 10% "didn't know".

Youth

When the Y sample was asked how the spill would economically affect their community, 23% stated it would have "no effect". Fifty percent thought the oil spill would "hurt their community", and 27% thought it would "help their community", economically.[2]

SUMMARY: Wide variations exist with respect to how members/ families in Homer and the Homer community were economically affected by the oil spill. Perceptions of the immediate and future effects of the spill on Homer also show wide variations.

STRESS

Community Leaders

Disaster research suggests that a significant amount of stress accompanies such events, particularly those involving toxic disasters (Kushnir, 1982; Gibbs, 1982; Wolfenstein, 1957). Research also suggests that the stress may be felt immediately and/or in the future. In order to assess the amount of short-term stress experienced by individuals in our sample, several measures were included. One of these measures was a 10-point scale that asked CL to indicate how much stress they experienced during the oil spill and clean-up. As can be seen from Table 2, the extent of perceived stress was fairly high. About 50% of the CL's reported relatively high stress levels, ranging from 8-10, while about 18% reported

stress levels of 5-7, and about 29% reported low stress levels, 1-4. (Four percent did not respond).

In order to measure specific types of stressors, CL were asked whether they had experienced any stress-related problems with such things as their nerves, worries, and depression. About 68% said they had. When asked what kind of problems these were, the largest mentioned category was stress/tension (29%), followed by feelings of anxiety (11%). Other areas mentioned by 7% of the sample were worry and depression, respectively. Four percent, respectively, mentioned exhaustion, confusion or feelings of powerlessness, insomnia and grief.

TABLE 2 ABOUT HERE

Adults/Seniors

The Fredericks Post Traumatic Stress Syndrome scale was included in the A/S sample. Using the stress categories assigned by Fredericks, it was found that 34% of the sample showed signs of "severe" or "very severe" PTS. Seven percent showed signs of "moderate" PTS, and 7% fell into the "mild" PTS range. The scale showed that 52% of the sample fell into the category of "doubtful that PTS exists". Thus, about one-third of the A/S sample appeared to suffer substantial PTS, while slightly over half appear to be unaffected.

The Frederick's Post Traumatic Stress Syndrome scale was also included in the Y survey. For this group, 9% fell in the "mild"

PTS range, 26% fell into the "moderate" range, and 65% scored in the "severe" PTS range.[1]

SUMMARY: **Although the measures of stress for the samples were not the same, the findings suggest wide variations of stress levels within groups. Among groups, the CL appear to have been more affected by stress--at least immediate stress--then were either the A/S or Y samples.**

COPING WITH STRESS

Community Leaders

In order to determine how individuals coped with stress, respondents were provided with a list of known coping mechanisms and asked to indicate how frequently they used each in dealing with everyday problems. The results are shown in Table 3. The largest category for CL was to "take action to solve problems"--everyone (100%) said they did this. This was followed by "ask for advice from others" (68%) and "stay busy" (46%). Most reported they <u>did not</u> use medicine as a way of coping with problems, but 14% (4) of the sample said they "sleep a lot" as a way of coping. As one can see from Table 3, there is considerable variation among coping mechanisms that involve such things as arguing with others, yelling and shouting, getting physical exercise, drinking, waiting for things to work themselves out in the future, worrying about troubles, and keeping hurt feelings to onesself. (In the paper sent to the Homer community leaders last spring gender differences

were also noted).

TABLE 3 ABOUT HERE

Adults/Seniors

As can also be seen from Table 3, adults and seniors are somewhat similar to the community leaders with respect to how they cope with stress. However, fewer of this group seem to be willing to "let nature take its course" (think things will work out in a year or two/future), sleep a lot, or argue with others as a way of coping with stress. Both groups, however, are more likely to try to take some action to solve their own problems, or seek the advice of friends/family than they are to look to the "bottle", medicine, or social/mental health professionals for help.

Youth

The majority (56%) of the youth sample "keep hurt feelings inside" as a way of coping with stress. Forty percent stated that they "keep busy and get physical exercise" as a way of coping with stress. Similar to the adult/seniors and community leaders, a substantial number of the youth (45%) stated they take action to solve problems, and like the adult/senior sample, 61% of the youth indicated that they are not willing to sit back and wait for things to work out by themselves. The major difference between the adults, including community leaders, and the youth in Homer, is that the youth as compared to adult residents, are less likely to

verbalize their concerns. This finding is not surprising, however, as it is consistent with overall research on characteristics of the adolescent stage of the lifecycle.

