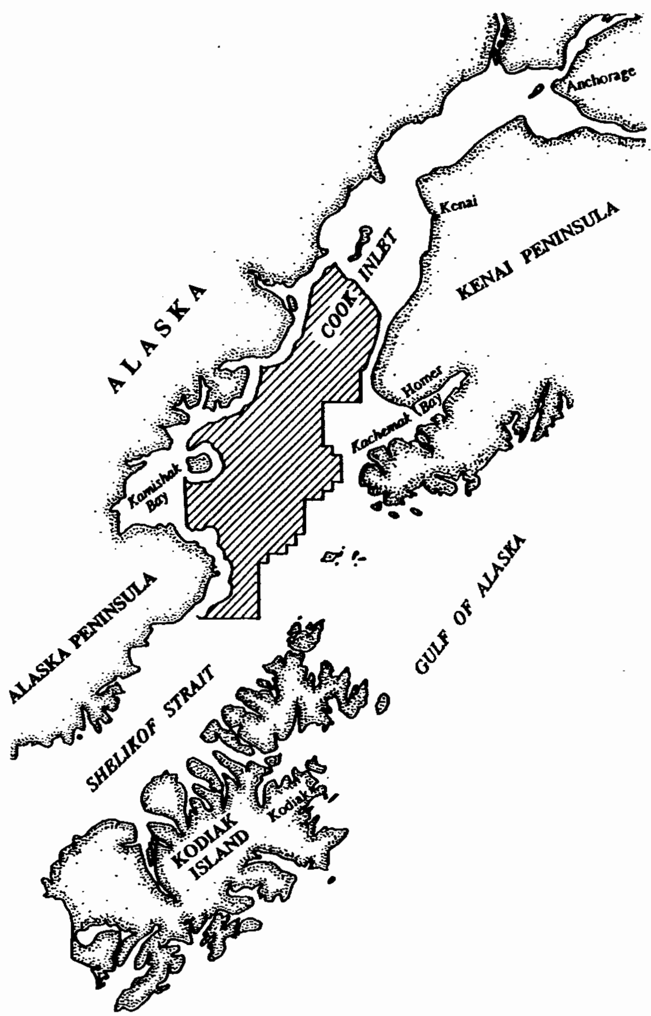
Alaska Outer Continental Shelf

OCS EIS/EA
MMS 95-0066

Cook Inlet Planning Area
Oil and Gas Lease Sale 149

Final Environmental Impact Statement

Volume II



MMS U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region

This Environmental Impact Statement (EIS) is not intended, nor should it be used, as a local planning document by potentially affected communities. The exploration, development and production, and transportation scenarios described in this EIS represent best-estimate assumptions that serve as a basis for identifying characteristic activities and any resulting environmental effects. Several years will elapse before enough is known about potential local details of development to permit estimates suitable for local planning. These assumptions do not represent a Minerals Management Sservice recommendation, preference, or endorsement of any facility, site, or development plan. Local control of events may be exercised through planning, zoning, land ownership, and applicable State and local laws and regulations.

With reference to the extent of the Federal Government's jurisdiction of the offshore regions, the United States has not yet resolved some of its offshore boundaries with neighboring jurisdictions. For the purposes of the EIS, certain assumptions were made about the extent of areas believed subject to United States' jurisdiction. The offshore-boundary lines shown in the figures and graphics of this EIS are for purposes of illustration only; they do not necessarily reflect the position or views of the United States with respect to the location of international boundaries, convention lines, or the offshore boundaries between the United States and coastal states concerned. The United States expressly reserves it rights, and those of its nationals, in all areas in which the offshore-boundary dispute has not been resolved; and these illustrative lines are used without prejudice to such rights.

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Alaska OCS Region

Cooperating Agency

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Proposed Cook Inlet Oil and Gas Lease Sale 149
Final Environmental Impact Statement

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V. REVIEW AND ANALYSIS OF COMMENTS RECEIVED:

__Section V Acronym List__

The acronyms or initialisms used in this section have not been identified in the text. Please refer to this list for clarification.

AA	Azis Armand (Individual)
AK	Arthur Kettle (Individual)
ALS	Alaska Legal Services (Organization)
AOG	Alaska Oil and Gas Association (Organization)
APH	Anchorage Public Hearing
AS	Art Sowls (Individual)
CC	Chris Chavasse (Individual)
CIM	Cook Inlet Marine Mammal Council (Federal)
CM	Craig O. Matkin (Individual)
DZ	Daniel Zatz (Individual)
EPA	Environmental Protection Agency (Federal)
FWA	Fish and Wildlfie Service (Air Quality Branch)
FWR	Fish and Wildlfie Service (Region 7)
HPH	Homer Public Hearing
IPC	Indigenous Peoples Council for Marine Mammals (Organization)
JC	Joel Cooper
JK	Juergen Kienle (Individual)
JLM	John Luther Mohr (Individual)
KBC	Kachemak Bay Conservation Society (Organization)
KCN	Kodiak Conservation Network (Organization)
KePH	Kenai Public Hearing
KIB	Kodiak Island Borough (Borough)
KoPH	Kodiak Public Hearing
LS	Leslie Slater (Individual)
MAB	Margaret A. Blanding (Individual)
MC	Mark Child (Individual)
MDM	Marla D. McPherson (Individual)
MEL	Marie E. Lowe (Individual)
MMC	Marine Mammal Commission (Federal)
MSO	Michael S. O'Meara (Individual)
NGO	North Gulf Oceanic Society (Organization)
NL	Nancy Lord (Individual)
NPS	National Park Service (Federal)
PG	Patricia Garoutte (Individual)
PSG	Pacific Seabird Group (Organization)
RJW	Roberts J. Wienhold (Individual)
RMM	Rita M. May (Individual)
SA2	State of Alaska (State)
SOA	State of Alaska (State)
SW	Susan Winder (Individual)
TAG	Alaskans for Clean Wacter (Organization)
UFA	United Fishermen of Alaska (Organization)
WD	Willy Dunne (Individual)
WH	Winslow Hoffman (Individual)

V. REVIEW AND ANALYSIS OF COMMENTS RECEIVED

A. Introduction:

1. **Summary of Comments on the Draft EIS:** During the DEIS comment period, written statements and oral testimonies were provided by various governmental agencies, organizations, businesses, and individuals. More than 400 written statements were received, and 115 individuals testified at the public hearings. All of the written and oral comments on the Sale 149 DEIS were reviewed and considered in preparing responses.

More than 350 of the written statements and some of the public hearing testimony expressed opposition to or support for Sale 149; many of the statements and testimony also contained reasons for opposing or supporting the sale. A summary of these reasons are noted in Section V.B.1.

About 60 written statements and oral testimonies contained comments regarding material presented in the DEIS requiring responses; responses were prepared for approximately 500 individual comments. Statements and oral testimonies requiring responses are noted in Sections V.B.2 and 3, respectively. Most of the comments on the DEIS addressed concerns regarding (1) oil spills, threat of oil spills, and adequacy of oil-spill-cleanup technology; (2) effects of oil spills and industrial activities on lifestyles, the environment, biological resources, subsistence harvesting, and commercial fishing; (3) environmental contamination by the oil and gas industry from past waste-disposal practices, continued discharge of permitted wastes, and violations of permit discharges; (4) adequacy of environmental information, including physical, chemical and biological baseline data; (5) adequacy of the oil-spill-risk analysis model; (6) the need for oil that might be discovered and produced as a result of the sale; and (7) the absence of descriptions and/or analysis of effects on specific resources, areas, or activities that were either not raised during the scoping process or were beyond the scope of the EIS.

2. **EIS Changes in Response to Comments on the Draft EIS:**

a. **Alternatives:** Two deferral alternatives have been added to the final EIS (Secs. II.H and I) and analyzed in Sections IV.B.8 and 9. These alternatives are the Northern Deferral Alternative (Alternative VIII) and the Kennedy Entrance Deferral Alternative (Alternative IX).

(1) **Alternative VIII, Northern Deferral Alternative:** The Northern Deferral Alternative would offer for leasing 285 blocks (about 580,000 ha or 1.44 million acres) in that part of the Sale 149 area south of Anchor Point (Fig. II.H.1). The area removed by the deferral alternative consists of 117 whole or partial blocks (about 220,000 ha or 0.48 million acres) located north of Anchor Point; the deferred area comprises about 29 percent of the Alternative areas.

Deletion of the blocks north of Anchor Point was proposed by the United Cook Inlet Drift Association during testimony at the Anchorage Public Hearing. As noted in the description of the Coastal Fisheries Deferral Alternative, Section I.D.2.a(2) the area north of Anchor Point is the heart of the Cook Inlet salmon gillnet fishery. Deferral of these bocks would eliminate fishing-gear conflict between commercial-fishing activities and oil and gas operations in the OCS area north of Anchor Point. Also, there would not be any discharges from drilling and production operations in the area. The blocks proposed for deletion from the sale area by this deferral alternative include some of the blocks proposed for deletion in Alternatives IV, V, and VII (Figs. II.D.1, II.E.1, and II.G.1, respectively). The benefits and risks to the biological resources in these areas would be similar to those described for the corresponding blocks in Alternatives IV, V, and VII (Secs. I.D.2.a(1), (2) and (4), respectively).

(2) **Alternative IX, Kennedy Entrance Deferral Alternative:** This alternative would offer for lease 385 blocks (about 760,000 ha or 1.88 million acres). The area removed by the deferral alternative consists of 17 blocks (about 40,000 ha or 0.10 million acres) in two areas adjacent to Kennedy Entrance (Fig. II.I.1). One of the areas is off the southwestern end of the Kenai Peninsula and the other is west of the Barren Islands.

Deletion of the blocks near the western end of Kennedy Entrance was suggested by the State of Alaska. The deferral of northern blocks would reduce the risk of oil spills contacting subsistence-harvest areas used by the Native communities of Port Graham and Nanwalek, and the deferral of both areas would reduce potential conflicts with commercial fisheries. Both the northern set of blocks (located off the southwestern end of the Kenai

Peninsula) and the southern set (located west of the Barren Islands) were part of Alternatives V, and VII (Figs. II.E.1 and II.G.1, respectively), and the southern set of blocks also was part of Alternative IV (Fig. II.D.1). The benefits and risks to the biological resources in these areas would be similar to those described for the corresponding blocks in Alternatives IV, V, and VII (Secs. I.D.2.a(1), (2) and (4), respectively).

b. Mitigating Measures: Significant changes in the mitigating measures between the draft and final EIS's consist of changing an ITL to a stipulation, adding three new stipulations to the potential mitigating measures and changing the text of three ITL's. These three new stipulations were recommended by the State of Alaska. Changes in the text of the ITL's were made in response to comments from the Kodiak Island Borough.

(1) Stipulation No.1, Protection of Fisheries: The Information on Minimizing Potential Conflicts between the Oil and Gas and Fishing Activities has been changed to a stipulation that is part of the Proposal. A requirement was added to the stipulation to minimize conflicts between oil and gas activities and subsistence and sport fishing (Sec. II.J.1.a). The modification of the mitigating measures was in response to concerns about the potential for conflicts between oil and gas operations and subsistence, sport, and commercial fisheries. These concerns were expressed by individual commercial and subsistence fisherman and by commercial-fishing groups and the Kodiak Island Borough. The State of Alaska also recommended a stipulation to reduce conflicts between oil and gas operations and commercial and subsistence fisheries.

(2) Stipulation No. 5, Restriction on Multiple Operations: Stipulation No. 5 responds to a concern that the level of exploratory drilling operations in an area may interfere with commercial-fishing activities. The stipulation states that two or more simultaneous drilling operations will not be permitted unless an analysis of use conflicts indicates that such operations will not result in unreasonable conflicts with fishing activities.

(3) Stipulation No. 6, Seasonal Drilling Restriction: This stipulation also addresses concerns about fishing-gear conflicts by proposing to prohibit exploratory drilling from June 11 though August 15 in those blocks that lie along the northeast perimeter of the sale area (Fig. II.E.1—the blocks along the perimeter of the sale area that extends from Homer to north of Ninilchik).

(4) Stipulation No. 7 No Surface Entry during Development and Production: Stipulation No.7 addresses concerns about fishing-gear conflicts with development and production facilities. Surface entry in those blocks that lie along the northeast perimeter of the sale area (Fig. II.E.1—the blocks along the perimeter of the sale area that extends from Homer to north of Ninilchik) would be prohibited. Access to any oil and gas resources in these blocks is allowed by directional drilling or other methods that do not conflict with fisheries activities.

(5) ITL's No. 2, No. 4, and No. 5: The Information on Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans, ITL No. 2, has been revised to include some additional areas of special biological and cultural sensitivity suggested by comments received on the draft Sale 149 EIS. The Information on Coastal Zone Management, ITL No. 4, has been revised to notify potential lessees that specific coastal districts have enforceable policies that have been incorporated into the Alaska Coastal Management Program. The Information on Oil-Spill-Response Preparedness, ITL No. 5, has been revised to address concerns regarding the ability of the lessee to protect communities and important resources from the adverse effects of an oil spill.

c. Text Revisions: The analyses in Section IV.B has been revised to include (1) the social, psychological, and cultural effects that the Sale 149 pre- and postlease sale and development and production processes have on individuals and communities adjacent to the sale area and (2) the effects of Sale 149 on the Kodiak commercial fisheries. Where comments warranted other changes or presented new or additional information, revisions were made to the appropriate text in the EIS; references to the revised sections are presented in the responses to the specific comments.

B. Statements, Comments, and Responses:

1. Statements Opposing or Supporting Sale 149: There were more than 350 statements submitted with comments and/or reasons opposing or supporting Sale 149. Comments received on a draft EIS that provide new or additional information or address the adequacy of descriptive material or analysis are responded to in the final EIS in Sections V.B 2 and 3 and V.C. Those comments that only express opposition to or support for a lease sale are included in the decision documents (Sec. I.A.15) prepared to assist the Secretary of the Interior in making a decision whether or not to hold a lease sale; they are not presented in an EIS. However, because there was such a significant number of comments received during the comment period on the Sale 149 draft EIS that fell in this category, it was decided to present a summary of the reasons for opposing or supporting the lease sale in the final EIS for Sale 149.

Reasons for opposing the sale include:

effects on the local economy which largely is based on:
- commercial fishing,
- tourism,
- charter fishing boats,
- guide services,
- bed and breakfast facilities,
- small businesses and services, and
- charter aircraft services.

Exxon Valdez oil spill and:
- marine mammals and birds, fishes, and plants and beaches that are still recovering from the oil spill;
- experiences in cleaning spilled oil from the beaches and birds and animals;
- lingering psychological effects; and
- ongoing litigation.

threat to the quality of life as described by:
- proximity to Federal and State parks, refuges and wildlife, and recreation areas;
- boating, recreational/sportfishing, scenic viewing, and beachcombing activities; and
- Native culture and subsistence activities.

petroleum industry activities (including):
- threat of oil spills;
- violations of NPDES discharge permit in upper Cook Inlet;
- lack of effective oil spill cleanup technologies;
- toxicity of drilling muds and other discharges;
- opposition to tanker safety;
- vessel traffic patterns,
- double hulls on tankers, and
- tug escorts;
- associated transit population during development.

threat to biological resources (and habitats) (including):
- finfishes (salmon, halibut, and herring);
- marine mammals(seals, killer and beluga whales, and sea otters) and threatened or endangered species (sea lions, humpback and gray whales);
- shellfish;
- birds and bird rookeries; and
- terrestrial wildlife.

lack of National energy policy which should be encouraging the:
- development and use of alternative energy sources; and
- conservation in the use fossil fuels.

natural risks from:
- volcanic eruptions,
- earthquakes,
- tsunamis,

- high tides,
- sea ice in the winter, and
- storms.

other:
- economic concerns;
- compensation for damages,
- no community benefits, and
- economic displacement because of a spill.
- moratorium on leasing or development in Bristol Bay and California and Florida;
- repeated efforts of Homer area residents in opposing oil and gas development in the area;
- hypocrisy in stating there is a domestic need for the oil when there are also proposals to export oil; and
- oil may be more valuable in the future.

Reasons for supporting the sale include:

effects on state and local economies:
- the presence of the oil and gas industry has stimulated the economies of many regions in Alaska, both directly and indirectly, creating jobs and many associated benefits;
- oil and gas industry has played an important role in the Kenai Peninsula's economy for over 30 years, and
- supported economies of Anchorage and Kenai.
- OCS leasing can help to secure continued long-term investment by oil and gas companies in Alaska;
- further modifications of the Sale 149 proposal may cause the petroleum industry to lose interest in this area, and
- new sources of revenues must be found to help compensate for declining state revenues.
- development has contributed to economic stability;
- a healthy economy allows us to spend more to protect the environment; and
- social and economic benefits of offshore oil and gas development outweigh the risks.

ensuring energy resources:
- the nation will continue to rely on oil and gas well into the next century despite the development of alternative energy sources;
- nation needs to be ensured of increasing domestic production to meet increasing demand for oil;
- domestic oil production is critical to this country's national interest;
- OCS Program contributes to reducing the dependency on imported oil,
- greater self-sufficiency in US energy reserves and production,
- cannot depend on 3rd world countries for reliable energy resources, and
- need to decrease the dependence on foreign oil.
- decreasing gas reserves in the Cook Inlet region could result in;
- changing home heating systems from gas to oil, wood or coal,
- increasing electrical generation from diesel fuel,
- increasing coal-fired generation capacity (and coal mining), and
- increasing hydroelectric capacity (damming rivers).
- fishing industry depends on economical fuel to do their work.

environment and social concerns:
- studies indicate there have been no on adverse impacts on the marine environment from Cook Inlet oil and gas operations;
- MMS has addressed public concerns regarding the lease sale;
- the oil and gas industry has become much more sensitive to the protection of the subsistence lifestyles of Alaska's Native communities;
- oil and gas development is compatible with fishing industry and tourism;
- oil and gas industry has a history of working with government agencies, commercial interests and environmental groups to solve problems; and
- there are adequate laws and regulations to protect the environment.

2. <u>Comments and Responses</u>: The following section presents a list of statements received during the DEIS comment period and a reproduction of all those statements with comments that require responses. Comments requiring a response either provided new or additional information to be incorporated into the EIS or addressed the adequacy of descriptive material or the analysis. Specific comments in each letter are bracketed and numbered. The MMS responses to the specific comments follow each letter. Statements requiring a response are highlighted and indicated by the ▸ symbol.

Federal Agencies

- Department of the Interior
  - Bureau of Mines (Alaska Field Operation Center)
  - ▸**Fish and Wildlife Service (Region 7)—FWR**
  - ▸**Fish and Wildlife Service (Air Quality Branch)—FWA**
  - ▸**National Park Service (Alaska Region)—NPS**
  - National Park Service (Air Quality Division)
- Department of Commerce
  - ▸**NOAA/NMFS (Cook Inlet Marine Mammal Council)—CIM**
- ▸**Environmental Protection Agency—EPA**
- ▸**Marine Mammal Commission—MMC**

State of Alaska

- ▸**Office of Management and Budget Division of Governmental Coordination (May 3, 1995)—SOA**
- ▸**Office of Management and Budget Division of Governmental Coordination (August 3, 1995)—SA2**

Boroughs

- ▸**Kodiak Island Borough—KIB**
- Kenai Peninsula Borough (Resolution)

Organizations

- ▸**Alaska Legal Services—ALS**
- ▸**Alaska Oil and Gas Association—AOG**
- Alaska Waveriders
- ▸**Alaskans for Clean Water (Representing 19 other organizations)—TAG**
  - Alaskans for Clean Water
  - Alaska Center for the Environment
  - Alaska Marine Conservation Council
  - Alaska Public Interest Research Group
  - Alaska Wildlife Alliance
  - American Oceans Campaign
  - Cook Inlet Vigil
  - Greenpeace
  - Kachemak Bay Conservation Society
  - Kodiak Conservation Network
  - Legasea
  - National Parks and Conservation Association
  - National OCS Coalition
  - National Wildlife Federation
  - Natural Resources Defense Council
  - Sierra Club
  - U.S. Public Interest Research Group
  - The Wilderness Society
  - Trustees for Alaska
- Beauty Without Cruelty, USA
- Chugachmiut Environmental Protection Consortium (Representing 4 Groups)
  - Homer Citizens
  - Greenpeace Alaska
  - Kodiak Conservation Network
  - Trustees for Alaska

Eastern Kenai Peninsula Environmental Action Association
Homer Fish and Game Advisory Committee
▸**Indigenous Peoples Council for Marine Mammals (10 Members)—IPC**
- Alaska Eskimo Whaling Commission
- Alaska & Inuvailuit Beluga Whale Commission
- Alaska Sea otter Commission
- Association of Village Council Presidents
- Bristol Bay Native Association
- Eskimo Walrus Commission
- Inuit Circumpolar Conference
- North Slope Borough Department of Wildlife Management
- Pribilof Aleut Fur Seal commission
- Southeast Native Subsistence commission

▸**Kachemak Bay Conservation Society—KBC**
▸**Kodiak Conservation Network—KCN**
▸**North Gulf Oceanic Society—NGO**
North Pacific Fisheries Association, Inc
▸**Pacific Seabird Group—PSG**
Resource Development Council for Alaska, Inc.
United Cook Inlet Drift Association
▸**United Fishermen of Alaska (Sale 149 Area Members 6)—UFA**
- Area K Seiners Association
- Cook Inlet Aquaculture Association
- Kenai Peninsula Fishermen's Association
- Kodiak Regional Aquaculture Association
- North Pacific Fisheries Association
- United Cook Inlet Drift Association

Wilderness Education Association

Businesses, Consultants
BP Exploration
CTI Alaska
Easley and Bendino
Paul S. Glavinovich
Kachemak Bay Wilderness Lodge
Ketchikan Pulp Company
LAPP Resources Inc
Maritime Helicopters
McGranes
McIntosh Marine, Inc.
Peak Oilfield Service Co.
Petro Marine Services
Petro Star, Inc
Platinum Jewelers
Ryanlode Mines, Inc
Wavetamer Kayaking

3. **Personal Letters, Cards, and Written Testimony Submitted at the Public Hearings:**
(Personal—statements that do not have a heading which identifies a business or group and the writer appears to be representing herself/himself)

A

Aarts, Frances P.	Danbury, CT
Acuff, Ardis	Copper Hill, VA
Amptmeyer, Ryan	Lafayette, IN
Anderson, Claudia	Kodiak, AK
Anderson, Martha Ellen	Kenai, AK
Andrews, Josh	Kenai, AK
Andrews, Quinn	Seattle, WA
▸**Armand, Azis—AA**	Urbana, IL
Arndt, Susan	Homer, AK

B

Balch, Richard G	Anchorage, AK
Baker, Randall D.	Kenai, AK
Bakke, Robin	Homer, AK
Bakke, Seena	Homer, AK
Bankes, Dale L.	Homer, AK
Barnett, Tamara	Homer, AK
Barter, John	Kenai, AK
Bates, Lee	Homer, AK
Beck, Elizabeth Wood	Homer, AK
Beeman, Louise S.	Seattle, WA
Belieu, Marjorie	Homer, AK
Belieu, Chelsa M.	Homer, AK
Belieu, Jesanna	Homer, AK
Bellamy, Annette	Halibut Cove, AK
Bell, Cynthia	Kenai, AK
Benson, Charlene M.	Kenai, AK
Benson, Ted	Kenai, AK
Berlin, Melanie B.	Kenai, AK
Bitter, Daisy, Lee	Homer, AK
▸**Blanding, Margaret, A-MAE**	Homer, AK
Blankenship, Brent	Kenai, AK
Boddy, Rickey	Kenai, AK
Bodett, Tom	Homer, AK
Bollenback, Amy	Homer, AK
Bogel, J. Stanley	Los Angeles, CA
Bond, Andrew J.	Anchorage, AK
Bowens, Greg	Kenai, AK
Bradley, Marcus	Homer, AK
Brainard, Jessica G.	Homer, AK
Brau, John	Fritz Creek, AK
Breiby, Wendy	Homer, AK
Breslaw, Dan	Homer, AK
Brimberry, David L.	Eagle River, AK
Brookman, Gerald R.	Kenai, AK
Brooks, Josh	Homer, AK
Bury, Karen C.	Fritz Creek, AK
Bushell, Libby	Homer, AK
Butters, Dayton L.	Homer, AK
Butters, Sallie Dodd	Homer, AK
Butters, Wikima L,	Homer, AK

C

Cable, Sue Tallon	Homer, AK
Caldwell, Glenn E.	Homer, AK
Camp, Warren	Kenai, AK
Carlton, Stephen	Kenai, AK
Cassidy, Sylvia	Homer, AK
▸**Chavasse, Chris—CC**	Fritz, Creek, AK
Chesitis, Carolanne	Anchor Point, AK
▸**Child, Mark—MC**	Champaign, Il
Christopher, William G., Sr.	Kenai, AK
Clarke, Eric	Homer, AK
Clauss, Jim	Homer, AK
Clement, Kevin	Homer, AK
Clendenen, Dorine	Homer, AK
Clingman, Fred	Kenai, AK
Coen, Dora	Fritz Creek, AK
Cohl, Davey	Kenai, AK
Cole, Joanna L.	Kenai, AK
Collingsworth, (?) L.	Kenai, AK
Connolly, Nancy	Homer, AK
▸**Cooper, Joel—JC**	Homer, AK
Corelieus, D. L.	Kodiak, AK
Coulon, Gage Dennison	Princeton, NJ
Cox, Gloria	Kenai, AK
Creary, Judy	Kenai, AK
Crooks, Victoria	Grosse Pointe Woods, MI
Cullerton, Sean W.	Homer, AK
Curry, Christie	Anchor Point, AK
Curry, Jerry D.	Soldotna, AK

D

Daigle, Chris	Kenai, AK
Daniels, Donna, S.	Kenai, AK
Daniels, Sonny	Kenai, AK
Dartez, Ralph	Anchorage, AK
D'Atri, Bill	Anchorage, AK
Daunais, Cathleen	Fairbanks, AK
Davis, Joe	Fritz Creek, AK
De Vries, Virginia	Kelseyville, CA
Dodge, John C.	Homer, AK
Dragoo, Belinda	Homer, AK
Dragoo, Donald E.	Homer, AK
Drueseclou, Larry	Kenai, AK
Dumm, Don S.	Kodiak, AK
▸**Dunne, Willy—WD**	Fritz Creek, AK

E

Earll, Jody	Kenai, AK
Earll, Tracey A.	Kenai, AK
Edwards, Jennifer	Homer, AK
Ekman, B. M.	Kenai, AK
Elkins, David L.	Kenai, AK
Elkins, Pamela C.	Kenai, AK
Elkins, Therese, R.	Homer, AK
Eplee, Philip Rance	Kenai, AK
Evans, Benjamin	Chicago, IL
Evans, Donald O.	San Clemente, CA

F

Feiler, Linda	Anchor Point, AK
Fields, Athelda F.	Kenai, AK
Findling, George R.	Anchorage, AK

Fink, Janet	Homer, AK
Freeman, Cherilyn R.	Kenai, AK
Freeman, R. J.	Kenai, AK
Freeman, Carlos	Homer, AK
French, Ben L.	Arcata, CA

G

▸**Garoutte, Patricia—PG**	Grants Pass, OR
Gelbert, Randy	Homer, AK
Germano, Deborah J.	Homer, AK
Gherman, Dina	Anchor Point, AK
Gil, Shelley	Homer, AK
Gillies, Pam	Kenai, AK
Glad, Brian	Kenai, AK
Glad, Tawney M.	Kenai, AK
Gotti, Joanne	Anchorage, AK
Greenwale, Thomas Kane	Kenai, AK
Grimmer, Todd	Kenai, AK
Griswold, Frank	Homer, AK

H

Haag, William S.	Kodiak, AK
Hafemeister, Leslie	Homer, AK
Halpin, Robert	Homer, AK
Hamik, Jack	Homer, AK
Hammerstedt, David	Compton, CA
Hammerstedt, Elizabeth	Compton, CA
Hanley, (?)	Kenai, AK
Hansen, D.H.	Kenai, AK
Hansen, K. Dale	Kenai, AK
Harpole, Mary	Kenai, AK
Hart, Dixie	Homer, AK
Hays, Brenda	Homer, AK
Helm, Marilyn	Homer, AK
Hennessy, Betsy A.	Seattle, WA
Hermanns, Jeff	Kenai, AK
Heron, JoAnne	Homer, AK
Herreid, Chris	Homer, AK
Herrin, Christine	Kenai, AK
Herrin, Kevin D.	Kenai, AK
Herron, Shane	Douglas, AK
Hibert, Susan	Seattle, WA
Highland, Roberta	Homer, AK
Hoffman, Christine	Homer, AK
▸**Hoffman, Winslow—WH**	Homer, AK
Holland, Claire	Kodiak, AK
Holser, Karin	Wasilla, AK
Hosty, Charles R.	Kenai, AK
Hughes, Stephen, R.	Homer, AK
Hunt, Mary	Kenai, AK
Hunter, Elizabeth, A	Denver, CO

I

Ibele, Lyndon D.	Anchorage, AK
Imboden, Shaun	Homer, AK
Ince, Donald W.	Anchorage, AK
Inga, Tanya	Homer, AK
Inglima, Laura	Anchor Point, AK
Iredale, Ahna	Homer, AK

J

Jackman, Kelly	Homer, AK
Jenes, Heidi L.	Kenai, AK
Johngren, Emily R.	Homer, AK
Johnston, Neill Douglas	Homer, AK
Jones, Georgia	Homer, AK
Jones, Rick	Atlanta, GA

K

Kabisch, Sally	Homer, AK
Kangas, Kurt W.	Kenai, AK
Kassik, Frank	Kenai, AK
Keim, Frank	Marshall, AK
Kennedy, Mike	Homer, AK
▸**Kettle, Arthur—AK**	Homer, AK
▸**Kienle, Juergen—JK**	Fairbanks, AK
Kilcher, Mairus	Homer, AK
Kipp, Glenn J.	Kenai, AK
Kirk, Mike	Kenai, AK
Kleinleder, Peg	Homer, AK
Kleinleder, Rich	Homer, AK
Knudtson, Eric	Homer, AK
Kobayashi, Sylvia K.	Anchorage, AK
Konopka, Audry	Homer, AK

L

Lee, Wm. L.	Kenai, AK
Levine, Jim	Anchorage, AK
Lewis, Larry L.	Kenai, AK
Lewis, Valerie A.	Kenai, AK
Liebenthal, Jonathan	Kenai, AK
Lineback, Angela	Anchorage, AK
Livingston, Laurence	Homer, AK
Lloyd, David	Homer, AK
▸**Lord, Nancy—NL**	Homer, AK
Loshbaugh, Bonnie	Homer, AK
Love, Michale	Kenai, AK
▸**Lowe, Marie E.—MEL**	Homer, AK
Luskin, Noah	Seattle, WA
Lyle, John D.	Fairbanks, AK
Lyndes, Jan	Homer, AK

M

MacDermaid, Harry	Kenai, AK
Madsen, Dale, T	Kenai, AK
Martin, Mildred, M	Homer, AK
Martin, Pete K.	Bend, OR
▸**Matkin, Craig O.—CM**	Homer, AK
Matthews, Kris	Seattle, WA
▸**May, Rita M.—RMM**	White Heath, IL
McCauley, Michael, J.	Kenai, AK
McCava, Mike	Homer, AK
McKay, Thomas W., PE	Anchorage, AK
McNamara, Patrick	Homer, AK
McNiel, Barbara	Homer, AK
▸**McPherson, Marla D.—MDM**	Homer, AK
Meyer, Barbara	Homer, AK

Miller, Courtney	Seattle, WA
Miller, Michael	Seattle, WA
Millstein, Ben	Kodiak, AK
Mize, Mary J.	Kenai, AK
▸**Mohr, John Luther—JLM**	Los Angeles, CA
Morgan, Anne	Homer, AK
Morgan, Billy	Homer, AK
Morgan, Paige	Homer, AK
Mulligan, Margi	Douglas, AK
Munro, Mark	Homer, AK
Murphy, Maryjane	Homer, AK
Murray, Sandra R.	Seldovia, AK
Myers, Arthur B.	Homer, AK
N	
Nagar, Ornitte	Ann Arbor, MI
Neff, Myra	Homer, AK
Nelson, Beth	Homer, AK
Nelson, E.H.	Anchorage, AK
Nelson, Erich	Kenai, AK
Neumann, Elizabeth	Anchor Point, AK
Newton, Adar	Homer, AK
Nixon, Ingrid	Homer, AK
Northcott, T. J.	Kenai, AK
O	
O'Hara, Alison	Homer, AK
Ohlson, Richard J., Rev.	Homer, AK
OLivas, Julie	Homer, AK
O'Mear, Mel	Upper Lake, CA
O'Meara, Jan	Homer, AK
▸**O'Meara, Michael S.—MSO**	Homer, AK
Oppenheim, Deborah	Homer, AK
Orr, Danielle	Seldovia, AK
P	
Page, Bill	Kenai, AK
Pamela M ?????	Homer, AK
Parker, Jeanne	Homer, AK
Parks, Alan J.	Homer, AK
Parsons, Gail	Homer, AK
Patch, De	Homer, AK
Payne, Susan	Kodiak, AK
Pearce, Amy	Homer, AK
Pearson, Debbie	Kenai, AK
Pearson, Ted	Kenai, AK
Perry, K. G.	Kenai, AK
Person, Julia A.	Homer, AK
Persons, Wayne	Bradford, ME
Post, Joy	Homer, AK
Post, Sue	Homer, AK
R	
Rabottini, Lydia	Homer, AK
Redman, Linda	Homer, AK
Rhode, David	Cooper Landing, AK
Rhodes, James R.	Kenai, AK
Roberts, Penny	Homer, AK
Roche-Carlton, Laurel	Kenai, AK
Roe, Kurt	Homer, AK
Rooker, Gary	Kenai, AK
Rosenfel, Robert	Homer, AK
Russel, Priscella N.	Homer, AK
Rutzebeck, Deborah Allen	Homer, AK
Ruzanski, Stephen	Homer, AK
S	
Salinas, Gene	Valdez, AK
Saltz, John	Kenai, AK
Sandel, Yvonne	Kenai, AK
Schass, Michael R.	Copper Hill, VA
Schneider, Rachael	Homer, AK
Schmidt, George, R.	Anchorage, AK
Schmutzler, Stuart	Homer, AK
Schoepke, R. J.	Homer, AK
Schofield, Edward, E.	Fritz Creek, AK
Schofield, Janice	Fritz Creek, AK
Schollenberger, Mark	Homer, AK
Scholz, Dale	Anchor Point, AK
Schreiner, Don	Kenai, AK
Scott, Michael J., RPh	Homer, AK
Scritchfield, James A	Kenai, AK
Seeds, Greg	Kenai, AK
Seguna, Dave L.	Kenai, AK
Seguna, Sandra K.	Kenai, AK
Seiger, Carol A.	Heber City, UT
Simmons, Sabine	Homer, AK
Simmons, Scott	Homer, AK
Sinclair, Mark L	Anchorage, AK
Siranides, Dianne	Fairbanks, AK
Sjoeberg, Sunrise	Homer, AK
▸**Slater, Leslie—LS**	Homer, AK
Smith, Kenneth C.	Kenai, AK
Snodgrass, George R	Eagle River, AK
Sokarda, Patricia A.	Chino Hills, CA
Solvie, Susan	Homer, AK
Sortor, Paulette	Homer, AK
▸**Sowls, Art—AS**	Homer, AK
Squires, Catherine	Homer, AK
Stahl, Anita	Homer, AK
Stamm, Joan D.	Kirkland, WA
Steberl, Kathy	Homer, AK
Steward, Joy	Homer, AK
Streater, Ken	Seldovia, AK
Strickland, Bill	Kenai, AK
Strother, George C.	Wasilla, AK
Stutzer, David	Homer, AK
Sundmark, Dean	Homer, AK
Swan, Michael	Homer, AK
T	
Tausig, Heather C.	Brookline, MA
Tharnyer, Judy	Homer AK
Thorson, Scott	Anchorage, AK
Torian, Suzanne	Homer, AK
Tornes, Joanna	Homer, AK

Towne, Janice	Kenai, AK
Turnage, Ken	Kenai, AK
Turner, Lora	Homer, AK
Tyler, Richard, W.	Homer, AK
V	
Von Ziegesar-Matkin, Olga	Homer, AK
W	
Wade, Dennis	Homer, AK
Wade, Honora	Seattle, WA
Wade, Ruth	Homer, AK
Wade, Ruth E.	Billings, MT
Walker, Russell	Homer, AK
Ward, Eric	Kenai, AK
Waxman, Claire	Homer, AK
Webb, Elizabeth Ann	Homer, AK
Weiss, Adrienne	Los Altos, CA
Weekly, Michelle	Kodiak, AK
Wetzler, Sandra L.	Kenai, AK
White, Bernard D.	Kenai, AK
White, Michael	Homer, AK
Whytzl, Sharon	Homer, AK
Wiebe, Jane	Homer, AK
Wieland, Anne	Homer, AK
▸**Wienhold, Robert J.—RJW**	Eagle River, AK
Wilcox, Margaret	Anchorage, AK
Wilke, William	Homer, AK
Wills, Andrew M.	Homer, AK
Wills, Sally A.	Homer, AK
▸**Winder, Susan—SW**	Grants Pass, OR
Wise, John F.	?
Wolfe, Ronald R.	Juneau, AK
Woltjen, Sara	Homer, AK
Wyers, Abby	Homer, AK
Y	
Yourkowski, Michael	Homer, AK
Z	
▸**Zatz, Daniel—DZ**	Homer, AK
Initials*	
?B	Kenai, AK
CK	Kenai, AK
CMR	Kenai, AK
CS	Kenai, AK
CT	Kenai, AK
GM	Kenai, AK
G ?	Kenai, AK
JE	Kenai, AK
MLM	Kenai, AK
RDS	Kenai, AK
VM	Kenai, AK
??	Kenai, AK

*The names of the individuals signing these letters could not be read and the initials represent a best identification effort.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Rd.
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:
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REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

Memorandum

To: Regional Director, Alaska Outer Continental Shelf Region
Minerals Management Service

From: Acting Regional Director
Region 7
Rowan W. Gould

Subject: Comments on Draft Environmental Impact Statement (DEIS) - Cook Inlet Planning Area Oil and Gas Lease Sale 149

Thank you for the opportunity to review the subject document. Previously, the U.S. Fish and Wildlife Service (Service) provided comments on other stages of the planning and leasing process for this sale, notably, July 16, 1991, (reply to Request for Information); October 1, 1991, (reply to Request for Interest and Comments); December 17, 1991, (Notice enlarging the proposed lease sale); and March 20, 1992, (reply to Call for Information and Notice of Intent to Prepare an Environmental Impact Statement).

Of the seven alternatives presented in the DEIS, the Service supports Alternative IV, the Wildlife Concentration Deferral, because of the additional protection this alternative provides to Chisik, Duck and the Barren islands, all of which are important marine bird breeding colonies in Cook Inlet. Other Alternatives, such as V and VII, defer greater numbers of coastal tracts from the lease sale area and may result in a lower probability of a spill occurring there. It is difficult to imagine those Alternatives resulting in greater protection to the coastline, however, given the dynamic nature of water movements in Cook Inlet and the likelihood that oil would spread rapidly in the inlet should a spill occur. In fact, any large spill in Cook Inlet resulting from this lease sale is likely to have widespread effects on fish and wildlife resources because of this area's importance to marine birds and mammals.

We have some additional comments on the Effects Assessment for the various Alternatives. These assessments were generally well-written but do not place the potential impacts of a large spill on marine bird and mammal resources in proper perspective considering what we know of the effects of the *Exxon Valdez* oil spill. For example, a large spill might have catastrophic effects on nesting seabirds in Lower Cook Inlet and along the Alaska Peninsula. Some colonies in the potential path of a Cook Inlet spill, notably those on the Barren Islands and on the Semidi Islands, are the largest of their kind in the area and are of great regional significance.

We believe the assessment downplays not only the potential impacts of a large spill, but also the amount of coastline that could be affected and the time it would take marine birds to recover from such a spill. The Alaska coastal current will have a major influence in distributing oil spilled in Cook Inlet. After the *Exxon Valdez* spill, oil constrained in the Alaska coastal current travelled hundreds of miles to the west, affecting seabird colonies and sea otters far removed from the spill site. FWR-01

Recovery of seabird populations following an oil spill has two components: 1) a recovery of production (fledged chicks per nesting attempt) and 2) a recovery of populations. The former may occur well before the latter. In fact, population recovery will be related to the magnitude of spill-related mortality and may greatly exceed the one to three generations suggested in the DEIS. The DEIS also downplays the potential effects from disturbance at seabird colonies. It is our experience that disturbance of cliff-nesting seabirds often causes mass panic flights of adults from the colonies and results in abandonment of nests, and the mortality of eggs and chicks through being knocked off the cliff or predation by eagles and gulls. Any development related overflights or noisy boat traffic would have to give wide berth to seabird colonies. FWR-02

Lastly, regarding seabirds, we wish to point out that the murre population on the Barren Islands has already been seriously affected by the *Exxon Valdez* oil spill and the breeding population is only just recovering. What cumulative effects would result from another oil spill reaching this colony is unclear at this time.

Sea otters also would likely be affected by an oil spill in Cook Inlet as discussed in the DEIS. Although the population data for sea otters in Cook Inlet, the Kodiak Archipelago, and along the Alaska Peninsula may be imprecise, it is safe to say that thousands of sea otters may be at risk from a large spill in the planning area. As the *Exxon Valdez* oil spill has demonstrated, recovery of sea otter populations from a large spill in Cook Inlet would take years. Recently, the Service conducted a population survey for sea otters in the Kodiak Archipelago resulting in a new population estimate of about 6,100 otters (Service, unpublished data). Please consult Carol Gorbics of the Service's Marine Mammals Management Office at (907) 786-3804 if you require additional details on this survey.

A number of specific comments are provided in the attachment. If you require clarification of any of our comments or additional information, please contact Tony DeGange at (907) 786-3492.

Attachment

Attachment

Specific Comments

Vol. I; Figure III.A.2-7. This figure fails to identify even minor tide rips in Kennedy Entrance that are already noted on nautical charts. FWR-03

Vol. I; Page III.B.13; Paragraph 3. Add "A minimum of 10 minor harbor seal haulouts and pupping areas (<100 seals) exist in bays adjacent to Shelikof Strait." FWR-04

Vol. I; Figure III.C.6-1. This figure fails to identify the Foul Bay-Blue Fox Bay Unit of the Kodiak National Wildlife Refuge. FWR-05

Vol. I; Figures IV.A.2-3 and IV.A.2-4. No definition of an Environmental Resource Area is given in the text or on the figures. Very little of the Kodiak National Wildlife Refuge coastline was included in the oil-spill-risk-analysis yet the majority of the biological resources present in the Kodiak area are found on refuge lands. An important Steller's sea lion haulout at Cape Ugat is not included in any of the resource areas as well as eight minor harbor seal haulouts. The environmental resource areas also fail to incorporate important fin and humpback whale foraging areas in Uyak and Uganik bays. Sea otter concentrations are present in the same areas. FWR-06

We are also concerned that many drift beaches, which we know received heavy oiling from the *Exxon Valdez* spill were not used in the analysis - an obvious shortcoming of the "spill" model. FWR-07

Vol. I; Page IV.B1.57; First Sentence. Change to "Humpback whales are present in this area from late May to the middle of November." FWR-08

Vol. I; Graphic 4. The brown bear and Sitka black-tailed deer coastal habitat maps are grossly inaccurate for Kodiak Island. A number of key wintering locations for black-tailed deer were omitted, such as Seven Mile Beach, Olga Bay Flats, Aliulik Peninsula, and Sitkalidak Island, to name a few. The same is true with brown bear spring concentration areas along Kodiak Island's western coast. Coastal portions of Grant's, Halibut, Sulua, and Portage Bays, and the Aliulik Peninsula are used extensively by brown bear during the spring. FWR-09

Vol. II; Page C-7; Paragraph 5. The mortality estimate for harbor seals does not reflect the many seals found on minor haulouts throughout the potential spill area. FWR-10

Vol. II; Page C-9; Section 3. It does not appear that populations of sea otters in Viekoda, Terror, Uganik, Spiridon, Zachar, and Uyak Bays are considered in the mortality estimate. Much of this area was impacted by the *Exxon Valdez* oil spill and would likely be impacted again by a spill in the planning area. FWR-11

Last Paragraph on Page C-9. The mortality estimate does not include or discuss the Cape Ugat Steller's sea lion haulout which was impacted by the *Exxon Valdez* oil spill. FWR-12

Vol. II; Page C-11; Paragraph 1, Sentence 1. The conclusion that Sitka black-tailed deer are not present on the beaches of the Kodiak Archipelago during April is not true. The density of deer and their dependence on beach habitats does not notably decrease until "greenup" is well under way. Greenup usually occurs from mid to late May on Kodiak, Afognak, and Shuyak islands. FWR-13

Vol. II; Page C-11; Paragraph 3. Impacts of the *Exxon Valdez* oil spill on river otters have yet to be fully determined or assessed, so the statement that no impacts would result is premature. FWR-14

Vol. II; Page I-5; Last Paragraph, First Sentence. Change to "Fall migration occurs from September to November with some fin whales wintering in the Gulf of Alaska; however, most of the North Pacific population is believed to winter far offshore at latitudes from central California to Baja California." Winter observations of fin whales during the majority of the past 15 years would indicate this is more than a possibility.

Vol. II; Page I-13; Paragraph 1. Same comments as above. FWR-15

Vol. II; Page I-18; Paragraphs 5 and 7. No suitable areas off-refuge exist along the western shore of Kodiak Island. An oil terminal is not a compatible refuge use. See the Kodiak National Wildlife Refuge Comprehensive Conservation Plan. FWR-16

Vol. II; Page 39; Figure 3. No National Wildlife Refuge lands exist at the head of Izhut Bay on Afognak Island or at the head of Kaiugnak Bay on the east side of Kodiak Island. Also, many Alaska Maritime National Wildlife Refuge lands on the eastern coast of the Kodiak Archipelago are not identified.

Vol. II; Page 41; Figure 4. Two minor Steller's sea lion haulouts on the Cape Douglas reef and near Shaw Island are not identified. Each has 75-100 sea lions.

Vol. II; Page 57; Figure 5. Harbor seal haulouts in Viekoda, Uganik Pass, and Uganik Bay, accounting for several hundred animals, are not included in the figure.

Vol. II; Page 58; Figure 6. This figure is difficult to understand. FWR-17

FWR-01

The MMS believes the potential effects of the proposal on marine and coastal birds has been adequately addressed in the EIS. The comparison between the assumed 50,000-bbl spill and the EVOS needs to factor in the type of crude oil in Cook Inlet compared to Prudhoe Bay crude oil. The oil assumed to be discovered in the Sale 149 area is expected to be a much lighter crude oil, similar to upper Cook Inlet crude that disperses more rapidly in the water, than the more viscous Prudhoe Bay crude oil spilled in the EVOS. The size and the nature of the spill must be considered. The EVOS was more than 200,000 bbl and the assumed spill under the proposal is 50,000 bbl, one-fourth the size of EVOS; and the EVOS was an instantaneous spill occurring under calm sea-weather conditions that were unusual, even for Alaska-Prince William Sound. It is very unlikely that a spill in the Sale 149 area would occur under similar conditions. Wind and wave conditions are likely to disperse-evaporate much of the 50,000-bbl spill within a few days (Table IV.A.3-1 of the EIS). The total loss of marine and coastal birds may exceed several thousand. The total estimated loss of birds to spills under the proposal has been increased to 100,000 in response to this comment and other similar comments. However, the estimated recovery time has not been revised. Further investigations of bird colonies affected by the EVOS, particularly the Barren Islands, have not verified the predicted long recovery times of several generations or >50 years predicted by Heinemann (1993).

FWR-02

The recovery time estimated for seabird colonies affected by the proposal in the DEIS is based on the number of breeding adult birds attending the colonies and productivity of the colony. The total number of surplus adult or immature birds associated with the colonies is difficult to know before or after an oil spill and cannot reasonably be used to measure recovery times due to natural variation and natural mortality. Population recovery must be determined by what can be reasonably measured. Regarding potential effects on seabird colonies from disturbance, the amount of air (2-4 round trips/day) and vessel (1-2 round trips/day) traffic is very low compared to existing air and vessel traffic along the coast of lower Cook Inlet and the Kenai Peninsula. Air and vessel traffic associated with the proposal is very unlikely to pass near or over the major seabird colonies adjacent to the Sale 149 area, such as the Barren Islands or Chisik-Duck Islands, because this traffic is expected to be coming out of Kenai and going directly to and from the offshore platforms and not pass near any of these important colonies. The ITL No. 1 on Bird and Marine Mammal Protection recommends that the lessees and their contractors avoid passing within 1 mile of known bird-concentration areas, including seabird colonies (see Sec. II.J for the purpose and effectiveness of this mitigating measure). Thus, the effect of disturbance from air and vessel traffic on marine and coastal birds associated with the proposal is expected to be minimal. Regarding the concern about aircraft disturbance of seabird colonies, a recent study by Curry and Murphy (1995) indicated no significant decrease in reproductive success of thick-billed murres nesting in colony plots subject to heavy aircraft disturbance on St. George Island, Alaska, compared to colony plots farther away from the airport.

FWR-03

Figure IV.A.2-7 has been modified to show the area of tide rips.

FWR-04

The suggested change in the text has been made in Section IV.B.4.a(2).

FWR-05

Figure III.C.6-1 has been modified so that the Foul Bay-Blue Fox Bay Unit of the Kodiak National Wildlife Refuge is identified.

FWR-06

Environmental Resource Areas (ERA's) and Land Segments (LS's) are areas where particularly notable wildlife concentrations are known to occur, or are expected to be occupied frequently by portions of wildlife populations. Vulnerable species or species groups that are expected to occur in these areas are listed in Table IV.A.2-1. The number of such areas incorporated into the OSRA model is limited to 31 of the most important areas by model constraints; thus, it was not possible to include areas occupied by lesser concentrations of wildlife. Because Cape Ugat is located near (about 7.5 km) the southern edge of ERA 10, analysis of oil-contact probability at the cape typically would be assumed to be the same as at ERA 10. Also, Cape Ugat is included within LS 70, which would provide a second estimate for probability of oil contact for analysis of risk to wildlife concentrations in this area. A similar argument could be advanced for coverage of Uganik Bay, and Uyak Bay is included within LS 69, which provides a contact-probability value for oil-spill-risk analysis. An explanation of these two types of areas has been added to Section IV.A.2.

FWR-07

Information regarding EVOS oiling of Cook Inlet and Shelikof Strait shoreline was included in Section IV.A.3.c. The environmental sensitivity index (ESI) for Sale 149 shoreline types is shown in Figure IV.A.3-3. The shoreline type (such as drift beaches) is considered in analyzing the persistence and weathering of oil and subsequent effects on the environment. The MMS's oil-spill-trajectory model currently does not include shoreline type. The MMS currently is working on a model that includes shoreline type and the interaction of oil along the shoreline.

FWR-08

The period of humpback whale presence in the Barren Islands area has been modified to reflect recent observations (in Sec. IV.B.1.f(2)).

FWR-09

All of the wintering areas for Sitka black-tailed deer mentioned in this comment (with the exception of Seven Mile Beach), including Olga Bay Flats, Aliulik Peninsula, and Sitkalidak Island, are on the southeast side of Kodiak Island and are very unlikely to be affected by the assumed 50,000-bbl spill under the proposal. However, Graphic 4 has been revised to include these habitat areas. Brown bear spring concentration areas—Grant's, Halibut, Sulua, and Portage Bays—also have been added to Graphic 4 in response to this comment.

FWR-10

The mortality estimate is based on the estimated population of harbor seals at haulouts within or immediately adjacent to the sale area that have the highest probability of being contacted by oil, if an oil spill occurs, based on the OSRA model. Some minor haulouts at greater distances from the sale area also may be contacted by spilled oil, but it is difficult to know which ones, to what extent they would be affected, and what mortality would occur, if any, due to the numerous variables involved. The OSRA model estimates a ≤2-percent chance of a spill contacting any harbor seal habitat (within 30 days) other than the habitat included in calculating the mortality estimate. The estimate is intended to give a general idea of potential mortality.

FWR-11

The mortality estimate is based on the estimated population of sea otters in the major high-use areas within or immediately adjacent to the sale area that have the highest probability of being contacted by oil if an oil spill occurs, based on the OSRA model. Some minor use areas at greater distances from the sale area also may be contacted by spilled oil, but it is difficult to know which areas, to what extent they would be affected, and what mortality would occur, if any, due to the numerous variables involved. The OSRA model estimates a ≤2-percent chance of a spill contacting sea otter habitat (within 30 days) in the specific areas referred to in the comment. The estimate is intended to give a general idea of potential mortality.

FWR-12
The referenced discussion of the potential effects of a 200,000-bbl spill on Steller sea lions employs a regional approach to estimate population-level effects that may adversely influence this declining species; thus, discussion of specific haulouts other than major rookeries was not seen as essential to this objective. Although the Cape Ugat haulout may have been contacted by EVOS oil, it is not likely that mortality resulted, because postspill studies found no evidence of sea lion mortality anywhere in the affected area. At this point, it is not possible to determine with precision the potential interactive effects of oil contact and declining population. The probability of contact in the Cape Ugat area from a spill in the southern portion of the proposed sale area is no greater than 2 percent; elsewhere it is <0.5 percent.

FWR-13
The text in Appendix C, Section II.G, has been revised in response to this comment. However, the conclusion on effects on Sitka black-tailed deer has not been revised. The EVOS occurred in late March and contacted Sitka black-tailed deer winter habitats in Prince William Sound in April, but the findings of the EVOS study on Sitka black-tailed deer indicated no evidence of oil ingestion by deer or deaths attributable to the spill (Lewis and Calkins, 1991). If the EVOS occurred earlier in the year, during midwinter, perhaps some deer would have been affected.

FWR -14
The conclusion to the impacts of the 200,000-bbl spill on river otters in Appendix C, Section II.G, does not say that "no impacts would result." It states that overall populations of river otters and other terrestrial mammals are not expected to be affected by the spill. Published results of EVOS studies on river otters indicate adverse effects such as reduction in body mass, reduced diet diversity, and avoidance of preferred habitats oiled by the spill on individual otters or groups of otters frequenting oiled areas as compared to otters in adjacent unoiled home ranges (see discussion in Sec. IV.B.1.g(1)(c)). No findings suggest that there were population-level effects on river otters in Prince William Sound.

FWR-15
The text cited regarding fin whale wintering is in the Section 7 Biological Evaluation document, included in the EIS as part of the Section 7 Consultation documentation and, as such, is not subject to change. The commenter should note that in Section III.B.5.a of the EIS, fin whales are indicated as wintering in the Kodiak Island area.

FWR-16
Please refer to the response for Comment FWR-15; the Section 7 Consultation Biological Evaluation document is not subject to change. The scenario used in the Biological Evaluation for Threatened and Endangered Species with Respect to the Proposed Cook Inlet/Shelikof Strait Oil and Gas Lease Sale 149 portion of Appendix I represented a best-estimate assumption at the time the Biological Evaluation was prepared and is subject to change as a result of further information. In this case, most of the Shelikof Strait part of the Cook Inlet/Shelikof Strait Planning area was subsequently deleted from the proposed Sale 149.

FWR-17
Please see Errata page, Appendix J.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR, FISH AND WILDLIFE SERVICE

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REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

April 12, 1995

Memorandum

To: Regional Director, Alaska Region, Minerals Management Service

From: Chief, Air Quality Branch, Fish and Wildlife Service

Subject: Draft Environmental Impact Statement for the Proposed 1996 Outer Continental Shelf Oil and Gas Lease Sale 149 in Cook Inlet

We have reviewed the draft Environmental Impact Statement (DEIS) for the proposed 1996 Outer Continental Shelf (OCS) oil and gas lease sale 149 in Cook Inlet. The proposed action would offer 402 blocks of the Cook Inlet Planning Area for leasing. These blocks are located approximately 5 km east of Tuxedni Wilderness Area (WA), a very important sea bird sanctuary and a Class I air quality area administered by the Fish and Wildlife Service (FWS).

The DEIS examined some of the effects on air quality that might occur as a result of the lease sale. For the analysis, the DEIS considered three cases (low, base, and high) relating to different amounts of oil discovered. The low case assumed a minimum amount of industrial activity. The base and high cases assumed more industrial activity resulting from oil development and production. The base case would result in the production of 100 to 300 million barrels (MMbbl); the high case would result in the production of 550 to 1,100 MMbbl.

Emissions of nitrogen oxides (NO_x), PM-10, and sulfur dioxide (SO_2) for the peak development year are summarized in the table below.

	ESTIMATED EMISSIONS FOR PEAK DEVELOPMENT YEAR (TONS PER YEAR)		
	NO_x	PM-10	SO_2
Base Case	2,070	163	249
High Case	3,308	246	445

The DEIS modeled the annual nitrogen dioxide (NO_2) impact at Tuxedni WA from the proposed action during the peak development year. The predicted NO_2 impact for the base case is 0.51 micrograms per cubic meter ($\mu g/m^3$); the predicted NO_2 impact for the high case is 0.88 $\mu g/m^3$. These impacts consume 20 and 35 percent of the Class I increment, respectively, a significant contribution to the increment consumption. (Note: FWS uses significant impact levels to evaluate a source's contribution to increment consumption.) FWS significant impact levels are shown in the following table.

Pollutant	Averaging Times	FWS Class I Sig. Impact Levels ($\mu g/m^3$)
SO_2	Annual 24-hour 3-hour	0.025 0.07 0.48
PM_{10}	Annual 24-hour	0.08 0.27
NO_2	Annual	0.025

The DEIS indicates that impacts of SO_2 and PM-10 emissions were also modeled for the Class I area, but these results were not stated. We ask that you provide these analyses for the short-term (3-hr, 24-hr) and long-term (annual) impacts to the Class I SO_2 and PM-10 increments. FWA-01

Because the proposed action would contribute significantly to NO_2 Class I increment consumption, we ask that you perform a cumulative analysis for NO_2 increment consumption. This analysis should include all NO_2 increment-consuming sources in the area. In addition, if the proposed project contributes significantly to SO_2 or PM-10 Class I increment consumption (short- or long-term), cumulative analyses should be performed for those pollutants also. FWA-02

We evaluated potential visibility impacts at Tuxedni WA from the proposed action using the VISCREEN model. Both the base and high cases failed VISCREEN at a 10-km distance from the wilderness area using a 100-km background visual range. This indicates a potential exists for plume impacts at Tuxedni WA. Plume impacts would constitute an adverse impact to the Class I area and, therefore, would be unacceptable. Congress established as a national goal "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution" (Section 169A, Clean Air Act as amended in 1977). FWA-03

In summary, the DEIS has not adequately addressed cumulative impacts to the Tuxedni WA, particularly Class I increment consumption. In addition, the proposed action has the potential to cause adverse impacts to the visibility of the Class I area. We suggest that Alternative IV be adopted. Alternative IV would delete 52 blocks near Tuxedni WA from the lease sale, thus reducing impacts to the Class I area.

If you have any questions regarding this matter, please call Ellen Porter at (303) 969-2617.

Sandra V. Silva

Sandra V. Silva

cc:
Director, Minerals Management Service
Department of the Interior
Room 4230
1849 C Street NW
Washington, D.C. 20240

FWA-01
The highest predicted onshore concentrations of SO and PM-10 in the peak-development year using the OCD model are as follows:

		Concentrations ($\mu g/m^3$)		
Pollutant	Averaging Time	Base Case	High Case	PSD Class 1 Standard
Sulfur Dioxide	Annual Average	0.058	0.067	2
	Max. 24-hr	0.76	0.87	5
	Max 3-hr	3.61	4.2	25
Particulate Matter (PM-10)	Annual Average	0.058	0.067	4
	Max. 24-hr	0.76	0.87	8

Highest predicted concentrations of sulfur dioxide and PM-10 during the exploration and production phases would be lower than those during development activities. These concentrations exceed the Class I significant impact levels defined by the Fish and Wildlife Service. However, a PSD increment-consumption analysis was not performed, because not enough specific information is available in the prelease stage (see response to Comment FWA-02).

FWA-02
The air-quality modeling for the proposed lease sale represents a worst-case analysis of potential impacts on the Tuxedni Wilderness Area (WA). At the prelease stage, MMS does not have the specific information necessary to conduct a PSD increment consumption analysis as requested by the commenter. Such an analysis will be performed in the postlease stage each time a lease operator submits a permit application for any exploration, development, or production project that has the potential for impacting the Tuxedni WA.

FWA-03
Please see the response to Comment FWA-01.

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892

IN REPLY REFER TO:

L7619(ARO-REC)

RECEIVED
APR 20 1995
2:00pm
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

APR 19 1995

Memorandum

To: Regional Director, Minerals Management Service, Alaska Region

From: Regional Director, National Park Service, Alaska Region

Subject: Review of Draft Environmental Impact Statement for the Proposed 1996 Outer Continental Shelf Oil and Gas Lease Sale 149, Cook Inlet

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (EIS) for Proposed 1996 Outer Continental Shelf (OCS) Oil and Gas Lease Sale 149. The National Park Service (NPS) is concerned about potential impacts to coastlines of Katmai National Park, Aniakchak National Preserve, and Lake Clark National Park and Preserve, especially areas previously injured by the Exxon Valdez Oil Spill (EVOS).

NPS-01

In our March 18, 1992, scoping comments we recommended that any leasing in lower Cook Inlet and Shelikof Strait be deferred until the full extent of injury from the EVOS to federal/state trust resources, including those of the NPS, is known and the damaged resources have recovered to appropriate pre-spill conditions. In addition to again requesting that you delay Lease Sale 149, we are also requesting your assistance in cooperatively developing a coastal resource studies program to understand and address the impacts of OCS Lease Sales in Cook Inlet. Increased OCS oil and gas activities in Cook Inlet have the potential to be counterproductive to ongoing EVOS restoration efforts, which emphasize minimization of added stress to impacted resources during their recovery period. Future exploration, development, production and transportation of oil within and away from Cook Inlet will increase the risk of spills and damage to significant natural and cultural resources of Cook Inlet, Shelikof Strait and beyond (including units of the National Park System).

In March 1992 the EVOS Trustees Council was initiating and continuing efforts to restore resources injured by the spill, and plans for further studies were underway. Most studies have been focused on Prince William Sound, and very little information has been provided in Cook Inlet and the Gulf of Alaska. Although some species studied in Prince William Sound by the EVOS Trustee Council restoration projects are showing evidence of recovery, no species in Katmai National Park or Aniakchak National Preserve are known to be recovering. Until studies are completed that show recovery of resources injured from EVOS impacts in the National Park System unit coastal zones in Cook Inlet and Shelikof Strait, further increases in oil spill risks to the area should be avoided.

NPS-01

Some studies of effects from the EVOS have shown recovery for certain species in Prince William Sound. However, there are differences between the Sound and the Cook Inlet coasts in life history and habitat requirements for some injured species. This makes implementation of management decisions based on Prince William Sound data uncertain. There is currently a project in process with the EVOS Trustee Council restoration program to collect baseline data and detect trends in population parameters of intertidal organisms on the Katmai and Aniakchak coast. There is also a Trustee Council restoration program proposal to evaluate the status of harlequin ducks on the Katmai National Park, Kodiak Island, and Kenai Fjords National Park coastlines. A study is continuing to determine the persistence of oil in mussel beds at specific points within Katmai National Park as well as an ongoing fate and persistence study for oil form the EVOS.

The present NPS coastal resources program is limited. At Lake Clark National Park, the NPS is in the second year of a three-year inventory and monitoring effort to gather baseline information on its coastal resources. In addition, a study of the baseline hydrocarbon and intertidal fauna for various geomorphological classifications in Lake Clark National Park is in progress. A seabird study for the Katmai coast has just been funded for this year. The ongoing and planned projects will help us better understand the full extent of the injury from EVOS as well as provide a much better basis for our ability to understand or predict the potential impacts of an oil spill in Cook Inlet to NPS coastal resources.

We estimate that in five years there will be sufficient additional information available to help in analyzing the impacts of a subsequent oil spill affecting the coastal resources of the National Park System units. The Minerals Management Service (MMS) could perform a valuable service by assisting NPS to expedite its coastal resource studies. The timely completion of the studies could prove to be invaluable to MMS in the planning and analysis of OCS lease sales. We welcome the opportunity to discuss the development of a cooperative coastal resource studies program with you.

If MMS decides to proceed with Lease Sale 149 prior to the completion of the studies of the coastal resources affected by the Exxon Valdez Oil Spill, we request, in addition to a cooperative study program, that MMS do the following:

In cooperation with NPS, develop and analyze an additional Lease Sale alternative for the final EIS that minimizes the risk of oil spills (originating either in Cook Inlet or from the transportation of Cook Inlet oil through the Gulf of Alaska) occurring and affecting the following resources:

a. Units of the National Park System,
b. McNeil River State Game Sanctuary (National Natural Landmark),
c. National historic landmarks with coastal frontage,
d. State and local parks/recreation areas with coastal frontage that have received federal assistance through the Land and Water Conservation Fund.

Detailed review comments are enclosed. Please direct your questions, if any, to Joan B. Darnell, Chief, Division of Environmental Quality, at (907) 257-2648.

Ralph Tingey
for Robert D. Barbee
Regional Director

Enclosure

NPS Review of MMS' Draft EIS for Oil/Gas Lease Sale 149, Cook Inlet (April 13, 1995)

<u>NPS Concerns</u>

1. Evidence of the Exxon Valdez Oil Spill (EVOS) persists in varied locations along the Katmai National Park coast.

Katmai was one of the hardest hit of any area outside Prince William Sound during EVOS. Several individual beaches were as heavily oiled. Today, at least six locations in Katmai National Park still hold heavy deposits of Prudhoe Bay crude oil from the spill just under the surface.

2. Katmai National Park wildlife populations have not yet recovered from EVOS.

The EVOS Trustee Council has addressed and prioritized various species impacted by the spill. Most of its analysis also holds true for park and preserve ecosystems. Species and resources believed to be injured and now recovering from the spill are some intertidal organisms, killer whales, bald eagles and black oystercatchers. Resources and species injured by the spill and not recovering are harbor seals, sea otters, common murres, harlequin ducks, marbled murrelets, pigeon guillemots, Pacific herring, pink salmon, sockeye salmon (specific locations), archeological sites, some intertidal organisms, mussel beds and commercial fishing. Resources and species injured by the spill and for which recovery status is unknown are river otters, Dolly Varden trout, rockfish, designated wilderness areas, recreation, and tourism.

We do not know how the chronic contamination from EVOS impacts the local ecology. It is relatively unknown and unstudied in depth. Almost all research into the spill impacts on natural processes are restricted to Prince William Sound.

Harbor seals were impacted by the EVOS which exacerbated an already declining population. Future oil spills could further impact this species.

Sea otters were once common on the Katmai coast. Over 500 otters were observed in the Hallo Bay - Shakun Islets area days before oil from the Exxon Valdez struck the coast. More than 30 dead sea otters were recovered from Katmai beaches in the first months following the oil spill, representing only a fraction of the actual total lost. Information on the impact of the oil spill to the population is not available.

Nearly eight thousand bird carcasses were recovered from the Katmai coast following the EVOS. Post-oil spill restoration needs for coastal birds are being assessed. Long term impacts NPS-02

1

and recovery may not be known for many years. Bald eagle nest failure was 18.9% during the summer of the oil spill. There is little to no information to assess impacts from EVOS to other injured coastal species such as harlequin ducks, black oystercatchers, or marbled murrelets. NPS-02

3. The basic capacity to handle the containment and cleanup of major marine oil spills in these waters under average conditions has not been demonstrated. Until we have the proven technology and infrastructure at a state of readiness to protect the natural and cultural resources of units of the National Parks System, further oil spill risks should be minimized. NPS-03

4. Until studies show that recovery of key ecological indicator species injured from EVOS impacts in the Katmai National Park and Aniakchak National Preserve coastal zone are completed, further increases in oil spill risks to the area should be avoided. NPS-04

5. Lease Sale 149 mitigation measures should ensure that the EVOS Trustee Council's restoration goals are not impeded by future oil/gas activities. For example, the EVOS Trustee Council restoration program studies for the collection of base-line data and the detection of trends in population parameters should be completed prior to exploration. NPS-05

<u>Adequacy of Draft EIS</u>

1. Draft EIS, page III.A.2, Volcanism: Reference is incorrectly made to Katmai National Monument rather than Park and Preserve. NPS-06

2. The potential impacts from future oil spills to National Park System unit wilderness, visitor, recreational, natural and cultural resource values are not adequately addressed by the Draft EIS. The extrapolation of data trends elsewhere are extensively used in the Draft EIS and may not be appropriate for specific National Park System unit coastal habitats. NPS-07

3. Draft EIS, page III.C.18, 6 a. (1):

The heading should read Katmai National Park and Preserve. NPS-08

The discussion ~~needs~~ to identify the nationally significant values recognized in the legislation establishing Katmai National Park and Preserve. With this information the EIS should analyze the potential impacts to these values in the Environmental Consequences section. NPS-09

The discussion of the condition of Katmai National Park beaches suggests that EVOS oil is no longer present. This is untrue as subsurface Exxon Valdez oil has been documented. Oil presently exists in great quantities under a thin cap of tar and asphalt. NPS-10

2

When disturbed by foot traffic and exposed to water, these areas still produce sheen. All of the oiled coast of Katmai National Park is designated wilderness. NPS-10

4. Draft EIS, page III.C.18, 6 a.:

The Affected Environment section needs to recognize the existence of Aniakchak National Monument and Preserve as it could also be affected by a Cook Inlet spill. The discussion needs to identify the nationally significant values recognized in the legislation establishing Aniakchak National Monument and Preserve. With this information the final EIS should analyze the potential impacts (and consequences of the impacts) to these values in the Environmental Consequences section. NPS-11

5. Draft EIS, page III.C.18, 6 a. (2):

The discussion needs to identify the nationally significant values recognized in the legislation establishing Lake Clark National Park and Preserve. With this information the final EIS should analyze the potential impacts (and consequences of the impacts) to these values in the Environmental Consequences section. NPS-12

6. Draft EIS, page III.C.20, 6 b. (1):

The discussion needs to identify the nationally significant values leading to the designation of the McNeil River State Game Sanctuary as a National Natural Landmark. With this information the final EIS should analyze the potential impacts (and consequences of the impacts) to these values in the Environmental Consequences section. NPS-13

7. Draft EIS, Figure III.C.6-5:

The yearly trends of 1978-80 should be replaced with updated information. The title of the Figure and/or the discussion of the data (page III.C.21) are not consistent and need to be revised. NPS-14

8. Draft EIS, page IV.B.1-88, Section M:

The proposed action under Lease Sale 149 provides what could prove to be relatively short-term economic benefits at the risk of further injury or damage to nationally significant resource values as well as the economic benefits associated with visitor appreciation of those resource values. The Katmai National Park coast was "discovered" in 1989 by oil spill response and clean-up workers. Many of the oil spill workers and contractors realized the potential for ecotourism on the Katmai shores after working there on the spill. Many returned in later years as ecotour providers and are the nucleus for a fast growing industry. NPS-15

3

Figures are scarce and imprecise for coastal use, but the best available estimates indicate use tripled in the first four years after the oil spill. With the present popularity of Alaska with global tourism markets, recent television and magazine features on Alaskan brown bears and the Kodiak area, and the overloaded conditions at other popular bear viewing locations in Alaska, we can only expect further increases in coastal Katmai recreational use and impacts to designated wilderness values. The potential impacts of a spill to this new industry should be evaluated in the EIS. NPS-15

9. Draft EIS, pages IV.B.1-89 & IV.B.1-90, (2):

The coast of Katmai National Park and a portion of the coast at Lake Clark National Park (Chinitna Bay) are designated wilderness. This fact should be noted and considered in the impacts analysis. NPS-16

4

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NPS-01
Except for the northwestern part, most of the Shelikof Strait has been deleted from the Sale 149 area.

The request to delay the sale is addressed in the responses to Comments NPS-03, NPS-04, and NPS-05.

In May 1995, MMS Alaska OCS Region staff met on two occasions with NPS Alaska Region staff to discuss information related to developing a coastal resource studies program. We have taken the comments into consideration and, where appropriate, developed proposals for new studies. The MMS very much appreciated the NPS suggestion relative to recommended changes to the study titled *Exxon Valdez Oil-Spill Cleanup: A Synthesis of Existing Community-Based Social Information, 1989-1995* and has incorporated the suggestions accordingly. Also, MMS received a proposed cooperative study drafted by NPS staff titled *Forage Fish Assessment of the Cook Inlet Gas and Oil Development in Affected Areas*. This study will be incorporated in our next Alaska Environmental Studies Strategic Plan, which still will provide sufficient time to obtain the information needed for postsale decisions.

