appear to be the ones in the community who will need the greatest amount of support/assistance during the time of crisis events such as the oil spill. Second, perceptions about the effect of the oil spill on the community varied among these three groups, confirming the methodological assumption that surveying different groups in the community is necessary if researchers want to generalize about the "community's" perceptions of the effects of the oil spill.

In conclusion, the findings reported in this paper support previous research that demonstrates the complex interactions that take place between social, economic and psychological factors, as well as between the different levels of society identified in Figure 1. That is, the oil-spill related impacts affect not only peoples' behavior, but how they perceive and comprehend their lives both in the short and long term. It is also clear from our findings that actual, perceived, or anticipated stress leads to various coping responses. Similar conclusions have been drawn by other studies on the oil spill (National Wildlife Foundation, 1990; Impacts Assessments, 1990), and the findings reported herein are consistent with previous toxic disaster research (e.g. see Edelstein, 1988).

Finally, it is worth noting that while the State and Exxon, have reached a $900 million settlement, effects on the Alaskan people, as compared to the environment, water and wildlife, remain

generally hidden and seemingly unimportant. And, because it is obvious from our findings that the spill continues to cause anxiety and fear about the future, more research, particularly longitudinal studies are needed to determine the full extent of the oil spill on residents and communities such as Homer. As previously noted, a follow-up survey is being planned by this author during the Spring of 1992.

NOTES

1. Cumulative percentages may not add to 100% due to rounding.

2. At present, the open-ended responses have not been coded and analyzed for either the A/S or Y samples.

3. The Child Form of the Federicks Post Traumatic Stress scale was used for the Youth sample. However, after a discussion with the author of the PTS scale, he suggested that we should have used the adult form. Thus, the stress scores for the Youth sample are probably inflated, and this caution should be used in interpreting of the results.

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Table 1. VARIOUS "FIRST-MENTIONED" EFFECTS OF THE OIL SPILL ON COMMUNITIES: PERCENTAGE OF RESPONSES MENTION. IN OPEN-ENDED QUESTIONS CON'T.

	Community Leader
EFFECT ON FAMILY PROBLEMS	
Increase in general problems	18%
Increase in alcohol/drug related problems	0
Increase in marital problems	4
Increase in domestic violence	25
Increase in child neglect	4
Increase in elder abuse	4
Increase in miscellaneous abuse	11
EFFECT ON SCHOOL PROBLEMS	
Increased dropouts	7%
Kids coming in stressed/ neglected	0
Teacher stress	7
School/oil spill work conflict	0
EFFECT ON ALCOHOL AND DRUG USE	
General increase	57%
Increase due to increase of income	7
Decrease in use	0
EFFECTS ON SUBSISTENCE	
General increase--more for some because no one fishing	28%
Decrease due to contamination	11
Decrease because too busy/ working oil spill	11
Subsistence values threatened	4
Decreased subsistence, increased use of store bought food	4
Decreased subsistence due to other adaptations	4
Quality, Quantity of bags and catches influenced, (-)	6
EFFECTS ON JOB-RELATED PROBLEMS	
Decrease in local jobs/ labor force	32%
Increase in general work related problem	0
Increase in social change problems	0
Overworked, overstressed	14
Lost fishing related jobs	7
Positive effects: increased opportunities for many	4
Boom/bust trends	0
OTHER "FIRST MENTIONED" PROBLEMS	
Economic problems	21%
Leadership/government problems	4
Split between job and morality	7
Emotional effects	18
Increased environmental activism	4
Problems with Exxon and cleanup	7

Table 1. VARIOUS "FIRST-MENTIONED" EFFECTS OF THE OIL SPILL ON COMMUNITIES: PERCENTAGE OF RESPONSES MENTIONED IN OPEN-ENDED QUESTIONS.

	Community Leader
FINANCIAL EFFECTS	
Good for some, bad for others	21%
Boom then bust	4
Change (numberous examples)	11
Loss from fishing/cannery closure	4
Cash gain	39
Increased employment	4
Increased business	4
Community organization had economic gain	7
EFFECTS ON CRIME	
General increase	21
General decrease	0
Increase due to transients	7
Increase in fighting/hostility	4.
Increase in vandalism/theft	4
Increase in domestic violence	21
Increase in alcohol/drug related	7
EFFECTS ON PHYSICAL HEALTH	
Increase in stress/overwork related	32%
Increase in eating/stomach disorders (including weight loss or gain): nausea	4
General oil spill related work/ health problems	11
Respiratory problems	7
Internal problems	0
Nosebleeds	4
EFFECTS ON MENTAL HEALTH	
General increase in problems	21%
Stress/tension/burnout	29
Anxiety/fear/uncertainty/worry	11
Anger/irritability	11
Frustration	0
Depression	7
Powerlessness	4
Denial	4
EFFECTS ON HOUSING	
Housing shortage	50%
EFFECT ON DEMAND FOR SOCIAL SERVICES	
General increase	32%
Increase demand on police/ emergency services	4
Increase demand on mental health services	11
Increase demand on social services (miscellaneous)	7
Increased need for training	4
Decrease use of services more than expected	0
Increased amount of money anticipated for demands of spill related problem	0

Table 2. RESPONSES TO EXXON-VALDEZ OIL SPILL STRESS SCALE: COMMUNITY LEADERS (N =16).

Extent of Perceived Stress		Community Leaders
1	Low	7.1%
2		7.1
3		14.3 = 28.5%
4	Medium	00.0
5		03.6
6		3.6
7		10.7 = 17.9%
8	High	17.9
9		7.1
10		25.0 = 50.0%

Table 3. METHODS OF COPING WITH STRESS BY COMMUNITY LEADER (N=16) AND ADULT/SENIOR GROUP (N = 24).

Methods of Coping	Community Leader			Adult/Senior			Youth		
	1	2	3*	1	2	3	1	2	3
Ask advice from others	11.0%	21.0%	68.0%	12.0%	21.0%	67.0%	26	44	30
Yell or shout to let off steam	68.0	21.0	11.0	49.0	33.0	17.0	39	52	9
Keep hurt feelings inside	36.0	57.0	7.0	41.0	44.0	15.0	35	9	56
Take medicine to feel better	82.0	7.0	4	88.0	8.0	4.0	86	9	5
Stay busy	29.0	21.0	46.0	19.0	15.0	39.0	17	35	48
Think things will get better in a year or two	29.0	32.0	36.0	48.0	28.0	24.0	17	52	30
Wait for things to work out by themselves	32.0	39.0	25.0	51.0	38.0	11.0	61	26	13
Have a drink or two	64.0	25.0	7.0	75.0	22.0	3.0	73	27	0
Take action to solve the problem	4	14.0	79.0	3.0	22.0	75.0	17	39	45
Get physical exercise	14.0	36.0	46.0	10.0	38.0	53.0	9	43	48
Sleep a lot	54.0	29.0	14.0	71.0	24.0	5.0	48	26	26
Argue with others	29.0	43.0	25.0	60.0	28.0	12.0	26	48	26
Pray	39.0	14.0	43.0	32.0	27.0	41.0	48	30	22
Get help from professionals	68.0	21.0	4.0	82.0	12.0	5.0	96	4	0

* Number refer to following responses, respectively. Never or almost never; Once in a while; Fairly often.
** Percentages rounded to nearest whole number.

Table 4. PERCEPTIONS OF EXISTING SOCIAL PROBLEMS IN COMMUNITY AND WHETHER OIL SPILL INCREASED PROBLEMS.

Social Problems	COMMUNITY LEADERS								ADULTS/SENIORS							
	Problem in Community?				Increased Because of Oil Spill?				Problem in Community?				Increased Because of Oil Spill?			
	NO 1	DK 2	YES 3	NR or NA	NO 1	DK 2	YES 3	NR or NA	NO	DK	YES	NR or NA	NO	DK	YES	NR or NA
Alcoholism/Alcohol Abuse	0%	4%	96%	0%	0%	18%	79%	4%	7%	18%	87%		30%	13%	57%	
Drug Abuse	4	4	93	0	4	18	75	4	4	9	87		26	22	52	
Spouse Abuse	0	11	89	0	7	25	64	4	26	13	61		30	26	44	
Child Physical Abuse	4	21	75	0	11	46	39	4	48	39	22		44	52	4	
Child Sexual Abuse	4	21	71	4	14	46	32	7	48	44	9		44	53	4	
Adolescent Physical Abuse	7	36	57	0	14	46	36	4	44	39	17		39	57	4	
Adolescent Sexual Abuse	7	43	50	0	14	57	21	7	74	26	0		65	35	0	
Elder Abuse	25	50	18	7	25	54	11	11	95	4	0		95	4	0	
Child Neglect	11	25	64	0	11	32	54	4	22	26	52		26	22	52	
Murder	57	21	21	0	32	36	29	4	68	32	0		64	36	0	
Rape	29	32	36	4	25	46	21	7	44	30	26		48	35	17	
Stealing	18	21	57	4	18	32	43	7	78	13	9		78	17	4	
Lack of Food	36	29	32	4	39	29	25	7	70	13	17		87	9	4	
Lack of Social Services	54	25	21	0	39	29	29	4	91	9	0		91	4	4	
Lack of Medical Supplies	75	21	4	0	54	32	7	7	78	22	0		78	22	0	
School of Dropout Rates	29	46	21	4	21	61	11	7	17	9	74		58	21	21	
Employment Problems	25	18	57	0	21	29	43	7	68	5	27		65	13	22	
Housing	46	18	36	0	25	25	43	7	87	9	4		75	13	13	
Crime in general	29	11	61	0	14	21	61	4	64	0	30		79	4	17	
Discrimination	39	32	21	7	21	43	21	14	69	0	30		68	9	23	

Table 5. COMMUNITY LEADERS' PERCEPTIONS OF CONFLICTS/COOPERATION WITHIN COMMUNITIES.

Confilcts	HOMER NO	DK	YES	NA or NR
Residents and Exxon	7%	4%	82%	7%
Residents and VECO or VECO Contractors	7	11	75	2
Residents Themselves (i.e., Neighbors, Friends, and Families	18	0	68	14
Residents and Local Institutions	18	36	46	0
Federal and State Agencies (e.g., U.S. Coast Guard and Alaska Dept. of Conservation	14	39	46	0
State and Federal Agencies and Local Fishermen (A & B)	14	14	71	0
Native and Non-Native Institutions	39	39	21	0
Local Fishermen or Cannery Employees and Non-local Commercial Fishermen	43	29	29	0
Local Fishermen Who Worked for VECO and Those Who Did Not	11	18	71	0
Cooperation				
Public/Social Institutions In The Community and Region Cooperated In Working On Spill Problems	21	0	79	0

* Percentages rounded to nearest whole percent.

Table 6. COMMUNITY LEADERS' RESPONSES TO SPECIFIC QUESTIONS CONCERNING IMPACTS ON COMMUNITIES.

Questions	NO	DK	YES	NA or NR
Was tourism reduced by the oil spill?	68%	18%	14%	0%
Did the loss of commerical fishing income noticeably affect community businesses and residents?	32	25	39	4
Did people in the community express a reluctance to invest in businesses, houses and the like?	68	14	18	0
Did people express an interest in moving out of the community/village?	61	11	25	4
Were subsistence pursuits and the quantity and quality of bags and catches influenced by the oil spill?	31	36	61	4
Do you think that persons in your community perceive threats to their health from the oil spill?	21	0	71	7
Do people in your community think that it is safe to eat fish that may have been in contact with the oil spill?	93	0	4	4

Table 7. PERCEPTIONS OF WHO COMMNUNITY LEADERS THINK ARE RESPONSIBLE FOR THE EXXON-VALDEZ OIL SPILL ON MARCH 24, 1989.

	Community Leaders	Adults/Seniors	Youth
RESPONSIBLE FOR OIL SPILL			
Exxon	32%	15%	10%
Captain	7	30	50
State	4	6	5
Coast Guard	4	4	0
Third Mate	0	4	5
Crew	7	4	10
Everyone	11	9	5
Alyeska	0	0	0
Legislators/Congress	7	0	0
Alcohol	4	6	0
Negligence	4	7	5
Oil industry	4	4	0
No one	0	3	5
Other	7	7	5

Table 8. PERCEPTIONS OF COMMUNITY LEADERS AND ADULTS/SENIOR AND YOUTH ON EFFECTIVENESS OF VARIOUS ORGANIZATIONS IN CLEANING UP OIL SPILL.

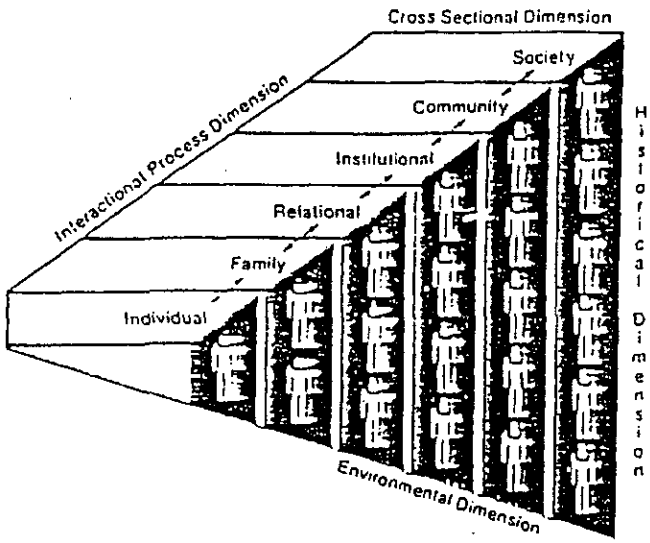
	Community Leaders				Adults/Senior				Youth			
ORGANIZATIONS	Low (0-2)	Medium (3-5)	High (6-7)	NR/NA	Low (0-2)	Medium (3-5)	High (6-7)	NR/NA	Low (0-2)	Medium (3-5)	High (6-7)	NR/NA
Exxon	43%	46%	7%	4%	46.0%	39.0%	8.0%	7.0%	22.0%	48.0%	17.0%	13.0%
Federal Government Agencies (e.g., U.S. Coast Guard)	43	46	7	4	38.0	51.0	6.0	6.0	22.0	30.0	9.0	39.0
State Government Agencies (e.g., State Dept. of Conservation; Fish and Game	21	57	14	7	34.0	52.0	7.0	7.0	4.0	48.0	9.0	39.0
Regional Profit Organization (e.g., VECO	4	43	7	46	26.0	15.0	9.0	51.0	13.0	35.0	13.0	39.0
Regional Nonprofit Organizations? (e.g., Volunteer Groups)	21	39	14	25	4.0	29.0	32.0	35.0	4.0	13.0	48.0	35.0
Village Corporations	11	39	4	46	12.0	26.0	17.0	45.0	9.0	17.0	13.0	61.0
Local Government Agenices	18	54	21	7	22.0	48.0	19.0	12.0	17.0	30.0	18.0	35.0
Indian Reorganization Act (IRA) Council	7	0	0	93	19.0	2.0	2.0	78.0	13.0	9.0	9.0	70.0
Local Business	18	36	18	29	21.0	46.0	19.0	14.0	18.0	50.0	9.0	23.0
Insurance Companies	14	11	7	68	46.0	14.0	3.0	46.0	17.0	30.0	9.0	44.0
Schools	14	21	11	54	25.0	36.0	15.0	25.0	26.0	35.0	9.0	30.0
Churches	18	22	22	39	19.0	39.0	16.0	27.0	22.0	22.0	13.0	44.0
Medical Professionals	18	18	19	39	14.0	34.0	24.0	28.0	13.0	22.0	13.0	52.0
Social Workers	7	29	36	29	15.0	38.0	25.0	22.0	13.0	30.0	18.0	39.0
Local Law Enforcement	7	36	32	25	14.0	44.0	26.0	16.0	22.0	30.0	4.0	44.0
State Law Enforcement	11	39	50	29	19.0	44.0	17.0	20.0	17.0	39.0	4.0	39.0

* Percentages rounded to nearest whole number.

Table 9. PERCE :ONS OF EFFECTS OF OIL SPILL O')TURE OF HOMER.

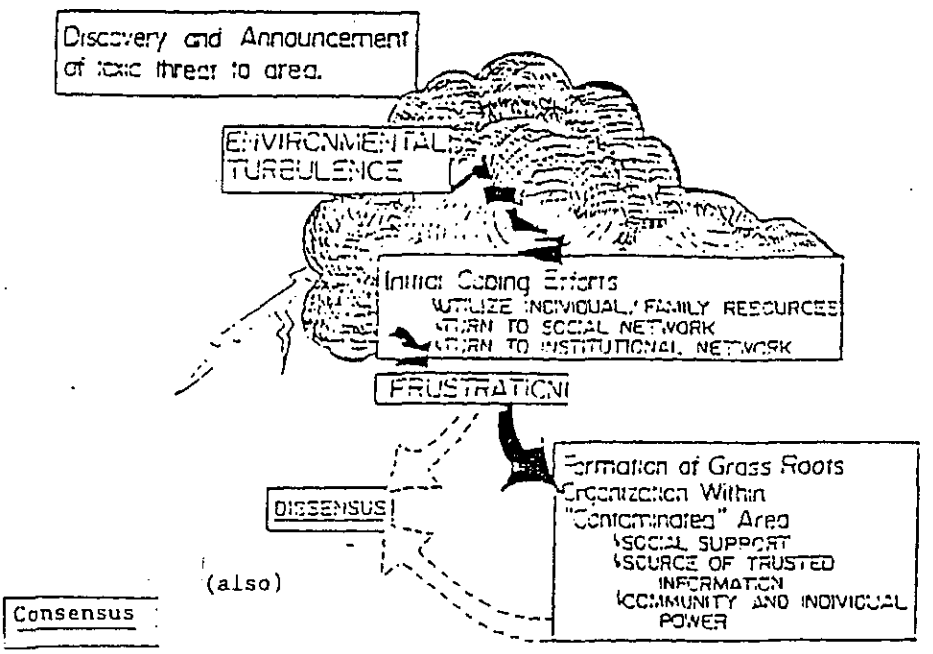
	Community Leaders
LIFESTYLE	
Less fishing	04.0%
Depends on fishing	14.0
Increased awareness/ prevention	25.0
Both positive and negative effects	00.0
Improve	11.0
Worsen	07.0
Will change somehow	14.0
No effect	18.0
EMPLOYMENT/CAREER PLANS	
Depends on fishing	21.0%
Improve	21.0
Worsen	07.0
Will change somehow	04.0
Educate kids awareness	07.0
New skills/less dependence	00.0
No efffect	18.0
FAMILY RELATIONSHIPS	
Both positive and negative effects	00.0%
Improve	04.0
Worsen	29.0
Will change somehow	14.0
No effect	21.0
COMMUNITY RELATIONSHIPS	
Improve	18.0%
Worsen	14.0
Will change somehow	04.0
Both positive and negative effects	04.0
People working together more	14.0
No effect	25.0
HABITS, e.g., DRINKING	
Improve	11.0%
Worsen	39.0
Will change somehow	04.0
Both positive and negative effects	04.0
No effect	21.0
SUBSISTENCE	
Increase	04.0%
Decrease	29.0
Will change somehow	11.0
Not taken for granted	04.0
Improve politically	00.0
No effect	11.0
WORLDVIEW	
Improve	11.0%
Worsen	21.0
Will change somehow	07.0
Improved awareness	21.0
Both positive and negative effects	00.0
No effect	11.0

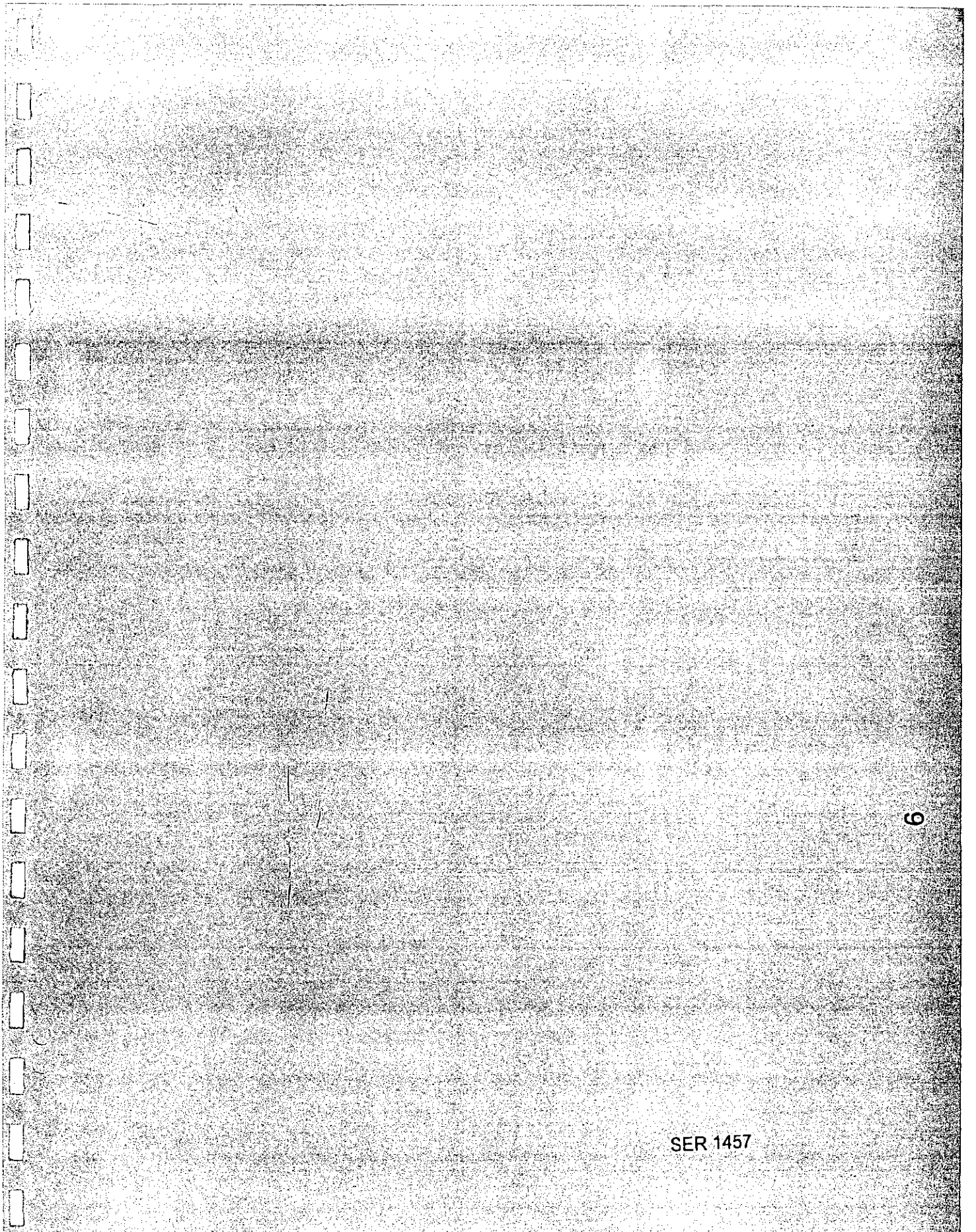
Figure 1. The Social Process Model (Edelstein, 1988).



Perceptions and Outcomes Result from Interactions Between/Among Different Levels of Society, The Environment, and Past Histories.

Figure II. An Exploratory Map of Community Response to Toxic Contamination (taken from Michael R. Edelstein and Abraham Wandersman, "Community Dynamics in Coping with Toxic Exposure," in Irwin Altman and Abraham Wandersman (eds.), Neighborhood and Community Environments [New York: Plenum Press, 1987].