SUMMARY: Homer appears to be a "take action" community when it comes to coping with stress. All three groups, the CL, A/S, and Y also tend to seek the advice of others as a way of coping with stress. Homer residents, overall, report that they do not cope with stress by drinking or using medications. When compared with the CL and A/S samples, the Youth sample are less likely to cope with stress by verbalizing their concerns.

ALCOHOL/DRUG USE

Community Leaders

In times of crises many people turn to alcohol or drug use as a way of coping. In order to determine if the oil spill had any effect on individuals' use of drugs or alcohol, several types of questions were included. First, respondents were asked if the oil spill had any effect on their drinking patterns/use of drugs. About 7% of the CL reported being affected. In most cases, the nature of the influence was an increase in drinking.

With respect to drug use, respondents were queried about their use of prescription or non-prescription drugs. The majority of the CL's indicated that they did not use prespcription or non-prescription drugs. Seven percent indicated they did use prescription or non-prescription durgs, 4% indicated that the spill

increased their usage of these drugs.

Adults/Seniors

Turning to the A/S sample, about 63% of the sample indicated that they drank alcoholic beverages, 33% said they never had, and about 4% said they had stopped. Of those who responded that they were drinkers, or who had stopped, 61% said the spill did not affect their drinking, while 1% indicated it had.

Turning to the use of drugs and/or medications, close to 60% of the A/S sample indicated that they had used either prescription drugs or non-prescription (usually prescription) for various reasons. However, only 1% indicated that the oil-spill had affected this use.

Youth

The Y sample were also asked about their consumption of alcohol. The majority of the sample (61%) indicated they had never drunk alcohol. However, 35% indicated that they did use alcohol and 4% said they had stopped drinking. When asked if the spill had an affect on their drinking 29% (of the 35%) said it did not have an effect.

SUMMARY: The majority of respondents interviewed in this study indicated that the oil spill caused alcohol and drug use/abuse to increase in the community (See Tables 1 and 4). However, it appears that very few of the respondents we interviewed feel it

affected their drinking or drug use behavior.

PHYSICAL HEALTH

Community Leaders

When the community leaders were asked about the negative effects that the oil spill may have had on their own or members of their family's physical health, or members of their family, 54% indicated that neither they nor their family had suffered any negative effects. However, 43% had been impacted. Of these, 18% indicated that the stress had them "burned out". The second largest area of effects mentioned were fatigue and insomnia (7%, respectively). Other problem areas mentioned were alcohol use (4%) and reduced breast milk (4%).

Adults/Seniors

When A/S residents were asked about negative effects that the oil spill may have had on their own or their family members' physical health, the majority (89%) indicated that neither they nor their family members had suffered any negative effects. However, 11% had been impacted themselves, and 8% said their family members had been impacted. Of the 11% impacted, the negative effects reported were stress (5%), respiratory infections, contaminated oil in body, weight gain, and/or pinched nerves and fatigue (1%, respectively).

Youth

The majority of the Y sample (96%) indicated that the oil spill had no negative effect on their physical health. However, 4% indicated that they had experienced negative effects, and traced these to added stress and fatigue caused by the oil spill.

SUMMARY: All groups interviewed indicated that their physical health had been impacted in some way by the oil spill; although, the CL group appears to have suffered the greatest impact. The majority of problems, for all groups, appear related to stress and fatigue.

MENTAL HEALTH

Community Leaders

When asked if there had been any negative effects on their mental health, 68% of the community leaders said they experienced a problem with nerves, worries, depression or anxiety. Twenty-nine percent of those said stress/tension was the biggest problem. Twenty-one percent of the community leaders believed the spill made existing mental health problems worse.

Adults/Seniors

While most community leaders reported no oil-spill related effects on their physical health, 50% of the adults/seniors reported that during the spill they had experienced increased levels of such things as worry, anxiety, nervousness, and depres-

sion. However, only a few (4.2%) attributed the problem directly to the oil spill.