The MMS Alaska OCS Region staff met with NPS Alaska Region staff to discuss an additional lease-sale alternative that would minimize the risk of oil spills contacting NPS coastal areas in Cook Inlet and Shelikof Strait. Although an additional alternative was not developed, MMS believes the Northern Deferral Alternative would help address NPS's objective to minimize risk to their coastal areas.

Following the *Exxon Valdez* oil spill, none of the other activities that might affect the resources of the area and disrupt recovery and interfere with restoration-monitoring programs have been stopped; these activities include commercial, recreational, and subsistence fishing; the discharge of municipal wastewaters; oil and gas production in upper Cook Inlet; and marine transport of crude and refined petroleum. The commercial finfisheries include harvesting all five species of salmon, halibut, herring, and pacific cod. The commercial shellfisheries include harvesting tanner crab, razor clams, hardshell clams and mussels, green urchins, sea cucumbers, scallops, octopus, and shrimp. Recreational finfisheries consist mainly of salmon and halibut and shellfisheries of razor clams and dungeness crabs. Subsistence finfisheries target salmon while the shellfishes harvested razor clams, butter clams and cockles, chitons, mussels, crabs, shrimp, and octopus.

Between 1989 and 1995, approximately 74 MMbbl of oil have been produced in upper Cook Inlet—this is about 37 percent of the amount estimated for Sale 149.

NPS-02
Of the 8,000 bird carcasses recovered from the Katmai coast, many of these birds may have been killed by the EVOS from other areas upstream of Katmai and drifted with the oil to the Katmai shoreline. Whether there are long-term effects from the spill on many species such as murrelets and oystercatchers probably never will be known, because baseline information on population levels and productivity prior to the spill is unknown. Although relatively short-term effects on bald eagle abundance and productivity from the EVOS were documented (see Sec. IV.B.10.D), investigators predicted that the eagle population would recover by 1992 (Bowman, Schempf, and Bernatowicz, 1995).

NPS-03
The MMS has established stringent requirements for spill prevention and employs an inspection program to ensure compliance (Sec. IV.A.4.b of the EIS). Through spill prevention requirements and the inspection program MMS endeavors to prevent oil spills, and if these efforts are successful, cleanup of a major spill would not be required—which may be the only practical demonstration suggested by the comment.

As part of the prevention efforts, oil-spill-contingency plans (OSCP) must be submitted and approved by MMS prior to conducting any drilling operations on OCS leases. The ITL No. 2, Information on Sensitive Areas to be Considered in the OSCP, reminds lessees that biological and culturally sensitive areas, such as national parks and preserves, should be given consideration in OSCP's.

Also, MMS uses inspection, equipment deployment, and table-top communications exercises to ensure that the lessee has trained, knowledgeable crews and well-maintained equipment to respond to spills.

NPS-04
The comment does not provide any information about what species the NPS considers to be key ecological indicators nor does it indicate the type or extent of the injury to any of them nor how long recovery might take. Such an open-ended requirement could be the basis for long-term delays in any activity. As noted in the response to Comment TAG-08, none of the other activities that might affect the resources of the area and disrupt recovery and interfere with restoration monitoring programs have been stopped; these activities include commercial, recreational, and subsistence fishing; the discharge of municipal wastewaters; oil and gas production in upper Cook Inlet, and marine transport of crude and refined petroleum.

If commercially recoverable quantities of oil are discovered as the result of Sale 149, production is estimated to begin in the year 2003—about 14 years after the *Exxon Valdez* oil spill. In the analysis of the effects of a large (≥1,000 bbl) oil spill for Sale 149, it was estimated that populations of many of the species that might be affected by such a spill would recover after several years.

NPS-05
The Information on Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans ITL and Protection of Biological Resources Stipulation have been developed to protect environmentally sensitive areas and their concentrations of marine birds, marine mammals, fishes, and other biological resources that are known or may be identified in the future.

The *Exxon Valdez* oil spill occurred in 1989, and exploration-drilling activities for Sale 149 are estimated to begin in 1997—8 years after the spill. This interval between the spill and the start of Sale 149 exploration activities allows a number of years to conduct baseline studies. The *Exxon Valdez* Oil Spill Trustee Council's 1995 Status Report shows recovery trends for biological resources injured as a result of the EVOS. Recovering species include the bald eagle, some intertidal and subtidal organisms, mussels, and the killer whale. Species that are listed as not recovering include common murre, harbor seal, some intertidal and subtidal organisms, and the sea otter. The species whose recovery status is unknown include clams and the river otter.

The effects on Cook Inlet resources that might be affected by exploration-drilling activities are analyzed in Section IV.B. In general, these effects are local (within several hundred meters of the drilling site) and short term (several months during the drilling operations).

NPS-06
The Katmai National Park and Preserve has been identified, as suggested by the comment.

NPS-07
The comment that potential impacts on parks and resource values is presumably a broad introductory comment to the following more specific comments. In response to the following more specific comments, changes have been made to the EIS where appropriate in Section III.C.6, Section IV.B.1.m, and corresponding subsections for alternatives. Also, it should be noted that potential impacts on important resources within the parks, such as bears, other mammals, etc., are analyzed in other subsections of the EIS. Regarding the extrapolation of data trends from other places, these are the best data available and the most appropriate for analysis of potential impacts on specific National Park System unit coastal habitats.

NPS-08
The heading in Section III.C.6 was changed as suggested.

NPS-09
The phrases identifying the nationally significant values recognized in the legislation establishing Katmai National Park and Preserve now are quoted in the text in Section III.C.6.a(1). These values that are potentially impacted are analyzed in the appropriate subsection of Section IV. For example, potential impacts on brown bears are analyzed in Section IV.B.1.g.

NPS-10
The statements regarding the oiled condition of the beaches have been added to the discussion in the text in Section III.C.6.

NPS-11
The OSRA land segments that correspond to Aniakchak National Monument and Preserve are 6, 7, and 8. According to the OSRA, it is not anticipated that oil will contact Land Segments 6, 7, or 8 within 30 days in the winter or summer seasons (Appendix B, Tables B-10 and B-13).

NPS-12
The phrases identifying the nationally significant values recognized in the legislation establishing Lake Clark National Monument and Preserve now are quoted in the text in Section III.C.6(2). These values that are potentially impacted are analyzed in the appropriate subsection of Section IV. For example, potential impacts on brown bears are analyzed in Section IV.B.1.g.

NPS-13
The phrases identifying the nationally significant values recognized in the legislation establishing McNeil River State Game Sanctuary as a National Natural Landmark now are quoted in the text in Section III.C.6a(6). These values that are potentially impacted are analyzed in the appropriate subsections of Section IV. For example, potential impacts on brown bears are analyzed in Section IV.B.1.g.

NPS-14
Figure III.C.6-5 apparently was given an incorrect title. Instead of visitors to national parks of the Cook Inlet and Shelikof Strait region, it is visitors to all national parks. Data for all national parks are not necessary for this EIS. Monthly data for recent years for national parks of the Cook Inlet and Shelikof Strait region are not readily available based on calls to the park offices. Reference to Figure III.C.6-5 has been deleted.

NPS-15
The description of visitors to Katmai National Park and Preserve coastal area in this comment has been added to Section III.C.6.c. Potential impacts on visitor use are analyzed in Section IV.B.1.m(2).

NPS-16
The text has been modified to consider the wilderness designation for the coast of Katmai National Park and a portion of the coast at Lake Clark National Park (Chinitna Bay) in Sections III.C.6.a(1) and (2) and Section IV.B.1.m(2)(b).

Dear Mrs. Gottlieb and Minerals Management Service,
We would greatly appreciate your consideration of these;

Cook Inlet Marine Mammal Council (CIMMC) Members' Testimony to Mineral Management Service (MMS) Regarding the Draft Environmental Impact Statement (DEIS) for the Proposed Oil and Gas Lease Sale 149 in the Lower Half of the Cook Inlet.

Denty Owens, CIMMC Co-Chairman

Of course the beluga whales and other marine mammals are our major issue, and I believe that the health of these populations needs to be studied. However, we rely on the broader ecology of the Cook Inlet for our sustenance and sense of well being. For example, the hooligan come to the mouth of the Big Susitna River to lay their eggs. We subsist on these hooligan, as do the beluga. The sea gulls eat the hooligan eggs and we eat the sea gull eggs. Contamination and spills from oil development could devastate this whole cycle.

Marc Lamoreaux, CIMMC Research Facilitator:

CIMMC is composed of the Native Marine Mammal Hunters and Users, and other concerned entities. Beluga hunters are the core initiating group. We are preparing a written statement which I hope will be considered before prosecuting this sale.

My basic position is that further oil development in the Cook Inlet should not proceed till there has been adequate testing for the effects of development to date, as well as research to better understand the potential effects of the proposed development.

There is a paucity of relevant data from the upper Inlet. Tidal action scours the bottom, leaving little sediment to analyze for petroleum pollution. Mollusc reproductive rate tests conducted by MMS failed when the mollusks (species brought in from other areas) died from suspended sediments. That such tests were conducted highlights the poor state of scientific understanding. We don't even know what kind of bottom fish should be tested for petroleum hydrocarbon effects in the upper inlet, or whether these would be the best organisms to test if we did know. In other areas these fish enzyme tests are some of the best tests to date for oil pollution. These tests should be conducted, and their results considered, before leasing the inlet. (The Cook Inlet Regional Citizen's Advisory Council is planning some such exploratory tests in 1995.) CIM-01

Marine mammal tissues should contain indicators of marine pollution as these toxins accumulate up the food chain. Cook Inlet Beluga tissue sampling, for analysis of pollutants, has been opportunistic for specimens, and far from comprehensive in the range of components analyzed. Some archived tissues should be further analyzed for back cast baseline data for a range of oil pollution indicators. Similar comments apply for harbor seals and sea otters, which have not been systematically monitored as Cook Inlet Region pollution indicators. CIM-02

CIMMC intends to begin supplying samples of marine mammal tissues for archival and analysis this summer. National Marine Fisheries Service (NMFS) and probably MMS will help with this project. Beluga livers should be analyzed for several indicators of petroleum hydrocarbons. These include metabolites, and biomarkers such as enzymes and remnants of petroleum parent compounds. Paul Becker, advisor to the Alaska Marine Mammal Tissue Archival Project (AMMTAP), is now confident in DNA adduct analysis. This looks at changes in molecules attached to liver DNA, resulting from petroleum hydrocarbons. Also, many heavy metals, such as vanadium, can accumulate in beluga blubber from oil and gas development related pollution. We want to see analysis for these, organochlorines, and other pollutants. Cook Inlet harbor seals should also be considered for sampling. (Also sea otters.) None are reported in the AMMTAP reports. These are now available from CIMMC hunters. CIM-03

Natives are understandably concerned about these pollutants which accumulate in marine mammal tissues since this is their food. Some hunters have reported an increase in lesions, tumors, blubber irregularities, and other maladies in beluga tissues. These should be sampled and analyzed. It is a morbid joke that dead beluga washed ashore in some areas of Eastern Canada are classifiable as miniature toxic waste sites. Although commercial and sports hunting originally contributed to beluga population declines in the Gulf of St. Lawrence, pollution seems to have depressed their reproductive rate to the extent that they cannot repopulate. CIM-03

It is now thought that the Cook Inlet does not flush itself as was once thought, but rather the water flushes back and forth like in a bath tub. The marine mammal subsistence resources may be swimming in an accumulating toxic brew. CIM-04

MMS projects a 64% probability of a major oil spill, from 1,000 to 250,000 barrels. Only 10% of oil is usually recovered from Cook Inlet spills because of extreme tides, ice, etc. This is an unacceptable risk level to the aquatic ecology and marine subsistence resources.

There is currently a moratorium on offshore oil and gas development off the East and West Coasts of the lower 48 states, as well as Bristol Bay. Sales off Kodiak have been cancelled twice and Shelikof Strait was deleted from this sale. Fishermen and a concerned public are largely responsible for these wise management decisions. Northern subsistence whalers were instrumental in achieving a moratorium on the Chukchi Sea oil lease. Subsistence resources in the Cook Inlet are no less important to the cultural traditions which depend upon them.

The Cook Inlet beluga population is discreet, being reproductively isolated from other beluga in the Bering, Chukchi and Beaufort Seas. Over the last year, official estimates of the number in the Cook Inlet beluga stock have ranged from 331 to 1,251. NMFS classifies it as a strategic stock, which mandates further study of its population parameters under the Marine Mammal Protection Act. ADF&G classifies it as a species of special concern.

Cook Inlet beluga migration routes, and times and ways they might rely on the areas slated for oil development are not documented. However, they almost certainly include the areas slated for development. The sonic impacts associated with oil platform production would be likely to disrupt these. The DEIS contains insufficient modeling of how extreme tides, such as bore tides, might distribute a catastrophic spill up and down the inlet, likely impacting the food chain upon which marine mammals and subsistence hunters depend. CIM-05 Native elders report there is still oil from the EVOS to be found in infoldings along estuarine shores in the upper inlet. Harbor seals, which entered the mouth of the big Susitna River in numbers around 100 before the EVOS, were very few in number for some years. (There appears to have been some recovery, since numbers around 30 are now reported there.)

Studies of some of these factors are planned by NMFS and CIMMC. Oil lease sales should await consideration of these results. MMS should await consideration of these results before leasing the Cook Inlet for oil and gas development. If you do go ahead with lease sale 149, you should certainly consult the Cook Inlet Marine Mammal Council about how to minimize impacts to their marine mammal subsistence resources.

P.S. I have not appended a reference section. However, I encourage you to contact me (Marc) to discuss these issues. I would also appreciate information offered regarding the 1972-2002 OCS program. Please note my name is not Lawrence, as appears on your recent communication to me.

Marc Lamoreaux

4/10/1995

Marc Lamoreaux, Research Facilitator
Cook Inlet Marine Mammal Council (CIMMC)
National Marine Fisheries Service
222 W. 7th Avenue, #43
Anchorage, Alaska 99513-7577
PH: (907) 271-5006, FAX: (907) 271-3030

CIM-01
The mollusc study cited was conducted for the Cook Inlet Regional Citizens Advisory Council, not MMS. The molluscs were of a species found in Cook Inlet, but the tidal currents in the upper inlet essentially both beat them to death and smothered them with entrained sediments. Rather than highlighting the poor state of scientific knowledge, the results demonstrate why the uppermost inlet is depauperate in benthic and planktonic biota and of lesser interest than the more biologically robust and significant middle and lower ranges of Cook Inlet. Please also see the response to Comment TAG-32.

CIM-02
The MMS-sponsored Alaska Marine Mammal Tissue Archival Project (AMMTAP) listed specimen material from four beluga whales from Cook Inlet in its specimen inventory of November 1994. As of March 1995, tissues from one of these whales (692-BLKA-015) has been analyzed for inorganic contaminants, with results shown in "Concentration of Chlorinated Hydrocarbons, Heavy Metals and Other Elements in Tissues Banked by the Alaska Marine Mammal Tissue Archival Project." Tissues of the remaining three beluga whales, as well as an additional beluga collected this summer, presently are being analyzed by the National Institute of Standards and Technology for both organic and inorganic contaminants. Specimen material from 14 other beluga whales has been collected and analyzed ("Concentrations of Chlorinated Hydrocarbons, Heavy Metals and Other Elements. . .") from other areas in Alaska, the results of which are suitable for direct comparison with values obtained from Cook Inlet belugas.

We have asked NBS to coordinate with the Cook Inlet Marine Mammal Council (CIMMC) and to obtain additional tissues from Cook Inlet beluga whales.

Likewise, specimen material has been collected from one harbor seal from Cook Inlet (692-HBSL-004). Continued collection of tissues from other harbor seals (and also from sea otters) is anticipated on an as-available basis through AMMTAP and the MMS/University of Alaska-Fairbanks Coastal Marine Institute's Alaska Frozen Tissue Collection. The CIMMC would appear to be a good coordination point for collection of tissues from these species as well.

CIM-03
Please see the response to Comment CIM-02.

CIM-04
The comment provides no additional data or sources upon which to revise any of the Cook Inlet circulation information presented in Sections III.A.3, 4 and 5 of the EIS.

Studies do not indicate nor does the continuing commercial, sport and subsistence harvests of marine animals that live in or migrate through Cook Inlet that the marine mammal resources may be swimming in an accumulating toxic brew as noted in the comment.

CIM-05
Please see the response to Comment MDM-06.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Reply to Attn: WD-126

April 24, 1995

George Valiulis
Headquarters, Sale 149 EIS Coordinator
MMS (644) USDOI
381 Elden Street
Herndon, Virginia 22070-4817

Dear Mr. Valiulis:

The Environmental Protection Agency (EPA) has reviewed the draft environmental impact statement (EIS) for the **Alaska Outer Continental Shelf (OCS) Cook Inlet Planning Area Oil and Gas Lease Sale 149**. Our review was conducted in accordance with the National Environmental Policy Act (NEPA) and our responsibilities under Section 309 of the Clean Air Act.

EPA requested to be a cooperating agency in the preparation of the EIS because we will have a NEPA compliance responsibility for any new source National Pollutant Discharge Elimination System (NPDES) permits issued for oil and gas drilling discharges in accordance with Section 511(c)(1) of the Clean Water Act (CWA). The NPDES permit that EPA Region 10 will develop for this particular lease sale will regulate sources that are subject to the OCS New Source Performance Standards promulgated by EPA this year. As a cooperating agency, EPA plans to adopt the final EIS for this sale to meet our NEPA compliance responsibility for our NPDES permit. This should prevent a duplication of effort by EPA and MMS and prevent undue delays in the issuance of the NPDES permit relative to this lease sale.

This draft EIS presents a comprehensive evaluation of the potential effects that could result from this lease sale. Overall, it reflects the current state of knowledge about the physical, chemical, and biological characteristics of the Cook Inlet planning basin. However, we have several concerns which are described in the enclosed detailed review comments. We are providing these comments in an effort to improve the information presented in the draft EIS and to clarify issues that are important for making decisions on the leasing options for the proposed lease sale.

EPA continues to be concerned that the proposed action does not provide a commitment to the Stipulations and Information to Lessees (ITL's). Many of the proposed stipulations and ITL's presented in the draft EIS have been included in past

Alaska OCS lease sales. The discussions of the effectiveness of these stipulations in mitigating adverse effects could be improved if they provided a historical perspective on how well these mitigating measures have actually performed in the past.

The draft EIS has identified environmental consequences associated with the proposed action. We believe that adverse effects could be reduced by implementation of the Coastal Fisheries Deferral alternative or the No-Action Alternative. Due to uncertainty about whether stipulations will be included in the sale, and uncertainty about the effectiveness of mitigating spill risk we are rating the proposed action EC-2 (Environmental Concerns-Insufficient Information). The insufficient information rating is based on the need for additional information and clarification about the effectiveness of stipulations to lessen impacts and protect the area from oil spills.

Thank you for the opportunity to review this draft EIS. If you have any questions about these comments, you may contact John Bregar in our Environmental Review Section at (206) 553-1984.

Sincerely,

Joan Cabreza

Joan Cabreza, Chief
Environmental Review Section

Enclosure

cc: MMS Alaska OCS Region

U.S. Environmental Protection Agency
Detailed Comments on Cook Inlet Lease Sale 149

ITL's and Stipulations

In numerous past MMS lease sale environmental impact statements (EIS's) EPA has expressed concern regarding the lack of commitment to the Information to Lessees (ITL's) and Stipulations found on pages II-6 - II-16. The National Environmental Policy Act sections 1502.16 and 1505.2, state that the lead agency must disclose the means to mitigate adverse environmental effects in the draft EIS, and the Record of Decision must state whether all practicable means to avoid or minimize environmental impacts have been adopted. The Counsil on Environmental Quality has also upheld the requirement that the draft EIS disclose the **likelihood of mitigation implementation.** EPA-01

The draft EIS general mitigation measures could be implemented on the authority of the Regional Supervisor, Field Operations. This decision would be made at the final Notice of Sale stage, which is after the EIS process is complete. The sensitive nature of the natural environment surrounding this project dictates that mitigation measures will play an important role in protecting resources. We would like future draft EIS's to more precisely define the likelihood of mitigation implementation, describe in detail what these measures will be and disclose how they will be monitored for their effectiveness. This level of detail is imperative in order to consider the effects of the proposed action. EPA would like to work more closely with MMS in this and future projects to better convey the level of mitigation commitment we envision for lease sale projects.

This EIS has fallen short in describing mitigation measures and instead focussed on oil spill response and effectiveness as a means to minimize environmental damage. The effectiveness of spill response is well-documented, especially in light of the Exxon Valdez spill. As part of an increasing federal emphasis on pollution prevention, EPA feels that it is appropriate to offer increased commitment to methods that can help avoid this kind of scenario. Examples of appropriate commitments would include: Identification and avoidance of sensitive wildlife areas, other actions that would limit interactions with sensitive wildlife species, implementation of modem safety devices, oil transportation precautions and other protective stipulations. These commitments should be stated in the draft EIS so that the public can get a sense that MMS is addressing their concerns as well as those of other federal and state agencies.

The draft EIS should also include an examination of how well these mitigation measures have worked in past MMS exploration projects. EPA has consistently requested this information from MMS, yet we have not seen it examined in a draft EIS to date.

Spill Risk

Table IV.A.2-2 shows that the cumulative case scenario indicates a 64% chance of one or more spills of at least 50,000 barrels in federal waters during the life of the project. The same table, in the base case scenario, indicates that there would be a 27% chance of one or more 50,000 barrel spills. The 300 million barrels of oil generated from this project under the base-case scenario would only be enough to provide the U.S. with roughly one to two months of oil (pers. comm. Ray Emerson, MMS). Page B-1.2-25 states that a spill in the base-case could effect 20% or more of the intertidal and shallow marine plants in the Cook Inlet. On the same page it indicates that 20% of the mollusks, annelids and crustaceans in the Cook Inlet could die from exposure of 1.4 ppm hydrocarbons for 96 hours, an event that is not unrealistic if a spill occurred. This data brings the validity of such a small lease sale into question in an area like the Cook Inlet.

Given the relatively high risk associated with this project combined with the incredible array of sensitive wildlife resources, EPA encourages MMS to carefully consider the gains vs. the potential impacts from this project. We understand the importance of oil exploration to the national economy, but the amount of oil predicted is such a small percentage of the national oil consumption, we feel that the risks from lease sale 149 far outweigh the benefits.

EPA requests additional information on spill prevention mitigation measures. The risk of spills from a cumulative effects perspective is extremely high. An effort to reduce this risk would be appropriate in the Cook Inlet.

Cumulative Effects

EPA appreciates the in-depth Cumulative Case impact assessment in Chapter IV.B.10. The cumulative impacts from this and other activities within the planning area cover a wide range of resources. The draft EIS does a good job of summarizing these impacts without exhaustive detail.

Preferred Alternative Selection

EPA strongly supports the selection of Alternative V, the Coastal Fisheries Deferral, which would reduce the risk of spill to 17%. Habitat in Tuxedni Bay, Kamishak Bay, the Barren Island Group and Augustine Island would be better protected from spills under this Alternative scenario. In addition, EPA also supports the No-Action Alternative for reasons stated above.

2

SUMMARY OF THE EPA RATING SYSTEM
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS:
DEFINITIONS AND FOLLOW-UP ACTION *

Environmental Impact of the Action

LO–Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplish with no more than minor changes to the proposal.

EC–Environmental Concerns

The EPA review has identified environmental impacts that should be avoid in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO–Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU–Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1–Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2–Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoid in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3–Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussion are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 policy and Procedures for the Review of Federal Actions Impacting the Environment.

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EPA-01
The MMS's commitment to the Sale 149 mitigating measures (lease stipulations and environmentally relevant ITL's) is demonstrated by their inclusion in both the draft EIS and the proposed Notice of Sale (NOS). The decision on which measures to include in the Sale 149 draft EIS and proposed NOS was approved by the Secretary/Assistant Secretary, Lands and Minerals, at the Area Identification step (Sec. I.A.7 of the EIS) of the lease-sale process (Sec. I.A). This decision was based on information derived from experience with previous Alaska OCS lease sales and from public comments and consultations with stakeholders during the EIS scoping process.

As a result of comments received on the Sale 149 draft EIS and proposed NOS, the following actions regarding mitigating measures have been taken for the final EIS: (1) three new stipulations have been added (Secs. II.J.2 and V.A.2.b(2), (3), and (4)); (2) an ITL has been changed to a stipulation and revised to include additional activities (Secs. II.J.1.a and V.A.2.b(1)—Protection of Fisheries Stipulation); and (3) the language in three ITL's has been revised (Secs. II.J.1.b and V.A.2.b(5)—ITL's Nos. 2, 4, and 5). These actions further demonstrate MMS's commitment to considering and analyzing measures that help to mitigate the actions of the proposed lease sale.

Of course, no final decision on the adoption of the mitigating measures can or should be made until completion of the lease-sale process (Sec. I.A. 10 to 16). This includes: public review of the draft EIS and proposed NOS; preparation of the final EIS; comments from the Governor of Alaska on the proposed notice regarding size, timing, location, terms, and conditions of the sale; a determination of consistency with coastal management plans; biological opinions from NMFS and FWS regarding the effect of the proposed action on endangered or threatened species; and a balancing of all pertinent information in a final decision on the lease sale. The requirements of the Council of Environmental Quality Regulations for Implementing the Procedural Provision of the National Environmental Policy Act implementing regulations stated in Section 1505.2 state, in part, that "At the time of its decision—each agency shall prepare a concise public record of decision." The EIS is an environmental disclosure document, not a decision document. As noted in Section I.A.14 of the EIS, a decision document is prepared after the final EIS.

The status of the Sale 149 mitigating measures suggested during the scoping process are listed and summarized in Section I.D.3 of the EIS. New mitigating measures or revisions to existing measures suggested by comments on the Sale 149 draft EIS and proposed NOS are listed and summarized in Section V.A.2.b. A detailed description of all the Sale 149 mitigating measures analyzed in the EIS is provided in Section II.J. This description includes the text, a statement regarding the purpose, and an evaluation of the effectiveness of each measure.

To date, only exploratory-drilling activities have been conducted on the Alaskan OCS as a result of previous oil and gas lease sales. The analysis in this and previous EIS's indicates any environmental effects resulting from exploratory drilling are likely to be local (within several hundred meters of the drilling unit) and short term (2-3 months, depending on the time required to drill and test the well). Because of the relatively short-term nature of the operations, MMS has not developed a strategy to monitor the effectiveness of the mitigating measures that are part of a lease sale. However, support for including mitigating measures has been received from some of those individuals, organizations, and governmental agencies—including USEPA—that have commented on the Sale 149 DEIS as well as DEIS's from past lease sales. This support indicates that the measures are perceived as being effective. The effectiveness of the measures in achieving mitigation may not be measurable. However, if production becomes a possibility as the result of this or any sale, MMS would work with USEPA to develop a reasonable strategy to monitor the effectiveness of mitigating measures on activities that take place over a relatively long period of time.

The MMS believes the mitigating measures for Sale 149 have been adequately described in the EIS (Sec. II.J); the comment does not provide any suggestions about what additional material is thought to be needed.

Based on the results of the scoping process, the effects of oil spills on environmental resources in and adjacent to the Sale 149 area is a significant issue. Because the effects of oil spills is a significant issue, it is appropriate to include in the EIS a discussion of spill prevention and response. This discussion does not focus the EIS on oil-spill response and effectiveness as a means to minimize environmental damage, as the comment suggests. As noted in Section IV.A.4, MMS has established stringent requirements for spill prevention and response and employs an inspection program to ensure industry compliance. To complement the regulatory programs in place, the petroleum industry uses state-of-the-art technology for prevention equipment and the most current operating procedures while conducting operations on the OCS. Additionally, the petroleum industry must maintain a constant state of readiness for oil-spill response to meet the MMS's stringent response requirements.

The MMS does have a commitment to ensure safe and environmentally sound exploration and production of offshore natural gas, oil, and other mineral resources. Measures to identify and protect biologically sensitive wildlife species and habitats include the Protection of Biological Resources Stipulation and Information on Bird and Marine Mammal Protection, Information on Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans, and Information on Steller Sea Lion ITL's. The regulations governing offshore operations are contained in 30 CFR 250 and have been formulated to ensure safe and environmentally sound operations. Mitigating measures provide environmental protection that is in addition to existing laws and regulation. The Transportation of Hydrocarbons Stipulation is intended to ensure that the decision on which method to use in transporting hydrocarbons considers the social, environmental, and economic consequences of pipelines.

The Sale 149 EIS Appendix K notes a cooperating agency agreement between Minerals Management Service, Alaska Outer Continental Shelf Region, and the U.S. Environmental Protection Agency, Region 10. This agreement notes USEPA recommendations will be considered in making balanced decisions on the EIS and the lease sale process, but MMS will retain final responsibility for the content of the EIS's and for the determination of which alternatives and mitigation measures are selected for inclusion in the project.

MARINE MAMMAL COMMISSION
1825 CONNECTICUT AVENUE, N.W. #512
WASHINGTON, DC 20009

13 April 1995

Ms. Judith C. Gottlieb
Regional Director
Minerals Management Service
Alaska Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

Dear Ms. Gottlieb:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, has reviewed the Draft Environmental Impact Statement for the Cook Inlet Planning Area Oil and Gas Lease Sale 149. The Commission offers the following comments and recommendations regarding the assessment of the possible impacts of the proposed lease sale on marine mammals.

<u>General Comments</u>

The Draft Environmental Impact Statement (DEIS) provides an assessment of the resource potential and the possible environmental consequences of a proposal to lease approximately 1.98 million acres of submerged lands in the Cook Inlet Planning Area for oil and gas exploration and development. It indicates that the proposed lease area is located 3 to 25 miles from shore. The DEIS also provides assessments of the resource potential and possible environmental consequences of seven alternative actions, including a "no action" alternative.

The DEIS indicates (page III.B.11 and Table III.B.4-1) that 15 species of nonendangered marine mammals are resident or occur seasonally in the lower Cook Inlet. It notes that the northern fur seal, harbor seal, minke whale, killer whale, beluga whale, Dall's porpoise, harbor porpoise, Pacific white-sided dolphin, and sea otter are either common, abundant, or seasonally abundant in the lower Cook Inlet and Shelikof Strait. It indicates that the northern fur seal, harbor seal, and sea otter are the most common and occur in substantial numbers throughout the region. In addition, the DEIS indicates that seven marine mammal species (Steller sea lions, blue whales, fin whales, humpback whales, right whales, sei whales, and sperm whales) that occur in the planning area are listed as endangered or threatened under the Endangered Species Act.

MMC-01

The DEIS states (page IV.B.1-38) that the "[p]rimary factors that may have deleterious effects on marine mammals in the sale area under the base case are oil spills, noise and other disturbances associated with exploration and development (<u>e.g.</u>, seismic activities, marine and aircraft traffic), and habitat loss and/or alteration." With regard to nonendangered marine mammals, the DEIS concludes (Table II.I-1) that --

> "[a] large (50,000-bbl) [oil] spill, assuming contact with marine mammals, would have measurable (numbers of individuals) lethal effects on fur seals (<10), harbor seals (63), killer whales (<5), beluga whales (<10), and sea otters (75-100); the chance of one or more large ($\geq$1,000 bbl) oil spills occurring is estimated to be 27 percent. Fur and harbor seal mortalities are not expected to have population level effects. Recovery to pre-spill numbers for killer whales is expected to take $\geq$1 years, beluga whales 2 years, and sea otters 1-2 years. Noise, disturbance, and habitat alteration activities would be relatively short term and very localized and should not affect marine mammal survival."

The DEIS concludes (page IV.B.1-66), with respect to endangered and threatened marine mammals, that --

> "[t]he overall effect of exposure of endangered whales to disturbance and contaminants within or outside the proposed sale area is expected to be minimal; no mortality is expected to result from this lease sale. The effects of Steller sea lion exposure to disturbance and minor contaminants within or outside the sale area is expected to be minimal; mortality resulting from an oil spill is expected to require at least one generation for recovery."

These conclusions may be valid. However, the DEIS does not provide data, analyses, or references to support all of them. The DEIS concludes, for example, that production waters, drilling noises, <u>etc</u>. will not affect marine mammal food supplies, but provides no information on the feeding areas or food requirements of the various marine mammal species that occur in and near the proposed lease sale area.

MMC-02

Also, the DEIS does not provide a thorough summary or assessment of the best available information concerning marine mammals that occur in the planning area. It provides only limited information on the abundance and habitat use patterns of the marine mammals known to occur in Cook Inlet and adjacent waters and how these species and their habitats have been affected by previous oil and gas development and other activities (e.g., Native subsistence harvest and incidental take in commercial fisheries). Further, it does not identify critical uncertainties concerning the natural history, demography, and the essential habitats and habitat components of the marine mammals that could be affected or how they might be affected, both directly and indirectly. MMC-02

The Environmental Impact Statement (EIS) should provide a more complete and up-to-date assessment of what is known about the demography, habitat requirements, and status of the marine mammal species that occur in Cook Inlet and adjacent waters and how they could be affected indirectly, as well as directly, by oil and gas activities in and near the proposed sale area.

The Marine Mammal Commission recognizes that it may be prohibitively costly, if not impossible, to obtain all of the information necessary to accurately predict the possible direct and indirect effects on every species and population that could be affected by activities in the proposed lease sale area. Consequently, some requirements of the Marine Mammal Protection Act and other relevant legislation, such as the Endangered Species Act, might best be met by designing and conducting post-lease sale monitoring programs to detect possible adverse effects before they reach significant levels. In this regard, we note that section 20 of the Outer Continental Shelf Lands Act, as amended, requires that the Service conduct post-lease monitoring to detect and determine the cause of environmental change possibly resulting from oil and gas exploration and development. Also, section 101(a)(5) of the Marine Mammal Protection Act, as amended, provides that U.S. citizens engaged in offshore oil and gas activities can be exempted from the taking prohibitions in the Act when the taking is unintentional, involves small numbers of animals, has negligible effects on the affected population(s), and satisfactory provisions have been made to monitor and report the taking. MMC-03

The Marine Mammal Commission recommends that the EIS be expanded to more fully describe what is being or will be done to meet the monitoring requirements of section 20 of the Outer Continental Shelf Lands Act and to ensure that lessees are aware of the Marine Mammal Protection Act's general moratorium on taking marine mammals and the Act's provisions for obtaining a "small take" exemption or waiver of the Act's moratorium on taking marine mammals.

Specific Comments

Pages II-10 and II-11 (Information to Lessees: ITL No. 1, Information on Bird and Marine Mammal Protection): The DEIS states (page II-11) that the purpose of the Information to Lessees is to alert lessees to "the provisions of those acts and treaties protecting marine mammals, endangered species, and MMC-04

birds..." However, the information provided is incomplete. The EIS should provide a more complete description of the intents and provisions of the Marine Mammal Protection Act, the Endangered Species Act, the Outer Continental Shelf Lands Act, and other statutes relevant to the activities described in the DEIS. MMC-04

In this regard, the Commission notes that the Marine Mammal Protection Act was amended by Congress in April 1994. New section 101(a)(5)(D) and regulations and programs being developed by the National Marine Fisheries Service and the Fish and Wildlife Service to implement the amendments could make it easier for both the oil and gas industry and the Minerals Management Service to meet the requirements of the Marine Mammal Protection Act. Therefore, if the Minerals Management Service has not already done so, it should consult with the National Marine Fisheries Service and the Fish and Wildlife Service to ensure that it is aware of potentially relevant provisions of the 1994 Marine Mammal Protection Act amendments, and the regulations and programs being promulgated to implement them. A copy of the Marine Mammal Protection Act, as amended, is enclosed. Also enclosed is a paper entitled "Marine mammal and habitat monitoring: Requirements; principles; needs; and approaches". Although this paper is somewhat outdated by the 1994 Marine Mammal Protection Act amendments, it may help to understand the intent and measures necessary to meet the provisions of section 101(a)(5) of the Act.

Page III.B.11 through III.B.23 (Nonendangered Marine Mammals (Pinnipeds, Cetaceans, and the Sea Otter) and Endangered and Threatened Species): This section describes the status and aspects of the distribution and diet of the marine mammal species that occur in Cook Inlet and adjacent waters. Much of the data and information referenced and used are out-of-date. For example, many of the population estimates for marine mammals that occur in the planning area are outdated. In this regard, the Minerals Management Service should be aware that, in response to provisions of the amended Marine Mammal Protection Act, the National Marine Fisheries Service and the Fish and Wildlife Service are preparing stock assessment reports for each marine mammal stock that occurs in U.S. waters. Among other things, the stock assessments provide estimates of population size and the sources and levels of human-related mortality and injury. MMC-05

The Marine Mammal Commission recommends that the Minerals Management Service, if it has not already done so, consult with the National Marine Fisheries Service and the Fish and Wildlife Service to obtain copies of the stock assessment reports for marine mammals species and populations that occur in and near the Cook Inlet planning area. This section of the EIS should be revised as necessary to (1) ensure that it incorporates the best available information on the natural history, size, status, and sources and levels of human-related mortality of the stocks that potentially could be affected by the proposed action, and (2) describe any uncertainties in this regard and what is being done or being planned to resolve them. MMC-05

This section also contains a list (Table III.B.4-1) of the nonendangered marine mammals species that occur in the vicinity of the Lower Cook Inlet and Shelikof Strait, and includes notations about their relative abundance. There are some inaccuracies in the table. For example, it does not, but should, include the eastern North Pacific gray whale population. The table and, as appropriate, other sections of the EIS should be revised to reflect the fact that the eastern North Pacific gray whale population was removed from the List of Endangered and Threatened Wildlife in June 1994. Also, we are unaware of any beaked whale species referred to commonly as the "Bering Sea Beaked Whale."

There are a number of other specific points in this section that should be corrected in the EIS. As noted earlier, many of the population estimates are not current or accurate. For example, the DEIS states (page III.B.18) that there are 1,600 blue whales in the North Pacific, but Barlow (1994)[1] estimated the number of blue whales occurring off California alone to be 2,250. The DEIS states (page III.B.18) that the North Pacific humpback whale population is estimated to number between 1,200 and 2,100, but the next sentence states that humpback whale abundance in the Shumagin Island and Cook Inlet area has been estimated at 1,247, which is more that the lower limit of the total population estimate. MMC-06

<u>Page IV.B.1-38 (Effects on Marine Mammals (Pinnipeds, Cetaceans, and the Sea Otter))</u>: As noted earlier, the DEIS states (page IV.B.1-38) that the "[p]rimary factors that may have deleterious effects on marine mammals in the sale area under the base case are oil spills, noise and other disturbances associated with exploration and development (e.g., seismic activities, marine and aircraft traffic), and habitat loss and/or alteration." A number of other activities or factors also could have deleterious effects on marine mammals. They include platform removal, discarded trash and debris from service vessels and drill platforms, and vessel operation and other activities required to contain and clean-up oil spills. MMC-07

This section also states (page IV.B.1-38) that "[o]il can affect marine mammals through direct contact with the skin surface, inhalation of PHC vapors, ingestion, or by the alteration of their normal patterns of behavior." It does not MMC-08

[1] Barlow, J. 1994. The abundance of cetaceans in California waters. Part I: Ship surveys in summer and fall of 1991. Fishery Bulletin 93:1-14.

identify or consider the full range of possible direct and indirect effects. For example, oil spills also could (1) cause starvation or nutritional deficiencies by reducing the abundance or productivity of important prey species; (2) cause stress making animals more vulnerable to disease, parasitism, environmental contaminants, or predation; (3) cause animals to abandon or avoid feeding areas or other areas of similar importance; and (4) cause animals to be attracted to prey debilitated by the oil and make them more vulnerable to contact with oil and ingestion of contaminated prey. MMC-08

The EIS should be expanded to provide a more complete assessment of how marine mammals could be affected, both directly and indirectly, by exploration and development activities and related possibilities, such as oil spills, in the lease sale area. Enclosure 3 notes the various ways that marine mammals possibly could be affected by offshore oil and gas development and can be used as a check list for determining whether the EIS has assessed all relevant possibilities.

<u>Pages IV.B.1-38 through IV.B.1-47 (Direct Effects of Oil Contamination)</u>: This section provides a description of the possible effects of a large oil spill (50,000 bbl) or a series of smaller spills ($\geq$1,000) on each of the marine mammal species that occurs in Cook Inlet. It does not, but should, provide an assessment of the possible indirect effects if a large spill occurred and contacted an important marine mammal feeding area. In this regard, the analysis does not, but should, consider the various components of the oil that enter the water column when oil breaks down as a result of weathering or evaporation and the possible effects those compounds might have as they are incorporated into food webs. If there are uncertainties concerning the distribution, abundance, seasonal movement patterns, food habits, food requirements, <u>etc</u>. of the various species, or how important prey species or other components of the food webs of which marine mammals are a part might be affected by oil spills, the uncertainties should be identified clearly. MMC-09

Also, some of the conclusions in this section do not seem consistent with the analysis. For example, the DEIS states (page IV.B.1-44) that it is estimated that a 50,000 bbl oil spill would result in the death of 63 Pacific harbor seals. It also states that although the harbor seal population in lower Cook Inlet "has decreased about 50 percent in the last 13 years for unknown reasons", the "[o]il spill mortality probably would have a minimal and relatively short-term effect on the local harbor seal population." The harbor seal population decline appears to be continuing and to be food-related[2]. The cause of the apparent MMC-10

[2] Anonymous, 1993. Is it Food? Addressing Marine Mammal and Sea Bird Declines. Alaska Sea Grant Report 93-01. 59 pp.

MMC-10

decline in food species is uncertain. Likewise, it is not clear whether the harbor seals in the Cook Inlet Planning Area comprise a single population, a number of relatively discrete local populations, or are part of a larger population. Also, it appears that the assessment did not consider the possible effects of an oil spill on harbor seal prey or that the harbor seal population decline appears to have been food related. Thus, there appears to be no reason for concluding that the affected population or populations would recover at all, let alone rapidly, if subjected to a major oil spill.

The enclosed paper by A. Anne Hoover-Miller -- "Harbor Seal (*Phoca vitulina*) Biology and Management in Alaska" -- provides a thorough and nearly up-to-date summary of available information concerning the natural history, demography, and status of harbor seals in Alaska. It and the recently published book[3] -- "Marine Mammals and the *Exxon Valdez*" -- should be helpful in revising this section to provide a more complete and accurate assessment of the possible effects of the proposed action on marine mammals and their habitats in the Cook Inlet Planning Area. The enclosed paper by C.O. Matkin and E.L. Saulitis -- "Killer Whale (*Orcinus orca*) Biology and Management in Alaska" -- also should be useful.

MMC-11

Page IV.B.1-47 (Effects of Noise and Disturbance on Marine Mammals): This section states, with respect to noise associated with geophysical surveys and other industrial activities, that "[m]arine mammal population vulnerability to disturbance depends on (1) the number of animals involved, (2) sensitivity of the species, (3) the presence of preferred habitat in relation to the disturbance, and (4) the characteristics of the disturbance source." This statement does not reflect the fact that effects and the distances at which effects occur may vary depending upon such things as the frequency composition of the sound, water depth, bottom type, and bottom contour. Also, marine mammal response to underwater noise will vary in some cases depending upon what the animal is doing. That is, individuals engaged in essential functions such as feeding or breeding may react to a stimulus at a much higher threshold than resting or milling animals. Therefore, while the DEIS provides a review of studies of the response of some baleen whale species to noise in specific locations, it should be recognized that the studies cited may not provide a reasonable bases for assessing the likelihood and biological significance of potential noise disturbance on marine mammals in the lease area.

On a related point, the DEIS states (page IV.B.1-48) that "[b]aleen whales apparently are tolerant of seismic pulses and continue normal activities when sound levels are below 150 dB."

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[3] Loughlin, T.R. (ed). 1994. *Marine Mammals and the Exxon Valdez*. Academic Press, Inc., San Diego. 395 pp.

MMC-11

It is not evident what is meant by "tolerant." Many organisms may be able to "tolerate" environmental conditions that are far from optimal, but this does not mean that they are unaffected by the conditions. Therefore, the rationale for this statement should be explained.

MMC-12

Page IV.B.1-48 (Marine Construction): This section states that --

> "... gray whales abandoned Laguna Guerrero Negro, Baja California, possibly due to dredging activity necessary to maintain the channel for shipping. Gray whales reoccupied the lagoon when the activity ceased (Bryant et al. 1984). These observations indicate that cetaceans may react to dredging and construction activities by avoidance of the disturbed areas during construction, but they would reoccupy the disturbed area upon project completion."

This statement appears to infer that, since the animals returned after the construction was completed, they were not affected by the displacement. The reference for the cited paper by Bryant *et al*. (1984) is not provided in the references, making it impossible to determine whether the inference is merited -- *i.e.*, that there is evidence that the displacement had no effect on the survival or productivity of the affected whales. Another paper that may be useful in this context is the enclosed report by Jones *et al*. entitled "Census of gray whale abundance in San Ignacio lagoon: a follow-up study in response to low whale counts recorded during an acoustic playback study of noise-effects on gray whales." The authors of this report concluded that many gray whales left San Ignacio Lagoon when exposed to underwater projections of recorded industrial noises and that most, but not all, of the affected whales apparently returned to the lagoon the following year.

MMC-13

Page IV.B.1-62 (Effects on the Southern Sea Otter): This section includes a discussion of the southern sea otter because "southern sea otters may be affected by an oil spill from a tanker transporting oil to California from the proposed Cook Inlet sale area." It provides, among other things, estimates of the amounts of oil to be transported, and the types of ships and shipping routes that likely will be used. It states that "an estimated 45 tankers/year", each with approximately 325,000 bbl capacity, "would be required to transport Sale 149 oil if all projected resources is recoverable and shipped south...." It describes a scenario involving a 30,000 bbl oil spill occurring within 40 km of the California coast with the oil contacting about 30-60 km of the coastline inhabited by southern sea otters. It is not clear why this discussion also does not consider potential impacts to other endangered and nonendangered marine mammal species that could be affected by an oil spill from a tanker accident along the shipping route. In addition, the rationale for selecting the numbers used in the predictive oil spill model is not provided. For example, it is not clear why the size of the hypothetical spill (30,000 bbl) was chosen given that the tankers have the capacity to carry over 300,000 bbl of oil. Also, plans for transporting oil from the proposed lease site and related information probably should be described in the section on "Activities Associated with Oil Transportation" which begins on page IV.B.1-3. MMC-13

Pages IV.B.10-18 through IV.B.10-27 (Cumulative Case -- Effects on Nonendangered Marine Mammals (Pinnipeds, Cetaceans, and the Sea Otter)): On page IV.B.10-18 of this section it is stated that: MMC-14

> "[t]he primary factors that may have deleterious effects on marine mammals in the sale area under the cumulative case are oil spills, noise and other disturbances associated with exploration and development (e.g., seismic activities, marine and aircraft traffic), oil-industry-related habitat loss and/or alteration, commercial and sport fishing, commercial-logging operations, and Native subsistence harvests."

Although the potential impacts of these factors on marine mammals are considered individually, the DEIS does not, but should, assess the potential additive effects including possible food chain effects.

In this regard, the DEIS concludes on page IV.B.10-23 that "[t]he contribution of the proposal to the cumulative case is expected to be minimal, with no population level effects." This conclusion does not follow logically from the data and analyses in the DEIS. As noted earlier, for example, there appears to be no justification for the inferred conclusion that harbor seal prey species are unlikely to be affected and, if affected, recovery of both the prey and harbor seal populations will occur rapidly. Also, there is no discussion of other sources and levels of human-related mortality and injury (e.g., incidental take in fisheries and Native subsistence hunting) either within the proposed lease sale area or in other areas where marine mammals from the sale area may occur at different times of the year. The Marine Mammal Commission recommends that this section of the EIS be expanded to provide a more thorough assessment of how the proposed action, by itself and in combination with other sources of human-caused mortality, injury, and habitat degradation, might affect the marine mammal populations in Cook Inlet. If there are uncertainties regarding possible cumulative effects, they should be clearly identified.

Summary Comments

In summary, the DEIS does not provide a thorough or fully objective assessment of the possible direct and indirect effects of oil and gas activities in the proposed lease sale area on marine mammals. The Commission believes that the Minerals Management Service can and should expand the EIS to provide a more thorough assessment of both the possible indirect food chain effects and the possible direct effects of the proposed action on marine mammals in Cook Inlet.

If available information is insufficient to accurately predict the possible effects of the proposed action, the EIS should identify the uncertainties and describe the additional studies being conducted or planned to resolve the uncertainties and the monitoring programs that are being or will be conducted to verify that oil and gas exploration and development in Cook Inlet do not have unacceptable adverse effects.

* * * * * * * *

I hope that the enclosures and these comments and recommendations are helpful. If you or your staff have questions about any of them, please let me know.

Sincerely,

Robert J. Hofman, Ph.D.
Scientific Program Director

Enclosures

cc: The Honorable Rolland A. Schmitten
The Honorable Thomas A. Fry, III
Richard N. Smith, Ph.D.

MMC-01

The analysis and the rationale for the analysis for nonendangered marine mammals and endangered and threatened species are discussed in Sections IV.B.1.e. and IV.B.1.f, respectively, of the EIS. The ranges and prey of the marine mammals, both nonendangered and endangered and threatened, are described in Sections III.B.3 and 4, respectively, of the EIS. The marine mammal species are opportunistic feeders and will feed upon available prey wherever they might be. The daily food requirements of the individuals in each of the marine mammal species is not very well known. Furthermore the amount of the various prey species that might be lost as the result of an oil spill can only be estimated in very general terms. Given these considerations, a description of the food requirements, based on the amount consumed per individual during some time period—such as a day—would not significantly contribute to the analysis of the effects of oil and gas development activities on marine mammals.

In the oceanographically dynamic area of Cook Inlet, discharged drilling muds and produced waters are expected to be rapidly diluted to nontoxic concentrations such that the few individuals entering the area are not likely to be adversely affected. Likewise, few individuals are expected to be exposed to noise associated with industrial activities at the short distances known to cause significant responses. Prey organisms on which they feed are not known to be lethally affected by dilute discharges.

MMC-02

The MMS considers the information presented in the EIS to be sufficient to analyze the potential effects of Sale 149 on marine mammals. In many cases, specific data on abundance and habitat use patterns of marine mammals in the Cook Inlet area are limited.

Few endangered whales will occur in the proposed sale area, because most of the area is relatively far removed from seasonal concentrations of these species. Whale distributions, supported by the two most recent reports (Brueggeman, 1987 and 1988), are discussed in Section III.B.5. Recent whale sightings in this area have been incidental to beluga whale or marine bird surveys. The latter have documented only a few humpback whales in lower Cook Inlet; information on large whales included in a report on the beluga surveys will be included in the EIS if its availability is timely. For the cetaceans, the NMFS currently has an unpublished report on population estimates of beluga whales in Cook Inlet. This information has been incorporated into the text (Sec. III.B.4(b)).

Relatively few sea lions will occur in the proposed sale area, because most of the area is relatively far removed from seasonal concentrations of these species. Steller sea lions observed on marine bird surveys were found to be common in lower Cook Inlet in summer and winter; this information has been included in the EIS. Information from the 1994 sea lion survey has been included in Section III.B.5.b(1). Designated sea lion Critical Habitat areas are described in Section III.B.5.b. The critical uncertainties of sea lion natural history and demography, particularly with regard to potential factors influencing the species' recent decline, are under investigation by personnel of the NMFS Marine Mammal Laboratory; these results will be incorporated in EIS's as they become available.

Information from a 1992 study that provides specific information on harbor seals in Cook Inlet has been incorporated into the EIS.

The effects on marine mammals from previous oil and gas exploration and development and other activities, oil and gas industry activities, logging, subsistence harvest, and commercial fishing operations are discussed in Sections IV.B.10.e and f (cumulative effects). Neither State oil and gas development in Cook Inlet, nor oil and gas exploration in the Federal OCS area, nor oil from the *Exxon Valdez* spill or other spills in Cook Inlet are known to have caused significant adverse effects or mortality in Cook Inlet.

MMC-03

Our fiscal year (FY) 1996-1997 and the upcoming FY 1988 Alaska Environmental Studies Strategic Plan describes our proposed studies, several of which will provide a basis for future monitoring should it be needed. We would anticipate that if exploration would move to development of OCS leases, monitoring activities will be coordinated between potential MMS-sponsored regional sampling and industry-sponsored site-specific sampling. Also, please see the response to Comment EPA-01. Information on incidental taking of marine mammals under the MMPA and the ESA can be found in ITL No. 1 in Section II.H.1.b.

MMC-04

The purpose of the ITL is to minimize behavioral disturbances of wildlife, particularly at known wildlife-concentration areas. It is not the intent or purpose of the EIS to provide detailed explanations of these laws but to make lessees and their contractors aware of the laws and some of the important provisions in those laws.

MMC-05

Population estimates for some of the species have been updated and the most current stock-assessment reports have been requested, but not yet received, from the Fish and Wildlife Service and the National Marine Fisheries Service. The North Pacific gray whale has been added to Table III.B.4-1. A reference to the removal of the gray whale from the List of Endangered and Threatened Wildlife in June 1994 is located on page III.B.13 of the Sale 149 DEIS under the gray whale. The Bering Sea beaked whale (also known as Stejneger's beaked whale and sabertooth whale) is referred to in the literature in a number of reports, books, and field guides. Most literature that refers to the whale as Stejneger's beaked whale also lists the Bering Sea beaked whale as a common name.

MMC-06

Sections III.B.5.a(2) and (5) have been revised to reflect current population information for humpback and blue whales, respectively.

MMC-07

The primary factors that may have deleterious effects on marine mammals are noted in the DEIS. Vessel operation and other activities associated with containment and cleanup of an oil spill are considered as part of the base case. We do not consider removal of platforms as a primary factor in causing adverse effects on marine mammals. Removal of drilling platforms for exploratory drilling (semisubmersibles or jackups) is a relatively simple task that is very short term and would have little, if any effect on marine mammals. Three production platforms are assumed under the base case. Removal of production platforms, as well as plugging and abandonment of the wells, is a process that would be reviewed at the time by MMS in consultation with FWS and NMFS to minimize any adverse effects to fish and wildlife in the area. These are very short-term projects and would result in very few adverse effects to marine life. Discharge of trash and debris from drill platforms and vessels is prohibited by the MMS.

MMC-08
These potential effects are included in the text of the DEIS under Section IV.B.1.c.(1), Direct Effects of Oil Contamination, and under Section IV.B.1.e(5), Indirect Effects of Oil on Marine Mammals.

MMC-09
A discussion and analysis of the fate and behavior of spilled oil in marine waters is included in the EIS in Section IV.A.3. While there may be some uncertainties regarding distribution, abundance, seasonal movements, food habits, etc., we believe that sufficient information is available to make an impact assessment.

MMC-10
The potential effects of an oil spill on harbor seal prey are included in the text of the DEIS in Section IV.B.1.e.4, Indirect Effects of Oil on Marine Mammals.

A discussion of possible reasons for the decline of harbor seals, including reduced food supply, has been added in Section 3.III.4.a.2. The reference recommended by the Marine Mammal Commission certainly does not conclusively identify reduced food supply as the primary cause of the population decline of pinnipeds, only that the working group concluded that food supplies are limited for pinnipeds in and around Alaska waters. It should be noted, however, that the working group was apparently created for the sole purpose of focusing on the issue of reduced food availability as a cause of the population decline, and did not address other possible factors that may be contributing to the population decline.

It appears that the harbor seal population is continuing to decline in Prince William Sound and the Gulf of Alaska, including locations that were not oiled by the EVOS. It is clear that the recovery of this species from EVOS is complicated and apparently overshadowed by factors causing the population decline before the spill occurred. We continue to believe that oil-spill-related mortality probably would have a minimal and relatively short-term effect on the local harbor seal population.

MMC-11
Frequency composition of the sound is included in the characteristics of the disturbance source. Characteristics of the environment, including water depth, bottom type, and bottom contour, have been added to the text. We disagree with the comment that the studies cited may not provide a reasonable basis for assessing the likelihood and biological significance of potential noise disturbance on marine mammals in the lease area. We believe that the studies cited provide a sound, logical basis for evaluating potential effects from oil and gas operations.

The word "tolerant" in this instance means "to put up with" or "to endure." We did not say that whales were not affected by the seismic activity or that they did not react to it. However, whales are very mobile animals and are very capable of leaving an area if they feel threatened or are annoyed by activities near them. Whales that continue normal activities in the presence of seismic noise would appear to be neither threatened nor annoyed enough to leave. We think the word "tolerant" seems to describe the situation quite well.

MMC-12
The text neither stated nor inferred that the whales were unaffected by the displacement, only that they would reoccupy the disturbed area upon project completion. Likewise, there is no inference in the text that the displacement had no effect on the survival or productivity of the whales. The missing reference has been added to the bibliography.

MMC-13
During the ESA Section 7 consultation process, the Fish and Wildlife Service highlighted the southern sea otter and marbled murrelet as primary southern tanker route species to be considered in the Biological Evaluation and Biological Opinion for this proposed lease sale. Other southern species, discussed briefly in this document, may be analyzed in greater detail in a developmental EIS, if the proposed action proceeds beyond the exploration phase. The scenario used here to determine risk in southern areas was dictated by modeled oil-spill size and trajectory availability for these areas. The transportation scenario for the proposed action, should it proceed to production, is hypothetical at the present time and, therefore, not supportive of detailed analysis.

MMC-14
The potential effects of an oil spill on harbor seal prey species and on the marine mammals that consume them are included in the text of the DEIS under Section IV.B.1.e.4, Indirect Effects of Oil on Marine Mammals. As stated in the text, there could be reductions of prey species as a result of an oil spill. The text also stated that it has been extremely difficult to quantify spill effects on marine mammal prey populations or to differentiate spill effects on prey numbers from their natural variability. As a result, the indirect effect of reduced or altered prey availability has not been shown to have had an effect on marine mammals in any of the past oil spills. The text did not state nor did we intend to infer that harbor seal prey species are unlikely to be affected. As stated in a previous comment, we believe that oil-spill-related mortality probably would have a minimal and relatively short-term effect on the local harbor seal population.

A discussion of other sources of human-related mortality and injury, such as incidental take in fisheries and subsistence hunting can be found in Section IV.B.1.e. Additional information on subsistence harvest of harbor seals and incidental catch by commercial-fishing activities has been added. Additional details on subsistence harvest can be found in Section III.C.3.

STATE OF ALASKA

TONY KNOWLES, GOVERNOR

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May 3, 1995

Mr. Tom Gernhofer
Associate Director, Offshore Minerals Management
Office of Program Development and Coordination
Minerals Management Service
MS-4400, 381 Elden Street
Herndon, VA 22070

Dear Mr. Gernhofer:

The Division of Governmental Coordination is pleased to provide you the consolidated State response to the draft Environmental Impact Statement (EIS) for Lease Sale 149. Our comments are based on a substantive review of the draft EIS and the Proposed Notice of Sale (PNOS) by the Departments of Fish and Game, Natural Resources and Environmental Conservation.

Governor Knowles has also commented on the size, timing and location of Lease Sale 149 in his May 3 Section 19 response to Ms. Cynthia Quarterman. The State's concerns about potential conflicts between oil and gas activities and existing subsistence and commercial fisheries users are presented in that letter, which is enclosed and incorporated by reference into this response to the National Environmental Policy Act analysis.

Page-specific technical comments on the draft EIS, which have been provided in large part by the Department of Fish and Game, are also enclosed for your use. I appreciate your consideration of these well-researched remarks.

Please contact me if the Division can be of assistance in your efforts to incorporate this information into your process or act as a liaison to other interested Alaskans.

Sincerely,

Gretchen Keiser for
Diane Mayer
Director

Enclosures

01-A35LH

State of Alaska Comments on the DEIS for Lease Sale 149 May 3, 1995

cc: Gene Burden, Commissioner, Department of Environmental Conservation
Willy Hensley, Commissioner, Department of Commerce and Economic Development
John Katz, Office of the Governor, Washington, D.C.
Frank Rue, Commissioner, Department of Fish and Game
John Shively, Commissioner, Department of Natural Resources

-2-

State of Alaska
Comments on the Draft Environmental Impact Statement
For Lease Sale 149

Section II: Alternatives Including the Proposed Action

1. Pages II-1 through II-16: Refer to the State's Section 19 comments regarding the size and location of Sale 149 and the proposed mitigation measures. In addition, it should be noted that there are several differences in the mitigation measures presented in the draft EIS and those included in the Proposed Notice of Sale (PNOS). For example, the PNOS includes nine Information to Lessees (ITLs) while the draft EIS includes only six ITLs as part of the proposed action. This discrepancy should be corrected in the final EIS. SOA-01

2. Third Page of Table II.I-1after page II-16: Under the *Cumulative Case* column, it states that the cumulative effect on fisheries resources is likely to include reduced stocks of some species primarily due to the potential for over harvest by commercial fishing activities. This statement summarizes a portion of the cumulative effects discussion presented on pages IV.B.10-13 and IV.B.10-14. While there is always a potential for overharvest, the opinions offered in this section of the draft EIS are unsubstantiated. The document does not include a citation to support the position that intercept fisheries off Kodiak Island and in lower Cook Inlet have caused or will likely cause an over harvest of fish stocks. Unless this statement can be substantiated, it should be deleted from both sections II and IV of the final EIS. SOA-02

Section III: Description of the Affected Environment

3. Page III.B.7: The Alaska Department of Fish and Game is unaware of any documentation that Pacific hake are present in lower Cook Inlet "in very large numbers." While the draft EIS cites Hart (1973) as the source of this information, Hart simply states that Pacific hake are distributed "From the Gulf of California to the Gulf of Alaska..." The description on hake should be revised in the Final EIS to reflect the fact that hake is not an abundant species in Lower Cook Inlet. SOA-03

4. Pages III.B.11 and III.B.12: Item 4 in this section states that northern fur seals are seasonally abundant in lower Cook Inlet and Shelikof Strait. Graphic 2, Marine Mammals, also indicates that fur seals commonly occur in this area during the spring and summer. Apparently, this information was derived from Morris et al. (1983). As documented in Consiglieri et al. (1982), and reflected on page IV.B.1-43 of the draft EIS, fur seals are not abundant in lower Cook Inlet and Shelikof Strait. Although they occasionally occur in these areas, fur seals are primarily SOA-04

found further offshore along the continental shelf break. The largest numbers of seals are present during the spring migration as they move to the Pribilof Islands to breed. Some, mostly juvenile non-breeding males, remain along the shelf break to the south and southwest of Kodiak Island throughout the summer. The marine mammal discussion in the final EIS should reflect this information. SOA-04

5. Page III.B.17: The list of threatened and endangered species that occur in the Sale 149 vicinity does not include the Steller's eider. This species is addressed on page III.B 21, but it should also be listed on page III.B.17. SOA-05

6. Page III.B.23: Reference to the Arctic fox should be deleted from Item 6. This species does not occur in lower Cook Inlet and Shelikof Strait. SOA-06

7. Pages III.C.2 and III.C.4: The draft EIS does not include adequate information on the Cook Inlet commercial salmon fishery. Only a single year of harvest information is presented for the lower Cook Inlet state management area (i.e., Southern, Kamishak, and Outer districts), and no information is provided on the upper Cook Inlet management area (i.e., Central and Northern districts). The lack of information on the upper Cook Inlet area is a serious omission because the proposed sale area extends into the middle of the Central District. The Northern District could also be affected by Sale 149 if a significant oil spill occurred and was transported north of the Forelands. SOA-07

   During the 1994 commercial fishing season, approximately 3.5 million sockeye salmon, valued at $30 million, were harvested in the upper Cook Inlet management area. About half (53%) of the catch was taken by drift gillnet fishermen, who concentrate in the Central District along the east side of the Kenai Peninsula (ADF&G, 1994). The importance of this fishery to both local residents and the State should be more fully described in the final EIS. Catch and ex-vessel value information for at least 1990 through 1994 should be provided. In addition, it should be noted that the ex-vessel value is the price paid to fishermen, and the total value of the fishery is considerably higher.

8. Pages III.C.20 and III.C.21, Figure III.C.6-1 and Table III.C.6-1: There are four legislatively designated critical habitat areas adjacent to the Sale 149 area that are not identified in this section of the draft EIS. These areas include: Redoubt Bay Critical Habitat Area (CHA), Kalgin Island CHA, Clam Gulch CHA, and Kachemak Bay CHA. Five state refuges located north of the planning area include: Trading Bay State Game Refuge (SGR), Susitna Flats SGR, Goose Bay SOA-08

SGR, Palmer Hayflats SGR, and the Anchorage Coastal Wildlife Refuge. In addition, neither the discussion of "national resources" or Figure III.C.6-1 identifies Chisik and Duck Islands as part of the Alaska Maritime National Wildlife Refuge. These omissions should be corrected in the final EIS. SOA-08

Section IV: Environmental Consequences

Many of the following comments on *Alternative I, the Proposal, Base Case* are also relevant to the impact analyses for other alternatives (e.g., Alternatives IV and V) that rely upon the Alternative I base case evaluation.

9. Entire Section, Oil Spill Risk Analysis: As illustrated in Figure IV.A.2-2, the Sale 149 oil spill risk analysis does not address potential shoreline impacts north of the Forelands. The reason for this is unclear. According to the draft EIS (pages II-2 and II-3), if a commercial discovery is made in the sale area, the oil would probably be transported to Nikiski through an offshore pipeline. From Nikiski, the oil would either be trans-shipped or processed for in-state sale. Under this development scenario, a pipeline or tanker spill could occur in the Nikiski vicinity and oil could be carried northward. Consequently, the final EIS should address the possibility of shoreline impacts north of the Forelands. SOA-09

   In addition, it is unclear how the "environmental resource areas" depicted in Figures IV.A.2-3 and IV.A.2-4 were derived. Some very important areas, such as Redoubt Bay CHA, Clam Gulch CHA, and the mouth of the Kenai River, are not represented in these figures. These habitats support valuable fish and wildlife resources which are harvested for commercial, sport, and subsistence purposes. The final EIS should evaluate the risk of an oil spill impacting all of the environmentally sensitive areas in the sale vicinity. SOA-10

10. Page IV.A.21: The draft EIS discussion of the M/V Glacier Bay oil spill is summarized from the Scientific Support Coordinator's (SSC) report on this incident. It is unclear why this source was used rather than the official reports prepared by the U.S. Coast Guard (USCG, March 1988) and Alaska Department of Environmental Conservation (DEC, May 1988). One statement attributed to the SSC's report is that: "The fishery was likely affected the greatest as false slick reporting resulted in unnecessary displacement of fisherman." We were unable to find any mention of this in either the USCG or DEC reports, and we believe that it understates the effect of the M/V Glacier Bay spill on the commercial salmon fishery. SOA-11

On page 1 of the DEC report it states: "Over 200 salmon nets were contaminated by the oil spill and damage claims total about $1.3 million to date. About 100,000 lbs. of salmon were contaminated from the spill." The final EIS should include a more accurate summary of the effects of the M/V Glacier Bay spill on the Cook Inlet commercial salmon fishery based on the official USCG and DEC reports on this incident. SOA-11

11. Page IV.B.1-30: The information attributed to Bue et al. (1992) should be revised in the final EIS to more accurately reflect the authors' conclusions. The draft EIS correctly notes that, between 1989 and 1992, these researchers documented higher pink salmon egg mortality in some oiled intertidal areas than in unoiled areas. The draft EIS further notes that these differences were not maintained in egg-to-fry survival. While the researchers found no significant difference in egg-to-fry survival between oiled and control streams, the authors believed this was likely ". . . due to insufficient power in the sampling design or sampling levels . . . rather than a true lack of change." This is an important point to include in the final EIS. The inability to document an impact is not the same as determining a lack of impact. SOA-12

12. Pages IV.B.1-74 and IV.B.1-75: This section of the draft EIS discusses the economic effects of the base case on the commercial fishing industry of Cook Inlet. The State questions two aspects of this economic evaluation. First, there is no mention of the Kodiak commercial fisheries. Based on the figures provided, it appears that the ex-vessel value of the Kodiak fisheries were not considered in the analysis. If this is the case, the draft EIS has a serious deficiency that should be corrected in the final EIS. SOA-13

    Second, the evaluation is based on the assumption that no fishing closures would be necessary as a result of the 49 smaller spills associated with the base case. This is not an appropriate assumption. While the volumes of these spills are expected to be relatively small, fishing closures might be required depending on where and when the spills occur. Past experience has demonstrated that spilled oil accumulates in the Cook Inlet rips. The east rip is also a major migration corridor for adult salmon moving into Cook Inlet and, consequently, a key commercial fishing area. Even a relatively small amount of oil in the east rip during the commercial harvest season could necessitate restrictions in drift gillnet fishing. SOA-14

13. Page IV.B.1-90: As noted above in comment 8, most of the state legislatively designated refuges and critical habitat areas in Cook Inlet are not identified in SOA-15

Section III of the draft EIS. Similarly, Section IV does not discuss the risk of an oil spill impacting these areas. The final EIS should include this information. SOA-15

14. Page IV.B.10-13: As noted in comment 2 above, the draft EIS provides no documentation that over harvesting is likely to have the most substantial effect on fisheries resources over the 19-year life of the proposed sale. These statements should be deleted from the final EIS. SOA-16

15. Graphic 1, Marine and Coastal Bird Resources: This graphic does not depict all of the important coastal bird habitats in the Cook Inlet/Shelikof Strait vicinity. For example, the map does not illustrate spring and fall waterfowl staging concentrations in Redoubt Bay, Trading Bay, and at the mouth of the Kenai River. In addition, much of the information depicted on the map refers to "Other high-use areas." There is no indication, however, what bird species use these areas (i.e., waterfowl or seabirds) or when they are present. Based on the source documents identified on the graphic, it appears that the waterfowl information was derived from documents published in the 1970s. More current information is available and should be used to update this portion of the final EIS. SOA-17

16. Graphic 2, Marine Mammals: As mentioned in comment 4, this graphic should be revised to illustrate that fur seals primarily occur south of the Sale 149 area, along the continental shelf break. In addition, the harbor seal information is difficult to see, and should be clarified in the final EIS. SOA-18

References

Alaska Department of Environmental Conservation (DEC). 1988. A Report on the Tanker Glacier Bay Spill in Cook Inlet, Alaska - July 2, 1987. 13 pp.

Alaska Department of Fish and Game (ADF&G). 1994. Upper Cook Inlet Annual Management Report, 1993. 61 pp.

Bue, B.G., S. Sharr, S.D. Moffitt, and A. Craig. 1993. Assessment of Injury to Pink Salmon Eggs and Fry. In: Exxon Valdez Oil Spill Symposium Abstract Book, B. Spies, L. J. Evans, B. Wright, M. Leonard, and C. Holba, eds. and compilers. Anchorage, Alaska, Feb. 2-5, 1993. Anchorage, Alaska: Exxon Valdez Oil Spill Trustee Council; UA Sea Grant College Program; and American Fisheries Society, Alaska Chapter, pp. 101-103.

Consiglieri, L.D., H.W. Braham, M.E. Dahlheim, C. Fiscus, P.H. McGuire, C.E. Peterson, and D.A. Pippenger. 1982. Seasonal Distribution and Relative Abundance of Marine Mammals in the Gulf of Alaska. RU 68. OCS Study, MMS 89-0026. OCSEAP Final Reports of Principal Investigators, Vol. 61 (June 1989). Anchorage, Alaska: USDOC, NOAA, and USDOI, MMS. pp. 191-343.

Hart, J.L. 1973. Pacific Fishes of Canada. Fisheries Research Board of Canada Bulletin 180:740.

Morris, B.F., M.S. Alton, and H.W. Braham. 1983. Living Marine Resources of the Gulf of Alaska, A Resource Assessment for the Gulf of Alaska/Cook Inlet Proposed Oil and Gas Lease Sale 88. NOAA Technical Memorandum NMFS F/AKR-5. Seattle, Washington: USDOC, NOAA, NMFS, 232 pp.

United States Coast Guard (USCG), Marine Safety Office Anchorage. 1988. Federal On-Scene Coordinator's Report, Major Oil Spill M/V Glacier Bay, Cook Inlet, Alaska, 2 July to 3 August 1987. 40 pp. plus enclosures.

SOA-01
Please see the response to Comment KIB-07.

SOA-02
Please see the response to Comment KIB-08.

SOA-03
Please see the response to Comment KIB-11.

SOA-04
Please see the response to Comment KIB-12.

SOA-05
Please see the response to Comment KIB-14.

SOA-06
Please see the response to Comment KIB-16.

SOA-07
Please see the response to Comment KIB-17.