THE STRESS RELATED IMPACT OF THE VALDEZ OIL SPILL ON THE RESIDENTS OF CORDOVA AND VALDEZ, ALASKA

A Comparative Study Conducted by the Valdez Counseling Center

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JUNE 1990

EXHIBIT 9

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Abstract

A one year study of the human effect of the Exxon Valdez oil spill on residents of Cordova and Valdez, Alaska, using stress related criteria found that the majority of residents experienced symptomatology consistent with a diagnosis of Post-Traumatic Stress Disorder. Stress symptomatology was found to be greater in Cordova than in Valdez in incidence, intensity and duration. The variation in individual stress scores was generally found to be greater than the central tendency of subgroups.

Acknowledgments

The researchers wish to acknowledge the following persons for their invaluable assistance: Dr. Calvin Frederick of the University of California at Los Angeles for his expertise and the use of his Reaction Index; Mr. Douglas Griffin, Valdez City Manager for his financial support; Dr. Susan Soloman, Director, Emergency Services Office of the National Institute of Mental Health for her expertise; Dr. William Freudenberg of the University of Wisconsin for his contribution on the social impact of "Boomtowns"; Dr. Francis Norris of Georgia State University for her technical assistance on scale selection; Diane Kinney and Cecille Scott of the Valdez Counseling Center for their wordprocessing and unwavering good humor.

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The Problem and Its Setting

On March 24, 1989 the tanker vessel "Exxon Valdez" ran aground on Bligh Reef in Prince William Sound, Alaska. The grounding resulted in the spill of almost 11 million gallons of crude oil into the surrounding water. This was the largest oil spill in U.S. history; furthermore, the event took place in a remote area renowned for its wilderness quality and abundant wildlife. The commercial fishing value from the Sound typically ran into the tens of millions of dollars per year.

Thousands of sea birds and other wildlife were killed and an important habitat was damaged or threatened by the encroaching oil. Eventually more than 1100 miles of shoreline was impacted. Much of the commercial fishing season was cancelled and there is considerable speculation about future damage to the fishery. The event was widely acknowledged as this country's worst environmental disaster.

The impact of the oil spill on the emotional well being of area residents was unknown. Change was inevitable, the predictability of life was disrupted for most who live or work in the area. Normal employment patterns were disrupted as many community members were drawn into the spill related work force where "normal" work hours were 12 hours a day, seven days a week. Some workers were absented from their families for weeks at a time as clean up workers were housed in dormitory ships near the spill.

The Exxon Corporation, owner of the tanker, assumed responsibility for the spill and mounted a massive clean-up effort

that cost the company over two billion dollars and employed thousands of workers during the summer of 1989. Exxon also set up claims offices and began processing claims from fishermen and others who were economically impacted by the spill.

In addition to the influx of oil spill workers, a host of other groups and individuals converged on Valdez, including: the mass media, Exxon bureaucrats, security guards, representatives of state and federal agencies, bird and otter rescue groups, scientists, environmentalists, tourists, street vendors, the unemployed and the unemployable. This rapid population influx disrupted normal social patterns as the population of Valdez swelled from 3500 to an estimated 7000 in a matter of weeks. Along with this rapid population influx came a variety of social ills: a fourfold increase in crime and consequent increase in fear for personal safety; a critical housing shortage that lead to all manner of unusual living arrangements; traffic congestion; long lines at the post office, stores, and restaurants. City services were overwhelmed, for example areas of the city literally stank as the sewage treatment system was unable to meet demand. Cordova was spared much of the population influx because it is not connected by road with the rest of the state. Cordova, however, because it is primarily a fishing community is more economically dependent on the Sound than Valdez.

Media coverage of the spill and clean up effort was intense and video images of dead or dying wildlife, oil blackened sea and shoreline as well as the high impact, labor-intensive invasion of the Sound were a constant reminder to residents that they were

suffering a catastrophic event. Researchers have discovered that people in our society base their impressions about disaster behavior mainly on mass media accounts. Even where individuals have been through a disaster and have experienced what actually happened, they tend to discount their experience as atypical. (Gist, p. 22).

The Exxon Valdez oil spill and its aftermath were unique events: never had this country suffered a spill of such magnitude; never had such a massive spill occured in an area so remote and environmentally sensitive; never had there been so large, intensive or diverse a convergence on an area as the result of a human failure disaster.

Disasters involving human casuality, dislocation and property destruction can have severe long-term psychological consequences such as shock, anxiety, sleep disturbances and impaired interpersonal relationships, but even in the absence of severe human stressors such as upheaval or massive loss of life, any upset in the normal state that cannot be overcome through usual methods of problem solving will cause stress and, consequently, stress related problems. The immediate and long term impact of the oil spill on the mental health of area residents was unknown. In order to gain insight into the human impact of the event a methodological inquiry was necessary.

Study Objectives

The central objective of this study was to understand the impact of the spill and its aftermath in human terms.

A second objective of the study was to gain some understanding of the spill's impact, if any, on any subgroups of the population for the purpose of mental health service planning and delivery.

The final objective of the study was to identify possible mediators that helped reduce strassfull symptomatology. If we can learn more about how people coped with this accident, we may be able to help future victims of technological mishaps.

Hypotheses

In order to accomplish the study objectives it was necessary to generate a number of hypotheses. Because of the unique nature of the event, and, hence, the difficulty in being able to make predictions on the basis of outcomes from similiar research, there was a great deal of conjecture in the formulation of these hypotheses.

The primary research hypothesis was that the oil spill and its aftermath constituted an extreme stressor for most area residents that could cause emotional problems in most people. This was operationalized as a score of 12 or more on the Reaction Index by more than 50% of the study population.

It was hypothesized that Cordova, which is more dependent on the Sound than Valdez due to fishing and related industries, would experience a higher incidence, intensity and duration of stress

symptomatology than would Valdez whose economic base consists primarily of the Alyeska Pipeline Terminal.

It was hypothesized that the incidence of depressive symptomatology as measured by the Center for Epidemiologic Studies Depression Scale (CES-D Scale), would increase for both communities as a result of spill related stress and a positive correlation as well as a cause and effect relationship would exist between Reaction Index scores and CES-D scores.

Because people under increased stress sometimes increase their alcohol consumption and/or use of illicit drugs, it was hypothesized that drug and alcohol use would increase and this increase would be related to higher Reaction Index scores.

Subgroup Hypotheses

The desire to explore the relationship between Reaction Index scores and subgroup membership led to the formulation of the following subgroup hypotheses.

According to Kilizanek and Drabek (1979), the elderly, because they have had to master a greater amount of adversity in their lifetime, are less likely to perceive significant long-term negative consequences of disaster; therefore, it was hypothesized that older persons, as a group, would be less symptomatic than younger persons.

Research by Holahan (1978) indicates that while men are inclined to see their physical environment objectively and in nonsocial terms, women, on the other hand tend to view the environment in more personalized terms; therefore, it was

hypothesized that women, as a group, would be more symptomatic than men.

Because of their cultural history and subsistence use of the environment, it was hypothesized that Native Alaskans would experience more symptomatology than members of other racial groups.

It was hypothesized that persons who have lived in Alaska for long periods would experience the spill as more of a loss and would, consequently, be more symptomatic than persons who had not lived in the state as long.

Because the spill represented a direct threat to their livelihood, it was hypothesized that fishermen, as a group, would be more symptomatic than any other occupational group.

Mediating Hypotheses

It was hypothesized that persons who enjoyed greater social support would be less symptomatic than persons with lesser social support.

It was hypothesized that income earned as a direct result of the spill would be a mediating factor and there would be a direct relationship between increased net income as a direct result of the spill and decreasing stress symptomatology.

Literature Review

Psychological Stress

According to Frederick (Laub, 1985, p. 110)

> Within the last few decades it has become clear that a broad spectrum of measurable effects of psychological stress could become manifest in humans at all age levels. A special component of this phenomenon, namely, psychic trauma, was probably first recognized per se, in the early 1940's. This has developed into a significant condition called Post-Traumatic Stress Disorder (PTSD) which was officially listed for the first time in the third edition of the Diagnostic and Statistical Manual (DSM III) of the American Psychiatric Association (1980)...it has long been suspected that these disturbances might have both acute or long term effects. The specific range of stressors which could evok such disturbances has been recognized only within the last couple of decades. In addition to the existence of a recognizable stressor which would be likely to evoke symptoms of distress in the majority of persons, typical symptoms include reexperiencing the traumatic situation; a difficulty in experiencing normal feeling, that is, an emotional anesthesia or reduction in being involved with the world around oneself; and an avoidance of situations that symbolize or represent the event.

Technological Disaster

According to Baum (1983, p. 120), "We have created a vast technological environment to improve the quality of our lives, but this network of power generating, production, and waste disposal systems can and does malfunction. Some of these malfunctions may be called technological disasters." Beigel (1985, p. 144) is more direct in assessing the cause of human-induced disasters which he characterizes as acts of omission that tend to result from attempts to either save money, resources or time.

Baum (1983, p. 120) contrasts victimization by technological

mishap, which he maintains involves a perceived loss of control over something that was once perceived as controllable, with natural disaster which involves a perceived lack of control over something that was never perceived as controllable. He concludes therefore that technological mishaps may generate greater post-accident uncertainty than natural disasters. "While natural disaster may also pose some chronic problems, we feel that the combination of factors underlying technological disaster is more likely to cause long-term uncertainty and consequent psychological effects than are natural disasters."

According to Beigel (1985, pp. 143-150), victims of disasters of omission may never go through recognizable stages of recovery because victims may not recognize themselves as such. "Without evidence of a disaster, the potential for resolution that occurs with most natural disasters is missing. In a sense the victims are stuck in the initial phase of a disaster, shock, anger, depression, etc."

Beigel maintains that victims of acts of omission are perceived as causing new problems:

> For example, it was pointed out that while victims of an asbestos problem were waiting for the red tape to clear, many residents of the larger community began to blame those same victims for complaining to the federal government about the problem. It was a "blaming the messenger for the message" phenomenon. The more the victims voiced their concern, the more severe was the blot on the community. For those with a vested interest in a community with a good name, the image of the problem (caused by the victims) was seen as worse than the problem itself.

The nuclear power plant accident at Three Mile Island has been ascribed as the most studied accident in America. Hartsough (Laub, 1985, p. 10), characterized Three Mile Island as a bench mark in disaster effects research.

> Because the accident was ominously threatening and drew world-wide attention, but did not cause injury or death, or result in community destruction, the effects on the mental health of the surrounding population became identified as the major impact of the accident. Psychological stress became the major variable of study.

Methodology

This was an exploratory study designed to gain insight into the psychological impact on area residents of the Exxon Valdez oil spill for the purpose of mental health assessment and intervention planning.

Description of the Subjects and Sample Selection

The subjects were all adult members of the communities of Valdez and Cordova. Subjects were selected using a computer generated simple random sample (SRS) of registered voters. Sample selection was conducted by an independent commercial computer firm. This sampling frame encompassed approximately two thirds of the adult population of each community. One hundred fifteen randomly selected residents in each community were mailed an invitation to participate along with a copy of the first instrument and an offer of a $25 payment to respondents who completed and returned all three instruments mailed to them over a one year period (see appendix A). The offer of a cash payment was utilized to increase response and minimize respondent bias.

Description of the Research Design

A bifurcated longitudinal panel format was used to record depressive and stress symptomatology using standardized measuring instruments. In order to measure change over time, respondents were mailed a series of three similiar self report survey instruments over a one year period. The first survey was conducted

in the second month after the spill, the second in the eighth month, and the final survey in the twelfth month post spill. An accurate recording of stressful symptomatology required a timely assessment. According to Yates (Gist, p. 183), "When initial data are collected 6 months or even 1 year after a disaster, valuable information critical to an analysis of processes expected to change over time - is lost." Slow start-up time also forces the researcher to rely more exclusively on retrospective, self report data that is likely to be less reliable.

Even though the initial instrument was in the field within two months of the spill, one month would have been preferable and the one month target date would have been met if the start up time had not been delayed while the sponsoring agency awaited requested funding from the State Department of Mental Health and Developmental Disabilities that was not forthcoming. Limited resources also dictated a self report mail survey format rather than personal interviews.

Two follow up requests were mailed to initial subjects who failed to respond and two more follow up requests were made to respondents who failed to return the 2nd or 3rd survey instruments. Only respondents who returned all three completed instruments were included in the study.

Code numbers were used to protect confidentiality and the anonymity of respondents was guaranteed.

Description of the Research Instruments

A criticism of past disaster studies is the failure to use

standardized measuring devices. All three survey instruments used in this study relied on standardized instruments, including: A perceived social support scale; The Center for Epidemiologic Studies Depression Scale (CES-D scale), and the Frederick Reaction Index.

Social support is known to be a mediating factor in the stress-health relationship (Cohen, 1985); furthermore, Wethington and Kessler (1986) reported that perceived social support appears to be more important than received support. In order to determine the role of perceived social support as a mediating factor in stress reactions of study subjects, a six item perceived social support scale was adapted from the 12 item Interpersonal Support Evaluation List (ISEL) and included in the survey (see appendix B).

The 26 item Center for Epidemiologic Studies Depression Scale (CES-D Scale) (see appendix C) was developed to be appropriate for use in studies of the epidemiology of depressive symtomatology in the general population. The scale was designed to reflect current state. Radloff and Locke (Weissman, 1986, p. 185) found that high CES-D scores were significantly related to life events. The scale was included in this study to be examined as either a dependent or independent variable in oil spill symptomatology.

The 20 item Frederick Reaction Index (Copyright 1988 by Calvin Frederick - used with permission) (See appendix D) was designed to determine the level of stress in a subject group that has been exposed to an extreme stressor.

Of the many standardized instruments considered, the Reaction Index was selected as the most appropriate for the measurment of

stress reaction to the Exxon Valdez oil spill. Reaction Index scores constitute the dependent variable for this study. According to Soloman (Gist, p. 312), "Post-Traumatic Stress Disorder (PTSD) is the mental illness of greatest relevance to the experience of disaster." According to Frederick (appendix E) the degree of Post-Traumatic Stress Disorder has been determined from Reaction Index Scores with a correlation of .95 with established cases of PTSD from a variety of stressors.

A caveat - Post-Traumatic Stress Disorder is a mental disorder that requires a clinical diagnosis, nevertheless, Reaction Index scores are indicative of a degree of stress that would be consistant with that diagnosis.

In addition to the three standardized scales, each of the three survey instruments requested vaious demographic and socio-economic information that included: age, sex, race, marital status, education, number of years in Alaska, occupation, annual income, oil spill income, and number of children living at home. The 2nd and 3rd instruments included a four item scale designed to determine increased medical problems and help seeking behaviors (see appendix F) and a question about increased use of drugs or alcohol. All three instruments provided space for and encouraged comments from respondents.

Delimitations of the Study

It is unclear whether the stresses created from the response to a disaster are significantly different than those generated by the disaster itself. In this study there was no attempt to

distinguish between psychological sequelae of the spill and the aftermath; spill induced stress is conceptualized as including response generated stress.

This study is limited to the spills impact on adults. This is a most unfortunate limitation that was imposed by the sampling technique. Children have often been the overlooked victims of disasters and there is much anecdotal evidence that children suffered significantly as a result of the oil spill.

Limited resources forced a choice between replicating the study in a control group and studying two impacted communities.

As the oil spread many Alaska communities were affected, although this study involves only the communities of Valdez and Cordova, it is hoped that the results will be helpful in assessing psychological sequelae in other communities.

Definition of Terms

STRESS - an arousal reaction to a perceived threat.

In humans stress is thought to be the vestage of our 50,000 year old fight-flight reflex which is biologically geared to prepare us to fight or flee a threatening stimulus and to sustain our action during a brief period of exertion. Today activation can occur in non-biologically threatening events, the sources of which can be environmental, physical, interpersonal or psychological. Stress can be either acute or chronic and can cause adverse biological and psychological consequences (Womack).

According to Tierney (Gist, p. 11), a lack of agreement on what types of events to include under the disaster label is one of

the roots of the ongoing debate on how disasters affect mental health. This study will use Berren's definition - DISASTER - "any event that stresses a society, a portion of that society, or even an individual family beyond the normal limits of daily living: (Gist, p. 44).

Results

The Samples

Of the 115 subjects solicited from each community, Cordova respondents returned 53 initial questionnaires for a response rate of 46%. Of the Valdez subjects solicited, 64 returned the initial questionnaire for a total response rate of 56%. The researchers were unable to discern any pattern of respondent bias from the initial survey returns.

Panel mortality for the Cordova sample was 19% as 43 of the initial 53 respondents returned all three completed instruments and were included in the study. No pattern of respondent mortality bias was discernable for Cordova.

In Valdez 50 of the initial respondents returned all three instruments for a panel mortality rate of 22%. In Valdez a disproportionate percentage of females was discernable in the final sample, 68% compared to 58% in the voter registration sampling frame (see figure 1). This discrepancy may be explained by the other anomaly that was discernable in the final Valdez sample - the respondent mortality rate for those initial respondents who identified themselves as employed in the oil industry (all male) was also found to be disproportionate. Of the 11 oil industry employees responding to the initial survey, only 5 went on to complete and return the second and third survey for a respondent mortality rate for oil industry employees of 120%; consequently, males as well as oil industry workers were under represented in the final Valdez panel.

Primary Hypotheses Testing

The primary research hypothesis - the oil spill and its aftermath constituted an extreme stressor for most area residents that could cause emotional problems in most people is upheld for both communities. Of the 43 Cordova respondents 36 or 83% reported symptoms consistent with the criteria for a diagnosis of PTSD. Of the Valdez sample 33 or 65% reported symptoms consistent with PTSD at some point in the study.

The hypothesis that Cordova would experience a higher incidence, intensity and duration of stress symptomatology than would Valdez is upheld (see figure 2). The incidence of stress symptomatology was actually slightly less in Cordova than in Valdez on the first survey, but, unlike Valdez, the incidence of stress symptomatology increased on the second survey. Although the incidence of stress symptomatology decreased in Cordova between the second and third survey by 9.3%, the incidence of stress symptomatology on the final survey reflects Cordova's stress index to be 14.19% higher than in Valdez. A comparison of the mean scores verifies Cordova's greater intensity and duration of stress symptomatology. Figure 2 demonstrates a steadily decreasing mean stress score for Valdez from the first through the third survey, mean scores in Valdez decreased from 15.6 to 10.8. In Cordova the mean score decreased by less than 2 points from the first to the third survey remaining more than 4 points higher on the third survey than the mean score on the Valdez third survey. Note the high standard deviations on all three surveys in both cities indicating a large degree of variability on Reaction Index scores.

Demographically, the registered voter population of Valdez and Cordova appears to be very similiar on a number of variables (see figure 3): both populations are well educated with more than 60% having a college degree; both enjoy high average incomes; both are overwhelmingly caucasian. It was apparent in the examination of data; however, that the samples were drawn from two vastly differing populations. The populations differ appreciably on the variable of occupation (see figure 4) and this may explain some of the differences in mean Reaction Index scores; however, even within the same occupation the populations were different when occupation was compared to Reaction Index scores (see figure 5). An analysis of variance found no statistically significant relationship between occupation and Reaction Index scores in either population and a t test for two independent groups between the variables of fishing and all other occupations was also not statistically significant. Consequently the rationale that Cordova would experience more symptomatology than Valdez because of its dependence on fishing and related industries has not been verified by the findings.

Respondent comments were reviewed in order to determine the most frequently expressed respondent concerns. In Valdez the most frequently expressed concern (N=11) was convergence related, i.e., crime, transients, crowds, and traffic that all increased as a result of the spill. Concern about the negative impact of the spill on the environment (N=5) was the second most frequently expressed comment. In Cordova concern about the negative impact of the spill on the environment (N=10) and social disruption caused by perceived greed or jealousy as a result of spill related income

(N=16) were the most frequent comments. Concern about the future of the fishery (N=7) was Cordova's second most frequent comment.

A statistically significant relationship was found to exist between stress and depressive symptomatology as indicated by correlation of Reaction Index and CES-D scores on all three surveys in Valdez and on the first and third surveys in Cordova (see figure 6). Further investigation by regression analysis found a cause and effect relationship to exist (see figures 7 & 8). As stress symptomatology increased there was a corresponding increase in depressive symptomatology.

Three respondents in Cordova and one in Valdez indicated their alcohol consumption and/or illicit drug use increased since the oil spill. This resulted in too few respondents to test the hypothesis that a cause and effect relationship existed between increased substance use and Reaction Index scores.

Subgroup Hypotheses

Possibly as a result of too small a sample but, more probably due to the large amount of variability in stress scores across discrete categories, no relevant statistically significant relationships at a .095 level of confidence were found to exist between Reaction Index scores as the dependent variable and subgroup membership as the independent variable, with the following exception: In Valdez there was a statistically significant positive correlation between years in Alaska and Reaction Index scores on all three surveys. Further investigation by regression analysis, however, failed to find a statistically significant cause

and effect relationship between the variables. No significant correlation between years in Alaska and Reaction Index scores was found in the Cordova sample on any of the three surveys.

There were too few Native Alaskan respondents to test the hypothesis that Natives would experience more symptomatology than members of other racial groups.

The hypotheses that younger persons, women and fishermen would be more symptomatic than corresponding groups is rejected by the findings. Other variables were investigated for relationship with stress scores, including marital status, number of children living at home, annual income, occupation, increased help seeking behavior, and increased medical problems. None of these variables were found to be related to Reaction Index scores a .095 level of confidence.

Mediating Hypotheses

The hypothesis that persons who enjoyed greater social support would be less symptomatic than persons with lesser social support is partially upheld for Valdez. Statistically significant correlations between Perceived Social Support scores and Reaction Index scores were found on the second and third surveys from Valdez. A regression analysis showed a statistically significant relationship existed (see figure 9). There was no statistically significant correlation between these variables in Cordova but in Valdez persons with high Perceived Social Support tended to score lower on the Reaction Index.

The hypothesis that income earned as a direct result of the

spill would lessen stress symptomatology is rejected. No statistically significant correlation was found in Valdez. A significant negative correlation between the variables was found in Cordova, but regression analysis failed to establish a statistically significant casual relationship (see figures 10 & 11), even though the respondents earning the most money from the oil spill also had the highest mean score on the Reaction Index by a considerable margin.

Summary, Conclusions and Recommendations

Summary

A one year, three phase study was conducted by the Valdez Counseling Center in order to determine the psychological impact of the Exxon Valdez oil spill on residents of Valdez and Cordova. Stress reactions to the spill, as measured by the Frederick Reaction Index, upheld the primary research hypothesis that the oil spill was an extreme stressor that could cause emotional problems for most area residents. Cordova was found to have a higher incidence, intensity, and duration of stress as a result of the spill than was experienced in Valdez.

Evidence of delayed and cyclical stress reactions was found as well as a cause and effect relationship between stress and the incidence and severity of depression.

Perceived Social Support was found to be a mediating factor in Valdez but not Cordova. In spite of certain demographic similarities, Cordova was noted to represent a very different population than Valdez.

Investigation of subgroups found little relationship between group membership and Reaction Index scores due to a high level of variability in individual stress reactions to the oil spill and its aftermath.

Conclusions

A technological disaster of the scope of the Exxon Valdez oil spill that does not result in human casuality or dislocation but

does disrupt normal social and occupational patterns may result in emotional problems for most area residents. In the case of the Exxon Valdez oil spill stress symptomatology was greater on an individual basis than was evident in any subgroup of the study populations indicating the individual nature of each persons relationship with their environment as well as the importance of protection of the environment to the maintenance of good mental health for the majority of it's human occupants.