Youth

When members of the Y sample were asked about their mental health in the past six months, 26% indicated they had experienced some problems. Of this percentage, half of these respondent's (13%) indicated that the problems existed prior to the oil spill, and none of them believed the oil spill caused the problems to increase.

SUMMARY: While a substantial number of the three populations sampled indicate that they have problems with such things as nervousness, worry, anxiety and depression, only community leaders appear to have a significant number reporting that the oil spill exaccerbated existing problems. These findings no doubt result from the fact that it was the community leaders such as the mayor, police chief, emergency professionals, and social/health service professionals who were faced with trying to resolve the problems cuased by the oil spill.

FAMILY RELATIONS

Community Leaders

Stress is frequently linked to increases in family problems. Hence, a section on family relations was included in the survey. A number of questions focused on spousal relationships in general,

and then respondents were asked if the oil spill had affected their overall relationships with their partners; i.e., had their relationship "gotten worse", "improved", or "not been affected". Of all individuals who had partners, about 71% of the CL said the oil spill had not affected their relationships. However, 7% indicated that their relationships had "gotten worse", while 4% said they had "improved". Reasons given for worsening relationships were increased stress and more fighting, while better communication and working together were explanations for improving relationships.

Adults/Seniors

In comparing the A/S group with the CL's, none of the adult sample responding to the survey admitted to having any serious problems in their marriages or relationships before the oil spill, and no one believed the oil spill had affected their relationships or marriages. Hence, it appears that A/S sample saw their marriages/relationships impacted to a lesser degree than the C/L sample.

Turning to family members other than spouses, about 11% of the sample that they indicated they had serious conflicts with family members, but no one indicated that these conflicts were related to the oil spill. (There were no corresponding questions for the C/L sample).

Youth

For the Y sample, 91% indicated that the spill had not affected their family relations. Of the remaining 9%, respondent's felt that family relations had been improved by the spill.

SUMMARY: With respect to the effects of the oil spill on spousal and other family relationships, the CL sample once again appears to be the group most impacted by the oil spill, although only about 11% reported having their relationships affected. Of these the majority (7%) felt the spill had a negative effect, although some beleived the effect was positive (4%). The A/S group reported no adverse or positive effects of the spill on spousal or other family relationships. The Y majority of the Y group (11%) did not perceive the oil spill as affecting family members' relationships, but of the 9% that did, all thought it positively affected relationships.

PERCEPTIONS OF THE EFFECTS OF THE OIL SPILL ON COMMUNITY FABRIC

Community Leaders and Adults/Seniors

Using Figure 1 as a guide, the next level of analysis focused on perceptions of relational, institutional and community interactions that were influenced by the oil spill.

Social Problems

We turn our attention first to perceptions of social problems that existed in the community prior to the spill and whether or not

the oil spill affected these. As can be seen from Table 4, the existing social problems that both the CL and A/S samples identified as most serious in their communities before the oil spill were alcohol use/abuse, drug use/abuse, employment problems, spouse abuse, child neglect, and, to some extent, stealing. Overall, these were also the ones that they viewed as having the greatest increases during the oil spill and clean-up. While no statistics are presently available to this author, verbal reports by police, alcohol treatment centers, and domestic violence shelters substantiate the perceptions about domestic violence and alcohol use as existing social problems, and the increases due to the oil spill. For example, where agencies existed in communities, significant increases were reported in (1) alcohol use/abuse, (2) clients referred for alcohol/drug abuse and spousal abuse, and, (3) an increase in the number of new clients. Further, with respect to domestic violence, social service professionals in Homer expressed concern about the increased lethality in these incidents--e.g., they were seeing an increasing number of broken bones, which in the past may have been bruises or black eyes. The social service workers traced many of the domestic violence incidents directly to times when oil spill workers were paid and spent part of their money on alcohol and/or drugs. Other incidents were tied to the oil spill work ending and husbands/partners sitting at home drinking and becoming violent.

TABLE 4 ABOUT HERE

In the fall of 1989, several social service/mental health professionals in Homer reported that they expected an increase in clients during the winter months. A follow-up on these reports was planned for Spring, 1991, but due to funding problems the project had to be cancelled. A follow-up is planned for Spring, 1992.