SOA-08
The four legislatively designated critical habitat areas have been added to the text in Section III.C.6. It is not anticipated that any of the five State refuges identified in the comment will be affected by the proposal and, therefore, no reference will be made to them. Chisik and Duck Islands are not specifically referenced in the description of the Alaska Maritime National Wildlife Refuge because there are so many islands; however, a general description of the refuge has been added to the text in Section III.C.6.

SOA-09
Please see the response to Comment KIB-29.

SOA-10
Please see the response to Comment KIB-30.

SOA-11
Please see the response to Comment KIB-31.

SOA-12
Please see the reponse to Comment KIB-39.

SOA-13
Please see the response to Comment KIB-44 .

SOA-14
Please see the response to Comment KIB-45.

SOA-15
Please see the response to Comment KIB-48.

SOA-16
Please see the response to Comment KIB-50.

SOA-17
Please see the response to Comment KIB-51.

SOA-18
Please see the response to Comment KIB-52.

TONY KNOWLES, GOVERNOR

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
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August 3, 1995

Ms. Judy Gottlieb
Director, Alaska OCS Region
Minerals Management Service
949 E. 36th Avenue
Anchorage, AK 99501-5151

Dear Ms. Gottlieb:

The Governor appreciated the opportunity to meet with you and Cynthia Quarterman on June 5. The Governor continues to encourage the MMS to meet with local communities and villages, oil companies, and interest groups to forge a consensus about how to conduct Outer Continental Lease Sale 149. The Governor was particularly concerned that MMS address concerns of affected fishing groups and the borough mayors.

Enclosed with this letter are technical comments representing a consensus among the Departments of Fish and Game, Natural Resources, Environmental Conservation, and Commerce and Economic Development. This document provides specific technical information about the lease sale from the state agencies' perspective. We do not believe this satisfies the obligation for community input or represents all of the concerns of the communities and interest groups. As the Governor stated, it is important that MMS complete this part of the process and meet with these groups to further identify and address their specific areas of concern.

Thank you for your continued willingness to assess this lease sale and address the concerns of people who live and work in the area of the proposed sale. We look forward to working with the MMS during the state consistency review of Lease Sale 149.

Sincerely,

Diane Mayer

Diane Mayer
Director

Enclosure

cc: Mayor Glen Alsworth, Sr., Lake and Peninsula Borough
Gene Burden, Commissioner, Department of Environmental Conservation
Mayor Don Gilman, Kenai Peninsula Borough
Marilyn Heiman, Office of the Governor
William Hensley, Commissioner, Department of Commerce and Economic Development
John Katz, Office of the Governor
Frank Rue, Commissioner, Department of Fish and Game
Mayor Jerome Selby, Kodiak Island Borough
John Shively, Commissioner, Department of Natural Resources
Deborah Williams, U.S. Department of the Interior

State of Alaska
Supplemental Comments on Lease Sale 149

May 1995

The following technical comments on Outer Continental Shelf (OCS) Lease Sale 149 supplement earlier comments by the State of Alaska. These comments reflect a consensus among the Departments of Fish and Game, Natural Resources, Environmental Conservation, and Commerce and Economic Development.

Potential Resource Conflicts

Potential resource conflicts concerning Lease Sale 149 have been identified by municipalities, fishery groups, and other organizations. The Kodiak Island Borough, the Kenai Peninsula Borough, the Lake and Peninsula Borough, the Alaska Department of Fish and Game, and commercial fishing organizations have expressed concern about the effect of oil and gas development on commercial fishing, commercial sport fishing, and recreational sport fishing. In addition, the Chugachmuit Environmental Consortium, the Ninilchik Traditional Council, and the United Fishermen of Alaska have passed resolutions opposing the sale. Clearly, many Alaskans are concerned about the potential for resource conflicts as oil and gas exploration and development proceed in Cook Inlet. While these mitigation measures can address some of the concerns raised by these groups, the measures do not substitute for the public process MMS must complete to ensure consensus on this lease sale. SA2-01

Deferrals

In response to issues raised, the State of Alaska recommends MMS defer the two areas along the southeast side of Cook Inlet. These areas were incorporated into Alternative V of the draft Environmental Impact Statement and identified as cross hatches on the attached sale map. Deferral of these areas would reduce potential oil and gas conflicts with commercial fisheries and reduce the risk of an oil spill without substantially reducing the acreage available for leasing. SA2-02

Proposed Mitigation Measures for the Northeast Side of Cook Inlet

The State of Alaska recommends two additional lease sale stipulations for the northeast side of the sale shown in black on the attached sale map. This area was included in the areas identified for deferral in Alternative V of the draft Environmental Impact Statement. Fishing activities are often restricted to this corridor as a management tool to control the catch of specific salmon species.

1. No exploratory drilling shall occur within indicated lease sale tracts from June 15 through August 15. (This stipulation reduces potential conflicts with fishing activities which are frequently restricted to the identified corridor.) SA2-03

2. Surface entry into the indicated lease sale tracts is prohibited during oil and gas production and development. Access to oil and gas resources is allowable by directional drilling on these tracts or other methods which preclude development structures that may conflict with fisheries activities. SA2-04

Sale-Wide Mitigation Language

The State of Alaska recommends three changes in mitigation language for the entire lease sale. The first change to an existing stipulations includes language from the 1984 Proposed Notice of Sale (PNOS) for Gulf of Alaska/Cook Inlet Lease Sale 88. The second change incorporates language from a Information to Lessees (ITL) from Lease Sale 88. The third change adds a stipulation modified from a State of Alaska lease sale stipulation which provides specific authority to regulate sale activities that may affect subsistence and commercial fishing operations.

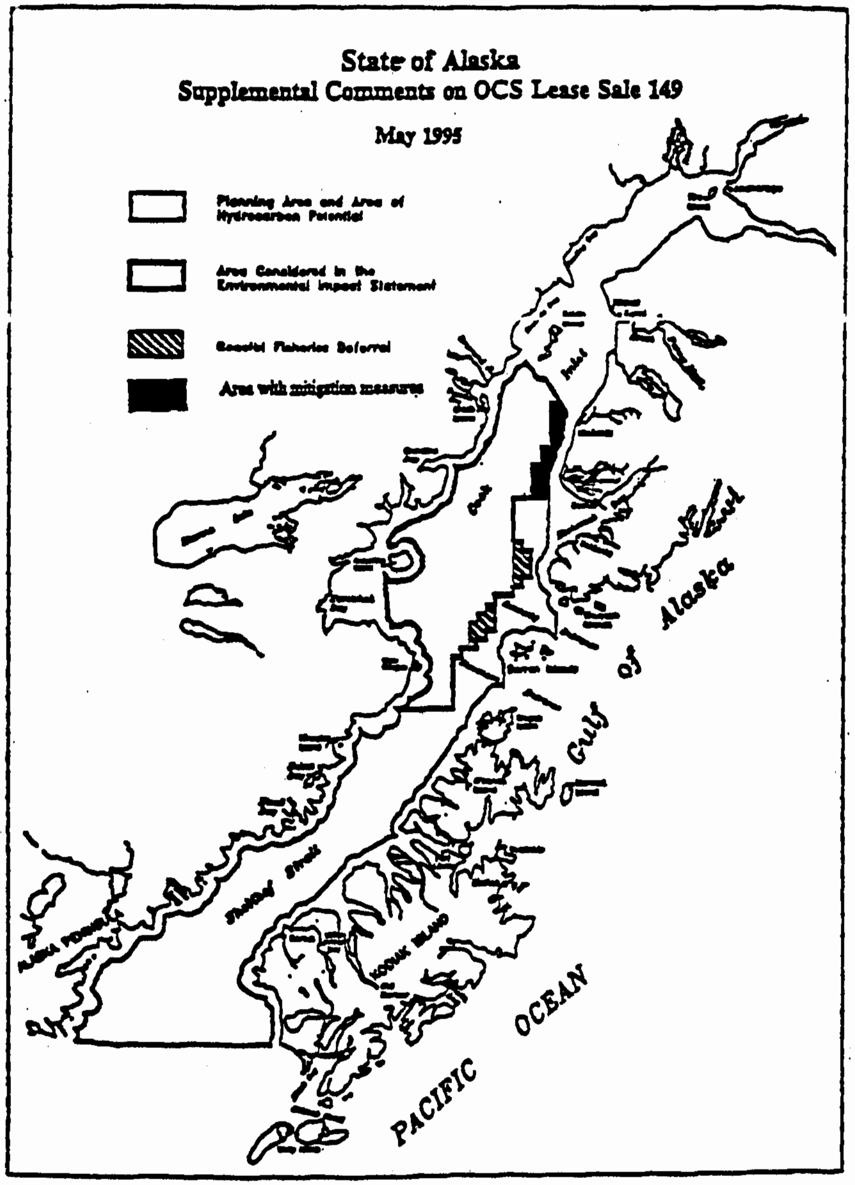
1. Add the following underlined Lease Sale 88 language to the beginning of the second paragraph of Sale 149 Stipulation No. 3, *Transportation of Hydrocarbons* (page 6 of Lease Sale 149 PNOS): SA2-05

   All pipelines, including both flow lines and gathering lines for oil and gas, shall be designed and constructed to provide for adequate protection from water currents, storms and ice scouring, permafrost, subfreezing conditions, and other hazards as determined on a case-by-case basis. Following the development of sufficient pipeline capacity . . .

2. Add a new ITL to the PNOS that identifies affected coastal districts. Consistent with Lease Sale 88, identify the affected coastal districts in the second paragraph of the *Coastal Zone Management* Information to Lessees (ITL) for Lease Sale 149 (page 9 of Lease Sale 149 PNOS). Coastal districts that may be affected include Kodiak Island Borough, Kenai Peninsula Borough, Matanuska-Susitna Borough, and the Municipality of Anchorage. Identification of these coastal districts in the ITL will facilitate early coordination between lessees and the coastal districts, as encouraged by the ITL. SA2-06

3. Add a new stipulation to the PNOS which reads as follows: SA2-07

   To prevent conflicts with subsistence and commercial fishing operations, the Regional Supervisor, Field Operations, may restrict lease-related use. In enforcing this term during review of plans of operations, the Regional Supervisor, Field Operations will work with other agencies and the public to assure that potential conflicts are identified and avoided to the fullest extent possible. Available options include alternative site selection, requirements for directional drilling, and seasonal drilling restrictions.



SA2-01

The MMS continues to meet with various groups, communities, and individuals to enhance our understanding of the public's concerns and to modify the program or proposed lease sales to address these concerns. Changes might include (1) deferring part of a planning area from a lease sale because of environmental concerns of interest groups such as the commercial-fishing associations; (2) adding measures to help reduce or eliminate potential effects of petroleum development—this includes surveys to determine the extent and composition of biological populations or habitats that may require special protection; (3) conducting monitoring studies to identify potential adverse effects; and (4) holding meetings in communities that might be affected by offshore oil and gas development to explain the program, the steps MMS is taking to address specific concerns, and to answer any questions. Examples of MMS's continuing efforts to address the public's concerns regarding Sale 149 are noted below.

(1) Results of the Scoping Process:

During the scoping process, which began in March of 1992, over 50 meetings were held in 11 Cook Inlet/Kodiak/Alaska Peninsula communities. Scoping is an information-gathering process to help identify major issues and primary areas of concern that should be addressed in an environmental impact statement. Based on the results of the scoping process four deferral alternatives and 12 mitigating measures (4 stipulations and 8 ITL's) were identified and analyzed in the draft EIS. These alternatives and mitigating measures are identified in Section I of the EIS.

(2) Responses to the Tri-Borough Position Paper:

Prior to the publication of the DEIS for Sale 149, MMS had addressed four of the concerns expressed in the Tri-Borough Position Paper of the Kenai Peninsula, Kodiak Island, and Lake and Peninsula Boroughs. The position paper noted five critical issues must be included in the lease sale environmental impact statement and specifically addressed in the terms and conditions in any proposed Notice of Sale. If the five issues were not addressed in the lease-sale review process, the three boroughs would have grave reservation about supporting the lease sale.

The five issues in the Tri-Borough Resolution are:

1. no offshore loading of tankers;
2. specific plans to minimize and avoid commercial-fishing gear conflicts with the exploration and development of oil;
3. the oil-exploration company must have adequate spill-prevention and -response capability;
4. identification of critical habitat areas; and
5. provision for local government revenue sharing.

A letter from the Borough Mayor of May 22, 1995, noted that the "Kenai Peninsula Borough Assembly supported Lease Sale 149 when it adopted the 'Tri Borough' resolution in 1993. All of the concerns expressed in that resolution have been satisfactorily addressed in the Draft Environmental Impact Statement." Furthermore, in his statement at the Sale 149 Public Hearing in Kenai on March 6, 1995, the Kenai Peninsula Borough Mayor noted that the Tri-Borough position was to encourage the Lease Sale 149 to proceed provided the caveats in the resolution.

In their letter commenting on the OCS Lease Sale 149 Proposed Notice of Sale and the draft

EIS (KIB, Sec. V), The Kodiak Island Borough recommended that MMS adopt Alternative V, the Coastal Fisheries Deferral. They further noted the borough was pleased that the proposed Notice incorporates four of the five critical issued identified in the Tri-Borough position paper as either stipulations or information to lessees and recognized that the position for local government revenue sharing was beyond the scope of MMS.

(3) Responses to Comments on the Draft EIS for Sale 149:

In response to comments received on the Draft EIS for Sale 149 (1) two new deferral alternatives were identified and analyzed in the Final EIS for Sale 149 (Sec. V.A.2.a); (2) three new stipulations were proposed, the text of three ITL's was modified, and an ITL was changed to a stipulation and the text modified to include an additional activity (Sec. V.A.2.b and II.J); and (3) the analyses were modified to include the social, psychological, and cultural effects that the Sale 149 pre- and postlease sale and development and production process have on individuals and communities adjacent to the sale area and the effects of Sale 149 on the Kodiak commercial fisheries (Sec. IV.B). (Where comments warranted other changes or presented new and/or substantive information, revisions were made to the appropriate text in the EIS; references to the revised sections are presented in the responses to the specific comments.)

(4) Pre-Final EIS Outreach Efforts:

Outreach efforts for Cook Inlet communities in September and October have included or will include discussions of the final EIS and attempts to settle some of the unresolved aspects of the proposal.

Citizens in Cook Inlet communities also have written to MMS supporting Sale 149 and expressed support during the public hearings in Anchorage and Kenai.

SA2-02
The two areas identified in the comment make up the deferred areas in Alternative IX—Kennedy Entrance Deferral Alternative. This deferral alternative is shown in Figure II.I-1, described in Section V.A.2.a(2), and analyzed in Section IV.B.9 of the EIS.

SA2-03
A stipulation that would prohibit exploratory drilling from June 15 though August 15 in a corridor of blocks in the eastern part of the Sale 149 area from about Kachemak Bay to Ninichik is part of the proposed Stipulation No. 6—Seasonal Drilling Restriction Stipulation. This stipulation is described in Section II.J.2 of the Final EIS.

SA2-04
Two stipulations have been proposed that would restrict surface entry during exploratory and development and production activities. Stipulation No. 5, Density Restriction Stipulation, would prohibit exploratory activities if the density of such activities would significantly impede commercial fishing uses. Stipulation No. 7, No Surface Entry during Development and Production Stipulation, would restrict or prohibit surface entry into those blocks along a corridor in the eastern part of the Sale 149 area from about Kachemak Bay to Ninichik. These stipulations are described in Section II.J.2 of the Final EIS.

SA2-05
Please see the response to Comment KIB-01.

SA2-06
Please see the response to Comment KIB-02.

SA2-07
The ITL Information on Minimizing Potential Conflicts between Oil and Gas and Fishing Activities was changed to the stipulation Protection of Commercial and Subsistence Fisheries Stipulation (Stipulation No. 1), and wording was added to the text of the stipulation to include subsistence fisheries (Sec. II.J.1.a). The purpose of this stipulation is to ensure the petroleum industry and the participants in commercial- and subsistence-fishing activities have a mechanism to coordinate their activities and minimize spatial-use conflicts. This stipulation will require lesees to include in their exploration and development and production plans a method for early notification of potentially affected fishing organizations and subsistence communities. Lessees will be required to document this coordination effort and resulting conflict resolutions as part of the explorations plan which is distributed for public comment and to the State for consistency determination.

Kodiak Island Borough

710 MILL BAY ROAD
KODIAK, ALASKA 99615-6340
[redacted]

April 19, 1995

Raymond R. Emerson
Project Chief, Sale 149 EIS
MMS Alaska OCS Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

RE: OCS Lease Sale 149 Proposed Notice of Sale and Draft EIS

Dear Mr. Emerson:

The Kodiak Island Borough has reviewed the Outer Continental Shelf Cook Inlet Oil and Gas Lease Sale 149 Proposed Notice of Sale (PNOS) and draft Environmental Impact Statement (EIS). Our comments are divided into in several sections. The basis of our comments is two-fold: the tri-borough position paper, which you have previously received, and local knowledge.

The tri-borough position paper does not provide direction for identifying an alternative preference from those presented in the EIS; however, the Kodiak Island Borough recommends that the MMS seriously consider Alternative V, the Coastal Fisheries Deferral, as described in the draft EIS. This alternative would allow the lease sale to proceed, but would reduce the chance of a major oil spill occurring from 27 percent to 19 percent.

This alternative would defer leasing around the perimeter of the Cook Inlet planning area where multimillion dollar commercial fishing activities concentrate. It would also provide larger buffers around important seabird nesting colonies in the Barren Islands. This deferral does not exclude areas in the vicinity of Cape Douglas, which are included in the General Fisheries Deferral (Alternative VII); however, according to the EIS the General Fisheries Deferral does not provide for any additional reduction in spill potential.

While Alternative V will remove approximately 33 percent of the prospective sale acreage, the draft EIS indicates that the hydrocarbon resources attributed to the remainder of the planning area would still be sufficient to warrant development if a discovery is made. Moreover, this alternative would reduce the chance of a major oil spill (>1,000 barrels) occurring from 27 percent to 19 percent. Considering this, Alternative V likely achieves the best balance between exploration and development of hydrocarbon reserves and consideration of important biological resources. Alternative V would allow the lease sale to proceed, while reducing the potential risk to fish and wildlife populations and traditional harvest activities.

The remainder of our comments are contained in two sections: comments about the PNOS and comments about the draft EIS.

Comments on the Proposed Notice of Sale

The Kodiak Island Borough is pleased that the PNOS incorporates four of the five critical issues identified in the tri-borough position paper, as either stipulations or information to lessees (ITL). We recognize that the fifth issue identified in the tri-borough position paper (provision for local government revenue sharing) is beyond the scope of the PNOS.

The four critical issues identified in the tri-borough position paper are:

1. <u>No Off-Shore Loading of Tankers</u>

2. <u>Specific Plans to Minimize and Avoid Commercial Fishing Gear Conflicts with Exploration and Development</u>

3. <u>Oil Exploration Companies Must Have Adequate Spill Prevention and Response Capability</u>

4. <u>Identification of Critical Habitat Areas</u>

Each of these issues is discussed in turn, below.

1. No Off-Shore Loading of Tankers

Off-shore loading of tankers is addressed in Stipulation No. 3 of the PNOS. Interestingly, the PNOS does not include all of the mitigation language included in the LS 88 PNOS. Neither the LS 149 PNOS nor the draft EIS explain why some of the mitigation language was dropped. The most significant of these deletions occurs in Stipulation No. 3. The Kodiak Island Borough advocates the following revision to Stipulation No. 3, unless the Minerals Management Service can illustrate that this topic is adequately addressed elsewhere (e.g. regulations or operating orders).

Specifically, the second paragraph of Stipulation No. 3, "Transportation of Hydrocarbons", should be modified to include the following underlined LS 88 language: KIB-01

"<u>All pipelines, including both flow lines and gathering lines for oil and gas, shall be designed and constructed to provide for adequate protection from water currents, storms and ice scouring, permafrost, subfreezing conditions, and other hazards as determined on a case-by-case basis.</u> Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore.....and appropriate responses to these conditions will be made by the RS/FO." KIB-01

2. Specific Plans to Minimize and Avoid Commercial Fishing Gear Conflicts with the Exploration and Development of Oil KIB-02

Information to Lessees (e) relates to this critical issue identified in the tri-borough position paper. We are pleased that MMS has informed potential lessees that "local communities including commercial fishing interests will have the opportunity to review and comment on proposed EP's and DPP's as part of the regulatory review process pursuant to 30 CFR 250.33 and 34." The ITL states that these "comments will be considered during MMS decision to approve, disapprove or require modification of the plan."

We suggest that MMS make it clear to lessees that EP's and DPP's are subject to coastal consistency review, and that local coastal districts and the State of Alaska have an enhanced role in the review process, beyond that available to the general public. This suggestion further relates to ITL (d), which is the other mitigation item revised in this PNOS from the LS 88 PNOS.

Consistent with LS 88, the Kodiak Island Borough requests that ITL (d), "Coastal Zone Management", be revised to identify the coastal districts, in the vicinity of LS 149, that have programs applicable to Alaska Coastal Management Program consistency reviews of post-lease activities (i.e. the Kodiak Island Borough and the Kenai Peninsula Borough). This would facilitate early coordination between the lessees and the coastal districts, as encouraged in the ITL.

3. Oil Exploration Companies Must Have Adequate Spill Prevention and Response Capability

This issue is addressed by ITL (f), which informs lessees that "with or prior to submitting a plan of exploration or a development and production plan, the lessee will submit for approval an oil-spill-contingency-plan (OSCP) in accordance with 30 CFR 250.42" and that "guidelines for oil spill contingency planning and response drills which supplement 30 CFR 250.43 have been developed and are available from the RS/FO." The Kodiak Island Borough encourages the MMS to make clear to lessees, that such plans, as part of an EP or DPP are also subject to consistency review by local coastal districts and the State of Alaska. KIB-03

The Kodiak Island Borough expects the opportunity to be fully involved in the review of these plans, as they are developed. We request that the MMS encourage lessees to consult and coordinate early with the Kodiak Island Borough as they develop such plans.

Kodiak Island Borough

4. Identification of Critical Habitat Areas

The last critical issue, relevant to the PNOS, identified in the tri-borough position paper is the identification of critical habitat areas in the region of LS 149. This issue is partially addressed by ITL (b). There are additional sensitive areas that have been legislatively identified that are not noted in this section. They are Shuyak State Park and Afognak Island State Park. In addition, while Tugidak Island is mention, it is not correctly identified as a State Critical Habitat Area. KIB-04

We believe that industry should not only "consult with FWS, NPS, or State personnel to identify specific environmentally sensitive areas...when developing a project-specific OSCP", the industry should also consult with local communities and organizations in this identification process.

While, as the ITL notes, "lessees are advised that they have the primary responsibility for identifying these areas in their OSCP's and for providing specific protective measures", an early and accurate identification process is necessary in order for adequate and appropriate protection measures to be designed. We are concerned that the draft EIS does not adequately identify and describe <u>all</u> the critical habitat areas in the region.

We also have the following additional comment on the PNOS. While we are very pleased to see Stipulation No. 2 (Orientation Program) included in the PNOS, we believe that the stipulation should be revised to require that the program be attended at least twice a year by all personnel. We also think that lessees should be required to consult with local governments and organizations in the region of the spill, prior to finalizing their orientation program. This would ensure that the program is truly "designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas which such personnel will be operating", as well as meeting other orientation program objectives. KIB-05

Comments on the Draft EIS

This section provides specific comments on the draft EIS; however, the Kodiak Island Borough also has some general observations about the document. While we appreciate the EIS workshop that the MMS held in Kodiak, we feel that any document as significant as this draft EIS, should be formatted and written in a manner that is clear, concise and, above all, understandable. We recognize that compilation of the vast amount of information contained in this document requires a great deal of effort; however, the way this information is presented in this draft EIS, makes it very difficult for any reader to access the information.

Formatting suggestions include organizing all of the resource sections in the same way, so a reader can rely on consistency in these sections of the document. This would make it easier for the reader to assess what the stated environmental consequences of a specific alternative are. The document could also be formatted to use the section heading much more effectively. In general this document is not user friendly, and for the most part this results from the document layout, not the subject matter. KIB-06

There is a general subject area that we are concerned about, the lack of detail in the socioeconomic descriptions of the affected environment. Considering the amount of background information that is available, a more complete picture of the regional communities and their socioeconomic structures should be included in the final EIS. The following specific comments identify numerous errors and omissions in the document that should also be corrected in the final EIS.

SECTION II, ALTERNATIVES INCLUDING THE PROPOSED ACTION

Pages II-1 through II-16: It should be noted that there are several differences in the mitigation measures presented in the draft EIS and those included in the Proposed Notice of Sale (PNOS). For example, the PNOS includes nine Information to Lessees (ITLs); while the draft EIS includes only six ITLs that are part of the proposed action. This discrepancy should be corrected in the final EIS. KIB-07

Table II.I-1, Second Page: Under the cumulative case, it is stated that the overall cumulative effect on fisheries resources is likely to include reduced stocks of some species primarily due to the potential for over harvest by commercial fishing activities. This statement summarizes a portion of the cumulative effects discussion presented on pages IV.B.10-13 and IV.B.10-14. While there is always a potential for over harvest, the opinions offered in this section of the draft EIS are unsubstantiated. There is not a single citation supporting the position that intercept fisheries off Kodiak Island and in lower Cook Inlet have, or will likely, result in over harvest of fish stocks. The Kodiak Island Borough recommends that this portion of the cumulative effects discussion be deleted from both sections II and IV of the final EIS. KIB-08

SECTION III, DESCRIPTION OF THE AFFECTED ENVIRONMENT

Page III.B.1: This section overlooks the seasonally abundant and critical "community" of buoyant eggs and/or larvae from many near shore and offshore commercial species, including halibut, pollack, cod, crabs, shrimp, and many flatfishes critical to local economies. KIB-09

Page III.B.5: This section overlooks the probability that the Shelikof Strait serves as a major mitigation corridor for salmonid juveniles from Prince William Sound and KIB-10

S.E. Alaska, if not the whole West Coast and British Columbia. As shown by the movement of oil from the Exxon Valdez, major ocean currents move from the Gulf of Alaska into and through the Shelikof. It follows that salmonid juveniles moving on these currents would also traverse the sale area. Since most of the runs in the southern range of the species are either depressed, threatened or endangered, this potential should not be taken lightly. Tag recoveries have shown that Columbie River chinook and Sacramento River chinook utilize the Kodiak area seasonelly, es do many others. Endangered listing of those runs will have as significent en impact upon proposed oil and gas development as it will on Kodiak's commercial and charter boat fisheries. Please consult with ADF&G, NMFS, and the PMFC for more information. KIB-10

Page III.B.7: The KIB is unaware of any information documenting that Pacific heke are present in lower Cook Inlet "in very large numbers." While the draft EIS cites Hart (1973) as the source of this information, Hart simply states that Pacific hake are distributed "From the Gulf of California to the Gulf of Alaska..." Hake is not en abundant species in the lower Inlet, and this information should be deleted from the final EIS. KIB-11

Pages III.B.11 and III.B.12: Item 4 in this section states that northern fur seals are seasonally abundant in lower Cook Inlet and Shelikof Strait. Graphic 2, Marine Mammals, also indicates that fur seals commonly occur in this area during the spring and summer. Apparently, this information was derived from Morris et al. (1983). As documented in Consiglieri et al. (1982), and reflected on page IV.B 1-43 of the draft EIS, fur seals are not abundant in lower Cook Inlet and Shelikof Strait. Although they occasionally occur in these areas, fur seals are primarily found further offshore along the continental shelf break. The largest numbers of seals are present during the spring migration as they move to the Pribilof Islands to breed. Some, mostly juvenile non-breeding males, remain along the shelf break to the south and southwest of Kodiak Island through the summer. The marine mammal discussion in the final EIS should reflect this information. KIB-12

Page III.B.15: Harbor porpoise minimum population estimates statewide are now available from M. Dahlheim at the National Marine Mammals Laboratories, as are those for killer whales (III.B.14). KIB-13

Page III.B.17: The list of threatened and endangered species that occur in the vicinity of Sale 149 should include the Steller's eider. This species is addressed on Page III.B 21, but is not listed here. KIB-14

Page III.B.19: 1994 population estimates are available for Stellar Sea Lions. The stock of Stellar Sea Lions may be split into East and West segments at 144 degrees W, with the Western stock proposed for endangered listing. KIB-15

Page III.B.23: Reference to the Arctic fox should be deleted from Item 6; this species does not occur in lower Cook Inlet and Shelikof Strait. KIB-16

Pages III.C.2 and III.C.4: The draft EIS does not include adequate information on the Cook Inlet or Kodiak commercial salmon fisheries. Only a single year of harvest information is presented for the lower Cook Inlet management area (i.e., Southern, Kamishak, and Outer districts); and no information is provided on the upper Cook Inlet management area (i.e., Central and Northern districts). This latter omission is a particularly serious deficiency because the proposed sale area extends into the middle of the Central District. The Northern District could also be affected by Sale 149 if a significant oil spill occurred and was transported north of the Forelands. In the Kodiak Area, the Big River section of the Mainland District and the Afognak District could be impacted by the sale, yet there is no information provided in the draft EIS. KIB-17

During the 1994 commercial fishing season, approximately 3.5 million sockeye salmon, valued at 30 million dollars, were harvested in the upper Cook Inlet management area. About half (53%) of the catch was taken by drift gillnet fishermen, who concentrate in the Central District along the east side of the Kenai Peninsula (ADF&G, 1994). The importance of this fishery, as well as those in the Kodiak Area, to both local residents and the State should be more fully described in the final EIS. Catch and ex-vessel value information for at least 1990 through 1994 should be provided. In addition, it should be noted that the ex-vessel value is the price paid to fishermen, and the total value of the fishery is considerably higher. KIB-18

Page III.C.3: This section completely disregards the historic shrimp and crab fisheries in the region. It can be assumed and reasonably forecast that over the life of a production field in this area that most of those fisheries will return. Prior to 1980 the total shrimp landings for the Kodiak region were a stable 110 million pounds annually, including 55 million pounds from the Alaska Peninsula. Landings for king, tanner, and Dungeness crab were more variable, but none the less substantial. Oral communications with ADF&G and NMFS indicate some signs of recovery in all of these populations. Historic landing data available from NMFS and ADF&G should provide good background, perhaps even allowing the MMS to speculate about high, middle, and low yields of shellfish from the affected region. KIB-19

Page III.C.4: This figure is confusing. With the 1991 landings at 2,432 tons, $55,000 must have been the average return to each participating fishermen, in which case the total value of the landings needs to be corrected. At an average of about $400 per ton (which is low), this figure could have been $972,800. Subsequent harvest levels hava been higher, as were the priçes per ton. KIB-20

Page III.C.4: This section on commercial fisheries completely over looks the halibut fishery in its many guises. Commercial landings from this area are substantial, as are the landings of the charter boat industry and the recreational fishery. Homer harbor reports 79 full-time local charter boats, plus a much larger number of no-local or part time vessels. In addition, Anchor Point and Ninilchick KIB-21

each report more than 100 vessels under charter on a full or part time basis. There is also a growing charter fleet operation out of Kodiak, and there is no way to quantify the hundreds of private vessels using this area. Landings and value should be available in some detail for all these fisheries. Also consider that the commercial fishery is now switching to Individual Fishing Quotas (IFQ's), under which regimen commercial fishing can be conducted for 9 months per year at much higher projected values per pound. KIB-21

Table III.C.2-5: This table overlooks halibut completely, a discrete and valuable commercial fishery. KIB-22

Table III.C.4-1: This table underrepresents the population of the Kodiak region, since a large segment of the road system and remote area population lives outside of census designated places (CDP's). Please see the attached population table for more accurate information. KIB-23

Page III.C.11(2): A significant residential area outside of Kodiak proper is the Service District One/Monashka Bay area with a population of approximately 3,865 people. KIB-24

Page III.C.12: Paragraph five (5) on this page categorizes the remote communities in this region as "very old" and "relatively new". It is important to define these terms in the content of this discussion. To which categories do Old Harbor, Larsen Bay and Ouzinkie belong? KIB-25

Page III.C.18: While due to limited space in the text, the MMS only selected some areas of Parks and Wildlife Refuges and Recreation Areas to describe in detail, all areas should receive at least some mention due to their importance in the region. The Alaska Maritime National Wildlife Refuge is not even mentioned in the text. While the Kodiak National Wildlife Refuge is mentioned, the Afognak Island lands of this Refuge are over-looked and the Trinity Islands are misidentified as being part of the Refuge. In fact, Tugidak Island is a designated State Critical Habitat Area. KIB-26

There are also four other legislatively designated Critical Habitat Areas adjacent to the Sale 149 area that are not identified in this section of the draft EIS. These areas include: Redoubt Bay CHA, Kalgin Island CHA, Clam Gulch CHA, and Kachemak Bay CHA. Five state refuges are also located north of the planning area, including: Trading Bay State Game Refuge (SGR), Susitna Flats SGR, Goose Bay SGR, Palmer Hayflats SGR, and the Anchorage Coastal Wildlife Refuge. In addition, neither the discussion of "national resources" or Figure III.C.6-1 identifies Chisik and Duck Islands as part of the Alaska Maritime National Wildlife Refuge. Another omission in the text and Figure III.C.6-1 is Shuyak State Park and the major Kodiak Island Borough land holdings on Shuyak Island which are likely to be transferred to the park. The map also overlooks recent additions to the State park system on north Afognak Island. In addition, the map overlooks the portion of the KIB-27

Kodiak National Wildlife Refuge centered about Foul Bay and Bann Island on Afognak Island. KIB-27

Text references to these features, the impact of proposed development upon their use and management, and the potential impacts from spills are similarly lacking. These omissions should be corrected in the final EIS.

Page III.C.22: The Concept Approved Draft of the Kodiak Island Borough Coastal Management Plan is expected in July, 1995. KIB-28

SECTION IV, ENVIRONMENTAL CONSEQUENCES

Many of the following comments on "Alternative I, the Proposal, Base Case" are also relevant to the impact analyses for other alternatives (e.g., Alternatives IV and V) that rely upon the Alternative I, base case evaluation.

Entire Section, Oil Spill Risk Analysis: As illustrated in Figure IV.A.2-2, the Sale 149 oil spill risk analysis does not address "potential shoreline impacts north of the Forelands." The reason for this is unclear. According to the draft EIS (pages II-2 and II-3), if a commercial discovery is made in the sale area, the oil would probably be transported to Nikiski through an offshore pipeline. From Nikiski, the oil would either be trans-shipped or processed for in-state sale. Under this development scenario, a pipeline or tanker spill could occur in the Nikiski vicinity and oil could be carried northward. Consequently, the final EIS should address the possibility of shoreline impacts north of the Forelands. KIB-29

In addition, it is unclear how the "environmental resource areas" depicted in Figures IV.A.2-3 and IV.A.2-4 were derived. Some very important areas, such as Redoubt Bay SGR, Clam Gulch CHA, and the mouth of the Kenai River, are not represented in any of these areas. These habitats support valuable fish and wildlife resources, which are harvested for commercial, sport, and subsistence purposes. The final EIS should evaluate the risk of an oil spill impacting all of the environmentally sensitive areas in the vicinity of the sale. KIB-30

Page IV.A.21: The draft EIS discussion of the M/V Glacier Bay oil spill is summarized from the Scientific Support Coordinator's (SSC) report on this incident. It is unclear why this source was used rather than the official reports prepared by the U.S. Coast Guard (USCG) (March 1988) and the Alaska Department of Environmental Conservation (DEC) (May 1988). One statement attributed to the SSC's report is that: "The fishery was likely affected the greatest as false slick reporting resulted in unnecessary displacement of fishermen." We were unable to find any mention of this in either the USCG or DEC reports, and we believe that it understates the effect of the M/V Glacier Bay spill on the commercial salmon fishery. KIB-31

On page 1 of the DEC report it states: "Over 200 salmon nets were contaminated by the oil spill and damage claims total about $1.3 million to date. About 100,000 lbs of salmon were contaminated from the spill." The final EIS should include a more accurate summary of the effects of the M/V Glacier Bay spill on the Cook Inlet commercial salmon fishery, based on the official USCG and DEC reports on this incident. KIB-31

Page IV.B.1-19: This entire section doesn't consider the planktonic eggs or larvae of commercially important species or the forage fish for those species or marine mammals. KIB-32

Page IV.B.1-20: The reference to phytoplankton production of similar or identical hydrocarbons to some contained in oil does not lead directly to an assumption that those same hydrocarbons in the water column would have no effect on the phytoplankton. Our bodies produce carbon dioxide as e normal product of respiration and the gas occurs naturally in the air around us. By your reasoning it would follow that the addition of carbon dioxide to human living spaces would not have an effect on humans. KIB-33

Pages IV.B.1-22, IV.B.1-23 and IV.B.1-24: The findings presented here do not consider that planktonic eggs and larvae of commercially important species or forage species are only in the water column for brief periods and will not be replenished by "rapid rate of regeneration" as are zooplankton that inhabit the water column for their entire life cycle. It further fails to consider that all plankton are subject to oceanographic forces such as sheers, thermoclines, salinity gradients, wind, tides, beaches, and eddies which concentrate them in specific areas, often the same areas that collect and concentrate hydrocarbons in all their forms from oil spills. Suggesting that hydrocarbon components will be restricted for the most part to upper water layers, and will therefore not affect deeper zooplankton ignores the diurnal movement of most zooplankton species toward the surface in periods of darkness. KIB-34

A spill in the wrong place and at the wrong time of year could be very detrimental to a particular population or species. The offhand manner in which these paragraphs treat effects on zooplankton obscures the potential for such disasters. The Exxon Valdez spill, for example, may or may not have affected the herring population of Prince William Sound in this fashion. It is no more certain than uncertain that the Exxon Valdez spill did not affect the herring population. Statistical probability is an indiscriminate sword which cuts both ways in circumstances of little prior data. In the case of planktonic larvae, claims that spills will have minimal effect and the population will recover quickly are at least as speculative as claims that great harm will occur. The MMS should be careful about broad application of statistics based upon limited data for a few species. KIB-35

Planktonic larvae of benthic invertebrates and eggs or larvae of benthic and pelagic vertebrates in the water column will not be regenerated "within a week," KIB-36 as generalized (fifth from last line, p. IV.B.1-23 "whereas zooplankton recovery may require up to 1 week."), and should be considered separately from a general discussion of zooplankton. KIB-36

This section further ignores the life cycle and behavior of Pandalid shrimp, which concentrates juveniles in the heads of bays in comparatively shallow water where they would be highly susceptible to the normal circulation patterns of spilled oil, as described several times in this document. The pink shrimp, P.borialis, is particularly noted for its diurnal movement off bottom and seasonal movement between deeper and shallower water, as well. KIB-37

Pages IV.B.1-27, IV.B.1-28, and IV.B.1-29: This section compounds the failure to deal with the planktonic stages of the lifecycles of many important commercial species. Considering that these same larvae drift into shallow bays and estuaries for settlement and early life, it is entirely conceivable for the projected spill to impact any species on the high seas, followed by an effect of 20 to 30% on the same species and year class in shallow areas as the spill evolves. This represents a substantial impact on many species important to local economies. Estimates that "Recovery within the affected embayments is expected to take 1 to 2 weeks" (IV.B.1-29) are completely incorrect in this light. Recovery estimates of "2 to 3 years in high-energy habitats and up to 7 years in lower energy habitats" are only valid for sessile invertebrates and epiphyton and should not be generalized to species that utilize these areas as nursery habitat for a portion of their total life cycle, especially if multiple year classes are present at one time. KIB-38

Page IV.B.1-30: The information attributed to Bue et al. (1992) should also be revised in the final EIS to more accurately reflect the authors' conclusions. The draft EIS correctly notes that, between 1989 and 1992, these researchers documented higher pink salmon egg mortality in some oiled intertidal areas than in unoiled areas. The draft EIS goes on to note that these differences were not maintained in egg-to-fry survival. While the researchers found no significant difference in egg-to-fry survival between oiled and control streams, the authors believed this was likely "...due to insufficient power in the sampling design or sampling levels...rather than a true lack of change." This is an important point to include in the final EIS. The inability to document an impact is not the same as determining a lack of impact. KIB-39

This discussion also overlooks the effects of restricted or prohibited commercial fishing for salmon for an entire summer due to marketing and public health restraints. As seen following the Exxon Valdez spill, resultant over-escapement poses serious threats to salmon runs. KIB-40

Page IV.B.1-45: The current estimate of beluga numbers in Cook Inlet is 898 (minimum estimate using correction factors). See NMFS 1994/95 Stock Assessment reports. KIB-41

Page IV.B.1-71: This treatment of employment effect of spills neglects demonstrated effects on local industries and employers. Hiring of cleanup workers at high wages following the Exxon Valdez spill depleted local labor supplies and had a tremendous impact on fish processing companies, as well as local small businesses who needed workers. In addition, the small percentage of vessels that received cleanup contracts derived a tremendous financial and competitive advantage over vessels not so employed and still awaiting settlement from spill-related claims to this day. While fishermen without cleanup contracts suffered a protracted period of little or no income, the vessels with cleanup contracts received a huge influx of cash which they applied to their vessels to improve their competitiveness over other vessels once fisheries were opened following the spill. The term "Spillionaires" was coined locally and should be self-explanatory. KIB-42

Page IV.B.1-72: See previous comments regarding the shellfish and halibut fisheries. KIB-43

Pages IV.B.1-74 and IV.B.1-75: This section of the draft EIS discusses the economic effects of the base case on the commercial fishing industry of Cook Inlet. The Kodiak Island Borough questions two aspects of this economic evaluation. First, there is no mention of the Kodiak commercial fisheries. Based on the figures provided, it appears that the ex-vessel value of the Kodiak fisheries were not considered in the analysis. If this is the case, it represents a serious deficiency that should be corrected in the final EIS. KIB-44

Second, the evaluation is based on the assumption that no fishing closures would be necessary as a result of the 49 smaller spills associated with the base case. This is not an appropriate assumption. While the volumes of these spills are expected to be relatively small, fishing closures might be required depending on where and when the spills occur. Past experience has demonstrated that spilled oil accumulates in the Cook Inlet rips. The east rip is also a major migration corridor for adult salmon moving into Cook Inlet and, consequently, a key commercial fishing area. Even a relatively small amount of oil in the east rip during the commercial harvest season could necessitate restrictions in drift gillnet fishing. KIB-45

In addition, though not a true commercial fishery, the charter boat and guided fisheries in this region are so substantial that impacts on them should also be a major consideration. See previous comments regarding charter vessels, then consider the intensive visitor industry developing at remote lodges, which are also dependent upon aquatic resources. This section also needs to consider the growing aquaculture industry in the area as it is an outgrowth of the commercial fishing industry. Effects on shellfish aquaculture could be dramatic. KIB-46 KIB-47

Page IV.B.1-90: As noted previously, most of the state legislatively designated areas of importance in Cook Inlet and Kodiak are not identified in Section III of the draft EIS. Similarly, Section IV does not discuss the risk of an oil spill impact in these areas. The final EIS should include this information. KIB-48

Page IV.B.1-99: This section neglects the effects of contaminated or potentially contaminated products as experienced in both spills, as well as the effects on employment and income. These experiences are well documented and quantifiable, even though the resources impacts were negligible or not documentable. KIB-49

Page IV.B.10-13: As noted previously, the draft EIS provides no documentation that over harvesting is likely to have the most substantial effect on fisheries resources over the 19-year life of the proposal. These statements should be deleted from the final EIS. KIB-50

Graphic 1, Marine and Coastal Bird Resources: This graphic does not depict all of the important coastal bird habitats in the Cook Inlet/Shelikof Strait vicinity. For example, the map does not illustrate spring and fall waterfowl staging concentrations in Redoubt Bay, Trading Bay, and at the mouth of the Kenai River. In addition, much of the information depicted on the map refers to "Other high-use areas." However, there is no indication what bird species use these areas (i.e., waterfowl or seabirds) or when they are present. Based on the source documents identified on the graphic, it appears that the waterfowl information was derived from documents published in the 1970's. More current information is available, and should be used to update this portion of the final EIS. KIB-51

Graphic 2, Marine Mammals: As mentioned previously, this graphic should be revised to illustrate that fur seals primarily occur south of the Sale 149 area, along the continental shelf break. In addition, the harbor seal information is difficult to see, and should be clarified in the final EIS. KIB-52

Thank you for the opportunity to comment on these OCS LS 149 planning documents. If you have any questions about the Kodiak Island Borough's comments, please contact Linda Freed at 486-9360.

Sincerely,

KODIAK ISLAND BOROUGH

Jerome M. Selby

Jerome M. Selby
Mayor

Attachment (1)

Kodiak Island Borough

cc: Kodiak Island Borough Assembly
Mayor Don Gilman, Kenai Peninsula Borough
Mayor Glen Alsworth, Lake and Peninsula Borough
George Valiulis, MMS - Headquarters
Governor Tony Knowles
Marilyn Heiman, Special Staff Assistant, Office of the Governor
Glenn Gray, OMB - DGC, Office of the Governor
John Shiveley, Commissioner, ADNR
Pam Rogers, Division of Oil and Gas, ADNR
Frank Rue, Commissioner, ADFG
Lance Trasky, Habitat Division, ADFG
Claudia Slater, Habitat Division, ADFG
Gene Burden, Commissioner, ADEC
William Hensley, Commissioner, ADCED

KODIAK ISLAND BOROUGH POPULATION FIGURES

The following figures include federal census figures, state certified population figures resulting from the 1982 Kodiak Island Borough Special Census, and State certified revenue sharing population figures for 1983 through 1994.

	Fed.Cen. 1980	1982	1983	1984	1985	1986	1987	1988	1989	1990	Fed.Cen. 1990	1991 & 1992	1993	1994
City of Kodiak	4,756	5,873	6,072	6,469	6,602	6,668	6,681	6,774	6,774	6,787	6,365	7,229	7,581	7,428
City of Akhiok	105	103	103	103	103	103	109	123	93	93	77	77	78	86
City of Larsen Bay	168	180	180	180	180	180	217	169	149	149	147	147	144	153
City of Old Harbor	340	355	355	355	355	355	380	380	322	322	284	284	307	311
City of Ouzinkie	173	233	233	233	233	233	235	204	204	216	209	209	210	221
City of Port Lions	215	291	291	291	291	291	302	296	300	300	222	222	259	264
Village of Karluk	96	102	102	102	102	102	102	107	82	82	71	71	74	65
Chiniak	--	185									69	150	75	143
Womens Bay	--	521									620	843	674	746
USCG Base	1,370	1,995									2,025	2,129	2,016	2,066
Service District #1	--	1,853	5,146*	5,059**	5,285	5,423	5,585	6,871	6,983	7,079	--	--	--	} 3,863
Monashka Bay	--	426									--	--	--	
Remainder of Borough	2,716	597	597	597	597	597	597	651	651	651	3,220	4,174	3,827	229
TOTALS	9,939	12,714	13,079	13,389	13,748	13,952	14,127***	15,575	15,558	15,679	13,309	15,535	15,245	15,575

* This row represents combined figures for these road system areas.

** Loss of population due to annexations of property by the City of Kodiak. The population effected by the annexations was 214 people.

*** This column does not add up, as the State certified village population figures independently of the Kodiak Island Borough population figures.

December, 1994

KIB-01
This language, which was used in the Transportation of Hydrocarbons stipulation for Lease Sale 88, has been incorporated into the regulations at 30 CFR 250.152, ***Design requirements for DOI pipelines***, paragraph (f), which states: "Pipelines shall be designed and maintained to mitigate any reasonably anticipated detrimental effects of water currents, storm or ice scouring, soft bottoms, mud slides, earthquakes, subfreezing temperatures, and other environmental factors." At the time of Lease Sale 88 in 1984, these were not regulatory requirements.

KIB-02
The ITL No. 4, Information on Coastal Zone Management, has been revised to identify the coastal districts of the Kodiak Island Borough and the Kenai Peninsula Borough. The ITL also has been modified to state that the Kodiak Island and Kenai Peninsula Boroughs have enforceable policies that (1) have been incorporated into the ACMP, (2) are more specific than the Statewide standards, and (3) encourage lessees to consult and coordinate early with those involved in coastal management review.

KIB-03
The ITL 4, Coastal Zone Management, addresses these concerns. This ITL advises lessees that all postlease activities will be subject to consistency review. It also encourages lessees "to consult and coordinate early with those involved in coastal management review."

KIB-04
The ITL on Sensitive Areas to be Considered in Oil-Spill-Contingency Plans has been revised to incorporate several additional areas including Shuyak State Park, Afognak Island State Park, and Tugidak Island as a Critical Habitat Area.

KIB-05
During the exploration phase of offshore operations, the lessee/operator is located onsite for a limited time, generally not in excess of 2 to 3 months. The rig is then released to another operator or anchored in a harbor. Consequently, it is not necessary for personnel to attend an orientation program more than once during such a limited time onsite. Twice-yearly programs could be considered during the development and production plan that, by regulation, requires further National Environmental Policy Act review and State consistency concurrence of the proposal.

KIB-06
Some minor changes in section headings may be made for the Sale 149 final EIS. The format of the section headings in the Sale 144 (Beaufort Sea Planning Area) EIS are more easily identified. Compared to the text, a larger format is used and a bold, italic print style is used. This format likely will be used in future EIS's. Also for future EIS's, more attention will be given to organization.

KIB-07
The mitigating measures (Stipulations and Information to Lessees [ITL] Clauses) that are included in the DEIS are considered as part of the proposed action and alternatives. The mitigating effects of these measures have been factored into the environmental analysis. The DEIS includes four stipulations and six Information to Lessees Clauses.

All of the stipulations included in the DEIS also are included in the proposed Notice of Sale. The DEIS includes in its analyses six ITL Clauses, while the proposed Notice of Sale includes nine. The three additional ITL's are administrative in nature; they are: (1) Affirmative Action Requirements, which advises potential bidders and lessees of revision of Department of Labor regulations on affirmative action requirements for Government contractors (including lessees). (2) Navigation Safety, which advises lessees of safety zones, precautionary zones, anchorages, traffic separation schemes, and designations of fairway zones. Operations on some of the blocks offered for lease may be restricted by designation of fairways established by the U.S. Coast Guard, and that U.S. Army Corps of Engineers permits are required for construction of any artificial islands, installations, and other devices attached to the seabed located on the OCS. (3) Offshore Pipelines, which advises bidders of a Memorandum of Understanding between the Department of the Interior and the Department of Transportation concerning the design, installation, operations, and maintenance of offshore pipelines.

These measures are considered administrative and advisory only; they have no mitigating effects on the proposal and, therefore, are not included in the DEIS analyses.

KIB-08
The statement in the text in Section IV.B.12.c and in Table II.I-1 has been changed. This issue has been the topic of discussion in the Anchorage Daily News on a number of occasions, as recently as May 14, 1995, in the Outdoors Section.

KIB-09
Halibut, pollock, cod, and flatfishes are vertebrates (including their eggs) and, as such, are discussed in the Fisheries Resources section. Zoea generally are present at the same time as that of other zooplankton, as indicated in Cooney, 1987 (referenced in the EIS).

KIB-10
The text in Section III.B.2.b(1)(d) has been revised to address the comment.

KIB-11
The text in Section III.B.2.b(2)(b) has been revised to address the comment.

KIB-12
The recommended changes have been made in the text and in Table III.B.4-1, and Graphic 2 has been revised.

KIB-13
The information referenced has been requested from M. Dahlheim at the National Marine Mammals Laboratory and will be incorporated into the text if it is received in a timely manner.

KIB-14
The Steller's eider has been added to the list of endangered, threatened, and proposed species in Section III.B.5.

KIB-15
The 1994 Steller sea lion population estimates have been received and incorporated into the EIS. Until a change in ESA status for a species or stock is proposed, it is inappropriate to speculate on the effects of such an action.

KIB-16
Although the arctic fox is not a native species to the Cook Inlet/Shelikof Strait area, it was introduced on the Kodiak archipelago and islands south of the Alaska Peninsula in the 1920's on established farms and later released into the wild (Bailey, 1993).

KIB-17
The essence of the environmental impact statement is supposed to be Section IV, Environmental Consequences. The analysis of commercial fisheries in Section IV is based on the potential effects of Sale 149 on all the commercial fisheries and not on the fisheries at any specific location or the size of the catch in terms of numbers of individual fish caught. The harvest information provided in Section III was intended as an example only. The material presented in Section III (Description of the Affected Environment) should briefly and concisely describe the areas affected by the proposed action; lengthy, detailed descriptions are not necessary and should not be considered a measure of the adequacy of the EIS. The estimated annual value of the Cook Inlet and Kodiak commercial-fishing industry is relevant to the potential economic impacts on that industry and is characterized in Section IV.B.1.i(8).

KIB-18
Please see the response to Comment KIB-17.

KIB-19
Please see the response to Comment KIB-17.

KIB-20
To eliminate the confusion, the word "individual" has been added to the sentence, as suggested. Regarding Kodiak herring harvests, they have almost doubled since 1991. However, the analysis depends on the estimated annual value of the entire Cook Inlet commercial-fishing industry, which includes all commercial species in all areas within the sale area. Literally all of these fisheries have high and low years, but the estimated annual value of the Cook Inlet commercial-fishing industry appears to range from $50 to $135 million and Kodiak's from $50 to $100 million.

KIB-21
The information on charter boats in this comment has been added to the text in Section III.C.6.

Sport-fish- and razor clam-catch data also have been added to the text in Section III.C.6. There are no data on the value of these catches because, by definition of the term "sport fishery," these catches are not sold.

The IFQ's are considered a management technique. While it will increase the value of fish to commercial fishermen and the amount of time they can fish, it is not likely to result in a greater number of fish being taken. At this time, the estimated annual values of the Cook Inlet and Kodiak commercial-fishing industry is not likely to be different from that suggested in Section IV of the DEIS ($50-$135 million and $50 to $100 million, respectively; see Sec. IV.B.1.i(8).)

KIB-22
The referenced table was intended to show general patterns only in the years 1987-1991. It was not intended to include all years of recorded data or all species harvests during that time.

Also, please see the response to Comment KIB-17.

KIB-23
Table III.C.2-5 was not intended to account for all population within the Kodiak region. The commenter notes that 24 percent of the total population for the Kodiak region (3,220 of 13,309) in 1990 resided outside census-designated places, constituting residents living along the road system or in remote areas. Adding this additional element of population would not alter the analysis where such information is used.

KIB-24
Please see the response to Comment KIB-23.

KIB-25
The "relatively new" communities are defined in the text as having been established since 1950. The communities of Old Harbor, Larsen Bay, and Ouzinkie are situated in age somewhere between the relatively new and very old communities.

KIB-26
A description of the Alaska Maritime National Wildlife Refuge has been added to the text in Section III.C.6. A reference to Afognak Island lands being a part of Kodiak National Wildlife Refuge has been added to the text in Section III.C.6. The KIB is correct that the Trinity Islands are not part of the Kodiak National Wildlife Refuge. Because oil is not anticipated to reach the shores of the Trinity Islands within 30 days of a spill (Fig. IV.A.2-7), reference to the Trinity Islands has been deleted from the text.

KIB-27
The Alaska Maritime National Wildlife Refuge is now described in Section III.C.6. No reference is made to individual islands, because there are so many of them in this refuge. The map in Figure III.C.6-1 has been changed to indicate that Kodiak National Wildlife Refuge has a segment centered around Foul Bay on Afognak Island. Reference to the Trinity Islands in the text of Section III.C.6 under Kodiak National Wildlife Refuge has been deleted, because those islands are not part of that refuge. The Trinity Islands are not discussed in Section III.C.6, because oil from an oil spill is not anticipated to reach these islands within 30 days (see Fig. IV.A.2-8).

The four legislatively designated critical habitat areas have been added to the text in Section III.C.6. It is not anticipated that any of the five State refuges identified in the comment will be affected by the proposal and, therefore, no reference will be made to them. Chisik and Duck Islands are not specifically referenced in the description of the Alaska Maritime National Wildlife Refuge because there are so many islands; however, a general description of the refuge has been added to the text in Section III.C.6.

Shuyak State Park is not described in Section III.C.6, but it is listed in Table III.C.6-1 in the DEIS. Describing proposed changes to parks involves a level of detail that is beyond the scope of the EIS, so this information will not be added to the text. However, effects on parks are described primarily through effects on park resources (birds, mammals, etc.) in the EIS in general and to a lesser degree on management of the resources. Only one State park, the one with the largest land area, is illustrated in Figure III.C.6-1. Other much smaller State parks and recreation and tourism areas are listed in Table III.C.6-1, including a description of location, and they are described in the text of Section III.C.6.

Afognak Island State Park has been added to Table III.C.6-1; however it has not been added to the map because of space limitations. As stated above, the map in Figure III.C.6-1 has been changed to indicate that Kodiak National Wildlife Refuge has a segment centered around Foul Bay on Afognak Island.

Text references to the features cited have been added where appropriate. The impact of the proposed use and potential impacts from spills are analyzed in Section IV.B.1.m and corresponding sections for alternatives; however, the analysis is at a level of generality that is appropriate for this EIS and does not include every area by specific referenced name. Oil-spill analysis is by land segment (which is approximately 30 km in length) and is summarized in Figure IV.1.2-8. The oil-spill analysis interpreted with respect to national and State parks and related recreational places is in Section IV.B.1.m.

KIB-28

Section III.C.22 of the final EIS has been modified to reflect that the Concept Approved Draft of the Kodiak Island Borough Coastal Management Plan is expected in late fall 1995. We appreciate the updated information.

KIB-29

Because general circulation models often are incapable of sufficient resolution a representation of bays and other small estuarine bodies of water, the OSRA does not model enclosed bays and estuaries. To count simulated trajectories that would have entered the estuary, the estuary entrance is treated as part of the shoreline, and a land segment is associated with each. Counts of simulated spills contacting these land segments allow for risk analysis to the bay as a whole without addressing further problems of spill movement within the estuary. The Cook Inlet/Shelikof Strait oil-spill-trajectory model does not estimate specific contacts to resources north of the Forelands. Sea Segment (SS) 1 and Land Segment (LS) 37 are used to identify the chance of oil moving north of the Forelands. Analysts used the OSRA to estimate the effects to resources north of the Forelands by assuming the same chance of contact to the resources north of the Forelands as SS1 and LS 37. If commercial quantities of oil were found, a development and production EIS would address the specific location of the transportation scenario. Detailed analysis regarding that particular transportation practice would be done at that time.

KIB-30

The Environmental Resource Areas depicted in Figures IV.A.2-3 and IV.A. 2-4 represent biological habitat or wildlife-concentration areas that extend offshore from the coast. Other important habitats, such as Redoubt Bay, Clam Gulch, and the mouth of the Kenai River, are represented by land segments shown in Figure IV.A.2-2 and LS's 34, 41, and 39, respectively. Combined oil-spill-probabilities of contact to these habitats-land segments are evaluated in Figure IV.A.2-8. Land segments, including LS 34, all with probabilities of <0.5-percent chance of contact are not included.

KIB-31

The *Glacier Bay* oil spill was one of three Cook Inlet historical spill events described in Section IV.A.5 of the EIS. The intent of the description was to demonstrate a progressive improvement on the part of the industry and government to make decision and clean up an oil spill in the area; there was no attempt in the description of any of the three spills to summarize any environmental effects. Section IV.B.1.i of the EIS includes an analysis on the effects of potential spills on the Cook Inlet commercial-fishing industry and notes that the estimated losses for driftnet fishermen ranged from $10 to $108 million and from $12 to $82 million for setnet fishermen from the *Glacier Bay* oil spill (Sec. IV.B.1.i(8). The Scientific Support Coordinator report is an official report, and MMS considered its use appropriate to summarize the *Glacier Bay* oil spill. The MMS considers the information about the *Glacier Bay* oil spill presented in Section IV.A.5 of the EIS to be appropriate for the intent of the discussion, as noted above.

KIB-32

Fishes and fish eggs and larvae are discussed in Section IV.B.1.c, Fisheries Resources.

KIB-33

The commenter appears to be addressing what Davenport (1982) discovered concerning biogenic hydrocarbons (mentioned on page IV.B.1-21), namely, that many hydrocarbons produced by plankton are the same as or similar to those found in crude oil. The point is not that these similar hydrocarbons coming from crude oil would have no effect, as was suggested by the commenter, but rather that they are likely to have little effect on plankton (as stated in the DEIS).

KIB-34

The effects of oil on fish and fish eggs and larvae are analyzed in Section IV.B.1.c, Fisheries Resources.

Naturally occurring events may concentrate both zooplankton and spilled oil in the same area, increasing the risk of exposing the zooplankton to oil. These circumstances have been addressed for bays and other areas where circulation is restricted. While it is true that zooplankton move closer to the surface at night, it is also true that the water-soluble fractions of crude oil are not likely to be deep enough to affect them significantly during that time.

KIB-35

The analysis concerning lower trophic-level organisms is based on the best scientific information available. That information clearly indicates that an oil spill is not likely to affect plankton populations significantly. There is no reason to expect a "disaster" on zooplankton following an oil spill, as was suggested in the comment. In general, few plankton are expected to be affected by an oil spill, and those that are affected would be quickly replaced by plankton in adjacent waters.

KIB-36

The effects of oil on pelagic vertebrates are analyzed in Section IV.B.1.c, Fisheries Resources.

KIB-37

The Pandalid shrimp is one of many species of invertebrate organisms inhabiting the waters of the Cook Inlet Planning Area. Because of the number of species, MMS has chosen to analyze the effects of Sale 149 on the group designated as lower trophic-level organisms rather than on some selected number of representative species. The MMS considers this approach to be appropriate for a proposed action that potentially could affect a diverse area of over 8,000 square miles (Cook Inlet Planning Area).

KIB-38

Please see the response to Comment KIB-34.

KIB-39

The recommended revision has been added to the text in Section IV.B.1.c.

KIB-40

A brief discussion about overescapement of sockeye salmon has been added to the text in Section IV.B.1.c.

KIB-41

A reference to this unpublished report by the National Marine Fisheries Service has been included in the text in Section IV.B.1.e.

KIB-42
The comments about the potential labor shortage and wage inflation are noted and the appropriate narrative inserted into the text in Section IV.B.1.h. Your comments concerning the advantages and disadvantages gained by those who participated or didn't participate in the *Exxon Valdez* cleanup are more difficult to incorporate. Individuals and companies make decisions about whether to hire or participate in things such as cleanup activities, and it is beyond our capability to predict who might or might not reap the economic windfalls that occur during such times. In addition, for this proposed sale, pipelines are expected to be the desired form of transportation for the platforms to the refineries, and the quantity of oil spilled per day is expected to be much lower; therefore, the type of cleanup operations and the amount of equipment may be quite different from those used in the *Exxon Valdez* cleanup.

KIB-43
Please see the response to Comment KIB-17.

KIB-44
An analysis of the economic effects of a large Cook Inlet oil spill on the Kodiak commercial-fishing industry was added to Section IV.B.1.i(8), as suggested in the comment.

KIB-45
Regarding the 49 small spills (totaling 555 bbl), the DEIS did not make the assumption that these small spills would result in no commercial-fishing closures. The DEIS noted that they were unlikely to result in closures or in reduced market values. To our knowledge, there has never been a commercial-fishing closure due to a small spill.

As noted in Section IV.A.1.c, MMS requires oil-spill-cleanup equipment to be available at the site of all operations for the purpose of an initial response. Also, equipment to respond to larger spills or provide backup must be available to respond within 6 to 12 hours of a spill. Prompt response to a spill would help minimize any potential effects on the marine biota.

KIB-46
Please see the response to Comment KIB-21.

KIB-47
Please see the response to Comment KIB-17.

KIB-48
State of Alaska-designated wildlife areas located near or adjacent to the proposed Cook Inlet sale area are identified in ITL No. 2, Information on Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans (Sec. II). Redoubt Bay Critical Habitat Area and Trading Bay State Game Refuge have been proposed as additions to the list of sensitive areas included in this ITL. The probability of an oil spill ≥1,000 bbl occurring and contacting these areas is <0.5 percent. Because of their distance from the proposed sale area, the suggested areas in the upper portion of Cook Inlet are not considered vulnerable to contact by a spill originating there (expected to be <0.5%).

KIB-49
The Alaska Coastal Management Program contains no Statewide standards on employment and income. The effects of oil spills from Sale 149 are analyzed in several sections in IV.B, including effects on commercial fisheries, IV.B.1i, pp. 72-76; effects on the economy, Section IV.B.1h; effects on subsistence-harvest patterns, IV.B.1j, pp. 76-80; and effects on sociocultural systems, IV.B.lk, pp. 80-83. The Glacier *Bay* oil spill is discussed in IV.A.5.

For the *Glacier Bay* spill, the effects of a product spill are not analyzed in this EIS. The effects of the *Exxon Valdez* spill are analyzed in Section IV, where it is appropriate to the resource. We believe that effects on contaminated or potentially contaminated products and on employment and income resulting from a spill are adequately addressed in these sections.

KIB-50
Please see the response to Comment KIB-08.

KIB-51
Graphic 1 depicts major concentration and high-use areas of marine and coastal birds. Although Redoubt Bay, Trading Bay, and the mouth of the Kenai River are local concentration areas for waterfowl, they are not recognized as major concentration areas for waterfowl and thus are not depicted in Graphic 1. A discussion of the species that use these habitat areas is in Section III.B.3.a.1.(b) and on Table III.B.3-2, Seasonal Bird Densities in Lower Cook Inlet.

KIB-52
Graphic 2 has been revised to address the comments.

LAW OFFICES OF
ALASKA LEGAL SERVICES CORPORATION
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April 19, 1995

U.S. Department of the Interior
Minerals Management Service
OCS Region
949 East 36th Avenue, Room 603
Anchorage, Alaska 99508-4302

We have received notice that you plan to sell leases for offshore oil and gas exploration and development in the lower Cook Inlet area. However, your plans give no consideration to the aboriginal rights of Alaska Native tribes in the area, even though it is abundantly clear that the proposed sale will violate the unextinguished aboriginal rights of a number of these tribes. It is a well established principle of federal law that agencies of the federal government lack the authority to pursue development activities on aboriginal lands without the express consent of Congress and of all the affected aboriginal tribes. Since your agency has the consent of neither, the sale plans must be cancelled. ALS-01

The Draft Environmental Impact Statement (DEIS) makes only the briefest reference to this overriding issue, and even then only in relation to the potential claim of a single tribe. Moreover, notwithstanding the existence of these unextinguished aboriginal rights, the DEIS indicates that you intend to proceed with the lease sale with no inquiry or investigation into the nature and extent of your proposed violation. The only reason the DEIS gives for your refusal to fully investigate, identify, and protect the affected tribes' aboriginal rights and interests is that the question of aboriginal title "is not an environmental issue." DEIS, Vol. I at I-9.

There is no question that the areas affected by the proposed lease sale are currently used and occupied by Alaska Natives, as they have been for untold centuries. The DEIS itself documents, at least in part, the dependence of Alaska Native tribes on the resources of this area. Moreover, it predicts that the proposed oil and gas development will inflict potentially serious harm on a number of Alaska tribes, noting that "[t]his is especially so in the Alutiiq communities of Nanwalek and Port Graham." DEIS, Vol. I at IV.B.1-81.

We must remind you that the federal government, acting through the Department of the Interior, has a solemn trust responsibility to protect the aboriginal rights of Alaska Native tribes. The proposed lease sale constitutes a serious breach of that trust responsibility. The lease activities will illegally trespass on areas of the Outer Continental Shelf to which certain tribes retain the exclusive right of use and occupancy known as aboriginal title. The proposed activities also pose serious threats to many tribes' way of life by jeopardizing their ability to continue to successfully hunt and fish on their aboriginal lands. To remedy that breach, it is essential that the federal government take all necessary steps to identify and fully

protect the aboriginal rights of the affected tribes *before* proceeding further with the lease sale that is under consideration. We trust that you will re-evaluate your position and fulfill your legal responsibilities to these tribes.

Sincerely,

ALASKA LEGAL SERVICES CORPORATION

Joseph D. Johnson
Statewide Litigation Attorney

ALS-01
The EIS addresses environmental issues. Issues related to ownership and sovereignty must be resolved in other forums. It is the position of the Department of the Interior that Outer Continental Shelf lands are under the jurisdiction of the United States Government, and that the Alaska Native Claims Settlement Act extinguished any existing aboriginal title to those lands.

Alaska Oil and Gas Association

121 West Fireweed Lane, Suite 207
Anchorage, Alaska 99503-2035
Phone: (907) 272-1481 Fax: (907) 279-8114

April 19, 1995

Project Chief, Sale 149 EIS
Minerals Management Service
Alaska OCS Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

AOGA Comments on Draft EIS Cook Inlet Planning Area Oil and Gas Lease Sale 149

Dear Project Chief:

The Alaska Oil and Gas Association (AOGA) is a trade association whose member companies account for the majority of oil and gas exploration, production, transportation and marketing activities in Alaska. AOGA would like to make the following comments on the Draft Environmental Impact Statement for the Cook Inlet Planning Area, Oil and Gas Lease Sale 149.

The United States is increasingly dependent on foreign sources of energy, with oil imports providing over 50% of domestic demand. Although many oil companies are looking overseas for new discoveries, the Lower Cook Inlet provides an opportunity for oil companies to explore for oil and gas in an environment that is known to the industry and can be explored safely with minimal environmental impact.

The oil and gas industry has explored for and produced oil and gas in the Cook Inlet for over 40 years, and no adverse environmental impacts have been identified. Recent studies by the MMS and the Cook Inlet Regional Citizens' Advisory Council support this conclusion as have similar studies conducted since 1975.

Based on the above information AOGA is concerned with some of MMS's estimates of impacts in the Draft EIS. Estimates like a 27% chance of an oil spill of greater than 50,000 bbls in the base case and a 72% chance of an oil spill of greater than 50,000 bbls in the high case have unnecessarily heightened the concerns of the local community. The facts and history in the Cook Inlet simply don't support such estimates. Apparently the estimates are based on historical figures from the 70's and 80's. If this is the case the MMS should take into consideration local history and conditions as well as changing laws and improvements in technology and spill prevention methods. AOG-01

AOGA strongly encourages the MMS to proceed ahead with the sale. The OCS leasing program must reestablish credibility and certainty in the process. Lease Sales should be held on schedule unless there are significant environmental reasons for delays or cancellation of sales. In the Lease Sale 149 area there are no environmental or scientific reasons to delay the process.

Thank you for the opportunity to comment

Sincerely,

Judith Brady

JUDITH M. BRADY
Executive Director

JMB:ts

APR-19-95 WED 10:58 ALASKA OIL & GAS ASSOC. FAX NO. 9072798114 P. 02/02

AOG-01

The use of the oil-spill statistics has been misinterpreted by the reader. The OSRA estimates a mean spill number of 0.31 with a 27-percent chance of one or more oil spills ≥1,000 bbl occurring. There is no spill size for this statistic other than the spill will be 1,000 bbl or greater. For analysis, MMS uses a 50,000-bbl spill. This spill size is based on the average size pipeline, platform, and tanker spill (see Sec. IV.A.2.a.(4)). Oil-spill sizes are based on U.S. OCS platform and pipeline spill data from (1964 through 1987) and worldwide tanker spill data (1974 through 1989). Most oil spills are caused by human error rather than environmental factors (Gulf Research and Development, 1982). However, a study conducted for MMS by the Futures Group and Environmental Research and Technology, Inc. (1982) was unsuccessful in deriving any valid statistical relationships for predicting the occurrence of ≥1,000-bbl spills from a specific cause, including environment. The MMS tanker-spill rates are derived from a worldwide database (polar and temperate) and show a similarity to Cook Inlet spill rates. Although MMS spill rates from platforms and pipelines are derived from OCS regions in temperate climates, they too show a similarity to Cook Inlet spill rates. In addition, MMS spill rates are based on billion barrels of oil produced and transported. The exposure variable can be applied to all areas with the same meaning.

COMMENTS ON
ALASKA OUTER CONTINENTAL SHELF
COOK INLET PLANNING AREA
OIL AND GAS LEASE SALE 149
DRAFT ENVIRONMENTAL IMPACT STATEMENT

April 19, 1995

RECEIVED
APR 21 1995
12:30 pm
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

Submitted by:

ALASKANS FOR CLEAN WATER
ALASKA CENTER FOR THE ENVIRONMENT
ALASKA MARINE CONSERVATION COUNCIL
ALASKA PUBLIC INTEREST RESEARCH GROUP
ALASKA WILDLIFE ALLIANCE
AMERICAN OCEANS CAMPAIGN
COOK INLET VIGIL
GREENPEACE
KACHEMAK BAY CONSERVATION SOCIETY
KODIAK CONSERVATION NETWORK
LEGASEA
NATIONAL PARKS AND CONSERVATION ASSOCIATION
NATIONAL OCS COALITION
NATIONAL WILDLIFE FEDERATION
NATURAL RESOURCES DEFENSE COUNCIL
SIERRA CLUB
U.S. PUBLIC INTEREST RESEARCH GROUP
THE WILDERNESS SOCIETY
TRUSTEES FOR ALASKA

I. Introduction

On behalf of the listed groups, Trustees for Alaska and Greenpeace submit the following comments on the Mineral Management Service's (MMS) Cook Inlet Planning Area Oil and Gas Lease Sale 149 Draft Environmental Impact Statement (DEIS). Trustees for Alaska is a nonprofit, public interest law firm in Anchorage, Alaska. Greenpeace is an international environmental organization. These comments represent the interests of local, regional, national, and international public interest environmental groups, commercial and sport fishing coalitions, clean water advocates, and several Native Villages in the sale area.