Individual perceptions and coping abilities vary greatly. In the case of the Exxon Valdez oil spill, most of the residents of Valdez and Cordova experienced emotional problems as a result of the spill, yet only 10% of the respondents sought professional help for any marital or emotional problem during the first year after the spill. This is consistent with other studies of help seeking behaviors (Bosmajian, 1985) and illustrates the need for innovative, community based treatment strategies as well as additional evidence for an increased role for prevention of technological mishaps.

In spite of their relative geographic proximity and some demographic similiarities, Valdez and Cordova represent very dissimiliar populations and each community was uniquely impacted by the oil spill. In Valdez the greatest harm may have resulted from society's response to the oil spill, the tremendous convergence that totally disrupted the community and robbed the residents of the ability to predict events in their lives with any degree of accuracy that is so important in minimizing stress. As one resident commented, "The fact that the town is so crowded and

the crowds milling around - waiting in lines, etc. is what causes me the most stress. I am afraid for my childrens' safety now - also I feel like our town has been invaded and violated."

Cordova was spared much of the human invasion, but none of the social or emotional disruption caused by the spill. A Cordova respondent commented, "The oil spill claims precedure is very stressful. Watching close family/friends reap benefits of oil (cleanup) work is also stressful. Life in Cordova is not as sweet as it was."

Recommendations

If the psychological impact on area residents of the Three Mile Island nuclear power plant disaster is the most studied event in history, the psychological impact of the wreck of the T/V Exxon Valdez on area residents may be the least studied event in this nations history. Further study is needed. At the end of 12 months 44% of the Cordova and 30% of the Valdez respondents were still experiencing significant trauma as a result of the oil spill.

Efforts to understand the impact of the oil spill on the emotional well being of the people of Alaska have been minimal. The spiller, the state and the federal government need to recognize that otters were not the highest species of animal to suffer as a result of the Exxon Valdez oil spill. Resources should also be directed toward understanding and ameliorating the negative psychological impact of the spill on the people who live there.

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Figure 1

Sex

VALDEZ

BAR GRAPH OF VARIABLE SEX , N = 50

VALUE	COUNT	PERCENT
MALE	16	32.00
FEMALE	34	68.00

CORDOVA

BAR GRAPH OF VARIABLE SEX , N = 50

VALUE	COUNT	PERCENT
MALE	20	46.51
FEMALE	23	53.49

Figure 2
FREDERICK REACTION INDEX

CORDOVA

	SURVEY #1 SCORE	COUNT	PERCENT	N = 43
NO PTSD	0 - 11	22	51.16	
MILD PTSD	12 - 24	12	27.91	
MODERATE PTSD	25 - 39	5	11.63	Mean = 16.71
SEVERE PTSD	40 - 59	4	9.30	SD = 14.1

	SURVEY #2 SCORE	COUNT	PERCENT	
NO PTSD	0 - 11	20	46.51	
MILD PTSD	12 - 24	13	30.23	
MODERATE PTSD	25 - 39	9	20.93	Mean = 15.44
SEVERE PTSD	40 - 59	1	2.33	SD = 11.50

	SURVEY #3 SCORE	COUNT	PERCENT	
NO PTSD	0 - 11	24	55.81	
MILD PTSD	12 - 24	12	27.91	Mean = 14.93
MODERATE PTSD	25 - 39	5	11.63	SD = 12.28
SEVERE PTSD	40 - 59	2	4.65	

VALDEZ

	SURVEY #1			
NO PTSD	0 - 11	25	50.00	
MILD PTSD	12 - 24	16	32.00	Mean = 15.34
MODERATE PTSD	25 - 39	5	10.00	SD = 13.16
SEVERE PTSD	40 - 59	4	8.00	

	SURVEY #2			
NO PTSD	0 - 11	29	58.00	
MILD PTSD	12 - 24	13	26.00	Mean = 13.18
MODERATE PTSD	25 - 39	6	12.00	SD = 13.105
SEVERE PTSD	40 - 59	1	2.00	
VERY SEVERE	60 +	1	2.00	

	SURVEY #3			
NO PTSD	0 - 11	35	70.00	
MILD PTSD	12 - 24	10	20.00	
MODERATE PTSD	25 - 39	3	6.00	Mean = 10.760
SEVERE PTSD	40 - 59	2	4.00	SD = 11.242

SER 1491

Figure 3

Sample Demographics

	Valdez	Cordova
Mean Age	41.5	36.9
SD	11.4	8.03
Race		
Caucasian	96%	97%
Education		
High School	38%	35%
2 yr. College	36%	35%
4 yr. College	14%	14%
Graduate Degree	14%	14%
Years in Alaska		
Mean	16.5	13.7
SD	7.6	7.6
Annual Income		
Mean	$60,933.00	$63,200.00
Marital Status		
Married	68%	70%

Figure 4

Occupation

BAR GRAPH OF VARIABLE OCCUP , N = 50 VALDEZ

VALUE	COUNT	PERCENT
1.000	2	4.00
2.000	7	14.00
3.000	6	12.00
4.000	5	10.00
5.000	3	6.00
6.000	8	16.00
7.000	3	6.00
8.000	16	32.00

BAR GRAPH OF VARIABLE OCCUP , N = 43 CORDOVA

VALUE	COUNT	PERCENT
1.000	6	13.95
2.000	2	4.65
3.000	1	2.33
5.000	14	32.56
6.000	4	9.30
7.000	4	9.30
8.000	12	27.91

KEY:

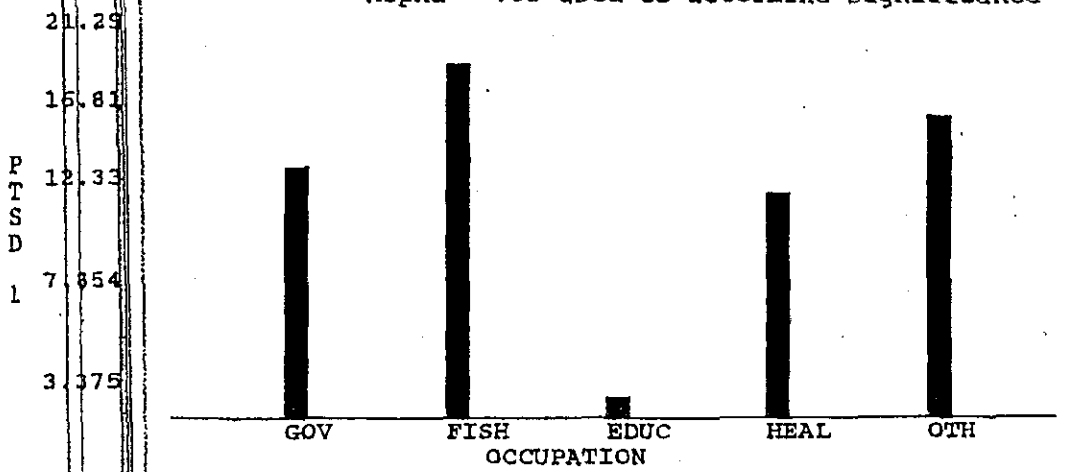
1. Federal Government
2. State Government
3. Local Government
4. Oil Industry
5. Fishing Industry
6. Education Service
7. Health Service
8. Other

Figure 5

Comparisons Test of Reaction Index Scores and Occupation

CORDOVA

Alpha = .05 used to determine significance



VALDEZ

Alpha = .05 used to determine significance

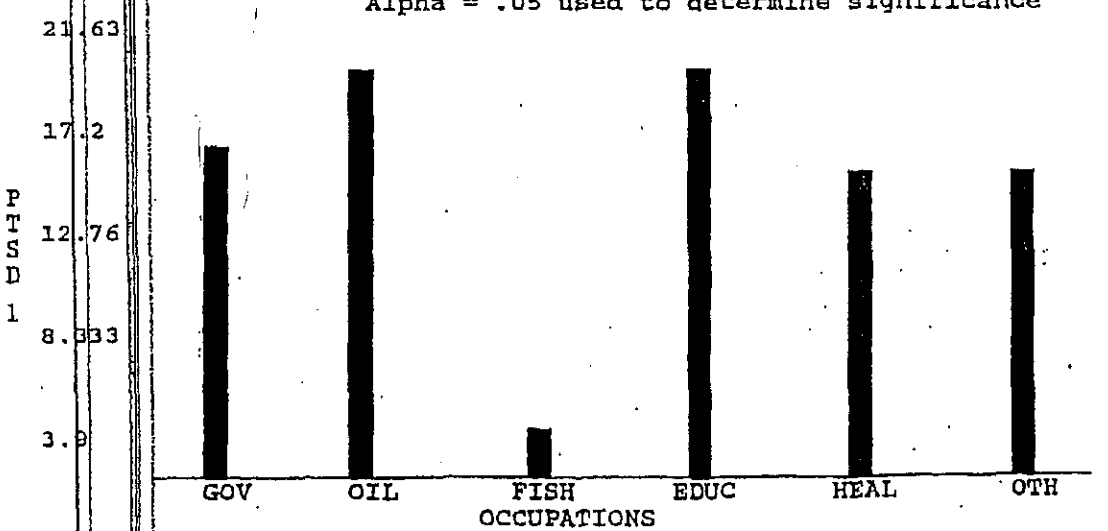


Figure 6

Scale Mean Scores

TOTAL OBSERVATIONS: 50 VALDEZ

	PSS1	PSS2	PSS3	CESD1	CESD2
# OF CASES	50	50	50	50	50
MINIMUM	6.000	6.000	1.000	0.000	0.000
MAXIMUM	18.000	18.000	18.000	25.000	48.000
MEAN	15.260	15.360	15.140	6.480	10.160
STANDARD DEV	2.481	3.135	3.326	6.494	10.473

	CESD3	PTSD1	PTSD2	PTSD3
# OF CASES	50	50	50	50
MINIMUM	0.000	0.000	0.000	0.000
MAXIMUM	24.000	51.000	57.000	51.000
MEAN	8.580	15.640	13.180	10.760
STANDARD DEV	7.451	13.161	12.705	11.242

TOTAL OBSERVATIONS: 43 CORDOVA

	PSS1	PSS2	PSS3	CESD1	CESD2
# OF CASES	43	43	43	43	43
MINIMUM	8.000	9.000	11.000	0.000	0.000
MAXIMUM	18.000	18.000	18.000	44.000	31.000
MEAN	15.093	15.326	15.233	9.023	8.884
STANDARD DEV	2.918	3.220	2.635	10.143	6.780

	CESD3	PTSD1	PTSD2	PTSD3
# OF CASES	43	43	43	43
MINIMUM	0.000	0.000	0.000	0.000
MAXIMUM	34.000	49.000	47.000	43.000
MEAN	9.326	16.721	15.442	14.930
STANDARD DEV	7.574	14.141	11.506	12.281

VALDEZ

DEP VAR: PTSD1 N: 50 MULTIPLE R: .438 SQUARED MULTIPLE R: .192
ADJUSTED SQUARED MULTIPLE R: .175 STANDARD ERROR OF ESTIMATE: 11.952

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	9.884	2.400	0.000	.	4.118	0.000
CESD1	0.888	0.263	0.438	1.000	3.379	0.001

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	1630.586	1	1630.586	11.414	0.001
RESIDUAL	6856.934	48	142.853		

ANOVA Reaction Index/Depression
Valdez

Figure 7

33

DEP VAR: PTSD2 N: 50 MULTIPLE R: .685 SQUARED MULTIPLE R: .469
ADJUSTED SQUARED MULTIPLE R: .458 STANDARD ERROR OF ESTIMATE: 9.355

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	4.741	1.852	0.000	.	2.559	0.014
CESD2	0.831	0.128	0.685	1.000	6.510	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	3708.527	1	3708.527	42.375	0.000
RESIDUAL	4200.853	48	87.518		

SER 1496

CORDOVA

DEP VAR: PTSD1 N: 43 MULTIPLE R: .398 SQUARED MULTIPLE R: .158
ADJUSTED SQUARED MULTIPLE R: .138 STANDARD ERROR OF ESTIMATE: 13.135

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	11.719	2.694	0.000	.	4.349	0.000
CESD1	0.554	0.200	0.398	1.000	2.775	0.008

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	1327.793	1	1327.793	7.699	0.008
RESIDUAL	7070.858	41	172.460		

DEP VAR: PTSD3 N: 43 MULTIPLE R: .317 SQUARED MULTIPLE R: .101
ADJUSTED SQUARED MULTIPLE R: .079 STANDARD ERROR OF ESTIMATE: 11.787

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	10.131	2.872	0.000	.	3.528	0.001
CESD3	0.515	0.240	0.317	1.000	2.143	0.038

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	638.132	1	638.132	4.593	0.038
RESIDUAL	5696.659	41	138.943		

Figure 8

ANOVA Reaction Index/Depression
Cordova

Figure 9

ANOVA Perceived Social Support/Depression
Valdez

DEP VAR: PSS2 N: 50 MULTIPLE R: .284 SQUARED MULTIPLE R: .081
ADJUSTED SQUARED MULTIPLE R: .062 STANDARD ERROR OF ESTIMATE: 3.037

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	16.224	0.601	0.000	.	26.980	0.000
CESD2	-0.085	0.041	-0.284	1.000	-2.052	0.045

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	38.837	1	38.837	4.211	0.046
RESIDUAL	442.683	48	9.223		

DEP VAR: PSS3 N: 50 MULTIPLE R: .292 SQUARED MULTIPLE R: .086
ADJUSTED SQUARED MULTIPLE R: .066 STANDARD ERROR OF ESTIMATE: 3.213

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	16.260	0.697	0.000	.	23.324	0.000
CESD3	-0.131	0.062	-0.292	1.000	-2.118	0.039

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	46.245	1	46.345	4.488	0.039
RESIDUAL	495.675	48	10.327		

Figure 10

Oil Spill Net Earnings

BAR GRAPH OF VARIABLE SN13 , N = 50 VALDEZ

VALUE	COUNT	PERCENT
1.000	18	36.00
2.000	8	16.00
3.000	5	10.00
4.000	6	12.00
5.000	6	12.00
6.000	7	14.00

BAR GRAPH OF VARIABLE SN13 , N = 43 CORDOVA

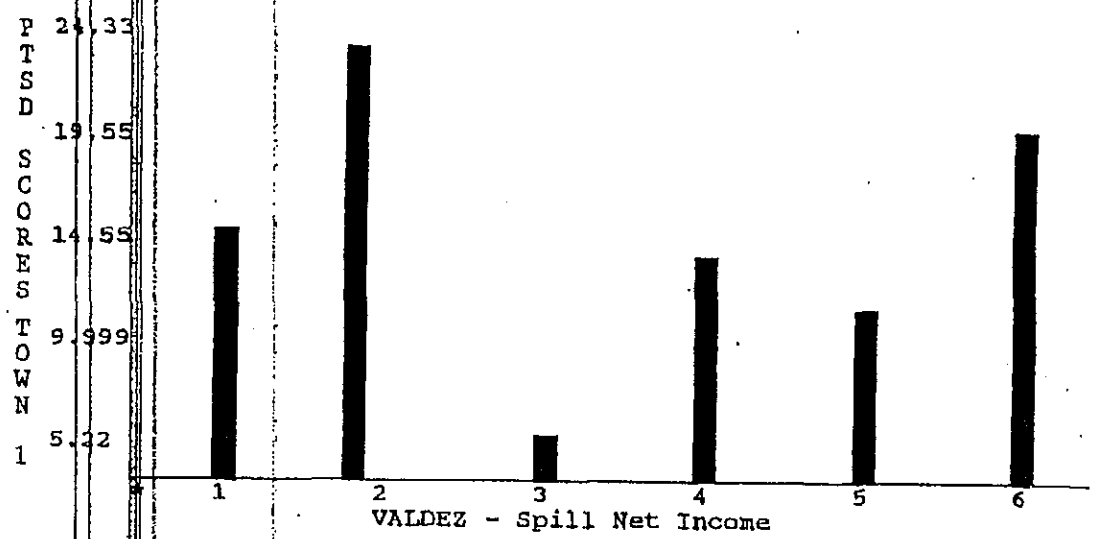
VALUE	COUNT	PERCENT
1.000	20	46.51
2.000	4	9.30
3.000	3	6.98
4.000	5	11.63
5.000	3	6.98
6.000	8	18.60

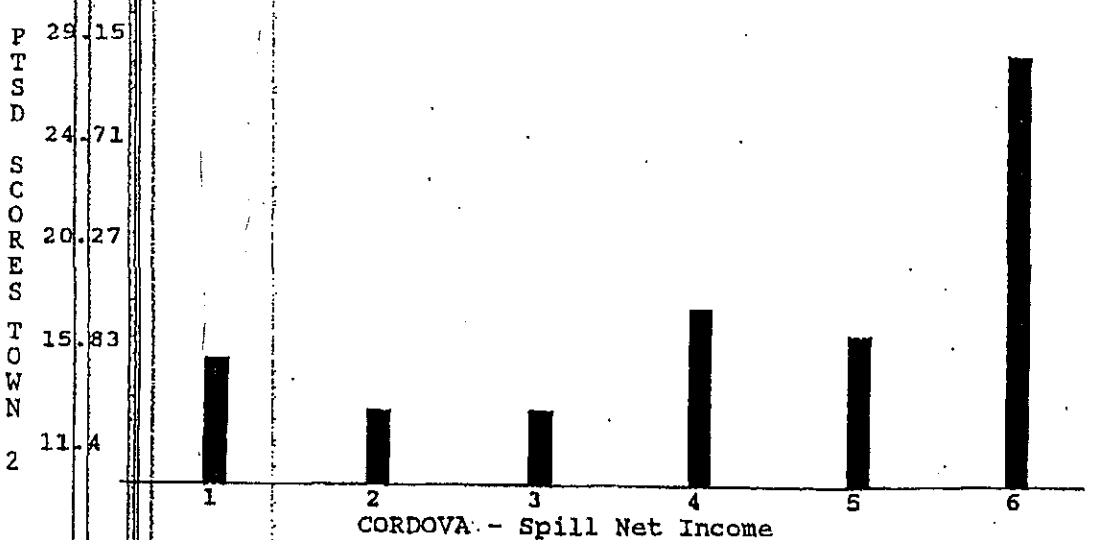
KEY:

1. $0
2. $500 - $5,000
3. $5,001 - $10,000
4. $10,001 - $25,000
5. $25,001 - $50,000
6. $50,001 +

Figure 11

Comparisons Test of Reaction Index Scores and Spill Net Earnings





*See Key Figure 10

Appendix A

May 15, 1989

Dear Prince William Sound Resident:

You have been chosen by random selection technique from the voters registration list as a candidate for participation in an area mental health needs assessment.

We are offering $25.00 to participants who complete and return the enclosed simple survey as well as two (2) other brief surveys that will be mailed to participants during the next ten (10) months.

We guarantee anonymity and confidentiality of your responses. Code numbers are being used and no one will be able to identify your response. We are only interested in a general assessment of the population not individual symptoms.

Your participation in this study is entirely voluntary. We encourage your participation and the $25.00 payment will only be paid to participants who return all three completed surveys, but the decision to begin the study or to drop-out at anytime, for any reason, is strictly yours.

This study is being conducted by the Valdez Counseling Center in cooperation with the Cordova Mental Health Center.

The Valdez Counseling Center will happily address any questions or concerns you may have regarding the study.

To become a participant simply complete the enclosed questionnaire seal the questionnaire in the enclosed stamped, addressed envelope and mail it no later than May 27, 1989.

Thank you for your time and consideration.

Sincerely,

Richard G. Cook, MSW
Study Coordinator

Rose Fong Bixby, MSW, ACSW
Study Coordinator

SER 1501

VALDEZ COUNSELING CENTER P.O. BOX 1050 VALDEZ, ALASKA 99686 (907) 835-2838

Appendix B

PERCIEVED SOCIAL SUPPORT SCALE

These questions are about other people in your life. For each statement, please mark an X in the box that best describes you. Answers should be: definitely (true/false) or probably (true/false).

	DEF True	PROB True	PROB False	DEF False
1. There are several people that I trust to help solve my problems.	___	___	___	___
2. There is no one that I feel comfortable talking to about intimate personal problems.	___	___	___	___
3. There really is no one who can give me an objective view of how I'm handling my problems.	___	___	___	___
4. If I were sick and needed someone to take me to the doctor, I would have trouble finding someone. Is this...	___	___	___	___
5. If I needed a place to stay for a week because of an emergency I could easily find someone who would put me up.	___	___	___	___
6. I feel that there is no one I can share my most private worries and fears with.	___	___	___	___

Appendix C

CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE

Now, please mark an X in the box with the statement which best describes how often you felt or behaved this way - DURING THE PAST WEEK.

		Rarely or None of the Time (Less than 1 Day)	Some or Little of the Time (1-2 Days)	Occasionally or Moderate Amt. of Time (3-4 Days)	Most All of the Time (5-7 Days)
7.	I was bothered by things that usually don't bother me.				
8.	I did not feel like eating; my appetite was poor.				
9.	I felt that I could not shake off the blues even with help from my family or friends.				
10.	I felt that I was just as good as other people.				
11.	I had trouble keeping my mind on what I was doing.				
12.	I was depressed.				
13.	I felt that everything I did was an effort.				
14.	I felt hopeful about the future.				
15.	I thought my life had been a failure.				
16.	I felt fearful.				
17.	My sleep was restless.				
18.	I was happy.				
19.	I talked less than usual.				

20. I felt lonely.
21. People were unfriendly.
22. I enjoyed life.
23. I had crying spells.
24. I felt sad.
25. I felt that people disliked me.
26. I could not "get going".

Appendix D

FREDERICK REACTION INDEX SCALE
(Copyright 1988 - used with permission)

The following questions concern your reaction to the March 24, 1989, grounding of the tanker Exxon Valdez and consequent oil spill. We are interested in ascertaining your feelings. WITHIN THE LAST MONTH,

	None of the Time (0)	A Little of Time (1x in 10 -14 days)	Some of the Time (1x in 5 -10 days)	Much of the Time (1x in 2 -5 days)	Most of theTime (more than 3 days/wk
27. I believe my exposure to the oil spill was an extreme stressor that could cause emotional problems in most people.					
28. Fears of personal experiences with the oil spill continue in my mind.					
29. I re-experience disturbing scenes about the oil spill physically or emotionally.					
30. Uncomfortable thoughts about my experiences in the oil spill seem to invade my mind in spite of my efforts to keep them out.					
31. Dreams about the oil spill experience keep coming back.					
32. I see or think of something that makes me feel as if my oil spill experiences are about to happen again.					
33. I keep an interest in activities that were important before the oil spill such as sports or playing cards with a group, reading, visiting friends.					
... Fears about the oil spill have left me numb and emotionally unfeeling.					

35. I am now more detached and less involved with other people than I was before the oil spill.					
36. I express emotions and feelings as freely as I did before the oil spill.					
37. I am jumpy, edgy, and more easily startled than before the oil spill.					
38. I sleep well.					
39. I feel bad or guilty that I didn't do more to try to prevent what happened or went through less than others.					
40. I remember things as well as I did before it happened.					
41. My concentration is as good as it was before.					
42. I tend to avoid activities which might make me remember my experiences related to the oil spill.					
43. When something resembles the oil spill or reminds me of the oil spill, feelings of distress increase.					
44. Feelings of distress about the oil spill occur.					
45. I am relaxed and without tension when I think of the oil spill.					
46. It is as easy for me to make decisions as it was before the oil spill.					

Appendix E

REACTION INDEX (Form R) ADULT

Score		Percent of Time	Daily/Weekly Approximations
0	None	Zero	Zero
1	Little	Less than 15%	Once in 10 - 14 days
2	Some	15 - 30%	Once in 5 - 10 days
3	Much	30 - 50%	Once in 2 - 5 days
4	Most	More than 50%	More than 3 days per week

Items 7,10,12,14,15,19,20 are scored in reverse order, i.e. 4, 3, 2, 1, 0; all others are scored as listed 0, 1, 2, 3, 4.