When the A/S sample were questioned about the long term effect the oil spill would have on increasing domestic violence in Homer, about 34% thought it would cause domestic violence to increase, 31% believed there would be no change, and 35% didn't know.

SUMMARY: **The majority of repsondents in the CL and A/S samples viewed alcohol and/or drug use/abuse, employment and domestic problems as the most significant social problems existing in Homer prior to the oil spill as well as the ones most affected by the oil spill. These findings are similar to studies of the other communities impacted by the Exxon-Valdez oil spill (Impact Assessments, 1991:X-XIV and Chapter 2). With respect to the long term effects of the oil spill on the problems noted above, at least domestic violence, the sample respondents had mixed feelings about whether there would be an "increase," "no change," or "uncertain about effect".**

Community Interactions

Table 5 depicts the types of conflictive or cooperative interactions that were taking place between community residents themselves, between residents and local institutions, and between

local, regional, state, and federal agencies. As can be seen, the greatest amount of conflict was between residents and Exxon (82%). Another area that people perceived generating high amounts of conflict was between community residents and VECO (a contracting firm hired by EXXON to hire clean-up crews, rent/buy necessary clean-up equipment, etc.). About 75% of the sample reported conflicts between these groups. The next largest category of reported conflicts (71%) were between State and Federal agencies and local fishermen. A similar percentage (71%) reported conflicts between local fishermen who worked for Veco and those who did not. Forty-six percent reported conflicts between residents and local institutions, and between Federal and State agencies (e.g., U.S. Coast Guard and Alaska Department of Conservation). Table 5 also indicates that the CL's perceived a substantial amount of cooperation between community and regional institutions (79%).

TABLE 5 ABOUT HERE

SUMMARY: **Basically these findings suggest that regional and community group interactions tended to have a cooperative tenor until Exxon, the State, or Federal government agencies become involved. At this point the nature of the relationships at all levels tended toward conflict.**

TOURISM, FISHING, SUBSISTENCE

Community Leaders

We also asked some specific questions revolving around the impact the oil spill had on tourism, commercial fishing and subsistence. Responses to these questions are reported in Table 6. As can be seen, 14% of the CL indicated a noticeable reduction in tourism in Homer. With respect to a loss in commercial fishing income, a substantial number of CL (39%) also reported a noticeable negative effect.

Responses to the third question indicates that the oil spill did not heavily influence business or home purchases in Homer. However, 18% of the CL's thought that it might in the future.

TABLE 6 ABOUT HERE

With respect to subsistence pursuits, 61% of the CL's perceived that the quanity and quality of bags and catches were influenced by the oil spill. Similarly, a high percentage of leaders (71%) believed residents of their communities experienced threats to their health due to the oil spill (Table 6). Moreover, many CL (93%) believed that residents in their communities did not feel it was safe to eat fish that may have been in contact with the oil spill.

Adults/Seniors

The A/S sample was asked a set of specific questions about the effect the oil spill had on subsistence. The majority of respon-

dents did not perceive that the oil spill had any major effects on their subsistence activities. That is, about 34% of the respondents felt that there was no decrease in the amount of subsistence activities they did. With regard to consumption of subsistence food, about 22% believed that there was no reduction in the quantity of subsistence food eaten. However, 15% stated that since the oil spill they have restrained from subsistence activities, and about 16% said that they had refrained from eating subsistence food. They were also asked about how the spill might affect the likelihood of children learning subsistence skills, although 23% felt that the spill had no effect, about 4% felt that there would be an increase in children learning these skills. Twenty-one percent felt that there would be a decrease in children learning subsistence skills.

In the A/S survey it was also asked if there was an increase in the social activities or communications related to subsistence. About 7% felt that there would be a decrease in the amount of time that was spent with relatives or on social activities, such as potlucks, church activities, and community celebrations. About 38% of the A/S sample felt there would be no effect in the ability to share with elders, while 11% felt there would be a decrease.

In the A/S survey residents were asked about the possibility of leaving Homer because of the oil spill. Eight percent indicated that they had thought of leaving, while 92% said they had not. We also asked them about leaving Homer if another spill happened in the area. About 4% indicated that it was "very likely" that they

would leave, 13% said "maybe", 21% said they "probably would not" and the majority (63%) said "it was not at all likely." Thus, it appears that most people who live in Homer are committed to staying even if another oil spill occurs.