Citizens in the most affected communities have spoken out in opposition to Lease Sale 149. Native communities in and around the sale are on record opposing the sale, including Chugachmiut Environmental Protection Consortium (representing the villages of Port Graham, Nanwalek, Chenega Bay, and Tatitlek), Ninilchik Traditional Council, Dena'ina Traditional Council, Chickaloon Village, and Alaska Federation of Natives. The United Fishermen of Alaska, representing 18,000 commercial fishers, opposes the sale. In the cities of Homer and Kodiak, and in the communities surrounding the lease sale area, public sentiment has been overwhelmingly against the sale. Over 400 Homer residents, 12 percent of the city's population, showed up to oppose the sale at MMS' March, 1995 hearing. The boroughs of Kodiak, Lake and Peninsula, and Kenai passed a tri-borough resolution conditionally opposing the sale.

With Lease Sale 149, MMS proposes to allow oil companies to spend the next 20-25 years extracting enough oil from Cook Inlet to meet the United State's oil needs for approximately <u>two months</u>. This small amount of oil for the United States simply does not justify 20-25 years of legal and illegal air and water pollution, related threats to the integrity and beauty of numerous national treasures including four national parks, five national wildlife refuges, and the McNeil River Wildlife Sanctuary, the constant threat of oil spills, actual oil spills, aesthetic harm, psychological harm, harm to subsistence resources, values and cultures, harm to fish and wildlife, harm to tourism and recreational values, and harm to sustainable economies. As discussed below, the certain environmental, social, cultural and economic harms that will result from this proposed sale far outweigh any of its potential benefits, economic or otherwise.

The comments are organized into twelve different categories, each of which raises serious concerns about Sale 149. Section II discusses the Cook Inlet ecosystem at stake in this proposed lease sale. Section III discusses the continuing adverse impacts of the *Exxon Valdez* oil spill ("EVOS") in the Lease Sale 149 area, and explains why these impacts counsel MMS not to go forward with the lease sale at this time. Section IV details the oil industry's environmentally destructive actions in Cook Inlet to date, and notes that given this history, the oil industry should not be further entrusted to respect the beauty and bounty of Cook Inlet. Section V notes that there is a genuine issue as to aboriginal title to OCS lands in Alaska, and that any OCS lease sale in Alaska should await resolution of this issue. Section VI notes that MMS underestimates Sale 149's impact on subsistence-based communities. Section VII identifies pre-lease and lease sale impacts which MMS overlooks, and section VIII discusses how commercial and sport fishing, tourism, and recreation are the truly sustainable economies on the Kenai Peninsula, and that Sale 149 will disrupt and harm these economies. Section IX details how MMS, in its Sale 149 DEIS and in its 1992-1997 OCS Progam EIS, fails to adequately consider energy

sources other than oil and gas as viable alternatives to Sale 149. Section X exposes scientific weaknesses in the DEIS, and challenges some of MMS' conclusions regarding Cook Inlet's water quality, and the effects of the EVOS on marine mammals, coastal birds, and fisheries. Section XI describes MMS' failure to adequately consider the cumulative impacts of Sale 149 in combination with other existing and proposed pollution sources in and around Cook Inlet. Finally, section XII notes that MMS overestimates the ability of spill response organizations to prevent harm to the Cook Inlet and Shelikof Strait ecosystem and its resident populations in the event of a spill.

II. The Cook Inlet And Shelikof Strait Ecosystem: What's At Stake.

Extending north from the great expanse of the Gulf of Alaska, Cook Inlet and Shelikof Strait form a contiguous body of water cradled between spectacular mountain ranges and flanked by a vast network of coastal estuaries and silt-laden glacial rivers. Massive geological forces have formed and continue to transform this body of water, from the ice fields of the Chugach Mountains to the active volcanoes of the Alaska and Aleutian Ranges. Even the movement of water within the Inlet and the Strait is on a grand scale—some of the most extreme tides in the world, as high as 35 feet, move in and out in a daily cycle. As described in the DEIS, "the coast in the proposed Sale 149 area and the marine environment offshore contain some of the most beautiful shore and ocean features in the world. The aesthetics of this are based on the near-pristine environment."[1]

The interplay of tidal currents and glacial waters creates a rich, productive habitat for a host of marine fish and wildlife, including four species of salmon, halibut, seals, sea

[1] DEIS III.C.18.

lions, porpoises and a distinct, geographically isolated population of beluga whales. The Inlet and Strait's coastal wetlands and rocky shorelines provide critical nesting, rearing and staging area for millions of waterfowl, shorebirds and seabirds.

All along the shores of Cook Inlet and Shelikof Strait, residents of Native villages pursue a subsistence livelihood that is centuries old. The rich, productive waters of Cook Inlet and Shelikof Strait are essential to maintaining the social and cultural integrity of these communities and the way of life of their residents.

This unique marine ecosystem supports some of the richest fisheries in the world, sustaining commercial harvests and a sport fishing industry that bring millions of dollars into local economies each year. As noted in the DEIS, "On nearly every river, stream, or waterway, there is public access for fishing. In almost every State and Federal area surrounding the 149 region, there is access and provision for hunting, swimming, skiing, camping, picnicking, and other numerous recreational pursuits."[2] Species of particular importance include king, red, silver and pink salmon, halibut and crab. Studies of planktonic communities performed between 1979 and 1987 have indicated that lower Cook Inlet and the Kenai shelf are among the most productive high latitude shelf areas in the world.[3]

The Cook Inlet and Shelikof Strait ecosystem encompasses or borders four national parks, one national monument, one national forest, five national wildlife refuges, four state wildlife refuges and sanctuaries, and seven critical habitat areas, the largest concentration of state-designated CHAs in Alaska. These many treasures include Katmai

[2] *Id.* III.C.18.
[3] *Id.* III.B.1

National Park, one of the oldest and most unique parks in the country, and the McNeil River State Wildlife Sanctuary, where the annual summer gathering of brown bears draws scientists, photographers and wildlife watchers from around the world.

Anchorage, where half of Alaska's population lives, is located on the northern end of Cook Inlet. Connected by road to the Kenai Peninsula and by air to points west, the city serves as a gateway for tourists traveling to areas all along the Cook Inlet and Shelikof Strait shorelines. Last year, people from all over the world accounted for the over 1 million tourist visits made to the Kenai Peninsula on Cook Inlet's eastern shore. Indeed, tourism has become so popular in and around the Inlet that visits to the region have played a significant role in making tourism the state's largest growth industry, contributing nearly $95 million dollars annually to the state and local economies.

It is into this precious, thriving environment that MMS would introduce Lease Sale 149. The Sale will irreparably harm each of the above mentioned characteristics and values of Cook Inlet. Indeed, in some respects it has already begun to do so.

III. MMS Should Cancel or Defer Proposed Sale 149 Due to the Continuing Impacts of the Exxon Valdez Oil Spill.

The Exxon Valdez oil spill continues to have a staggering effect on the natural and human environments with which it came into contact. Section A demonstrates that MMS vastly understates the impacts of this tragedy. Section B argues that Sale 149 conflicts with the objectives of the EVOS Trustee Council's Restoration Plan. Section C notes the National Park Service's recommendation to delay the sale due to the serious impacts of the Exxon Valdez spill, and section D observes that Interior's reliance on this same factor to defer Sale 114 still makes sense today.

A. **The *Exxon Valdez* Oil Spill Has Seriously Harmed, And Continues To Harm, The Lease Sale 149 Area.**

The Lease Sale 149 area was hit hard by the *Exxon Valdez* oil spill. As mentioned above, the currents in the Gulf Alaska cause the ocean waters to move through Prince William Sound (where the spill occurred), down the Kenai Peninsula, into and around Cook Inlet and then out Shelikof Strait.[4] Following this path, the currents carried oil from the *Exxon Valdez* into the lease sale 149 area,[5] soaking much of the shoreline and ocean floor with crude oil. TAG-01

The evidence is also clear that the lease sale 149 area has not fully recovered from the effects of the of the *Exxon Valdez* oil spill. The *EVOS* Trustee Council's[6] *1994 Status Report on the EVOS*[7] concludes that the spill-effected marine ecosystems, including those in the sale area, have not yet recovered. While many marine ecosystem species are recovering, "other parts of the ecosystem have not recovered. It is still unclear when full recovery will be achieved."[8] TAG-02

The Trustee Council's *1994 Status Report on the EVOS* assesses the recovery of intertidal and subtidal communities, fish, marine mammals, birds, and subsistence TAG-03

[4] *Id.* III.A.5 to III.A.7.
[5] See *Final Environmental Impact Statement, Exxon Valdez* Oil Spill Trustee Council, ch. 1, p. 4., figure 1-1. The figure represents the extent of surface oiling. Documents which MMS already has or should have, such as this one, are not attached to these comments. We will provide copies of referenced documents not attached upon request.
[6] The EVOS Trustee Council (Trustee Council) was set up pursuant to the Comprehensive Environmental Response, Compensation and Liability Act to oversee the restoration of the spill-effected area. The Trustee Council is made up of Federal and State Representatives, including a representative from the Department of the Interior.
[7] As of April 19, 1995, the *1995 Status report on EVOS* had not been released. It was scheduled to be released an April 21, 1995.
[8] See *1994 Status report on EVOS*, EVOS Trustee Council, p. 17.

resources. Perhaps the most fundamental evidence that recovery lies far off on the horizon is the status of the intertidal communities, some of the basic building blocks for the whole ecosystem. In intertidal communities, the two most serious continuing problems are oiled mussel beds and the absence of a well-developed canopy of the seaweed *Fucus*. The oiled mussel beds continue to be the source of fresh oil for animals (harlequin ducks, black oystercatchers, river otters and juvenile sea otters) that feed on the mussels. These beds were not cleaned because it was feared the mussels would not survive. *Fucus* provides a protective canopy and is closely linked to the recovery of limpets and other invertebrates that are an important part of the ecosystem. The report concludes that "full recovery of the intertidal community may take more than a decade, for it may take several years for invertebrate species to return after *Fucus* has recolonized."[9] TAG-03

As for subtidal communities, the 1994 status report states that, "Although no measurable oil remains in the water -- that was gone within the first year -- oil will still be detectable in the sediments in many shallow spill areas for at least several years to come." Small crustaceans, worms, and clams live in these shallow areas as do Dolly Varden and cutthroat trout.[10]

More easily visible are the spill's significant impacts on fish resources, of course a mainstay of Alaska's economy and way of life. Neither pink salmon, nor sockeye salmon, nor herring have recovered from the effects of the spill, nor are these effects fully understood. Pink salmon mortality has remained consistently higher for salmon returning to oiled, compared to unoiled, streams. In 1991 and 1992, between forty to fifty percent TAG-04

[9] *Id.* at 7-8.
[10] *Id.* at 8-9.

TAG-04

of pink salmon eggs from oiled streams did not survive. Further, the spill has retarded growth in pink salmon and, alarmingly, "it appears there is an inheritable difference in egg mortality for fish from oiled versus unoiled streams."[11]

The spill also impacted the sockeye salmon stock in the Kenai River, an important spawning area just north of the lease sale 149 area. The river was affected by a previous oil spill in 1987 and a naturally high overescapement in 1988. In 1989, smolt production in the Kenai River system was 30 million. Since then, however, smolt production has dramatically declined. In 1990, smolt production was 6 million, in 1991, 2.5 million, and in 1992 and 1993, less than 1 million. "The forecast is for returns in 1994 and 1995 to be below escapement goals."[12] While there may be many factors contributing to the dismal runs, the Exxon Valdez oil spill is certainly one of them, and full recovery to anywhere near prespill conditions has not occurred.

Further, "[l]ike pink salmon, strong runs of herring right after the spill were followed in 1992 and 1993 by poor returns."[13] This again leads to the question of whether the effects of oil on herring eggs led to inheritable traits that have somehow weakened the herring stock.

The Status Report notes that "the Trustee Council has embarked on a multi-million dollar research and monitoring program to attempt to understand these fishery declines and to identify effective restoration actions. A significant segment of the 1994 work plan is devoted to fishery research with these goals in mind."[14] To say the least, these

[11] *Id.* at 14.
[12] *Id.* at 15 - 16.
[13] *Id.* at 15.
[14] *Id.* at 15.

important fisheries have clearly yet not recovered from the spill; the fact that they are the subject of extensive, continuing efforts to understand the many and dramatic spill impacts demonstrates that those impacts are not yet fully understood.

TAG-05

The marine mammals reported to still be recovering are sea otters, seals, and whales. Carcasses of sea otters in their prime have been found in much higher proportions than usual in the spill area. Although the data indicates the seal population may be stabilizing, elevated levels of oil residue continues to be found in their internal organs. Also, in 1989 it was noted that seven whales from the "AB" pod of killer whales were missing after the spill, and in 1990, six more disappeared. This constitutes an "unprecedented mortality rate of approximately 20 percent. The pod will not likely return to pre-spill conditions until the turn of the century.[15]

TAG-06

Two species of birds that have yet to recover from the spill are the common murre and marbled murrelet. The report concludes that "it may be several decades before the colonies [of common murres] have recovered." The Barren Islands, a major breeding ground of the common murre, is in the lease sale 149 vicinity. The marbled murrelet is of special concern because it has been listed as an endangered species in Washington, Oregon, California, and British Columbia where populations are "perilously low."[16] The spill killed as many as 12,000 birds, or five to ten percent of the marbled murrelet population that lived in the spill area.[17] The Kodiak Archipelago is a prime habitat area for the marbled murrelet. The Trustee council is still attempting to protect critical habitat and studying the species' foraging habits which are not yet fully understood.

[15] *Id.* at 12-13.
[16] *Id* at 10.
[17] *Id.* at 9-10.

In the report, the Trustee Council comments on subsistence resources that Native communities have relied heavily on for generations. Many people in these communities feel they can no longer trust the safety of their traditional food after the oil spill, "and use of these subsistence resources declined significantly in some communities."[18] An Oil Spill Health Task Force has "recommended against using shellfish from beaches where oil is still present." Finally, the Trustee Council "will continue to support subsistence food safety testing" to address subsistence communities' concerns regarding food quality.[19] TAG-07

Evidence of the continuing effects of the spill also comes from the private sector. Dr. Riki Ott, in her analysis of scientific EVOS studies funded by government and *Exxon*, concludes that, "recovery is patchy and incomplete" and "because of ongoing long-term effects, the time period for complete recovery is unknown."[20] She further concludes, TAG-08

> [that] the persistent biological effects in birds, mammals, and fish are strong evidence that oil contaminants are still present in the environment. The dramatic reduction in certain populations of marine mammal, birds, and fish caused by the oil spill have seriously altered the structure, composition, and dynamic interrelationships in the effected coastal ecosystem. Indirect "ripple" effects are just starting to appear. The time required for full recovery is unknown, but may take decades.[21]

In sum, the evidence overwhelmingly demonstrates that the effects of the *Exxon Valdez* oil spill are still felt in the oil spill area and beyond. The spill-affected region is still in the process of recovering, and there is a considerable ongoing effort to understand the

[18] *Id.* at 16.
[19] *Id.* at 16.
[20] See R. Ott, *Sound Truth: Exxon's Manipulation of Science and the Significance of the Exxon Valdez Oil Spill*, p. 41. A copy of this study is attached to the United Fishermen of Alaska's comments.
[21] *Id.* at 8.

spill's impacts. MMS should not burden this recovery process with an additional source of further contamination.

B. Lease Sale 149 Is Contrary To The *Exxon Valdez Oil Spill Restoration Plan*.

The Trustee Council prepared the *Exxon Valdez Oil Spill Restoration Plan* (the Plan) and is responsible for implementing it. Pursuant to the Plan, the Trustee Council is spending 900 million dollars to restore injured Alaskan ecosystems, including the Lease Sale 149 area, from the effects of the spill. The first half of the Trustee Council's mission statement reads as follows:

> "The mission of the Trustee Council is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthy, productive, world renowned ecosystem, while taking into account the importance of the quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living.[22]

The Trustee Council has used its resources, primarily money from the settlement with Exxon, to purchase and set aside tracts of land it considers "critical habitat." Chapter 3 of the Plan, "Categories of Restoration Actions," addresses habitat protection and acquisition. The section states that, "[h]abitat protection and acquisition is one of the principal tools of restoration."[23] It then lists species that would benefit from such habitat protection, which include, but are not limited to, pink salmon, sockeye salmon, herring (all considered cornerstones of the Southcentral Alaska ecosystem[24]), harbor seal, sea otter,

[22] See EVOS Trustee Council, *EVOS Restoration Plan*, p.11.
[23] *Id.* at 22.
[24] See R. Ott, *Sound Truth* at 45, *citing* C. Peterson, *Supplemental Report on Coastal Ecosystem Damages from the Exxon Valdez Oil Spill*, Expert witness report prepared for Dickstein, Shapiro, & Morin, Washington, D.C.

and intertidal organisms. All of these species live in the proposed Sale 149 vicinity. The Council goes on to explain, "[r]esource development, such as harvesting timber or building subdivisions, may alter habitat that supports injured resources or services."

To help combat resource development or other actions which may injure important habitat, the Plan notes that some agency management practices should change under appropriate circumstances:

> Habitat protection on existing public land and water may include recommendations for *changing agency management practices*. The purpose, in appropriate situations, is to increase the level of protection for recovering resources and services above that provided by *existing management practices.*[25]

Thus, the Plan envisions that agencies, such as MMS, "in appropriate situations," would change their management practices to accommodate the goals of the *EVOS Restoration Plan*.

DOI's practice of selling tracts in the spill-effected area for oil and gas development, thus exposing the area to further spills and complicating and obstructing ongoing restoration, is an example of an existing management practice which, if changed, would "increase the level of protection for recovering resources."[26] The DEIS for Sale 149 estimates that in the event of production there will be between 49 and 129 spills of under 42,000 gallons. For the base case there is a 27 percent chance of one or more 2.1 million gallon spills and a 64 percent chance in the cumulative case.[27] If leases are sold and developed, this spillage, along with chronic discharges of drilling muds, cuttings, and produced waters, will occur before recovery from the EVOS is complete. Because

TAG-09

[25] *Id.* at 22 (emphasis added)
[26] *Id.*
[27] See *DEIS* at Vol. I, pp. xix, III.C.8, III.C.10, IV.B.1-76, IV.B.10-6. 1995.

"complete recovery from the oil spill will not occur for decades,"[28] additional pollution in the spill area will only disrupt recovery and the ability to monitor its progress.

TAG-09

> environmental impact of one spill may overlap on the . . . impact of a previous spill, with the result potentially exceeding that of either of the individual spills. Little is known of either the cumulative impact or of the long-term biological recovery after such repeated spillage, partly because of the lack of sufficient follow up studies. *Thus there are inherent difficulties in distinguishing ecological perturbations due to a previous spill from those resulting from a subsequent accident.*[29]

Damaged habitat in the seas, like land habitat, must be protected to minimize further injury to resources in the *Exxon Valdez* spill-affected area. Lease Sale 149, in contributing to the further degradation of habitat previously damaged by the *Exxon Valdez* oil spill, conflicts with the restoration goals of the EVOS Restoration Plan.

Finally, at best it is inconsistent for the U.S. Department of the Interior, having an officer as a member of the EVOS Trustee Council, to approve a lease sale which will inhibit the recovery of a spill area, or will interfere with restoration efforts. Simply put, for the Department of the Interior to pursue Lease Sale 149 is tantamount to the Department of the Interior turning its back on the EVOS restoration process.

C. The National Park Service Concurs That Sale 149 Should Be Deferred Until Injured Trust Resources Recover.

In a letter dated to MMS concerning the OCS five year plan, the National Park Service stated that,

TAG-10

[28] *Draft Fiscal Year Work Plan Summary*, pp. iv and vi. *Exxon Valdez* Oil Spill Trustee Council. Anchorage.
[29] National Research Council, 1985, *Oil in the Sea: Inputs, Fates, and Effects*, p. 448. National Academy Press. Washington, D.C. (emphasis added).

> OCS activities could be counterproductive to efforts initiated by federal/state natural resource Trustees to restore resources injured by EVOS. We recommend that any leasing in lower Cook Inlet and Shelikof Strait be deferred until the full extent of injury to Trust resources, including those of the National Park Service, is known and the damaged resources have recovered to appropriate pre-spill conditions.[30]

TAG-10

Both Dr. Ott's study and the Trustee Council's 1994 status report confirm that the resources of Cook Inlet and Shelikof Strait have not recovered to pre-spill conditions and that the full extent of the injury to those resources in is still unknown. The National Park Service, with the shores of four of its Parks in or adjacent to the Lease Sale 149 area, is well-informed to advise MMS of the condition of the Lease Sale 149 area and the danger involved in exposing this environment to further pollution. MMS should heed the Park Service's advice.[31]

D. MMS Should Cancel or Defer Lease Sale 149 For the Same Reasons it Deferred Lease Sale 114.

TAG-11

MMS notes that a prior proposed oil and gas lease sale, Sale 114, was delayed in 1989 so that MMS could assess the effects of the Exxon Valdez spill. In a Department of the Interior press release dated May 17, 1989, then Secretary of the Interior Lujan explained:

> because the Sale 114 area is near an area directly affected by the [*Exxon Valdez* oil] spill in Prince William Sound, I have asked the Minerals Management Service to delay preparation of an Environmental Impact Statement (EIS) until more is known about

[30] See letter dated March 18, 1992 to Regional Supervisor of Leasing and Environment, Alaska OCS Region, MMS, from Joan Beattie, Chief of Environmental Quality Division, Alaska Region, National Park Service.

[31] Studies of Katmai and Kenai Fjords coastlines begun in 1992 and continued in 1994 revealed the presence of oil. The continuing presence of oil entrained in large cobble/boulder armored beaches suggests continuing injury to NPS trust resources, although the extent and effects of the subsurface oiling are not well studied or known. Personal communication between Pamela K. Miller, Greenpeace, and Gail Irvine, National Biological Survey, April 14, 1995.

TAG-11

> the consequences of the spill and its relationship to this proposed sale. In particular, we will be working closely with the Governor and local communities to ensure that new issues arising from the changed circumstances of the region are identified before we proceed.

As discussed above, "changed circumstances of the region" that led to Lease Sale 114's deferment still persist.[32] MMS apparently believes that the area has recovered to the point that it can withstand the affects of further oil spills.[33] This premise, on which MMS bases its decision to proceed with Lease Sale 149, is unsubstantiated. As stated above, "[the] environmental impact of one spill may overlap on the . . . impact of a previous spill" and, "[l]ittle is known of either the cumulative impact or of the long-term biological recovery after such repeated spillage."[34]

The human and other inhabitants of the sale area are attempting to cope with the legacy of the spill; adding a 100% chance of more spills, and a 64% chance of more large spills, will impede if not destroy the recovery process. It was prudent of the Department of the Interior to delay Sale 114; for many of the same reasons it would be prudent to delay or cancel Sale 149.

IV. Existing Industry In And Around Cook Inlet Has A Poor Environmental Record And Has Caused Untold Harm To The Cook Inlet Ecosystem.

The oil industry's existing operations in Cook Inlet have heavily polluted the land, air, and water wherever the industry has been allowed to operate. Citizen environmental enforcement actions and citizen documentation of contaminated sites have finally brought some of the industry-caused environmental degradation to light; neither the industry nor

[32] See supra, section III.A.

[33] As discussed above, the DEIS predicts a significant rate of spillage from offshore oil development. See *DEIS* pp. xix, III.C.8, III.C.10, IV.B.1-76, IV.B.10-6.

[34] National Research Council, 1985, *Oil in the Sea: Inputs, Fates, and Effects*, at 448.

regulatory agencies have taken action without a prod from the citizens most affected by the industry's pollution. Sections A - C discuss some of the oil industry's documented violations of environmental laws and some of its toxic legacy on the Kenai Peninsula.

In addition to its sorry environmental track record, the industry has also fought, often successfully, efforts to prevent pollution in the first place. Section D discusses the industry's resistance, on economic grounds, to environmentally protective initiatives in Alaska.

Given the combination of a proven legacy of environmental destruction plus a demonstrated aversion to proactive pollution prevention efforts, it is painfully obvious that the oil industry cannot economically pursue oil and gas exploration and development activities in the Sale 149 area in an environmentally sensitive manner. At least until the industry cleans up its existing operations and demonstrates an ability to comply with the law, MMS should not offer further opportunities for the oil industry to exploit the public resources of Cook Inlet for private gain.

A. The Oil Industry Has Demonstrated A Pattern Of Environmental Neglect By Polluting The Waters Of Cook Inlet.

TAG-12

Water pollution from the oil and gas companies operating in the Cook Inlet is regulated by the Environmental Protection Agency under the Clean Water Act (CWA). Pursuant to the CWA, EPA issues National Pollutant Discharge Elimination System (NPDES) permits authorizing certain discharges into the waters of Cook Inlet, and limiting the amounts of toxic and other pollutants. Eighteen oil and gas facilities in upper Cook Inlet -- owned and operated by Unocal Corp., Marathon Oil Co., Phillips Petroleum

TAG-12

Co., and Shell Western E and P Inc. -- operate under a general NPDES permit, i.e., one permit applicable to all the facilities.

Since this general permit was issued in October of 1986, these oil and gas companies have violated the terms of the permit thousands of times. In November, 1994, Greenpeace, Trustees for Alaska, and Alaska Center for the Environment provided notice that they intended to bring a citizen's lawsuit to enforce the CWA. EPA then gave notice in mid-February that it intended to levy $1.5 million in fines against these companies for 827 separate CWA violations.

Al Ewing, Alaska Director for the EPA, stated that "if you look at the number of violations, that indicates a pattern of neglect, and taken cumulatively, these violations are serious."[35] This pattern is almost certain to continue in the expanded operations proposed in Lease Sale 149. MMS, therefore, should take this into account as a baseline factor when considering the effects of Sale 149. It has not done this.[36]

B. The Oil Industry Has Polluted the Airshed of Cook Inlet.

TAG-13

Tesoro Alaska Petroleum Co. operates a refinery in Nikiski, Alaska, north of Kenai on the Kenai Peninsula adjacent to Cook Inlet. Unocal Corp.'s Chemical and Mineral Division manufactures fertilizer at a nearby Nikiski plant. These two facilities have repeatedly polluted Cook Inlet's air and violated the federal Clean Air Act, yet the DEIS fails to take this into account.

[35] See Homer News, "Inlet Oil Rigs: 827 Violations," February 23, 1995.
[36] See *DEIS* IV.B.1-4.

Tesoro's refinery experienced numerous excess sulfur dioxide emission episodes during the early 1990s.[37] In early 1994, Tesoro applied for an amendment to its existing air quality control permit to operate. Citing the repeated excess sulfur dioxide emissions, Trustees for Alaska challenged the proposed permit renewal administratively. That challenge led to a settlement agreement under which Tesoro agreed to conduct an environmental audit of its facility; eliminate its excess sulfur dioxide emissions problem; reduce its volatile organic compound emissions; monitor emissions of several other pollutants; and identify at least twelve pollution prevention options which the facility could implement to reduce its emissions of air pollutants.

TAG-13

While the settlement agreement and environmental audit may represent a step in the right direction for the Tesoro facility, it has yet to be implemented and does not create any increased level of public confidence in the oil industry in Cook Inlet. Tesoro has not to date demonstrated how it will remedy its excess emissions problem. Its environmental audit identifies power outages as a major contributor to excess emissions, but identifies no solutions which can reasonably be expected to solve this problem. Stated "improvements" to the electric power grid serving Tesoro are not documented, and Tesoro explicitly declined to generate its own power as an alternative. Thus, not only can the public expect to have to monitor the industry themselves, but it can further expect the industry to continue to violate applicable environmental laws.

Unocal's Nikiski fertilizer plant has also heavily polluted the Cook Inlet airshed. In 1992, according to Toxic Release Inventory data required to be submitted to the EPA,

[37] See, e.g., Ex. B (compilation of Tesoro's excess emission reports from October, 1991, - December, 1993, on file at the Southcentral Regional Office of the Department of Environmental Conservation in December, 1993).

TAG-13

Unocal spewed more pollution into the air than any other facility in all of EPA's Region X, which covers Alaska, Washington, Oregon, and Idaho.[38] Further, in 1994 the EPA issued Unocal a Notice of Violation (NOV) alleging that Unocal had modified its facility so as to significantly increase its air pollution; this modification should have triggered "Prevention of Significant Deterioration" (PSD) of air quality review, which among other things requires the facility to use the best available technology in completing its modifications. Instead, the NOV alleges, Unocal proceeded without any PSD review, in violation of the Clean Air Act. Id.

TAG-14

In addition to pollution from these onshore facilities, Congress has recognized that "operations from an OCS platform and associated marine vessels can routinely exceed 300 tons of oxides of nitrogen and 100 tons of reactive hydrocarbons annually. Platform construction emissions can easily exceed 350 tons of oxides of nitrogen, while drilling a single exploratory OCS well can cause emissions in excess of 100 tons. A major uncontrolled offshore oil project can emit pollution in a year which exceeds pollutants emitted by one hundred thousand automobiles (meeting 1988 California emission standards) each traveling 10, 000 miles."[39]

TAG-15

The oil industry has exhibited little regard for protecting the airshed of Cook Inlet, or the people who breathe and view it. It has violated applicable laws and heavily polluted the air, and this trend can be expected to continue if the industry is granted further license to operate in Cook Inlet. Further, the fact that citizens again were forced to initiate action while the government stood idle is a grim reminder of the inadequacy of government

[38] See *Nikiski a Top Polluter; UNOCAL Emissions are Northwest's Biggest*, Anchorage Daily News, April 21, 1994, p. D1.
[39] See S. Rep. 101-228, 101st Congress (1988)

enforcement of environmental laws. Citizens, with their limited resources and expertise, and limited ability to obtain information from companies cannot reasonably be expected to keep close tabs on the oil industry. Once again, as with the waters of Cook Inlet, MMS should take this into account as a baseline factor when considering the effects of Sale 149. This it did not do.[40]

TAG-15

C. The Oil Industry Has Polluted the Lands of the Kenai Peninsula.

The Kenai Peninsula is the site of Alaska's first major commercial oil fields and one of the nation's toxic hot spots. The Kenai remains largely untouched by the spotlight of media and Congressional attention. Yet, the Environmental Protection Agency's Toxic Release Inventory (TRI) required under the Emergency Planning and Community Right to Know Act, consistently demonstrates that the Kenai Peninsula Borough has the highest annual levels of toxic releases of any county or borough in its EPA Region X, which includes Washington, Oregon, Idaho, and Alaska. EPA's 1993 statistics, the most recent year for which the information is available, shows that the Unocal Chemicals Plant and the Tesoro refinery facilities alone contribute over 5.1 million pounds of toxic pollutants into the environment.[41] These facililties are two of Alaska's eight most heavily contaminated sites, according to the Alaska Department of Environmental Conservation.[42]

The abysmal record on the Kenai Peninsula, including within the Kenai National Wildlife Refuge, of oil-related pollution and failure of regulatory agencies to prevent pollution sets a frightening precedent for future Alaskan oil and gas leasing decisions. Residents on the

[40] See DEIS vol. I at IV.B.1-92 to IV.B.1-96.
[41] Peninsula Clarion, *Unocal pollutants down, but Nikiski plant still tops EPA list in northwest*, 3/28/95).
[42] See Ex. C (Alaska Journal of Commerce reprint of DEC list of contaminated sites).

Kenai Peninsula have long been fighting pollution problems associated with oil and gas activities. Concerns include abandoned drums, contaminants leaking and seeping onto the ground and into the air, chronic health symptoms potentially related to toxic exposure, contaminated drinking water wells, and decreased property values.

In 1991, a Alaska Department of Environmental Conservation report listed over 150 suspected contaminated sites, most attributed to the oil industry.[43] The majority of these sites are uncontained and have not been inventoried to understand the nature and extent of contamination. The largest concentration of contaminated sites is within the Kenai National Wildlife Refuge caused by operations in the Swanson River oil field. In sum, there is a toxic legacy of hazardous waste on the Kenai Peninsula from the oil and gas industry which MMS fails to discuss.

TAG-16

D. The Oil Industry Has Resisted Efforts To Prevent Pollution In Cook Inlet And Has Demonstrated That Oil Development Is Not Economically Feasible With Any Acceptable Level Of Environmental Protection.

In addition to polluting Cook Inlet's water, air, and land, the oil industry has actively resisted attempts to prevent environmental harm and invest in spill prevention. For example, the industry has strongly opposed a proposal to require tug escorts for oil tankers moving through Cook Inlet. See, e.g., Ex. D. An industry leader claimed that the tug escort requirement would cost the industry up to 1500 jobs. Id.

TAG-17

The industry has similarly resisted a five cent per barrel tax being paid into a spill prevention and response fund. Thus, the very industry that is requesting access to vast areas

[43] Harding-Lawson Comprehensive Inventory Report: Potential Waste Disposal Sites to the Department of Environmental Conservation, 1991.

of Lower Cook Inlet, and claiming commitment to environmentally sound practices, simultaneously is opposing basic and responsible spill prevention measures in the Inlet. The industry's claimed inability to afford environmentally protective measures, and its demonstrated inability or unwillingness to comply with environmental laws, indicate that industry is either misrepresenting its costs or environmentally safe oil development is not economically feasible. MMS must acknowledge this before making a decision on Sale 149, and explain the ultimate decision in light of the foregoing. TAG-17

V. MMS Fails to Adequately Analyze Sale 149's Impacts on Subsistence Cultures in the Sale Area.

TAG-18

The role and importance of the subsistence harvest of fish, wildlife, plants and berries, etc., in many Alaskan communities, especially native communities, is difficult to overestimate. The subsistence lifestyle is what ties communities together; helps form a shared understanding of the world; and constitutes the daily activity upon which community survival is based. MMS proposes Sale 149 at a time when subsistence communities are still reeling from the effects of the Exxon Valdez Oil Spill. Section A discusses these effects on the critically important subsistence way of life for native communities imperiled by Sale 149.

MMS' analysis of Sale 149's impact on subsistence use of fish and wildlife assumes that, absent a large oil spill, there will be no significant impact on existing subsistence use patterns. Section B explains that this misses the fact that Sale 149 will exacerbate the considerable existing skepticism regarding the quality of subsistence foods due to the Exxon Valdez spill, and thereby significantly harm subsistence-based lifestyles in and around the sale area regardless of whether a large spill occurs.

Section C notes that MMS references no environmental justice strategy which Sale 149 may or may not conform with, and has provided no information to the public concerning the health impacts of consuming pollutant-bearing fish and wildlife. These omissions violate President Clinton's Executive Order 12898.

Section D identifies the current policy of the federal government regarding "Government-to-Government Relations" with Native American tribal governments, and a Department of Interior guidance memorandum implementing that policy, and argues that MMS has failed to meet the letter and spirit of these directives.

A. The Exxon Valdez Oil Spill Has Severely Harmed the Subsistence Lifestyles of Alaskan Communities in and Around the Sale Area.

TAG-19

The DEIS summarizes the Alaska Department of Fish and Game's Subsistence Division's data demonstrating significant reductions in subsistence harvests and species harvested after the EVOS. However, MMS fails to evaluate the deeper meanings of the losses experienced by Native communities and the communities' resultant view of the current lease sale proposal.

TAG-20

Native village concerns are reflected in part within the resolutions in opposition to the sale from the Chugachmiut Environmental Protection Consortium (representing the villages of Port Graham, Nanwalek, Chenega, and Tatitlek), Ninilchik Traditional Council, Dena'ina Traditional Council, Chickaloon Village, and Alaska Federation of Natives. See, e.g., Ex. D. Proceeding with this sale would run roughshod over Native interests given the present level of village concerns and continued suffering from the Exxon Valdez oil spill impacts on subsistence.

The experience of the Exxon Valdez oil spill continue to cause profound impacts to the Alutiiq coastal villages throughout the spill-affected region. "The very lifeblood of Alutiiq culture was seriously impaired, and for an unknown length of time. For the Alutiiq people, this disaster is not yet over . . . . In the case of the oil spill, the toxic contamination affected the entire Alutiiq region. The oil spill represents the first time that the Alutiiq people have doubted the environment that has always been the source of their food and culture."[44]

The following statements evince Native people's deep concerns about the importance of a subsistence lifestyle, the healthy environment that supports it, and about continuing injury due to the Exxon Valdez spill:

> "Subsistence is the way of life of the Native people. We all feel great pain. It [the oil spill] affected our lives because we live off the ocean and it is a fellowship among our people. We live to gather and think of others and help them when they cannot help themselves. We want to teach the next generations to gather, hunt and share. It is an art, an identity, a being.... We are cut off from our way of life" (resident of Port Graham at 3/14/91 press conference, in Braund, 1993, p 92).
>
> "When we worry about losing our subsistence way of life, we worry about losing our identity... It's that spirit that makes you who you are, makes you think the way you do and act the way you do and how you perceive the world and relate to the land." Id. p. 106.
>
> "How will the children learn the values and the ways if the water is dead?" Id. p. 95.
>
> "Our children will be afraid of eating [subsistence foods] for a long time because they will grow up with the behavior of not eating them . . . and it will become ingrained. It will completely ruin our lifestyle. Id. p 95.

[44] Braund, S.R. 1993, Effects of the Exxon Valdez Oil Spill on Alutiiq Culture and People, pp. 67-68.

The Alutiiq people and other researchers have noted that the disruption to subsistence harvesting caused by the Exxon Valdez oil spill damaged an entire constellation of culturally meaningful, subsistence-based elements of Alutiiq life. These elements include:

* Participation in subsistence in general;
* Cooperative hunting, fishing and gathering;
* Processing and preparing subsistence foods;
* Sharing subsistence foods and meals;
* The transfer of subsistence knowledge from elders to younger people;
* The preference for and satisfaction derived from eating subsistence foods;
* The spiritual connection to the natural resources; and
* The autonomy derived from relying on subsistence

Id. p. 91. Sociological research has confirmed that technological disasters differ from natural disasters in the kinds, severity and longevity of effects.[45]. Technological disasters involving toxic substances produce a reaction not engendered by natural disasters or non-toxic technological disasters.[46] "Invisible contaminations remain a part of the surroundings -- absorbed into the grain of the landscape, the tissues of the body, and, worst of all, into the genetic material of the survivors. An 'all clear' is never sounded."[47]

During a recent workshop sponsored by the Rural Alaska Community Action Program and Indigenous Peoples' Council for Marine Mammals, participants noted: "The use of the word 'subsistence' has become one of limited perception... and does not adequately reflect the

[45] Baum, A. et. al. 1983, Emotional behavior and psychophysiological effects of chronic stress at Three Mile Island. Journal of Consulting and Clinical Psychology 51:565-72, cited in Braund, 1993, p 55.
[46] Id. 56.
[47] Erickson, K., Toxic Reckoning: Business. Harvard Business review. Jan.-Feb. 1990, cited in Braund, 1993, p 56.

true sense of its cultural bases." Alaska Native Traditional Knowledge and Ways of Knowing Workshop, September 1994 report. Participants then provided over 40 phrases that describe "parts of our way of life not encompassed by the word subsistence." MMS fails to fully address the potential losses to subsistence based on traditional knowledge and experience from the EVOS. With the high probabilities of multiple spills and chronic pollution associated with the proposed sale, Alaska Native people will be forced to continue to live in fear of the safety of their subsistence foods. MMS has not made an attempt to demonstrate respect and meaningfully incorporate indigenous knowledge and ways of knowing into any aspect of the DEIS. TAG-21

B. **MMS Fails to Recognize That Sale 149 Will Harm Subsistence-Based Communities Regardless of Whether There is a Major Oil Spill.**

In its discussion of existing subsistence harvest patterns, MMS notes that subsistence harvest of many different types of foods is critical to the physical, social and cultural survival of many Alaskan communities near the sale area. Yet, in its discussion of the proposed sale's impacts on these subsistence cultures, MMS discusses only the likelihood that an oil spill will harm the subsistence resources, and fails to recognize that the sale itself, regardless of an eventual spill, harms the social and cultural fabric of these communities. TAG-22

MMS acknowledges that "very large amounts of subsistence foods are harvested" by many Alaskan communities near the proposed sale area. DEIS III.C.6. These foods include salmon, other fish, big and small game, marine mammals, birds and eggs, marine invertebrates, and plants and berries. Id. "The harvest and use of these foods represent

activities having significant social and cultural meaning as well as economic importance, especially within predominantly Alaskan Native communities. Extensive sharing is commonplace, as suggested by the high percentage of households in these communities that receive and give away subsistence resources." Id.

MMS' impacts analysis asserts that exploration activities and accidental small spills during development and production would likely not reduce subsistence resources or harvest. DEIS IV.B.1-76-77. A large spill, of which there is a 27% chance in the base case, "could affect subsistence harvests." DEIS IV.B.1-77. In the event of such a spill, some communities "would experience subsistence-resource losses, primarily because of the high level of exposure to spills from transportation sources. Such losses would include the lack of resource availability, accessibility, or desirability of use. The social consequences of such effects among southern Kenai Peninsula communities and the communities of Nanwalek and Port Graham could be serious." DEIS IV.B.1-81. MMS then explains that subsistence

> is a core cultural institution with complex social meaning. Threats to the subsistence resources and activities that are so fundamentally embedded within Native culture threaten that very culture itself and the meaning it gives to daily life. In addition to anxiety over the loss of subsistence resources and the quality of the habitats that nurture them, the Exxon Valdez experience showed heightened and continuing concern over the health effects of eating contaminated wild foods and the need to depend on the knowledge of others about environmental contamination. Id.

MMS' analysis erroneously assumes that only a large oil spill will create anxiety and stress among subsistence resource users. Based on this erroneous assumption, MMS concludes that, in the base case, sociocultural systems in one or more southern Kenai Peninsula communities would undergo periodic episodes of stress and disruption that TAG-23 could last for one year or more; "effects are caused by one or more large (> 1000 bbl) accidental oil spills that have a 27% chance of occurring." DEIS IV.B.1-83. TAG-23

This implies that there is a 73% chance that sociocultural systems in Kenai Peninsula communities will not undergo the expected stress and disruptions, which is simply not the case. The announcement of the sale itself has already caused concern over impacts to subsistence resources. See, e.g., section VII, *infra*. Subsequent exploration and production will only heighten anxiety, whether a spill occurs or not. To a local subsistence community, the platforms on the horizon will evince not a 73% chance that their way of life will not be harmed, but instead, a 100% chance that they can no longer trust the quality of their cultural and social mainstay - the subsistence harvest.

MMS must acknowledge that Lease Sale 149 has already significantly adversely affected Kenai Peninsula communities' subsistence lifestyles, and stands a 100% chance of continuing to adversely affect subsistence communities regardless of oil spills, in addition to the claimed 27% chance of a spill significantly harming the subsistence resources themselves. TAG-24

C. MMS Fails to Discuss the Requirements of Executive Order 12898 Concerning Environmental Justice.

By Executive Order (EO) of February 11, 1994, President Clinton directed each Federal agency to "make achieving environmental justice part of its mission."[48] The EO requires each federal agency to finalize an environmental justice strategy by February 11, TAG-25

[48] See Executive Order 12898, February 11, 1994.

1995.[49] The EO identifies subsistence consumption of fish and wildlife as an environmental justice issue, and directs federal agencies, "whenever practicable and appropriate," to "collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal agencies shall communicate to the public the risks of those consumption patterns." Executive Order 12898, § 4-401. Further, the EO directs federal agencies to "publish guidance reflecting the latest scientific information available concerning methods for evaluating the human health risks associated with the consumption of pollutant-bearing fish or wildlife. Agencies shall consider such guidance in developing their policies and rules." Id. § 4-402. TAG-25

MMS does not discuss the Executive Order or any environmental justice strategy, or any guidance regarding methods for evaluating the human health risks associated with consuming pollutant-bearing fish, in the DEIS. Given the high consumption of fish and wildlife for subsistence use by many communities affected by proposed sale 149, MMS must identify the risks of this consumption, and communicate those risks to the public, as the EO directs.

D. MMS Has Failed to Engage in Government-to-Government Relations With the Affected Native Alaskan Villages and Councils.

President Clinton's Memorandum of April 29, 1994 directs the head of each federal executive department and agency to ensure that the department or agency operates within a government-to-government relationship with federally recognized tribal governments. 59 Fed. TAG-26

[49] A subsequent Executive Order extended this deadline until March 24, 1995, the sixth anniversary, ironically, of the Exxon Valdez Oil Spill, which disproportionately affected low-income minorities living a subsistence lifestyle. See Executive Order 12948, January 30, 1995.

Reg. 22951 (May 4, 1994). The Memorandum directs each federal agency to consult with tribal governments to maximum extent practicable prior to taking actions which affect such governments. Id.

In February, 1995, Assistant Secretary for Indian Affairs Ada Deer issued a guidance memorandum to DOI bureau and office heads on implementing the government-to-government policy. This guidance document describes the constitutional basis of tribal sovereignty, discusses inherent powers of sovereign tribes, and lists several actions which agencies should take in order to show respect for tribal sovereignty. Guidance Memorandum at 1-3. Among other things, agencies should "take affirmative steps to become knowledgeable about tribal governments and processes generally, and where an agency is working with a specific tribe, ensure that all personnel have adequate knowledge about the specific tribe's government and procedures." Id. at 2.

TAG-26

While MMS has made an effort to identify Native communities which Sale 149 may impact, it has not dealt with Native Villages as governments. An example of this is MMS' dismissal of Chickaloon Village's stated concerns regarding land ownership as an issue which must be resolved in another forum. While it may be that another forum, i.e., a federal court, ultimately resolves the issue of claims of aboriginal title to OCS lands off Alaska, that does not mean that MMS should ignore the concerned Native governments in the meahtime. Instead, MMS should establish communication links and strive to understand the affected governments, as DOI's guidance memorandum states. In short, to comply with the President's memorandum and DOI guidance, MMS must take additional actions to establish better government to government relations with affected Native governments, prior to finalizing the EIS. In doing so, MMS will likely develop a fuller understanding of the meaning of Sale 149 to affected Native Alaskans.

TAG-26

VI. The DEIS Fails To Adequately Analyze The Pre-Lease And Lease Sale Impacts On Affected Communities.

TAG-27

Lease Sale 149 has already had a demonstrated and adverse psychological effect ~~on the people in the communities surrounding the Inlet and Strait; these effects will~~ continue and worsen if the sale proceeds. MMS has not considered these impacts. Coastal residents, commercial and sport fishers, subsistence harvesters, and tourism and recreation industry participants depend on a clean and healthy Cook Inlet ecosystem. After the Exxon Valdez spill's catastrophic disruption of the lives of Cook Inlet communities, MMS now asks these same communities to accept further intrusion of the oil and gas industry into the ecosystem which provides their way of life. People who depend on this ecosystem are outraged at this prospect. Nowhere was this more clearly expressed than at MMS' public hearing held in Homer, Alaska, where four hundred residents of this small community that depends primarily on commercial fishing, sport fishing, and tourism, attended the hearing to express their opposition to the proposed lease sale. MMS must consider the high level of anxiety regarding impacts on social and cultural values and lifestyles which this proposed sale has generated.

Social and cultural impacts from the decision to proceed with an oil and gas lease sale can come in many forms. In a recent analysis of the federal offshore oil and gas program, two pre-eminent social scientists, with a great deal of experience dealing with oil and gas programs, examined in detail the impacts associated with the federal government's decisions to lease lands for oil and gas exploration, development and production. Freudenburg and Gramling, *Oil in Troubled Waters*, State University of New York Press (1994). As the authors noted:

> In the physical or biological sciences, it may in fact be true that no impacts take place until a project leads to concrete alterations of physical or biological conditions. In the case of the human environment, by contrast, observable and measurable impacts can take place as soon as there are changes in *social* conditions -- which often means from the time of the earliest announcements or rumors about a project.[50]

These "planning phase" impacts "are shaped by a community's prior experience and present interests."[51] In general, they fall into six categories, all evident in the Proposed Lease Sale 149 context: 1) Biophysical/Health Systems (concerns about the potential for human and environmental health degradation); 2) Cultural Systems (threats to indigenous/native cultures, i.e. "increased dependence on money economies that can threaten subsistence activities and threats to "mainstream" cultures, i.e., shock to individuals when government officials fail to exhibit "appropriately neutral behaviors"); 3) Social Systems (i.e., risk to the "highly-prized" "slow-paced, peaceful and friendly community"); 4) Economic Systems (i.e., risk to commercial fishermen and tourism); 5) Political/Legal Systems (i.e., lobbying and lawsuits which increase alienation); and, finally, 6) Psychological Systems (i.e., threats to self-concepts and the degree to which people view themselves as effective individuals).[52] TAG-28

[50] *Id.* at 119 (emphasis in original).
[51] *Id.*
[52] *Id.* at 119-26. Unfortunately, as the authors note, all too often the process of identifying threats to a community ("most often [to] biophysical/health and/or social systems") as well as the opportunities ("most often [to] economic systems"), id. at 120, is a contentious process. This may, in turn, lead to further alienating of the interested parties along the lines of those who consider a

Nowhere does MMS give credence to these impacts of the "planning process." As Freudenburg and Gramling note, "[t]he notion that government agencies respond to 'real' risks and opportunities, while citizens are reacting mainly to (implicitly erroneous) 'perceptions,' may be popular in the subcultures of the agencies in question, but it is simply one that cannot be supported in the real world."[53] TAG-28

> The key is to realize that, to the degree to which our goal is an improved and more balanced understanding of the ongoing debates -- as opposed to "success" in promoting or opposing a given development project -- we need to do better. . . In all too many cases, to date, agencies and project proponents have taken advantage of the ambiguity of past terminology, insisting that they have seen no need to deal with impacts that are "merely perceptual," being "anticipatory" rather than real, or (purportedly) being so far in the future as to be "beyond our control." . . . In empirical fact, as is becoming increasingly clear, these impacts have often proved to be every bit as real, as quantifiable, as predictable, and as significant, as the development-phase impacts that have been officially acknowledged. Given that impacts do not cease to exist if they are simply ignored, the failure to deal with the broader range of impacts has effectively meant that, rather than *dealing* with risks, we have simply transferred them, shifting them from the principal beneficiaries of development "to local communities and residents who are little more than innocent bystanders."[54]

proposed project as offering threats or offering opportunities; something Trustees hopes can be avoided in this case and in the future.
[53] Freudenburg 1994 at 144.
[54] *Id.* at 145. It is worth noting that many of these statements are particularly relevant in the Alaska and Sale 149 context, not only as scientific backing for the very real concerns expressed by Trustees and other commentators regarding lease sale impacts but also with respect to exploration and development-related impacts. See e.g., Freudenburg 1994 at 144 (agencies "do their best to determine which issues and topics will be considered legitimate") (quotations omitted, emphasis in original).

Please take this opportunity to recognize, consider and, if the project is still to proceed, deal with these pre-lease and lease sale impacts to ensure that the "best interest" of the affected communities is protected.[55]

VII. The DEIS and PEIS Fail to Adequately Assess Energy Alternatives to Offshore Oil and Gas Development.

MMS estimates a base-case yield of 500 MMbbl from Sale 149. The high case potential is an estimated 1.2 billion barrels. DEIS App. A at 2-3. Even assuming the high-case potential is realized, this amounts to approximately two months of U.S. energy needs at current U.S. consumption rates; the base-case yield would not last the country a month.[56] MMS must explain how this sale will aid our national security, and address the issue of why such a small amount of oil, even in the most optimistic of scenarios, can justify the enormous risks of the proposed sale. TAG-29

MMS dismisses the potential for energy alternatives to OCS leasing in general by stating that "many of these alternatives are very expensive, environmentally unattractive, or both," and "there is little basis for anticipating which alternatives might become attractive in future." DEIS at App. D at 1. In the DEIS, MMS incorporates by reference its "Comparative Environmental Analysis of Energy Alternatives to OCS Oil and Gas" from the Programmatic EIS for the Comprehensive Program (PEIS). Id.

As an initial matter, the appropriate energy alternative to Sale 149 cannot be dismissed with reference to an analysis of energy alternatives to the whole OCS program. As noted

[55] One way to deal with these impacts, for example, might be to implement mitigation measures designed to minimize the impacts, i.e., specially dedicating a certain percentage of bonus payments and other project-related income to social service organizations in the affected communities.
[56] See Watson, R.K., *Looking for Oil in All the Wrong Places*, Natural Resources Defense Council, 1991.

above, Sale 149, in even the most optimistic scenario, will only meet U.S. energy needs for roughly two months at the current rate of consumption. MMS must analyze energy alternatives which would meet this -- much narrower -- need. While MMS does consider some of the effects of seeking oil elsewhere, see DEIS at App. D-4, it does not discuss the viability of alternative technologies to meet this two-month need. MMS must analyze more thoroughly the prospect that alternative energy sources, including conservation, could produce as much energy as Sale 149 may. TAG-29

In any event, even assuming that the broader analysis of energy alternatives is relevant to Sale 149, MMS has failed to fulfill legal requirements of the National Environmental Policy Act to adequately consider alternatives. Previous comments critiqued MMS' energy analysis in detail and are incorporated here by reference. See Supplemental Comments of Greenpeace USA and the Natural Resource Defense Council on USDOI OCS Program for 1992-1997 and DEIS, October 1991.

As stated in these comments, the energy analyses MMS continues to use do not incorporate the most recent and comprehensive energy analyses which demonstrate the potential and imperative for energy efficiency and renewable energy to replace the need for developing offshore oil and gas resources. Rapid conversion to renewable energy sources is both technologically possible and now economically viable. These energy sources provide a realistic and necessary alternative to the proposed program. MMS should address this issue by engaging the consultation of progressive and credible energy analysts in providing an evaluation of the potential for energy efficiency and renewable energy sources. Indeed, were MMS to do so, it could perhaps further this nation's move away from oil to renewable energy resources which can truly create a secure nation.

X. **The DEIS is Scientifically Deficient.**

The 1989 National Academy of Sciences (NAS) report "Adequacy of Environmental Information for Outer Continental Shelf Oil and Gas Decisions" was a large factor in the establishment of a presidential moratorium on leasing in most areas of the country outside the Gulf of Mexico and Alaska. The report found that in the fields of physical oceanography, ecology, and socio-economics, MMS had generally inadequate scientific information on which to base sound leasing decisions for Florida and California (the only areas that the National Academy of Sciences was formally requested to review by then President Bush). Scientific understanding of the Cook Inlet and Shelikof Strait ecosystem is qualitatively and comparatively meager. No such NAS review has been done for Cook Inlet and Shelikof Strait, nor has a comprehensive assessment been made to understand the chronic and cumulative effects of development in Upper Cook Inlet. These are fatal flaws for the consideration of leasing in Lower Cook Inlet and Shelikof Strait. We ask that the same scientific standards used in California and Florida be applied to Lease Sale 149. We request that a complete and independent analysis of the adequacy of scientific information be completed before a decision is made on the proposed lease sale. TAG-30

The NAS ecology panel addressed several overall concerns: "First, the Department of the Interior has relied too heavily upon the OSRA model for prediction of impacts. This has resulted in an emphasis on the probability of an oil spill instead of on the effects of a spill. Second, there is a lack of general process-level studies. Third, not enough attention has been paid to inshore, on-shore and estuarine areas. Fourth, there is too narrow a focus on oil spills and not enough on the other potential impacts associated with development and production. Fifth, potential recovery rates of ecosystems after

damage have been overestimated in the EISs. Sixth, sublethal and chronic effects of oil and gas activities have been largely ignored." MMS' Environmental Studies Program and the DEIS for proposed Lease Sale 149 contains the same flaws. TAG-30

We note the following specific scientific deficiencies in the DEIS as examples demonstrating an overall low standard of scientific analyses in the DEIS.

A. **Water Quality**

MMS, in its summary of water quality studies in the DEIS, concludes that the "water quality of lower Cook Inlet is generally good" and that the studies indicate a "pollution-free environment." DEIS III.A.23. MMS and its contractors conclude from the recently completed study done by the University of Alaska's Environment and Natural Resources Institute (ENRI)[57] that the Cook Inlet has "very low" concentrations of hydrocarbons and that sediments are "generally free from toxicity" (quotes from Homer News 3/30/95). The contractor stated in the report: "The physical, chemical, and bioassay results of this study show that Cook Inlet has very low environmental concentrations of hydrocarbons and that sediments and water are generally free from toxicity."[58]

The statements made in the DEIS, the MMS-funded study, and the press are gross misrepresentations of the data and have no scientific foundation. Further, the study does not support the conclusion that there are no chronic effects of existing oil and gas activities in the Upper Inlet. There are three fundamental problems with the MMS-funded water quality study: 1) the science is of poor quality and not supported by peer review; 2) TAG-31

[57] Current Water Quality in Cook Inlet, Alaska, Study. March 1995. OCS study MMS 95-0009
[58] *Id.* at p. xv.

the data does not support the stated conclusions that Cook Inlet is "generally free from toxicity" and a "pollution-free environment"[59]; and 3) there is no attempt on the part of the contractor or MMS to compare the methodologies and data with such obvious national and international studies as the NOAA National Status and Trends Program and International Mussel Watch Project.[60] MMS should not use the flawed assumption that Cook Inlet demonstrates no chronic ill-effects from pollution to justify leasing in Lower Cook Inlet and Shelikof Strait.. TAG-31

1. **The MMS-Funded Study Demonstrates Poor Science And Lack Of Peer Review.**

The MMS study has no discussion of relevant peer-reviewed literature to justify research design, methodologies, results, and conclusions. The report does not provide adequate discussion of site selection criteria or explain the smaller number of sampled sites versus planned sites. Contrary to accepted scientific methods, and to the method used in other similar studies,[61] the researchers do not establish and test null hypotheses. TAG-32

The study uses laboratory toxicity testing, which has severe limitations in adequately assessing biological and ecological harm. The contractor admits that the bioassay methodology is only a primary screening tool and "should be viewed as only one step in a number of assays to assess overall toxicity levels." MMS 95-0009, p.92. In fact, responses to environmental contaminants vary significantly among species, making

[59] See DEIS, III.A.23
[60] The International Mussel Watch project has been recognized as a "legitimate tool for coastal monitoring" by the 1992 UN Conference on Environment and Development held in Rio de Janeiro. Farrington, J.W. and B.W. Tripp, 1993, International Mussel Watch: Chemical Contaminants in the World's Coastal Oceans. Oceanus 36(2):62-63.
[61] See, e.g., Prince William Sound RCAC Long-Term Environmental Monitoring Program, Annual Monitoring Report, 1994).

generalizations difficult.[62] Thus, the study's use of three non-indigenous organisms[63] does not necessarily reflect the effects or sensitivities of Cook Inlet sentinel species to potential contamination problems. Although expedient and relatively inexpensive, the bioassay measures are crude and outdated (1986), and cannot be used to generalize the range of possible sublethal and ecological effects. TAG-32

Further, the DEIS cites the Cook Inlet Discharge Monitoring Report's use of the 96-hour static acute toxicity (LC 50) test to determine that the toxicities of produced waters in Cook Inlet are "slight" and "practically non-toxic." DEIS III.A.20. The deficiencies of the 96 hour LC 50 test, however, are well known and counter these conclusions.

A 1990 study, for example, indicates that the LC 50 test is not the most accurate measure of the effect of chemical pollutants on marine animals. "Tools now available to biologists can detect certain biochemical changes, sometimes called biomarkers, that signal an animal's first response to chemical pollutants. By analyzing biomarkers, we can assess the biological exposure and effects of pollutants more specifically and inexpensively than other methods that assess the presence of the pollutants. Biomarkers have provided the first direct evidence that some chemicals may already be causing biological change in the deep ocean, a region far removed from the known point sources of those chemicals."[64]

[62] See Howarth, R.W. and R. Marino. 1991. Oil in the Oceans. Cornell University Section of Ecology and Systematics.
[63] See MMS 95-0009 at 41. The study used *photobacterium phosphoreum, rhepoxynius abronius, and dendraster excentricus.*
[64] See Stegeman, J.J. 1990, Detecting the biological effects of deep-sea waste disposal. Oceanus 33(2):54-62.

MMS, CIRCAC, and industry studies cited in the DEIS are further lacking in design. A comprehensive study designed to understand the long-term and chronic impacts of waste disposal in Cook Inlet must include an understanding of: TAG-32

** the physical processes -- specifically currents -- that influence contaminant distribution;

** the chemical processes that influence availability, persistence, and degradation of these materials in sediments and water; and

** the long-term biological effects that alter the stability of animal populations and the consequences of those effects on subsistence, commercial and recreational fisheries.[65]

MMS' study does not address these physical and chemical processes, and long-term effects. The MMS study was performed over a short period of time (a 3 week period during one summer season) and the sampling stations, sample sizes, and data points are relatively few. Thus, in light of the study's design, it cannot possibly justify the MMS' sweeping conclusions regarding the health of Cook Inlet.

2. MMS' DEIS Does Not Support Its Conclusions That Cook Inlet Is A "Pollution-Free Environment."

In addition to the fact that MMS does not discuss the shortcomings of the LC 50 test and that the studies referenced in the DEIS are not adequately designed to support the conclusions they make, MMS' conclusions regarding the health of Cook Inlet's waters are not supported by the studies themselves, or by other relevant scientific literature. For example, threshold levels for sublethal behavioral effects of petroleum hydrocarbons in finfish and shellfish have been demonstrated at the 0.1-0.4 ppb level,[66] several orders of TAG-33

[65] Capuzzo, J.E. 1990, Effects of wastes on the ocean: the coastal example. Oceanus 33(2):39-44.
[66] Strickland, R. and D.J. Chasan. 1989, Coastal Washington: A Synthesis of Information. Washington Sea Grant of the University of Washington.

magnitude less then the MMS study cites as a "level of concern."[67] Inhibitory effects on respiration, growth, behavioral responses, hatching success, and salmon migration occur at 1-10 ppb levels of petroleum contamination,[68] in contrast to the MMS-funded study's claim that the level of concern is 500-1000 ppb. TAG-33

The MMS and CIRCAC studies, contrary to conclusions drawn, demonstrate cause for concern regarding toxicity levels in Cook Inlet. For example, the MMS study as discussed in the DEIS shows that levels of toxicity in sampled waters from five of the eight stations caused statistically significant reductions in fertilization rates in *D. excentricus*. Echinoderm larvae exposed to Kamishak Bay waters had a survival rate less than 10% of the control. Pore waters and sediments from the western Inlet stations also demonstrated toxicity in the echinoderm and luminescent bacteria tests. PAH concentration comparisons between the OCSEAP data (range up to 266.3 ng/g) and the MMS study (range up to 958 ng/g) indicate over a three-fold increase, although it is unclear from the data presentation whether the OCSEAP data reflect total PAHs or a sum of selected individual PAHs. Levels of selected PAHs are high (up to 400 ng/g), although the overall sample size is small. The lack of appropriate sediment chemistry analysis for the TOC samples prevents differentiation between petroleum and other sources. However, the DEIS fails to note that the TOC levels are nevertheless high.

In the CIRCAC pilot study, mussel tissue analysis reveals major petroleum source inputs of alkyl-naphthalenes in the Beluga River sample. The relatively high levels of

[67] See MMS 95-0009 at p. 117. The study states the "level of concern" to be 500 to 1000 ppb.
[68] Howarth and Marino, 1991.

PAHs in the pre-exposure mussels (84 ng/g) and the source of the mussels is not explained. TAG-33

B. The DEIS Contains Flawed or Incomplete Analysis of Projected Oil Spills, Bird and Fish Resources, and Impacts on Steller Sea Lion Habitat.

1. Oil Spill Containment And Recovery

The oil spill model used to assess spill rates, trajectories, and chances of contact to environmental resource areas is not representative of the range, complexity and magnitude of meteorological and physical oceanographic realities in Lower Cook Inlet and Shelikof Strait. For example, sea ice is not modeled[69] – this is a serious omission given the hazards associated with sea ice conditions throughout the winter months in Cook Inlet. Furthermore, the winter spill scenarios modeled use a 16 knot wind speed and 1.8 meter wave height[70] – this is not reflective of the range of conditions in Cook Inlet and Shelikof Strait. The Alaska Oil Spill Commission Report[71] indicates that a spill of between 300,000 and 1 million gallons can be expected in Cook Inlet every 2.2 years, a spill of 9 million gallons can be expected about every 24 years, and a spill of 9 million gallons or more can be expected about every 66 years. As this study was completed before oil exploration and development existed in lower Cook Inlet, it demonstrates the level of risk for a spill in Cook Inlet is already too great even without Lease Sale 149. TAG-34

MMS' estimates of spill prevention and response capabilities in Cook Inlet are overstated. Data collected by the U.S. GAO demonstrates that generally no more than TAG-35

[69] See DEIS at IV.A.6.
[70] See DEIS, table IV.A.3-3
[71] See *Spill: The Wreck of the Exxon Valdez – Implications for Safe Transportation of Oil.* Alaska Oil Spill Commission. February 1990. Appendix J-L.

10-15% of all spilled oil is ever recovered.[72] The Alaska State Oil Spill Commission Report states, "The extreme environmental conditions in Cook Inlet, tides of 30 feet and currents of 8 knots, cause spreading to occur so rapidly that effective response with mechanical recovery is not likely to be successful for any spills larger than a few thousand barrels."[73] In contrast, the DEIS does not reflect this reality. MMS states only that, "mechanical oil-spill response generally is accepted as the primary means for containing and recovering an oil spill."[74] TAG-35

2. The Descriptions Of Fisheries and Bird Resources Is Incomplete.

The effects of Sale 149 on Upper Cook Inlet fisheries is not described in the DEIS. Recent studies indicate a substantial levels of marine productivity and diversity in Upper Cook Inlet, especially with regard for secondary productivity, and planktonic crustaceans and larval fishes diversity.[75] The Cook Inlet ecosystem cannot be divided; it should be treated holistically. The need to consider the entire Inlet and Strait as one ecosystem is illustrated by the Alaska Oil Spill Commission's oil spill trajectories. These trajectories demonstrate that a spill of as few as 1 million gallons at Nikiski, Kachemak Bay, or the Kennedy or Stevenson Entrances, could oil the entire Inlet.[76] TAG-36

The DEIS fails to incorporate the most current information on the distribution and ecology of marine birds in lower Cook Inlet and Shelikof Strait. Two recent studies offer TAG-37

[72] *Id.* at 12
[73] See, *Spill* at Appendix J-L, p IV-14
[74] See DEIS at IV.A.16.
[75] See Moulton, L.L. 1994. 1993 Northern Smolt Studies Draft Report. Prepared for ARCO Alaska.
[76] See *Spill* at Appendix J - L, pp. A1-36.

information on the rich diversity of seabird assemblages in the lower Cook Inlet.[77] Because "[l]ower Cook Inlet is one of the most productive areas for seabirds in Alaska" and that "[c]ompared with other marine areas of Alaska, seabirds in Lower Cook Inlet have been little studied with regard to their pelagic ecology,"[78] ignoring these studies is a significant omission. In order for MMS to understand the extent and importance of these seabird foraging areas, as well as data gaps in our knowledge of population dynamics and ecological relationships, it is important that the information from these studies be incorporated into the DEIS. Lower Cook Inlet and Shelikof Strait contain crucial habitat areas for migratory birds and waterfowl. For example, all of Kachemak Bay, located five to ten miles east of the Sale 149 area,[79] was recently designated as a Western Hemisphere Shorebird Reserve an international recognition of the area's importance as critical habitat for migrating shorebirds. "We've identified the whole [Kachemak] bay as a site of international importance," said Ian Davidson, Director of the Western Hemisphere Shorebird Reserve Network (quoted in Homer News, "Mud flats get world recognition," 2/16/95). TAG-37

Finally, MMS does not consider the chronic impact of pollution on seabirds. Recent studies suggest that "chronic impacts may be a more significant cause of seabird mortality than large spills. The subtle and long-term effects of chronic oil pollution are TAG-38

[77] These studies are, 1.) Piatt, J.F. 1993. Monitoring Seabird Populations in Areas of Oil and Gas Development on the Alaskan Continental Shelf. OCS Study MMS 92-0000 - Draft, and 2.) Agler, B.A. 1995. Estimates of Marine Bird and Sea Otter Abundance in Lower Cook Inlet, Alaska During Summer 1993 and Winter 1994. OCS Study MMS 94-0063.
[78] See Piatt, J.F. 1993
[79] See DEIS, Graphic 1. Marine and Coastal Bird Resources.

likely to be extremely damaging to seabird populations and to be politically difficult to stop."[80] MMS does not consider these chronic pollution impacts in the DEIS. TAG-38

3. The DEIS Does Not Reflect The Importance Of Steller Sea Lion Critical Habitat And The Threat Posed By Offshore Oil And Gas Development.

Counts of Steller sea lions on rookeries and major haulouts demonstrate precipitous declines in the Gulf of Alaska of 82% since 1960. DEIS III.B.19. Activities and impacts associated with offshore oil and gas development in Lower Cook Inlet and Shelikof Strait pose a grave threat to the Steller sea lion. Spills, disturbance, chronic discharges, and cumulative effects from offshore oil and gas activities in the region are likely to irreversibly harm a significant proportion of the population. NMFS has stated in their comments to MMS on the 1992-97 5-Year Plan: "We do not believe that sea lion populations should be expected to recover from any of the impacts analyzed in this section. Given the current state of the species and the continuing downward trend, it is not certain the species could recover in 30 years, let alone in the face of these additional factors." Shelikof Strait and marine areas surrounding rookeries and haulouts have been designated as critical habitat areas for the Steller sea lion under the Endangered Species Act. DEIS III.B.20. Sugarloaf Island in the Barren Islands is the site of the second largest sea lion rookery in Alaska. DEIS I.1-10. As NMFS indicated, oil development in Lower Cook Inlet and Shelikof Strait is simply not compatible with protecting and rehabilitating this species from further harm under the ESA. TAG-39

[80] Boersma, P.D. et.al. 1994. Magellanic penguins affected by chronic petroleum pollution along coast of Chubut, Argentina. Auk 111(1):20-27).

The lease sale area also serves as essential habitat for other species at risk, including: harbor seals, beluga whales, Stellers eider, marbled murrelets, fin and humpback whales. The NMFS Status Report on Cook Inlet Belugas (1992) states: "Because the beluga whale population in Cook Inlet, Alaska appears to be a small geographically isolated population of the species, human-induced perturbations could have a dramatic effect on the stock." Calving areas and other basic habitat requirements for the Cook Inlet beluga population have not been documented. The importance of the area to year-round use by fin whales as documented by Kodiak National Wildlife Refuge biologists[81] is not discussed in the DEIS. The lack of basic ecological knowledge concerning distribution and dynamics of key species, assemblages, and habitats warrants in-depth investigation prior to a lease sale decision. TAG-40

XI. MMS Fails To Adequately Consider The Cumulative Impacts Of Sale 149 With Other Development Activities Around Cook Inlet.

As discussed in section IV, Cook Inlet already receives permitted and unpermitted toxic discharges to its waters which pose significant health hazards to humans and the environment. These discharges from oil and gas industry facilities constitutes a major source of pollution to Cook Inlet. Operation of the existing offshore oil and gas production platforms and support facilities has resulted in discharges into the Inlet of drilling wastes and "produced water"–water laced with toxic compounds found deep within the earth in oil-bearing formations. Since 1987, offshore oil platforms have dumped over 7.5 billion gallons of produced water into Cook Inlet and over 31.5 million TAG-41

[81] Pamela K. Miller, Greenpeace, personal communication with Denny Zweifelhofer, Biologist, Kodiak National Wildlife Refuge, February 22, 1995.

gallons of drilling "muds"–fluids used to lubricate drilling bits as they bore into the earth– and other drilling wastes that contain oil, mercury, cadmium and other heavy metals and toxic chemicals. The DEIS does not contain a comprehensive assessment of the chronic and cumulative impacts of further pollution on the vast and complex ecosystem of Cook Inlet and Shelikof Strait. TAG-41

Despite the natural wealth of this unique region, and the economies it sustains, Cook Inlet and Shelikof Strait face serious threats from a host of development activities. The State of Alaska has leased vast tracts of land, within northern Cook Inlet, both onshore and offshore, to the oil and gas industry. This has resulted in the development of a network of offshore production platforms, subsea pipelines, refineries and oil terminals – all of which are subject to the vagaries of the extremely unique and hazardous oceanographic and geophysical conditions of the region (earthquakes, volcanic eruptions, tidal currents that average four knots, tidal exchanges of up to 35 feet, and sea ice for almost six months of the year). As discussed more fully in section XII, these are conditions for which no effective oil spill prevention, control, and clean-up technologies currently exist.