Measure of Post Traumatic Stress Disorder (PTSD) from the REACTION INDEX

RAW SCORE	DEGREE OF DISORDER
Less than 12	Doubtful
12 - 24	Mild
25 - 38	Moderate
48 - 52	Severe
More than 52	Very Severe

Scoring should not be listed so that the subject can read the numbers nor any terms relating to Degree of Disorder. This helps to preclude any *halo* effect or implied interpretation by the subject.

Instructions should include providing the subject with information relating to percent of time feelings occurred within the last month, preferably within a month after the traumatic event.

Only items 1 through 20 are scored and contribute to the degree of stress listed above. Other items are informational and assist in determining type of disturbance, e.g. acute, chronic or delayed.

Correlation is .95 with established cases of PTSD from a variety of stressors.

REACTION INDEX SCALE DEVELOPED BY
DR. CALVIN J. FREDERICK

Appendix F

MEDICAL PROBLEM/HELP SEEKING BEHAVIOR SCALE

Please check appropriate letter/s to these questions:

During what period/s have you been in a hospital?

___ a) past month
___ b) three months
___ c) six months
___ d) past year
___ e) more than a year
___ f) never

Within what period/s did you last consult a doctor?

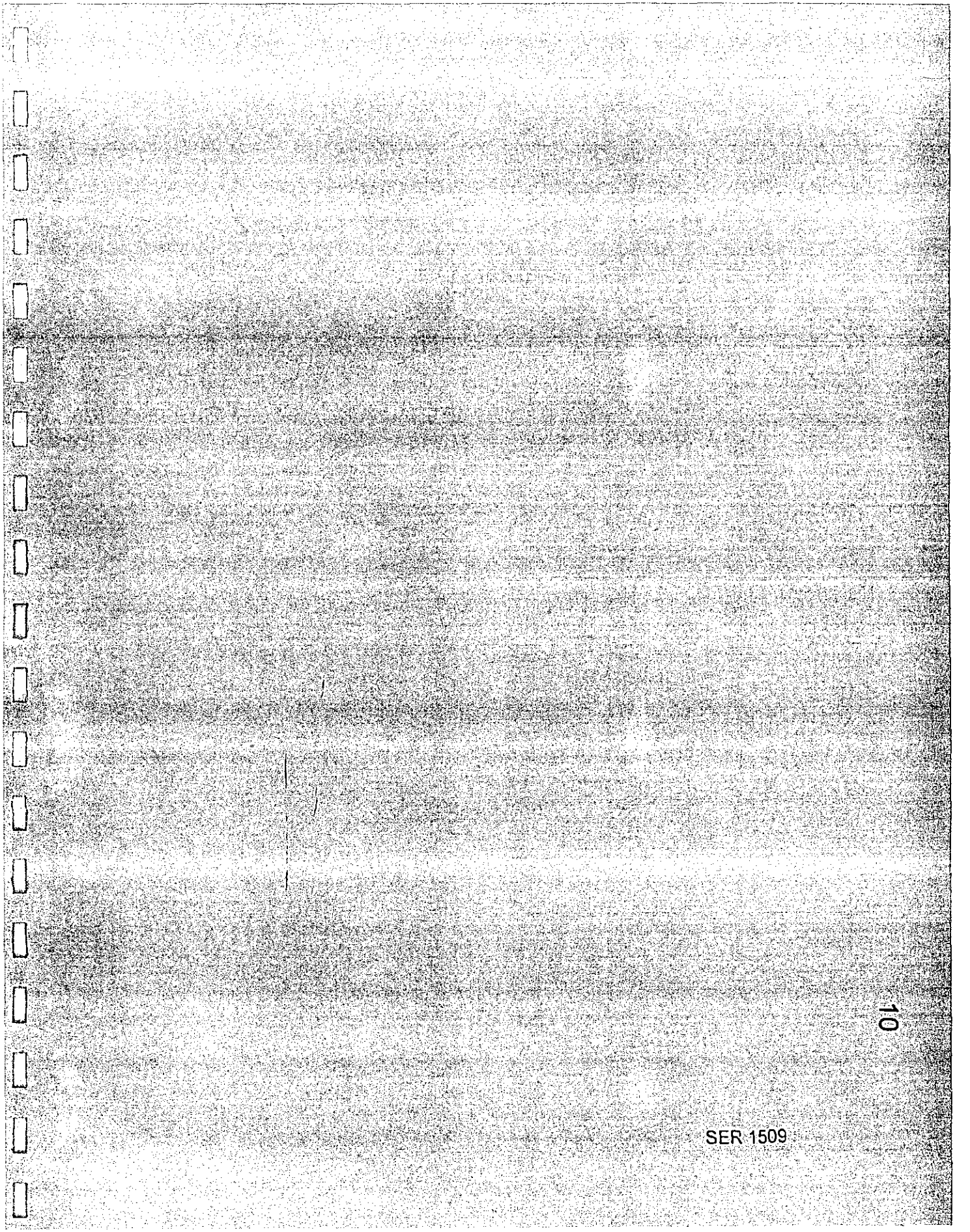
___ a) past month
___ b) three months
___ c) six months
___ d) past year
___ e) more than a year
___ f) never

Within what period/s have you received a prescription for any medication?

___ a) past month
___ b) three months
___ c) six months
___ d) past year
___ e) more than a year
___ f) never

Have you seen anyone (clergyman, physician, mental health worker) for marital or emotional problems?

___ a) past month
___ b) three months
___ c) six months
___ d) past year
___ e) more than a year
___ f) never



TRADITION LOSS AS SECONDARY DISASTER: LONG-TERM CULTURAL IMPACTS OF THE EXXON VALDEZ OIL SPILL

CHRISTOPHER L. DYER
Department of Sociology and Anthropology, University of South Alabama

This article presents a qualitative analysis of the cultural impacts of the Exxon Valdez oil spill of March 24, 1989. The focus of the article is on Alaska Natives in Cordova, Alaska. The analysis uses a conceptual framework contrasting community worldviews of the Dominant Social Paradigm (DSP) and the Natural Resource Community (NRC). Data reveal incipient cultural impacts from the spill that can evolve into tradition loss. These include decline of sharing and social support networks, decline in subsistence activities, and disruption of communal control of local natural resources. It is recommended that proactive incorporation of culturally appropriate responses to disasters become a priority of multinational corporations and their regulatory agencies.

So, how do you like our country—Alaska?
—Eyak Village Elder, Cordova, Alaska

The study of the social impacts of disasters has received much attention in recent years. Out of this research has come the recognition that disasters can have enduring impacts on

This article is a revised version of a paper presented at the 1992 meeting of the Southern Sociological Society, in New Orleans, LA, 1992. Funds for this research were provided by grants from the National Science Foundation (DDP-9101093) and the Natural Hazards Research and Application Information Center, University of Colorado (Boulder). This research also was supported by resources provided by the Coastal Research and Development Institute, University of South Alabama, the Social Science Research Center, and the Mississippi Agricultural and Forestry Experiment Station (Project #MIS-4315; Duane A. Gill project leader), Mississippi State University, and the Fisheries Art Collective, Santa Cruz, California. Special thanks are extended to Bob Shipp, Brad Davis, Patience Faulkner, Marilyn Marsanskis, and Dana Linderer for their respective contributions. J. Steve Picou and Duane A. Gill are extended special thanks for their editorial suggestions and scholarly support. Data for this research were collected by the research team of J. Steve Picou, Christopher L. Dyer, and Duane A. Gill.

SOCIOLOGICAL SPECTRUM, 13:65-88, 1993
0273-2173/93 $10.00 + .00

human communities (Baum et al. 1982, 1983; Bogard 1989; Couch and Kroll-Smith 1985, 1991; Edelstein 1988; Gill and Picou 1989, 1991; Kroll-Smith and Couch 1989, 1990; Omohundro 1982; Picou et al. Forthcoming; Ridington 1982; Shirvastava 1987). These impacts can include mental health outcomes and social network disruptions that persist long after the event and have the potential to alter the traditional character of an affected community (Freudenberg and Jones 1991). Erickson (1976) identified the enduring social impacts that arise from disasters as "secondary disasters." One aspect of "secondary disasters" that has been relatively overlooked are those impacts that are explicitly cultural, rather than social, in nature (Curtis 1992; Ridington 1982).

This article examines the cultural impacts of the Exxon Valdez oil spill of March 1989 on the Natural Resource Community (NRC) of Cordova, Alaska. The oil spill is considered a technological disaster, having potential long-term impacts on NRCs in the affected area. The affected area included western Prince William Sound (PWS) and communities out to Kodiak Island. Cordova was not directly oiled by the spill, but was affected due to its reliance on commercial fishing and subsistence. An NRC is defined as a population of individuals living within a bounded area whose primary existence depends on the utilization of renewable natural resources (Dyer et al. 1992). A case is made that culture and, ultimately, tradition loss are outcomes of technological disaster, and that such impacts have not been identified or delineated from more apparent social impacts. Understanding cultural impacts is crucial to mitigation efforts following disasters. Cultural understanding is particularly important given the expansion of first-world technology into third-world settings, which may increase the potential for technological disaster (Bogard 1989; Shirvastava 1987).

Although the communities of Prince William Sound are within the polity of the United States, they remain culturally unique in their utilization of natural resources (Dyer et al. 1992). Emphasis on sustainable resource utilization patterns, sharing of subsistence resources, and communal protection and enhancement of local natural resources are traditional to Native villages and fishing communities in Prince William Sound. The last 20 years have seen Alaska's reliance on renew-

able (subsistence) resources fused to a dependence on the oil industry (Kruse 1991).

Cultural dependence, arising from a subsistence tradition, prevails for both Native and non-Native groups that utilize natural resources. Picou et al. (Forthcoming) documented that "cultural values unique to natural resource community membership may influence the longitudinal pattern observed for disruption and stress" (p. ?). Kruse (1991) noted that exposure to cash income is not sufficient to alter patterns of subsistence use. In fact, the "psychic income" (Neal 1971) generated from such cultural activity outweighs the cash income lost participating in the subsistence culture option (Kruse 1991).

Differences in natural resource use and attitudes/perceptions of environment have a cultural basis. Alaska NRC residents follow a different tradition of resource use than residents of Dominant Social Paradigm (DSP) communities of the continental United States. Explicating such differences provides a better understanding of the potential cultural impacts of a technological disaster like the Exxon Valdez oil spill.

This article presents perceptions of the Exxon Valdez oil spill and its impact on culture and traditions. Perceptions of individuals in key occupational roles, Native elders, and those following a subsistence tradition are presented. These perceptions are contrasted with historical and oral history information to describe the process of accelerated cultural change and potential tradition loss represented by the Exxon Valdez oil spill.

CULTURE, TRADITION, AND SOCIAL BEHAVIOR

It has been proposed that an NRC is a culturally distinct entity, with core traditions linked to natural resource utilization (Dyer et al. 1992). Culture is a synchronic phenomena, and it is socially realized as the transmission of learned information between individuals. In an NRC, this is exemplified by learned social behaviors of commercial and subsistence fishing, hunting, and gathering. Social transmission of this cultural information across generations results in traditions. Traditions are culturally adaptive options that allow for social and biological reproduction. Traditions, as selected options, entail an invest-

ment in livelihood, both economic and social. This investment creates a resistance to social and cultural change that would threaten the basis of livelihood—natural resources. Those traditions protecting the resource base are highly adaptive and resistant to change. These "core traditions" are the essence of transgenerational community, and provide for stability of community through time (Figure 1).

Dependence on natural resources limits the occupational roles of community members and can intensify the process of cultural assimilation for new members. Assimilation effectively

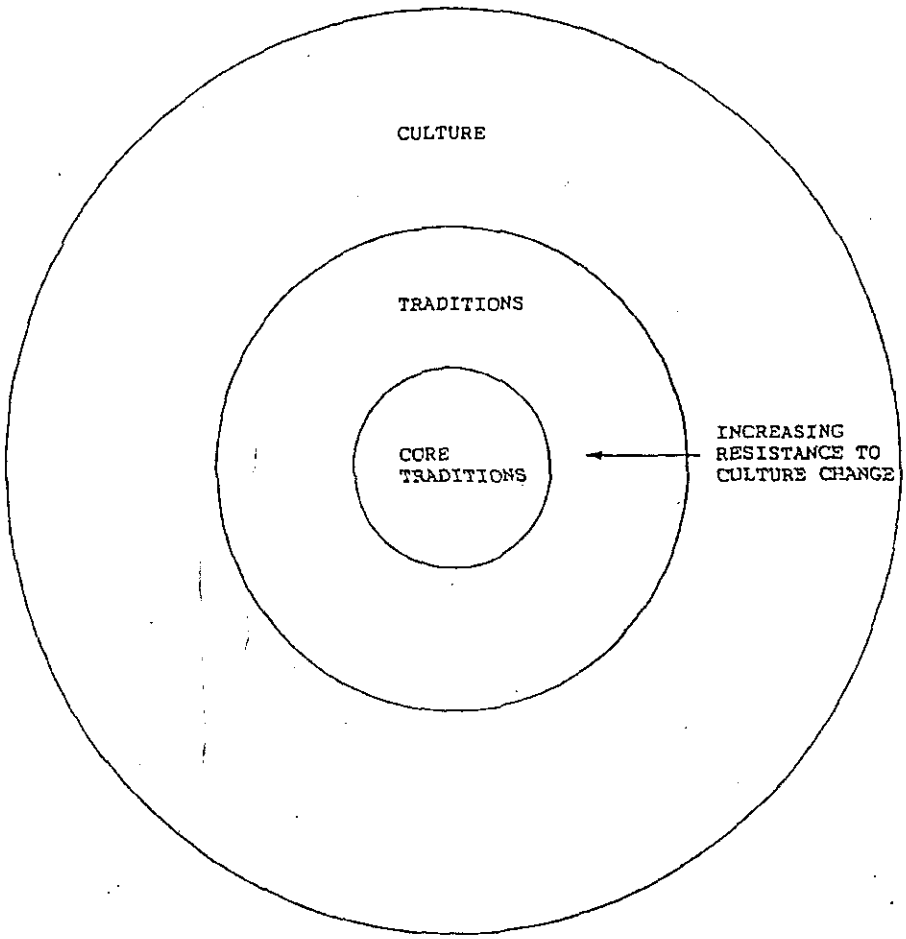


FIGURE 1. Relationship between culture, traditions, and core traditions.

disintegrates the boundaries of metaphysical dominion between humans and their environment. An effective state of environmental awareness for community residents is generated in its place. The occupational roles of resource extraction define NRC residents as extensions of their environment. Alaskan Natives most explicitly achieve this state:

> The environment is not for the Tlingit, simply the land and sea with natural resources to be exploited. It is, as we shall see, much more a community of living beings, where the lines which we draw between man and beast or between the animate and the inanimate are blurred or do not exist. (De Laguna 1972, p. 211)

The identified human–nature relationship existing in NRCs can be linked conceptually to the ecological-symbolic approach (Kroll-Smith and Couch 1991). This approach recognizes the existence of culturally based responses to environmental disruptions. Its basic tenets are: "(1) people exist in exchange relationships with their built, modified, and biophysical environments" and "(2) disruptions in the ordered relationship between individuals, groups, and communities, and their built, modified, and natural environments are labeled and responded to as hazards and disasters" (Kroll-Smith and Couch 1991, p. 361).

Practical and symbolic association with natural resources becomes a part of residents' patterned activities. An appropriate example of an ecological-symbolic connection in Cordova is the Iceworm festival. This winter event (February) is Cordova's answer to the Chinese New Year and Fourth of July combined. It brings together out-of-town relatives and those unable to celebrate the Fourth of July because of fishing activities. The focal attraction is a dragon-like representation of an Iceworm, which is paraded down the main street to the cheers of onlookers. Design of the Iceworm, a representation of a local marine polychaete, varies from year to year, but it symbolizes the relationship between the occupational community and the marine environment. This example of symbolic-ecological expression has persisted as tradition through several generations of Cordovans, providing a reification of community and family during the harsh Alaskan winter.

CULTURE EXTINCTION AS DIACHRONIC DISASTER

Although disasters, in their immediate form, provide rapid potential for tradition loss or cultural extinction (Kroll-Smith and Couch 1991), other factors arising from tradition conflict have occurred as "diachronic" (historical) disaster. This inverse cultural perspective on disaster allows us to appreciate the cultural extinction that has plagued Native American populations for centuries. That such events may be prolonged does not detract from their disastrous impacts, with those impacted being recognizably "victimized" (Bodley 1991).

There is a degree of cultural continuity between the NRCs of contemporary Alaska and those impacted Native American communities, which have suffered from the European pattern of technology induced dominance over the last several centuries. A variety of cultural indicators can identify a more prolonged disaster scenario for many Native American communities. For example, loss of linguistic diversity is an indicator of culture genocide, and about half of Native American languages spoken north of the Rio Grande are now extinct (McNickle 1962). Cultural and biological extinction coincide, and declines in North American Native populations following contact generally reach 75% (Dodyns 1966; Ewers 1973; McNickle 1962; Schlesier 1976). Complete "extinction" of Indian cultures, such as the Delaware Nation (Mooney 1911), Illinois (Blasingham 1956), Erie (White 1978), and others, follows the systematic expansion of European culture across the North American continent.

Congressional actions, such as the Indian Removal Act of 1830, the Dawes Act of 1887 promoting assimilation, and a resolution to eliminate established reservations for some tribes, are further examples (Spicer 1982). Presently, the Alaska Native Claims Settlement Act (ANCSA) of 1972 threatens native culture by eliminating Native communities' control over local resources (Flanders 1989).

PARADIGMS OF COMMUNITY IN CONFLICT

In Prince William Sound, the NRC has come in conflict with the established paradigm of utilization that drives the production economy. This production economy is fostered by a

strong anthropocentric tradition in Western culture that emphasizes humans' separation from nature, as if the human species was immune from ecological constraints. The Eurochristian ideal of dominance has been accelerated by a reliance on machines, science, and technological capabilities. This high-production economy must absorb natural resources to keep its technological engine running. When such a worldview comes in contact with an NRC worldview, conflict is inevitable. The foundation of conflict is the Dominant Social Paradigm (DSP) worldview (Catton and Dunlap 1980). Its characteristics are:

1. People are fundamentally different from all other creatures on earth over which they have domination.
2. People are masters of their destiny; they can choose their goals and learn to do whatever is necessary to achieve them.
3. The world is vast, and thus provides unlimited opportunities for humans.
4. The history of humanity is one of progress, for every problem there is a solution, and thus progress need never cease.

The DSP creates a worldview that cultural change, as represented by technological change, is equated with "progress" (i.e., is perceived as intrinsically good) (Bodley 1991). This change is promoted by nonrenewable (industrial) resource development. The potential for technological disasters and natural resource destruction from such development presents hazards and risks for communities (Bogard 1989; Couch and Kroll-Smith 1991; Douglas and Wildavsky 1982). The potential cultural consequences from these types of impacts can lead to social and psychological pathology that can destroy an NRC community (Shkilnyk 1985). As Curtis (1992) remarked: "With the passage of new generations, the cultural identity of severely impacted communities or tribes may be lost and the process of cultural extinction complete" (p. 68).

The DSP community relies on nonrenewable natural resources. It is this reliance that creates the potential for technological disaster. On the other end of the spectrum, the NRC relies on renewable natural resources. Culture, traditions, and social behavior are structured around this reliance. Yet, it is this very reliance that makes the NRC extremely fragile in the face

of technological disaster. The hazards and risks involved carry the potential of cultural extinction, which is "an irreversible risk that prompts strong risk-aversion strategies and behaviors that must be understood in their cultural context" (Curtis 1992, p. 68). The outcomes of a technological disaster can be better comprehended by contrasting the characteristics of the DSP community with the NRC. NRC characteristics are as follows:

1. Residents of NRCs are strongly linked to their resource base by traditions that integrate them into the natural order.
2. To the extent that cultural activities may destroy renewable natural resources, NRC residents practice folk management of resources to maintain their sustainability.
3. Because natural resources are utilized and renewed within bounded areas, they are viewed as limited and limiting in the variety of opportunities they provide their human stewards.
4. Progress is resisted to the extent that it threatens the sustainability of core traditions and the natural resource base on which they are structured.

Interactional characteristics of an NRC foster social networks based on kinship and cooperative social ties. Although impersonal social contracts predominate between residents and outside organizations, they are not prominent within the community. Extended networks of family and worker relationships (e.g., fishing crews) allow for intense cooperative interaction in the occupational roles of natural resource extraction.

By comparison, a DSP community relies heavily on social contracts both within and without the community. A social contract can be defined as "a voluntary and mutual agreement to engage in purposefully limited cooperative endeavor" (Hillery 1977, p. 52). Emphasis on "social contract" versus "social relationship" can limit the degree of traditional stewardship expressed toward other components of environment (e.g., natural resources). Thus, a symbolic "ecology" consciousness (Kroll-Smith and Couch 1991), which results in an environmental awareness vis-á-vis natural resource utilization, is absent in the DSP. This detachment from resource and environment allows for unchecked utilization (i.e., high short-term productivity).

In an NRC, personal knowledge of all or most residents is

a characteristic flowing from cooperative social ties. This follows from Mead's (1979) definition of a village as a "bounded group of people who know each other . . . " (p. 3). Indeed, most of the more than 3 billion village residents in the world, representing the most persistent form of human organization, could be classified as some variant of the NRC model.

One could argue that a model of environmental community already has been generated. Milbrath (1984) proposed that a valid dichotomy exists between the traditional momentum driving the DSP and the perspective of contemporary environmentalism. This perspective has been labeled the "New Environmental Paradigm" (NEP) (Catton and Dunlap 1980; Dunlap and Van Liere 1978; Pirages and Ehrlich 1974). The NEP represents a partial shift toward the NRC paradigm, although it does not entail a total rejection of DSP values. Instead, it proposes a compromise position, including "subdued production and consumption, conservation of resources, protection of the environment, and the basic values of compassion, justice, and quality of life" (Milbrath 1984, p. 14).

Environmentalists place high value on "nature" and empathy toward "other species, other peoples, and other generations" (Milbrath 1984, p. 21). Humans must "adapt" to growth limits. This adaptation is realized through conservation of natural resources. However, the environmentalist perspective does not necessarily shift the basic pattern of resource utilization of its proponents. One can be environmentally active by saving the whales, but can still drive an expensive gas guzzler and contribute tons of waste to a landfill throughout a lifetime.

Environmental awareness springs from a direct, intimate reliance on the surrounding environment. Adaptation in an NRC comes from extraction of immediately available natural resources. Environmental awareness is adaptive in an NRC, in that it promotes sustainability of both lifestyle and resources.

To promote sustainability of the NEP perspective, environmentalists compete with an already established paradigm of community, the DSP. The DSP largely determines the political economy of the wider society. To effect change, NEP proponents must work from within this political economy. As such, they become institutionalized as a special interest group. As Yankelovich (1981) noted, "within system" groups in DSP society rarely achieve fundamental shifts in paradigms of resource

utilization. What is achieved is a dialogue between DSP and NEP supporters, which further detracts from the intent of environmental activism. As Cotgrove (1982) noted, "the protagonists face each other in a spirit of exasperation, talking past each other with mutual incomprehension. It is a dialogue of the blind talking to the deaf" (p. 33). Cotgrove (1982) argued that this lack of dialogue is due to differences in cultural perspective. I would argue that the DSP and NEP worldviews do not represent fundamental cultural differences and are not culturally different, but rather represent the range of perspectives within American monoculture regarding resource use. However, a definite cultural difference does exist when contrasting the DSP perspective with that of the NRC.