Youth

Turning to the Y sample, 39% of the Y indicated that subsistence food was part of their general meals. While thirteen percent of the sample indicated that the spill had affected the amount of subsistence activities they did, we were unable to determine if this was a positive or negative effect.

With respect to the affect it would have on children's opportunities to learn subsistence skills, 30% of the Y sample believed the oil spill would have no effect on the opportunities, 22% stated it would decrease children's opportunities, and 9% thought it would increase opportunities.

SUMMARY: The community leaders who responded to the survey did not believe that businesses or home purchases in Homer were affected, overall, by the oil spill. The area that the most CL did believe was affected was commercial fishing, and this was in a negative direction. With respect to subsistence activities, the community leaders, as compared to the A/S and Y samples, perceived much greater and more negative affects on the community. However, across all groups, there was a substantial number of respondents who felt the spill had affected subsistence-related activities--

usually in a negative way.

The A/S sample was asked whether they would leave Homer in the event of another oil spill--the overwhelming response was "No".

RESPONSIBILITY FOR THE OIL SPILL

Community Leaders

Community leaders were asked who they thought was/were responsible for the Exxon-Valdez oil spill. Table 7 indicates that Exxon takes first place, with 32% of the CL blaming them. Next in line for blame was "everyone", with 11%. The captain was 7% along with "state congress" and "Exxon crew" and "other" each received blame by 7% of the sample, respectively.

Adults/Seniors

The majority of the A/S sample (30%) blamed the captain for the Exxon-Valdez oil spill. Fifteen percent of the A/S sample blamed Exxon, followed by 9% blamed "everyone" for the spill. Seven percent of the A/S sample blamed "negligence" for the spill. The A/S sample (6%) blamed the state and another (6%) blamed alcohol.

Youth

The Y sample yielded somewhat different findings than those from the CL and A/S samples. Fifty percent of the youth believed the captain was responsible. Ten percent believed Exxon was responsible, and another 10% believed the crew was responsible for

the oil spill. Others who were blamed by the youth at (5% each), were "the State, third mate, everyone, negligence, no one, and other".

TABLE 7 ABOUT HERE

SUMMARY: **The best summary for this section appears to be that no one is quite sure who should be blamed for the oil spill. However, considering all three samples, the majority believe that Exxon and the Exxon-Valdez captain should shoulder the majority of the responsibility.**

ASSISTANCE DURING THE OIL SPILL

Community Leaders

Following the oil spill there was much media attention, as well as substantial informal discussions about the assistance individuals, families, and communities needed, received and/or did not receive as a result of the oil spill. In order to evaluate this, a list of all possible groups that were involved in the oil spill assistance activities was compiled. These groups are presented in Table 8. As can be seen, there is substantial variation on how effective the CL thought these groups were in assisting with the clean-up related activities or problems.

TABLE 8 ABOUT HERE

Overall, the greatest percentage (50%) of community leaders

believed that state law enforcement officials were the most effective in dealing with oil spill related problems. This was evidenced by verbal comments about the lack of preparedness, direction, organization, and knowledge of Exxon; the coast guard, and various federal/state agencies--hence, it was left to local mobilization efforts to get tasks accomplished.

Adults/Seniors

The A/S sample felt local volunteer groups (32%) and local law enforcement were more effective in dealing with oil spill related problems as compared to Exxon, or state and federal agencies. This somewhat contrasts with the CL's perceptions, who thought it was the state law enforcement agencies that were most effective. Both seem to agree, however, that law enforcement agencies were more effective than other state, regional, and federal agencies as well as Exxon/VECO.

Youth

The Y sample's perception of who was the most effective during the cleaning up of the spill is somewhat different than either the adults and seniors, or the community leaders. Forty-eight percent of the Y sample believed that regional-nonprofit organizations were most effective in cleaning up the oil spill.

SUMMARY: **The overall concensus of the three groups sampled is that local and state law enforcement or regional groups were more**

effective in dealing with the oil spill and clean-up than either state or federal government agencies and Exxon.