As also explained in section IV, the oil and gas industry has also inflicted serious air pollution and hazardous waste problems on Cook Inlet and Kenai Peninsula. MMS improperly dismisses this entire issue as "beyond the scope" of the DEIS. DEIS I-9. Existing hazardous waste sites caused by the oil industry's Nikiski facilities, however, are not beyond the scope of what MMS must consider. After all, if oil is found, it will be transported to Nikiski, adding to the flow of crude oil refined there. It is this flow of oil, and the oil companies' inability to conduct its refining and related operations in an TAG-42 environmentally safe manner, that has in large part caused the toxic catastrophe which MMS now ignores. MMS must consider the existing oil industry-caused toxic pollution on the Kenai Peninsula, and consider the likely cumulative impacts on that environment in the event that oil is found and transported there. MMS should also acknowledge hazardous waste contamination on the Kenai Peninsula not necessarily related to the oil and gas industry, for the purpose of estimating the cumulative impacts of total hazardous waste contamination on the Kenai Peninsula. Finally, MMS should condition any lease agreement it decides to enter into with a company which has contaminated the Kenai Peninsula with hazardous waste on the company's cleaning up that waste prior to initiating any lease-related activities.

TAG-42

The final EIS must account for the cumulative impacts of these existing and potential future legal and illegal air and water pollution discharges, hazardous waste sites, etc., on Cook Inlet and the Kenai Peninsula.

TAG-43

Finally, MMS' final EIS must account for any significant congressional changes to existing environmental laws. Congress is contemplating sweeping changes to this country's environmental laws, threatening to roll back 25 years of advances in environmental protection, and return to an age where environmental consequences of public and private sector actions simply did not warrant much attention.

Should Congress repeal of significantly weaken any of today's laws operating to protect the environment, MMS must reanalyze the likely environmental impacts of Sale 149, including the direct, indirect, and cumulative impacts on the Cook Inlet ecosystem, in light of this reduced protection. Existing pollution from the oil and gas industry, plus expected increased pollution from further oil and gas and other industrial development,

TAG-43

would all be expected to significantly increase, if laws like the Clean Water Act or Clean Air Act are dismantled. Any significant change in existing environmental protections will create significant likely new impacts, and thus will require an EIS which addresses these impacts.

XII. MMS Overestimates Oil Spill Prevention and Response Capabilities in Cook Inlet.

The National Park Service in a letter to MMS commented on the geography and climate of the Inlet and Strait:

> A great degree of concern for this area is the higher degree of risk to natural and cultural resources from oil spills because of the vagaries of weather, and the remote, isolated wilderness coastlines that are somewhat complex in configuration. *Prevailing conditions in Lower Cook Inlet and Shelikof Strait make it one of the most difficult areas in the world in which to conduct any kind of an operation.*
>
> The DEIS should address the realities of oil spill clean-up under such circumstances. For instance, the shoreline of Katmai National Park and Katmai Preserve precludes the establishment of base camps. Coupled with difficult weather conditions, clean-up for Katmai would be difficult.[82]

The Park Service's concerns are well-placed. The environmental hazards in Cook Inlet create some of the most hazardous navigational and operational hazards in the world. Lower Cook Inlet is situated in one of the most active seismic zones in the world. More than 100 earthquakes with a magnitude greater than six have occurred in the Cook Inlet area since 1902.[83] The Inlet's watershed includes at least a dozen large, glacially-fed river systems that

[82] See letter dated November 21, 1991, to Mr. Scott Sewell, Director, MMS, from Dennis P. Galvin, Associate Director, Planing and Development, National Park Service, p. 7. *Cited from OCS Natural Gas and Oil Resource Management, Comprehensive Program 1992-1997, Final Environmental Impact Statement*, MMS 92-0004, vol. III, Sec. G.
[83] *Id.* at vol. 1, p. III.A.1 & III.A.2.

deliver tons of glacial silt into the Inlet on a daily basis, creating a water body with extremely high turbidity and constantly shifting bottom contours. The Inlet's tides are among the most extreme in the world, as high as 35 feet. Vessels transiting the Inlet regularly encounter tidal currents in excess of 4 knots and ranging up to 7 knots. Sea ice clogs the Inlet's waters for nearly 6 months of the year. Winter storms produce winds exceeding 100 knots at a time of year when total daylight averages 6-7 hours. Fog is common at all times of the year. These are conditions for which there are no effective oil spill control or cleanup technologies exist.

MMS is wrong to claim that there has been a progression in the ability to prevent and respond to an oil spill due to improvements in the regulatory regime since EVOS (IV.A.22-23). Despite the extreme navigational hazards, there is no vessel traffic system for Cook Inlet. There are no limitations on tanker operations based on weather or ice conditions. There is no fire-fighting capability for ports in the Inlet and very limited tug assist capability. Of the three major terminals where oil tankers routinely dock -- Nikiski, Drift River, and Anchorage -- only Anchorage uses a small harbor tug to assist tankers in docking. As for Nikiski and Drift River, according to a report on navigation safety in Cook Inlet published by the Cook Inlet Regional Citizens Advisory Council (Report on Safety of Navigation and Oil Spill Contingency Plans in Alaska's Cook Inlet. February 1992. Captain James T. Dickson, Shetland Oil Terminal, Sullom Voe, Scotland), "...we cannot find another facility in the Western world that routinely berths and unberths large crude oil tankers without tug assistance." In addition, no ocean-going tugs capable of controlling a fully laden tanker currently operate in Cook Inlet. TAG-44

Drift River oil terminal lies beneath an active volcano, Mount Redoubt. During the winter of 1989, the eruption of the volcano forced the curtailing of operations of ten of the Inlet's fifteen oil platforms and flooding of the oil terminal (The Eruption of Redoubt Volcano,

Alaska. USGS Circular 1061. 1990). Tides and currents make Nikiski and Drift River two of the most hazardous docking facilities for tankers in the country.

MMS does not provide a complete history of the significant spills in Cook Inlet and the many "near-misses." Within the past eight months alone, three tankers lost power while transiting the Inlet when ice was pulled into their engine cooling systems. In 1992, a pipeline break at Nikiski spilled over 47,000 gallons of crude oil/water mixture into Cook Inlet on January 4. Only 2,400 gallons were recovered and dispersants couldn't be used due to freezing conditions. In February of 1991, the tanker Coast Range was ripped from the dock by tide-borne ice at Drift River. The oil loading dock and tanker were both damaged, but luckily the pumps were not operating and only a small spill resulted. TAG-45

Five years after the Oil Pollution Act of 1990 (OPA 90) mandated strict spill prevention and response measures, the region remains highly vulnerable to oil spills from existing and planned operations. OPA 90 provisions requiring the use of local resources and the protection of sensitive habitat have yet to be implemented within Cook Inlet or Kodiak region. Human factors cause 80% of all oil spills, yet tanker manning levels remain minimal. OPA 90 identified double-hulled tankers as a key to prevention, but conversion of the fleet will not occur until well into the next millennium.

In sum, MMS has not provided an accurate picture of the regulatory failures, industry resistance to effective spill prevention and response measures, and the lack of effective technologies to prevent and clean up spills under realistic conditions in Cook Inlet and Shelikof Strait. TAG-46

CONCLUSION

Perhaps the simplest way to conclude is to restate that the risks of this proposed sale far outweigh any benefits. We defy MMS to justify this sale on an "energy needs" or "national security" basis. We urge MMS to listen to the Alaskan people, including Native Alaskans, who have steadfastly opposed the sale, testifying at hearings, contacting the press, working without pay to protect the Alaska they love, overwhelming the voices of the paid industry representatives who favor the sale. We implore you to rethink this proposed action and either cancel or defer Sale 149.

Sincerely,

Patrick D. Lavin, Staff Attorney
John Buchheit, Legal Intern
Trustees for Alaska

Pamela K. Miller, Biologist
Greenpeace

GROUPS SUBMITTING COMMENTS ON OCS LEASE SALE 149 DEIS

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TESORO EXCESS EMISSION REPORTS AS OF DECEMBER 19, 1993

REPORT DATE	INCIDENT DATE	DESCRIPTION	SO_2	H_2S
Oct. 14, 1991	Oct. 10, 1991	H-701 put on line with H-801 for 8 hrs.		
Dec. 2, 1991	Nov. 27, 1991	Repairs to sulfur recovery unit (SRU) for 16+ hrs.; acid and sour gases flared; SO_2 exceeded 500ppm. for duration		
		1992		
Feb 11, 1992	Feb. 10, 1992	Maintenance; SRU shut down; gases flared; SO_2 em. 25-500 ppm. for 3 hrs., exc. 500 ppm. 2 hrs.	1.95 tons	
Mar. 4, 1992	Feb. 29, 1992	Hydrocracker unit upset, 2 shut downs of SRU; acid gases flared 15 min.; sour gases flared for 5 hrs. 54 min.; SO_2 exceed 500 ppm. for 6 hrs. and 9 min.	0.718 tons	
Mar. 4, 1992	Mar. 4, 1992	SRU down; gases flared; 250-500 ppm. for 30 min.; 500 ppm. for 15 min.	0.506 tons	
Mar. 10, 1992	Mar. 5, 1992	Non-HeA power interruption caused SRU downtime; 500 ppm. for 13 hrs. and 45 min.;	3.614 tons	
Mar. 19, 1992	Mar. 18, 1992	HEA power outage, SRU down; acid gases flared for 61 min.; sour gases flared for 197 min.; 250-500 ppm. for 2 min.; 500 ppm. for 197 min.	1.297 tons	
Mar. 10, 1992	Mar. 5, 1992	SRU down due to non-HEA power interruption; acid and sour gases flared; SO_2 over 500 ppm. for 13 hrs. and 45 min.	3.614 tons	

EXHIBIT A PAGE 1 OF 5

May 7, 1992	April 24, 1992	Hydrocracker unit down; SO2 250-500 ppm. for 30 min., over 500 ppm. for 14.5 hrs; acid gases flared 7 hrs, sour 22 hrs.	2.75 tons
May 13 ,1992	May 11, 1992	Non-HEA power outage. SRU down; 250-500 for 10 min.; over 500 ppm. 10 min.	0.209 tons
May 26, 1992	May 15, 1992	Ditto; acid and sour gases flared for 30 min.; SO2 over 500ppm. for 30, and 250-500 for 40 min.	0.215 tons
May 26, 1992	May 20, 1992	Spike in H2S; in fuel gas system. H2S to 1500 ppm. for 2hrs., 30 min.	
May 26, 1992	May 23, 1992	Maint. on reformer unit; H2S reached 252 ppm. 1 hour 43 min.	
June 12, 1992	May 28, 1992	SRU shutdown; So2 250-500 for 3 min. 500 ppm. for 10 min.	0.072 tons
June 12, 1992	June 2, 1992	SRU down for maint; acid and sour gases flared for 16 hrs.; SO2 exceeded 500 ppm. for 17 hrs.	3.9 tons
July 27, 1992	July 8, 1992	SRU down due to HEA power outage; SO2 between 250 and 500 ppm. for 2 min., and over 500 ppm. for 30 hrs.	16.84 tons
July 27, 1992	July 17, 1992	SCOT unit off line; SO2 250-500 ppm. for 7.5 hrs., over 500 ppm. for 7 hrs.	0.333 tons
Nov. 2, 1992	Oct. 16, 1992	SRU down due to HEA power failure; acid and sour gases flared for 1032 min., SO2 over 500 ppm. for 1090 min.	less than 5 tons
Nov. 2, 1992	Oct. 26, 1992	SRU down due to HEA power outage; acid and sour gases flared for 1640 min.; SO2 in excess of 500ppm. for 1641 min.;	less than 5 tons

EXHIBIT A PAGE 2 OF 5

Nov. 2, 1992	Oct. 26, 1992	HEA power outage, H2S reached level of 700 ppm. highest value caused by SRU shutdown; 45.7 hrs. duration	
Nov. 5, 1992	Nov. 3, 1992	SRU down due to malfunction; flared for 6 hrs. 40 min.; SO2 over 500 ppm. for 6 hrs. 45 min.	2 tons
Dec. 31, 1992	Dec. 27, 1992	Leak. SRU malfunction; no emissions	

1993

Jan. 18, 1993	Jan. 14, 1993	SRU down due to HEA power outage; acid and sour gases flared 22.67 hrs.; SO2 excess 500ppm. for 24 hrs.	10 tons
Jan. 19, 1993	Jan. 14, 1993	HEA power failure; H2S excess for 30 min., highest value 238 ppm. H2S	
Feb. 8, 1993	Feb. 3, 1993	SRU malfunction; acid and sour gases flared 21 min., SO2 250-500 for 43 min., and excess 500ppm. for 31 min.	0.335 tons
Feb. 18, 1993	Feb. 14, 1993	HEA power outage; acid and sour gases flared for 17 hrs.; SO2 250-500 for 40 min.; excess 500 ppm. for 18 hrs.; H2S excess 160 ppm. for 2 hrs., and 40 min.; up to 300 ppm.	9.35 tons
May 14, 1993	May 12, 1993	Hydrocracker unit malfunction; 190 min. 250-500ppm. SO2	
June 17, 1993	June 10, 1993	Internal power loss; acid and sour gases flared for 30.8 hrs; SO2 250-500 ppm. for 2 min. and over 500 for 33.3 hrs.	6.8 tons
Sept. 10, 1993	Sept. 2, 1993	SRU malfunction; so2 250-500 for 93 min., over 500 for 92 min.	0.187 tons

EXHIBIT A PAGE 3 OF 5

Oct. 26, 1993	Sept. 6, 1993	Maintenance shutdown of hydrocracker and SRU; H2s exceeded 162 ppm. for 25 days; highest recorded value was 2600 ppm.; average was 440 ppm.	
Dec. 14, 1993	Nov. 29, 1993	Float valve LIC 4525 maintenance; LPG and sour gases flared for 110 min. SO_2 exceeded 500 ppm. for 1 hr. 50 min.	0.25 tons
Dec. 14, 1993	Dec. 9, 1993	Liquid petroleum gas leak caused shutdown of hydrocracker unit; acid and sour gases flared 28 hrs.; SO_2 exceeded 500 ppm. 29 hrs. and was between 250-500 ppm. for 50 min.	21.3 "long" tons

EXHIBIT A PAGE 4 OF 5

DRAFT - CONFIDENTIAL - ATTORNEY WORK PRODUCT

Attached is a updated, rough analysis of Tesoro's "excess emissions" or "excursion" reports from in the ADEC Southcentral Regional Office (SCRO) files. This may not be a totally accurate, or for that matter, complete listing. It only reflects what I copied from the SCRO files. My file search was not thorough, so I may have missed some reports.

The existing permit was issued on Feb 19, 1991. Under condition 26 of the permit, oral reports of excess emissions are required within 12 hours, and a written follow up report in 5 days. In 1992, there were 8 instances of failing to submit a written report within 5 days, and in 1993 4 instances, for a total of 12 reporting violations in 1992-1993. (It was obviously not possible to accurately track the timeliness of oral reports from SCRO files.)

Permit Exhibit B, p 11, says the sulfur recovery unit (SRU) must meet a 99.9 % recovery rate, with a not more than 250 ppm/v SO_2 daily average, and not more than 500 ppm. for more than 3 hours. H_2S must meet 0.1 ppm. daily average at zero percent oxygen, with an annual H_2S limit of 0.3 ton.

With reference to the October 10, 1991 incident in the chart below, under the permit sources H 701, 702 and 801 may be operated only singly, and at not greater than 35% capacity. This condition was imposed in a previous PSD "avoidance" permit change.

SO_2 and H_2S emissions are reported in quantities only when so reported in Tesoro's written excess emission reports.

EXHIBIT A PAGE 5 OF 5

ALASKA'S MOST CONTAMINATED SITES

[The] following listing was generously provided by Dennis Harwood - Environmental Specialist of the Alaska Department of Environmental Conservation/Contaminated Sites [Re]mediation Program/Remediation Unit. The AJOC feels that this is the most accurate source of information pertaining to contaminated sites in Alaska. The Alaska Hazard [Ra]nking Model is used to illustrate the threat a contaminated site poses to human health, wildlife and the environment. It provides for evaluation of various pathways of [exp]osure and takes into account the toxicity of contaminants as well as the sites proximity to potentially exposed populations. It also provides a means of organizing sites [as] they relate to each other in severity. This ensures a focus of attention on sites that pose the greatest threat first. The sites listed below have been determined to be the highest priority sites in the state. The sites of greatest concern are listed first and decrease in severity as the list progresses. There are currently 1,702 active sites on [the] contaminated sites database. This number is inclusive of leaking underground storage tank sites. The total inventory of active and closed sites now stands at 2,116. [Ex]act address of sites was unavailable for publication. The highest ranked sites would be funded for assistance first. Due to possible misconceptions, the DEC score of [ea]ch site is not available for publication. It is important to note that this list is dynamic and the site scores represent a snap-shot in time. As site assessment proceeds, [re]evaluation of the information that goes into the ranking model is constantly being updated and scores are revised accordingly. Last year's ranking model may vary from [thi]s year's ranking model.

Current Ranking	Last Year's Ranking	Physical Location	City
1.	(1)	Lucky Sourdough	Fairbanks
2.	(4)	Alaska Gold House	Fairbanks
3.	(7)	Galena Air Force Station	Galena
4.	(6)	FMUS - Fairbanks MUS Facility	Fairbanks
5.	(5)	Tesoro Alaska Refinery	Kenai
6.	(8)	Sanden's Peters Creek Tesoro	Chugiak
7.	(2)	SE Corner Spruce and 84th Ave.	Anchorage
8.	(29)	UNOCAL Ammonia Urea Plant	Nikiski
9.	(10)	Northside Grocery & Gas Proper	Fairbanks
10.	(-)	McGahan Utilities	Nikiski
11.	(13)	ADOT&PF Maintenance Yard	Anchorage
12.	(14)	Water Gallery	Shemya AFB
13.	(15)	Mapco Express #[illegible]	Anchorage
14.	(-)	Dowell Schlumberger, Inc.	Kenai
15.	(17)	Standard Steel & Metals Company	Anchorage
16.	(19)	Stage Stop Station	North Pole
17.	(16)	Arctic Surplus	North Pole
18.	(-)	Water Wells on Holt Road	Fairbanks
19.	(-)	Ridgeway Chevron Station	Soldotna
20.	(-)	OU# [illegible]	Elmendorf
21.	(19)	UAF Physical Plant	Fairbanks
22.	(26)	Former Laidlaw Transit, Inc.	Soldotna
23.	(24)	McCall Property	Fairbanks
24.	(-)	Moose Creek - Al Cory Drive	Moose Creek
25.	(-)	Mile 22.5 North Kenai Road	Nikiski
26.	(-)	Four Corners Country Store	Palmer

EXHIBIT B PAGE 1 OF 1

01/30/95 12:11 ☎907 272 6519 ☐001

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 3
To Ann Rothe | From Pam Miller
Co. TFA | Co. GP
Dept. | Phone #
Fax # | Fax #

Peninsula Clarion, January 30,1995

Tug escorts not needed in inlet, say oil backers

By KRISTEN SCHULTZ
Peninsula Clarion

Wylie Barrow, Alaska general manager of oil and gas operations for Unocal, has launched a full-scale offensive against U.S. Coast Guard consideration of tug escorts for oil tankers in Cook Inlet.

After a speech to the North Peninsula Chamber of Commerce last Thursday, Barrow provided form letters for area residents to send to the Coast Guard in Washington, D.C., urging it to deny fishers' and environmentalists' request for the escorts.

"I consider it a major underfunded mandate that's a threat to the small oil industry of the Cook Inlet," Barrow said in a later interview. "This is a bad idea."

If the Coast Guard goes ahead with the program, oil tankers may be required to enter and exit the inlet only if accompanied by a tug that would provide assistance if the tanker looses power.

A similar program already is required in Prince William Sound.

Barrow estimated that it would cost the industry at least $3 million a year to implement a tug escort program for the inlet. Unocal and Tesoro Alaska Inc. generate the most inlet tanker traffic and so would end up footing the bill.

Barrow contended that requiring such a program would cut into his company's exploration budget, shortening the life of Cook Inlet's already marginally profitable fields.

"There will be that much less money for exploration," he said. "Because there is less investment, production will decrease sooner."

Barrow predicted that if the Coast Guard requires the tug escort program, the industry's 1,500 jobs in the area would be in serious jeopardy.

"These people are threatened by this issue," Barrow said. "It isn't just a Unocal issue."

Bill Stamps, chairman of the Kenai Peninsula chapter of The Alliance, a group of oil industry supporters, attended the chamber meeting in Nikiski. He said that the speech was designed to warn residents about what Barrow sees as an "economic danger" for the area.

"It will take money away from the community," Stamps said. "It's pretty grim."

According to Stamps, the audience was very receptive to Barrow's opinions. "He received 100 percent support," Stamps said. "Oil companies are 100 percent against tug escort service."

Other private and governmental groups, however, like the Kenai Peninsula Fishermen's Association, the United Cook Inlet Drift Association, the state Department of Environmental Conservation and the Cook Inlet Regional Citizens Advisory Council, have pushed for approval of the program.

Last Monday, Ken Castner, a Cook Inlet setnetter, represented numerous fishing groups in Washington, D.C., at the Coast Guard's last public hearing on the topic.

The fishing groups have said they may be willing to compromise on the issue and just ask for a tug to be on standby in case of a tanker problem.

But Barrow claimed that Cook Inlet Spill Prevention & Response Inc. (CISPRI), the industry-funded cooperative in Nikiski that responds to oil spills, already has a boat that could be used as an escort in case of an emergency.

"They have a response vessel," Barrow said. "We don't see a need beyond what CISPRI already has."

Bill Stillings, general manager of CISPRI, agreed with Barrow. "Since 1989 we have had a vessel in Cook Inlet that is capable of assisting tankers," he said. "We don't believe in an escort system. They're more of a hindrance than a help."

CISPRI's spill-response vessel, the 204-foot Banda Seahorse, is "very comparable" to tugs that the Coast Guard may require, according to Stillings. The Seahorse is able to pull as much weight as the tug escorts in Prince William Sound, he said.

Fishers have said that the Seahorse is moored too far away to help tankers with problems throughout the entire inlet.

According to Barrow, there has yet to be a situation in the inlet that couldn't be solved by existing equipment. "There has not been a tanker incident where a tanker escort would have been helpful," Barrow said.

Stillings agreed. "All the incidents have been taken care of" with the Seahorse, he said.

The public has until Feb. 13 to comment on the tug issue. Letters may be mailed to: Executive Secretary, Marine Safety Council (G-LRA), U.S. Coast Guard Headquarters, 2100 Second Street SW, Washington, D.C., 20593-0001.

The Coast Guard will disclose in April whether tankers in the inlet will be required to use tug escorts.

EXHIBIT C PAGE 1 OF 1

Valdez
Tatitlek
Eyak
Chenega Bay
Seward
Port Graham
Nanwalek

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(907) 562-4155 • FAX (907) 563-2891

Chugachmiut

Environmental Protection Consortium

Promoting a Healthy Environment for the Chugach Region

Chugachmiut Environmental Protection Consortium
Resolution No. 95-02

A resolution opposing the proposed Outer Continental Shelf Lease Sale 149.

WHEREAS The Chugachmiut Environmental Protection Consortium is a tribal organization designed to facilitate the development of tribal environmental health and protection programs: and

WHEREAS The Chugachmiut Environmental Protection Consortium includes representatives of federally recognized tribes in the Chugach Region in south central Alaska: and

WHEREAS The Chugachmiut Environmental Protection Consortium supports the protection of the subsistence way of life for all Alaska Natives and of species upon which local Native communities depend for subsistence: and

WHEREAS Alaska Native village residents harvest an average of 260 lbs per person per year of subsistence foods from Cook Inlet, and

WHEREAS Maintaining a clean, healthy environment in Cook Inlet is essential to the subsistence lifestyle of Chugach Region villages: and

WHEREAS Recovery from disasters associated with oil development, such as the Exxon Valdez Oil Spill, is very slow as indicated by the 5-year ban on harvesting clams from beds near Port Graham following contamination by this spill: and

WHEREAS There is no guaranteed protection of subsistence species, other wildlife and the environment when oil or gas development is present: and

WHEREAS The Cook Inlet is an area of significant ecological, economic and subsistence value which is incompatible with oil development:

NOW THEREFORE LET IT BE RESOLVED that the Chugachmiut Environmental Protection Consortium is opposed to Lease Sale 149 due to the harm it may cause to subsistence species and the subsistence way of life for Alaska Native villages in Cook Inlet.

SIGNED:

Gary Kompkoff EXPCT
Gary P. Kompkoff, Chair
Chugachmiut Environmental Protection Consortium

DATE: 3/22/95

EXHIBIT D PAGE 1 OF 3

APR 27 '92 09:35 NINILCHIK COUNCIL 9075673313 P.2

NINILCHIK TRADITIONAL COUNCIL

P.O. BOX 39070
NINILCHIK, ALASKA 99639
PH: (907) 567-3313 • FAX: (907) 567-3308

RESOLUTION OPPOSING 5-YEAR OUTER CONTINENTAL SHELF OIL AND GAS LEASING PLAN IN ALASKAN WATERS

WHEREAS, the Ninilchik Traditional Council is the tribal government for the Ninilchik Tribe, and

WHEREAS, the Dept. of the Interior, in its 1992-1997 5-Year Oil & Gas leasing program is proposing to lease approximately 120 million acres of the Beaufort and Chukchi Seas, five large areas in the Bering Sea including areas close to the Pribilof Islands and St. Lawrence Island, a federal-state Cook Inlet sale and an extensive area in the Gulf of Alaska off Yakutat, which represents about 50% of the total acreage offered in the United States, and

WHEREAS, the Cook Inlet is a vital fishing interest for our Tribe in regards to our subsistence activities, and

WHEREAS, an oilspill would devastate our culture, impacting not only the salmon, but other marine life, burds in adjoining wetlands areas, and shore vegetation upon which we depend, and

WHEREAS, the Exxon Valdez oilspill is still having a powerful negative impact on affected areas, including ours, according to latest reports, and

WHEREAS, other more efficient energy resources need to be <u>actively</u> pursued and developed rather than promoting a continuous dependency on oil with its atendant risks,

NOW THEREFORE BE IT RESOLVED by the Ninilchik Traditional Council, that the Council hereby adopts this resolution opposing the Department of Interior's 1992-1997 5-Year Oil & Gas leasing program in Alaskan waters, and

BE IT FURTHER RESOLVED that the Ninilchik Traditional Council request the United States Congress, the President of the United States, and the State legislature to do whatever is necessary in in their power to prevent any and all oil exploration under the 5-Year plan.

Voting For: 5
Voting Against: 0
Absent: 0
Abstaining: 0

S. Oskolkoff Sec/Treas
Ninilchik Traditional Council
April 24, 1992

EXHIBIT D PAGE 2 OF 3

ALASKA FEDERATION OF NATIVES, INC.

1991 ANNUAL CONVENTION

RESOLUTION 91-65

TITLE: OPPOSING OFFSHORE OIL LEASING AND DEVELOPMENT

WHEREAS: the U. S. Congress has examined the issues involved in national offshore oil leasing policy; and

WHEREAS: the subsistence lifestyle and the commercial fisheries throughout coastal Alaska provide the very foundation of local economics; and

WHEREAS: if the proposed Alaskan offshore lease tracts are developed, and a major oil spill occurs, migratory fish, birds, and marine mammal resources of the state, and especially the abundant marine resources of its coastal waters upon which our Native communities depend will be endangered;

NOW THEREFORE BE IT RESOLVED that the delegates of the 1991 Annual Convention of the Alaska Federation of Natives, Inc. urge the U. S. Congress to oppose offshore oil leasing and lease tract development off the coast of Alaska.

SUBMITTED BY: Bristol Bay Native Association

COMMITTEE RECOMMENDATIONS: Do pass

CONVENTION ACTION: Passed

EXHIBIT D PAGE 3 OF 3

ALASKA FEDERATION OF NATIVES, INC.

1991 ANNUAL CONVENTION

RESOLUTION 91-65

TITLE: OPPOSING OFFSHORE OIL LEASING AND DEVELOPMENT

WHEREAS: the U. S. Congress has examined the issues involved in national offshore oil leasing policy; and

WHEREAS: the subsistence lifestyle and the commercial fisheries throughout coastal Alaska provide the very foundation of local economics; and

WHEREAS: if the proposed Alaskan offshore lease tracts are developed, and a major oil spill occurs, migratory fish, birds, and marine mammal resources of the state, and especially the abundant marine resources of its coastal waters upon which our Native communities depend will be endangered;

NOW THEREFORE BE IT RESOLVED that the delegates of the 1991 Annual Convention of the Alaska Federation of Natives, Inc. urge the U. S. Congress to oppose offshore oil leasing and lease tract development off the coast of Alaska.

SUBMITTED BY: Bristol Bay Native Association

COMMITTEE RECOMMENDATIONS: Do pass

CONVENTION ACTION: Passed

EXHIBIT D PAGE 3 OF 3

TAG-01
Section IV.A.3.c discusses the EVOS shoreline weathering adjacent to the Sale 149 Area. State, Federal, and Exxon investigators did not report crude oil from the *Exxon Valdez* soaking the shoreline and the ocean floor. Rather, these studies indicate that less than 5 percent of the oil reached this area, and it was weathered, emulsified, and viscous in nature, limiting subsurface migration.

TAG-02
The 1994 EVOS Trustee Council's Status Report states the following in the Conclusion: "Five years after the spill, Trustee Council-sponsored research has documented the severe immediate impact of the *Exxon Valdez* oil spill on vulnerable species and communities of the Alaska marine ecosystem. Many of these are well on their way to recovery or have already recovered. However, other parts of the ecosystem have not recovered. It is still unclear when full recovery will be achieved."

Differences between the effects of the EVOS in Prince William Sound and the Sale 149 area (lower Cook Inlet) are addressed in the responses to Comments TAG-01 and TAG-08. These differences indicate recovery rates in Cook Inlet generally may be greater than in Prince William Sound.

TAG-03
The EVOS Trustees Council's 1994 Status Report notes that the lower and middle intertidal zones appear to have recovered to a large extent and states: "There are strong indications that by 1993 the upper intertidal zone, especially on rocky sheltered shore, had begun to recover. Full recovery of the intertidal community may take more than a decade, since it may take several years for invertebrate species to return after *Fucus* has recolonized the area."

Estimates of the extent oil from the *Exxon Valdez* spill covered beaches in the affected area are summarized in the response to Comment TAG-08. The characteristics of the oil that accumulated on beaches in and adjacent to the Sale 149 area are described in Section IV.A.3.c of the EIS; the subsequent weathering characteristics of this oil also are described in Section IV.A.3.c. These considerations leads us to believe the oiling of the intertidal areas of Cook Inlet and the Shelikof Strait were not as extensive as they were in Prince William Sound, and that the oiled areas in Cook Inlet and Shelikof Strait probably would have a faster recovery rate than similar areas in Prince William Sound.

TAG-04
While it is too early to tell if recovery is beginning for pink salmon, there are some encouraging signs. In 1993, the rate of egg mortality had dropped to an average of <25 percent in oiled streams, compared to <15 percent in unoiled streams. In addition, the 1994 return of hatchery and wild pink salmon to Prince William Sound resulted in the second highest harvest on record, although counts of wild stock returns were below average. The status of recovery is unclear at this time, and it will take several more years of study before a final determination of pink salmon recovery can be made.

A discussion of sockeye salmon overescapement in the Kenai River in 1987-1989 has been included in the text in Section IV.B.1.c.

Although herring runs declined right after the spill, it is not possible to blame the poor return solely on the oil spill. The decline may be due to natural causes or to some combination of oil spill effects with natural causes. For instance, it is known there was an outbreak of viral hemorrhagic septicemia in herring returning to Prince William Sound in 1993. It is known that previous exposure to toxins can affect the immune system of fish, making them more susceptible to disease, but without an accurate estimate of level of exposure, it is not know if the spill contributed to this outbreak. In addition, McGurk (1992) concluded that despite the large volume of oil released in the spill, herring eggs and larvae were not exposed to sufficiently high concentrations of water-soluble hydrocarbons to affect their ability to survive in a natural environment. Finally, although biomass was low, herring were observed spawning in more areas in 1995 than in 1994. Biologists noted that the decline in herring biomass, although serious, was not as drastic as some feared, and may suggest moderately successful harvests will be possible in future years.

TAG-05
The reference to a higher proportion of carcasses of sea otters in their prime apparently refers to the years 1990 and 1991. The 1995 status report provides no additional information on sea otters. The FEIS for the *Exxon Valdez* Oil Spill Restoration Plan (1994) states that juvenile mortality rates in 1992 and 1993 had decreased dramatically but were still higher in oiled than in nonoiled areas, indicating that these mortality rates may be returning to prespill conditions. What constitutes recovery is uncertain, because there are no population data from 1986 to 1989. Killer whale mortality, recruitment, and recovery are discussed in Section IV.B.1.e.

TAG-06
The number of common murres on the Barren Islands lost to the EVOS was difficult to estimate because there was a lack of accurate information on the population status, nesting success, recruitment, and other population information. This lack of information also made it difficult to determine recovery time for the population assuming large number of adults were lost from particular colonies such as on Nord Island, where low reproductive success was coincidental to the EVOS. The study that predicted that the Barren Island colonies may take several decades to recover from the spill was based on a model that assumed there would not be any natural recruitment from nearby colonies, and it assumed that there were no surplus adult birds to replace those killed by the spill. These assumptions were not substantiated for the Barren Island colonies. In fact, it appeared that not all of the Barren Island colonies suffered high losses due to the EVOS.

TAG-07
The MMS is aware of the quality testing carried out on subsistence foods following the EVOS. A program of testing subsistence foods collected from different parts of the EVOS area was initiated informally among State and Federal agencies, known as the Oil Spill Health Task Force (State of Alaska, Dept. of Fish and Game [ADF&G], 1991). In the findings of the toxicology expert committee for evaluating data related to the consumption of marine subsistence foods, it was reported that based on available data and cumulative scientific knowledge, finfish were safe for human consumption but molluscs should not be collected from areas that are obviously contaminated with oil, because these molluscs "showed the presence of aromatic hydrocarbons in higher concentrations than found in uncontaminated areas but at levels that are not considered to represent a serious health hazard" (State of Alaska, Dept. of Health and Social Services [DHSS], 1990).

According to these findings, there are no feasible tests available to test for or monitor human exposure to aromatic hydrocarbons or other components of crude oil. There also are no established guidelines for acceptable levels of aromatic hydrocarbons in foods. "Aromatic hydrocarbons are ubiquitous. They are present in many foods routinely consumed, including cooked and smoked meats and fish, grains and cereal products, and fruits and vegetables." (State of Alaska, DHSS, 1990) As an example, ". . .two samples of subsistence smoked salmon prepared in a traditional manner contained 8,170 and 22,400 ppb [parts per billion] of total aromatic hydrocarbons, respectively. By comparison, levels of total aromatic hydrocarbons found in finfish thus far are generally very low (less than 15 ppb) and are not significantly greater than in the non-polluted areas tested. Less than 1% of fish tested had levels of total aromatic hydrocarbons slightly in excess of 100 ppb" (State of Alaska, DHSS, 1990).

As a result of the above, villagers were advised to rely on common sense and their own judgement to avoid collecting foods from areas obviously impacted by oil. Individuals also were advised that if food was of doubtful quality due to appearance, smell, texture, or taste, it should not be consumed (State of Alaska, DHSS, 1990). Advice such as this raised concerns locally about making judgmental decisions about the quality of marine subsistence resources, especially the intertidal variety. Such concerns in the case of the EVOS experience were heightened by the need for further research on other subsistence resources, such as crabs, bottomfishes, marine mammals, and terrestrial mammals that feed on marine resources. Continued research through the Oil Spill Health Task Force using fish-bite tests ("bite screening") showed that samples of halibut, gray cod, and red snapper as well as different species of salmon taken throughout the EVOS-impact area in August to November of 1990 were safe to eat (State of Alaska, ADF&G, 1991). In addition, none of the 33 seals and 10 sea lions tested had high levels of hydrocarbons in their meat or livers. Slightly higher levels of hydrocarbons were found in the blubber of some seals that had oil on their skins, but even these levels were so low that they were not considered a health concern (State of Alaska, ADF&G, 1991). Ducks and deer also were tested and found to be well within the range that is considered safe to eat (State of Alaska, ADF&G, 1991).

Continuing research into the quality of subsistence resources was funded by the *Exxon Valdez* Oil Spill Trustees Council and coordinated through the Subsistence Division, ADF&G. As a result of community meetings and discussions, it was decided to test subsistence food samples from the use areas of Chenega Bay, Tatitlek, Port Graham, Nanwalek, Ouzinkie, Larsen Bay, Akhiok, Karluk and Port Lions (State of Alaska, ADF&G, 1993). Field sampling and review of testing was coordinated through the Pacific Rim Villages Coalition, which was the joint undertaking by the village corporations of Chenega Bay, Tatitlek, Port Graham, and Nanwalek and the Chugach Alaska Corporation (State of Alaska, ADF&G, 1993). Mussels, clams, shellfish, and rockfish were the primary resources tested for light and heavy hydrocarbon content. The very low levels of hydrocarbons found in the samples were considered to be the levels likely to have been present in fish and shellfish in the spill area before the spill (State of Alaska, ADF&G, 1993).

TAG-08

The EVOS occurred in the northeastern part of Prince William Sound (PWS) March 24, 1989, and oil from the spill spread throughout areas in PWS, the Gulf of Alaska, Cook Inlet/Kenai Peninsula, Kodiak Island, and Shelikof Strait/Alaska Peninsula. Because of the difficulties in estimating the extent of harm to various areas and their resources, comparing the overall effects of the spill between the affected regions may be limited to general relationships or certain resources. Perhaps one way of comparing the effects between regions is to look at the extent of shoreline oiling between the areas. The 1994 EVOS Trustees Council Status Report notes that oil from the EVOS resulted in significant impacts to shoreline biological communities, particularly in the upper intertidal zone.

The most heavily impacted region affected by the EVOS was PWS (Galt et al., 1991). An estimated 40 percent of the spilled oil affected shorelines inside of the sound; 35 percent of the oil evaporated or was dispersed into the water column in the sound mostly in the first 2 weeks. The amount of oil leaving the sound and entering the Gulf of Alaska was an estimated 25 percent of the spill; the oil began leaving the sound about March 30. As it spreads, weathering changes the character of the oil; in general, it becomes less toxic and more viscous as the lighter components evaporate or dissolve and emulsions form. Only about 10 percent of the oil was transported past Gore Point, and about 2 percent entered Shelikof Strait. Most of the oil passing the Barren Islands was transported into Shelikof Strait and only a small fraction moved into Cook Inlet. The oil that reached the southern end of the Shelikof Strait was in the form of widely separated tarballs. The following table indicates the extent of shoreline oiling from three areas: PWS, Kenai/Cook Inlet, and Kodiak/Shelikof Strait. (Kenai includes those beaches along the southern coast of the Kenai Peninsula facing the Gulf of Alaska.)

Exxon Valdez Oil-Spill Shoreline Oiling

Amount of Oiling	Shoreline Oiling—Miles			
	Initial Oiling (%)	Fall 1989	Spring 1990	Spring 1991
Prince William Sound				
Heavy	209.5 (26.5)	44.9	12.9	---
Moderate	163.4 (20.7)	39.8	28.6	---
Light	270.2 (34.2)	81.2	49.7	---
Very Light	146.5 (18.6)	194.2	169.8	---
Totals	789.6	360.1	261.0	---
Kenai/Cook Inlet				
Heavy	49.4 (9.6)	6.0	1.6	0.0
Moderate	73.0 (14.2)	8.0	4.8	0.7
Light	157.4 (30.7)	15.0	9.9	0.4
Very Light	232.8 (45,4)	52.0	53.4	9.9
Totals	512.5	161.0	69.7	
Kodiak/Shelikof				
Heavy	16.4 (0.8)	0.3	0.4	0.0
Moderate	55.6 (2.9)	1.0	3.2	0.1
Light	201.8 (10.4))	5.0	4.3	<0.1
Very Light	1,669.1 (85.9)	41.0	59.1	6.3
Totals	1,942.7	47.3	67.0	
All Areas				
Spill Totals	3,244.8	568.4	397.7	

The information in the table indicates heavy and moderate oiling of the beaches was more common in Prince William Sound (about 47%) than Kenai/Cook Inlet (about 25%) or Kodiak/Shelikof Strait (about 4%) beaches. Weathering of oil from the *Exxon Valdez* along shorelines adjacent to the Sale 149 area is described in Section IV.A.3.c of the EIS.

The 1995 Status Report of the *Exxon Valdez* Oil Spill Trustees Council Report noted recovery is occurring at different rates for different resources; some resources seem to have fully recovered, others are in significant decline, and some may be in a transitional state. Based on the extent of shoreline oiling, as described above and in the preceding table, recovery rates also may vary from area to area. Again, based on shoreline oiling, the extent of the overall effects of the EVOS in Cook Inlet would appear to be less than in Prince William Sound.

For Sale 149, exploration-drilling activities are estimated to begin in 1997 with the drilling of one to two wells per year; this is 8 years after the EVOS occurred. As noted in Section III.A.5 and IV.B.1.a, the discharge of drilling muds and cuttings from drilling operations would affect a relatively small area during the period of discharges. Furthermore, drilling muds have a very low toxicity—as measured prior to discharge and mixing in the environment.

If commercially recoverable quantities of oil are discovered, the drilling of production and service wells is estimated to begin in the year 2000, 11 years after the EVOS, and production in 2003. As noted in Section III.A.5 and IV.B.1 production discharges would affect a relatively small area during the period of discharge. Furthermore, some of the discharges and/or constituents are less than or within the variability range of other discharges or their constituents from municipalities or industrial processing or natural sources (rivers and streams) (Secs. II.A.5, IV.B.1.a, and IV.B.10.a).

Following the *EVOS*, none of the other activities that might affect the resources of the area and disrupt recovery and interfere with restoration monitoring programs have been stopped—these activities include commercial, recreational, and subsistence fishing; the discharge of municipal wastewaters; oil and gas production in upper Cook Inlet; and marine transport of crude and refined petroleum. The commercial finfisheries include harvesting all five species of salmon, halibut, herring, and pacific cod. The commercial shellfisheries include harvesting tanner crab, razor clams, hardshell clams and mussels, green urchins, sea cucumbers, scallops, octopus, and shrimp. Recreational finfisheries consist mainly of salmon and halibut and the shellfisheries of razor clams and dungeness crabs. Subsistence finfisheries target salmon, while the shellfishes harvested are razor clams, butter clams and cockles, chitons, mussels crabs, shrimp, and octopus.

Between 1989 and 1995, approximately 74 MMbbl of oil have been produced in upper Cook Inlet—this is about 37 percent of the amount estimated for Sale 149.

In addition, measures have been taken or proposed to minimize potential effects on biological resources, including those resources affected by the *EVOS* in areas adjacent to or near the Sale 149 area. The part of the Cook Inlet Planning area near the Barren Islands is not part of the Sale 149 area. Also, three of the four areal deferral alternatives delete additional blocks near the Barren Islands from the Sale 149 area. Two of the four areal deferral alternatives delete blocks in the vicinity of the Cape Douglas area. The Protection of Biological Resources Stipulation states that the Regional Supervisor, Field Operations (RS/FO) may require lessees to conduct a biological survey, if the RS/FO identifies any biological habitats that may require additional protection. The RS/FO may require lessees to relocate the site of operations or modify the conduct or timing of operations to protect the resources. Information to Lessees Number 2, Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans, identifies areas of special biological sensitivity and advises lessees that they have the primary responsibility for identifying biologically sensitive areas in their oil-spill-contingency plans and to provide for specific protective measures. Specific protective measures must be adopted for these areas and for any additional areas that may be identified during the review of exploration plans and development and production plans.

TAG-09

In the Proposed 5-Year Outer Continental Shelf Oil and Gas Leasing Program Mid-1987 to Mid-992, the Gulf of Alaska-Cook Inlet Oil and Gas Lease Sale 114 was scheduled to be held in 1991; in January 1988, MMS published a Request for Interest for Gulf of Alaska-Cook Inlet Sale 114 in the Federal Register (53 FR 2208). On May 17, 1989, the USDOI announced a decision to delay Sale 114 to allow more time to assesses the consequences of the EVOS in Prince William Sound.

The USDOI is required by law to manage the Federal offshore natural gas and oil leasing program on the OCS and one of MMS's primary responsibilities is to manage the mineral resources located on the OCS. The OCS areas are leased; the Federal Government grants to another the right to possess and use it for a specified period of time in exchange for payment. The MMS is responsible for approving, supervising, and regulating operations conducted on a lease.

For spills <1,000 bbl (42,000 gal), the DEIS estimates 49 spills for the base case and 123 spills for the cumulative case. The commenter failed to note that for the cumulative case, 73 of these spills are estimated to come from production in State of Alaska waters and not from production associated with Sale 149. The average size of most of these spills (spills ≥1-<50 bbl) (47 for the base case and 117 for the cumulative case) is <5 bbl. For spills >50 bbl, the average size is estimated to be 160 bbl; for the base case 2 such spills are estimated, and 5 spills are estimated for the cumulative case. These spills are estimated to take place over the 19-year life of the fields.

As noted in the response to Comment TAG-08, the permitted discharges are expected to affect relatively small areas during the period of the discharge. These discharges are not expected to alter any of the habitats supporting EVOS-injured resources in or adjacent to the Sale 149 area. The analysis in Section IV.B of the EIS indicates small (<1,000-bbl) oil spills are not expected to have a significant effect on any of the resources analyzed, which includes a number of species and activities affected by the EVOS. In the unlikely event that a large (>1,000-bbl) oil spill occurred as the result of Sale 149, it would be 14 or 15 years after the EVOS, and those effects have been analyzed in Section IV.B.1.

The Sale 149 measures taken to help minimize any potential environmental damage associated with Sale 149 is noted in the response to Comment TAG-08. Sale 149 is not scheduled to occur until mid-1996 and presently cannot be contributing to further degradation of the of the habitat previously damaged by the EVOS, as noted in the comment. Furthermore, MMS is sponsoring or contributing to environmental monitoring studies and studies associated with the effects of the EVOS; these studies are listed below.

The mission of the Exxon Valdez Oil Spill Trustee Council "is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthily productive world renowned ecosystem while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living." The MMS believes Sale 149 is consistent with the Trustee's stated mission.

Studies in the *Exxon Valdez* affected area that MMS has helped to support:

University of Alaska Coastal Marine Institute:

- A Study of the Adsorption and Biodegradation of Aromatic Hydrocarbons by Marine Sediments (Kasitsna and Jakolof Bays)
- Kachemak Bay Experimental and Monitoring Studies. (invertebrates and algal)
- Defining Habitats for Juvenile Flatfishes in Southcentral Alaska. (Kachemak Bay)

- Microbial Degradation of Aromatic Hydrocarbons in Marine Sediments. (Kasitsna Bay)
- Intertidal and Subtidal effects of Pollution: Assessment of Top Trophic Level Predators as Bioindicators. (Kachemak Bay—River Otters, and pigeon guillemots)
- Interaction Between Marine Humic Matter and Polycyclic Aromatic Hydrocarbons in Lower Cook Inlet and Port Valdez

Cook Inlet Regional Citizens Advisory Council:
1995 Cook Inlet Monitoring Study

Published articles on research relating to the *Exxon Valdez* oil spill that were supported by MMS include the following:

Jayko, K. and M.L. Spaulding. 1989. Application of the ASA Oil Spill Model to the *Exxon Valdez* Spill. In: Twelfth Annual Arctic and Marine Oilspill Program Technical Seminar. Calgary, Alberta, Canada, June 7-9, 1989. Ottawa, Ontario, Canada: Environment Canada.

Kvenvolden, K.A., F.D. Hostettler, J.B. Rapp, and P.R. Carlson. 1993. Hydrocarbons in Oil Residues on Beaches of Islands of Prince William Sound, Alaska. Marine Pollution Bulletin 261:24-29.

Niebaur, H.J., T.C. Royer, and T.J. Weingartner. 1994. Circulation of Prince William Sound, Alaska. Journal of Geophysical Research 99C7:14113-14126.

Payne, J.R., J.R. Clayton, Jr., G.D McNabb, Jr., and B.E. Kirstein. 1991. *Exxon Valdez* Oil Weathering Fate and Behavior: Model Prediction and Field Observations. In: Proceedings of the 1991 International Oil Spill Conference (Prevention, Behavior, Control, Cleanup). San Diego, Calif., March 4-7, 1991. Washington, D.C.: American Petroleum Institute, pp 641-654.

Venkatesh, S. 1990. Model Simulations of the Drift and Spread of the *Exxon Valdez* Oil Spill. Atmosphere-Ocean 28 (1):90-105.

Wolfe, D.A., M.J. Hameedi, J.A. Galt, G. Watabayashi, J. Short, O'Claire, S. Rice, J. Michel, J.R. Payne, J Braddock, S. Hanna, and D. Sale. 1994. The Fate of the Oil Spilled from the *Exxon Valdez*. Environmental Science and Technology 2813:561A-568A.

TAG-10
The MMS believes Sale 149 is consistent with the EVOS Trustee Council's mission as noted in the response to Comment TAG-09. Comments regarding recovery and restoration are addressed in the response to Comments TAG-01 and TAG-08. The comments of the National Park Service have been addressed in the response to Comment NPS-01.

TAG-11
The MMS recognizes recovery from the EVOS is a continuing process and, as noted in the response to Comment TAG-09, is contributing toward studies associated with some of the affected resources. The MMS does not believe the planned and permitted activities associated with Sale 149 will affect the recovery of the resources affected by EVOS. Oil spills are accidents and, as noted in Section IV.A.4 of the EIS, MMS has established stringent requirements for oil-spill prevention and response and employs an inspection program to ensure industry compliance; the petroleum industry uses state-of-the-art technology for prevention equipment and the most current operating procedures while conducting operations on the OCS. A large oil spill causes significant environmental damage and although the probability of such a spill occurring as the result of Sale 149 is estimated to be 27 percent, the effects of an assumed spill are analyzed.

Furthermore, those human activities that were being conducted in the area prior to the EVOS have continued, as noted in the response to Comment TAG-08. The five critical issues the Kenai Peninsula, Kodiak Island, and Lake and Peninsula Boroughs wanted addressed (Tri-Borough Position Paper) in the lease sale environmental impact statement and in the terms and conditions in any proposed Notice of Sale did not mention recovery from EVOS; please see the response to Comment PG-03. As noted in the response to Comment TAG-09, the MMS believes Sale 149 is consistent with the *Exxon Valdez* Oil Spill Trustee Council's mission.

TAG-12
In October 1994, the USEPA, Region 10, commenced Clean Water Section 309(g) administrative penalty actions against 18 oil and gas exploration, development, and production facilities located in Cook Inlet, Alaska, for the period 1989 to 1994. Permittees are required to submit to USEPA and the Alaska Department of Environmental Conservation a Discharge Monthly Report. The information in these reports includes the specified characteristics of the permitted discharges. (There is a 5-year statute of limitations regarding violations of discharge permits; thus violations prior to 1989 could not be part of the administrative penalty actions.) These actions were initiated by an investigation by USEPA of these facilities' compliance records for the past 5 years. A total of 827 violations were cited covering a 5-year period for the 14 platforms, 3 production facilities, and 1 tank farm—all located in upper Cook Inlet.

Failure to make the required observation or take the required samples and report the results accounted for 320 violations. The NPDES permit requires weekly measurements of the pH in the produced waters and, during the 1989 to 1994 period, the total number of measurements required is estimated to be over 2,000. Failure to sample the pH in the produced waters resulted in 150 violations; the NPDES permit limits the pH in the produced-waters discharge to 6 to 9. During the 1989-1994 period, the pH in the produced-water discharge exceeded the limit 9 times and in well fluids 14 times. In the Cook Inlet Discharge Monitoring Study (September 1988-August 1989) (EBASCO Environmental, 1990), the pH in the produced waters as measured in the laboratory, ranged from 6.5 to 8.3.

Failure to observe whether or not there was free oil (indicated by a visible oil sheen) in deck drainage, sanitary and domestic wastes, and other discharges (not including produced waters) during the 1989-1994 period occurred only five times. The NPDES permit requires free oil to be (1) measured daily for domestic wastes, and there is to be no visible sheen, and (2) measured once per day for continuous discharges or once per discharge for intermittent discharges and there is to be no free oil—a visible sheen indicates the presence of free oil.

Exceeding permit limits for the sanitary and domestic wastes discharges accounted for 169 violations; residual chloride limits were exceeded 29 times, biological oxygen demand 61 times, and total suspended solids 79 times. On 13 occasions, there was a failure to observe or sample for the constituent.

Oil and grease content in the produced waters is to be measured weekly, and the limit for all but one of the platforms is 72 mg/l (Tyonek is 20 mg/l); however, the monthly average of the weekly discharge measurements for each facility must not exceed 48 mg/l (Tyonek is 15 mg/l).

The NPDES permit requires weekly measurements of the oil and grease in the produced waters and, during the 1989 to 1994 period, the total number of measurements required is estimated to be over 2,000. There were 31 instance where the content of oil and grease in the weekly measurements exceeded the discharge limit and 9 instances where the monthly average was exceeded; failure to observe occurred 8 times. The USEPA counts each time the monthly average is exceeded as 30 violations; thus the 9 actual violations of the monthly average are counted as 270 violations. In the Cook Inlet Discharge Monitoring Study (September 1988-August 1989) (EBASCO Environmental, 1990), the oil and grease in the oil production facilities ranged from about 3 to 130 mg/l.

Perhaps some appreciation of the relative significance of the oil and grease discharge violations might be indicated from the following example. Platform Baker was cited for 11 violations of exceeding the 72 mg/l limit, and the Trading Bay Production Facility was cited for 3 violations. In 1990, the average produced water discharge from Baker was about 30 bbl/day and from Trading Bay Production Facility 115,000 bbl/day (AOGA, 1991). In the Cook Inlet Discharge Monitoring Study (EBASCO Environmental, 1990), the mean amount of oil and grease in the produced-water discharge from Baker was 34.0 mg/l and from the Trading Bay facility 36.0 mg/l. Based on these rates, Baker might discharge about 0.02 lb of oil and grease daily and Trading Bay about 84 lb.

The MMS disagrees with the commenter's statement in the last paragraph: "This pattern is almost certain to continue in the expanded operations proposed in Lease Sale 149." As noted in Section I.C, MMS will conduct NPDES permit compliance inspections in conjunction with its inspections of postlease operations, as authorized under the OCS Lands Act. The MMS may suspend or temporarily prohibit production for failure to comply with applicable law or provision of a lease or permit (30 CFR 250.12). In the analysis of the effects of petroleum development, MMS assumes that all operations will be conducted in compliance with applicable laws, regulations, and provisions of leases and permits. The analysis of the effects of Sale 149 does consider the effects permitted discharges will have on water quality and the environment.

TAG-13
The Alaska Department of Environmental Conservation (DEC), Tesoro Alaska Petroleum Co., and Unocal Corp. (Chemical and Mineral Div.) have jointly monitored air conditions at and adjacent to these facilities since 1989. Both Tesoro and Unocal currently are in compliance with National Ambient Air Quality Standards—neither have been issued a USEPA Notice of Violation in the past. In accordance to its agreement with Trustees for Alaska, Tesoro has reduced its sulfur-dioxide emissions as well as other air pollutants. According the DEC Unocal, in 1994, increased air flow in its drill towers to a level that was previously approved, thus not requiring a PSD review.

TAG-14
Sections IV.B.1-10.n of the Sale 149 EIS adequately assess the potential effects of the potential discharges of pollutants on air quality. Federal and State statutes and regulations define air-quality standards in terms of maximum allowable concentrations of specific pollutants for various averaging periods.

The USEPA-approved Offshore and Coastal Dispersion (OCD) model was used to calculate the effects of pollutant emissions due to the proposal on onshore air quality. Because the Class I PSD areas allow for the least amount of degradation, the modeling scenario (i.e., source location) chosen for this analysis is the one that results in the maximum potential effect to the air quality of the designated national wilderness area of the Tuxedni National Wildlife Refuge, the only Class I area adjacent to the proposed sale area. Under Federal and State of Alaska PSD regulations, a PSD review would be required due to the estimated annual uncontrolled NO_x emissions for the peak-development year would exceed 250 tons per year. The lessee would be required to control pollutant emissions through the application of Best Available Control Technology to emissions sources. Table IV.B.1.n-2 shows the model estimated pollutant concentrations and compares them with the PSD increments and the national ambient-air-quality standards. The OCD model air-quality analysis performed for air pollutants emitted for exploration, development, and production under the Alternative I base case showed that maximum NO_2 concentration, averaged over a year, would be 0.19, 0.51, and 0.14 $\mu g/m^3$, respectively, at the shoreline; 7.6, 20.4; and 5.6 percent, respectively, of the available Class I increment for NO_2; and .76, 2.04, and .56 percent, respectively, for Class II. (Other pollutants also were modeled; however, NO_2 had the highest concentrations, which were well within PSD increments and air-quality standards.) The existing air quality would be maintained by a large margin.

TAG-15
The USEPA, and the Alaska DEC, as delegated by USEPA, are charged with administering the Clean Air Act, as amended. Contrary to the statement of the commenter, both the USEPA and DEC have demonstrated their responsibilities through continued monitoring, documentation and enforcement procedures. With regards to citizens having limited access to air-quality information, the MMS suggests the commenter directly contact both the USEPA and DEC with their request. Both agencies have willingly worked to provide information similarly requested in the past.

TAG-16
A discussion of the practices and effects of onshore oil and gas development on the Kenai Peninsula would not contribute to the analysis of the effects of Sale 149. Such a discussion probably would not add any additional information that isn't already known to members of the environmental community or other concerned/interested members of the public. Most of the oil and gas fields on the Kenai Peninsula were discovered in the late 1950's and early 1960's and drilling and producing technologies and practices and discharge procedures have changed since the development of these fields. Furthermore, the Kenai fields were developed under regulations that were in effect at that time. Many of these regulations have changed in response to new laws written in response to environmental concerns. The comment fails to note that efforts have been undertaken to remedy past oil and gas development activities on the Kenai Peninsula and that Greenpeace, accompanied by TV crews, visited one of the cleanup sites in July of 1994 (Alaska Journal of Commerce, July 15, 1994). The MMS works with other Federal agencies and State and local resource agencies to ensure safe development of petroleum resources. The onshore handling of waste discharges is governed by State and local regulations and subject to NPDES discharge permits.

TAG-17
Tanker safety and whether or not tugs should be used to escort tankers in Cook Inlet is the responsibility of the U.S. Coast Guard. The National Ocean Service of the National Oceanic and Atmospheric Administration has proposed the Prince William Sound and Cook Inlet Navigation Safety and Efficiency Project to work jointly with the U.S. Coast Guard to identify issues and design solutions associated with navigation safety and pollution prevention.

The comment statement "the industry has similarly resisted a five cent per barrel tax being paid into a spill prevention and response fund" does not represent the industry's inability to afford environmental protective measures nor its inability or unwillingness to comply with environmental laws. As reported in the news media, one of the reasons the industry was opposing paying into a spill-prevention and -response fund was that the Alaska Legislature was using the fund to support projects that, in the industry's opinion, were not related to spill prevention and response. The industry has and is continuing to implement measures to comply with existing laws and regulations. Implementing these measures is one of the "costs of doing business," which ultimately is paid for by the users of the products or services.

Changes in operating procedures and prevention and accident response strategies to comply with changing regulations is an ongoing process. Changes that have significantly improved the oil-spill-response capabilities in Alaska in response to The *Exxon Valdez* oil spill and the Oil Pollution Act of 1990 are an example of modifications that are being made in response to concerns about oil-spill-cleanup capability and new legislation. Spill-response plans for these operations recently were reviewed and received both Federal and State of Alaska approval. The approval indicates that industry has met both State and Federal spill-prevention and -response planning requirements for the area, taking into account the potential risk of a spill, industry's response capabilities, the potential adverse effects should a spill occur, and all the mitigating measures in place to compensate those who might be damaged should a spill occur. As a result of these efforts, there is additional response equipment, more trained response personnel, new performance standards that must be met, more citizen involvement, and an improved cooperative effort between responders and regulators. Several additional measures currently are being evaluated.

TAG-18
Please see the text changes made in the cumulative case (Sec. IV.B.12.k). These changes take into account social impacts from prelease and postlease planning processes and the EVOS context within which such impacts must be considered. Results of post-EVOS research conducted by the ADF&G Subsistence Division under contract with MMS was added to the cumulative case, with a discussion of the lasting consequences of oil spills. Please also see the response to Comment TAG-07 with regard to human health factors. This addresses the issue of human health factors relative to the consumption of subsistence resources affected by the EVOS. The finding here was that finfish and some shellfish were considered safe to consume in the year following the spill. By 1993, the very low levels of hydrocarbons found in the samples were considered to be the levels likely to have been present in fish and shellfish in the spill area before the spill (State of Alaska, ADF&G, 1993).

In government-to-government relations, MMS has tried to work with all the various levels of government; whether they are community, borough, tribal or Native village, State or province, or Federal; in an equitable and consistent manner. The MMS has sought and will continue to seek meetings with all Native communities and governments, tribal leaders and elders, and regional and village corporations in the areas adjacent to the OCS planning areas. As noted in Section I.F, MMS is continuing to identify ways to improve the input from all Alaskan residents, not only in commenting on official documents, but also contributing their knowledge to the scientific and analytical sections of the EIS.

TAG-19
The deeper meaning of the EVOS was well represented, for example, by the speech prepared for the Oiled Mayors conference in June 1989 by Mr. Walter Meganack, Sr., then Chief of the Native Village of Port Graham, "Coping with the Time When the Water Died" (Anchorage Daily News, August 5, 1989) and the radio broadcast prepared in Homer entitled "Poisoned Waters: Alaska Natives and the Oil Spill" (Kernes, no date). There was no intent to deny the deeper psychological and spiritual consequences of the EVOS on Alaska Native people. Please also see the response to Comment MAB-04.

TAG-20
Please see the text changes made in the cumulative case (Sec. IV.B.12.k). These changes take into account social impacts from prelease and postlease planning processes and the EVOS context within which such impacts must be considered. Results of post-EVOS research conducted by the ADF&G Subsistence Division under contract with MMS was added to the cumulative case, with a discussion of the lasting consequences of oil spills.

TAG-21
The MMS initiated research on impacts to subsistence and quality of life in southcentral Alaskan communities soon after the EVOS. The ADF&G Subsistence Division was contracted to carry out the research. Study communities in the area affected by the EVOS included Chenega Bay, Cordova, Tatitlek, and Valdez in the Prince William Sound area; Kenai, Nanwalek, Port Graham, and Seldovia in the Cook Inlet area; Akhiok, Karluk, Kodiak, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions in the Kodiak Island Borough; and Chignik Bay and Chignik Lake in the Lake and Peninsula Borough (Alaska Peninsula). Fieldwork took place in 1992, 1993, and 1994. Results of the research published by MMS in March 1995 are summarized in Sections III.C.3 and III.C.4, and are incorporated into this FEIS.

TAG-22
Please see the response to Comment MAB-04. An additional category of prelease-sale effects-causing agents and their impacts has been added to all sections on sociocultural systems in all alternatives and the cumulative case in this FEIS.

TAG-23
The effects of Sale 149 on the lifestyles of Kenai Peninsula communities are addressed in the responses to Comments MAB-04 and MSO-07.

There is not a 27-percent chance of a spill harming sociocultural systems in Kenai Peninsula communities. For purposes of analysis the EIS assumes spills will occur based on statistical trends. There is a 27-percent chance of one or more spills ≥ 1,000 bbl occurring for the base case. This statistic does not relay any information about the size of the spill or what resources or systems an oil spill may contact. An oil-spill-trajectory model is used to estimate contacts to environmental, social, and economic resources.

TAG-24
The comment regarding Kenai Peninsula subsistence lifestyles is addressed in the responses to Comments MAB-04 and MSO-07.

There is not a 27-percent chance of a spill harming subsistence resources. For purposes of analysis, the DEIS assumes, spills will occur based on statistical trends. There is a 27-percent chance of one or more spills ≥ 1,000 bbl occurring for the base case. This statistic does not relay any information about the size of the spill or what resources an oil spill may contact. An oil-spill-trajectory model is used to estimate contacts to environmental, social, and economic resources.

TAG-25
Please see Section I.F and the response to Comment TAG-21.

TAG-26
The MMS must comply with existing statutes, laws, and treaties and any applicable court decisions regarding land status and boundaries in lease-sale offerings and leasing decisions. It is the position of the Department of the Interior that OCS lands are under the jurisdiction of the

U.S. Government, and that the Alaska Native Claims Settlement Act extinguished any existing aboriginal title to those lands. (The village of Chickaloon is specifically mentioned in the comment and, for the benefit of the reader who is not familiar with the geography of the Cook Inlet region, the village is located on the Chickaloon River, about 70 miles northeast of Anchorage and about 150 miles from the Sale 149 area. The Chickaloon River is a tributary of the Matanuska River, which flows into Knik Arm at the northern end of Cook Inlet.)

In government-to government relations, the MMS has tried to work with all the various levels of government; whether they are community, borough, tribal or Native village, State or province, or Federal; in an equitable and consistent manner. The MMS has sought and will continue to seek meetings with all Native communities and governments, tribal leaders and elders, and regional and village corporations in the areas adjacent to the OCS planning areas.

As noted in the response to Comment TAG-25, MMS is continuing to identify ways to improve the input from all Alaskan residents, not only in commenting on official documents, but also contributing their knowledge to the scientific and analytical sections of the EIS.

TAG-27
Please see the response to Comment MAB-04.

TAG-28
Please see the response to Comment MAB-04.

TAG-29
We believe that the referencing in the Sale 149 EIS to the analysis of energy alternatives done for the entire OCS program, USDOI OCS Comprehensive Program for 1992-1997 (Comprehensive Program) EIS, is particularly appropriate. The Council on Environmental Quality regulations (1986) implementing NEPA encourages such "tiering from statements of broad scope to those of narrower scope" [Sec. 1500.4(i)].

Understanding the alternative energy consequences for a no-sale action, as in the proposed Sale 149, is most accurately viewed from the program level. By this, the "big picture" describes how the action in one OCS area, as in Cook Inlet, has environmental consequences in other areas. For instance, the Comprehensive Program EIS points out that the no-lease-sale action in Alaska (including the Cook Inlet area) likely would result in increased oil import by tankers to the west coast or Gulf of Mexico, with its attendant, possible oil-spill impacts. No oil imports, under such circumstances, are expected to occur in Alaska itself.

The viability of alternative technologies that may substitute for the energy source lost as a result of the no-sale action is scrutinized carefully in the Comprehensive Program EIS. It is on this basis that no action was determined for the "most likely mix of replacement" alternative energy sources for the Comprehensive Program.

The energy alternative analysis for the 1992-1997 Comprehensive Program EIS was based on the most recent and comprehensive energy analysis available. Since that document appeared, MMS has diligently monitored the energy alternatives literature. Although it is true that interesting and potentially useful technological advances have appeared in the literature, nothing we have seen leads us to change the conclusions reached in the previous program. Among the analysts who look at the full array of energy alternatives and their financial implications, a consensus seems to be that the U.S. and world economies will continue to rely on fossil fuels, especially oil and natural gas, until well into the next century.

The commenters mention the "Supplemental comments of Greenpeace USA and the Natural Resource Defense Council on USDOI OCS Program for 1992-1997 and DEIS, October 1991." These comments, as pertaining to matters in the DEIS, were considered and responded to in the 1992 Comprehensive Program final EIS.

TAG-30
For a response to the comments about the NAS report, please see the response to Comment APH-03.

The Sale 149 draft EIS adequately addresses the potential environmental effects of Sale 149. The OSRA is used to predict oil-spill trajectories and the probability of contacting identified coastal or biological resource areas. The results of physical, biological and social science studies are used to describe and analyze the potential effects of oil, as well as other factors, on the environment; these other factors include noise and habitat alteration and/or disturbance (sublethal and chronic effects of oil and gas activities). The effects of habitat alteration and/or disturbance on bird rookeries; seal-haulout areas; the alongshore migration of fishes; caribou-feeding areas (in Arctic EIS's); and the coastal feeding areas of deer, bears, and river otters are examples of analyses in the nearshore and onshore areas.

The Sale 149 EIS also analyzes the effects of the proposal on the economy of the area, the national and State parks and special habitat areas adjacent to the sale area, and the sociocultural aspects and subsistence harvests of the indigenous people who live onshore in areas adjacent to the proposed sale area.

TAG-31
The cited statements from Homer News, University of Alaska, and the DEIS are in agreement with the data and conclusions from the MMS-funded water-quality study conducted by the University of Alaska, Anchorage, Environment and Natural Resources Institute (UAA, ENRI 1995). The MMS considers this reconnaissance study to be of good quality, and although this research has not yet been submitted to a peer-reviewed journal, its findings are well supported by the peer-reviewed literature for Cook Inlet (e.g., Atlas and Griffiths, 1986; Atlas et al., 1983; Hampton et al., 1986; Hein et al., 1979; Shaw and Wiggs, 1980; Venkatesan, 1988; and Venkatesan and Kaplan, 1982).

The UAA study found low levels of hydrocarbons in water and sediment and a general lack of toxicity attributable to contaminants. The hydrocarbon concentrations found are in the range considered to be indicative of unpolluted environments, and the values found are consistent with both prior and concurrent studies cited in UAA, ENRI (1995).

The emphasis of the study was to measure contaminant levels potentially correlatable to offshore oil and gas development in Cook Inlet and to address issues raised by the PACE (1991) report. The NOAA Status and Trends Program and International Mussel Watch Project are not active in Cook Inlet and are not designed to specifically address offshore oil industry discharge issues. In particular, the mussel-watch approach has been unsuccessfully tried in Cook Inlet and is not recommended for monitoring in Cook Inlet (Hyland et al., 1995). Methods chosen for the UAA, ENRI (1995) study were based on procedures and protocols developed and tested in *Exxon Valdez* spill studies and in peer-reviewed MMS monitoring studies, and on recommendations from MMS and Cook Inlet Regional Citizens Advisory Council monitoring workshops for Alaskan waters.

TAG-32
The commenter is in error. The UAA report cites several peer-reviewed articles that describe

research design and methodology or support results found in this study. Correctly, conclusions of this study itself are derived from the data included in the report and not from other sources. Additional citations in the report are to specific, national standards for procedures such as the American Society for Testing and Materials (ASTM) "Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods." These national standards are peer-reviewed standards.

Furthermore, the UAA report preferentially cites complete Cook Inlet environmental study reports rather than the incomplete study descriptions available in the peer-reviewed literature. Citation to the original source rather than to diverse secondary publications does not demonstrate "poor science and lack of peer review." For example, the report of Shaw (1985) cited in the UAA report has been the basis for at least five peer-reviewed publications (USDOC, NOAA, and USDOI, MMS, 1990). In addition, in Alaska, the Final Report Series for the Outer Continental Shelf Environmental Studies Program, published and distributed by the MMS and NOAA, are generally of greater availability to the public and scientific community than are esoteric scientific journals in which the studies have been summarized.

Twenty-seven initial sampling locations in the UAA study were agreed to by MMS and UAA, based on following criteria:

- reoccupation of stations from prior studies that had pollutant shows or at least finer grained sediments capable of retaining pollutants;
- occupation of stations on both the east and west sides of the central tidal rips;
- occupation of locations suspected of being oiled in the *Exxon Valdez* spill (i.e., Barren Islands);
- occupation of locations in the major depositional areas of Cook Inlet (Kamishak and Kachemak Bays);
- occupation of locations in the general vicinity of upper Cook Inlet offshore oil and gas fields;
- occupation of locations between Anchorage and these offshore oil fields;
- occupation of locations between the oil fields and lower Cook Inlet;
- occupation of locations within the proposed Sale 149 area;
- quality control issues (e.g., need to get bioassay samples to test laboratory within 48 hours of collection); and
- the sea capabilities of MMS launch *RV 1273*.