The NEP represents a shift toward values and philosophies of the NRC. This shift is only partial, because it has not yet linked the moral economy necessary to achieve environmental awareness on the level of community with the political reality of the controlling DSP. This only can occur as a slow evolutionary process (Boulding 1978; Naroll 1983) and can be stalled, or even reversed, by trends in the political economy of the DSP. In fact, recent reversals in perspectives on resource use represent a backlash that threatens existing achievements of the environmental movement (Ruben 1992).

METHODOLOGY

The Exxon Valdez oil spill occurred on March 24, 1989. The ecosystem of Prince William Sound and the surrounding area out to Kodiak Island was impacted severely. Oiled beaches, dead sea birds and mammals, disrupted fisheries, and exterminated benthic communities (crabs, starfish, urchins) were ecological consequences of the disaster. Disruption of subsistence activities, commercial fishing, and the invasion of local communities by outsiders were immediate and ongoing outcomes.

Data gathered for this article were collected from August, 1989, through August, 1991, during the summer fishing seasons in Cordova. Alaskan Natives, individuals occupying key occupational roles, and those intimately involved with, and impacted by, the oil spill and its aftermath were interviewed. Collective perceptions and individual recollections were gathered and analyzed, with a focus on social and cultural change. These

were supplemented by historical records, newspaper articles, and published research of other social scientists.

Informants were identified in the Native community through a social networking technique. This was necessary because Natives are not distributed randomly in Cordova, and comprise only 20% of the resident population of approximately 2,500. Occupational role informants were identified by their participation in specific occupational populations, and key informants by their social status as community leaders. Taped formal interviews, informal conversations, and written documents were the source of quotes presented in this article.

From this process, general topics were identified that relate to the four matched characteristics of natural resource communities. These are discussed within the historical framework of the oil spill event, and the nature of cultural disruption is addressed.

CHARACTERISTICS OF CULTURAL CHANGE

Identified processors of cultural change and tradition loss are structured around proposed NRC characteristics. Each characteristic is presented, followed by individual recollections and collective perceptions gathered from key informants.

Residents of NRCs are linked strongly to their resource base by traditions that integrate them into the natural order.

Fishing, subsistence, and activities supporting these traditions provide the primary means of cultural existence. Anything threatening the resource can thus threaten the very core of community survival.

> Fishing is the only game in town here. Cordova . . . is like a goldfish bowl because of [its] reliance on fishing. The problem is, if you put something in a goldfish bowl, it's easy to kill the goldfish. They have nowhere to go. (Cordova resident)

Besides commercial fishing, reliance on subsistence supports both Natives and non-Natives in activities that link residents to cycles of nature. Subsistence hunting and gathering are culturally significant activities that bring residents together

in a variety of cooperative ways. Cooperation is engendered through working together and sharing of subsistence resources within the household unit, and with others who are unable or incapable of hunting or gathering (Stratton 1989). The recognition of harvesting cycles of cultural significance can outweigh or supplement any cash income. The following is a non-Native's comment on how an oil spill threatens subsistence lifestyle.

> Living in a place like this ties you into a cyclic view of life because your daily work is tied directly from where your food and water and survival comes from. You have to be tuned into cycles of nature. For Natives, a lot of their daily work is getting food and I don't want to say that it's better than the way other people live. It's just when you have an oil spill maybe you and I can get by fine. I don't *have* to go fishing. Pay me some money and I'll go find something else. But if you live in some of these villages, and you're not used to using money so much to get your food, and all your culture is completely interwoven with the natural system—an oil spill is real trouble. (Cordova resident)

> Down through the ages we have come to understand nature's comings and goings. We are attuned to her subconsciously. There is no way around nature. We do not try to conquer nature. We live by her rules and act accordingly. Our instinct to survive keeps time with her seasons. When nature's time for fish arrive, we fish; when she says hunt, we hunt. When she says, "It's berry picking time," we pick berries joyously. (Active 1992, p. 2)

The oil spill severely disrupted the natural order, impacting subsistence activities and modifying perceptions of the resource (Dyer et al. 1992). Patterns of sharing and cooperation broke down during the oil spill cleanup, and those that came back after working on the spill cleanup had problems adjusting to a loss of cultural subsistence cycles in Cordova and other communities (Fall 1990). Outlying villages like Tatitlek and Chenega Bay were more severely impacted. These villages were oiled directly, and immediate loss of subsistence resources has led to severe cultural dysfunction.

> In Tatitlek, a brother of a local resident always brought in a seal to be shared by the village. He would land in his sea-

> plane and leave the seal on the beach for them to pick up. We flew over to Tatitlek about a week after he dropped off the seal last summer (1989). It was still on the beach where he had left it—rotting. Everyone was so drunk because of the spill crisis they hadn't even bothered with it. (Cordova resident)

The loss of subsistence resources causes breakdowns in cultural patterns of resource use and cooperative work, as well as domestic violence, severe alcoholism, and other forms of social dysfunction. Shortly after the rotting seal episode, a 12 year old in the same community was killed by a self-inflicted shotgun wound to the head. This resulted in a "ban" on alcohol use, but drug abuse and domestic problems, including sexual abuse of minors, are still a legacy of the oil spill in some Native villages.

Activities in the NRCs of Prince William Sound traditionally have been directed at conservation and stewardship of natural resources. As the second characteristic states: *To the extent cultural activities may destroy renewable natural resources, NRC residents' folk manage resources to maintain their sustainability.*

For years, Cordovans have been folk managers of their natural resources. The Prince William Sound Aquaculture Corporation was instituted by fishermen, and fishermen donated their labor to build the first hatcheries. When the oil spill occurred, fishermen from Cordova answered the call to protect their home. Within hours, fishermen volunteers were out on the Sound trying to prevent the oil from spreading.

> When we heard of the spill, I put a call out to fishermen in the co-op, and anyone else in town to help out. The response was immediate. They didn't have to be persuaded. They were helping save their home. They had built those hatcheries with their own hands—stone by stone. Within two hours, I had forty guys heading out with their crews to try and stop the oil. (Cordova resident)

Fishermen and subsistence users base their livelihood on use of natural resources. The spill cleanup took many fishermen out of their cultural routines and into a foreign activity that gave inflated benefits. This "money spill" did not benefit everyone, for there were those whose limited, traditional occu-

pational roles did not include boat ownership or commercial crew membership.

The third characteristic is: *Because natural resources are utilized and renewed within bounded areas, they are viewed as limited and limiting in the variety of opportunities they provide their human stewards.*

The occupational roles of fishermen and subsistence hunter-gatherers link Cordovans to natural resources as stewards. Stewardship gives a sense of proprietorship that is culturally encouraged.

> Cordova is my home. When most people from the lower forty-eight talk about home, they mean their house, or maybe their town. When I say home, I mean that rock over there, that tree up on the hill. Those are all part of my home. Home is this place. With all its water, and trees, and land. When the oil spill occurred, it wasn't just the case of oil spilling on some water or beaches. It was violating our home. All of Prince William Sound—that's where we live. And we have to take care of it. (Alaskan Native, Cordova)

> We do not define ourselves by how much money we make, how much money we consume, how much we owe, how much we can change nature or how well we compete with our peers. We define ourselves to ourselves by how well we cooperate with each other, how we avoid competition, how we live in harmony with nature and how well we adapt ourselves to it. (Active 1992, p. 2)

Those who protect their home, labor as stewards, and bring in resources to their families and community gain self-worth and prestige from doing so. The fisherman or subsistence-user's success is linked to community success. Prestige amounts to privilege of access to the resource and is a form of "ownership" (Fried 1967). Referring to the distribution of resources flowing from a primary producer (owner) to the wider community, Fried (1967) commented that "ownership . . . really means that the man who fulfills the social requirements of 'owner' is the one to whom prestige will accrue as the distribution proceeds" (p. 66). From this, Ingold (1988) predicted that the concepts of ownership would be most elaborate, and the pursuit of prestige most compelling, in the societies where people were most likely to be chronically reliant on products

that others have labored to obtain, and whose procurement was backed by strong positive inducements.

Prestige was lost in the spill cleanup, and the identification of those who most benefited as "Exxon Whores" (Spillionaires) is a reflection of this. In response to the question, "Have you noted any changes in the community of Cordova, in general, since the spill?", one resident commented:

> Friends have become enemies. [There is] name calling against those associated with Exxon. [People] avoid stores, stay home and hide, feel burdens, and there are more strangers. (Cordova resident)

In the oil spill cleanup, people who labor to extract natural resources were experiencing an activity for which they gained no traditional prestige, but an inordinate amount of cash compensation. Working outside this occupational role created an anomalous status and identity for individuals. As one resident remarked: "Our proper work is fishing." Due to irregular hiring and contracting procedures, some residents received lucrative work contracts, whereas others did not. Of those that did, some had little prior prestige in the community as fishermen (i.e., they were not "highliners") (Palsson and Durrenburger 1982).

Sudden wealth created anomalous relationships between previous friends, neighbors, and working partners. The emphasis on "social contract" rather than "social relationship" fostered during the cleanup activities resulted in the permanent loss of many personal ties between residents.

> I've known "x" for years, and he was never worth very much as a fisherman. He was a good neighbor, and we used to help each other out when something needed fixing, or some work on the boat needed an extra hand. But since he made that money on the spill, he doesn't even talk to me anymore. They're building a new house even in Whiteshed, and I guess they'll be moving out all together. (Cordova resident)

An important cultural activity that has experienced accelerated deterioration since the spill is sharing (Fall 1990). Sharing is an important cultural adaptation for maintaining social relationships. Sharing ensures a distribution of resources in a seasonally harsh environment, and strengthens and reaffirms es-

tablished social relationships. Sharing of subsistence resources was common between households in Cordova prior to 1989 (Stratton 1989), and a strong tradition in years past:

> It seems like everything was so cheap in those days. Fifty dollars worth of groceries would fill this place. Now fifty dollars worth you can't even see it. There was no tax to pay. When the fishermen went out to the flats they didn't have to pay for the groceries. The canneries furnished them coal and groceries, gas. Now they won't even give you one gallon of gas. That's the way the fishermen were. They furnished everything for them. (Eyak Village elder, Cordova)

> There's a whole lot of differences in the time that I was here. You didn't have to know anybody. Everybody did everything for each other. Now you go to do it for yourself. You don't depend on anybody no more. . . . If you got hungry, there was those that would help you until you got a job. They'd know if you weren't working and it was friendly. You don't see that anymore. Of course, I still like the place. I wouldn't trade it for any other place around. I've been all over up in Alaska and Cordova is still a friendly city. (Eyak Village elder, Cordova)

Cooperative "helping" networks in both the Native and non-Native community have been weakened since the spill. Cultural values of sharing have been lost for some.

> Before the spill, we (fishermen's wives) used to get together and help each other out with childcare, and just support each other. We would get together and visit—have tea, or drink a bit. It was nice when your husbands were out fishing. After the spill, it just seemed like everybody was too busy trying to make money, or find out what was going on. Nobody felt like getting together to just socialize. Some of our husbands were making real good money, but others weren't doing so good. It made it hard to talk to each other. And we just never really have gotten back together. Some of us just don't talk to each other at all anymore. (Fisherman's wife, Cordova)

Limits on sharing of subsistence resources have been a major concern for Natives. Elderly and homebound Natives traditionally relied on younger relatives to bring them subsistence foods. When the oil spill hit, instead of engaging in subsistence, many younger Natives worked on cleanup crews. When

they came back, they had been changed by their experiences. Some had been traumatized by the environmental destruction they saw, whereas others suffered from the harsh authoritative treatment received from work supervisors.

> Most Native workers are pretty straightforward. If they have a problem they go to their supervisor to deal with it. On the cleanup, if you had a problem, and you couldn't deal with it personally, you were basically told to go away. When you internalized it, by the time you came to town you had a lot of pent up frustration. You acted out your frustrations in a negative way. You were harmful to yourself and the people around you. (Alaska Native)

In such a scenario, the breakdown of traditions of sharing and subsistence use was acknowledged by key informants.

The fourth noted characteristic of the NRC is perhaps the most telling in terms of culture change: *Progress is resisted to the extent it threatens the sustainability of core traditions and the natural resource base on which they are structured.*

The idea of "progress" in Prince William Sound has been the dominion of the oil companies since the pipeline was first proposed. Cordovan fishermen and residents voted unanimously to oppose the construction of the pipeline, and a scenario describing an oil spill was given in testimony by a fisherman in Senate hearings in 1971 (Committee on Merchant Marine and Fisheries 1971). The spill was described as being much smaller, but the location—Bligh Reef—was well predicted. Ricki Ott, a local fisherman and marine toxicologist, predicted a major spill would occur less than 24 hours before the actual event.

The major contention for fishermen has been what is the impact of the spill on our fisheries? The 1990 season was a banner harvest, yet fish returning to the Sound that year would have been unaffected by the spill. Exxon sponsored a full-page ad, referred to as "Sound Progress" in the local Cordova newspaper that summer, speaking of the fish runs. As one fisherman remarked: "It made it sound as if oil was fish fertilizer." However, 1991 was the worst fishing season on record since 1960. In some cases, fish runs did not materialize at all, or were very poor. Many fish that did show up were stunted and underweight. Fishermen commented that they looked like Dolly Var-

dens (trout) rather than "Pinks" (pink salmon) or "Dogs" (chum salmon). The failure of the fish runs could have been due to ecological factors, but the fact remains that these runs of fish were the ones that would be predicted to be "Exxon's Fish."

Cultural impacts from the "Sound Progress" arose from the "money spill" of 1989–1990 and the simultaneous disruption of the fishery runs and a collapse of the market for fish. Instead of getting an anticipated $.24 a pound for pink salmon, or even a minimal $.15–$.20 needed to break even, fishermen received $.09–$.12 a pound, depending on the quality of the fish. It was ironic that the cans used to pack the salmon were, with the exception of Copper River king salmon, worth more than the fish. Fishermen who bought new boats or houses, or who otherwise overextended themselves economically, found they were facing economic ruin.

> The fishing runs have been bad—no terrible—this year, and a lot of fishermen are going to go under. I have a friend from Seattle, he buys up boat contracts (forecloses). I haven't seen him up here in 13 years, but he has only been here a couple of days and has already foreclosed on 17 boats. The fishermen are being sunk with their own boats. (Alaskan Native)

> Even though fishing has always been a gamble as far as financial stability, now a greater factor has entered in to where our future has to be closely guarded. Meaning that we will have to save our money for future years of oil-tainted fishing and no compensation!!! (Cordova resident)

Given such strains, some of the predicted overflow of problems must be dealt with by the therapeutic community. However, assuming that this "community" also is enculturated with the values of the NRC, they must cope with their own personal loss, and cannot be as effective as they might be in the event of a natural disaster.

> People who worked on the spill are still having problems. The social service people are good at their jobs. When a social service person comes in from the outside, they're either in love with the place, or gone in 6 weeks. And when they fall in love with this place it's a love affair like something you wouldn't believe. These people were damaged by the spill, just like everybody else. They tried to cope, their

> work load went up, but it was like the hurt helping the hurt. It was very difficult for them. And we would not accept at all a stranger coming in from Fairbanks, or Juneau, or Nome, to be our social worker, and sit there and say: "Yes, I know how you feel." No, you don't know how I feel, because you were not here. You did not go through the scare, the trauma, the fright, the financial disaster. There was nothing a social worker from anywhere else can say to help us. We have got to heal from within. (Alaskan Native)

CONCLUSIONS

The Exxon Valdez oil spill was a technological disaster in a region with a traditional lifestyle distinct from the growth-driven DSP model of the continental United States. Reliance on renewable natural resources, emphasis on "sustainability" rather than "progress," and a heightened environmental awareness are cultural practices that conflict with the DSP paradigm. The spill resulted in the modification of cultural practices and perceptions of environment. Cultural changes included loss of subsistence practices, breakdown of sharing networks, and disruption of communal control of natural resources (Dyer et al. 1992; Fall 1990). Preliminary indications are that some of these cultural changes may become permanent, particularly in villages most heavily impacted by the oil, such as Chenega Bay and Tatitlik. Disruptions in Cordova are probably not as severe as in these communities.

Tradition loss as secondary disaster may be conceptualized as "cultural chaos." Secondary disasters in NRCs interfere with the ability of cultural problem-solving mechanisms to function. Because the impact on environment and resources is irreversible, either in the magnitude of supply of resources, or in the complete loss of resources such as shellfish in certain heavily oiled areas (Fall 1990), there is no way to "re-order" the symbolic-ecological relationship that has been destroyed. Cultural chaos can result, where the rules for normal behavior do not apply, and neither do the rules for coping with unexpected problems—the cultural "emergency system" (Corlin 1975). Cultural chaos is a diachronic outcome of social chaos, which has been defined as the unexpected disruption of an anticipated and culturally defined sequence of events (Aronsson 1989).

These can occur from technological or natural disasters, or from a breakdown of social or interpersonal relations (e.g., disruption of sharing networks). Technological disasters can create cultural chaos in an NRC if they do not allow for the restoration of culturally defined sequences of natural resource utilization and culturally prescribed interpersonal relations.

The study of technological disasters must include an awareness of the potential for cultural disruption—for loss of traditions in communities whose existence is threatened by pollution and loss of natural resource sustainability. In Cordova, Alaska, the core traditions being threatened are those of subsistence, resource sharing, commercial fishing, and communal control (sustainability) of local natural resource cycles. When DSP technology is imposed in culturally different environments, we must be sensitive to those differences in calculating the potential outcomes of technological disaster. What can we learn from such disasters? The community of Cordova, and surrounding Native villages, teach us that perhaps sustainability of cultural strategies of resource use is more important than immediate profits and high productivity. A quote from a Cordova resident refers to this problem:

> Those are the very problems we're faced with today and with our oil economy, how fast can we use the oil, who is making the money, and what will the generations in the future have? In analogy, there is a plot of ground, a garden, and on that land we maybe could feed a thousand people if we use fertilizer and make it enormously productive, but not for very long. In twenty years the land would be dead and the ground would be poisoned or washed away. Today we're trading our topsoil for VCRs. And we claim we're just feeding the world, but you can't. You can only do that for a short time. If your goal is, as that of indigenous people, to survive the long term, then you make sure that your effort is not compromising the environment you live in.

Recognizing cultural differences between populations subjected to the potential for technological disaster must become a priority of industrial states and corporations. Cultural integrity is particularly threatened when natural resources are impacted by a disaster event, with cultural chaos an ultimate outcome.

Preventing or mitigating cultural chaos entails a valuation

of the human and social "capital" that drives NRC productivity. Such "capital" includes skills, knowledge, social networks, and means of natural resource utilization (Freudenberg and Gramling 1992). As the destruction of natural resources proceeds, a failure to provide for maintenance of anthropogenic elements of production capacity can result in a loss of communal cohesion. Preservation of communal cohesion in the face of technological change and accompanying disaster potential has been realized elsewhere (Wybrow 1986). The challenge for residents and communities of Prince William Sound is to communicate the cultural value of a lifestyle to the DSP extraction brokers. Only by codifying this cultural integrity can it be sustained, and can culturally appropriate solutions to disaster threats be realized.

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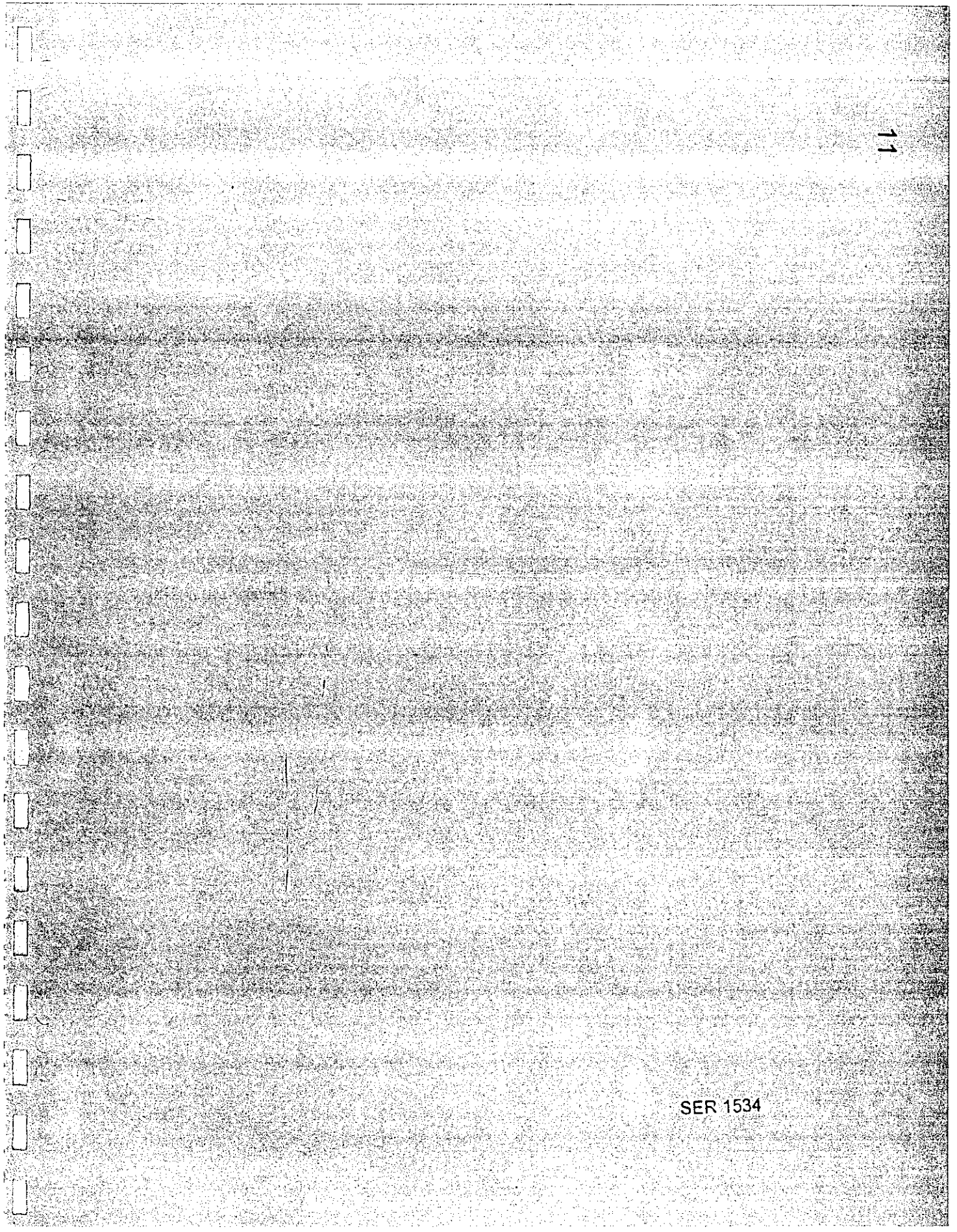


PARTIAL RELEASE

FOR AND IN CONSIDERATION of the sum of TWELVE THOUSAND SEVEN HUNDRED THIRTY SIX & NO/100 Dollars ($ 12,736.00 **) paid to the undersigned, receipt of which is hereby acknowledged, and intending to be legally bound hereby, the undersigned ABSOLUTELY AND IRREVOCABLY RELEASES and DISCHARGES, Exxon Shipping Company, Exxon Corporation, Alyeska Pipeline Service Company, their employees and agents, the M. V. EXXON VALDEZ, its officers and crew, and the Trans-Alaska Pipeline Liability Fund from all claims, demands and causes of action of every kind and character, for damages which have been or will be sustained by the undersigned, whether now known or unknown, with respect to LOSS of EARNINGS SUFFERED AS A SAC ROE HERRING PERMIT HOLDER BECAUSE OF THE CANCELLATION of THE 1989 PRINCE WILLIAM SOUND SAC ROE HERRING FISHING SEASON WHICH SAID LOSS CAME

as a result of the incident involving the EXXON VALDEZ on March 24, 1989 or as a result of any oil containment or clean-up procedures which followed. The undersigned expressly excepts and reserves all claims, damands and causes of action of every kind and character, other than that released by this Partial Release, resulting from the incident involving the EXXON VALDEZ or as a result of any oil containment or clean-up procedures which followed.