EFFECTS OF THE OIL SPILL ON THE FUTURE

Open-ended questions were asked about how the CL thought the oil spill would affect future lifestyles, occupational or career plans, family relationships, community relationships and habits such as drinking, smoking, leisure activities, subsistence activities, and worldviews. As can be seen from Table 9, there was great variation on responses to these questions. Some leaders felt, in the long run, that there would be minimal or no effects on Homer, while others felt there would be both positive and negative effects. Specifically, with respect to future lifestyle changes, the greatest percentage of leaders believed that there would be an increased awareness of the environment and more prevention-related actions. The second largest perceived change seemed to be a sense that lifestyles would change somehow, and an uncertainty about the future if commercial fishing continued to be harmed (14%). A substantial number of leaders saw "no noticeable effects", or "some improvement".

TABLE 9 ABOUT HERE

Turning to employment/career plans, most leaders saw no changes or some improvements in their communities and indicated that "it all depends on fishing".

The perceived effect on family relations seems to be that it "will change somehow" (14%), with more leaders viewing a worsening (29%) rather than an improving effect (4%).

With respect to effects on future community relationships, the largest percentage of leaders saw "no effects" or some type of improvement (e.g., people working together).

Turning to the future effects on habits such as drinking, smoking and leisure activities, the largest number of CL's (39%) believed the affect would be for the worse.

With respect to the future of subsistence activities, there seems to be a sense of uncertainty, although the largest percentage of responses were that "they would decrease", (29%) followed by "no effect" and "will change somehow" (11%, respectively).

Finally, looking at the future of residents' worldview, the greatest changes are associated with both an improved awareness that oil spills can happen (21%), and an increased negative view which was reflected in peoples' statements about distrust of state and federal government and big business (21%). Leaders sensed feelings of (1) anger at profit-only oriented groups such as Exxon, and, (2) powerlessness to combat them because state and local government seemed to support them. For example, we frequently heard in our interviews, "they're all in bed together, so if we want anything to change we will have to do it at the local level".[2]

SUMMARY: **The best way to summarize how community leaders perceive the effects of the Exxon Valdez oil spill on the future of Homer**

and its residents is "uncertainty". With respect to changes in worldviews, there seems to be (1) some agreement that residents are now more aware that oil spills can happen; (2) an increase in negative attitudes and feelings toward state and federal governments and big business; and, (3) a sense of powerlessness to influence or change these large bureaucracies.

DISCUSSION AND CONCLUSION

The purpose of this paper was to report on selected social, psychological, and economic effects of the Exxon-Valdez oil spill on the community of Homer and its residents. Following are some general conclusions drawn from the analyses.

1) The actual and perceived effects of the oil spill appear to be mixed, with both positive and negative effects emerging. The negative effects, however, appear to outweigh the positive ones, however, if uncertainty and anxiety about the future are considered.
2) There appears to be an increasing distrust of big business and government with a belief that only empowerment at local levels can save the environment from "greedy" corporations that are directly or indirectly supported by "big government". The development of this "mindset," which interviewers heard recollected over and over by leaders and other community residents is depicted by Figure 2 and can be interpreted as frustrations developing as a result of perceptions of ineffective responses

to the oil spill. These perceptions ultimately lead to the formation and need for grassroots action. In the present study these actions resulted from perceptions of ineffective and/or conflicting clean-up efforts by EXXON -VECO, and state and federal agencies. Initially the spill created grassroot organizations (volunteer groups) that worked together (concensus). It was primarily when EXXON-VECO entered the clean-up activities that conflicts occurred within communities. These conflicts led to more frustrations with big business and state and local agencies, which in turn led back to the belief that empowerment at the local level was necessary and the only solution. In several communities this "empowerment" movement resulted in the formation of job offices that remain very visible and active to date. At the state level it prompted the formation of groups such as the Regional Citizen's Advisory Council (RCAC) which is funded by Alyeska.

3) Of the three groups sampled--CL, A/S, Y--the community leaders appear to be the group most negatively impacted in the areas of stress, spousal relationships, and use of alcohol. They were also the ones to report experiencing the most economic effects with about twice as many (33%) reporting an income gain as compared to a loss. Other differences among perceptions of the three groups sampled demonstrate two points. First, community leaders