The last criterion, launch capabilities, eliminated consideration of sampling sites within Shelikof Strait. The resulting, proposed sampling locations were shown in Figure 1 of the UAA report. Of these stations, the six stations in outermost Cook Inlet could not be occupied because of inclement weather during the second cruise. The other 21 stations were occupied, but cobble and hard sand bottoms precluded collection of sediment at 11 of these stations. Alternative, nearby sampling sites with collectable sediments could be found for only 6 of these latter 11 stations—identified as "Alt" for alternative stations, in the UAA report.

These difficulties associated with finding and collecting depositional sediments in Cook Inlet are common to all Cook Inlet sediments studies, as described in both research reports and the peer-reviewed literature. Basically, Cook Inlet is not a depositional environment, with most sediments and pollutants flushed out of the Inlet by currents and tides (Atlas et al., 1983).

The MMS does not agree with the commenter that accepted scientific methods necessarily or even usually requires formal null hypothesis testing. Null hypothesis testing is a concept more necessary and more accepted in the life sciences than in the more quantifiable physical sciences. In particular, null hypothesis has not had a high degree of success in the aquatic chemical literature, which prefers to quantify contaminate levels rather than to convert data into simplified yes/no hypotheses. For the UAA data, there are no apparent trends or contamination levels found that merited further statistical analysis. Concentrations of hydrocarbons found in water and sediment were at low levels, mostly below the level of detection in the water; and in the sediments, at levels the peer-reviewed literature calls pristine.

The commenter has quoted the UAA report out of context. The quote was referring only to one bioassay, the Microtox® test, which has been used as screening test. The suggested "number of [other] assays" were performed as described on pages 92-101. The commenter also has misstated the nature of the bioassays performed. The bioassays used were sensitive-lifestage bioassays and not toxicity tests. As noted by the commenter earlier (TAG-31), it is important to be able to compare the methodologies and data with other studies: such comparison requires use of nationally-accepted protocols—such as ASTM (1990)—and use of standard test organisms. Bioassay measures are not crude and outdated; the commenter has misread the methods section, the sensitive-lifestages bioassays were not based on outdated procedures. Note that "the science of sediment toxicology is very young. The majority of peer-reviewed publications have been published since 1988" (Burton and Scott, 1992).

The MMS agrees that biomarkers may serve as an additional tool to look at early signs of response to chemical pollutants. We currently are funding the study of the possible use and calibration of biomarkers in two Cook Inlet upper trophic- level predators, otters and pigeon guillemots. The results of this evaluation is scheduled to be completed and submitted to the peer-reviewed literature in 1996. The 1995 monitoring program for the Cook Inlet Regional Citizens Advisory Council includes analyses of biomarkers in Cook Inlet fish. The results of this study will be available prior to Sale 149. However, MMS does not anticipate that fish biomarkers will prove particularly useful in Cook Inlet in regard to hydrocarbon pollutants. The PAH levels in Cook Inlet sediment, for all but one outlier replicate in the UAA study, are considerably below lower thresholds for likely biomarker activation in fish.

Multiple biogeochemical studies conducted by the ESP in the 1970's found that sediments in Cook Inlet had the chemical signature of a clean environment despite a decade of oil development in Cook Inlet. The current MMS study resampled stations occupied in the 1970's studies, stations in the vicinity of Cook Inlet oil fields, stations between oil fields and Anchorage, and stations in the two major depositional basins within Cook Inlet. The number of samples collected at the multiple locations were sufficient to detect any significant far-field or Region-wide contamination of Cook Inlet. The additional sampling by MMS in 1993 plus sampling by Cook Inlet Regional Citizens Advisory Council (CIRCAC) in 1993 and 1994 all found no evidence of contaminant accumulation in sediments and waters of Cook Inlet, with Cook Inlet sediments still maintaining chemical signature expected of a clean environment. In addition, for the summer of 1995, MMS will continue to work cooperatively with CIRCAC to collect additional water-quality samples and other environmental data from the Cook Inlet. The finding of a lack of detectable contaminant accumulation in Cook Inlet through three decades of oil-industry development is consistent with peer-reviewed scientific literature, which has found that (1) most of Cook Inlet is a nondepositional environment, and (2) the relatively low contaminant inputs to Cook Inlet are flushed out of the inlet toward Shelikof Strait.

The Fiscal Years (FY) 1996-1997 Alaska Regional Strategic Plan (MMS, Alaska OCS Region, 1995) has added a proposed study to address whether the contaminants flushed out of Cook Inlet are accumulating in significant quantities in Shelikof Strait or outermost Cook Inlet. In addition, the MMS is provided funding to the U.S. Geological Survey to complete additional trace metal analyses on Cook Inlet sediments collected by the UAA, ENRI (1995) study.

The MMS chemical and physical oceanographers disagree with the statement that not enough is known of the physical oceanography of Cook Inlet Planning Area (Cook Inlet and Shelikof Strait). In addition to a multitude of MMS contractor reports and the construction of four circulation models, the peer-reviewed scientific literature has produced at least 45 papers in the last 17 years relating to contaminant transport, persistence, degradation, and physical oceanography for this single, relatively small planning area. This is a high publication rate. For comparison, the Alaska OCS Region provided the National Academy of Science (NAS) a list of 62 papers relating to physical oceanography and contaminants for the three planning areas (Beaufort Sea, Chukchi Sea, and Navarin Basin) reviewed by the NAS and found by NAS to have an adequate information base in physical oceanography.

A single effort to examine physical processes, chemical processes, long-term biological effects, and consequences of those effects on subsistence, commercial, and recreational fisheries would not constitute a "single comprehensive study" as suggested by the commenter, but a long-term environmentsl assessment research program. The MMS has in fact conducted such a long-term comprehensive research program in Cook Inlet since the early 1970's. A completed studies list has been added to Appendix E of the FEIS, ongoing and proposed studies are listed in MMS, Alaska OCS Region, 1995.

TAG-33
The commenter misunderstands the source of hydrocarbon "levels of concern" both in the Sale 149 EIS and in UAA, ENRI (1995). These values were not derived by MMS or UAA, but have been determined by the USEPA and Alaska Department of Environmental Conservation (DEC) to be levels adequate to protect marine biota (USEPA, 1986, 1991; State of Alaska, DEC, 1995). Federal criteria are set at 0.01 of the applicable LC_{50}: no absolute Federal concentration standard exists for hydrocarbons. The LC_{50} is the continuous-flow, 96-hour lethal concentration at which half the organisms die. "Applicable" in this case refers to lifestages of species identified as the most sensitive, biologically important species in a particular location. Equivalent and applicable ambient water-quality standards for marine waters of the State of Alaska are 0.015 ppm (15 micrograms per liter [μg/l]) total hydrocarbons and 0.010 ppm (10μg/l) aromatic hydrocarbons (State of Alaska, DEC, 1995). The UAA, ENRI (1995) found aromatic hydrocarbon concentrations in Cook Inlet were below the limit of detection, or less than 0.01 part per billion (ppb) (0.01μg/l). Thus, Cook Inlet concentrations are at least one order of magnitude less than the commenter's stated threshold for even sublethal behavioral effects.

The commenter's concern about the "level of concern" for salmon being set at 500-1,000 ppb in the water by an MMS study (UAA, ENRI 1995) is based on a misreading. The 500-1000 ppb is not a UAA criteria for water, but a sediment threshold level determined by the National Marine Fisheries Service.

The commenter has misread some aspects of the UAA, ENRI (1995) report in regard to bioassay results. The water from five stations did show statistically significant reduction of *D. excentricus* fertilization rates. However, as explained in UAA, ENRI (1995), only two of the five stations could be considered to show indications of slight (15% lower fertilization) toxicity. The other three stations actually had the highest fertilization rates of any eight stations tested. The two stations exhibiting reduced fertilization were the northernmost stations and had extremely high suspended sediment loads that may have contributed to lessened fertilization rates. The echinoderm larvae from Kamishak Bay had a survival rate of 87 percent, only 9 percent below the control, not 90-percent less than the control. Some of the other bioassay data did indicate some statistically significant but small reductions in bioassay values. However, UAA, ENRI (1995) was unable to identify any consistent trend with different bioassays nor relationship between bioassays and pollutant chemistry. Based on the negligible to low effects found in the bioassays, UAA, ENRI (1995) concluded that the sediments and water of Cook Inlet are generally free from toxicity. The MMS is provided funding to the U.S. Geological Survey to complete additional trace-metal analyses on Cook Inlet sediments collected by the UAA, ENRI (1995) study. These data may provide information on whether trace-metal levels are correlated with the low bioassay effects found.

The value of 958 ng/g PAH in UAA, ENRI (1995) is a single outlier. Replicate sediment samples collected at the same station had zero and 28 ng/g PAH. The PAH outlier also had 4.09 percent organic carbon and probably represents a piece of vegetation (wood or coal) in the sample. The overall average PAH concentration in the sediments in this study, including the outlier, was 36 ng/g. Individual station PAH concentrations (based on summed resolved PAH's— as in the UAA study) in earlier OCSEAP studies ranged up to 445 ng/g and averaged 140 ng/g (Kaplan and Venkatesan, 1985:137). Thus the current average PAH concentrations found by UAA is 4 times lower than that found by OCSEAP.

The CIRCAC Pilot study did not reveal a major petroleum source in the Beluga River sample (Hyland et al., 1995). Mussels had a total PAH concentration of 84 ng/g prior to mooring at Beluga River and a slightly higher, 94 ng/g afterwards. With surviving mussels (overall 23 to 63% mortality in the study) at Beluga River losing weight, this small apparent increase in PAH most likely represents a net loss of PAH rather than gain during the study, when corrected to original weight.

TAG-34
Sea ice is not modeled in Cook Inlet. Sea ice is moved by the wind and the tide in Cook Inlet. The wind and the tides are two of the major components that would move an oil spill. It was assumed that oil would move with the sea ice and the wind and the tide. The sea ice in Cook Inlet generally is not fast ice with the exception of some bays with rivers. Beach ice and fast ice would protect a beach from an oil spill contacting resources in that area. With the exclusion of sea ice in the Cook Inlet, model estimates of contact are conservative because sea ice generally would protect the shoreline from oiling.

The OSRA-trajectory model does not use a 16-knot wind and a 1.8-meter-wave height. These data are used in the weathering model, which is separate from the trajectory model. These data are taken from Brower et al., 1988, and are representative of the average conditions of the area.

Please see also the responses to Comments AK-05 and AK-06.

TAG-35
Please see the responses to Comments UFA-06 and KCN-013.

TAG-36
The Oil-Spill-Risk Analysis study area extends from latitudes 54° 30' N. to 61° 30' N. and from longitudes 147° W. to 159° W. This area includes a portion of the Gulf of Alaska and all of Cook Inlet and Shelikof Strait (see Fig. IV.A.2-1). The MMS believes this is a representative area for modeling the Cook Inlet area and including the elements of its ecosystem. The MMS OSRA also indicates that much of the inlet may be oiled if an oil spill is assumed to occur. The MMS OSRA does not indicate that all of the inlet would be oiled. This is unlikely and has been borne out by the two major spills that have occurred in the inlet. Both the *Glacier Bay* and the *Cephus* spills were in the magnitude of 5,000 bbl, or greater than 200,000 gallons. Neither spill oiled the entire inlet.

Fisheries resources in the upper Cook Inlet are at little risk as a result of oil spilled in lower Cook Inlet (upper Cook Inlet is considered to be the area north of the Forelands and lower Cook Inlet the area south of the Forelands). For combined probabilities, the OSRA estimates a 1-percent chance of one or more oil spills greater than or equal to 1,000 barrels occurring and contacting SS 1 (Sea Segment 1), which is just south of the Forelands. For conditional probabilities, the OSRA estimates a 2-percent chance that an oil spill occurring at T1 (Tanker Segment 1) during either the summer or the winter season will contact Land Segment 37 (the area between the Forelands) within 30 days. The OSRA estimates <0.5-percent chance that spills occurring at other locations would contact Land Segment 37.

The effects of Sale 149 on lower trophic-level organisms is analyzed in Section IV.B.1.b of the EIS. Also, because upper Cook Inlet has significantly more suspended material in it than lower Cook Inlet, there is less plankton in upper Cook Inlet due to the reduced levels of light.

TAG-37
Section III.B.3.a(2), Marine and Coastal Birds, cited a draft publication "Agler B.A. 1995" as "Agler et al., 1994." Agler, B.A. actually is Agler, B.A., Kendall, S.J., Seiser, P.E. and Irons, D.B,. 1994 (1995), *Estimates of Marine Bird and Sea Otter Population Abundance in Lower Cook Inlet, Alaska, during Summer 1993 and Winter 1994.* "Piatt, J.F., 1993," *Monitoring Seabird Populations in Areas of Oil and Gas Development on the Alaskan Continental Shelf,* is the title of a series of seabird-monitoring reports. It is unclear which specific report the commenter has referenced. Agler et al., 1995, has been added as a citation in Section III.B.3.a(2). A more recent report by Piatt and Naslund, 1995, on marine birds in the Gulf of Alaska, Kodiak, Prince William Sound, and Cook Inlet, has been added as a citation in Section III.B.3.a(4).

The recognition of Kachemak Bay as a Western Hemisphere Shorebird Reserve has been added to Section III.B.3.a.

TAG-38
The DEIS does consider chronic impacts on seabirds, Section IV.B.1.d(1)(b), in the discussion of the assumed 47 small spills <0 bbl and 2 spills ≥50 bbl but <1,000 bbl. These small spills are assumed to occur over the life of the oil field and thus are considered chronic pollution. Some reports on chronic pollution in heavy ship-traffic lanes of Europe have speculated that chronic spillage may have more effects than large spills, but such ideas have never been substantiated. The levels of chronic oil pollution in Cook Inlet are very low, as indicated by the water-quality study recently funded by MMS.

TAG-39
The MMS believes the small projected mortality of Stellar sea lions associated with Sale 149 as being additive, but not significantly so, to other factors causing the current population decline. Most of the Stellar sea lion critical habitats in or adjacent to the Cook Inlet Planning Area are located in Shelikof Strait. Although originally part of the Sale 149 area, most of the Shelikof Strait was subsequently deleted from the Sale 149 area. Thus many of the potential source areas of disturbance and discharge near major rookeries and haulouts were eliminated. Also, the risk to Stellar sea lion critical habitats adjacent to the southeastern and southwestern part of the Sale 149 area could be reduced by the deferral alternatives. Alternatives IV, V, VII, and IX defer blocks adjacent to the Barren Islands, and Alternatives VI and VII defer blocks adjacent to Cape Douglas.

TAG-40
Information on the beluga whale population in Cook Inlet is limited. The National Marine Fisheries Service currently is conducting population studies that may provide additional information about the population and their habitat. Most of the population apparently spend the summers in upper Cook Inlet foraging on fish entering the various streams and would not be vulnerable to oil spills or exploration activities during this time. Also, see the response to Comment NL-01.

The occurrence of fin whales in the Kodiak region in summer and winter is noted on page III.B.18. The Kodiak National Wildlife Refuge has documented the presence of fin whales in the Kodiak area, but we question that the importance of the area to the population can be deduced from such a small sample.

TAG-41
There is no evidence that the discharge of permitted substances into Cook Inlet poses a significant health hazard to humans and the environment. Studies to date do not show hydrocarbons from oil and gas production or transportation or from municipal wastewaters are accumulating in the water column, sediments, or benthic biota of Cook Inlet. The discharges authorized in the NPDES permit must be supported by a USEPA determination that the permitted discharge will not cause irreparable harm nor unreasonable degradation to the marine environment; unreasonable degradation to the marine environment includes threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms. Copies of draft permits are available for public review and comment. The EIS does contain a discussion of the various industrial and municipal discharges entering Cook Inlet and an analysis of their effects. A description of some of the characteristics of drilling muds and produced waters is contained in Section III.A.5 of the EIS.

As noted in Section III.A.5.d(2)(c)2), the drilling muds used are practically nontoxic to a variety of organisms before mixing in the water column. These discharges may contain mercury, cadmium, and other heavy metals but, as shown in Table III.A.5-3, so do the rivers and streams that discharge into Cook Inlet. Except for barium, the amounts of zinc, mercury, and cadmium discharged into Cook Inlet from offshore oil and gas exploration and production operations are much less than in the discharges from rivers and streams; the amounts are within the natural variability ranges associated with the discharges. These characteristics are assumed to be representative of other trace and heavy metals as well. Barium in the drilling muds and cuttings is in the form of barium sulphate—a compound with a very low solubility. The effects of drilling muds and cuttings are analyzed in Section IV.B.1 for the base case and Section IV.B.10 for the cumulative case.

As noted in Section III.A.5.d(2)(c)2), Cook Inlet produced waters range in toxicity from slightly to practically nontoxic prior to discharge and mixing. The effects of produced-water discharges are analyzed in Section IV.B.1 for the base case and Section IV.B.10 for the cumulative case.

TAG-42
Please see the response to comment TAG-16.

The regulatory responsibility for ensuring cleanup of contaminated onshore sites on the Kenai Peninsula would, depending on the location of the site or circumstance, belong to several agencies. Basically the Alaska Department of Environmental Conservation (ADEC) has the authority to address any chemical spills in the onshore areas of the Kenai Peninsula. In the Kenai National Wildlife Refuge, the Fish and Wildlife Service, as the agency that manages the refuge, would also be involved. The USEPA, along with ADEC, could be involved in emergency spills or a large spill. There are no Superfund Sites located on the Kenai Peninsula, but if there where, their cleanup would be the responsibility of the USEPA.

TAG-43
The conclusions reached in the EIS assume that all laws and regulations currently in existence are part of the proposed lease sale for analysis purposes. Existing laws and regulations are considered a part of the proposal, and any significant changes to these laws or regulations would be addressed as they may occur. If significant changes to environmental laws occur, they may be addressed at the exploration or development and production stage, as appropriate. The environmental impact analysis does not stop with the analysis of the proposal as a whole but is also applied to any exploration, development, and production plans that are submitted by lessees.

TAG-44
Please see the response to Comment KCN-05.

TAG-45
Section IV.A.5.a describes three spills that MMS believes to be representative of spills in the Cook Inlet, including the Kenai Pipeline East Forelands spill at Nikiski. The MMS has information on spills in Cook Inlet from both DNR and AOGCC in Anchorage and the ADEC in Kenai. Because of the size restraint of an EIS, it is not possible to summarize every spill in Cook Inlet and, therefore, representative examples are chosen.

TAG-46
The MMS believes the description in Section IV.A.4 provides a realistic portrayal of oil-spill prevention (both regulatory and technological) and response measures applicable to the OCS. The regulatory failures was not considered a significant environmental issue to be addressed in the EIS—Section I.D.1. As noted in Section II.H, laws and regulations that provide mitigation are considered part of the Proposal, and their mitigating effects are factored into the environmental-effects analysis. Furthermore, the environmental-effects analysis assumes the lessee complies with existing laws and regulations—the MMS inspection program is described in Section IV.A.4. The specific comment regarding regulatory failures is addressed in the response to Comment TAG-12.

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Indigenous People's Council for Marine Mammals

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17 April 1995

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MMS, Alaska OCS Region
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Anchorage, AK 99508-4302

To whom it may concern:

I participated in the Public Hearing on the draft EIS of the Cook Inlet Oil and Gas Lease Sale #149 on 3 March in Anchorage and made a statement for the record. I have had a bit more time to look at the balance of this document and would like to provide these written comments.

IPC-01

I am concerned when Steller Sea Lions are about to be listed as an endangered species and read that "less than 2 percent of the Gulf of Alaska population is expected to be exposed to disturbance and exhibit adverse effects..." (I-14) "Given the small quantities of potential contaminants likely to be released, and the rapid dilution that would occur following any spill, exposure of sea lions to spilled contaminnats at detectable concentrations is not expected to occur." This is supposed to be a justification to state that the "disturbance and contaminants is expected to be negligible."

I disagree. It only takes seconds to oil a sea lion, or for it to breath in enough fumes from a spill to cause lung damage. The quantity of contaminants it is exposed to in an oiling probably would not cause the animal to be harmed, but this is playing with words and not addressing the issue of chronic exposure to oil field development wastes or an accute exposure due to an oiling from a spill. As a marine mammal no disturbance is allowed by law, not even the "few minutes to tens of minutes, per exposure incident" as stated. There is also no mention of what the total accumulated exposure time may be nor if it would occur during critical pupping times.

IPC-02

Marmot Island and Sugarloaf Island are two major rookeries adjacent to the area where there is expected to be some aircraft exposures. As it is know that such disturbances may cause adults to stampede and the trampling of pups might occur this is not wise management regarding this proposed endangered species.

IPC-03

I recommend that Steller Sea Lions be added to the Graphic 3 as proposed endangered species and significant buffer zones be placed around their known habitat and larger buffer zones be placed around their rookeries. I recommend that the endangered and threatened marine mammal species listed in Graphic 3 be included in Graphic 2 and that buffer zones be allowed these marine mammals as appropriate in regard to the federal laws on harassing animals in their environment. This would particularly impact the southern and western aspects of the proposed sale area.

IPC-04

I recommend the production of a subsistence use map as a graphic. This should include in one designation Alaska Native traditional subsistence use areas for all marine sources (vertebrate, invertebrate, and plant). It should include in a different designation the region occupied by Alaska resident subsistence permits for fishing. There should then be some basic buffer area allowed around these to offer a subsistence protection from possible spills or development degradation of the area.

The concerns I raise are based on the oil industries' admission that they cannot clean up a large spill in rough weather. The public has been told that in calm seas, in warm weather, they can boom and skim, but that for the greatest number of days during a year a spill will move on its own throughout the inlet.

IPC-05

Even in the conservative spill scenario it is calculated that 171 Harbor Seals, two Killer Whales, seven Cook Inlet Beluga Whales, and 353 Sea Otters would die. And the conclusion was that these numbers would be replaced in two years. Harbor Seals is a population that is inexplicably declining at an alarming rate already. The loss of 171 animals directly, indirect impact, and environmental degradation which may take several years to realize, does not calculate out to negligible impact from my perspective.

IPC-06

Add to the concerns regarding marine mammals and endangered species some other natural factors and there is more evidence to make major changes in this draft EIS. There should be a map of currents and tidal action for the lease area. This inlet has the second highest tides in the world with a well known boar tide. I have seen no mention of the impact of these extreme tides in moving any type of industrial spill, on deposition on a large benthic environment as the tide ebbs, or of the possibility of having a wall of water move a large quantity of oil rapidly up the inlet if the timing were such. Neither was there mention of the distribution of oil from a spill in regard to the motion of the ice which forms and moves in the inlet throughout the winter. IPC-06

There was not significant mention of the wind. This inlet is famous for its winds. As oil is driven by surface conditions it would be critical to know the extent and direction of winds in regard to critical habitats and subsistence use areas. A graphic of several wind roses with maximum-average and storm conditions would be helpful for sites along the lease areas. IPC-07

There was minimum mention of seismic concerns. A graphic of the lease sale area showing the major fault lines and land subsidance or lift from 1964 is necessary along with an overlay of proposed pipelines and drill sites. There should be a report from the Alaska Tsunami and Earthquake Center regarding their predictions for the region. To my understanding this area has not had a significant release of energy since 1964 and that the stress that has accumulated is indicative of a pending great (larger than 8 Richter Scale) earthquake for the immediate area. There has been a past record of such a quake every seven years on average. It is now over 30 years since the last big one. This may not be a wise time to be drilling in the inlet. IPC-08

For the first time in memory herring in Prince William Sound had VHS (viral hemorrhagic septicemia) and seals had target lesions in 1993. Many stated that it was due to a stressed environment after the Exxon Valdez oil spill (EVOS). Harbor Seals are declining in record numbers in the Gulf of Alaska. HCH (an organochlorine) in ocean surface water has been reported to be at its highest levels any where in the world in the Gulf of Alaska and Bering Sea. With these as general natural indications of the state of the environment, a lease sale with dubious other impacts does not appear to be at all appropriate at this time. IPC-09

With the impact of the EVOS still being questioned it would be impossible for MMS to ascertain an accurate baseline upon which to measure any deleterious impacts of oil and gas development in the lower portion of Cook Inlet at this time. Without an ability to measure change a draft EIS is an exercise without the significant ability to be proven right or wrong in the future. This is not the proper IPC-10

environment upon which to build a lease sale for development. IPC-10

It is the charge of the Mineral Management Service to provide recommendations on development of the outer continental shelf. From the materials presented in this Draft EIS for proposed Lease Sale 149 it appears that EIS should recommend against such a lease.

There are too many factors which may have been impacted by EVOS. There are too may protected species in the region with marine mammals leading the list. There are too many natural hazards (wind, tide, seismic, ice) in connection with the above environmental concerns. The draft could be made final, but this draft EIS indicates that there should not be a lease sale at this time. I would recommend that MMS cancel this proposed lease sale.

Thank you for this opportunity to comment. I wish I had had the time to review the draft in greater detail and the time to write all of the comments that are pertinent, but with limited time I needed to focus on those items which directly relate to my field of work on marine mammals. I look forward to your response and the final EIS if you proceed with it and the incorporation of the comments you receive.

Sincerely,

Carl M. Hild

Carl M. Hild, M.S.Sci.Mgmt.
Biologist / Planner

IPC-01
There is no evidence that Steller sea lions are disturbed significantly by occasional exposure to auditory or visual factors away from the rookery. Nor is there any reason to believe they would not detoxify small amounts of ingested oil as do other pinnipeds. Other contaminants are expected to be rapidly diluted and not harmful to sea lions. Chronic exposure, though undefined here, is not expected to involve large amounts of contaminants contacting sea lion-concentration areas if it occurs. Minor disturbance "take" may be allowed under an incidental take provision of the regulations. The MMS does not expect disturbance to occur near any sea lion rookeries.

IPC-02
The two sea lion rookeries noted are not expected to be exposed to support aircraft; Marmot Island is far removed from the sale area, and Sugarloaf in the Barren Islands is at least 3 miles from the sale-area boundary.

IPC-03
The range of the Steller sea lion is indicated on Graphic 3, as is the principal Critical Habitat designated by NMFS. The 3-mile buffers described in the text are not included on the map because at the map scale, they would be barely perceptible. Adding threatened and endangered marine mammals to Graphic 2 would result in a cluttered presentation where individual features would be obscured.

IPC-04
All of the subsistence-harvest area maps printed in Section III are community-specific composites for the harvest, usually averaged over several decades of information, of all subsistence resources used by the community in question. This level of generalization is consistent with the degree of specificity capable of being used in Section IV effects assessment.

IPC-05
The harbor seal population is declining and showed no sign of recovery in 1994. Reasons for the decline are not known at this time. Calculating recovery time for the species from the effects of an oil spill is very difficult. In Prince William Sound the number of seals at oiled sites in 1994 remained unchanged from counts conducted shortly after the spill. However, at unoiled sites the population decline that was occurring prior to the spill continued. It is clear that determining the recovery of this species is complicated by factors existing before the spill. It is possible that fewer mortalities would have been attributed to the oil spill had the population been healthy and not already in a decline. The mortality estimate of 171 animals as a result of an oil spill in Cook Inlet calculates out to approximately 6.5 percent of the potentially affected population. The contribution of an oil spill to mortalities is minimal when compared to the natural mortality that is occurring within the population and the possibility that whatever is causing the natural decline in the population may have contributed to the mortality currently attributed to the oil spill.

IPC-06
Figures III.A.2-5 and III.A.2-7 show a schematic of the circulation in Cook Inlet and the estimation of commonly observed tide rips in lower Cook Inlet, respectively. The oil-spill-trajectory simulations are constructed from simulations of tidal, wind-driven, and density-induced flow fields. Also, please see the response to Comment MDM-06.

IPC-07
Winds are discussed in Section III.A.2.b. Figure III.A.2-1 shows average wind speed in the planning area and local towns. Conversions to knots have been included for the reader. Also, please see the response to Comment AK-05.

IPC-08
Cook Inlet is in a region of high seismic activity. The range between great earthquakes in the EIS referred to the interval of great earthquakes occurring in the region, not the frequency of great earthquakes worldwide. Even though a great earthquake may occur in Cook Inlet during the time exploration/production is occurring, proper design criteria should minimize the damage. During the 1964 earthquake, oil facilities at Swanson River suffered no damage, even though the whole area was uplifted several feet.

IPC-09
The statements regarding herring VHS, harbor seal population decline, and the lease sale have been addressed in the responses to Comments TAG-04, IPC-05, and UFA-04, respectively.

IPC-10
Where appropriate, pre- or post-*Exxon Valdez* oil-spill surveys were used to analyze the potential effects of Sale 149; these surveys establish a reference or baseline. The potential effects of Sale 149 are based on discovering and producing an estimated 200 MMbbl of oil; this estimate is based on geological and geophysical information and not on well data from discovered fields in the sale area. The intent of the analysis is to provide an estimate of potential effects if certain activities occur and, in the case of oil spills, as assessment of the risk; they are not a hypothesis to be proven right or wrong in the future. Also, please see the response to Comment TAG-08.

The purpose of the EIS is to provide environmental disclosure, not to make a recommendation. As noted in Section I.A.14, a decision document is prepared that includes a discussion of significant information connected with the proposed lease sale. The decision document provides relevant environmental, economic, social, and technological information to assist the Secretary in making a decision on whether to proceed with preparation of a final notice and, if so, what terms and conditions should be applied to the sale and leases.

Also, please see the response to Comment TAG-08.

KACHEMAK BAY CONSERVATION SOCIETY
P. O. Box 846 • Homer, Alaska 99603

March 20, 1995

RECEIVED
MAR 23 1995
1130am
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region
949 East 36th Avenue, Room 603
Anchorage, AK 99508-4302

Dear Lease Manager:

After reading about the buyback of leases in Bristol Bay and the cancellation of leases in the Chukchi Sea, we are appalled that Lease Sale 149 is going forward for Lower Cook Inlet which suffered extensive damage from the 1989 Exxon Spill and is also an area of special concern. Furthermore, it is surprising that the Gulf of Alaska and the Gulf of Mexico are the remaining national sacrifice areas for offshore oil development. Surely the rich fishing resources of Lower Cook Inlet are of national significance and are worthy of protection from offshore oil development.

Since we have been residents of the Cook Inlet region since 1969 and the Homer area since 1981, we, like most members of our organization, have a very strong attachment to this important area. As we have watched the pollution of the oceans worldwide from oil spills and other environmental disasters and have experienced the heartache of the Exxon Valdez Oil Spill, we have come to realize how important it is to protect Lower Cook Inlet from oil development. Clean water, clean air, and abundant marine resources that are safe to eat are important to our way of life. We do not want these values compromised or mitigated. Communities affected by the Exxon Valdez Oil Spill have not yet even fully recovered from its effects.

We want to see this country achieve its energy independence by encouraging conservation and developing alternative energies rather than continuing its dependence on oil and other polluting hydrocarbons. It really makes no sense to continue jeopardizing the last remaining areas when we have not yet fully explored alternatives. Dependence on oil can be drastically reduced by promoting intensive research into emerging technologies using photovoltaics, fuel cells, and other alternative forms of energy as well as energy conservation. Some oil reserves should be left for the future for as yet undeveloped technologies.

We strongly oppose Lease Sale 149 and urge the federal government to cancel the sale. Some of our concerns follow:

KBC-01

The Clean Water Act is supposed to protect our waters from pollution. However, under its provisions, oil companies are granted permits to pollute. Unfortunately, as we have seen in recent newspaper reports, the drilling platforms in upper Cook Inlet often have not abided by their permits and have discharged more pollution into the Inlet than permits allow. This has occurred in more than 4000 instances according to some monitoring groups. We are concerned about chronic, long-term pollution. What are the effects of such pollution on the marine food web? Studies have been done on acute effects, but the chronic, long-term effects have been dismissed as negligible. Where are the long-term studies to prove this? It is time to consider zero discharge for all rigs in Cook Inlet.

KBC-02

We have strong concerns about the impacts of exploration, development and production. Exploration brings seismic testing which can kill fish and marine mammals. Development and production bring the possibility of accidents and spills as well as the pollution from dumping of drilling muds. We find the 57% risk of a serious spill totally unacceptable. Additional drilling rigs in the Inlet increase the dumping of toxic drilling muds and create possible conflicts with fishermen who use these areas. We also contend that drilling in the lower Inlet likely would bring increased oil-related tanker traffic into Kachemak Bay. Homer residents have fought off oil development in this region since the early 70s when the State bought back oil leases in Kachemak Bay. They also opposed the parking of drilling rigs in the Bay. Homer residents have made the quality of life choice that they do not want to have an oil-related industrial infrastructure located in or near Kachemak Bay, a critical habitat. A lease in lower Cook Inlet would have a major, local impact.

Many people in the lower Inlet still practice a subsistence lifestyle. Some in Homer put out subsistence nets for salmon in the summer. In the villages across Kachemak Bay--Seldovia, Port Graham, and Nanwalek--residents depend heavily on marine edibles for their subsistence lifestyle. Food gathering is a very important part of their culture. Oil development in Cook Inlet threatens this lifestyle.

KBC-03

Another concern is that despite having some of the most treacherous waters in the world in Cook Inlet, we have yet to institute any tug requirements for tankers or any coherent tanker traffic navigational safety plan, a major requirement of the Alaska Oil Spill Commission. No drilling should go forward without addressing this issue. There have been numerous recent incidents in Cook Inlet where tankers have lost power and been disabled. Tankers, drilling platforms, and especially pipelines will be vulnerable to damage from volcanism, earthquakes, and tsunamis. So far we have been extremely lucky, but the odds are against us. Oil leases in lower Cook Inlet increase our chances of suffering another major, devastating spill--a chance we do not want to take! We urge Minerals Management Service to do a major study of the gyres that are present in Cook Inlet. We understand that oil collects in these gyres as does a great deal of marine life. If the spilled oil disappears into these important currents, it will have a drastic effect on the developing marine life in the gyres.

KBC-04

Interestingly, big industries like oil and timber usually tout the development as a jobs opportunity. Those who benefited most from the Exxon Valdez Oil Spill cleanup were often from other states or were a minority of the local population. The reality is that most of the workers in both industries are brought in from Outside, and maybe about 12% of locals will be hired. Most of the new employment will be low-end service jobs. Meanwhile the local communities will experience the growth and have to pay for the required additional services through increased taxes. Most residents do not receive any benefits from these oil leases? In anything, their quality of life declines and their expenses go up. Sociological impacts to a community are very real, but they are rarely addressed by EIS planners. The spill had significant impacts on many coastal communities, and these effects take a long time to correct. An oil lease in lower Cook Inlet would have drastic impacts on Homer. The demographics would change as more oil workers and their families move here. Concomitant problems such as alcohol and drug abuse, domestic violence, child abuse, and increased crime are just some of the social problems that have come in the wake of the oil spill. Potentially, these can come with sudden, increased development and certainly with a high probability of other big spills, we will be severely affected again. Who pays these costs and who benefits? [illegible] royalties. **KBC-04**

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Our local economy is tourist and fishing oriented. Tourists are not coming here to see oil rigs and development. In fact, oil pollution, as demonstrated by the Exxon Valdez Oil Spill, is detrimental to the visitor industry. Many businesses suffered great economic loss in the wake of the spill and are still struggling to recover. We do not want to jeopardize our tourist and fishing economy in the future by developing oil leases in the lower Inlet. Environmental degradation that oil development will bring includes reduced air quality, chiefly from the natural gas flares. Homer and lower Cook Inlet currently have excellent air quality. In contrast the Kenai-Nikiski area which is dominated by the oil industry, is already the most polluted area in EPA's Region 10 because of toxic emissions. The toxic emissions from an oil rig equal a small city. It is not acceptable to us to add the equivalent of numerous small cities' toxic emissions to lower Cook Inlet. There are no guarantees that the oil industry will operate cleanly. The Kenai-Nikiski area has a history of industrial abuses, including illegal dumping, like the Poppy Lane incident, and other pollution problems. **KBC-05**

Prevention and response capability in Cook Inlet is below par. While Nikiski and Drift River are among the most dangerous ports, the Inlet is the only significant shipping area not protected by a large-scale oil spill response organization such as the Marine Spill and Prevention Corporation or Alyeska CISPRI and Alaska Clean Seas, which unfortunately, are inadequate as presently constituted. **KBC-06** We urge you to cancel Lease Sale 149. It is time this nation explore true energy independence by developing clean, alternative energy sources and by accentuating conservation. Homer residents have resoundingly said no to Lease Sale 149. Please honor their request. Thank you for your consideration.

Sincerely,

Nina Faust

Nina Faust, President

Edgar Bailey

Edgar Bailey, Board of Directors

cc Bruce Babbitt

KBC-01

A summary of the permit violations during the last 5 years is presented in the response to Comment TAG-12; it is anticipated that types of violations noted in this group are representative of the other violations. The permit violations involve failure to report a required observation or analysis or exceeding the amount of a substance allowed in a permitted discharge. The types of violations and relatively small quantities of substances involved indicate that the mixing and currents in Cook Inlet would rapidly disperse the discharges, and there would be no measurable effects on the marine food web.

The studies that have been done to determine the effects of petroleum-industry activities in Cook Inlet are summarized in Section III.A.5.c(4)(b) of the EIS.

The wastes generated from offshore drilling during the production activities may be discharged into the marine environment, transported onshore for disposal at permitted landfill sites, or injected or reinjected into subsurface formations. If there are to be no dischargers into the marine environment, alternative disposal methods would have to be used. There currently are no commercial land-disposal facilities in Cook Inlet that are permitted to accept drilling or production wastes. Marathon and UNOCAL jointly operate a site for the disposal of drilling wastes and tank bottoms. The site is 3 miles north of the Trading Bay facility on the west side of Cook Inlet. Because of the shallow waters on the west side of Cook Inlet, only barges can be used to transport the wastes from the platforms to shore; the presence of sea ice in the winter restricts the use of the barges to the summer. The subsurface formations beneath the onshore-treatment facilities are unsuitable for accepting large amounts of produced waters. Because of these and other factors, the USEPA has permitted drilling and production wastes to be discharged into Cook Inlet but imposes limits on the characteristics and constituents of the discharges.

KBC-02

As part of the analysis of the potential environmental effects of Sale 149, MMS uses the following estimates: the chance of one or more spills ≥1,000 bbl is estimated to be (1) 27 percent for the base case based on an estimated resource of 200 MMbbl, (2) 72 percent for the high case based on an estimated resource volume of 800 MMbbl, and (3) 64 percent for the cumulative case. It is not clear in the comment the source of the phrase "87% risk of a serious spill." If economically recoverable quantities of oil are discovered in the Sale 149 area, the 200-MMbbl estimate represents a range (100-300 MMbbl) of resources that are likely to be produced. The high-case estimate represents a quantity oil that is the maximum amount that might be produced; there is, however, a low probability that this amount of oil is present. The cumulative case includes an estimate of oil spills associated with Sale 149 and future production from offshore State of Alaska leases and tanker transport.

If economically recoverable resources are discovered as the result of Sale 149, it is anticipated development would, for the most part, use the existing infrastructure; offshore pipeline(s) would have to be laid to connect the offshore-production facilities to an onshore-loading terminal or refinery.

Seismic operations generally are not injurious to fishes and marine mammals. This issue is discussed in Section IV.B.1.c.5 and Section IV.B.1.e.5 of the EIS.

KBC-03

The concern regarding tug escort for tankers is addressed in the response to Comment TAG-17.

The gyres are semipermanent features whose characteristics depend on the currents and winds. The MMS considers the available information about the circulation in Cook Inlet to be adequate for the purposes of analyzing the potential effects of an oil and gas lease sale and to model the trajectories if an oil spill occurs.

KBC-04

Please see the response to Comment MSO-15 and Section IV.B.1.h., Local Economy.

KBC-05

Sections IV.B.1-10.n adequately assess the potential effects of the potential discharges of pollutants on air quality. Federal and State statutes and regulations define air-quality standards in terms of maximum allowable concentrations of specific pollutants for various averaging periods. The USEPA and the State of Alaska, DEC, as delegated by USEPA, are charged with administering the Clean Air Act, as amended. Contrary to the statement of the commenter, both the USEPA and DEC have demonstrated their responsibilities through continued monitoring, documentation, and enforcement procedures.

KBC-06

Please see the responses to Comments UFA-06 and KCN-13.

KODIAK CONSERVATION NETWORK

Information, Direction, Education, Action

P.O Box 2661, Kodiak, Alaska 99615
Phone: (907)486-4684 Fax: (907)486-7651

April 18, 1995

RECEIVED
APR 21 1995
12:30pm
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

Bruce Babbitt, Secretary
U.S. Department of Interior
1849 C st., NW
Washington, D.C. 20240

Dear Mr. Secretary,

The Kodiak Conservation Network is a grassroots, non-profit organization of 55 members formed as a direct result of the impacts of the *Exxon Valdez* oil spill (EVOS) on our personal and professional lives. Our purpose is to network with other community groups having similar interests in making educated public policy decisions balancing social, ecological and economic concerns. Our members have been actively involved in efforts to develop effective oil spill prevention and response measures in our region, as well as working on community impacts planning for oil spills and developing relevant mitigation strategies.

The Kodiak Conservation Network opposes any oil and gas development on the outer continental shelf (OCS) of Lower Cook Inlet and upper Shelikof Strait, specifically OCS Oil and Gas Lease Sale 149 (OCS 149). The elimination of most of Shelikof Strait from OCS 149 in late 1993 may have reduced the potential acreage available to the oil industry but it did not reduce the significant risk of oil spills to the sensitive habitat areas of the Kodiak Archipelago.

As the distribution of the *Exxon Valdez* oil spill (EVOS) demonstrated, the Kodiak island group acts like a rock in the middle of a stream, the great Alaska Coastal Current. That current eddies around the islands, mixing and depositing nutrients on the continental shelf that flush out of Cook Inlet on second largest tides in the world. This tremendous "biological pump" creates one of the world's richest fishery areas, second only in U.S. production to the eastern Bering Sea, and critical marine habitat central to the entire Gulf of Alaska. This major biological potential continues to be under significant risk from existing oil industry activity, in both Cook Inlet and Prince William Sound, and remains unprotected.

KCN-01

The Draft Environmental Impact Statement (DEIS) on OCS 149 guarantees that there will be another major oil spill resulting from this lease sale. This is absolutely unacceptable. It is the first time that there has ever been a proposed oil and gas lease sale in the center of an oil spill impacted region, especially one that is still recovering from previous impacts. There is an irreconcilable contradiction here when a federal resource Trustee agency is spending $900 million of settlement funds to restore the same region it purposely expects to re-oil in the not-to-distant future. If there is any consensus on oil spill damage it is that restoration cannot occur if there is another oil spill.

KCN-02

Furthermore, the DEIS makes insupportable statements about the potential of oil spill impacts to fisheries resources in the area. First it states that there is a less than 5% probability that an oil spill will "contact specific land or resource segments" (Table II.I-1. Alternative I (Base Case). Fisheries Resources). This statement does not track with the EVOS Trustee Council data that identifies more shoreline oiled by the EVOS in the Kodiak Island Borough (the region directly downstream from the proposed lease sale area) than the entire rest of the spill impacted region.

KCN-03

It goes on to claim that fisheries impacts of another large oil spill (> 1000 bbl) will be "minimal . . .[and] not expected to cause population-level changes". To the contrary, we know that there have been significant population level changes as a result of the Exxon spill to both herring and pink salmon populations in Prince William Sound. There has been a severe depression of even-year pink salmon runs in the Kodiak salmon district, major losses to chum salmon systems south of Cape Douglas on the north shore of Shelikof Strait (directly downstream of the lease sale area), and the elimination of commercial viability for red salmon runs on the south end of Kodiak Island for three years and possibly more.

The EVOS provided field verification for the first time of laboratory studies identifying reproductive impairment in fishes exposed to crude oil in Prince William Sound. Further, pollock tissues samples collected in Shelikof Strait over 300 miles away from Bligh Reef and 15 months after the spill contained identifiable contamination by *Exxon Valdez* crude oil. Correspondingly, the 1994 pollock year class has provided the first evidence of strong recruitment to that Kodiak fishery since 1989. Unfortunately, there have been no long term impact assessment and restoration studies in the Kodiak region to-date so most of this information is anecdotal and cannot be construed as causative.

It is important to note that these are just of few of the species from a richly diverse ecosystem. The full impacts of EVOS will never be scientifically verified.

KCN-04

MMS points out that historically oil spills from offshore platforms have been minimal, but clearly the greater risk that we face is from increased oil transportation though state waters.

Nonetheless, the entire area of this proposed sale is a highly dynamic seismic zone surrounded by active volcanoes. Given major earthquake activity, pipelines will rupture and, under an emergency situation, uncontrolled oil spills will result. KCN-04

This information is confounded by that fact that 5 years after the Oil Pollution Act of 1990 (OPA90) mandated strict oil spill prevention and response measures be put in place, the region remains highly vulnerable to existing oil industry operations. OPA90 provisions requiring the use of local resources and the protection of sensitive habitat have yet to be implemented within either the Cook Inlet or Kodiak region of operation in any meaningful way. Prince William Sound has a world class, state-of-the-art response system but it does not provide either prevention or preparedness outside the Sound. Currently, the adequacy of the Prince William Sound tankers' contingency plan in meeting the needs of the entire EVOS affected region is hotly debated. KCN-05

Given that prevention is the key to minimizing oil spill impacts, KCN is incredulous that the very industry that is proposing this development, and claiming environmentally sound practices, is, at the same time, vehemently opposing the implementation of basic spill prevention measures in Cook Inlet. Cook Inlet is arguably among the most treacherous waters that tankers operate in worldwide, yet it has no mandatory Vessel Traffic System and no tanker escort tugs, standard practices in every other port-of-call in the world. The U.S. Coast Guard is currently considering regulations to implement these safety precautions, but the oil industry in Cook Inlet has launched an extensive, organized campaign to oppose these new regulations. They claim that it is unnecessary and cost prohibitive.

Human factors have been identified as the cause of 80% of all oil spills yet tanker manning levels remain at a minimum to keep payroll costs down. Double-hulled tankers were identified in OPA90 as key to prevention, but the one double-hulled tanker serving Cook Inlet is currently out-of-service. The building of new double hulled tankers for the aging American fleet is also not considered cost beneficial.

Ironically, industry claims that it is not economically feasible to provide basic spill prevention measures in Cook Inlet, and that it is an economic hardship to pay a nickel-a-barrel conservation surcharge to the state's response fund. The logical conclusion is that going forward with further oil development in lower Cook Inlet is not good business for the country, especially when it puts at risk long term, sustainable fisheries and tourism economies of higher value, and providing more jobs, to the communities of the region.

What is most astounding to those of us who are living through the devastation of the *Exxon Valdez* is to be told that a KCN-06

major oil spill can be mitigated. Obviously, our history and experiences have been forgotten in 5 short years. Throughout the DEIS, MMS appears to acquiesce to industry's position that oil in the marine environment is short-lived and of minimal impact, that dispersion and natural biological processes remove most of the oil. MMS has gone so far as to cite unpublished Exxon scientists' reports that did not pass the muster of peer review scrutiny. We are here to testify that oil spills cannot be mitigated but preparedness and response capability are necessary so that something can be done to protect as much as possible. KCN-06

After 4 years of working closely with both Regional Citizens' Advisory Councils on protective measures for our region, the members of KCN were extremely disconcerted to read the oil spill response section of the DEIS. Preparedness and response capability in Cook Inlet and Kodiak is dismal. Limited response equipment is located only in the upper Inlet, north of Kalgin Island. The bigger problem, however, is that you cannot contain, control and cleanup oil spills in high wind, fast current and extreme tide conditions that occur regularly in Cook Inlet along with broken sea ice conditions. The discussion of response capabilities in the DEIS and the description of the use of different types of response tools are very inaccurate and shamefully misleading. KCN-07

The concept of dispersion, both natural and chemical, is repeatedly mentioned in the DEIS as a cleanup tool. Dispersion does not eliminate oil from the environment, nor mitigate the biological impacts of its presence. Furthermore, the adding of addition pollution to an already large pollution problem has questionable benefit. It is true that zones for conditional use of dispersants have been pre-approved by the Alaska Regional Response Team (ARRT), however, the majority of the region potentially impacted by an OCS 149 sale is not pre-approved for dispersant use and the conditions required for approval are prohibitive at best in this area. KCN-08

The same applies for the use of in situ burning. The ARRT has granted conditional approval to burn spilled oil in Cook Inlet, but under the necessary ARRT conditions, it could never be used because of potential air quality health issues for coastal communities. Nonetheless, the DEIS states that burning will be 65 to 90 % effective in removing oil from a broken sea ice condition. Even if conditions changed to allow burning, it is unrealistic and poor judgement to claim that any oil response technique has that high of an efficiency rate given prevailing environmental conditions in the lease sale area. KCN-09

It is even more unacceptable to compare a spill off of Huntington Beach, California with a theoretical spill in Cook Inlet or Shelikof Strait and claim a 69% effective removal rate (the American Trader, p. IV.A.20). It is extremely important in KCN-10 oil spill response to accurately understand your environmental conditions. It does not appear that the people who wrote this section of the DEIS have a clear understanding of the climatic and oceanographic conditions of the proposed lease sale area. KCN-10

Overall, oil spill response capabilities have changed in Alaska since the *Exxon Valdez*, but there is a large gap between what is on hand and our ability to actually prevent major habitat and community disruption due to a large oil spill. Federal and state requirements have no teeth in them to respond to and protect Kodiak and therefore provide lip service to our problems. KCN-11

Furthermore, there is internal contradiction in the Interior Department policy statement in the DEIS and from Department officials that we must go forward with OCS 149 to reduce the U.S. dependence on foreign oil at the same time the Department is pursuing the lifting of the export ban on North Slope crude. It is illogical to be asking the citizens' of Lower Cook Inlet and the Kodiak Archipelago to accept an increased burden of risk of major oil spills to their communities and one of the most productive marine and wildlife areas in the world for the sake of excessive oil consumption nationwide. U.S. dependence on foreign oil does not appear to be the real issue here. KCN-12

Except for Alaska and the Gulf of Mexico, there is a moratorium nationwide on any further offshore oil development. The moratorium was instituted by President Bush because of the concerns of the National Research Council on lack of significant scientific information and from pressure by the more populated states. People were afraid of the potential impacts of oil spills on their coastlines. We don't have to guess about oil spill impacts, we know them firsthand - the people impacts and the environmental impacts.

Please cancel OCS Lease Sale 149 and protect our coastal communities and priceless natural resources from denigration due to oil industry development and certain oil spills.

Sincerely,

Kristin L. Stahl-Johnson
Executive Director

cc: Judith Gottlieb, MMS Anchorage
Cynthia Quarterman, Director, MMS

5

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KCN-01
The Draft EIS on OCS Sale 149 does not guarantee there will be another major oil spill resulting from the lease sale. Based on an estimate of the amount of oil that might be produced, if there is a lease sale and economically recoverable quantities of oil are found, and a historical spill rate, the probability of a spill ≥1,000 bbl is estimated. This estimate is not a guarantee of an oil spill—it only assesses the risk of a spill occurring. As noted in Section IV.A.4 of the EIS, MMS has established stringent requirements for spill prevention and response and employs an inspection program to ensure industry compliance. The purpose of the lease sale is to provide an opportunity to develop those oil and gas resources that may be leased and discovered in the Sale 149 area—not to purposely re-oil the area affected by the EVOS, as suggested in the comment.

As noted in the response to Comment TAG-09, the proposed Gulf of Alaska-Cook Inlet Oil and Gas Lease Sale 114 was delayed to allow more time to assess the consequences of the EVOS.

Also as noted in the response to Comment TAG-09, the mission of the *Exxon Valdez* Oil Spill Trustee Council "is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthily productive world renowned ecosystem while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living." The MMS believes Sale 149 is consistent with the Trustee Council's stated mission.

KCN-02
The analysis of fisheries resources uses combined probabilities that include the chance of a spill occurring as well as the chance of a spill contacting. There is a 27-percent chance of one or more spills ≥1,000 bbl occurring for the base case. The analysis states there is a <5 percent chance of one or more spills ≥1,000 bbl occurring and contacting land segments and environmental resources in the Kodiak region. The OSRA does not indicate that if a spill occurred it would not contact Kodiak. The conditional probabilities, which assume a spill occurs and estimate the chance of a spill contacting from pipelines and tanker segments, range from <0.5 to 10 percent within 30 days during summer and winter for land segments and from <0.5 to 29 percent for environmental resource areas in the Kodiak region. See also the responses to Comments WH-04 and MAB-02.

The Kodiak/Shelikof Strait area did have more shoreline oiled than did the Prince William Sound or Cook Inlet/Kenai Peninsula areas; see the table that accompanies the response to Comment TAG-08. However, the amount of oil on most of the beaches (about 96%) in the Kodiak Shelikof Strait area was considered to be light or very light and about 4 percent heavy or moderate (TAG-09 Table). In Prince William Sound, the amount of oil on about 45 percent of the beaches was heavy or moderate and 55 percent was light or very light. Also, the TAG-09 Table shows that by the spring of 1990 the number of miles of oiled beaches in the Kodiak/Shelikof Strait area had declined by about 96 percent, and by 1991 there were <10 miles of oiled beaches—compared to over 1,900 miles of beaches initially oiled. Also, as noted in the response to comment TAG-08, the amount of oil from the EVOS that washed onto Prince William Sound Shorelines was estimated to be about 40 percent of the spilled volume, whereas it was estimated only about 2 percent of the spilled volume entered Shelikof Strait. Furthermore, the oil contacting the beaches of Prince William Sound had less opportunity to weather than did the oil entering Shelikof Strait. Weathering of oil from the EVOS along shorelines adjacent to the Sale 149 area is described in Section IV.A.3.c of the EIS.

KCN-03
Wild pink salmon constitutes only about 10 to 20 percent of the commercial pink salmon population in Alaska. Most pink salmon are produced by hatcheries and were not affected by the EVOS. Of the wild stock that was affected, there appears to be about a 10-percent increase in egg mortality in eggs that were located in areas oiled by the EVOS. However, since the EVOS, there appears to be no change in the pattern of returning adult pink salmon to Prince William Sound, with some of the highest runs on record. This is not surprising because most commercially caught pink salmon were unaffected by the EVOS. In comparison to the Shelikof Strait area, the wild pink salmon spawning grounds in the Prince William Sound area were exposed to much greater amounts of fresh oil. Hence, it is unlikely that the Shelikof Strait area would experience a greater adverse effect on wild pink salmon than is suspected in Price William Sound. Regarding the alleged losses of chum and sockeye due to the EVOS, we have no data that show any connection of chum or sockeye losses to the EVOS. However, we do know that the much larger sockeye, coho, pink, and chinook runs of Cook Inlet had to migrate directly through the path of the EVOS and suffered no apparent adverse effect.

The observation regarding herring is addressed in the responses to Comments TAG-04 and UFA-01.

KCN-04
All OCS oil and gas facilities—exploration drilling and production platforms and pipelines—must be designed to withstand the environmental conditions in which they operate. The environmental conditions include volcanic eruptions, earthquakes, and tsunamis. Before these facilities can be constructed and installed, the design must be approved by MMS. The MMS may require a third party with expertise in the design and construction of offshore facilities to verify the design. The oil produced from platforms in upper Cook Inlet is brought onshore by pipelines, and these facilities have withstood earthquakes and volcanic eruptions for more than 25 years. If a pipeline ruptures, the flow from the reservoir can be automatically or manually shut off, and only the oil in the pipeline at the time of the rupture will leak into the environment.

Also, please see the response to Comment JC-03.

KCN-05
Industry does provide spill response and implements preventive measures for operations in Cook Inlet. The U.S. Coast Guard and the Alaska Department of Environmental Conservation currently are evaluating the need for additional prevention measures for tanker operations in the area. If new development operations occur as a result of Sale 149, the economics for additional prevention measures may improve. The existing spill-response infrastructure in Cook Inlet has been tailored for the existing offshore production and transportation operations in the upper Cook Inlet area. Future development in lower Cook Inlet may bring additional spill-response resources to this area, which could improve the response preparedness for the entire region. Also, please see the response to Comment UFA-06.

The statements regarding tankers is addressed in the response to Comment TAG-17.

KCN-06
The fate and behavior of oil in marine waters is discussed in Section IV.A.3 of the EIS. This discussion is based on information from a number of sources, including studies sponsored or conducted by the U.S. and Canadian governments; this includes MMS-sponsored studies and those conducted by the U.S. National Research Council.

The information cited in the EIS or has contributed to the study about the effects of the EVOS comes from researchers associated with a variety of public and private institutions—they are not all Exxon scientists, as noted in the comment. These authors represent (1) Federal agencies such as the National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency, the U.S. Geological Survey, and the Fish and Wildlife Service; (2) the State of Alaska, such as the Department of Fish and Game and Department of Environmental Conservation; (3) universities, such as the University of Alaska, Louisiana State University, University of Texas, Woods Hole Oceanographic Institute, University of Washington, and University of Pennsylvania ; and (4) a variety of private research institutions.

Cleanup-response strategies and technologies can mitigate some of the effects of oil spills by removing some of the oil from the waters. As noted in Section IV.A.4 of the EIS and the response to Comment KCN-01, MMS has established stringent requirements for spill prevention and response and employs an inspection program to ensure industry compliance.

KCN-07
Please see the response to Comment UFA-06.

KCN-08
The Alaska Regional Response Team has developed a workable process for evaluating and approving the use of dispersants. Dispersion is an important process that occurs naturally over time and can be assisted with the use of chemical dispersants. The use of dispersing chemicals provides a supplemental response method to existing conventional cleanup techniques and allows spill-response personnel additional control over the type and location of spill impacts. In general, the compromise that must be evaluated is between the effects of dispersed oil in the water column and the effects of allowing oil to continue to float on the water surface where it may contact sensitive areas or effect organisms that float on the water surface.

KCN-09
The questions regarding the potential impacts to human health from in situ burning slowly are being answered. Recent offshore burn tests indicated that concentrations of combustion products reach acceptable levels for human health within 1 to 6 miles downwind of an offshore burn. The exact distance varies with atmospheric conditions. The Alaska Region Response Team has developed a workable process for evaluating and approving in situ burning, if needed. Like all response techniques, in situ burning has its limitations, its pros and its cons. Under the proper conditions however, in situ burning can be a very effective tool in quickly removing a significant amount of spilled crude oil from the surface of the water.

KCN-10
The EIS includes an analysis of several historical spill events in Cook Inlet including the Tanker *Glacier Bay* spill, the Platform Anna spill, and the Kenai Pipeline East Forelands Spill. The *American Trader* spill off Huntington Beach is used as an example of what is considered by many to be a successful response effort. The EIS points out that cases like the *American Trader* are not common and that even under ideal conditions, much of the oil cannot be mechanically recovered at sea.

KCN-11
We agree that oil-spill-response capabilities have improved in Alaska since the EVOS. In the event of a large spill, even under the best of circumstances, not all of the oil can be recovered at sea; and under the worst of circumstances, very little oil would be recovered offshore. For this reason, the effects assessment in Section IV.B in the Sale 149 EIS are based on the assumption that no oil is recovered offshore, only natural weathering processes are considered.

KCN-12
The lifting of the export ban on Alaskan oil and the need to continue encouraging additional exploration and development to reduce our dependency upon foreign oil are not as contrary as they seem. From an economic standpoint, the U.S. is interested in the "net" amount of oil imported. If by eliminating the oil-export ban we can reduce transportation costs, as explained in the response to Comment SW-01, then we are lowering the balance of trade deficit, which makes good economic sense. Furthermore, if the cost of transporting oil is reduced, then the mineral-extraction operation has a lower marginal cost per barrel and the field will produce more oil; therefore, over the long run, the total amount of oil produced actually may be increased. Even if production is not significantly increased, the savings associated with the difference in transportation costs are significant. Furthermore, providing an atmosphere where there are lower marginal costs of production will encourage larger international firms to stay in the U.S. and not move their capital and jobs to foreign countries.

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RECEIVED
MAR 17 1995
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Minerals Management Service
ANCHORAGE, ALASKA

March 14.1995

Judith Gottleib, Regional Director
MMS OCS Region
949 E. 36 Ave.
Anch. AK 99508-4302

Dear Judith Gottleib,

I am writing comments on the EIS concerning Oil Lease sale 149 and I would like to urge you to cancel this lease sale. I haven't read the entire document but I found problems with the part that concerns my field, that is the biology of humpback whales.

I have been living in Homer for 23 years. I commercial fish for herring and salmon in Prince William Sound. I am also co-director of the North Gulf Oceanic Society and have been studying the population of humpback whales that feed in Prince William Sound (PWS) since 1980. Humpback whales feed on the small fishes and zooplankton at the bottom of the foodchain. This type of feed is very abundant in the waters off of the Kenai Penninsula, to Kodiak and beyond. It is because of the richness of these waters that so many fishes, marine mammals and birds abound here.

NGO-01

In the EIS (III.B.18) the humpback whale population estimates that you site are contradictory to the numbers you use later when discussing the possible effects of a spill. You say there are 1200-2100 humpback whales in the north Pacific and 1247 whales in the area between the Shumigins to Cook Inlet. Using these figures, between 50-100% of the North Pacific humpback whale population would be feeding in the lease sale area during summer months. Later (IV.B.1-56), you say that 5% of the Pacific population of humpback whales are expected to occur in the proposed lease sale area.

Using more conservative estimates for the number of humpback whales in the lease sale area, let us say approximately 300-400 humpbacks, which is around 25% of the <u>entire</u> North Pacific humpback whale population (now thought to be at least 1400, Baker et al. 1986) are feeding and thriving in the waters where this oil development would take place. And may I add, they are not simply migrating through the lease sale area, but this is their destination, after a long migration, where they will feed voraciously in order to replenish depleted blubber layers after months of fasting.

NGO-02

You go on to say that no effects on the humpback whale population from the Exxon Valdez Oil spill (EVOS) were documented. I was the Principal Investigator for the assessment study on humpback whales after EVOS in PWS. It is true that the number of whales in PWS did not decrease after the spill. Most humpback whales don't arrive in Alaskan waters until June, which fortunately was two months after the spill. However a spill in Cook Inlet could occur during summer months at the peak of humpback whale abundance. We found that the whales in PWS did not know to avoid polluted areas. The longterm effects of the residual toxins from the spill and clean up are unknown and difficult to measure. Since humpbacks move in and out of areas, it is difficult to know if any have died. Strandings are rare, most marine mammals sink when they die.

NGO-03

Your summary statement, "No effects on the humpback whale population from the EVOS were documented" (Dalheim and Loughlin 1990) is over simplified and inaccurate. The study of which Dalheim and Loughlin were referring is reported in full in chapter 10-<u>Impacts on Humpback Whales in Prince William Sound</u> by Olga von Ziegesar, Elizabeth Miller and Marilyn E. Dalheim in <u>Marine Mammals and the Exxon Valdez</u>, Academic Press 1994, Edited by Tom Loughlin. This comes from that report:

"The potential impacts to humpback whales in PWS caused by the EVOS may have included displacement from their normal feeding areas in PWS, reduction in prey, or possible physiological impacts resulting in reproductive failure or mortality."

J. R. Geraci and D.J. St. Aubin (1985,) and D.J. Hensen (1985), both for the OCS Envir. Assess. Program, Minerals Management Service, Wash. DC, have written of their studies of effects of oil and other chemical pollutants on cetaceans. These studies should be reviewed for your EIS.

We have all enjoyed seeing more humpback whales around Kachemak Bay, Cook Inlet and the Barren Islands. They are here because of the abundance in feed. Since the oil spill in the Sound the herring run has decline drastically. The fishery is no longer open to us. I believe that humpbacks and their prey will be affected by oil spills and other forms of chemical pollution in their feeding grounds. Please cancel lease sale 149.

We were buying oil leases back from the oil companies when I first moved here. Let's have more foresight this time. Thank you for listening.

Olga von Ziegesar- Matkin
Co-director

Olga von Ziegesar- Matkin

NGO-1
Please see the responses to Comments HPH-10 and 24.

NGO-2
Ms. von Ziegesar-Matkin's statements regarding the EVOS appear correct, except that we do not find an explanation of how it was determined that humpback whales did not know how to avoid polluted areas.

NGO-3
The MMS believes the analyses regarding the potential effects of EVOS on humpback whales is correct; that is, that no effects were documented. Ms. von Ziegesar-Matkin cites only speculative statements that do not document effects on this species. All references she cites also are cited in the EIS.

Regional Director
Minerals Management Service
Alaska OCS Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

Dear Regional Director Gottleib: April 19, 1995

We submit this letter in response to the Draft Environmental Impact Statement (DEIS) for the OCS Oil and Gas Lease Sale 149, and urge Minerals Management Service to choose Alternative II, the no-lease option.

The Pacific Seabird Group is an international organization that was founded in 1972 to promote knowledge, study and conservation of Pacific seabirds. Its member are drawn from the entire Pacific Basin including Canada, Russia, Japan, China, Mexico, Australia, New Zealand, and the USA, including 54 Alaskans. Collectively, our knowledge about seabirds and the effects of oil spills is considerable.

We consider this lease sale to be environmentally risky. Lower Cook Inlet is too biologically rich to be further harmed by oil spills and the chronic pollution that also comes with development. The lease sale and surrounding area are home to over one million seabirds, includes many large colonies. Millions of additional birds migrate through the area, including large numbers from as far away as New Zealand, Chile, Japan, and the Hawaiian archipelago. Also other water and shorebirds of over 100 species (39 species of seabirds; 35 species of loons, grebes, and waterfowl; and 28 species of shorebirds) that will be effected by spills and pollution.

There may be no more dangerous place for oil drilling than offshore areas of Lower Cook Inlet. Major earthquakes, volcanic eruptions, and tsunami waves are a certainty over the life of any field. Augustine volcano, one of several active volcanoes in the area, sits near the center of the lease area. It erupts about every 12 years and is expected to have a major land slide with or without an eruption at anytime. This will cause a tsunami wave. With the world's second largest tides and very severe weather patterns and clean-up response will likely be impossible.

The DEIS predicts the chances of a major spill at 27% to 87%. Add to this the threat of additional spills from adjacent areas (Prince William Sound, Upper Cook Inlet, and tanker traffic) and the probability goes up higher. The Exxon Valdez spill sent oil through much of the Lower Cook Inlet in 1989 even though it occurred in Prince William Sound and marine birds were particularly hard hit. The DEIS also states that there will be many small spills PSG-01
and these are expected to kill several thousand marine and coastal birds and contaminate habitat. When this oil hits, it could kill hundreds of thousands of marine birds and mammals and badly damage intertidal areas where 40 60% of the marine invertebrates are predicted to be killed. Area mudflats are internationally important feeding grounds and stopover points for large numbers of shorebirds. Some of these mudflats have been officially recognized as a western Hemispheric Shorebird Reserve. These low energy areas would be damaged a spill for a long time since recovery would be particularly slow. Depending on the timing a spill, tens of thousands of shorebirds could also be directly oiled.

Also at great risk are a major portion on the lower food chain PSG-02
make up of small fish. Upper Shelikof Strait is an important spawning area for Walleye Pollock. These fish generally spawn during the spring in large aggregations. Their eggs and larvae remain at the surface of the water for 40-50 days. At this time they are highly vulnerable to damage from the spilled oil. Capelin and Sandlance spawn on beaches and in shallow water, thus are also vulnerable to any spilled oil. The DEIS says only that the loss of these juvenile fishes will not affect commercial fishing. This simply is not true! These species make up a major portion of the food base for not only commercial fish species, but marine birds and mammals as well. The EIS must better address this major oversight.

The effects of, and recovery from, oil spill damage is still not understood. The seabird colonies of the Barren Islands, Puale Bay, The Triplets and Ugaiushak Island were severely affected by the Exxon Valdez oil spill. A decrease in productivity of murres at Puale Bay was well-documented. The DEIS predicts a recovery time for these populations of more than one generation; some say recovery will take up to 70 years. The effects of the Exxon Valdez spill are still not fully documented and continuing with this lease at this time is therefore unwise.

The analysis model used in the DEIS for determining the trajectory of the spilled oil minimizes the impact of Lease Sale 149. The trajectory model predicts small probabilities of a major oil spill contacting important wildlife areas within 30 days of the spill, (figure IV. A. 2-7). This portrayal is not realistic. All one needs to remember is that the Exxon Valdez spill (which occurred over one hundred miles away in the protected waters of Prince William Sound) oiled many of these areas in Lower Cook Inlet and beyond. PSG-03

Oil spills from lease sale 149 would end up on the beaches and kill wildlife from: Katmai National Park; Lake Clark National Park; Kenai National Wildlife Refuge; Alaska Maritime National Wildlife Refuge; Alaska Peninsula National Wildlife Refuge; Becharof National Wildlife Refuge; Kodiak National Wildlife Refuge; McNeil River State Game Sanctuary; Trading Bay State Game Sanctuary; and other recognized critical habitat areas. This lease has no more justification in terms of potential environmental damage than one in the Arctic National Wildlife Refuge which the administration is against.

We are also concerned that as recently as 1994, the oil and gas industry successfully lobbied to reduce its contribution to the state's emergency response (470) fund, and continues to oppose such spill prevention measures as escort vessels for tankers and tractor tugs in Cook Inlet. The oil industry is not demonstrating the intention to improve their environmental record in Cook Inlet. PSG-04 Until there is a better industry record and attitude further offshore oil leasing should not be considered. Because of these above concerns, we urge you to select Alternative II, the no lease option for the OCS Oil and Gas Lease Sale 149. Thank you very much for your consideration.

Sincerely,

Mark J. Rauzon

Chairman
Pacific Seabird Group
Box 4423
Berkeley, CA 94704

PSG-01
A total of 47 small oil spills ≥1 bbl and <50 bbl (average size of only 5 bbl) and only 2 spills ≥50 bbl but <1,000 bbl are assumed to occur under the base case of the proposal over the life of the field (>20 years) (see Table IV.A.2-4b, Estimated Production Small Spills). Such small spills are likely to disperse before contacting coastal concentrations of marine and coastal birds and before substantially contacting and damaging intertidal feeding-habitats of marine birds, shorebirds, and mammals. The DEIS recognizes (1) that the assumed 50,000-bbl spill could kill more than several thousand marine and coastal birds, (2) the upper estimated number that may be killed has been increased to 100,000 birds, and (3) that intertidal habitats could remain contaminated by the spill for many years (see Sec. IV.B.1.d).

The MMS has established stringent requirements for spill prevention and response (Sec. IV.A.4). If a small spill occurs, response equipment at the drilling or production site is available for immediate deployment to help contain and clean up the oil. Small spills are expected to have only a short-term (<day) effect in a local area (<several km^2).

PSG-02
If eggs and larval forms of capelin and sand lance are heavily oiled, there is likely to be injury and mortality. However, because these fish are abundant and have a wide distribution, it is highly unlikely that anything more than a small percentage of the population would be lost. More information on capelin can be found in Section III.B.2 and in Section IV.B.1.c.

PSG-03
The oil-spill-trajectory model does not necessarily predict small probabilities of an oil spill contacting important environmental resources and land segments. The chance of contact is presented as conditional probabilities. Figure IV.A.2-7 shows combined probabilities representing the chance of one or more oil spills ≥1,000 bbl occurring and contacting important environmental resource areas within 30 days over the lifetime of the Sale 149 proposal. The combined probabilities factor is the chance of a spill occurring in the first place and then the chance of a spill contacting an area. Conditional probabilities assume an oil spill occurs and the path of the spill is followed and contacts to environmental resource areas are tabulated. Both conditional and combined probabilities are used to analyze the effects from oil spills to environmental, social, and economic resources. Also, please see the response to Comment WH-04.

PSG-04
Please see the response to Comment TAG-17.

UNITED FISHERMEN OF ALASKA

April 19, 1995

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Judith C. Gottlieb, Regional Director
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RECEIVED
APR 24 1995
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

Re: Oil & Gas Lease Sale 149
Lower Cook Inlet & Upper Shelikof Strait

Dear Ms. Gottlieb;

As you know, UFA is a statewide organization representing 18,000 commercial fishermen through 22 member organizations and three at-large delegates. UFA has six member groups in the Lease Sale 149 (LS 149) area including Area K Seiners Association, Cook Inlet Aquaculture Association, Kenai Peninsula Fishermen's Association, Kodiak Regional Aquaculture Association, North Pacific Fisheries Association and United Cook Inlet Drift Association. All these groups could be immediately impacted by a spill in the lease area: all were–and are still–affected by the *Exxon Valdez* spill.

We have corresponded with your office previously regarding our concerns with and opposition to LS 149. We also recently were part of an "Alaska delegation," involving commercial fishermen, Natives, and recreational and other subsistence users from the sale region, that met with MMS and DOI officials in Washington, D.C. over a 3-day period to express our concerns with and objections to this lease sale in person.