SER 1535

EXHIBIT 11 9000687

The sum stated above is accepted by the undersigned in full settlement of the claim described above. The undersigned understands that this sum was agreed upon as a compromise settlement and is not an admission of liability by any party. In consideration of the payment stated above the undersigned assigns to Exxon Shipping Company any claim which the undersigned may have in respect to the claim described above against any person, corporation or governmental agency, including those named above, and any liability fund that may be available for the payment of damage claims.

Executed this 10 day of May, 19 89.

Witness: _____

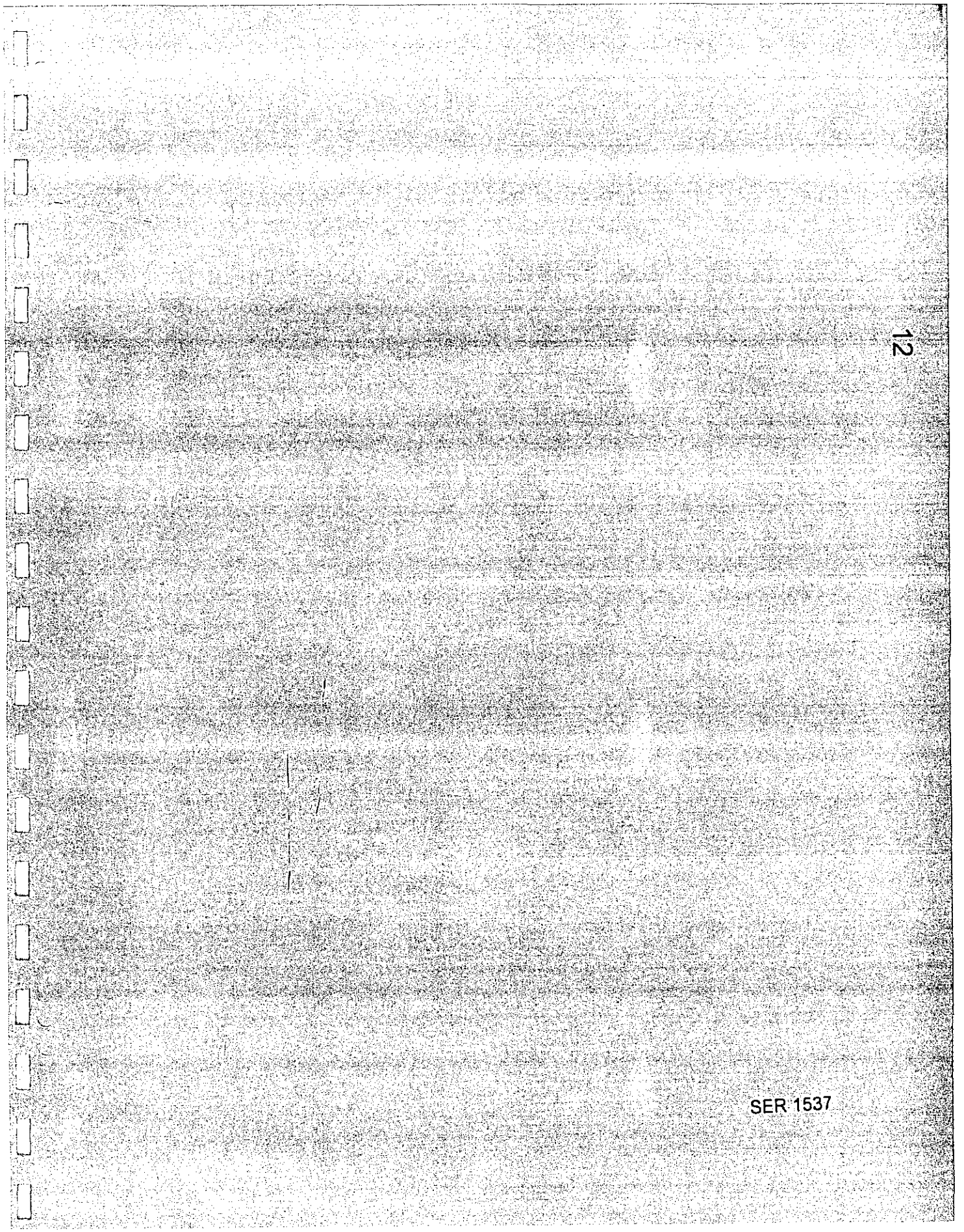
Arne O. Berg
Signature

ARNE O BERG
Printed Name

P.O Box 2516
Address

Seward Ak 99664

(907) 224 3229
Phone Number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SER 1537

Table 1

FINAL PERCENT SHARES

	Attorney	Tentative Final Percent Shares Of Alyeska Settlement	Final Percent Shares Other Recoveries
All Alaskan Seafoods	Ashburn	22.5449%	30.3439%
Allied Processing	Faegre	0.3555%	0.4785%
Bailey d/b/a The Smokehouse	Brown	0.5934%	0.7987%
Cook Inlet Processors	Weidner	22.4711%	0.0000%
Copper River Fishermen's Cooperative	Jameson	7.4277%	9.9972%
D&G Enterprises	Faegre	0.1308%	0.1761%
Eagle Fisheries	Ashburn	7.9967%	10.7630%
Ellis M. dba Trans-Ocean Enter.	Ashburn	0.1086%	0.1462%
Erickson dba Hidden Bay Seafoods	Ashburn	0.2124%	0.2859%
Estate of E.H. Bendikson/ Mister B	Helsell	0.1992%	0.2681%
Ginn, G.	Gerry	0.0159%	0.0215%
Hames dba Cold Water Harvesters	Gerry	0.0389%	0.0524%
Keener Packing Co.	Faegre	2.0701%	2.7862%
Kodiak Salmon Packers	Jamin	5.3591%	7.2130%
Kopecky dba Great Alaska Seafood Co.	Brown	0.0190%	0.0256%
Latta, D.	Jameson	0.0407%	0.0548%
M.S.P. Corporation	Gerry	0.0942%	0.1268%
McLean dba Prime Ak Seafoods	Gerry	0.0986%	0.1328%
Nautilus Marine Enterprises Inc.	Weidner	6.5330%	0.0000%
Northland Fisheries, Inc.	Coe	0.4042%	0.5440%
Odyssey Enterprises	Young	0.8579%	1.1546%
Pan Pacific Seafoods	Bennett	1.4095%	1.8971%
Queen Fisheries Inc. dba E. Point Seafoods	Helsell	2.0136%	2.7101%
Samer - I Seafoods	Jameson	0.1906%	0.2566%
Schilling P. dba Alaska Gourmet	Jameson	0.1626%	0.2189%
Sea Captain's Choice, Inc.	Peterson	0.3534%	0.4757%
Sea Hawk Seafoods	Ashburn	10.3349%	13.9101%
Seafood Sales	Young	0.7740%	1.0417%
Sea-Nik Foods/ Marutsubo-Suisan	Faegre	0.4608%	0.6203%
Seasonal Seafoods	Faegre	0.5831%	0.7849%
Smith, S. dba Virgin Bay Kelp Co.	Ashburn	0.1255%	0.1689%
Taylor, G. dba Taylor Aquatic Enter.	Ashburn	0.3354%	0.4515%
Western Alaska Fisheries Inc.	Hall	4.5779%	6.1615%
Woodbine Alaska Fish Co.	Faegre	1.1067%	1.4895%
Total		100.0000%	95.5560%

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EXHIBIT 12

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ALASKA

In re the EXXON VALDEZ	)	No. A89-0095-CV (HRH) (Consolidated)

SPECIAL VERDICT
FOR PHASE II-A OF TRIAL

Salmon / 1989

Interrogatory No. 1: For the areas listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of salmon by plaintiffs in 1989? You should answer separately for each area listed.

Answer:

Prince William Sound:	Yes	✓	No	
Upper Cook Inlet:	Yes	✓	No	
Kodiak:	Yes	✓	No	
Chignik:	Yes	✓	No	
Balboa-Stepovak:	Yes	✓	No	

Interrogatory No. 2: For each area for which your answer to Interrogatory No. 1 is "yes", what sum of money will reasonably compensate plaintiffs for the reduction of their harvest of salmon in that area in 1989 that was caused by the oil spill?

Answer:

Prince William Sound:	$ 7,689,714.
Upper Cook Inlet:	$ 45,905,758.
Kodiak:	$ 43,042,724.
Chignik:	$ 5,052,400.
Balboa-Stepovak:	$ 0

SER 1541

Setnetters' Catch / 1989

Interrogatory No. 3: Do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of increased harvests of salmon by set net fishermen in Upper Cook Inlet in 1989?

Answer: Yes ✓ No _____

Interrogatory No. 4: If your answer to Interrogatory No. 3 is "yes", please state how many additional salmon were caught by set net fishermen in Upper Cook Inlet in 1989 as a result of the oil spill.

Answer: 3,242,254

Pink Salmon / Prince William Sound Area / 1990-95

Interrogatory No. 5: For the years listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of pink salmon by plaintiffs in the Prince William Sound area? You should answer separately for each year listed.

Answer:

1990:	Yes	____	No	✓
1991:	Yes	____	No	✓
1992:	Yes	✓	No	____
1993:	Yes	✓	No	____
1994:	Yes	____	No	✓
1995:	Yes	____	No	✓

Interrogatory No. 6: For each year for which your answer to Interrogatory No. 5 is "yes", what sum of money will reasonably compensate plaintiffs for the reduction of their harvest of pink salmon in that year?

Answer:

1990:	$ ~~0~~
1991:	$ ~~0~~
1992:	$ 11,277,125.53
1993:	$ 11,111,200.00
1994:	$ ~~0~~
1995:	$ ~~0~~

Sockeye Salmon / Upper Cook Inlet Area / 1994-95

Interrogatory No. 7: Do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of salmon by plaintiffs in the Upper Cook Inlet area in 1994? (If you find that the State's management of the sockeye fishery is a superseding cause, as defined in Instruction No. 23, of reduced harvests of salmon in the Upper Cook Inlet area in 1994, then your answer to this interrogatory should be "no".)

Answer: Yes _____ No ✓

Interrogatory No. 8: Do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of salmon by plaintiffs in the Upper Cook Inlet area in 1995? (If you find that the State's management of the sockeye fishery is a superseding cause, as defined in Instruction No. 23, of reduced harvests of salmon in the Upper Cook Inlet area in 1995, then your answer to this interrogatory should be "no".)

Answer: Yes _____ No ✓

Interrogatory No. 9: For each year for which your answer to Interrogatory Nos. 7 and 8 is "yes", what sum of money will reasonably compensate plaintiffs for the reduction in their harvest of sockeye (red) salmon in Upper Cook Inlet in that year?

Answer: 1994: $ 0

1995: $ 0

Sockeye Salmon / Kodiak Area / 1994-95

Interrogatory No. 10: Do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of salmon by plaintiffs in the Kodiak area in 1994? (If you find that the State's management of the sockeye fishery is a superseding cause, as defined in Instruction No. 23, of reduced harvests of salmon in the Kodiak area in 1994, then your answer to this interrogatory should be "no".)

Answer: Yes _____ No ✓

Interrogatory No. 11: Do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of salmon by plaintiffs in the Kodiak area in 1995? (If you find that the State's management of the sockeye fishery is a superseding cause, as defined in Instruction No. 23, of reduced harvests of salmon in the Kodiak area in 1995, then your answer to this interrogatory should be "no".)

Answer: Yes _____ No ✓

Interrogatory No. 12: For each year for which your answer to Interrogatory Nos. 10 and 11 is "yes", what sum of money will reasonably compensate plaintiffs for the reduction of their harvest of sockeye (red) salmon in the Kodiak area in that year that was caused by the oil spill?

Answer: 1994: $ 0

1995: $ 0

Herring / 1989

Interrogatory No. 13: For the areas listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of herring by plaintiffs in 1989? You should answer separately for each area listed.

Answer:

Prince William Sound:	Yes	✓	No	
Lower Cook Inlet:	Yes	✓	No	
Kodiak:	Yes	✓	No	

Interrogatory No. 14: For each area for which your answer to Interrogatory No. 13 is "yes", what sum of money will reasonably compensate plaintiffs for the reduction of their harvest of herring in that area in 1989?

Answer:

Prince William Sound:	$ 15,872,720.
Lower Cook Inlet:	$ 188,400.
Kodiak:	$ 585,480.

Herring / Prince William Sound Area / 1993-94

Interrogatory No. 15: For the years listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of reduced harvests of herring by plaintiffs in the Prince William Sound area? You should answer separately for each year listed.

Answer:

1993: Yes ✓ No ____

1994: Yes ____ No ✓

Interrogatory No. 16: For each year for which your answer to Interrogatory No. 15 is "yes", what sum of money will reasonably compensate plaintiffs for the reduction of their harvest of herring in that year?

Answer:

1993: $ 7,021,593.

1994: $ ~~0~~

Salmon Prices / 1989

Interrogatory No. 17: For each salmon species listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of a decline in prices paid in 1989 for salmon of that species caught by plaintiffs? You should answer separately for each salmon species.

Answer:

Pink:	Yes	✓	No	
Sockeye (Red):	Yes	✓	No	
Chum:	Yes	✓	No	
King (Chinook):	Yes	✓	No	

Interrogatory No. 18: For each salmon species for which your answer to Interrogatory No. 17 is "yes", what sum of money will reasonably compensate plaintiffs for the decline in prices paid for salmon of that species caught by plaintiffs in 1989?

Answer:

Pink:	$ 28,807,647.59
Sockeye (Red):	$ 67,594,619.28
Chum:	$ 22,620,650.91
King (Chinook):	$ 672,504.91

Salmon Prices / 1990

Interrogatory No. 19: For each salmon species listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of a decline in prices paid in 1990 for salmon of that species caught by plaintiffs? You should answer separately for each salmon species.

Answer:

Pink:	Yes	_____	No	✓
Sockeye (Red):	Yes	_____	No	✓
Chum:	Yes	_____	No	✓
King (Chinook):	Yes	_____	No	✓

Interrogatory No. 20: For each salmon species for which your answer to Interrogatory No. 19 is "yes", what sum of money will reasonably compensate plaintiffs for the decline in prices paid for salmon of that species caught by plaintiffs in 1990?

Answer:

Pink:	$ 0
Sockeye (Red):	$ 0
Chum:	$ 0
King (Chinook):	$ 0

Salmon Prices / 1991

Interrogatory No. 21: For each salmon species listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of a decline in prices paid in 1991 for salmon of that species caught by plaintiffs? You should answer separately for each salmon species.

Answer:

Pink:	Yes _____	No ✓
Sockeye (Red):	Yes _____	No ✓
Chum:	Yes _____	No ✓
King (Chinook):	Yes _____	No ✓

Interrogatory No. 22: For each salmon species for which your answer to Interrogatory No. 21 is "yes", what sum of money will reasonably compensate plaintiffs for the decline in prices paid for salmon of that species caught by plaintiffs in 1991?

Answer:

Pink:	$ 0
Sockeye (Red):	$ 0
Chum:	$ 0
King (Chinook):	$ 0

Herring Prices

Interrogatory No. 23: For the years listed below, do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of the decline in prices paid for herring caught by plaintiffs?

Answer:

1989:	Yes	✓	No	
1990:	Yes		No	✓
1991:	Yes		No	✓

Interrogatory No. 24: For each year for which your answer to Interrogatory No. 23 is "yes", what sum of money will reasonably compensate the plaintiffs for the decline in prices paid for herring caught by plaintiffs in that year?

Answer:

Prince William Sound:	1989:	$ 5,831,429.61
	1990:	$ 0
	1991:	$ 0
Cook Inlet:	1989:	$ 2,683,913.23
	1990:	$ 0
	1991:	$ 0
Kodiak:	1989:	$ 1,454,617.16
	1990:	$ 0
	1991:	$ 0
Chignik:	1989:	$ 0

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Value of Fishing Permits

Interrogatory No. 25: Do you unanimously find from a preponderance of the evidence that the oil spill was a legal cause of a decline in the value of plaintiffs' limited entry fishing permits?

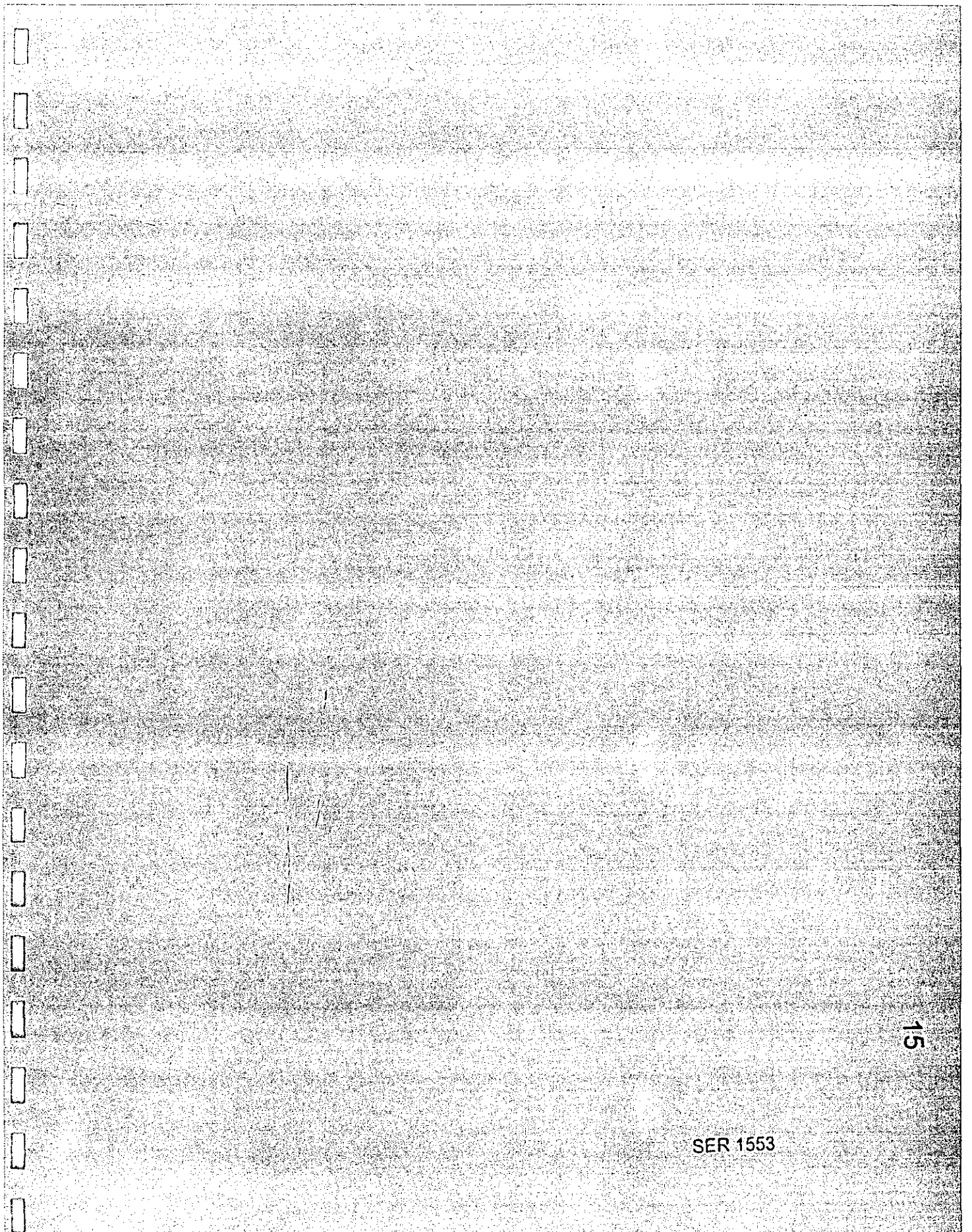
Answer: Yes ✓ No _____

Interrogatory No. 26: If your answer to Interrogatory No. 25 is "yes", what sum of money will reasonably compensate plaintiffs for any decline in value of plaintiffs' limited entry fishing permits?

Answer: $9,375,242.

DONE at Anchorage, Alaska, this _____ day of July, 1994.

_____
Presiding Juror



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Lead and Liaison Counsel for All Plaintiffs

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ALASKA

In re:	)	Case No. A89-095 (HRH)
	)	(Consolidated)
THE EXXON VALDEZ	)	
	)	This Document Relates to
	)	All Cases
	)	

AMENDED STIPULATION REGARDING IMPACTS FOR PHASE III[1]

This stipulation is entered into solely for purposes of the Phase III federal jury

[1] Nothing in this Stipulation shall be construed as a waiver of certain plaintiffs' right to be remanded to state court. Plaintiffs do not by this Stipulation submit to the jurisdiction of the federal court. Nor is anything in this stipulation to be deemed as a waiver by defendants of any defense of law or fact to any claim referenced herein or a consent to assertion of a barred or non-cognizable claim.

EXHIBIT 15 5634

trial, and for no other purpose. The parties agree that this stipulation shall not be used for any other purpose. This stipulation supersedes and replaces "Stipulation Regarding Impacts For Phase III" dated July 18, 1994. Subject to the foregoing, Sections I, II, III and IV of this stipulation may be read to the jury at the commencement of Phase III. Section V shall not be read to the jury.

I. The following Phase IIB claims for actual damages were resolved:

1. A class consisting of Alaska Natives made claims that their subsistence harvests were reduced as a result of the *Exxon Valdez* oil spill. Exxon has agreed to pay $20 million to the class on these claims.

II. The following claims for actual damages will be resolved in Phase IV proceedings:

1. Commercial fishermen in fisheries affected by the oil spill were unable to fish certain fisheries as a result of the *Exxon Valdez* Oil Spill, including pot shrimp, trawl shrimp, dungeness crab, brown king crab, tanner crab, king crab, halibut, sablefish, miscellaneous fin fish, miscellaneous shellfish, miscellaneous groundfish, smelt, scallops, and bait herring. Commercial fishermen participating in these fisheries contend their damages are $24,764,000. Defendants admit that there was some loss in each of these fisheries but contend that the actual damages were lower.

2. Commercial fishermen in the Lower Cook Inlet salmon seine and set net fisheries sustained losses due to closures as a result of the oil spill. Commercial fishermen

in these areas contend that these damages for 1989 amount to $787,000. Defendants admit that there was some loss in each of these fisheries but contend that the actual damages were lower.

3. Commercial fishermen in fisheries affected by the oil spill contend that they have sustained losses because the prices at which their fishing vessels sold have been reduced as a result of the spill. Defendants deny that the *Exxon Valdez* Oil Spill caused a drop in the price of vessels sold and contend that the actual damages, if any, were less than the amount claimed.

4. Certain commercial fishermen from fisheries affected by the oil spill who sold their fishing permits after September 1993 contend that the prices at which their fishing permits have sold have been reduced as a result of the spill. Defendants deny that the *Exxon Valdez* Oil Spill caused a drop in the price of these permits, and contend that the actual damages were less than the amount claimed.

5. Landowners (including certain Native Corporations), who own shoreside lands in the oiled areas of Prince William Sound, Kenai Peninsula and Kodiak contend that oiling of those lands by the *Exxon Valdez* Oil Spill resulted in damage of at least $130,000,000. Defendants assert that many of the lands involved were never oiled by oil from the *Exxon Valdez*. As to lands which were oiled, defendants admit that they are responsible for damages, if any, caused by the oil, but defendants contend that such lands have been, for the most part, cleaned up, and that any residual damages are temporary.

6. The Cook Inlet Aquaculture Association, Kodiak Regional Aquaculture

Association, and Prince William Sound Aquaculture Corporation contend they sustained losses due to a reduction of the price paid for fish actually harvested in 1989, and state that these damages are $18,860,000. Defendants contend that the hatcheries' damages, if any, were less than the amount claimed.

III. The following claims for actual damages are to be resolved in the Alaska State courts:

1. The municipalities of Kodiak Island Borough, Larsen Bay, Old Harbor, Ouzinkie, Port Lions, and Cordova, contend that they have sustained losses due to the *Exxon Valdez* Oil Spill and state the damages they have suffered at issue in the present trial are $ 8,784,567. Defendants contend that the damages suffered were less than $75,000.

2. Other municipalities including Seward, Valdez, Kenai, Kenai Peninsula Borough, Homer, Lake and Peninsula Borough, Chignik, Akhiok, City of Kodiak, and Whittier contend that they have sustained losses in an amount which is, at a minimum, equivalent to those municipalities presently in trial (in paragraph 1 above). Defendants deny that these municipalities were damaged by the *Exxon Valdez* Oil Spill or contend that the damages suffered, if any, were lower.

2. The Native Corporations of English Bay, Port Graham, Chenega, Chugach, Eyak, and Tatitlek contend that they have sustained losses from the oiling of their land due to the *Exxon Valdez* Oil Spill and state the damages they have suffered are $ 110,898,000. Defendants contend that lands far back from the shoreline and other lands that were not touched by oil were not damaged at all, and contend that the damage attributable to oiled

lands amounts to about $1,500,000.

3. The Native Corporations of English Bay, Port Graham, Chenega, and Chugach, contend that they have sustained losses to archeological sites on their lands due to the *Exxon Valdez* Oil Spill and state the damages they have suffered are $35,571,000. Defendants deny that archeological sites were damaged by the *Exxon Valdez* Oil Spill.

4. Certain commercial fishermen in fisheries affected by the oil spill have claims in state court for losses they claim for the depressed sales price of their permits and vessels. The Exxon defendants dispute these claims.

5. The Native Corporations of Chugach and Port Graham own and operate seafood processing operations that were impacted by the *Exxon Valdez* Oil Spill. Exxon paid these processors $9,515,000 in settlement of their claims.

6. Certain commercial fish processors claimed that they were damaged as a result of the *Exxon Valdez* Oil Spill. Exxon paid these processors $113,500,000 in settlement of their claims.

IV. Members of Punitive Damage Class:

1. Each and every claimant entitled to recover damages from defendants for damage resulting from the *Exxon Valdez* Oil Spill is a member of the punitive damage class and is a plaintiff in this action for purposes of this Phase III. No other jury will award punitive damages to these plaintiffs in any other lawsuit.

V. Phase III Evidence

1. This paragraph shall not be read to the jury. No evidence of damages claimed by the plaintiffs or claimants identified in Parts I through IV hereof shall be offered or admissible in the trial of Phase III; rather the entire Phase III record as to the fact or amount of such damages shall consist of this stipulation and the Phase II record and verdicts. Nothing in this stipulation is intended or shall operate to limit argument or to preclude plaintiffs or defendants from introducing appropriate cross-examination or rebuttal evidence or questioning.

So Stipulated: Dated: 26 July 1994

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FILED

JUL 27 1994

UNITED STATES DISTRICT COURT
DISTRICT OF ALASKA
By _____ Deputy

IT IS SO ORDERED.

DATED at Anchorage, Alaska, this 27 day of July 1994.

UNITED STATE DISTRICT JUDGE
The Honorable H. Russel Holland

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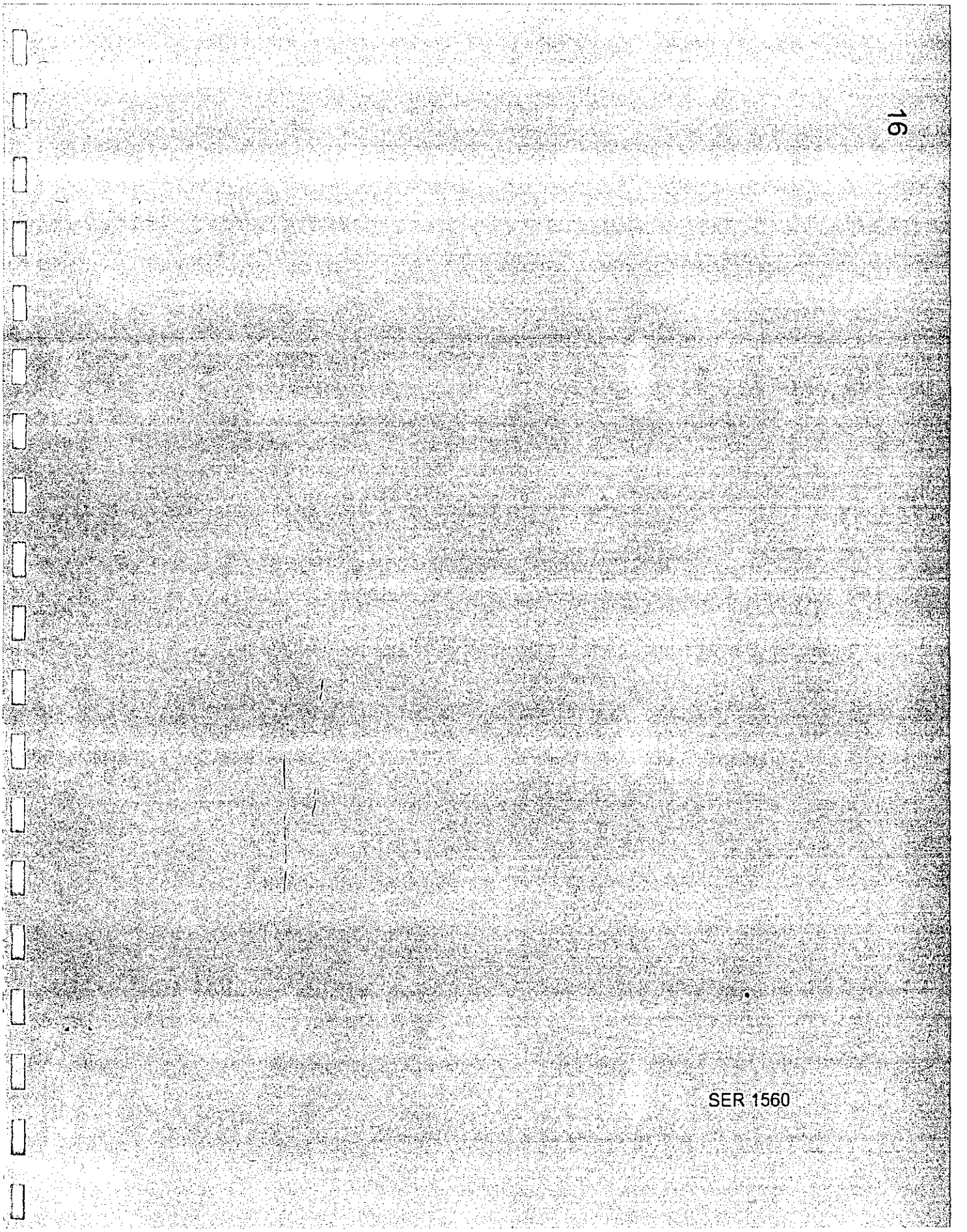
cc: [illegible]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SER 1560

IN THE UNITED STATES COURT OF APPEALS

FOR THE NINTH CIRCUIT

Nos. 96-36038
97-35036
(Consolidated)

In Re: THE EXXON VALDEZ

ICICLE SEAFOODS, INC., et al.,

Plaintiffs-Appellants,

EXXON CORPORATION; EXXON SHIPPING CO.,

Defendants-Appellants,

v.

GRANT BAKER, et al., as representatives of the Mandatory Punitive Damages Class,

Plaintiffs-Appellees.

ICICLE SEAFOODS, INC., et al.,

Plaintiffs-Appellants,

v.

ALASKA SPORTFISHING ASS'N, et al.,

Defendants-Appellees.

On Appeal from the United States District Court
for the District of Alaska

APPELLANTS' JOINT EXCERPTS OF THE RECORD

Volume II of IV
ER263-ER552

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EXHIBIT 16

1996
Settlement Agreement

Exxon Corporation, Exxon Shipping Company and Exxon Pipeline Company, on their own behalf and on behalf of and for the benefit of each of those companies' past and present directors, officers, employees and agents, and the T/V EXXON VALDEZ, its officers and crew (collectively "Exxon"), and Icicle Seafoods, Inc.; Astoria Warehousing, Inc.; Peter Pan Seafoods, Inc.; Peninsula Salmon, Inc.; Seven Seas Corporation; Stellar Seafoods, Inc.; Ocean Beauty Seafoods, Inc.; Washington Fish and Oyster Company; Ocean Beauty Alaska, Inc.; Portland Fish Group, Inc.; Wards Cove Packing Company; Alaska Boat Company; ADF, Inc.; Trident Seafoods Corporation; North Pacific Processors, Inc.; and North Coast Seafood Processors, Inc. and their subsidiaries and affiliates (collectively "Claimants"), do hereby enter into this Settlement Agreement ("Agreement"), dated as of January 11, 1996.

I. Intent.

So that all those who may read and be called upon to interpret or apply this Agreement may understand the intent of the parties in entering into it, Exxon and Claimants state the following:

A. On March 23-24, 1989, the T/V EXXON VALDEZ went aground on Bligh Reef, and as a result certain of its cargo tanks ruptured and approximately 11 million gallons of crude oil were released into Prince William Sound (the "oil spill").

B. Certain of Claimants have asserted claims against Exxon and other entities, including the Alyeska Pipeline Service Company ("Alyeska"), to recover losses they assert they suffered due to the oil spill, and due to various events and activities related to the oil spill, including certain alleged representations made prior to, during, and after the oil spill, and the activities of various persons and entities in preparing for and conducting the clean-up of the oil spill.

C. Certain of Claimants seek compensatory and equitable relief from Exxon, Alyeska, and others under all available common law, maritime, and statutory theories, including theories of negligence, strict liability, fraud, ultra-hazardous activity, public and private nuisance, and others, in Icicle Seafoods et al. v. Exxon Shipping Company, et al, which was originally filed under Cause No. 3AN-94-3121 in Alaska State Court, and was later removed to and is now pending under Cause No. 94-208-7 CV (HRH) in the United States District Court, District of Alaska. (collectively the "Action")

D. Exxon maintains that it is not liable for the relief Claimants seek but nevertheless recognizes that because of legal uncertainties, it might suffer an adverse judgment if Claimants continue the Action.

E. Claimants maintain that they are entitled to recover damages and other relief because of the oil spill, but they acknowledge that there is a financial risk and inherent uncertainty attendant upon pursuing their complex claims through litigation.

F. By entering into this Agreement Claimants and Exxon intend to compromise and settle all presently existing claims, whether asserted or not asserted and whether known or unknown, for actual damages and all other claims whatsoever, if any, arising out of the grounding of the EXXON VALDEZ.

G. Exxon wishes to limit to the full extent possible its potential liability to Claimants, including potential liability because of Exxon Pipeline Company's ownership interest in Alyeska Pipeline Service Company. Accordingly, this Agreement with Claimants, establishes a procedure to resolve completely any and all claims in any way relating to the oil spill that Claimants may have against the three named Exxon entities.

H. Claimants wish to secure promptly a sum of money adequate to compromise reasonably and in good faith all of the theories of relief they have asserted or could have asserted against Exxon and all others, for any and all oil spill related claims.

THEREFORE, in pursuit of the foregoing purposes, and in consideration of the payment Exxon will make, and the mutual covenants and warranties that follow, Exxon and Claimants agree:

II. Exxon Payment

A. As consideration for this Agreement, Exxon agrees to pay Claimants the sum of $6,000,000 within ten business days of the date of completed execution of this Agreement. The payment shall be made by wire transfer to First Interstate Bank of Washington, Seattle Main Branch, First Interstate Center, 999 Third Avenue, Seattle, WA 98104, ABA Routing No. 125000286 for further credit to the account of Byrnes & Keller, Trust Account No. 001982735.

B. Claimants agree by their acceptance of the above payment to be legally bound by all the terms of this Agreement, and to be bound as well under all the other warranties and covenants contained in this Agreement. The undersigned Claimants will divide the payment among themselves, and they hereby acknowledge that whatever amount they determine to allocate to each of them shall constitute good and satisfactory consideration for the undertakings of each.

III. Dismissal of The Action

Claimants agree that within ten (10) business days of receipt of Exxon's payment referred to in paragraph II.A., Claimants and all defendants will dismiss without prejudice and without costs or fees to any party,

all claims raised or which could have been raised against each other and all parties from the Action.

IV. Claimants' Covenants and Representations

Except with respect to any rights or obligations created by this agreement, in any oil spill (as defined herein) litigation in which Claimants become involved, Claimants and Exxon covenant not to execute against each other on any judgment or award of compensatory or equitable relief, or for attorneys' fees and costs, in any way relating to the oil spill.

V. Assignment of Claims

In further consideration of the payment, the Claimants hereby assign irrevocably to Exxon Corporation all rights, causes of action and claims, known and unknown, for monetary or equitable relief, which any of the Claimants have against any other person or entity other than Exxon, public or private, and that arise from the oil spill. This assignment is made without warranty of any kind, express or implied, other than warranties set forth in Paragraph VII.

VI. Not a Release

This Agreement is not to be construed as a release of any parties to litigation relating to the oil spill.

Notwithstanding any other provision of this Agreement, nothing in this Agreement shall waive, reduce, diminish or in any manner limit Claimants' status as members of the mandatory punitive damage class, their rights as members of said class, or their right to participate in the distribution of any final award of punitive damages to said class.

VII. Warranties

A. Claimants warrant that, other than to the extent set forth in the April 13, 1990 Partial Release and Assignment and the January 8, 1991 Settlement Agreement, they have not assigned to any entity or person any of their rights to recovery against Alyeska or Exxon for oil spill-related losses or claims.

B. Claimants and Exxon warrant that each person and entity that is a party to this Agreement is properly authorized to enter this Agreement.

VIII. No Assertion of Invalidity/Severability

Neither Exxon Corporation, Exxon Shipping Company, Exxon Pipeline Company nor any of the undersigned Claimants shall assert or contend in any judicial or non-judicial context that this Agreement or any part of this Agreement is in any way invalid, unenforceable, or unreasonable. In the event any provision or portion of this Agreement is held or adjudicated to be invalid or unenforceable, all other provisions shall remain in full force and effect and the parties shall be bound thereby, and no party may contend that there has been a failure, in whole or in part, of the consideration for which they bargained.

IX. Informed Consent

Claimants have read and fully understand this Agreement and execute it after full and free opportunity for consultation with independent counsel and other advisors of their choice.

X. Choice of Law

This Agreement and any issues or disputes arising from it shall be governed by the laws of the State of Alaska.

XI. If an action is instituted for breach of this Agreement or any of its terms, or for breach of any warranty or any representation herein, the prevailing party shall be entitled to receive its costs of suit plus reasonable attorneys' fees in addition to any other relief.

DATED: Jan 11, 1996

EXXON CORPORATION

By: _____
John R. Rebman
Assistant General Counsel

DATED: 1-11-96

EXXON PIPELINE COMPANY

By: _____
Otto R. Harrison
President

DATED: JANUARY 11, 1996

EXXON SHIPPING COMPANY,
now SEARIVER MARITIME
FINANCIAL HOLDINGS, INC.

By: _____
S.B.L. Penrose
Vice President

DATED: 1/16/96

ICICLE SEAFOODS, INC., and its
subsidiaries and affiliates

By: _____
Steven G. Numata
Its Executive Vice President
and Chief Financial Officer

DATED: 1/16/96

PETER PAN SEAFOODS, INC., and its subsidiaries and affiliates (excluding NICHIRO CORPORATION and its subsidiaries other than Peter Pan Seafoods, Inc., its subsidiaries, Peninsula Salmon, Inc., Seven Seas Corporation, and Stellar Seafoods, Inc.)

By: _____
William G. Saletic
Its President

DATED: 1/16/96

PENINSULA SALMON, INC.

By: _____
William G. Saletic
Its President

DATED: 1/16/96

SEVEN SEAS CORPORATION

By: _____
William G. Saletic
Its President

DATED: 1/16/96

STELLAR SEAFOODS, INC.

By: _____
William G. Saletic
Its President

DATED: 1-15-96

OCEAN BEAUTY SEAFOODS, INC., and its subsidiaries and affiliates (excluding SEALASKA CORPORATION and its subsidiaries other than Ocean Beauty Seafoods, Inc., and its subsidiaries), and as successor in interest to Washington Fish & Oyster Co.

By: _____
~~Bill Terhar~~ RICHARD DENMARK
Its Executive Vice President
~~and Chief Operations Officer~~

DATED: 1-16-96

ADF, Inc. dba Aleutian Dragon Fisheries, and its subsidiaries and affiliates

By: _____
Brad Resnick
Its President

DATED: 1-15-96

TRIDENT SEAFOODS CORPORATION, and its subsidiaries and affiliates

By: _____
Steve Okerland
Its Vice President - Finance

DATED: 1-15-96

NORTH PACIFIC PROCESSORS, INC., and its subsidiaries and affiliates (excluding Marubeni corporation and its subsidiaries other than North Pacific Processors, Inc., and its subsidiaries)

By: _____
James J. Kudwa
Its Vice President and Secretary

DATED: 1-15-96

WARDS COVE PACKING COMPANY, and its subsidiaries and affiliates

By: _____
Alec W. Brindle
Its President

DATED: 1-15-96

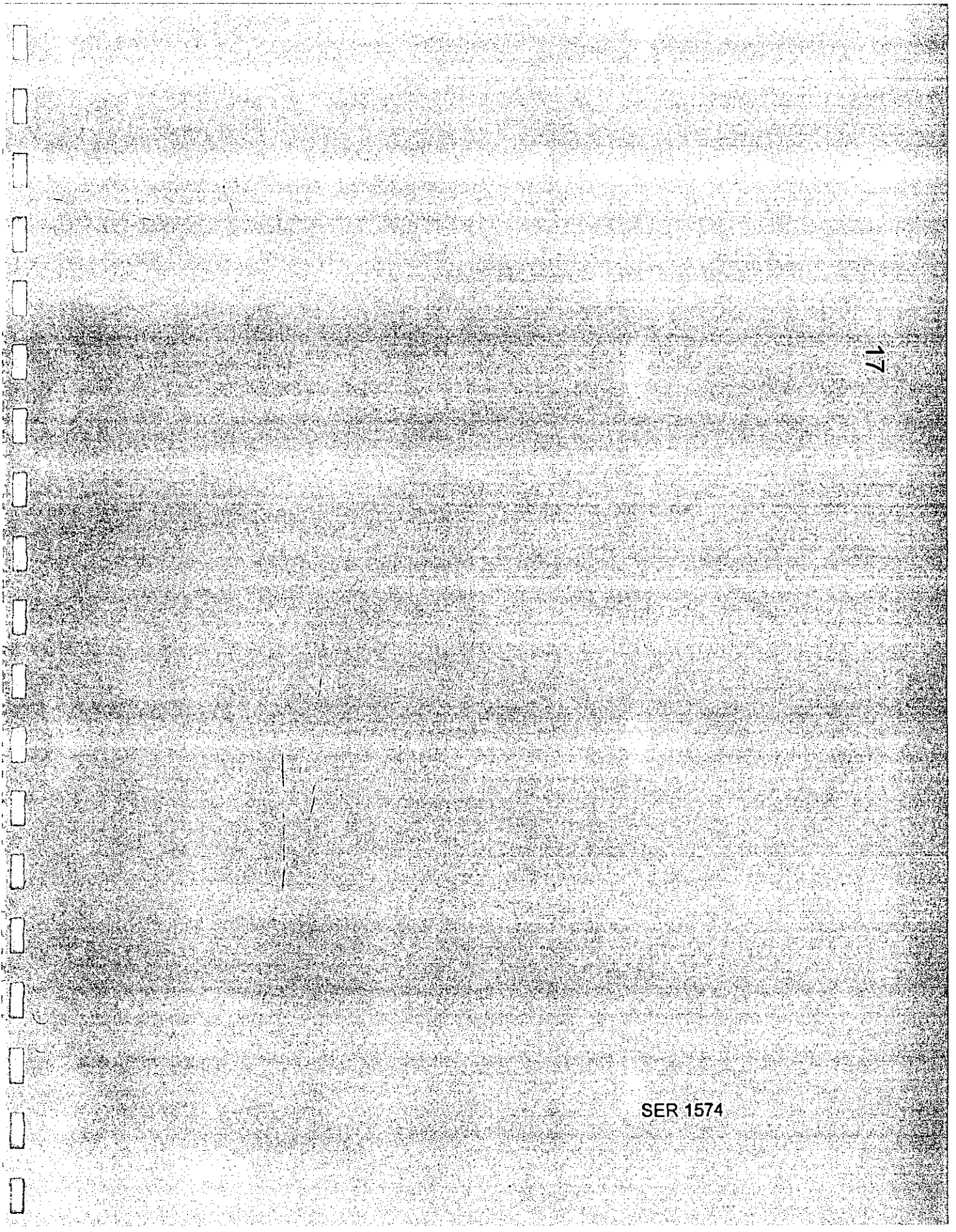
ALASKA BOAT COMPANY

By: _____
Alec W. Brindle
Its President

DATED: 1-16-96

NORTH COAST SEAFOOD PROCESSORS, INC., and its subsidiaries and affiliates

By: Ernest Nagai
Ernest Nagai
Its Vice President



BOGLE & GATES

LAW OFFICES

RICHARD M. CLINTON

Two Union Square
601 Union Street
Seattle, Washington 98101-2346

Main Office: (206) 682-5151
Facsimile: (206) 621-2660
Direct Dial: (206) 621-1435

Anchorage
Bellevue
Olympia
Portland
Tacoma
Vancouver, B.C.
Washington, D.C.

22137/48519

January 13, 1995

VIA HAND DELIVERY

Michael Woerner, Esq.
Keller Rohrback
1201 Third Avenue
Suite 3200
Seattle, WA 98101-3052

Re: Exxon Valdez Oil Spill Litigation
-- Exxon Claims Payments to Cannery Workers

Dear Mike:

Pursuant to your request, we are enclosing a copy of the list of cannery worker claims payments through the Exxon claims program. As you can see, the list provides the name of the claimant, the social security number and the amount paid. Please give me a call if you have any questions.