During the Washington D.C. meetings, UFA's representative was deeply disturbed at the attitude of federal officials who had basically pre-determined that this lease sale would proceed. **Such pre-determination is unconscionable as it undermines the public process and the public trust.** For example, Bob Armstrong, assistant secretary for lands and minerals, "held out little hope of stopping the sale because of pressure from pro-development state politicians" and told us the most we should expect "as the Interior Department nears a decision is some adjustment of the lease-sale boundaries... " (*Anchorage Daily News*, 4/7/95:D1, attachment #1).

Politicians in Alaska always clamor for oil development. That is why it is critical to the public process for the federal government to essentially intervene on behalf of the public to weigh our concerns about environmental and public protection against the national demand for energy. It is our belief that oil and gas lease sales should not be conducted in extremely productive biological areas in which oil spill clean up is

virtually impossible and shoreline fouling a near given. A similar belief held by the public in the lower 48, combined with a National Science Foundation report showing that MMS's science was biased towards oil development, resulted in much of the nation's coastline being put off limits to oil and gas leasing through a presidential moratorium.

If we can make a case that such conditions also exist in Alaska or that for other reasons the DEIS is fatally deficient, then it is incumbent upon the federal government to act upon our objections by withdrawing this lease sale. To do otherwise means that DOI and MMS will have breached the public trust and have a conflict of interest that biases their decisions towards pro-development. Should this occur, it means the public process is broken and that, in our opinion, no further federal land disposals should proceed until the public can be guaranteed a process free of bias on the part of public resource stewards.

At this point in time, UFA can only assume that MMS and other federal officials will carefully consider our comments on the DEIS before making a final determination on LS 149. We have five major areas of concern, discussed below.

- First, it is inconsistent for the federal government to be spending hundreds of millions of dollars on restoring and studying areas damaged by the 1989 *Exxon Valdez* oil spill and to simultaneously propose that potential impacts from OCS operations, including oil spills, will not cause serious, long-term damage to the environment.

In fact, federal and state studies in Prince William Sound to-date have found the biological damage caused by the *Exxon Valdez* oil spill was severe and unprecedented: dramatic reductions in certain populations of marine mammals, birds and fish caused by the spill have seriously altered the structure, composition and dynamic interrelationships in the affected coastal ecosystem. Indirect (ripple), long-term, and delayed effects are just starting to appear. While some recovery has occurred, significant components of the ecosystem continue to exhibit serious impacts, and probably will for decades to come. For a more in-depth discussion of *Exxon Valdez* studies and effects through 1993, please refer to "Sound Truth," attachment 2.

UFA-01

In particular, genetic damage and reproductive impairment caused by the *Exxon Valdez* oil spill have been documented in herring and pink salmon (see "Sound Truth," *Cordova Times*, 2/23/95, attachment #3). Herring in Prince William Sound are dying from an unprecedented (in the sound) outbreak of a fungal infection, the consequences of which first became apparent in 1993 when over two-thirds of the herring stock disappeared over the winter. The herring fisheries in the sound were closed in 1993 and have been ever since. Biologists are uncertain when the stocks will recover to a level permitting commercial harvest. Given the tissue damages measured in adult herring in 1989 ("*Alaska's Wildlife*," p. 39, attachment #4), biologists suspect that the *Exxon Valdez* oil spill is a major contributing factor to the herring decline. Studies on pink salmon have documented elevated egg mortalities in streams oiled during the *Exxon Valdez* spill through 1993 (attachment #3). Although the differences in 1994 were not significant, the damages have been stronger in the odd year class and will be monitored again in 1995. In addition to the genetic damage, exposure to North Slope crude oil in stream gravel was also found to have delayed impacts on salmon fry up to five months after the oil exposure had ended (attachment #3), thus lending support to the arguments that the *Exxon Valdez* spill was also a primary contributing factor to will be taken to reduce risk from spills and minimize environmental and social impacts. These seem reasonable expectations of a nation now largely dependent upon foreign oil imports and of an industry taking great strides forward in improving its oil extraction technology (*The New York Times*, 12/7/95:D1), but stagnating in its oil spill clean up technology.

In the eyes of the national public, the inept response to the *Exxon Valdez* spill and the subsequent oiling of large parts of Alaska's coast contributed to the Congressional decision to keep the Arctic National Wildlife Refuge closed to oil and gas leasing in 1989. It does not seem to be in the nation's best interest to promote oil leasing in areas in which there is a high likelihood of replicating this major catastrophe. Rather it seems oil leasing in such areas should be prohibited until, at a minimum, the oil industry can demonstrate that it has the technology, the skill and the will to reduce oil spills in the first place and to adequately respond to and clean up spills in the second place.

- Fourth, MMS's science is biased, misleading, inaccurate in some places and, in general, the conclusions of little or no biological effect are not supported by the data. In fact, a careful reading of various sections of the DEIS leads one to conclude exactly the opposite of what MMS concluded, based either on the data presented or knowledge of the data not presented. The following examples show that the DEIS is strongly biased towards pro-development.

Subsection (4) Hydrocarbons in the Marine Environment, p. III.A.11

Example 1: Baseline Levels of Hydrocarbons in Cook Inlet

Deficiencies with DEIS:

√ III.A.12 – MMS notes the amount of oil spilled between 1965 and 1975 and from 1976 through 1979, but fails to account for the next 15 years during which there were spills from broken pipelines and tankers. UFA-08

√ III.A13 – In determining the PAH bioavailability in the water column, the control mussels contained 84 ppb of PAH. It appears that this study was fatally flawed due to selection of contaminated controls. The authors of this CIRCAC report had similar flaws with experimental design and data manipulation during work for Exxon after the 1989 spill (attachment #2 p. 14-20): their studies have not passed peer review since presented in 1993. UFA-09

√ III.A.14 – The concentration of 94 ppb due mainly to alkyl naphthalenes indicates a major input of these compounds and is a cause for concern. Further, the finding that the mussels depurated at the Trading Bay site may be a more a function of use of contaminated controls rather than "lack of chronically available hydrocarbons" as MMS concludes. Use of inappropriate controls was a tactic employed by Exxon scientists after the 1989 spill that, for obvious reasons, minimize spill impacts (attachment #2, p. 24): these studies have also not passed peer review since presented in 1993.

√ III.A.14 – 6) Toxicity: This section appears to be purposely worded to mask the fact that 6 out of 8 – *fully three-quarters of the* – stations were highly toxic to echinoderms. This is water quality which is alarming because it suggests that levels of PAHs in the sediments may be even higher as sediments act as a sink and the UFA-10

Kamishak Bay area, in particular, was reported by fishermen to be a sink for oil after the *Exxon Valdez* spill. UFA-10

√ III.A.15 – The high TOC value in one site is significant because there weren't very many sites sampled. The authors of the ENRI study did total carbon, not chemistry, and consequently could not differentiate between biogenic and petroleum-derived hydrocarbons. Therefore, neither can MMS so the statement that the "relatively high concentration may be due to high primary productivity in the area" is meaningless: it may not. With input of total PAHs in treated produced-water samples of well over 800 ppb (III.A.14) and a high level of toxicity in the water column, this high TOC value could as easily be derived from petroleum hydrocarbons. UFA-11

√ III.A.15-16 – The total PAH concentrations in the sediments in 1993 do not indicate a pristine environment. Levels up to nearly 1 part per million indicate a problem. The finding that all stations had ≤ 105 ppb, that most stations were ≤ 60 ppb, and that one-fifth of the stations were ≥ 10 ppb could be a warning that PAH levels are on the increase from human activity, especially in light of the finding that the Microtox® bioassays showed pore water and sediments "might" be toxic to test organisms. It should be noted that NMFS studies on pink salmon found that exposure to 52.5 ppb PAH killed 90% of emerging pink salmon fry, that effects on pink salmon osmoregulation and behavior were observed at levels of PAH below the limits of detection, and that, as mentioned earlier, exposure to North Slope crude oil in stream gravel was also found to have delayed impacts on salmon fry up to five months after the oil exposure had ended (in attachment #2, Rice et al. 1994). UFA-12

√ III.A.17 – Total concentration of "selected" PAHs ranged from 0 to 400 ppb. The latter is high and does not indicate a pristine environment. Further, what is a "selected" PAH? Which ones weren't selected and why not? The correct term is total PAH or the individual PAHs should be identified. UFA-13

Deficiencies with MMS Conclusion: MMS concludes on III.A.23 that the "low concentrations of hydrocarbons in Cook Inlet are similar to concentrations found in other unpolluted coastal areas" and this indicates "a pollution-free environment." This conclusion is not supported by the data cited and unjustified. Further, the NOAA National Status and Trends data are not presented so the reader has no way to compare the Cook Inlet data with other areas. Also, the earlier (1979) NOAA OSCEP data were not presented which is curious as it seems these data would give a better baseline than some of the technically-flawed studies that were cited. From the data cited it appears that Cook Inlet is not pristine and is showing a build-up of toxic levels of PAH from human activities in the area. Further examination of available data is requested of MMS. In addition, should this alternative conclusion have merit, it seems that industrial discharge of PAHs and other toxic compounds into the inlet may need to be restricted. UFA-14

Example 2: Effects of Oil on Benthic Communities

Deficiencies with DEIS:

√ IV.B.1-25-28 – In the discussion on marine invertebrates there is no mention of oil spill impacts on mussels. Government scientists found after the *Exxon Valdez* oil spill mussel beds contained extremely high levels of essentially unweathered *Exxon Valdez* as late as 1993–these continuing concentrations in intertidal mussels and in the underlying sediments act as a potential source and may be associated with UFA-15 (which addresses effects from all sources, including North Slope oil) and a 200,000-MMbbl oil-spill scenario (see Appendix C).

UFA-06

Table IV.A.2-2 of the EIS presents the probability of one or more spills ≥1,000 bbl occurring for the Proposal (base and high cases), the various alternatives, and the cumulative case. These estimates are based on the amount of oil estimated to be produced. For the Proposal, the most likely (base case) amount of oil that might be produced is estimated to be 200 MMbbl, and the probability of one or more spills ≥1,000 bbl occurring is estimated to be 27 percent. The high-case estimate represents the discovery and recovery of a large volume of oil, in this case 800 MMbbl, but there is a much lower probability of discovering this amount of oil compared to the base case; the probability of one or more spills ≥1,000 bbl occurring is 72 percent for the high case. The probability of one or more spills ≥1,000 bbl occurring for the deferral alternatives is equal to or less than for the base case. These probabilities do not represent a certainty of a large oil spill.

Even though there is a relatively low (19-27 percent) chance of one or more spills occurring, for purposes of analysis one 50,000 bbl spill is assumed to occur. As noted in Section IV.A.2.a(4), a 50,000-bbl spill is the average of platform, pipeline, and tanker spills ≥1,000 bbl based on the historical spill record. If a large spill occurs, the size could range from 1,000 bbl to several hundred thousand barrels. The assumption that a 50,000-bbl (2,100,000-gallon) spill occurs is for analytical purposes and should not be interpreted as certainty that a spill will be of that size.

The MMS acknowledges that Cook Inlet is noted for its high winds, currents, a large tidal range, and the seasonal presence of moving ice in certain areas, and that there are limits to current technology for responding to spills in adverse conditions. Historically, only a small percentage of spilled oil has been recovered at sea.. Response time and oceanographic conditions at the time of the spill are the two most critical factors in determining whether or not a spill effectively can be cleaned up at sea.

Offshore spill response can be successful when oceanographic conditions are favorable and when response crews and equipment are adequately prepared and immediately available to respond to a spill. Even under ideal conditions, not all of the spilled oil will be recovered. For most crude oil spills, a significant portion of the oil is lost through evaporation and natural dispersion. Evaporation of volatile components accounts for 30 to 50 percent of crude loss, with approximately 25 percent occurring in the first 24 hours. If a spill occurs near land, shorelines typically are oiled and shoreline response and cleanup usually is necessary. It is very difficult to contain and recover oil at sea with booms and skimmers under adverse weather conditions, at night, and when sea ice is present. Although adverse weather conditions hinder spill-response efforts, it enhances evaporation and natural dispersion of the oil.

In situ burning is a viable alternative to mechanical containment and recovery and has the potential to remove over 90 percent of the contained oil. In situ burning can be used both summer and winter when ice is present, when the wind is <20 knots, and the seas are <3 feet.

The existing spill-response infrastructure in Cook Inlet has been tailored to the current offshore production and transportation operations in Cook Inlet. Spill-response plans for these operations recently were reviewed and received both Federal and State of Alaska approval. Approval by these agencies does not mean that all oil spills in Cook Inlet can or will be cleaned up. In general, the approval does indicate that industry has met both State and Federal spill-prevention and -response planning requirements for the area, taking into account the potential risk of a spill, industry's response capabilities, the potential adverse effects should a spill occur, and all the mitigating measures in place to compensate those who might be damaged should a spill occur.

Spill-response capabilities in Alaska have improved significantly since the *Exxon Valdez* oil spill. There are additional response equipment, more trained response personnel, new performance standards that must be met, more citizen involvement, and an improved cooperative effort between responders and regulators. There still is room for improvement in prevention and spill-response preparedness for Cook Inlet. Several additional measures currently are being evaluated.

If Sale 149 results in new offshore exploration or development activities in the Cook Inlet region, operators will have to prepare and submit oil-spill-response plans for these new activities. These plans will undergo public review and must be approved before activities can begin. The current spill-response infrastructure for Cook Inlet may need to be expanded to accommodate new operations. Other preventative measures also may be required for these activities.

UFA-07

We agree that oil spills can disrupt commercial fisheries. Section IV.B.1 of the EIS includes an analysis on the effects of potential spills on the Cook Inlet commercial-fishing industry.

UFA-08

The oil spill information for the periods 1965 through 1975 and 1976 through 1979, along with produced-water discharges, were noted to provide the reader with some information regarding the input of hydrocarbons into the environment before and during the Outer Continental Shelf Environmental Assessment Program (OCSEAP) studies in Cook Inlet during the period 1976 through 1979. During this period, water, suspended particulate matter, seafloor sediments, and benthic biota samples were analyzed for hydrocarbons. This information is part of Section II.A.5.c(4)(b)1), OCSEAP, which summarizes OCSEAP's Cook Inlet contaminant studies in the late 1970's.

UFA-09

The mussels used in the CIRCAC pilot study were obtained from a commercial mussel farm in Halibut Cove, and the PAH distribution in the tissues was determined before and after the 30-day exposure period. The PAH distribution in the sediments at the Beluga River and Trading Bay sites also was determined. The distribution of PAH's in the mussels after the 30-day exposure period was different than in the controls or in the sediments. The number of PAH's in the mussel tissues after the 30-day exposure period was less than in the controls and in the sediments. The PAH concentrations in mussel tissues were low compared to tissue levels found at historic spill sites (Hyland et al., 1995). The total PAH concentrations in the mussels deployed at the Beluga River site were significantly higher than mussels deployed next to the produced-water outfall in Trading Bay. These differences represent background variability due to low-level inputs of hydrocarbons in Cook Inlet from multiple sources (Hyland et al., 1995).

As noted in Section III.A.5.c(4)(c)5) total PAH concentrations in the Cook Inlet waters sampled by UAA, ENRI (1995) in 1993 were below the detection limit of 0.01 μg/l; two of the sites sampled were located in Trading Bay.

Cordova Times 2/23/95

Restoration workshop evaluates status of Prince William Sound herring, salmon

By Jody Seitz
Special to the Times

Scientists, biologists and fishermen attended numerous reports and discussions on restoration research during the Exxon Valdez Oil Spill Trustee Council Restoration Workshop Jan. 17-20.

Scientists from the Alaska Department of Fish and Game, Copper River Delta Institute, Prince William Sound Aquaculture Corp., Prince William Sound Science Center, Cordova District Fishermen United, Prince William Sound communities and members of the Exxon Valdez Oil Spill Trustee Council public advisory group all met to map out a strategy for Prince William Sound.

The news on herring was not good.

In addition to the low biomass recorded in the spring and fall of 1994, research identified a disease in Prince William Sound herring called Ichthyophonus.

"We don't know what caused the initial loss off of herring, but in 1994, Ichthyophonus (a fatal herring disease) was killing most of the herring," said Dr. Gary Marty at the workshop. Marty is a University of California researcher.

Though not a new disease in Prince William Sound herring, Ichthyophonus has been identified each year beginning in 1989.

In 1994 the disease was twice as prevalent as in previous years.

Ichthyophonus is a fungus which attacks the internal organs of fish. Herring seem to be especially susceptible to it.

"Herring are always getting the disease and dying from it," Marty said.

Once the disease progresses to the point where skin ulcers form and the fish dies, the fungus is more easily transmitted to other fish. Marty explained the best interpretation of the data is so many fish died from the disease in 1994, predators couldn't eat the herring before they contaminated more schools of fish.

Outbreaks of Ichthyophonus have been documented in 16-year cycles in Atlantic herring between 1898-1947.

"The herring die off until there's none left," Marty said. "Then they come back."

The restoration committee studied affects on other species in addition to herring.

Fish and Game studies on pink salmon continued to find elevated egg mortalities in oiled streams through 1993.

An experiment conducted by Fish and Game showed when eggs from oiled and non-oiled streams were taken to a hatchery for identical rearing in a controlled environment, the oiled and non-oiled stream differences persisted. In 1994 the differences were not significant, but the damages were stronger in the odd-year line (spawned in fall 1989, '91 and '93) and need to be monitored again in 1995.

Oil toxicity studies conducted by the National Marine Fisheries Service continued to gather evidence, testing the claim that pink salmon sustained long term heritable damage due to original oiling of

See Status, page 4

Status...

From page 2

ed impacts on survival, size and emergence timing.

"Impacts of oiled gravel weathered for a year prior to use were highly significant and unexpected. Most surprising was the delayed impact of the oil exposure during the egg-alevin stage on marine growth to fry stage, five months after the oil exposure had ended," Rice said. "The delayed impacts on growth from the long-term oil exposure is a unique observation and supports the long-term damage hypothesis."

Further study examined the presence of a tracer molecule known as "pristane" in the marine environment. This chemical tracer is found in only two sources, calanoid copepods and petroleum.

Pristane doesn't easily biodegrade and labels all parts of the food web that either directly or indirectly consume it. Pristane studies may potentially be used to help understand how food webs work in Prince William Sound.

Sound Ecosystem Assessment's lead scientist, Dr. Ted Cooney, gave a report on the first year's results. SEA is a long-term ecosystem-based research program which relates ocean currents to the production of zooplankton and the survival of pink salmon and herring in the Sound.

Other projects reported on include the near-shore and intertidal studies, studies of seabirds, sockeye salmon research and research on marine mammals.

Alaska Natives from the Sound met during the workshop to discuss ways to improve restoration efforts on subsistence.

Community representatives said subsistence hasn't recovered and probably won't recover within their lifetimes. The cycle of yearly activities has been disrupted for more than five years and there's a greater dependency in their communities on cash.

"I thought progress was made and the EVOS Trustee Council is becoming aware of the difference between corporations that own land and the tribes that are the government for the natives in the area," said Bob Henrichs, president of the Native Village of Eyak. "What's best for the landowners is not always best for the tribes that live in the area. Their aim is geared toward selling land to the Trustee Council.

"I'd like to see money spent toward actually restoring the resources," Henrichs said. "There's no crab and there's streams heavily damaged by oil. Let's get some people out there and clean them out. I saw lots of progress at the meeting, especially after Monica (Reidel) and Martha (Vlasoff) gave their presentations. Bob Spies and Molly McCammon started talking about seeing that Natives get hired on some of these projects."

Subsistence will recover when children are able to learn subsistence skills firsthand and when harvest efforts return to pre-spill levels, said Henrichs.

"The workshop was more productive than I thought it would be," said Salmon. "There's still great potential for integration and synthesis of numerous types of studies, but the internal support for that kind of work hasn't been forthcoming. Conversations with Molly [McCammon], Bob Spies and Pete Peterson lead me to believe that they are listening and somewhat open to suggestions. It's just a question of whether or not the bureaucratic red tape will ever be cut to allow people from different agencies and disciplines to work together towards what I still see as a common goal. The restoration and recovery from damages induced by the spill and a better understanding of how the system works as a benefit from studying it intensely will be the results."

SEA researchers were asked to estimate the length of time needed to understand which factors limit production of pink salmon and herring in Prince William Sound.

Ocean monitoring requires at least five years to capture inter-annual variation generated by typical ocean systems said Salmon.

Cindie Salmon contributed to this story.

UFA-01
According to the Cordova Times article, the fungal infection in herring is not a new disease in Prince William Sound herring. It is not possible to blame the decline in herring solely on the oil spill. As stated in the EVOS Trustees Council's 1994 Status Report, the decline may be due to natural causes or to some combination of oil-spill effects with natural causes. The viral and fungal infections likely have contributed greatly to the decline, and there is no definitive information whether the outbreaks of these pathogens are completely natural or whether the oil spill was a contributing factor. A discussion about possible genetic damage in pink salmon, egg mortality, egg-to-fry survival, and Kenai River sockeye salmon overescapement can be found in the text in Section IV.B.1.c.

Also, please see the response to Comment TAG-04.

UFA-02
The effects of the EVOS on commercial fishing in the Cook Inlet/Kodiak Island area are summarized in Section IV.B.1.i(8), and the effects of Sale 149 are analyzed in Section IV.B.1.i. The effects of a spill ≥1,000 in Cook Inlet on subsistence harvests and lifestyles in the areas adjacent to the Cook Inlet Planning Area are analyzed in Sections IV.B.1.j and i, respectively.

Also, please see the responses to Comments TAG-04 and UFA-01.

UFA-03
Please see the response to Comment TAG-20.

UFA-04
The decision whether or not to hold an oil and gas lease sale will be based in part on the information and analysis in the EIS. The EIS presents an impartial evaluation of the potential environmental effects of a proposed oil and gas lease sale. Judgments are made about how certain activities, planned or accidental, will effect resources that have been identified though a public process. The basis for these evaluations are explained in the EIS. The EIS is neither a pro-or-con document but rather a means for the public and decisionmakers to use in assessing risks and making decisions about which alternative they might prefer. The decision process also includes a review of the comments received during the scoping process and on the draft EIS.

The MMS has worked with the public in many areas of southcentral Alaska for several years to be responsive to the public concerns while carrying out its responsibility to ensure safe and environmentally sound exploration and development of the offshore (OCS) petroleum and mineral resources for the benefit of the Nation.

UFA-05
The EIS in Section IV.A.2 (Base Case, High Case, and Deferral Alternatives) states as one of its transportation assumptions that only 66 percent of the crude oil produced by the proposed action will be transported out of State. The balance will be processed for local consumption. The percentage of oil retained for local markets actually may grow if the crude produced by the proposal succeeds in backing out the oil shipments from Valdez, which now are brought into the Cook Inlet. Over time, with the growth of southcentral Alaska, more product actually may be processed for local markets, with tanker trips in the Cook Inlet actually declining. Over and beyond such considerations, the EIS addresses the effects of both a cumulative case

years" (IV.B.1-76) is unacceptable to us and unsubstantiated by events following the *Exxon Valdez* spill. Fishermen are still experiencing economic impacts from the spill six years ago and have been told in some instances (Prince William Sound herring, Kenai River sockeye) that the duration of the impact (i.e., time frame for recovery of stocks) is unknown. UFA-22

MMS's conclusion that the sociocultural systems in the lease sale area would "undergo periodic episodes of increased individual, social, and institutional stress and disruption that could last for 1 year, or more" following a large spill (IV.B.1-83) is also unacceptable to us and unsubstantiated by events following the *Exxon Valdez* spill. Many of our communities have are still experiencing social and economic disruptions from the *Exxon Valdez* spill 6 years ago. UFA-23

At this point in time, MMS cannot mitigate environmental, economic or social impacts of an oil spill that impacts natural resource based communities.

In summary, UFA opposes LS 149 and asks that the entire sale area be withdrawn. We believe that our members are being unfairly asked to bear the cost of our nation's oil dependency while the benefits are shared by all people. We cannot afford to bear this risk.

Further, in light of the fact that the sale area is in a region that encompasses 5 National Wildlife Refuges, 4 National Parks, the largest concentration of state-designated critical habitat areas including the McNeil River State Game Sanctuary for brown bears, a Western Hemispheric Shorebird Reserve Network site, and an ESA-designated critical habitat area for Steller sea lions, not to mention that the combined fisheries resources in the Cook Inlet and Kodiak regions are second only to the highly productive Bristol Bay, UFA believes that the lease sale lies within an extremely productive biological area. Based on this fact alone, the lease sale should be withdrawn.

Sincerely,

Jerry McCune Fsc

Jerry McCune
President

cc: President Clinton
Vice President Gore
EVOS Trustee Council
Senators Stevens and Murkowski
Congressman Don Young
Governor Knowles
Commissioners Rue and Shively
Alaska Federation of Natives
Alaska Outdoor Council
Trustees for Alaska

Anchorage Daily News Friday, April 7, 1995

Inlet oil sale hits opposition

Alaskans say drilling in area hit by spill makes little sense

By DAVID WHITNEY
Daily News reporter

WASHINGTON — A small group of Alaska Natives and environmentalists pleaded with a top Interior Department official Thursday to stop a proposed oil-lease sale in the lower Cook Inlet.

They told Bob Armstrong, assistant secretary for lands and minerals, that the sale would be the ultimate act of government contradiction.

The sale, which could occur within a year, would bring development to an area where state and federal trustees are spending tens of millions of dollars to help it recover from the 1989 Exxon Valdez oil spill.

Violet Yeaton, from the Native village of Port Graham, trembled as she tried to describe to Armstrong the impact of the 1989 disaster and the damage it brought to her community's subsistence lifestyle. It was her first trip to Washington.

"Six years," she said haltingly, trying in vain to hold back tears. "It seems like yesterday and they're wanting to drill three miles from our community? Where is reason?"

Armstrong oversees the U.S. Minerals Management Service, which proposed and will conduct the sale. He seemed moved by Yeaton's emotional plea. But he held out little hope of stopping the sale because of pressure from pro-development state politicians.

He told his visitors that the most they should expect as the Interior Department nears a decision is some adjustment of the lease-sale boundaries, which already were shrunk to eliminate drilling near Kodiak Island.

oil at any cost

The proposed sale area stretches north from Shelikof Strait off the tip of Kodiak Island and into the lower reaches of Cook Inlet. The government figures that maybe a billion barrels of oil lie under the area. The draft environ-

Please see Page D-7, INLET

INLET: Natives protest proposed oil-lease sale

Continued from Page D-5

mental-impact statement for the sale says that there's a high probability for development to result in a spill of at least 2 million barrels.

Armstrong told the group that their concerns are not what he usually hears, especially from Alaska politicians who are more frequently in his office.

"Most of the people who come here to see me want more," he said. "Most of the people I see and who are your representatives are all pushing for more development, more timber cutting, more. . . .

"I'm talking about the people elected in Congress or," he said, his thought trailing off to momentary pause, then picking up again. "They are almost uniformly pro-development."

Is there any political opposition to the sale in Alaska? Armstrong wondered. "Is there anybody who represents this viewpoint vocally and demonstrably at the legislative level?" he asked. Opposition

No, said Kristin Stahl-Johnson, representing the Kodiak Conservation Network. She told Armstrong that Alaska has a largely pro-development legislature. Armstrong listened and nodded.

Last month, nearly 400 citizens turned out in Homer at a Minerals Management Service hearing on the lease sale. Armstrong was given a story from the Homer News, which reported no one testifying in favor of the sale. Another story reported that a week after the hearing, the Homer City Council voted 4-1 to oppose the sale.

During the 90-minute session Thursday, Armstrong revealed his own agonizing over the issue.

He said he felt trapped between a country with persistent demand for gasoline and small hamlets like Port Graham, desperately trying to protect their livelihoods and lifestyles from industrialization.

"I have a statute that says I have to produce energy every day," Armstrong said. "I am also charged with environmental protection. You have to decide at some point which course to take."

For people like Port Graham villagers, he said, the course they may have to endure from offshore development is the price of convenience for one-person-a-car commuting in the Lower 48.

"When I have all these congressmen tell me we need more energy, I tell people to go out and look at all these cars," Armstrong said. "What we need is a national energy policy and we don't have one."

"Dammit, we've paid the price," replied Peter Van Tuyn of Trustees for Alaska. "The Exxon Valdez spill caused us to pay a price that no one in the Lower 48 has ever felt."

Armstrong was moved, but apparently unconvinced as he ushered the group to the door, briefly calling attention to a book on an end table titled "The Prize: The Epic Quest for Oil, Money & Power."

"Keep the fight up," Armstrong said as the last of his Alaska visitors left and the door closed behind them.

reproductive failures in harlequin ducks and delayed effects such as the poor survival of juvenile sea otters in the years following the spill (attachment #2, p. 21 and attachment #4, p. 14-17, 28-32). UFA-15

√ IV.B.1-26 – The statements drawn from Gilfillan et al. (1993), an Exxon contract scientist, that found little injury to and rapid recovery of beach communities are completely unsubstantiated. The study was technically flawed to the point where it provided little understanding of injury to and recovery of biological communities after an oil spill (attachment #2, p. 22-26). This study has not passed peer review since it was presented in 1993 because of extensive problems. Further, the finding that "remaining hydrocarbons were found to be generally nontoxic and are thought to serve as a food source for biota" conflicts with government science (mentioned above) and later on IV.B.1-34 that the "contamination of intertidal prey organisms of harlequin ducks as (a) result of the EVOS apparently resulted in reproductive failure of this species in habitats contaminated by the spill > 3 years." (Government studies found more than just harlequins were experiencing continued injury from contaminated prey organisms in the years following the spill (attachment #4, 8-10, 16-17).) UFA-16

Government studies found significant injury to and continuing but slow recovery of intertidal communities from oiled (and treated) beaches. Communities remained severely altered in 1991 (attachment #2, p. 22-27).

√ IV.B.1-27 – The finding that recovery of intertidal communities when beaches were treated with high pressure, hot water washes is true as the conclusions are supported by the data in the studies that were cited (attachment #2, p. 22-27). However, MMS's conclusion that attempts to clean oil from intertidal areas are expected to exacerbate any adverse effects of the oil is only true if high pressure, hot water washes are used again to "treat" beaches. Given the problems that became apparent after the *Exxon Valdez* oil spill, it is anticipated that NOAA <u>would not approve</u> such techniques for future spills. <u>The federal government should lean on the oil industry to develop a clean up technique that works because oil spills in biologically productive areas with no way to adequately clean up the spill are completely irresponsible and totally unacceptable from our perspective.</u>

Deficiencies with MMS Conclusion: IV.B.1-29 – The conclusion that recovery of benthic communities is "expected to take 2 to 3 years in high-energy habitats and up to 7 years in lower energy habitats" is unjustified in light of the ongoing restoration studies overseen by federal and state scientists to determine rate and extent of recovery of intertidal communities. The statement that "less than 5 percent of the subtidal benthic populations in the lower Cook Inlet area are expected to be affected" is meaningless as can be demonstrated by the impacted mussel beds in Prince William Sound. While comprising physically only a small fraction of oiled shoreline or oiled populations, this resource is a critical food source and a potential source of long-term contamination and injury. UFA-17

<u>Example 3: Oil Effects on Fisheries Resources</u>

Deficiencies with DEIS:
√ IV.B.1-30 – MMS's discussion on effects of oil on salmon and herring is <u>completely unacceptable</u> given the available science some of which was mentioned under UFA's first concern. In general, studies undertaken by government scientists or UFA-18

government-contracted scientists has passed peer review (when submitted) and is in various stages of being published. Studies undertaken by Exxon scientists or contractors has not passed peer review since first presented in 1993 and is not being published in peer-reviewed journals. These differences in studies, including study conclusions, are discussed at length in attachment #2 (p. 28-36). UFA-18

Regarding pink salmon, MMS states (as does Exxon) that the fact that the 1989 (and 1990) brood year returned in high numbers in 1991 (and 1992) "prove" little impact from the oil spill. However, MMS (and Exxon) ignored (or discounted) the pink salmon run failures in 1992 and 1993. As mentioned earlier, continuing studies by federal and state biologists have found genetic damage in pink salmon resulting from low levels of exposure to oil that affects survival of offspring and potentially population levels of the species as demonstrated by pink salmon stocks in Prince William Sound. UFA-19

Regarding herring, MMS states (and Exxon) maintain that the "vast majority of herring spawn in 1989 was not contaminated by the spill." This conclusion is based on the technically-flawed study done by Pearson, an Exxon contractor (attachment #2, p. 28-31). Government scientists found that over 40% of the areas used by herring to stage, spawn or deposit eggs, and over 90% of the areas needed for summer rearing and feeding were lightly to heavily exposed to crude oil. The government provides data to verify its findings; Exxon does not. The missing 1989 year class was first evident in 1992 when the 3-year old fish failed to materialize numbers comparable to the Sitka control. (MMS's statement that the "actual size of the 1989 year-class will not be known with certainty until 1996" is inaccurate.) It is by now well-established that this year class is essentially missing from the spawning biomass. (Further the study by Funk et al. accounts for the missing fish based on malformations quantified in 1989.) This year the Sitka Sound control herring produced a harvest of outstanding quality (ADF&G pers. com.) while the Prince William Sound fish are diseased and dying (see discussion under UFA's first concern for references to cites regarding diseased herring). UFA-20

Deficiencies with MMS Conclusions: IV.B.1-33 – MMS concludes that the various effects of oil to fisheries resources "taken altogether are not expected to cause population-level changes." MMS needs to integrate into the DEIS the studies on pink salmon and herring conducted by other federal and state scientists, including the ADF&G management data, discount the technically-flawed studies conducted by Exxon, and redraw its conclusions based on these updated findings. From the on-going restoration studies and the returns of pink salmon and herring in the years since the 1989 spill, it appears that exposure to oil is, at a minimum, a significant factor contributing to the declines in populations of pink salmon and herring. UFA-21

- Fifth, we have first-hand experience that MMS, however well intentioned, is not prepared to address, much less mitigate, the sociological impacts of large scale industrial development, including spills, on small rural communities.

As mentioned earlier (UFA's second concern), the *Exxon Valdez* oil spill had an extraordinary destabilizing effect on rural communities dependent on fishing and a subsistence lifestyle or culture. As mentioned, we also know first hand that many of these communities still have not recovered from the 1989 spill.

MMS's conclusion that economic losses to the Cook Inlet commercial fishing industry resulting from a 50,000 bbl oil spill will range from "about 15 to 65 percent/year for 2 UFA-22 the long-term damages being experienced in pink salmon stocks in Prince William Sound. Fisheries outside the sound have also shown spill-related impacts. For example, Kenai River sockeye have shown a 7-fold decrease in spawner/return ratio due to overescapement (attachment #4, p. 43-45). UFA-01

- Second, it is inconsistent for the federal government to be spending hundreds of millions of dollars on restoring and studying areas damaged by the 1989 *Exxon Valdez* oil spill and to simultaneously propose that potential impacts from OCS operations, including oil spills, will not cause serious, long-term damage to the humans and communities which depend upon the natural resources for commercial and subsistence harvests.

The *Exxon Valdez* oil spill had an extraordinary destabilizing effect on isolated rural communities dependent on fishing and a subsistence lifestyle or culture. As should be apparent from the above discussion, harvest of pink salmon in particular declined throughout the oil spill impacted area (Prince William Sound, Kodiak and Cook Inlet) as offspring of fish exposed to the oil spill failed to materialize in the numbers predicted by state biologists (refer to ADF&G data for these different management areas). Income earned from harvest of herring in Prince William Sound dropped to zero in 1993 and has remained at zero since then. Failed or severely diminished fish harvests not only affect individual fishermen (permit holders) and their families, but also have ripple effects through the community as money once paid to fishing crew, fish processors, shore-side support businesses and other support infrastructure, and even indirectly to communities in the form of raw fish taxes, fails to materialize (attachment #2, see also Radtke et al. cite). UFA-02

Sociologists have made careers studying the vulnerability of natural resource-based communities to disruption and stress caused by toxic, man-made disasters. In fact, many communities throughout the *Exxon Valdez* oil spill impacted region became case studies for sociological impacts caused by the *Exxon Valdez* spill (attachment #2, see also Dyer, Fall, Gill and Picou et al. cites). It is our experience that many of these communities still have not fully recovered from the effects of the 1989 spill. Natives from communities caught in the path of the 1989 spill are experiencing disruptions to the cycle of yearly harvests and a resulting greater dependency on cash: they do not expect subsistence, in the full cultural meaning of the word, to recover to its pre-spill value within their lifetimes (attachment #3). Such concerns are borne out in studies done by Picou and his team who are finding that the two subpopulations most affected by the *Exxon Valdez* oil spill, commercial fishermen and Natives, continue to experience long-term, spill-related effects (Steven Picou, pers. com. Univ. LA). UFA-03

The cavalier attitude of "oil at any cost" found throughout the DEIS and expressed recently by DOI official Bob Armstrong that Native villagers, commercial fishermen and other people at high risk from oil spills may have to "endure" offshore development as "the price of convenience for one-person-a-car commuting in the Lower 48" (attachment #1) is both inappropriate and unacceptable. If we are one thousand people or one million people, the concerns of the subpopulations most at risk must be adequately resolved prior to an oil and gas lease sale <u>or the sale should not proceed</u>. Surely this nation is not so poor or desperate for oil that it cannot afford to respect and protect the rights of all of its peoples or – equally importantly – grant its peoples equal rights. If people in California and other coastal states were granted protection in the form of an offshore moratorium because of concerns about UFA-04

environmental and community impacts, surely we, who are struggling to recover in the aftermath of an oil spill deserve respite from further oil and gas development until, at a minimum, we have recovered from the past offense. UFA-04

- Third, it is extremely poor public policy for the federal government to propose lease sales in and adjacent to extremely productive biological areas in which oil spill cleanup is virtually impossible and shoreline fouling a near given. Decisions to lease in areas like these reflect poorly on the federal government's stated intent to develop OCS oil resources responsibly.

In the proposed plan, MMS claims that the record of OCS operations regarding minimal spills is "outstanding," and points to marine transportation of oil as the primary culprit for spills (46%). It is painfully obvious to us that any oil from OCS developments in Alaska will have to be transported by tanker to a final destination (in a preliminary best interest finding on state lease sale 79, Cape Yakataga, the state acknowledged that "tankers are the most cost effective method, and the only feasible method for transporting crude oil to destinations outside of Alaska" - p. 83). Thus, we view the potential risks from oil spills cumulatively from exploring through marine transportation. UFA-05

MMS acknowledges in the DEIS that it is a virtually certainty (nearly 90%) that oil development will result in a spill of at least 2 million barrels in the lease area. Current state-of-the-art cleanup technology is unlikely to control, contain and cleanup a spill given the usual weather and tidal conditions in this area. The state, the U.S. Coast Guard (in the lease sale 79 document, p. 88 and A-40), the oil industry and commercial fishermen, particularly those who actively participate in oil spill drills (pers. communication, Cordova District Fishermen United) all realize the severe limitations of current state-of-the-art clean up technology and take preventative measures based on these limitations. UFA-06

For example, last November, Alyeska and the state DEC decided to shut down oil loading operations at the Port Valdez terminal when DEC became concerned that high seas (3-4') created by 30–40 knot winds would render tanker containment boom useless if a spill occurred. Further, an Arco spill drill on September 18-22, 1994, was moved from its original location at Naked Island to more protected waters in Two Moon Bay due to a weather forecast. The drill was moved again to Valdez harbor <u>during</u> the actual drill because of bad weather. Unfortunately, during an actual spill, the state and industry do not have the option of moving clean up operations to areas where it can be effectively deployed.

Further, even small spills can severely disrupt commercial fisheries. For example, during the 1987 *Glacier Bay* spill in Cook Inlet, approximately 10,000 gallons of oil caused major disruptions to the drift fisheries. While a small spill may have no discernible population level impacts to fish resources, if the spill occurs at the wrong time, commercial fishing and public resources are at risk. For example, the *Exxon Valdez* spill caused a <u>total closure</u> of the Cook Inlet drift fishery even though the amount of oil present in the inlet was relatively small. UFA-07

The federal government should not ask nor expect commercial fishermen and others in remote coastal communities to bear the costs of this nation's dependency on oil without first demanding of itself that all steps will be taken to reduce need through a comprehensive energy policy and secondly demanding of the oil industry that all steps

UFA-10
The toxicity noted in this comment is based on the toxicity tests of water. There was no purposeful wording of the text to mask any results of the water-quality studies.

As noted in the response to Comment TAG-33, the water from five stations did show statistically significant reduction of *D. excentricus* fertilization rates. However, as explained in UAA, ENRI (1995), only two of the five stations could be considered to show indications of slight (15% lower fertilization) toxicity. The other three stations actually had the highest fertilization rates of any eight stations tested. The two stations exhibiting reduced fertilization were the northernmost stations and had extremely high suspended sediment loads that may have contributed to lessened fertilization rates. The echinoderm larvae from Kamishak Bay had a survival rate of 87 percent, only 9 percent below the control, not 90 percent less than the control.

For the stations located north of Anchor Point, the waters were analyzed for PAH's and for all these stations, the results indicated that if PAH's were present in the water column, the amounts were less than the method detection limit of about 0.01 μg/l. For the other two stations, one in Kamishak Bay and the other off the southwestern end of the Kenai Peninsula, the waters were not analyzed for PAH's.

The sediments at or near five of the water-toxicity sites were analyzed for total PAH's and this analysis indicated the total PAH's was 0.0 ng/g in the sediments at those stations north of Anchor Point; the concentrations of the individual PAH's at these stations (based on 3 replicate samples) all were less than the method detection limit, about 0.9 ng/g. The sediments for the station off the southwestern end of the Kenai Peninsula were analyzed for PAH's, and the concentrations (based on 3 replicate samples) of total PAH's ranged from 0.0 to 958 ng/g. This station is located in an area influenced by waters and SPM that flow into lower Cook Inlet from the Gulf of Alaska.

The total PAH concentrations in the sediments at site located in or near the northern end of Kamishak Bay (off Oil Bay) ranged from 0.0 to 4.1 ng/g (based on 3 replicate samples). However, this station is offshore of an area were natural oil seeps have been reported.

UFA-11
Additional information has been added to Section III.A.5.c(4)(d)1) to address the TOC value. The studies to date to do not, as the comment notes, indicate a high level of toxicity in the water column.

UFA-12
Table III.A.5-8 shows the relationship between total PAH, total alkanes and TOC, and the bioassays for the sediments (and pore waters) sampled in the 1993 Cook Inlet study. For five of the six stations where the bioassays indicated possible contamination, the total PAH concentrations ranged from 0 to 6 ng/g. A station west of Anchor Point had total PAH concentrations of 22 ng/g, but the two bioassay tests performed did not indicate possible contamination. At the station in the outer part of Kachemak Bay, the total PAH concentration was 100 ng/g, and two of the three bioassay tests indicated possible contamination. As noted in the Toxicity part of Section III.A.4.c (4)(d)1), the cause of the possible contamination is unknown.

The water-quality discussion in Section III.A.5 of this EIS does not indicate Cook Inlet is a pristine environment. Human presence in the area and the discharges from municipalities, commercial-fish-processing operations, the petroleum industry, and recreational activities precludes making this assessment.

UFA-13
Mussel tissues were analyzed for 19 different PAH's, and the term "selected" refers to these. The PAH's and the analytical procedures are described in the reference (UAA, ENRI, 1995).

The water-quality discussion in Section III.A.5 of this EIS does not indicate Cook Inlet is a pristine environment. The discharges from municipalities, commercial-fish-processing operations, and the petroleum industry precludes making this assessment.

UFA-14
The NOAA OCSEAP data were presented in the DEIS by citing the following references: Katz and Cline, 1981; Kaplan et al., 1980; Shaw, 1977, 1979, 1980, and 1981; and Venkatesan and Kaplan, 1982. Most of these reference were identified in Section III.A.5.c(4)(b)1), Outer Continental Shelf Environmental Assessment Program. The list of citations in the section has been revised to include all of these references.

UFA-15
The effects of an oil spill in marine invertebrates, including mussels, is addressed in Section IV.B.1.b(4)(b). The effects of spilled oil on marine and coastal birds are analyzed in Section IV.B.1.d(1); there are more than 100 species of marine and coastal birds in the Sale 149 area, so the analysis has been generalized to cover all the potentially affected species. The effects of oil on sea otters are analyzed in Section IV.B.1.e.

UFA-16
Gilfillan et al. (1993) was a three-part study presented at the Third Symposium on Environmental Toxicology and Risk Assessment sponsored by the American Society for Testing and Materials in Philadelphia in 1993. To date, the proceedings from that symposium have not been published. However, to our knowledge, the Gilfillan et al. (1993) study is among the best studies on the subject of impacts associated with the EVOS. The fact that it was supported by industry should not detract from its findings. The team that worked on the study are credible scientists, and we have no reason to believe otherwise. The comments do not indicate any specific flaws in the study. The newspaper clippings supplied by the commenter do not mention the Gilfillan et al. (1993) study, let alone provide any scientific basis for the commenter's statements.

Regarding residual hydrocarbons serving as a food resource for some bacteria, this reality also has been noted by other scientists when studying naturally occurring oil seeps (Spies et al., 1988). The fact that residual oil, naturally occurring or otherwise, also may be eaten by some types of birds, confuses the analysis of oil effects on lower trophic-level organisms. The effects of oil on birds are analyzed in Section IV.B.1.d(1).

UFA-17
The analysis concerning recovery time is an estimate of the time it is likely to take for the majority of intertidal situations following an oil spill. In some areas, the time may be considerably shorter, while in others it may be longer. However, shorter and longer recovery times are considered the exception, not the rule. In general, recovery times are expected to fall within the ranges specified.

Mussel beds primarily inhabit the shallow subtidal and intertidal zone, not the subtidal zone. The analysis was addressing lower trophic-level organisms solely in the subtidal zone, in which <5 percent of those in the sale area are expected to be affected. It is unclear how the mussel beds of Prince William Sound would alter this.

UFA-18
The MMS believes the analysis of oil on salmon and herring is adequately addressed in the EIS. This analysis is based on available scientific information. The MMS analysts have the training and background to evaluate scientific information—whether or not it comes from peer reviewed documents—and judge its validity. Their analyses should not be influenced by others but should be consistent with all available information.

The comment refers to a document, *Sound Truth,* which was published by Greenpeace. To date, it does not appear this document has been published in any peer-reviewed journals.

UFA-19
The EVOS Trustee Council's 1994 Status Report discusses possible genetic damage to pink salmon briefly and offers as an explanation: ". . . perhaps there was a genetic effect in the young which carried over to adulthood, and was inherited by the next generation." The EVOS Trustee Council's 1995 Status Report offers no further information on the issue. The FEIS for the EVOS Oil Spill Restoration Plan also mentions genetic damage and indicates that the pink salmon runs in Prince William Sound were reduced by 2 percent to as much as 10 percent because of genetic damage that caused egg mortality and because of other environmental factors. Again, there is no particularly definitive statement in the EIS regarding genetic damage to pink salmon. A reference to genetic damage to pink salmon has been added to the text in Section IV.B.1.c.

The EVOS Trustee Council's 1994 Status Report states that the exact causes of the poor returns in 1992 and 1993 are not known. It further states that the oil spill, changes in climate affecting conditions in the Gulf of Alaska, decreases in food sources for juvenile fish growth in the last several years, and hatchery-wild stock interactions all have been proposed as contributing to the current poor state of the fishery.

UFA-20
The information referenced in Biggs and Baker (1993) has been added to the text in Section IV.B.1.c; the reference to the vast majority of herring spawn in 1989 not being contaminated by the spill has been deleted. Also, the reference to the size of the 1989 year-class not being known for certain until 1996 has been deleted.

UFA-21
Information from studies referenced in your comments have been incorporated in the text in Section IV.B.1.c. We believe the conclusion still is justified. Several factors, including the oil spill, are being considered as factors in the decline in pink salmon. Likewise, it is not possible to blame the decline in herring solely on the oil spill. As stated in the EVOS Trustee Council's 1994 Status Report , the decline may be due to natural causes or to some combination of oil-spill effects with natural causes. The viral and fungal infections likely have contributed greatly to the decline, and there is no definitive information whether the outbreaks of these pathogens are completely natural or whether the oil spill was a contributing factor.

UFA-22
The estimated economic losses to the commercial-fishing industry were based on estimated losses following the EVOS. We know of no "events" following the EVOS that would render these estimates inaccurate. However, we do know that the commercial-fishing industry was compensated for their EVOS losses several times over during the clean-up campaign. If there are in fact continuing economic losses that the commercial-fishing industry has been experiencing, we would be interested in knowing exactly what these economic losses are, so that they may factored in to our analysis.

UFA-23
Please see the response to Comment TAG-20.

Department of Urban and Regional Planning
University of Illinois at Urbana-Champaign
907 1/2 West Nevada Street
Urbana, Illinois 61801-6376

April 3, 1995

Raymond R. Emerson
Project Chief, Sale 149 EIS
Environmental Assessment Section
MMS, Alaska OCS Region
949 East 36th Avenue
Anchorage, AK 99508-4302

Dear Sir:
This letter is in regard to the DEIS for the proposed Oil and Gas Lease Sale 149, Cook Inlet. In general, I thought the report was well-documented and showed a commitment to minimize environmental impacts of the proposed action. However, I want to offer the following constructive comments to improve the final EIS.

In general, I agree with the proposed Oil and Gas Lease Sale 149, Cook Inlet. Along with the relatively slow progress in new source energy development, the country has to loosen its dependence on the uncertain world oil market. From a macroeconomic perspective, the proposed action would be a significant economic multiplier both for the country as a whole and for the surrounding areas in particular.

The following comments are based upon my perception of the economic and sociocultural effects. Since effects of other alternatives were treated similarly to the base case alternative, I will concentrate on the base case in my comments. The differences between the base case and the other alternatives was either the magnitude of the effects or the timing of the effects.

A. Effects on the Economy

1. Obviously, the proposed action would create a large number of employment opportunities. These would start from the exploration phase to construction phase, through to the operation/ production phase. Jobs would also be created indirectly from the supporting industries/facilities/ services. However, I do not agree with the statement that the new workers would come from the surrounding areas. Referring to Table III.C.1-2 of Nonagricultural Employment by Industry, 1980 and 1991 for Kenai Peninsula and Kodiak Island and the type of jobs that would be generated, I would say the new workers would come from outside the area. In addition, the current major jobs which are fishing, fish processing, and timber and lumber processing are quite different from the new oil jobs. The workforce would require time to adjust to the 'new economy'. This implies that the economic multiplier would not be as large as predicted. Nevertheless, indirect employment opportunities from industries other than the proposed project would probably take place. The point here is that the actual economic effects would be less than the projection. AA-01

2. The issue of employment is very important in relation to the possibility of an oil spill from the proposed project. As mentioned above, The main income of the people from fishing and fish processing would be negatively affected by the oil spill. In other words, the proposed project would probably change the commercial/industrial focus of the community. The significance of this is discussed below. The project must be able to provide a source of income substitution for the affected people.

In addition to the DEIS, data on characteristics of the new workers and their families who live there either temporarily or permanently would help people in assessing the effects on the local economy and on the local sociocultural aspects as described in the following paragraphs. AA-02

B. Effects on Sociocultural

My discussion will be closely related to the effects on the economy because I believe that sociocultural effects result mainly from the economic effects.

1. Although the discussion was inadequate, the DEIS addressed point 1 of the effects on the economy above. The main deficiency is that it did not relate to the existing social system. The new workers would possibly be different from the current population in their social relationships, age, gender, daily living and other characteristics of population. These differences would generate conflicts between the new workers and local population and, subsequently, could be detrimental to the project. The reaction of native Alaskans to those differences should be given more attention. AA-03

2. Sociocultural issues related to the source of income has already been addressed. However, one important thing the AA-04

report missed was the effect of the change in mode of production (i.e. commercial/industrial focus) in the area. This issue is very important because cultural practices in particular communities are closely related to the present mode of production. Addressing this issue would lend insight into the type of the communities the project will be dealing with. It will lead mitigation measures necessary to eliminate unnecessary social conflicts between the proponent of the project and their workers, on one hand, and the existing population, on the other hand. AA-04

Although the above issues seem trivial for this enormous project, I would suggest that considering them in the project and designing mitigation measures would be very helpful for the success of the project. The issues are very important and I do not believe they have been thoroughly addressed. I feel these issues should be given more consideration. However, I absolutely agree with the proposed action and I am really impressed with the report. Thank you for the opportunity to review and comment on this DEIS. I hope these comments prove helpful to you

Sincerely,

Azis Armand
Graduate student

CC: David Kovacic

AA-01
The Kenai Peninsula has a significant oil and gas industry with both onshore and offshore oil production. Many people in the area have experience working on oil rigs and offshore platforms, including some who currently are employed in North Slope activities. A significant number of potential technical and skilled jobs during exploration, development, and production will be filled by Kenai Peninsula resident. We agree that few jobs would be filled by Kodiak residents, except for support jobs. Other jobs, such as support boats, dock workers, laborers, etc., may come from the fishing industry and workers who have marine skills. As noted by the commenter, other jobs will be created by secondary employment in other industries, and these people also will reside in the area.

AA-02
The assumption is made that workers and their families would live in the mid-Kenai Peninsula "oil patch" area and would mirror the oil-field workers and families that presently are employed in the Kenai Peninsula and upper Cook Inlet oil and gas industry. It is considered unlikely that a significant proportion of these workers would choose to live elsewhere on the Kenai Peninsula, such as in Homer. However, if this were not the case, please see the response to Comment MSO-15.

AA-03
Please see the response to Comment AA-02.

AA-04
No significant change in the mode of production is anticipated as a result of the proposed lease sale. The sectors of the economy currently in place on the Kenai Peninsula are anticipated to remain. No new sectors are anticipated to be introduced.

P. O. Box 3355
Homer, Alaska 99603
April 19, 1995

Regional Director
U. S. Department of the Interior
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RECEIVED
APR 24 1995
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

Dear Director Gottlieb:

This letter addresses the Draft Environmental Impact Statement, Alaska OCS Oil and Gas Lease Sale 149, oil development in lower Cook Inlet. I have spent a great deal of time reading the DEIS, discussing the DEIS, and educating people about the DEIS. I am well educated and scientifically literate. I have spent the last five years in the lease sale affected area; living in the communities and working with its marine wildlife. The DEIS leads to only one conclusion concerning Lease Sale 149. Lease Sale 149 is environmentally unsound. Minerals Management Service must support Alternative II, the no-lease option to maintain its mission of managing the nation's natural resources in an environmentally sound manner. The proposed oil development for lower Cook Inlet must be cancelled.

MAB-01

The information in the DEIS is enough to support Alternative II. The DEIS states that there will be at least 49 accidental spills of less than 1000 barrels each in the "base case" scenario. The "cumulative case" estimates that 123 small oil spills less than 1000 barrels will occur. These spills are expected to kill several thousand marine and coastal birds and contaminate 1-2% of the habitat. The DEIS reports a range of probabilities predicting the occurance of a major spill during the project. It states, "There is only a 27 percent chance that a spill ≥1000 [bbl] would occur, but if it did, the size of the spill is estimated to be about 50,000 bbl." It later states the oil spill risk assessment model estimates a mean number of 2.06 spills greater than or equal to 1000 bbl are likely to occur as a result of the cumulative case scenario, with an estimated 87% chance of one or more spills occurring." When assessing the impact of development it is only realistic to look at the cumulative effects of the development. In this case, to allow the proposed lease sale we are accepting an 87% chance of another major spill in lower Cook Inlet. This is not a wise choice. If one wanted to not look at the big picture, and wanted to look at only the effect of the new development from sale 149, ignoring the development already in Cook Inlet, then one would focus on the 27% chance of another major spill. This itself is an unacceptable risk.

With this information it is amazing to realize that MMS is still continuing with the sale. I hope this is only a formality. The DEIS as it is written is evidence enough that this lease sale is an environmentally unsound idea. However, the DEIS does not address the true environmental impact of this lease sale.

The oil spill risk analysis model used for determining the trajectory of spilled oil minimizes the impact of Lease Sale 149. The trajectory model appears to result in small probablitities, such as 1% and 8% chance of a major oil spill contacting individual environmental resource areas within 30 days of the spill. This portrayal is not realistic. Also stated in the DEIS, "combined probability (expressed as percent chance) of one or more spills greater than or equal to 1000 bbl, contacting the environmental resource land (all land segments) is 26 and 70 percent, respectively, for the base and high case after 30 days." This shows there is actually a high probability of important resource areas being contaminated by oil. The model itself seems to be based on the assumption that once oil hits land it stops and does not continue to contaminate more area. This is unfortunately not the way we have seen oil in Alaska behave. If a spill occurring at Bligh Reef in Prince William Sound can hit beaches in the Sound, on the Kenai outer coast, inside Cook Inlet, on the Barren Islands, in Puale Bay and all the way down to Chignik, a spill in Cook Inlet certainly will contaminate areas around Cook Inlet and continue into Shelikof Strait.

MAB-02

It seems MMS has used a trajectory model that has not incorporated knowledge gained from the recent spill that happened very close to the proposed sale area, in an area similar to the one being studied, but in an area with less severe tides and currents. For MMS to not take the trajectory of the EVOS into consideration when assessing the environmental impact of Lease Sale 149 is irresponsible.

The DEIS also did not address other important aspects of the impact of this Lease Sale 149:

MAB-03

How will the forage fish of the area be affected by these predicted oil spills. The primary foods for lower Cook Inlet seabirds, marine mammals and commercial fished fish are capelin, sandlance, and juvenile pollock. These fish generally spawn during the spring in large aggregations. Their eggs and larvae remain at the surface of the water for 40-50 days. At this time they are highly vulnerable to damage from the spilled oil. The DEIS says only that the loss of these fishes will not affect commercial fishing. The DEIS does not address the affect on the seabirds, on the marine mammals and the other fish stocks. It is a difficult question to answer, but there will most certainly be an impact. To not address the issue, is to not address the environmental impact of the Lease Sale. MAB-03

The DEIS also does not seem to address some of the sociological issues of oil development in lower Cook Inlet. The communities of lower Cook Inlet have been very vocal and unwavering in their opposition to oil development in their waters for the last twenty years. Uncountable hours have been spent by local volunteers to prevent such development. The stress involved in the threat to someones home, community and livlihood repeatedly by government agencies is a very real impact that needs to be addressed in the FEIS. How will the communities cope with the 87% chance of a major spill? How will the stress affect the health and well-being of previously stable communities? MAB-04

Tourism was also not addressed satisfactorily in the DEIS. The communities of lower Cook Inlet are dependent on tourism. The tourists come to lower Cook Inlet for its natural beauty, its wilderness appeal and its abundant fishing. How will tourists feel about fishing among oil platforms? How will tourists be affected by the imminent threat of a major oil spill in their vacationland? How will the attractiveness of lower Cook Inlet wilderness be affected by the knowledge that the area is open to oil development and its inherent pollution? How will the rest of the country be impacted by the knowledge of the loss of such important Alaskan wilderness? These are all very important questions but ones that are not addressed in the DEIS. None of them are easy to answer. That is an indicator of their importance. It is the difficult questions that make us really learn. We have found out only too late in many parts of the country that people really do not want to be around polluting industry such as oil development. People do want to be around lower Cook Inlet. Let s not ignore the impact of oil development on that. MAB-05

Two other things in the DEIS bother me. They may seem small, but I think each is indicative of larger problems. Firstly, the tanker path map used in the DEIS does not show the tankers entering Kachemak Bay. Every tanker that travels up and down Cook Inlet comes close to Homer Spit to pick up and drop off its pilot. How does this affect the spill risks? How does this affect the trajectory contact probabilities? What other models are incorrect? MAB-06

Secondly, why does the summary of the environmental impact say, "There is only a 27 percent chance that a spill _1000 [bbl] would occur". Why is the word "only" used? This indicates to me that maybe their is a bias in the writing of the environmental impact statement. Certainly, a 27% chance is not an "only", and furthermore, why would the writers of the DEIS be implying such a subjective judgement? Is not the task of the DEIS to convey the environmental impact, and not to make judgement? MAB-07

Writing this letter is not a pleasant task for me, as I doubt it is for anyone. I hope this letter is not a waste of my time. I have great respect for the democratic process. I also have great fear of the impact of greed and power. The state of Alaska is presently being torn apart by the battle between greed and the need for conservation. Government agencies were developed to keep politics out of such decisions as these and to insure that decisions are made wisely and scientifically. I hope our government can maintain its integrity on this issue. I cannot imagine a responsible government allowing the proposed lease sale 149. At this time, the risk is too great. It is not environmentally sound. That in itself should be the reason to cancel Oil and Gas Lease Sale 149.

Thank you,

Margaret A. Blanding

Margaret A. Blanding

MAB-01
As noted in Section IV.A.2.b, the average size of most of the spills <1,000 bbl (≥1-<50 bbl) is about 5 bbl; for spills >50 bbl and ≤1,000 bbl, the average size is about 160 bbl. These spills are likely to occur over the 20-plus-year life of the production facilities. The MMS has established stringent requirements for spill prevention and response (Section IV.A.4). If a small spill occurs, response equipment at the drilling or production site is available for immediate deployment to help contain and cleanup the oil. Small spills are expected to have only a short-term (<1 day) effect in a local area (<several km^2). Small spills are not expected to kill several thousand marine and coastal birds.

MAB-02
The MMS OSRA model uses two types of objects to evaluate contacts from oil spills. One is called a land segment and the second is called an environmental resource area. The model does stop trajectories once land is contacted. However, for environmental resource areas, trajectories do not stop but continue until they either move out of the modeling area or 30 days has passed. Using both these tools, the analyst has a good general assessment of oil-spill movement throughout the Sale 149 and adjacent area. The MMS is currently testing a model that will simulate the effects of a beach oiling and removal of that oil by the tide and washing it down the coast.

The MMS, Alaska OCS Region, has spent considerable time and effort gathering information about and studying the fate and effects of the EVOS. Unfortunately, most of this information cannot be reiterated in an EIS due to the sheer volume. The MMS sponsored a hindcast evaluation of the Gulf of Alaska model to determine how closely the EVOS compared to modeled trajectories in the Gulf of Alaska (Jayko and Spaulding, 1989). The simulated modeled trajectories correlated very well with the actual EVOS trajectory. However, the timing of the contacts was slower in the EVOS due to the lower speed of the Alaska Coastal Current in the spring of 1989. Galt, Lehr, and Payton (1991) point out that the Alaska Coastal Current was slow in spring of 1989 due to the low freshwater discharge in March and April. The information gained from modeling the Gulf of Alaska, which included lower Cook Inlet and Shelikof Strait, was included in the Cook Inlet and Shelikof Strait model. In addition, analysts considered the effects of an oil spill contacting areas that had already been contacted by the EVOS in lower Cook Inlet and Shelikof Strait.

MAB-03
A discussion of the potential effects on fish and marine mammals as a result of an oil spill affecting prey species can be found in Section IV.B.1.c(1) and c(2) and Section IV.B.1.e(1) and e(4), respectively. There is little information available regarding the effects of an oil spill on capelin, pollock, and sand lance. Pollock were sampled in Prince William Sound in late 1990 and were found to have elevated levels of fluorescent aromatic compounds in their bile, indicating exposure to petroleum, but the levels had decreased very substantially by 1991. Assessment of female pollock collected in 1991 did not show any substantial effects that positively could be ascribed to increased oil exposure. The study did not show any profound effect on the species following the EVOS, but this is tempered by the delay in initiating studies and the short duration of the study.

Due to the high productivity, abundance, and broad distribution of forage fish such as pollock, sand lance, and capelin, the assumed 50,000-bbl spill is not expected to reduce the number of fish available to marine and coastal birds that feed on these fish populations; thus this issue was not discussed in the 149 DEIS. There were no findings from the studies of the EVOS to suggest that effects on forage fish such as herring had any effect on bird populations in Prince William Sound or other areas contaminated by EVOS.

MAB-04
The point is well taken that prelease-sale social and psychological effects also should be explored; but the DEIS may not be the vehicle for doing this, because individual and community perceptions of threats and opportunities within the human environment that may be brought on by the proposed lease sale actually evolve during the timeframe of writing the DEIS and can result from the processes involved in its preparation. On the other hand, such prelease effects are argued as not simply being perceptions but "every bit as real, as quantifiable, as predictable, and as significant, as the development-phase impacts that have been officially acknowledged" (Freudenburg and Gramling, 1994) and therefore deserve to be predicted and discussed in the DEIS. Regardless, this was not done in the DEIS for Lease Sale 149. Therefore, an additional category of prelease-sale effects-causing-agents and their impacts has been added to all sections on sociocultural systems in all alternatives and the cumulative case in this FEIS.

MAB-05
In general, the issues raised by the series of questions have been considered implicitly in Section IV.B.1.m and the corresponding sections for the alternatives. How much analysis is enough is a judgment. In our judgment, the analysis of potential impacts on visitors is adequate. The density and number of oil wells are anticipated to be low enough that tourists fishing in Cook Inlet should not feel encroached upon by wells; there still will be vast amounts of open water for fishing. The potential effect of oil development and pollution on wilderness values are considered in Section IV.B.1.m. Tourists to Cook Inlet come from all over the United States. Impacts on these visitors are considered in Section IV.B.1.m.

MAB-06
In regard to the maps of tanker routes, a revised map that displays the movement of tankers into the Cook Inlet will be part of the finished document. Regarding the use of Kachemak Bay by tankers and cargo carriers of various sorts, the DEIS discussed this topic in Section II.A.2.b.(3) (pages II-3 and -4). Such vessel movements within the Cook Inlet and Kachemak Bay were considered when laying the basic assumption for the Sale 149 OSRA.

MAB-07
The MMS encourages presenting the statistical statement and, when the author makes a judgement such as low or high, including the numerical amount in parentheses. The statement has been changed to read "there is a 27-percent chance of one or more oil spills ≥1,000 bbl occurring."

Chris Chavasse
P.O. Box 15003
Fritz Creek
Alaska 99603

March 7, 1995

United States Mineral Management Service
Public Hearing at Homer, Alaska 3/7/95

Re: Proposed Offshore Lease Sale 149

The fundamental Magnificence, the Peace, and the Dignity of Lower Cook Inlet will be substantively impaired by the Proposed Lease Sale 149.

Although the Draft EIS for this proposed sale is an ~~extraordinary~~ important contribution to the understanding of the Inlet's overall dynamics, it falls short in several critical areas.

1.) The long term implications of industrially imposed social disruption are not considered. CC-01

2.) The equal protection of the rights of those most likely to suffer direct effects of accidents are not considered. CC-02

3.) The evident weight placed on long term, externally controlled economic profits, including those to governmental organization is inappropriate. It lacks social, spiritual and environmental sensitivity and responsibility.

4.) The water quality assessments are flawed in their design and analytical method.

a) The design is evidently subjective. It inadequately identifies areas subject to sedimentary deposition, and by extension, ignores the necessary examination of potential and extant biologically active reservoirs of anthropogenic contaminants. CC-03

b)The Bioassays are similarly deficient in scope. Neither the species, locations nor the contaminant selection provide a scientific basis for consideration in defining the anthropogenic contaminant contribution or burdens in the marine living resources of the surrounding and common areas.

By surrounding and common I wish to imply the oceanographical, geographical and atmospheric commonalities both within the immediate vicinity of the proposed sale and those that are scientifically identified as being dynamically connected by natural environmental functions. CC-03

c) The dependence of local coastal communities on the commonly occurring aquatic life for subsistence, commerce and recreation has been effectively ignored in the species bioassay selections.

The expense alluded to as a limiting factor in establishing contaminant knowledge is an economic veil that impugns the integrity of the scientific assessment of the biology of the organisms/species extant in the area. Without a thorough, broad spectrum analysis of the micro-organism communities, all important subsistence, commercial and recreational species, and endemic and migratory avian populations, the assessment is incomplete.

A species contaminant burden bioassay that is as limited as the one performed for the DEIS is misleading insofar as it denies fundamental toxicological assessment methodologies, and ignores the interactive elements that induce deleterious biological effects in organisms, small or large.

The ubiquity of manmade environmental contaminants in every aquatically oriented species of the planet is well noted in archives, journals, and papers published and unpublished, of the sciences of environmental assessment and toxicology. No total contaminant burdens are noted in this DEIS. Consequently, no conclusions can be drawn by the data prepared for this section of the report .

The further assessment of anthropogenic pollution of the species in the area should adhere to the strictest scientifically reliable measurements of persistent and other toxicologically active substances. The outmoded methodology intrinsic to many EPA assessment criteria developed in the 1970s are often still utilized. This must be avoided, ~~and~~ the further evaluation of the area's environmental corruption by industrially manufactured and population-generated products and poisons. CC-04

I would like to see the contaminant data undergo a complete review by the US Department of the Interior Environmental Sciences Laboratory for inclusivity and accuracy. CC-05

At this time in human history, the advanced sciences have concluded that the very life support systems we rely upon are in jeopardy from biospheric pollution, which places us all in jeopardy.

Alaska is an Arctic State, and as such, is highly vulnerable to pollutants generated within her own borders, and is, with other Arctic States, the unwitting repository for most other environmental contaminants emanating from the lower latitudes of our planet.

Many, if not most, of these poisons are the byproducts of industry subsidiaries or associates of the industry that proposed lease sale 149 is promoting. This fact should be borne out by a comprehensive broad spectrum contaminant bioassay analysis.

Suffice it to say that it is indeed a peculiar madness that despite incontrovertible evidence implicating fossil fuels and their byproducts in the demise of the genetic integrity of biological life as we know it, the governments, in whom we put our trust, maintain their right to expand the development of the sources of these biologically active toxins.

The DEIS states that global or big picture concerns are beyond the scope of the agency. This is an unfortunate statement, and truly indicative of the lack of interagency involvement that the public rightfully expects.

This is perhaps the best example of rationalized, willful ignorance that can be found in a living document!

What is at stake here, as in ANWR and elsewhere, is our future health, the health of future generations, and the type of biological diversity that has provided for the magnificent natural productivity we know on the planet today. What is at stake here is also the peace that we hold so dear in our experiences of the natural world, and the dignity that we are afforded in our knowledge that we are doing what is truly right, for now and for the future.

Please consider for the administrative record that I oppose present and further production from oil-bearing deposits in the Cook Inlet, and am specifically opposed to lease sale 149.

If this sale is developed, it will directly and further impugn my peace, dignity and health. It will also substantively detract from the beauties that maintain my excitement and love for our natural environments.

Sincerely,

Chris Chavasse

CC-01
The long-term implications of social disruption attributed to the proposed lease sale are discussed in Section IV.B.1.k.

CC-02
The EIS analyzes the potential effects on the environment of the proposed lease sale. This document does not discuss the legal rights of those most likely to suffer direct effect of potential accidents. The analyses used to support the conclusions in the EIS assume that all laws and regulations are part of the proposed lease sale. The MMS regulates activities that may occur on the OCS as a result of the proposed lease sale and, as part of that process, MMS assures compliance with the laws that provide protection to the environment and the living and nonliving resources of the area.

CC-03
Please see the response to Comments TAG-32 and -33 and JLM-09.

CC-04
Please see the response to Comment TAG-32.

CC-05
The quality control of the 1993 Cook Inlet study was performed by the Alaska Department of Environmental Conservation, Juneau Environmental Analysis Laboratory. The data are submitted to the National Oceanographic Data Center.

Mark Child
309 South State St. #8
Champaign, IL 61820

April 3, 1995

Dear Mr Valiulis
MMS (644) USDOI
381 Elden Street
Herndon, VA 22070-4817

Ref - Proposed Cook Inlet Oil and Gas Leasing Sale 149
Oil Spill Risk Assessment Section (IV.A.2)

I have reviewed the draft EIS prepared on Cook Inlet, which involves the oil and gas leasing sale 149. I paid particular attention to the sections involving the oil spill risk assessment. My general impression of this report is that it is well organized, easy to understand and contains extensive information concerning the potential risks of the project. I do however have several questions relating to specific parts of the oil spill assessment section.

MC-01

First, I reviewed the physical considerations section (III.A) to get an understanding of the types of considerations included in this DEIS. One part of this section describes faults, volcanism, tsunamis and sediment/seafloor instability. (III.A.2 5 para 7-9) The physical characteristics mentioned made me question if there is a risk of turbidity currents occurring as a result of an earthquake. I understand from this section that the sea floor is considered stable, and therefor at very little risk of this phenomena, however, there is some question about possible subsurface liquefiable layers of silt and fine particles. If an earthquake occurs is it possible that, if this layer exists, it could become liquified and form a turbidity current. If so, are the drilling sites in areas protected from this risk.