Very truly yours,

BOGLE & GATES

Richard M. Clinton

Enclosure

SER 1575

EXHIBIT 17

EXXON VALDEZ OIL SPILL
CANNERY WORKER PAYMENTS

CLAIMANT NAME	SSN	AMOUNT PAID
ZOLLINGER, BRUCE H.	519783311	1,621.00
ZOLLINGER, SHARI L.	528456813	1,362.00
ZUMBADO, ROBERT	578150065	1,100.00
		10,787,886.34

CLAIMANT COUNT: 4,431

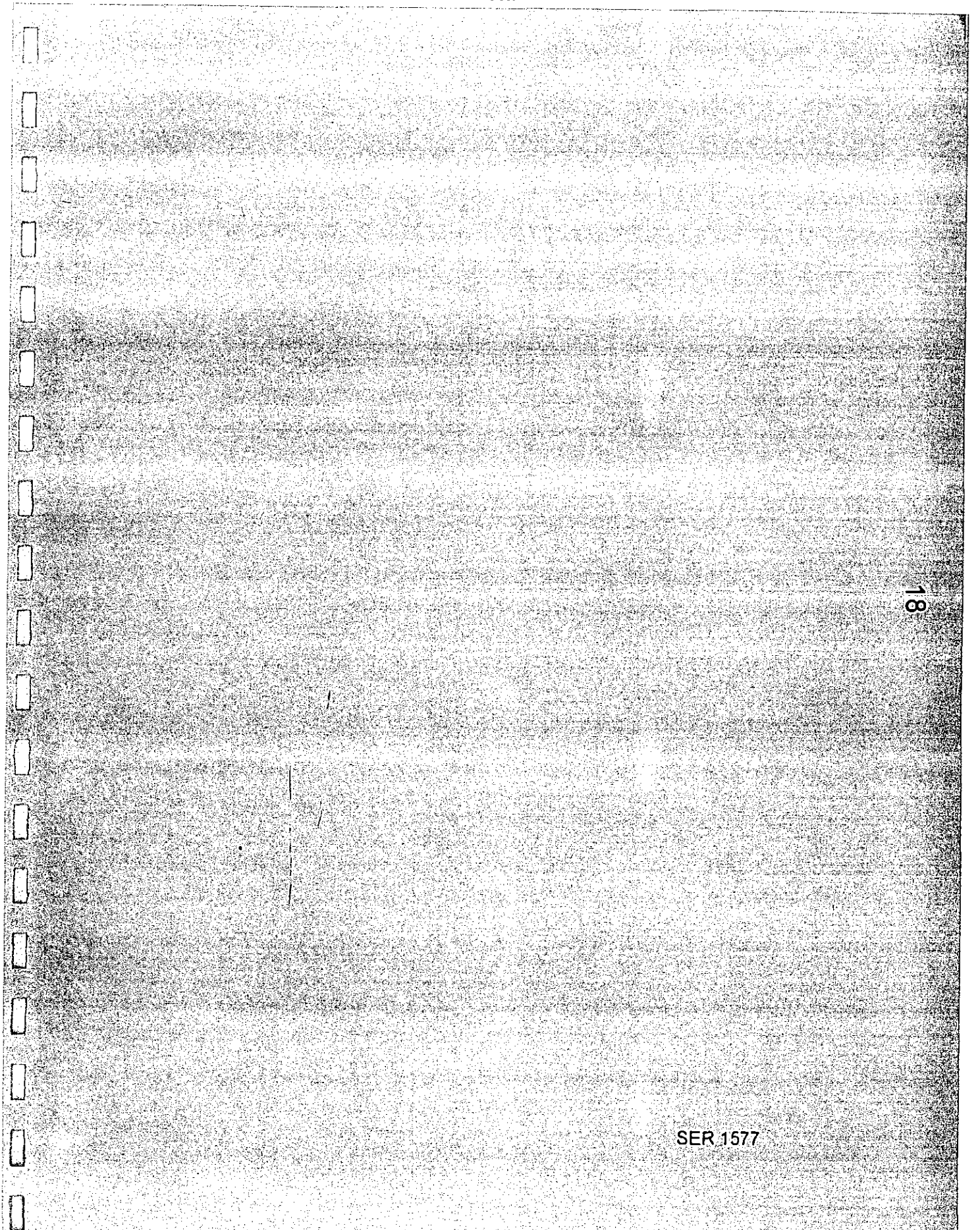


EXHIBIT C
TO MEMORANDUM IN SUPPORT OF MOTION OF DEFENDANTS WITH RESPECT TO JUDGMENT TO BE ENTERED ON THE PHASE III VERDICT

UNUSED EXXON CLAIMS PROGRAM PAYMENT CREDITS

PUNITIVE DAMAGE CLASS MEMBERS	UNUSED CREDITS
Lost Income Claims:	
CHIGNIK SALMON FISHERMEN	$ 19,749
KODIAK HERRING FISHERMEN	$ 712
KODIAK SALMON FISHERMEN	$ 498,372
PWS HERRING FISHERMEN	$ 228,139
PWS SALMON FISHERMEN	$ 332,131
UCI SALMON FISHERMEN	$ 1,020,611
PHASE IIA SUBTOTAL	$ 2,099,714
Lost Income Claims:	
LCI SALMON FISHERMEN	$ 1,922,346
PWS POT SHRIMP	$ 179,819
PWS SABLEFISH	$ 82,415
PWS TRAWL SHRIMP	$ 10,000
PHASE IV SUBTOTAL	$ 2,194,580

SER 1578

EXHIBIT 18

Lost Income Claims:	
AREA BUSINESSES	$ 82,081
CANNERY WORKERS	$ 192,651
MUNICIPALITIES	$ 100,000
NOT-FOR-PROFITS	$ 250,000
SEAFOOD BUYERS/BROKERS	$ 17,410
SEAFOOD PROCESSORS	$ 961,411
TENDERS & CREW	$ 1,159,517
OTHER CLAIMANTS	$ 14,148
OTHER CLAIMS SUBTOTAL	$ 2,777,218
Property Damage Claims:	
FISHERMEN	$ 1,000
TOTAL UNUSED EXXON CLAIMS PROGRAM CREDITS	**$ 7,072,512**

EXXON COMPANY, U.S.A.
ALASKA OPERATIONS

MEMORANDUM

To: Gary Dowling (without attachment-see cc list)
Otto Harrison (with BASIC REFERENCE MATERIALS notebook)
Judy Meidinger (" " " " ")
Jim Selna (" " " " ")
Mike Smith (" " " " ")
Jim Stevens (" " " " ")

From: W. Monte Taylor Monte

Date: March 20, 1992

Subject: EXXON'S RESPONSE TO COMMUNITY AND NATIVE NEEDS

Attached is my presumably "final draft" of the subject report on Community Liaison and related activities. Most of the information that Judy Meidinger and I thought might be useful or important has been found in our files, copied, and included as part of the report and references. The references have been divided into three categories, since it was considered impractical and unnecessary to make multiple copies of all backup materials. I also reserved some of the reference numbers in each category so that additional material can be added if necessary. Reference categories are summarized and explained below:

BASIC REFERENCE MATERIALS: Includes 80 references, numbered sequentially and distributed in a 3 inch notebook, with copies to each of the individuals indicated. The materials included in these references were either deemed important to understanding or clarification, contained quotes that might be useful, or consisted of only a few pages.

"A" (ACTIVITY REPORT) REFERENCES: These references are numbered sequentially with the suffix "A" and show the appropriate page numbers in the Community Liaison Activity Report (CLAR) that has previously been widely distributed. Extra copies of this report are available if you need one.

"B" (BACKUP) REFERENCES: These references are numbered sequentially with the suffix "B" and a backup copy is available in a special file called "Community Response File", currently located in my office in Houston.

I plan to return to Rockport on March 22, having essentially completed the Community Liaison Report, but will be in the Houston office on Thursday, March 26, prior to leaving for Anchorage on Friday, March 27. After returning from Anchorage on April 5, I will be available to return from Rockport on call to modify the report or for other needed work.

EXHIBIT 19

As requested, Judy Meidinger and I plan to work with the Oil Spill Health Task Force (OSHTF) to develop the agenda and presentation for the 1992 proposed village visits during the week of March 30, 1992. We will work with the technical subcommittee and attend the April 1 OSHTF meeting.

The trip to Anchorage will be an opportunity to search the files for additional reference material if necessary. Please advise me on March 26th in Houston; or the week of March 30th in Anchorage (care of Judy Meidinger), if you think of any reference material that we should attempt to find for you or add to the report.

I tried in this version to concentrate on back up materials, so most of the changes from the previous draft are either in response to your prior comments, or are additions after obtaining the appropriate reference materials. I have reserved reference numbers 32B to 34B for the presentation package and the final report on the 1992 Food Safety Visits. We will probably also want to add appropriate comments in the VILLAGE INFORMATION PROGRAMS section of the report after completion of that project in May or June.

Your suggestions, questions, and recommended changes can be made in the form of margin notes, returned with the report. It would also be helpful if you would indicate areas that look questionable, are confusing, etc. After receiving comments from everyone, I will make the necessary modifications and prepare a final report. Keep the "Basic Reference Materials" notebook if you wish. If the reference material changes, I will send you the revised information for incorporation into the notebook, along with the final report.

Please return your draft to Hattie Hollins, Jefferson Building, #928C. She will keep me informed in Rockport. My address and phone number, in case you need to contact me directly, or just want to come fishing, is listed below:

W. Monte Taylor
21 Pelican Drive
Rockport, TX. 78382
Ph. 512-729-2249

cc: Roger Leick (with BASIC REFERENCE MATERIALS notebook)

AFFIDM5.WMT

SER 1582

- incremental expenses associated with the initiation of important municipal projects which have had to be delayed due to municipal participation in spill mitigation activities;
- expenses to upgrade municipal services as required for spill mitigation only;
- costs of information projects designed to keep the community aware of spill related activities and mitigation measures; and
- municipal provision of equipment, facilities and services for spill mitigation programs and activities.

SUMMARY OF 1989 ADVANCES AND REIMBURSEMENTS (Reference 43) - In the implementation of the 1989 effort to advance funds and reimburse incremental expenses, including the advances made for the winter monitoring program discussed later, Exxon advanced a total of $4.4 million to the various boroughs, municipal governments, and native villages and corporations. We reimbursed an additional $4.1 million to the same groups, for total payments of $8.5 million. A summary table, showing the amounts advanced and reimbursed to each borough, city, village IRA council, and village corporation during 1989 by location is shown below. These totals only include the funds given directly to various governments and village corporations. They do not include costs paid to communities for services performed, license fees, taxes, etc. by Exxon or any of Exxon's contractors. Also excluded are funds for various community assistance projects, funds given to Chambers of Commerce, etc. It should also be noted that the amounts shown for the cities and villages on the Kenai Peninsula and on Kodiak Island do not include Exxon funds given to the boroughs that were passed through to the cities and villages.

CITY OR BOROUGH	ADVANCED	REIMBURSED	TOTAL
PRINCE WILLIAM SOUND AREA:			
City of Cordova	$163,400	$156,854	$320,255
City of Valdez	417,125	1,797,321	2,214,445
City of Whittier	26,500	314,647	341,145
KENAI PENINSULA:			
Kenai Peninsula Borough	$2,000,000	0	$2,000,000
City of Homer	70,000	260,469	330,469
City of Seldovia	95,668	27,773	123,441
City of Seward	95,000	75,758	170,758
KODIAK ISLAND:			
Kodiak Island Borough	$870,000	$491,690	$1,361,690
City of Kodiak	26,028	0	26,028

VILLAGE	ADVANCED	REIMBURSED	TOTAL
PRINCE WILLIAM SOUND AREA:			
Chenega	$98,500	$451,119	$549,619
Tatitlek	40,000	3,263	43,263
KENAI PENINSULA:			
English Bay	$50,000	0	$50,000
Port Graham	50,000	21,852	71,852
KODIAK ISLAND:			
Akhiok	$40,000	$14,124	$54,124
Karluk	40,000	0	40,000
Larsen Bay	70,000	122,159	192,159
Old Harbor	70,000	8,967	78,967
Ouzinkie	70,000	205,249	275,249
Port Lions	70,000	81,168	151,168
ALASKA PENINSULA:			
Chignik	$40,000	$2,181	$42,181
Perryville	40,000	0	40,000
TOTALS	$4,442,221	$4,034,591	$8,476,812

Concurrent with establishing reimbursement procedures for cities and villages, we offered assistance to the Native Regional Corporations and the Native Regional Associations in the impacted area. We entered into agreements with each group that requested assistance, advancing a total of $1.2 million and reimbursing an additional $0.5 million, for a total of $1.7 million during 1989. A summary table, showing the amounts advanced or reimbursed to each organization during 1989 is shown below:

REGIONAL NATIVE CORPORATION	ADVANCED	REIMBURSED	TOTAL
Chugach Alaska Corporation (CAC)	$500,000	$465,995	$965,995
REGIONAL NATIVE ASSOCIATION			
The North Pacific Rim (TNPR)	$400,000	$0	$400,000
Kodiak Area Native Association (KANA)	300,000	0	300,000
TOTALS	$1,200,000	$465,995	$1,665,995

The summary above does not include $107,610 paid under a separate agreement to Chugach Fisheries, Inc. (a subsidiary of CAC) for purchase and delivery of subsistence foods, discussed earlier. It should also be noted that Koniag, Inc., the regional corporation for Kodiak Island, said that they had not been

significantly impacted, and therefore did not need financial assistance. They said that Exxon should proceed with any required cleanup, but they would like to be notified when we were working on Koniag's lands. They also requested that we give Koniag shareholders who desired to work an opportunity to do so when we were working on Koniag's lands.

ANALYSIS OF PAYMENT TIMING AND DISTRIBUTION - We attempted to make payments on a timely basis and to meet the needs of the various areas based on the actual impact. An indication that the distributions were timely is the fact that 49% of the total $10,142,811 advanced and reimbursed during 1989 was paid out before the first of July, just over three months after the spill. Other measures of our success in this effort are illustrated by the distribution of the funds between geographical areas and between Native and non-Native entities. The totals are summarized below in these two categories. Detailed monthly payments and graphs of this information are also available (Reference 44).

Native vs. non-Native

Payments to Cities and Boroughs	$6,888,235	67.9%
Payments to Native Villages and Organizations	3,254,576	32.1%
	$10,142,811	100.0%

Geographic Distribution

Prince William Sound Area	- Most Impact	$4,834,724	47.7%
Kenai Peninsula Borough	- Less Impact	2,746,521	27.1%
Kodiak Island/Alaska Penin	- Less Impact	2,561,566	25.2%
		$10,142,811	100.0%

RESPONSE DURING THE WINTER OF 1989-90

WINTER MONITORING AND DISCRETIONARY CLEANUP - After the summer cleanup was concluded during the fall of 1989, some communities were concerned about the possibility of continuing impact on beaches important to their city or village. In response to those concerns, we established a winter monitoring and discretionary cleanup program with the 16 cities and villages in the impacted area. The purpose of this program was to let each community monitor the shoreline areas most important to them during the winter and to perform purely discretionary cleanup of those areas, if they desired to do so. Each community was encouraged to select nearby shoreline areas that would be safely accessible during good weather.

Agreements were entered into with each of the 16 cities and villages, and advances were made to cover the cost of the monitoring effort and to provide funds for discretionary cleanup (Reference 45). The

program was initiated on October 1, 1989 and continued through the winter to March 31, 1990. The communities were asked to inspect each beach segment once every two weeks, but only if weather conditions were acceptable.

The advance payments to cities and villages for this program were $320,000 for monitoring plus $600,000 for discretionary cleanup. Reimbursements for workmen's compensation and insurance exceeded $80,000 bringing the total expense for the program to over $1 million (See Reference 45). The individual amounts advanced and reimbursed to each city and village during 1989 are included in the tabular summary. The substantial cost of providing and delivering the appropriate storage facilities, cleanup supplies, protective gear, emergency supplies and survival gear to each of the cities and villages is not included in any of these cost figures. In selecting the equipment to be supplied, we gave a high priority to safety, due to the potential of someone getting inadvertently stranded in a somewhat remote locations. Fortunately, this did not occur to our knowledge.

The comments, photographs; and samples submitted by the cities and villages under this program were tabulated and compiled during the winter of 1989-90, and reviewed at the completion of the program. The overall percentage of survey reports indicating oil on the surveyed beaches dropped from a peak of 30% of the 76 reports received in November, 1989, to 12% of the 112 reports received in January, 1990. A detailed analysis of the 109 oil samples submitted by the communities also revealed that approximately 10% of the samples tested negative (ie. they were not from the EVOS). In particular, it was noted that all 4 samples submitted from the Alaska Peninsula, all from Perryville, tested negative. Summaries of each report received, a summary by beaches, a summary for each community, and the sample analysis data are shown in Reference 35B. The summary by community and a copy of the last daily report on this program is shown in Reference 31A.

It is also notable that even though we supplied the funds and equipment to perform cleanup work in each community, none of the involved communities apparently found it necessary to perform significant cleanup activities during that period. At the request of their attorneys, each of the Kodiak Island contracts included the requirement for the community to perform either 200 (Akhiok and Karluk) or 600 (Kodiak, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions) hours of cleanup. This was not an Exxon requirement and the rationale for this was never explained. Presumably, this performance requirement was met, however Exxon made no attempt to control or monitor this activity (Reference 36B). (Reference 46 reserved).

STATE OF ALASKA PAYMENTS IN 1989 & 1990 - During 1989 and 1990, various administrative departments in the State of Alaska were also responding to requests by the impacted cities, villages, and Native groups. In turn, the State submitted invoices to Exxon for recovery of the amounts granted or reimbursed. The payments made by the State that exceeded $1,000 and were identifiable in our controllers records as going to various impacted cities, villages, and Native associations totaled $2,159,543.25 **(Reference 47)**.

Although Exxon directly reimbursed some of these invoices to the State, many were still in the analysis phase or were being held for future consideration or additional information at the time of the settlement. Some had been officially turned down. Nevertheless, as a result of the settlement, it can now be assumed that Exxon ultimately paid for all of these costs.

The descriptions include a wide variety of items, including law enforcement, oil spill office grants, day-care, local response, subsistence food purchase, subsistence food collection, human services, outreach support, emotional/social support, hospital grants, substance abuse, mental health, employee bonuses, fire prevention, hiring a psychologist, etc.

Some of the items would have been reimbursed directly by Exxon if we had been asked. Others would undoubtedly have been (or were) questioned with requests for additional documentation. Others were or would have been turned down because they dealt with undefined and inconclusive mental health issues. We felt that these issues should be handled by the historical and conventional funding sources that were in a better position and were presumably more qualified to evaluate the need. The largest item in the list, a $200,000 "emergency expenditure reimbursement" by ADEC to Cordova, was apparently a loan to the Prince William Sound Aquaculture Corporation (PWSAC). Although this was apparently only reimbursed by Exxon through the settlement, we gave substantial support to this group, including an electronic transfer of $1 million on April 4, 1989. We eventually advanced and reimbursed a total of $8,172,044 to PWSAC.

SUMMARY OF 1990 ADVANCES AND REIMBURSEMENTS (Reference 48) - The programs and agreements for reimbursements continued as long as necessary; however, the amount of money involved, the type of expenses incurred and the need for advances changed significantly during 1990. Since the nature of the cleanup and the number of people involved were considerably reduced, we were able to devote considerably more attention to trying to independently determine how we could help. We were particularly concerned about some of the smaller native villages. One example of the type of assistance we offered and provided is the program we called the "Oil Spill Delayed Tribal Obligations Assistance" (OSDTOA) program. This program was described in more detail under the Response to Native Issues section of this report, but the amounts advanced or reimbursed to each village are shown below.

We also had the objective in 1990 of attempting to settle the remaining reimbursement issues to the satisfaction of each recipient. With minor exceptions, we believe this was accomplished. In total, we advanced and reimbursed $552,984 to the cities, villages, regional corporations and regional associations during 1990. These expenses were largely offset by the refund of $409,043 by the Kenai Peninsula Borough in August of 1990. This represented the unspent portion, plus interest, of the $2,000,000 advance made in 1989. A summary table is shown below:

LOCATION	DESCRIPTION OF EXPENSE:	TOTAL COST
Akhiok Village	Advance for OSDTOA	$4,700
Chenega Village Corp.	Advance for License Fee	50,000
Chenega Village Corp.	Reimbursement	13,346
Chignik	Reimbursement for Insurance	9,333
City of Cordova	Reimbursements	14,037
Eyak Tribal Council (located in Cordova)	Advance for OSDTOA	5,700
English Bay Village	Advances for OSDTOA	6,480
English Bay Village	Support for Providers Conference	500
Karluk	Reimbursement for Insurance	8,967
Old Harbor Village	Advance & payments for OSDTOA	5,930
Ouzinkie Village	Reimbursement	2,350
Perryville	Reimbursement	3,948
Port Graham Village	Payments for OSDTOA	12,500
Port Lions	Advance & payments for OSDTOA	9,510
City of Seward	Reimbursements	131,576
Mt. Marathon Natives (located in Seward)	Advance for OSDTOA	4,795
Tatitlek Village	Reimbursements	48,762
City of Valdez	Reimbursements	85,202
City of Whittier	Reimbursements	18,028
ORGANIZATION		
CAC	Reimbursements	$289,616
KANA	Reimbursements	93,425
Koniag, Inc	Scholarship Program	2,000
TNPR	Reimbursements	73,329
	TOTAL EXPENDITURE	$552,984
REFUNDS		
Kenai Borough	Refund part of advance	($409,043)
City of Kodiak	Refund part of advance	(4,964)
	NET EXPENDITURE	$139,004

SUMMARY OF 1991 ADVANCES AND REIMBURSEMENTS (Reference 49) - By 1991, the need for advances or reimbursements had almost entirely disappeared. Nevertheless, we had a few remaining reimbursement issues. Excluding the Chenega Corporation Work/Services contract, which is discussed elsewhere, we settled the pertinent issues for a total of $260,972, or 76.4% of the total

requested amount. The more important issues are described below and in the subsection on hospitals:

KODIAK AREA NATIVE ASSOCIATION (KANA) - KANA operates a clinic where any Alaskan Native, including those who live in the six outlying villages, can go for free health care. KANA claimed that the budget for this clinic was adversely impacted by the wages paid to Alaskan Natives. The problem occurred because Natives qualify for free health care whether they are employed or not, but the qualification for some of the third party reimbursements to the health care facility, such as medicaid for low income individuals, depends on the Natives income level. Since many of the Natives worked on the spill and had substantial incomes, the clinic was not able to obtain the reimbursement they had budgeted for, even though they still incurred some of the applicable costs. On April 22, 1991, Exxon paid KANA an additional agreed to amount of $22,638 for the claimed medical losses. We also reimbursed KANA an additional $22,628 for 1990 oil spill response expenses, for a total of $45,266.

CITY OF VALDEZ - A few issues that were not resolved with the City of Valdez in 1989 or 1990 became timely in 1991 for various reasons. The resolution of each of these issues to the satisfaction to the city are summarized below:

Nautilus Marine Lost Revenue - The city normally leases a warehouse to Nautilus Marine for their fish processing operation. The rental payment had varied from a low of $25,000 in 1982 to a high of $39,500 in 1988. In 1989, it was only $1195.62. The city claimed to have lost at least $40,000 in warehouse lease revenues. We reimbursed the $40,000 claimed loss on January 18, 1991.

Valdez Airport Terminal Carpeting - In August of 1989, Exxon agreed to reimburse up to $34,375 to replace the airport terminal carpeting because of the soiling and damage created by the traffic through the terminal during the cleanup. The city awarded a contract to replace the carpeting by mid-February, 1991. Exxon paid the $34,375 on January 18, 1991.

Animal Control Incinerator - On August 16, 1989 Exxon committed to pay 50% of the cost, up to $12,772.50, of a new animal control incinerator, based on the city's analysis of extra usage during the cleanup. Instead of replacing the unit, the city decided to repair the existing incinerator at a cost of $11,317.85. They asked us to pay the full cost of that repair, an alternative that had not been considered in our prior agreement. We sent them a check for the total repair cost of $11,317.85 on April 9, 1991.

CHENEGA BAY I.R.A. COUNCIL - During the first few months after the spill,