MC-02

In the shoreline weathering section of the report, it is acknowledged that oil spills of varying magnitude are inevitable. This section indicates what parts of the coastline (IV.A.10 2 and map IV.A.2-2) may be affected when a spill occurs and the Environmental Sensitivity Index (ESI) rating for the coastline types affected. The coastlines are identified as 49% sheltered/exposed rocky shores, 31% mixed sand and gravel beaches, 12% gravel beaches, and less than 7% sand beach tidal flats and marshes, of which 3% are exposed tidal flats and 1% are marshes. Marshes receive the highest ESI rating of 8. I haven't been able to determine what areas these percentages represent because no acreages for coastlines are given. The beginning of the report provides the total acres for the different alternatives (page iii) but there isn't a similar figure for coastlines. What percent or acreage of the marshlands (representing 1% of coastline) will be affected?

MC-03

Also paragraph 5 of the same page (IV.A.10) mentions that in the Exxon Valdez oil spill, small pockets of rocky shorelines where found to have heavy oil concentrations in areas sheltered from wind and waves up to 8 months after the spill. Are there similar sheltered locations in the proposed project area that may be at risk as the coastline for this project consists of 49 percent rocky shore?

MC-04

Last, section IV.A.11 indicates the chance of a spill occurring is estimated at 1-9 percent for the high case scenario. (using a poisson distribution IV.A.3) The high case scenario will affect the coastline of 34 land segments within 30 days (IV.A.11 paragraph 9). I am concerned because this risk seems high. Alternatives IV-VIII which involve deferrals based on wildlife and habitat conservation seem better alternatives, if the risk of spills is made a high priority, because they reduce the risk of a spill couuring to a maximum of 2 percent.

I found the information in this report very informative and up front about the risks this project poses. Except for the few comments I mentioned, the report adequately addresses my concerns regarding this project.

Thank you for the opportunity to respond to this report.

Sincerely,

Mark Child

Mark Child
Graduate student in landscape architecture

MC-01
The seafloor throughout the Sale 149 area is considered to be stable. The risk of turbidity currents is low. Drilling and/or production sites are reviewed on a site-specific basis prior to commencement of activity. Seafloor stability is one of the parameters reviewed.

MC-02
The data are summarized from a shoreline database compiled by Gundlach et al., 1990. The total amount of shoreline in the planning area is approximately 7500 km. For the base case, the OSRA estimates a chance of one or more oil spills ≥1,000 bbl occurring and contacting 19 land segments . These 19 land segments have approximately 92 km of marsh shoreline. For the high case, the OSRA estimates a chance of one or more oil spills ≥1,000 bbl occurring and contacting 34 land segments. These 34 land segments have approximately 106 km of marsh shoreline.

MC-03
Yes, there are rocky shorelines in lower Cook Inlet and Shelikof Strait similar to the sheltered rocky shorelines in Prince William Sound.

MC-04
The alternatives are analyzed to determine differences in effects to environmental resources from impact-producing factors such as oil spills. You are correct in your interpretation that some of the alternatives show less of a chance of one or more oil spills ≥1,000 bbl occurring and contacting some environmental resource areas and coastline than does the base case.

April 19, 1995

Joel Cooper
P.O. Box 3585
Homer, Alaska 99603

Judith Gottlieb, Regional Director
Minerals Management Service, Alaska OCS Region
949 East 36th Avenue
Anchorage, Ak 99508-4302

Dear Judith,

Once again I am communicating to you, this time, in my personal written comment, to cancel Oil and Gas Lease 149. As the hours, days, and weeks analyzing and discussing the DEIS continue to pile up, pile up like the dead fauna and flora will if MMS allows this sale to take place, I find more and more that the DEIS is extremely flawed and biased. And that the individuals who put this document together did not adequately research the marine, human, and coastal environments that the lease sale will affect nor did they utilize properly the information they did gather. This is a draft document and is suppose to be reviewed and criticized, however, myself and the hundreds of other people who have put countless hours studying this document should not have had to put this much time and energy into providing public comment on such a critical issue. It is the job of MMS to produce a workable DEIS not the public, the people at MMS are being paid to do this, the general public are using their valuable time away from work to give their input. Furthermore, it has been readily apparent early on that Oil and Gas Lease Sale 149 should not take place! So, once again, I support Alternative II, the no lease sale alternative.

This poorly drafted EIS is enough information to not proceed with writing a Final EIS, however, I will proceed to list points that were not addressed and those that were inadequately addressed.:

- A major point that stands out immediately is that Lower Cook Inlet is an area that is still recovering from the affects of the Exxon Valdez Oil Spill. The Exxon Valdez Trustee Council, which the U.S. Department of Interior is a member, was established to establish

a ecosystem-based approach to implement the Restoration Plan. The Trustee Councils' major focus of its mission is: general restoration, habitat protection, and research and monitoring. I would like to know how the U.S. Department of Interior can legally offer oil and gas lease sales in an EVOS affected area? The DEIS says that there will be Unavoidable Adverse Effects. JC-01

- The fact that Cook Inlet is one of the most active volcanic areas in the world and that Augustine Volcano, which sits near the center of the lease sale, erupts every 10-12 years with a major eruption is expecting to occur. The volcanologist claim that a major event is expected to take place and that Augustine volcano needs a 200 mile radius. They claim that they have provided this information to MMS. This is enough to cancel lease sale 149 right now! Why has this not been addressed? JC-02

- The fact that Cook Inlet is one of the most siesmically active area in the world. This poses a major threat to not only the propsed lease sale, but also to the development that exists in Upper Cook Inlet. This was briefly mentioned but does not discuss the impacts that a major quake of the magnitude of 8.2 or greater, which we know will happen, will have on the platforms and pipelines. How will a major quake affect the infrastructure that will exist if this sale takes place? Can we cancel this sale now? JC-03

- The fact that Lower Cook Inlet has some of the most extreme weather and sea conditions in the world. Winds of 100 mph and greater frequently occur in the fall and winter and winds up to 60 mph commonly occur throughout the year. This makes cleanup of oil spills impossible! This fact was very poorly addressed. Why? The most extreme conditions must be addressed! Surely this is enough information to cancel the lease sale? JC-04

- That the DEIS assures repeated small oil spills and predicts a 27% to 87% likelihood of one or more major spills. This information should be considered at all times when addressing the adverse effects to marine, human, and coastal environments surrounding the lease area. And that once the spill occurs it will spread throughout Cook Inlet and down Shelikof Strait. This is not hard to see. The oil spill model addressing how oil will spread is flawed and even says so. How can this lease sale proceed? JC-05

- The Fact that the communities surrounding the lease area depend upon the unspoiled natural qualities and continued productivity of Cook Inlet for their economic and subsistence livelihoods. The people of Cook Inlet, the state of Alaska, the U.S. of America, and the World depend on Cook Inlets ability to produce. The DEIS practically guarantees (27% to 87% chance) one or more major oil spills. The EVOS shows us the destruction once the spill occurs. How can we consider leasing this area? Please answer the following question. How can there be a moratorium to offshore oil drilling in Bristol Bay and not in Lower Cook Inlet/Shelikof Strait? This is a diversely productive area and deserves equal protection! JC-06 I'm sure by now you folks are drafting a press release announcing the cancellation of lease sale 149.

- The fact that upper Cook Inlet and Kenai Peninsula oil producers have consistently violated EPA discharge permits and have illegally dumped toxic and hazardous waste materials throughout the central and upper Kenai Peninsula. This should be addressed before offering other lease sales in adjoining areas. Why haven't they been adequately addressed? Why aren't MMS and the EPA working together? JC-07

- The fact that Cook Inlet lacks basic spill prevention measures such as a vessel traffic System, tanker escorts, or tractor tugs, and the Oil Pollution Act of 1990 does not require conversion to double-hulled tankers for another 20 years. Why is a lease sale being considered when these safeguards are not in place? JC-08

- The fact that just announcing a lease sale has already had adverse effects to the communities surrounding the sale. The city of Homer as been divided between its' local government and its' people. The people, as you know, have been speaking out in large numbers against Oil and Gas Lease Sale 149. The local government has responded by trying to take a marginal neutral stand and the mayor and several council members say that they are being pressured by the state government not to take a stand. This is not how Democracy is suppose to work. I will send all the newspaper articles documenting this.

Well, Judith , I have run out of time. The time allowed to comment is not adequate for working people. Please forgive all spelling and grammatical errors for I did not have time to proof this document. I

would greatly appreciate that my questions are answered appropriately. Thank YOU for your time and I look forward to your response. Finally, my seabird friends from the Barren Islands kindly ask you to cancel lease sale 149, they've experienced one major oil spill and lost many friends and they don't want to experience another!!!!!! Thanks Again!

Sincerely,

Joel Cooper

JC-01
The Outer Continental Shelf Lands Act requires the Department of the Interior to manage the Federal offshore gas and oil leasing program on the OCS. The OCSLA charges the Secretary of the Interior with administering mineral exploration and development on the U.S. OCS while conserving its natural resources. The Comprehensive Outer Continental Shelf Natural Gas and Oil Resource Management Program for 1992-1997 proposed five lease sales in the Alaska OCS Region. One of the sales included in the program was in Cook Inlet/Shelikof Strait. In developing the 5-year program, the Secretary carefully considered a broad range of factors in reaching his decisions, and sought to design a program that best met the energy needs of the American people and struck the appropriate balance between environmental concerns and the opportunity to find and develop new energy resources.

The Unavoidable sdverse effects of the proposal must be considered and weighed against the need for the search for new energy resources. The purpose of the EIS is to examine the potential effects of the proposal. Unavoidable adverse effects for this proposal generally are characterized as short term and localized. To create a comprehensive document, a scenario must be used wherein an oil spill would occur. The scenario for the base case—the most likely scenario for this proposal—has used for analysis purposes an oil spill of 50,000 bbl. Including an oil-spill event of this size in the EIS analysis does not indicate that such an event is expected to occur. The scenario is used only to analyze potential effects if such an event would occur.

JC-02
Several volcanic hazards are associated with Mt. Augustine Volcano. A very high-risk zone includes all of Augustine Island and the immediate offshore area around the island. Within this zone, the hazards are associated with pyroclastic flows, volcanic bomb fall, mudflows, tephra (ash) accumulation, and volcanic gases. Kienle and Swanson, (1985) do not extend this zone into the OCS area. .

A high-risk zone characterizes the immediate offshore area of Augustine Island, which is subject to pyroclastic flows, tephra accumulation, and volcanic gases. Hazards from the pyroclastic flows include the thermal and blast effects from nuee ardentes (hot gas clouds) that rise above the pyroclastic flows. The limit of the high-risk zone is taken to be three times the extent of the pyroclastic basal avalanche deposits (Kienle and Swanson, 1985). The high-risk zone does not extend into OCS waters.

A moderate-risk zone covers most of Cook Inlet and the Kenai Peninsula. This risk zone includes the potential effects of all the Cook Inlet region volcanos, not just Mt. Augustine. Hazards within this zone are due to tephra (ash) accumulation and low concentrations of volcanic gases. The effects of an eruption possibly would result in the temporary suspension of operations and increased maintenance (replacing filters, anti-corrosion, etc.) (Kienle and Swanson, 1985). This risk zone covers the Sale 149 area.

An additional potential hazard is the possibility of a tsunami generated by a volcanic eruption. The 1883 eruption of Mt. Augustine apparently generated a tsunami estimated from 20 to 30 feet high (Kienle et al., 1987). Because almost all of the Sale 149 area is in water depths greater than 100 feet, tsunamis would have little effect on drilling rigs and platforms. The major tsunami hazard is to coastal facilities and communities. Tsunami hazards for onshore facilities can be greatly reduced by proper location and design criteria.

JC-03
The first oil and gas discoveries offshore in Cook Inlet were in State waters, at least 2 years prior to the 1964 "Good Friday" earthquake. Any and all structures emplaced on the OCS must be engineered to withstand a maximum climatic or physical event, i.e., a 100-year storm or a massive earthquake. This is not to say that all installations will be quake proof, and that no damage will occur; however, significant advance in construction technology will, over time, minimize potential damage to installations and potential spillage of oil. Regarding the statement "we know a quake of 8.2 will happen," the calculation of the time of occurrence of an earthquake is speculative at best. Authorities in this field state that the return time for a major quake in the Cook Inlet could vary from a few decades to 800 years. Given the 19-year life of the field estimated for the proposed action, it well may never be disturbed by a major seismic event.

JC-04
Wind information for the Cook Inlet/Shelikof Strait area is presented in Section III.B.2.b of the EIS. The MMS considers this information adequate for the analysis presented in Section IV.B. Also, while winds helps to disperse spilled oil into the water column through wave action generated by the winds and increase the evaporation rate of the volatile components of spilled oil, the analysis of the effects of an oil spill are based, in part, on the assumption that none of the spilled oil is cleaned up. Also, it is noted in Section III.B.2.b(2) that drainage- (katabatic-) wind velocities can exceed 50 meters/second and extend for tens of kilometers offshore (50 meters/second is about 112 miles/hour or 97 knots).

JC-05
For purposes of analysis, the DEIS assumes small spills will occur based on statistical trends. There is a 27- and 72-percent chance of one or more spills ≥1,000 bbl occurring and contacting for the base and high case, respectively. These statistics do not relay any information about the size of the spill other than the fact that the spill is 1,000 bbl or greater. For purposes of analysis, a 50,000-bbl spill is chosen. There is not a 27-percent chance of a 50,000-bbl spill occurring. In modeling, simplifying assumptions are made about the natural environment. The fate of oil is governed by numerous secondary processes that transform and transport the oil such as advection, spreading, evaporation, dissolution, dispersion, emulsification, photo-oxidation, adsorption/ sedimentation, and biodegradation. The relationships of these processes to the environment are complex, and some are not well understood. Many of these processes are dependent on the oil type. In a frontier area, such as lower Cook Inlet, the oil type is not known. Furthermore, the OSRA results are used to analyze other scenarios, such as the transportation routes, which may represent different oil types. For these reasons, secondary transport processes are not included in the OSRA. A weathering model is used to provide information regarding evaporation, dissolution, dispersion, and spreading. The weathering information is used by EIS analysts in conjunction with the OSRA results in their interpretation of oil-spill effects on social, economic and environmental resources. Were oil to be found, the location of the spill area would be known as well as the oil type and its characteristics. The production and development EIS would cover these aspects in more detail.

Oil spills are one of the largest impact-producing factors considered in every analysis of social, economic, and environmental resources in an environmental impact statement for an oil and gas lease sale. The EIS analysts make extensive use of the Oil Spill Risk Analysis (OSRA) for determining what resources may be contacted by an oil spill and the effects to environmental resources from an oil spill. The MMS considers the OSRA adequate for a basic understanding of oil-spill trajectories. Quality-assurance checks provide an important means to verify the model. Drifter trajectories (Muench and Schumacher, 1980) were compared to modeled trajectories. In general, the diagnostic results of the three-dimensional hydrodynamic model show these features at the correct location and magnitude, meeting the zero-th order test of the basic model.

Also, please see the response to Comment AK-01.

JC-06

The Congress has, in its yearly Department of the Interior appropriations bills, beginning in 1988, included language that places a moratorium on oil and gas leasing and exploration and development activities in the North Aleutian Basin. Congress has not issued a moratorium on leasing in the Federal OCS area of Cook Inlet. The Cook Inlet area has been explored and developed and oil produced for many years in State waters, and a precedent has been set for safe and environmentally sound exploration and development and production activities in the Cook Inlet.

JC-07

The MMS recognizes the concerns of local citizens regarding illegally dumped toxic and hazardous waste materials; however, the regulations and the effects of onshore petroleum contamination are the responsibility of the State of Alaska (Dept. of Environmental Conservation), the USEPA, and the Fish and Wildlife Service if illegal dumping has occurred in the Kenai National Wildlife Refuge.

The MMS and USEPA do cooperate. The MMS and USEPA have a cooperative agreement to prepare EIS's for oil and gas exploration and development on the Alaskan OCS (Sec. I.C). In addition, MMS conducts inspections for compliance with the USEPA's National Pollutant Discharge Elimination System permits for operational discharges (Sec. IV.A.4.a(3)).

JC-08

Please see the responses to Comments KCN-05, UFA-06, and TAG-17.

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Copy of letter faxed 4/19/95

Willy Dunne

Naturalist Guide

Telephone (907) 235-7578

PO Box 15043
Fritz Creek, AK 99603

April 19,1995

Judith Gottlieb, Regional Director
Minerals Management Service
Fax : 907-271-6805

Dear Ms. Gottlieb,

Please consider and respond to the following comments on the Draft EIS for Lease Sale149.

The DEIS does not adequately consider the impacts of potential oil spills on shorebird staging areas in lower Cook Inlet and Kachemak Bay. Kachemak Bay was recently designated as an international site in the Western Hemisphere Shorebird Reserve Network, one of only 2 such sites in Alaska, due to its extreme importance as a feeding area for hundreds of thousands of migrating shorebirds. It is estimated that up to one half of the worlds population of Surfbirds utilizes Kachemak Bay during migration. An oil spill in the lease sale area could have significant impacts on shorebird habitat. WD-01

The DEIS does not address the potential impacts to the economic benefits derived from watchable wildlife activities. The Homer Chamber of Commerce and the US Fish and Wildlife Service have developed the Kachemak Bay Shorebird Festival which has had a significant economic impact for the community of Homer and provided income to numerous businesses during the "shoulder" season of tourism. How will lease sale 149 and potential oil spills affect these economic opportunities? WD-02

What are the impacts of potential oil spills to invertebrates, which are an important part of the marine food web? WD-03

The DEIS appears to present conflicting figures on Humpback Whale populations in the lease sale area. What are the actual population figures? WD-04

The DEIS does not present spill scenarios during all months of the year. We have learned from the Exxon Valdez Oil Spill that seabirds are more vulnerable during some seasons than others. What are the impacts of potential oil spills on seabirds during each month of the year? WD-05

The DEIS does not adequately address the socio-economic impacts to the sustainable economy of the communities in the lease sale area. For example, what are the impacts of the lease sale on the availability of low cost access to personal use fish and shellfish. My family uses in excess of 700 pounds of wild harvested food each year. How will the increase in residents and itinerant workers to the region impact my ability to supply my family with wild harvested food? What will the impacts be on costs of living? What will the impacts be on availability of housing, recreation, and harbor space be? These are only a small fraction of the questions that need to be addressed. WD-06

Thank you for the opportunity to comment. Please address these concerns and supply me with any further documents that are published regarding lease sale 149.

Sincerely,

Willy Dunne

Willly Dunne

WD-01

The combined probability of one or more oil spills ≥1,000 bbl (including the assumed 50,000-bbl spill) occurring and contacting outer Kachemak Bay (ERA 3) is <5 percent, and the probability of one or more spills occurring and contacting inner Kachemak Bay and Homer Spit is 1 percent (see Figs. IV.B.1.d-1 and IV.B.1.g-1). These probabilities indicate that an oil spill in the Sale 149 area is very unlikely to contaminate the important shorebird habitat in Kachemak Bay. The DEIS assesses the effect of oil-spill contamination of shorebird and sea duck habitats on page IV.B.1-36, second complete paragraph, and in the last sentence of the conclusion on page IV.B.1-38, second complete paragraph. The designation of Kachemak Bay as a Western Hemisphere Shorebird Reserve has been added to the text of the EIS on page III.B.9.

WD-02

Potential economic impacts on the tourist industry for the Southcentral region have been added to Section IV.B.1.m. and corresponding sections for alternatives. However, specific reference ~~has not been made to the Kachemak Bay Shorebird Festival. It would be difficult to account~~ for such specific events in the region.

WD-03

The effects of an oil spill on invertebrates are discussed in Section IV.B.1.

WD-04

Precise estimates for numbers of humpback whales present in and adjacent to the proposed sale area are not available, and are not likely to be in the foreseeable future because of budgetary constraints. However, reasonable estimates for seasonal occurrence based on previous studies and incidental observations are available and used in the analysis of potential effects. Estimates given in the document for the region and the sale area have been revised to eliminate confusion.

WD-05

The DEIS effects section on Marine and Coastal Birds focuses on potential oil spills occurring during May through September (summer season) using the Oil Spill Risk Analysis Model. This period includes the months when seabirds would be most vulnerable to oil spills. It includes the spring period (May), when the birds are congregated on the water near the seabird-colony cliffs, and also includes the fall period (September), when the seabird adults and young are congregated on the water near the colonies during their feather-molting season. It is during the molting season when the birds are flightless that they are most vulnerable to oil spills, because they cannot escape from the water if an oil spill sweeps through the area. Please see Section IV.B.1.d., Effects on Marine and Coastal Birds, for assumptions about oil spills occurring during the summer season. During the winter season (October-April), seabirds and other marine and coastal birds are expected to be less vulnerable to oil spills (because the birds have dispersed over their winter range in the Gulf of Alaska), and thus the effects are expected to be less if a spill occurs during the winter season. If oil spills occurred during any month of the summer season, the effects on seabirds are expected to be about the same; thus, analyzing spills occurring each month of the year is not likely to change the conclusion on potential effects of oil spills on marine and coastal birds. The DEIS in Section IV.B.1.d., Effects on Marine and Coastal Birds, assumes a severe case where the 50,000-bbl spill sweeps through the coastal waters near the Chisik-Duck Island seabird colonies when the seabirds are rafting-congregating on the water near the colony, a season and situation when the birds are most vulnerable to oil spills.

WD-06

The EIS addresses the impacts in the sustainable (renewable-resource-based) economy of the communities of lower Cook Inlet. Although the Native communities of lower Cook Inlet are singled out as most affected, the analysis considers communities throughout the Kenai Peninsula. An increase in population may increase competition for wild foods, especially increased hunting pressure on local big-game animals. There may also be increased pressure on personal-use fishing for adult salmon, although State records show that the number of salmon caught in 1989 and 1990 actually were peak catch years for the southern district, lower Cook Inlet personal-use/subsistence set gillnet salmon fisheries (ADF&G, 1995).

RECEIVED
Anchorage, Alaska
MAR 28 1995
REGIONAL SUPERVISOR
FIELD OPERATION
MINERALS MANAGEMENT SERVICE

March 23, 1995
Grants Pass, Oregon 97527

U.S. Department of the Interior
Minerals Management Service
Alaska O.C.S. Region
Regional Supervisor, Field Operations
949 East 36th Avenue MR 603
Anchorage, Alaska 99508-4302

RE: O.S.C. Cook Inlet Planning Area Oil and Gas lease Sale 149

On this anniversary date of the Exxon Valdez oil spill disaster, Iam opposed to Cook Inlet Land Lease Sale # 149 for the following reasons:

1) No oil and gas development should take place until the "burden of proof" is put on the shoulders of the industry that wishes to destroy our environment for development purposes. The "burden of prove" should not be up to the agencies, at the expense of the taxpayers, when all proceeds go to the International Conglomerates of big business. It is our land, water, and air that is being polluted and raped by big industry, so let the "burden of proof" lay with them.

2) I'm concerned that M.M.S. is proceeding with this Draft Environmental Statement without a comprehensive understanding of the long term and chronic effect of millions of pounds of toxins that have entered the land, air, and waters from upper Cook Inlet offshore oil platforms, refineries, oil storage and loading facilities, and petro-chemical plants. PG-01

3) There has never been a baseline study done of pollutants on the benthic communities of Cook Inlet. Without a baseline study, there is no way for scientists to know how much toxins have accumulated up to date, and how much will continue to accumulate in the future. This must be done.

4) Sustainable communities will be threatened once again by offshore oil and gas development.

5) Oil and gas development threatens the long term viability of multi million dollar commercial and recreational fisheries that provide a long-term economic base for local communities. Fishing is the mainstay of Alaska's coastal economy and employs more people statewide than the oil and gas industry.

6) I find it incomprehensible and unacceptable to lease and develop in an area that continues to suffer from the impacts of the Exxon Valdez oil spill disaster. There needs to be more information made available on the long term affects of the environmental degradation of all species of life of that area. Not all reports have been made public, so the information that is available is incomplete. PG-02

7) Cook Inlet is the feeding, molting, and calving area of the Cook Inlet Beluga Whales, which represent a unique and vulnerable population.

8) The Stellar sea lion is a "threatened" species under the Endangered Species Act. It has suffered a decline which exceeds 70% in Alaskan waters since the mid 1970's.

9) There are numerous protected areas located within or adjacent to the lease sale area. Five of these are National Wildlife Refuges which include: The Alaska Maritime; Alaska Peninsula; Bechoraf; Kenai; and Kodiak. There is also Lake Clark National Park and Preserve; Aniakchak National Monument and Preserve; Alaska State Game Sanctuary and McNiel River and Trading Bay Game Refuge; Katmai National Park Reserve; and Kachemak Bay, Fox River Flats, Clam Gulch, Anchor River, Fritz Creek, Redoubt Bay and Kaligin Island Critical Habitat areas. These areas must not be allowed to be destroyed by an accident waiting to happen, and it will happen!

10) There are diverse and productive fish and wildlife habitat areas which include seabird colonies and foraging areas, waterfowl habitat, nursery grounds and migratory routes for anandromous fishes and marine mammals.

11) There is overwhelming community opposition to offshore oil and gas development in lower Cook Inlet, as shown at countless "scoping" and "dialogue" meetings. My gut feeling is that this opposition has been taken too lightly by M.M.S. and it might come back to haunt them. PG-03

12) Spills are inevitable. Weather, waves, and sea ice conditions common to Cook Inlet would make cleanup procedures impossible. (I have witnessed this first hand.) M.M.S's own data states the chance of two or more large spills is 64% That percentage is unacceptable to take such a chance on repeating a spill or blowout and all it's consequences similar to the Exxon Valdez and Glacier Bay trajedies.

13) Five years has passed and the criteria spelled out in the Oil Protection Act of 1990 has not been met by the International Oil and Gas Conglomerates. They must not be allowed to go on with business as usual, until all criteria has been adhered to.

14) I find the extension of the NPDES permits to be unacceptable when thousands of violations have occurred and continue to occur in Cook Inlet. These violations must be cleared up and stopped before more development is allowed. Just being fined on a piece of paper does not take care of the pollution source, nor does paying the fine and being allowed to carry on business as usual clear up the problem of contamination. The source itself must be brought into compliance and stay in compliance at all times. PG-04

15) I find it ironic that the M.M.S. whose sole purpose is to develop oil and gas extraction for financial gain, will be the identity that will investigate compliance of NPDES reports. This arrangement stinks of big government and big business coercion. PG-05

16) ARTICLE III (B) of the Memorandum of Agreement states: "The MMS will provide the EPA with copies of completed NPDES inspections lists and other pertinent information on a monthly basis unless otherwise agreed to by the MMS and EPA." The words unless otherwise concern me. While looking into NPDES reports in Cook Inlet waters, I was told by EPA officials, that some of the platforms had not been visited in five to seven years! That is a much different scenario than one month as stated in ARTICLE III! PG-06

17) I'm deeply concerned for the villages such as Tyonek, Nanwalek, Port Graham, and the Chignik area that rely heavily on at least 34 different species for their year round subsistence, and for fishermen who make their yearly livelihood in just a few short weeks. An oil spill would devastate those communities and fishermen. I feel this issue is taken much too lightly by the powers that be. It must be considered a bigger piece of the pie, although it might not be as tasty as the oil and gas share. PG-07

18) Double hulled tankers, escort tugs, and warning lights must become a prerequisite for Cook Inlet Land Lease Sale #149. This must become an important criteria in the safety equation for development and transportation, as all oil leaving the state of Alaska goes by tanker.

19) There are no Oil Spill Contingency Plans in place that work, period! Until such time that the correct equipment and proper training is in place, Land Lease Sale #149 should not be allowed to go forward. PG-08

20) A Local Emergency Plan with alternate routes of escape available if and when a catastrophic event should take place is not in place at this time. This plan must also become a prerequisite.

21) Until such time that safer alternatives for our earth and all species on it become as important as Oil and Gas development, and the development of such alternatives is available for public use and choice, all Outer Continental Shelf Land Lease Sales should be put on hold, including Cook Inlet Oil and Gas Lease Sale #149.

Sincerely, Patricia Garoutte Patricia Garoutte
4349 Midway Avenue
Grants Pass, Oregon 97527
Phone: (503) 479-7830

cc: EPA Alaska Regional Office
Trustees for Alaska
Greenpeace Field office, Anchorage
US Fish and Wildlife, Alaska
Governor Tony Knowles
Cook Inlet Fisheries Association
CIRCAC, Kenai
Kenai National Wildlife Refuge
Alaska Oil and Gas Commission
DEC Kenai Branch (Oil and Gas Division)

PG-01
Baseline studies to determine background levels of hydrocarbons in the water column, sediments, and benthic flora and fauna of Cook Inlet are described in Section III.A.5.c(4).

PG-02
An OCS oil and gas lease sale has been proposed for Cook Inlet; this is no guarantee that areas will be leased and developed—or even that a lease sale will be held. Preparation of the DEIS is just one part of the lease-sale process described in Section I.A. of the EIS. As of June 1992, studies that were part of the damage assessment following the *Exxon Valdez* oil spill are being released to the public; there are some final reports and many interim reports, and some reports still are being prepared. Information about the reports is available through the Oil Spill Information Center, 645 G Street, Anchorage, AK 99501.

In addition, the *Exxon Valdez* Oil Spill Trustee Council funds a number of investigations to study the effects of the EVOS. Information also is available from environmental studies of other oil spills that allow reasonable estimates to be made on some long-term effects.

If Sale 149 is held and if commercially recoverable quantities of oil are discovered, a development EIS will have to be prepared before development and production of the resources would be allowed. Development is estimated to occur in 1999 or 2000. This is about 10 years after the EVOS and should be enough time to complete the damage-assessment work begun immediately after the spill. Also, there will be 5 to 7 years of EVOS Trustee Council-sponsored studies to help in evaluating any development proposal.

The statement regarding recovery is addressed in the responses to Comments TAG-01, TAG-02, TAG-03, and TAG-08.

PG-03
The MMS does not take opposition to the OCS oil and gas leasing program or individual lease sales lightly. We constantly work with groups and individuals to try to modify the program or proposed lease sales to address their concerns. Changes might include: (1) deferring part of a planning area from a lease sale because of environmental concerns of interest groups such as the commercial-fishing associations; (2) adding measures to help reduce or eliminate potential effects of petroleum development—this includes surveys to determine the extent and composition of biological populations or habitats that may require special protection; (3) conducting monitoring studies to identify potential adverse effects; and (4) holding meetings in communities that might be affected by offshore oil and gas development to explain the program, the steps MMS is taking to address specific concerns, and to answer any questions.

Citizens in Cook Inlet communities also have written to MMS supporting Sale 149 and expressed support during the public hearings in Anchorage and Kenai.

Negative reactions to any project that poses a threat to an individual's or community's status quo certainly are to be expected. However, to state that the public sentiment in the communities surrounding the lease-sale area has been overwhelmingly against the sale does not seem to be the case, if the actions of elected public officials are a measure of the widespread public reaction to Sale 149.

In Homer, the City Council did pass a resolution opposing Sale 149; however, the mayor vetoed the resolution and his veto was upheld.

The Kenai Peninsula, Kodiak Island, and Lake and Peninsula Boroughs met and jointly agreed (Tri-Borough Position Paper) that five critical issues must be included in the lease-sale EIS and specifically addressed in the terms and conditions in any proposed Notice of Sale. If the five issues were not addressed in the lease-sale review process, the three boroughs would have grave reservation about supporting the lease sale. (Furthermore, in his statement at the Sale 149 Public Hearing in Kenai on March 6, 1995, the Kenai Peninsula Borough Mayor noted that the Tri-Borough position was to encourage the Lease Sale 149 to proceed provided the caveats in the resolution.)

The five issues in the Tri-Borough Resolution are:

1. no offshore loading of tankers;
2. specific plans to minimize and avoid commercial-fishing gear conflicts with the exploration and development of oil;
3. the oil exploration company must have adequate spill-prevention and -response capability;
4. identification of critical habitat areas; and
5. provision for local government revenue sharing.

The three boroughs further stated that they looked forward to the opportunity to discuss and further develop these concepts with organizations and individuals interested in Sale 149.

A letter from the Borough Mayor of May 22, 1995, noted that the "Kenai Peninsula Borough Assembly supported Lease Sale 149 when it adopted the 'Tri Borough' resolution in 1993. All of the concerns expressed in that resolution have been satisfactorily addressed in the Draft Environmental Impact Statement."

In their letter commenting on the OCS Lease Sale 149 Proposed Notice of Sale and the DEIS (KIB, Sec. V), The Kodiak Island Borough recommended that MMS adopt Alternative V, the Coastal Fisheries Deferral. They further noted the borough was pleased that the proposed Notice incorporates four of the five critical issued identified in the Tri-Borough position paper as either stipulations or information to lessees and recognized that the position for local government revenue sharing was beyond the scope of MMS.

PG-04
Violations of the USEPA NPDES permit are discussed in the response to Comment TAG-12.

PG-05
The sole purpose of MMS is not to develop oil and gas for financial gain. The USDOI is required by law to assess and manage development of the Federal offshore energy and mineral resources for the benefit of the Nation. As a bureau of the USDOI, MMS's primary responsibilities are to manage these resources and collect revenue from Federal OCS and onshore Federal and Indian lands and distribute those revenues to Indian tribes and allottees, States, and the U.S. Treasury. The MMS's funds annually are appropriated by the U.S. Congress in the USDOI appropriation bill.

PG-06
The oil and gas production facilities in upper Cook Inlet are located in waters that are under the jurisdiction of the State of Alaska; inspections of these facilities are the responsibility of the State and not MMS.

For exploration drilling in the OCS waters of Alaska, MMS has had an inspector on board the drilling unit during drilling and testing operations to ensure compliance with MMS regulations and—in conjunction with the USEPA/MMS Memorandum of Agreement coordinating the EPA NPDES permit compliance program with the MMS offshore inspection program—NPDES permit requirements.

To date, there has been no production in Alaska OCS waters. If production occurs in Alaska OCS waters, MMS will work with USEPA to develop an inspection program based on the requirements of the NPDES permit that is in effect at the time production begins. The technologies and strategies for handling discharges 5 to 10 years from now are likely to be different than those presently used on the production facilities in upper Cook Inlet; most of these platforms were installed in the mid to late 1960's. For example, there is a trend for produced waters to be reinjected instead of being discharged into the marine environment; whether or not injection of any discharges occurs will depend upon the characteristics of the geologic formations of the producing fields.

PG-07
Please see the response to Comment APH-04. A discussion of effects on other aspects of the economy has been added to the section about Effects on Sociocultural Systems in Section IV.B.1.k.

PG-08
Please see the responses to Comments KCN-05 and UFA-06.

March 6, 1995

To: MMS, Alaska OCS Region

RE: OCS lease sale 149

I oppose lease sale 149 in its entirety. Quite simply, the risk of catastrophic damage to the lower Cook Inlet ecosystem, and its dependant fisheries and tourism economy, is much too large. The 27%chance estimated for the base case development scenario of one or more oil spills greater than 1,000 barrels is an unacceptable level of risk to those of us who value our home and businesses. If commercial salmon fishing or halibut chartering posed a 27% chance of damaging existing oil industry operations in Cook Inlet, would the Federal or State government allow us to indulge in them? I suspect not. Fair is fair; please cancel this lease sale.

As noted in the Draft EIS, we already face a substantial risk from oil industry operations in Cook Inlet. The 'Glacier Bay' spill in 1987, and numerous smaller spills over the years, bring that fact into clear focus. We coexist uneasily with this level of oil development, and seek to improve the safeguards involved. Increased oil development in lower Cook Inlet would greatly complicate that task.

Sincerely,

Winslow Hoffman

Winslow Hoffman

p.o. box 1842
Homer, AK., 99603

March 6, 1995

RE: specific criticisms of DEIS for OCS lease sale 149

The DEIS is full of questionable analysis and conclusions. To fully critique this document would require a similar sized compendium, and more time than an unpaid person could reasonably devote to it.

Discussing the effects of spilled oil on herring eggs/larvae (IV.B.1-30), it is concluded "...it is possible that the increased level of developmental malformations and increased egg-larval mortality, along with environmental effects, may have contributed to the smaller herring runs in PWS during 1993 and 1994." Two pages later:"Herring populations historically fluctuate, and environmental factors and natural variability remain the most likely causes of the lesion outbreak and the poor herring returns." This conclusion is the opinion of the author with no data cited to back it up. It is intended to gloss over the demonstrated malformation and mortality of herring egg/larvae by exposure to crude oil.(Kocan et al. 1993, and McGurk and Biggs, 1993) WH-01

In appendix C, page 4, the DEIS discusses the effect of a hypothetical 200,000 barrel spill in Kennedy Entrance on herring populations. "The number of herring and their spawn affected is indeterminate; however, the loss likely would be large in the coastal areas contacted by oil where herring spawn. Given the size and distribution of herring populations and the limited coastal area contacted, there probably would not be a large-scale loss of herring from this 200,000 barrel oil spill." If the number affected is "indeterminate", how can the conclusion be made that "probably" no large-scale loss would occur? That is wishful thinking, not science or logic. Common logic based on the experience of the EVOS event tells us that the area of oiled coastline would be similarly large, not limited. Therefore, the probability is unknown, but depending on which and how much coastal area is oiled, the potential for damage to herring populations is large. This is of concern for commercial fisheries, as well as for WH-02 the large percentage of sea life which consume herring, including threatened Stellar Sea Lions.

Stellar Sea Lions are currently listed as threatened. Further declines in their numbers might cause them to be listed as an endangered species, yet the DEIS glosses over this potential effect. The close proximity of the lease sale area to the Barren Islands rookery and Marmot Island rookery puts those rookeries in danger from the increased chance of a large oil spill. The DEIS states that exposure of Stellar Sea Lions to an oil spill in this vicinity "is expected to result in loss of less than 100 individuals." In conclusion, it states: "...mortality resulting from an oil spill is expected to require at least one generation for recovery."(IV.B.1-59+60) It should also state: Such a loss of individuals may contribute to the listing of Stellar Sea Lions as endangered. Such a listing would trigger further restrictions of commercial fisheries throughout Alaska, and cause economic harm to large numbers of people. WH-03

In addition, the statistics purporting to represent the likelihood of oil from a spill reaching various shore segments seem absurdly low, especially for the Barren Islands, Southern Kenai peninsula, and Alaska Peninsula. Lengthy investigation of the statistical procedures used in the DEIS would be required to confirm or disprove this suspicion. WH-04

Sincerely,

Winslow Hoffman

Winslow Hoffman

p.o.box 1842
Homer, AK., 99603

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WH-01

As stated in the EIS, there are no data indicating that the EVOS caused the outbreak of viral hemorrhagic septicemia. The FEIS for the *Exxon Valdez* Oil Spill Restoration Plan (1994) states that ". . .previous exposure to toxins can affect the immune system of fish making them more susceptible to disease, but without an accurate estimate of level of exposure, it is not known if the oil spill caused this outbreak." The role of the virus in the population decline is not known. In addition to the virus, a fungus has been detected in the herring population. The fungus previously has caused major population crashes in Atlantic herring, and its effects appear to be stress-related. Although the virus and the fungus were not detected until 1993, 4 years after the EVOS, it is possible that the virus and the fungus effects were accentuated due to stress on the herring population as a result of the oil spill. The wording in Section IV.B.1.c.(2) has been changed to make the conclusion less definitive.

WH-02

The conclusion in the text is based on OSRA-estimated probabilities of spilled oil contacting specific environmental resource areas or land segments. If a coastal area where herring spawn is heavily oiled, losses could be high. Based on the OSRA, many of the coastal areas have a low probability of contact. For instance, Kamishak Bay, a herring-spawning area, has a 13-percent chance of contact by spilled oil one of the highest probabilities estimated by the OSRA for contacting herring-spawning habitat. Most other areas have a lower probability of contact by spilled oil. Thus, the conclusion is there probably would not be a large-scale loss of herring.

WH-03

Given the oceanography of the Cook Inlet area and probable spill rate, the probability of an oil spill occurring and contacting the Barren Islands or Marmot Island sea lion rookery areas is ≤2 percent. It is expected that the Steller sea lion, given its current rate of decline, will be listed as endangered before the loss of any individuals from a Sale 149 oil spill would influence such an action; production from Sale 149 is estimated to begin in 2003, 7 years after the lease sale.

WH-04

The OSRA does not estimate that the chance of an oil spill contacting the Barren Islands, southern Kenai Peninsula, or Alaska Peninsula necessarily is low. Oil spills from certain lease blocks or transportation segments of the Sale 149 area have greater potential to contact those areas. The conditional probabilities assume a spill occurs. The path of the spill (trajectory) is followed, and contacts to land segments and ERA's are tabulated. The range of chances of an oil spill ≥1,000 bbl contacting (conditional probabilities) the Barren Islands, southern Kenai Peninsula, and the Alaska Peninsula after 30 days during summer and winter are summarized as follows:

	Barren Island (ERA 6 and LS 47)	Southern Kenai Peninsula (LS 39-45 and ERA 3)	Alaska Peninsula (LS's 1-22 and ERA's 9, 11, 12, 14
Hypothetical Spill Sites (Lease Blocks)	>5 to <50	>5 to <99.5	>5 to <99.5
Transportation Segments (P1-P5, and T1-T8)	<0.5 to 95	<0.5 to 63	<0.5 to 45

The analysis in the DEIS also uses combined probabilities that include the chance of a spill occurring as well as the chance of a spill contacting. The OSRA estimates a mean number of spills ≥1,00 bbl for the base and high cases of 0.31 and 1.26, with an estimated 27- and 72-percent chance of one or more such spills occurring, respectively. Combined probabilities depend on the chance of spill occurrence, the estimated volume of oil to be produced or transported, and the oil-transportation scenario.

Therefore, although the chance of a spill contacting may be larger, once the chance of a spill occurring is factored in, the chance of a spill occurring and then contacting can be less than just the estimate of a spill contacting. For the base case, the combined probabilities (expresses as percent chance) of one or more ≥1,000-bbl spills occurring and contacting the Barren Islands, southern Kenai Peninsula, and the Alaska Peninsula after 30 days range from 1 to 2, <0.5 to 4, and <0.5 to 2, respectively, over the life of the proposal.

6 PAGES TOTAL

P.O. Box 3355
Homer, AK 99603-3355
19 April 1995

Judith Gottlieb, Regional Director
U.S. Dept. of the Interior
MMS, Alaska OCS Region
949 E. 36th Ave.
Anchorage, AK 99508-4302

Dear Ms. Gottlieb:

This letter contains my comments on the Draft Environmental Impact Statement (DEIS) for Cook Inlet Planning Area Oil and Gas Lease Sale 149. For the past five years I have worked on seabird research projects at the Barren Islands, in the mouth of Cook Inlet, as a research technician. During the previous five years I commercially fished in Prince William Sound.

Because of the high diversity and abundance of life, including human life, that depends on the biological productivity of lower Cook Inlet and because the sale area is in an area of strong wind and tidal currents surrounded by land, the probabilities of a "major" oil spill occurring during the oil production, as predicted by the DEIS, make Alternative II: "No Lease Sale" the only responsible choice for this proposal.

The effects of a major oil spill on life in and outside Cook Inlet could be greater than the effects of the *Exxon Valdez* spill. I base this conclusion on my knowledge of Cook Inlet and the effects of the *Exxon Valdez* spill, not my careful reading of the DEIS. Although I found the "Description of the Affected Environment" section diverse in its scope, fairly thorough in describing what is known about the environment (it showed that what is known about the environment is inadequate), and interesting to read, the description of the effects of oil spills in the "Environmental Consequences" section is inadequate, misleading, and illogical. AK-01

~~This problem stems from the use of the oil spill trajectory model to determine which land and~~ water areas would be affected by an oil spill in lower Cook Inlet. The model is inappropriate for this sale area. The model uses daily wind data and water current data to track the paths of hypothetical spills from many starting points and predict their termination points. With repeated simulations, the probability of oil contact is calculated for land and water segments around the sale area. To determine the points of oil contact, the model ignores oil spreading, and it stops the simulation when land is contacted. The spills are literally points in these simulations and thus, so are the contact areas.

The DEIS's introduction of the use of the trajectory model in IV.A.2.a states, "The OSRA [Oil Spill Risk Analysis]-model trajectories are used to estimate contacts over days, not hours; consequently, only those spills that are large (>1,000 bbl) and can travel long distances or persist for several days are appropriate for the OSRA-trajectory model...." Section IV.A.6.b states that these conditions were not met in the Cook Inlet simulations: "In many cases, there was little difference between the 10-day and 30-day estimated probabilities. This is because the study area

is restricted within Cook Inlet and Shelikof Strait, and long travel times for oil-spill trajectories were not observed." In fact, there is very little difference between the 3-day simulations and the 10- and 30-day simulations for any of the 74 "land segments" and 29 "resource areas" considered, as shown in the risk contour maps in the OSRA report (Johnson, et al. 1994, vol. 2). Had the authors of the OSRA report stated the number of kilometers and amount of time of oil travel "appropriate" for the model, and shown the number of kilometers and amount of time oil travelled in the simulation results, it might be more clear for readers (including the authors of the DEIS) why the Cook Inlet simulations don't make intuitive sense. AK-01

As stated in "Oil Spill Risk Analysis: Outer Continental Shelf Lease Sale 149" ("OSRA," Johnson, et al. 1994; this document is the basis for the DEIS's oil contact probabilities), "In general, only environmental resources near the hypothetical spill site have high probabilities of being contacted by spills originating at that location. This is logical because each trajectory simulation stops when land is contacted, and the simulations show relatively early contacts to land" (p. 1-15)." The "Conditional Probability" maps in Volume 2 of the OSRA show how close the resource areas must be in to the spill sites to have a high probability of contact in the simulations. For example, if oil is spilled from a platform 40 nm upstream from Augustine Island (Land Resource 27, p. 2-150), the probability is less than 5% that it will contact that segment. For a platform spill between 30 nm and 15 nm from the island, the probability of contact is between 5 and 25%. Within 15 nm the probability is between 25 and 50%. The probability never reaches 50% on the map because there are no federal lease sale platforms within 3 nm of the coast. Therefore, according to the OSRA, the probability that oil will contact Augustine Island after being spilled from a platform 3 nm upstream is less than 50%. This does not make intuitive sense with the *Exxon Valdez* spill in mind. But it is a logical result of the trajectory simulation. In the simulation, the size of the spill is not considered to calculate the probabilities of contact. The spill does not spread, and if it drifts north and contacts a land segment, it cannot later continue south.

Oil spills do spread. The DEIS section, "Sale 149 Open-Ocean Weathering Assumptions" (IV.A.10) states that when 50,000 bbl of oil spills, it will spread until, after 30 days, it discontinuously covers 3500 km², or ½ the sale area. A 3500 km² circle has a diameter of 38 km. ~~A 3500 km² rectangle of oil 10 km wide would be 350 km long. What if a 50,000 bbl spill is~~ stretched by the wind in open water and then is blown toward the shoreline? Does it oil 350 km of coastline? If it does, and if only 5 km of the width sticks to the shore before the wind shifts, is the rest of the oil likely to move and oil another area? The information in the DEIS raises more questions than it answers. Oil spread should be one of the basic assumptions for predictions of contact areas and estimates of damage to Inlet life. As if an admission of this fact, in some parts of the DEIS, the contribution of oil spreading to damage to Inlet life was mentioned, but in an offhand way, as if an afterthought. Although for lower Cook Inlet the trajectory model and the oil spreading model conflict with each other, they are used together in these illogical, obfuscating passages. I provide an example of these passages: the following paragraphs from the benthic communities section of the "Environmental Consequences" chapter (IV.B.1-27 to IV.B.1-29) which consider the effect of a 50,000 bbl spill on marine invertebrates. AK-02a

"The estimated effect of the assumed oil spill would depend on the species and lifestages contacted as well as the type and amount of oil reaching the intertidal and shallow subtidal zones, where contact with marine invertebrates is most probable. The type of oil reaching the intertidal and shallow subtidal zones would be mostly floating and dispersed oil. Some of this oil would be dispersed into the water column by wave action as it reaches the shoreline and would be incorporated into bottom sediments. The assumed oil spill of 50,000 bbl is assumed to occur in the summer, the most biologically productive time of the year. The OSRA estimates only a 1- to 2-percent combined probability of one or more spills ≥ 1,000 bbl occurring and contacting LS's ["Land Segments"] 21-35, 40, and 42 within 10 days (much of Cook Inlet and some of western Shelikof Strait).... For purposes of assessment, it is assumed here that much of Cook Inlet and some of the Shelikof Strait would be contacted by the spill....

"Based on these assumptions and estimated points of contact, oil associated with the base-case spill is estimated to contact about 50 percent of the intertidal and shallow subtidal habitat (rocky and sandy) within the Cook Inlet and Shelikof Strait area (i.e. 50% of the land segments). It is further estimated that of this 50%, about 40 to 60 percent of the marine invertebrates contacted would either be killed of would be sublethally affected (e.g., failure to molt of swim, reduced growth, feeding, and/or reproduction). This represents 20 (.50 x 40) to 30 (.50 x 60) percent of the intertidal and shallow subtidal marine invertebrates in the lower Cook Inlet/Shelikof Strait area."

The Summary of this section states, "Based on the assumptions discussed in the text, the assumed base-case oil spill is estimated to have lethal and sublethal effects on about 20 to 30 percent of the intertidal and shallow subtidal marine plants and invertebrates in the lower Cook Inlet/ Shelikof Strait area. Recovery of these communities is expected to take 2 to 3 years in high-energy habitats and up to 7 years in lower energy habitats."

The Conclusion of this section discusses the effects on open-water phytoplankton and zooplankton and then states, "The assumed base-case oil spill also is estimated to have lethal and sublethal effects on about 20 to 30 percent of the intertidal and shallow subtidal marine invertebrates in the lower Cook Inlet area. Recovery of these communities is expected to take 2 to 3 years in high-energy habitats and up to 7 years in low energy habitats. Less than 5 percent of the subtidal benthic populations in the lower Cook Inlet area are expected to be affected."

This passage raises some questions:

1) "The OSRA estimates only a 1 to 2-percent combined probability of one or more spills ≥ 1,000 bbl occurring and contacting LS's ["Land Segments"] 21-35, 40, and 42 within 10 days (much of Cook Inlet and some of western Shelikof Strait)."

a) Why were these particular land segments chosen for consideration in this scenario?

b) There is a 1- to 2-percent combined probability of one or more spills ≥ 1,000 bbl occurring and contacting any one of these land segments, according to the tables. The probability if the spill hitting all of the areas at once is not mentioned in the tables and in fact, the oil cannot, with the OSRA model, contact more than one area per spill. The authors have, however, attempted to use the results to obtain a probability of this occurring . Not only do they make this logical error, they also make mathematical errors. If there is a 1- to 2-percent AK-02a

probability of oil contacting each of these land segments, the chances that all segments would be contacted (if this could occur) would in fact be much smaller than for each segment. The fact is that the only way more than one land segment can be contacted in a spill is for the oil to spread and to contact multiple areas. This makes sense intuitively, but is not dealt with quantitatively and logically in the DEIS. It is dealt with simply by saying, "For purposes of assessment, it is assumed here that much of Cook Inlet and some of Shelikof Strait would be contacted by the spill." AK-02a

2) It's not clear how the following quantities of land relate to each other: AK-02b

a) "Land Segments 21-35, 40, and 42"

c) "About 50 percent of the intertidal and shallow subtidal habitat (rocky and sandy) within the Cook Inlet and Shelikof Strait area."

3) "Based on these assumptions and estimated points of contact, oil associated with the base-case spill is estimated to contact about 50 percent of the intertidal and shallow subtidal habitat (rocky and sandy) within the Cook Inlet and Shelikof Strait area (i.e. 50% of the land segments)." This statement is in the second paragraph, and is repeated in the Summary of this section. The first phrase of this passage, "Based on these assumptions..." refers, I assume, to the conditions stated in the first paragraph: that the spill occurs during summer, that the size of the spill is 50,000 bbl, that there is a 1- to 2-percent chance that the oil will contact all the land segments mentioned, and that much of Cook Inlet and some of Shelikof Strait would be contacted. This suggests that no matter what the results of this scenario are, there is only a 1- to 2-percent chance that the scenario will occur in the first place. The conditions are, however, tossed for the Conclusion. It's important to state that there is only a 1- to 2-percent chance that the scenario presented in the Conclusion will occur, if that is the case.

This passage seems to be an attempt to patch the incongruities between the trajectory analysis on which the entire Consequences section depends, and the oil spreading model. Without the confusion that the use of the trajectory model introduces, it is clear that if removal of an oil spill in lower Cook Inlet is unsuccessful, after 30 days the oil in a 50,000 bbl spill will discontinuously cover up to ½ the sale area and when it moves toward shore it will contact many land segments, then move down the coast and contact more areas.

When oil spreading and multiple contact is considered, the scenario depicted for marine invertebrates may be quite likely, rather than unlikely, for any 50,000 bbl spill that occurs. This type of analysis of spill effects would change the DEIS's oil spill prognosis for most species in the Inlet.

For example, what happens to harbor seals when a slick of 3500 km² moves into Kamishak Bay--would the mortality be (see IV.B.1-44): AK-03

0.31 (the proportion of seals that disappeared from oiled haulout areas in the *Exxon Valdez* spill) times

0.21 (the "SF," or "Scale-Specific Mortality Factor," used because the *Exxon Valdez* spill was 5 times larger than the assumed 50,000 bbl spill in Cook Inlet) times 1,441 seals in the area?

Why would the SF be used in this case-- if all of Kamishak Bay is filled with an oil slick, the size of the entire spill would not affect the mortality of the seals within the bay. These types of questions should be asked and answered for every species considered in the DEIS. AK-03

Another question that could be better answered with a model that considers oil spread over time is, "What happens to the 798,000 marine birds counted in the lower Inlet (III.B.9) as the oil slick forms and moves? Mortalities of these birds could be better quantified with a model that considers the size, shape, and movement of the slick over open water and near the coast. AK-04

The DEIS Environmental Consequences section needs to be rewritten, using another model to predict which land and water areas that will be contacted by oil if a spill occurs. The model needs consider oil spread and the scale of the Inlet compared to the scale of a 1,000 bbl, 50,000 bbl, and 200,000 bbl spill. It should be based on wind data collected at real places in the Inlet (I could not determine how the daily wind data for the trajectory analysis were gathered). The major surface wind channels pointed out in the DEIS should be included, and should not be averaged with other collection points. Oil spreading projections should be based on these daily wind data, rather than the summer and winter averages in this DEIS, and should show the size, shape, and movement of the slick under different conditions. AK-05

Maps should be included that will give the reader an intuitive sense of the potential effects of a spill. There should be maps of the Inlet that show the size of oil slicks and their shape as they move. A description of what a "discontinuous slick" looks like should be included. The goal should be to give people the tools to think intuitively about the effects of an oil spill. The concepts are not very complicated. The trajectory analysis in this DEIS is difficult to understand not because the analysis is complicated but because its use for the Inlet doesn't make any sense. For this reason readers who wanted to understand the results of an oil spill in the Inlet were unable to do so with the DEIS.

~~The movement of an oil spill is highly variable and dependent on all sorts of environmental~~ conditions. This variability should be shown--this is the only way the reader will be able to know what the potential effects are. For example, what happens to a 50,000 bbl spill if the wind blows 50 knots from the southwest for two days? What if it's calm? What if the spill occurs in the middle of the sale area and the wind blows 60 knots from the northwest for four days (as it often does in late August and in September)? As the oil heads for the Barren Islands, does it go into the water column before it gets to the islands? If not, how much time passes before it gets there? How much has the slick broken up and what is the size of the slick with that kind of wind? These types of questions are discussed in the 200,000 bbl spill scenario, but should be applied to the 50,000 bbl spill also, for which probabilities of occurrence have been calculated. The questions should be answered for a variety of environmental conditions, not just average conditions; and not just for the month of April, as was done for the 200,000 bbl spill scenario. AK-06

If a realistic model were used to determine the fate of large oil spills in Cook Inlet, mapping of oiled areas and quantification of damage to Inlet life would be easier, more accurate, and

intuitively understandable by readers. If these effects were shown realistically, affected areas would be much more extensive and all areas would have a much higher probability of being contacted. Many of the effects of oil spills on Inlet life in the DEIS are dismissed as unimportant because with the trajectory model, only a small area of the Inlet is affected by any single spill. Were an accurate model used, the risks to life in the Inlet would increase. I suggest that if action on this lease sale is to continue, another DEIS be written. Alternative II, "No Lease Sale" would even more clearly be the best alternative.

Sincerely,

Arthur Kettle

AK-01
Although simplifications are necessary to model Cook Inlet/Shelikof Strait, the oil-spill-trajectory model is appropriate. The trajectories are calculated from observed wind fields and surface current fields derived from general circulation models (GCM) and tidal models. The GCM model is based on Semtner (1974) and Chao (1987) and is modified for Cook Inlet/Shelikof Strait. The GCM results were incorporated into the oil-spill-trajectory model to represent the density-induced, or buoyancy-drive part of the flow.

The simulated oil-spill trajectory moves as a series of displacements over time. The assumption is that the spill is represented as a point (the center of mass), and the trajectory traces the path of the spill's center of mass. In reality, there are many modifications to an oil spill over time and under different conditions. The oil spill will spread, separate, and lose mass through weathering. For purposes of the OSRA, the spill is treated conservatively; it does not spread or disappear through evaporation and weathering. The MMS has other models that examine the spreading, weathering, and smearing of the oil slick in the coastal regions. These supplemental models are used by the analysts to address particular scenarios once the coastal regions and resources that are at risk have been identified by the OSRA.

The reader is correct in stating that the simulations for contacting land do stop when the trajectory reaches land. However, not all simulations are conducted in this manner. Trajectories calculated for Environmental Resource Areas (ERA's) do not stop after contacting an ERA. Trajectories for ERA's are run for 30 days or until the trajectory leaves the model area.

It is intuitively correct that environmental resources closest to a spill area will have the highest chance of contact—not just a consequence of the oil-spill-trajectory analysis.

AK-02a
a) The Land Segments (LS's) 21-35, 40, and 42 were used in the lower trophics analysis because they represent the areas most likely to be contacted according to the OSRA. Although there is only a 1- to 2-percent combined probability that they would be contacted, the remaining land segments have less than a 0.5-percent chance of being contacted, according to the OSRA.

b) It is correct that the OSRA tables do not identify the probability of the spill hitting LS's 21-35, 40, and 42 all at once. However, the exact timing of contact is not critical to the analysis. What is relevant is whether land segments are or are not contacted by a spill within 10 days. As indicated by the OSRA, contact with more than one land segment (e.g., 21-35, 40, and 42) ~~has a 1- to 2-percent combined probability of occurring within 10 days.~~ Because these land segments were assumed to be contacted in the analysis, there was neither a logical nor mathematical error.

Also, please see the response to Comment AK-01.

AK-02b
a, c) Land Segments 21-35, 40, and 42 are the land segments having a 1- to 2-percent combined probability of contact within 10 days. These land segments represent about 50 percent of the shoreline intertidal habitat within the trajectory of the assumed 50,000-bbl oil spill.

b) If the 50,000-bbl oil spill were to occur, there is only a 1- to 2-percent combined probability of that spill contacting LS's 21-35, 40, and 42, according to the OSRA. Hence, there was no attempt to minimize the likelihood of the 50,000-bbl spill actually occurring and contacting multiple areas, because it already has been assumed to have occurred and contacted multiple areas in the analysis.

AK-03
The SF was used to provide an overall estimate of mortality for Cook Inlet, should an oil spill occur. It would not be used to estimate the mortality at a specific site, such as Kamishak Bay. There is no accurate way to predict that. The OSRA estimates there is an 8-percent chance that one or more spills $\geq$1,000 bbl would occur and contact the outer portion of Kamishak Bay/Augustine Island within 30 days. Areas that are heavily oiled likely would suffer a higher mortality of harbor seals than areas that are lightly oiled. However, even if an oil spill contacted Kamishak Bay and the area were heavily oiled, not all of the harbor seals would be killed. Most would suffer sublethal effects, but most would be likely to survive.

AK-04
On page IV.B.1-36, the DEIS assesses the effect on marine and coastal birds from the assumed 50,000-bbl spill spreading over an area of 3,458 to 3,715 km^2 as discontinuous slicks. Only a relatively small portion of the total population of 798,000 birds in Cook Inlet/Shelikof Strait (perhaps several thousand) are expected to be killed by the 50,000-bbl spill, is about one-fourth the size of the EVOS. Birds on or in the water when the spill swept through their location on the water would be killed. However, most of the birds in the air or in the area swept by the spill before or after the time that the spill was moving through the area would not be expected to be affected by the spill.

AK-05
The scale of a discontinuous 50,000-bbl oil spill compared to the Sale 149 Cook Inlet lease area is noted in Section IV.A.3.d.(1). The scale of a 200,000-bbl spill compared to the Sale 149 Cook Inlet lease sale has been added. A definition of a discontinuous spill has been added. Maps are not included so the reader is not biased by one scenario, because there are numerous scenarios. It would be imposible to include maps of every spill and weather situation. Instead, the results of the oil-spill-trajectory model are used to define the variablility.

The wind-data set used for the oil-spill-trajectory model was from the National Weather Service Limited Fine Mesh (LFM) model (Gerrity, 1977), and the 9-year simulation covered both the low-frequency variability and the interannual variability. The LFM winds were modified in the Cook Inlet and Shelikof Strait following the discussions with National Oceanic and Oceanographic and Atmospheric Administration investigators (Stabeno, 1993, pers. comm.). ~~The NOAA projects in Shelikof Strait since 1978 have shown that the winds are~~ significantly modified by the local topography (Muench and Schumacher, 1980). Recent low-level aircraft observations have suggested that the directions of winds calculated from large-scale pressure fields should be corrected to account for these orographic effects (Lackmann and Overland, 1989; Macklin, Stabeno, and Schumacher, 1993). Their experience with the wind product produced by the METLIB system from the barometric-pressure calculation revealed that the winds within Shelikof Strait and lower Cook Inlet should be modified according to the table below.

Table A
Rotation and Change in Magnitude in the Upper and Lower Shelikof Strait Necessary to Obtain Appropriate Ageostrophic Winds.

Geostrophic Winds	Upper Shelikof Strait		Lower Shelikof Strait	
Direction (T)	Direction	Magnitude	Direction	Magnitude
150-210	No Change	No Change	No Change	No Change
210-270	225	1.1	225	1.4
270-360	T-45	0.8	T-45	0.9
0-30	No Change	No Change	No Change	No Change
30-90	45	1.3	45	1.1
90-150	T-45	0.9	T-45	0.8

AK-06
One of the reasons an oil-spill model is used is to capture the variability in the environmental conditions rather than using one set of conditions in an oil-spill scenario. Wind data was used from a 9-year period from 1978 to 1987 with observations every 6 hours. All temperature and salinity data achived at NODC was used. These data represent all studies done by USDOI, MMS; USDOC, NOAA; and Universities. Two thousand trajectories were simulated for each of the 392 hypothetical spill sites that were located at the center of each block of the Cook Inlet Lease Sale 149. Transportation risks were generated by simulating 2,000 trajectories along hypothetical transportation segments. Over 810,000 trajectories were simulated to capture the variability of the natural environment in the Cook Inlet/Shelikof Strait region. It would be of little value to print each trajectory, because it is the sum of the trajectories that define the variability. The OSRA also provides information on the timing of the contacts indicating whether an environmental resource is contacted in 3, 10, or 30 days. This type of information is used for analysis because it does not just reflect one scenario as does the 200,000 bbl spill. The OSRA reflects a range of conditions and is considered in the effects analysis in Section IV.

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Juergen Kienle
P.O. Box 81658
Fairbanks, AK 99708

March 22, 1995

Raymond R. Emerson
Project Chief, Sale 149 EIS
MMS, Alaska OCS Region
949 E 36th Ave.
Anchorage, AK 99508-4302

Dear Raymond,

I would like to comment on the volcanological aspects of the EIS for proposed lease sale 149, Cook Inlet and Shelikof Strait. I find section III.A.1 (geology) very crisp. Only two and one half pages of text and six page-sized figures are devoted to geology in this two and a half inch thick EIS. Earthquake hazards are covered in two paragraphs, volcanism in three, and tsunamis in one. I think such a cursory treatment of the really serious geologic hazards in the proposed Cook Inlet and Shelikof Strait oil and gas lease area leave the EIS wide open for criticism by the public.

My main criticism is that this summary is not based on the current literature. So much has been published on Katmai and the Cook Inlet Volcanoes in recent years (last decade). None of this material is referenced in the EIS. For example an entire volume of the Journal of Volcanogical and Geothermal Research was recently dedicated to the 1989/90 Redoubt eruption. It includes several papers that deal specifically with aircraft hazards, and impact on oil & gas installations (Drift River Facility). The volcananologic information cited in the EIS is based largely on outdated OCSEAP Reports that are 15 years old. None of the four Cook Inlet Eruptions that occurred since Augustine 1976 are discussed in terms of the actual hazards involved.

Important items that I feel need discussion are:

JK-01

1) Hazards due to ash in the atmosphere, and it's impact on public health (inhalable and suspended particles in the air), aviation (near loss of Boeing 747-400 in December 1989 in a Redoubt eruption cloud), power grids (shorting out of transformers in power grids due to wet acid volcanic ash), impact on industrial equipment (e.g. clogged air filters in equipment used on oil platforms, or the Beluga power plant). ~~Damage due to ash impact during the 1989/90 Redoubt~~ eruption was, I believe, close to 100 million dollars.

2) Specifically concerning the oil industry, the threat of the Drift River flood waters to the Drift River Terminal is serious. Eruption-generated floods lead to the temporary shutdown of the facility in spring of 1990 and consequent temporary shutdown of the upper Cook Inlet oil platforms, also to a retrofitting of the terminal itself. None of this is mentioned in the EIS.

3) Tsunami hazards: Of all volcanoes discussed, Mt. St. Augustine, an island volcano, presents a great tsunami threat to oil development because it lies within the proposed lease sale area. It is the most active volcano in the eastern Aleutian Arc and should be given a wide berth with regards to offering lease blocks for sale.

JK-01

(The lease area discussed in the EIS also lies in the rupture area of the great Alaska earthquake, which spawned a major tsunami that raised havoc in Prince William Sound, the outer Kenai Peninsula, Kodiak Island, and caused many deaths and property damage as far away as Crescent City, California.)

The great eruption of Katmai, the biggest eruption in the world in this century, is mentioned in one sentence with no reference to the large body of literature published in the last 10 years, including a special JGR Letters volume.

Figure III.A.1-1 does not adequately show the locations of the eruptive centers. It is difficult to read the names of the volcanoes, the scale of the labels should be increased. There are also dozens of volcanoes on the Alaska Peninsula that are not shown. For example the Ukinrek eruptive center that formed two new craters in 1977 on the southern shore of Becharof Lake is not shown at all.

The important eruption of Augustine volcano in 1986 is not mentioned at all. Most of the other recent eruptions in Cook Inlet are mentioned by date only with no specific details about the eruptions and their hazards.

In my opinion, the volcanology section of the EIS (and incidentally also the seismic section - an upper limit of 800 years for recurrence of a the 1964 quake is cited from a very old reference) badly needs revision to reflect the present state of knowledge of volcanic, seismic, and tsunami hazards in Cook Inlet. A proper EIS for the planned oil & gas lease sale must have current information on these hazards. Good sources of information on volcanology are: Alaska Volcano Observatory reports, USGS open files and reports, DGGS publications and maps, Volcanological and Geophysical Journals.

Thanks for opening this EIS for public input. The views presented above are my personal ones and do not represent an official position of AVO or EIC of which I am a member, as you know.

Sincerely

Jürgen Kienle

Juergen Kienle

JK-01

An EIS is not designed to be an encyclopedic document. Discussion of hazards due to volcanic ash in the atmosphere and the impact of the ash on public health and facilities are beyond the scope of the EIS. Site location of production/transportation facilities would involve an in-depth review of potential hazards to avoid problems, such as the flooding at Drift River.

Tsunamis do not pose a significant threat to offshore facilities in lower Cook Inlet because of the water depth. Tsunami hazards for onshore facilities can be greatly reduced by proper location and design criteria.

Figure III.A.1-1 is a very generalized regional geological map of the Cook Inlet area and was not intended to provide detailed physiographical information. The scale of the map precludes locating all of the Cook Inlet volcanoes on it.

The 1986 Mt. Augustine eruption inadvertently was omitted from the text and will be included in the final EIS. Additional references also have been added.

Nancy Lord
P. O. Box 558
Homer, Alaska 99603
(907) 235-8252 phone
(907) 235-8253 fax

April 11, 1995

RECEIVED
APR 11 1995
12:30pm
REGIONAL DIRECTOR AK OCS
Minerals Management Service
ANCHORAGE, ALASKA

Judith Gottlieb, Regional Director
U. S. Department of the Interior, MMS, Alaska OCS Region
949 East 36th Ave., Room 603
Anchorage, AK 99508-4302

Dear Judith Gottlieb:

I wish to register my comments on the proposed oil and gas lease sale 149, as I was not able to attend the MMS hearing in Homer last month. I am opposed to a sale being held in 1996.

I've lived adjacent to the waters of lower Cook Inlet for 22 years and have fished commercially in both the upper and lower inlets for almost as long. I know firsthand how treacherous the sale area waters are, how rich they are in fisheries and related marine ecosystem values, and how important–indeed essential–they are to local residents for cash-based and subsistence economies.

I have reviewed the draft EIS and its appendices and am extremely troubled both by what they say and don't say. Much of the information is old and incomplete, and even then a clear picture emerges of environment risks that should be considered unacceptable by any person weighing them against possible benefits.

NL-01

Just as one example–consider beluga whales. The EIS rightly points out that Cook Inlet's beluga whales (now thought to number no more than 800) are a discrete population separated from those of western Alaska since the last ice age, and that the fact that they tend to congregate means that a single spill could impact the entire population (one listed as a candidate for endangered species). The EIS does not, however, indicate that no one knows–because no surveys have ever been done–where the belugas winter, although biologists believe they winter in the lower inlet, in precisely the waters proposed for leasing. Neither does the EIS consider what the evolutionary discreteness of this population means or the significance of the beluga as a subsistence food for Native peoples. (Beluga harvest numbers are another unknown, though they're thought to be 20–40 animals per year, likely at the margins of what's sustainable, and hunting pressure is increasing now that numbers of alternative marine mammals such as sea lions and seals are dropping precipitously, again for unknown reasons.) The EIS admits that there is no information about the effects of oil on belugas and that even basic data such as recruitment factors is lacking–and yet concludes that in its base case and 200,000-barrel spill analyses, few belugas would die and the population would rebound within a few years. The stretch to reach such a conclusion is completely indefensible.

NL-01

This is just one example of a lack of information and faulty analysis in the EIS. It can be multiplied many times, hundreds of times, to apply to almost every aspect of the biological resources, physical conditions, and social systems to be put at risk by oil development in the area.

If the above-mentioned population of whales were in East or West Coast waters, I feel sure the whales' habitat areas would be well-protected. It would not be permissible to put at risk either them or the people who depend on them culturally and nutritionally. Is our region to be given up just because we have so few people, with so little power, to defend it?

You know, certainly, that the proposed lease sale area is the same area still recovering from the *Exxon Valdez* oil spill. And you must know that, compared to Prince William Sound, virtually nothing has been done to improve tanker transport and oil spill prevention in Cook Inlet since that awful time.

I'm not saying never, ever drill in lower Cook Inlet, but it seems foolish indeed to hold a sale there in 1996. Any sale should certainly be postponed until adequate science and sociology is gathered and properly analyzed, and until much improved measures regulating tanker traffic and spill prevention are in place. To do less is a sad, sad sacrifice of values far more significant than a couple of months of oil.

Sincerely,

Nancy Lord

Nancy Lord

NL-01

The following changes have been made in the EIS:

- a reference to beluga whales overwintering areas (it is likely they spend most of the winter in the area south of the Forelands) in Cook Inlet has been added to the text (Sec. III.B.4.b(4));
- a reference has also been added regarding a National Marine Fisheries Service unpublished report that estimates the current population of belugas in the inlet at 898 (Sec. III.B.4.b(4));
- the conclusion that <10 beluga whales would die as a result of an oil spill has been changed to 43 (see the response to Comment CM-03).

There also are several other considerations. During part of the year, most of the whales are likely to be found in the upper Cook Inlet and would not be affected by an oil spill in lower Cook Inlet. The OSRA estimates a <5-percent chance that one or more spills ≥1,000 bbl would occur and contact Sea Segment 1 (near the Forelands) or many of the areas where beluga whales might occur. As a result, it is likely that <43 belugas would be killed. Finally, while there is no information regarding the effects of oil on beluga whales, it probably is reasonable to estimate the possible effects on beluga whales by looking at the possible effects of the EVOS on killer whales. The estimate for beluga whale mortality is based on assumed killer whale mortality. It should be noted that the missing killer whales in Prince William Sound are presumed to have died as a result of EVOS, though no killer whale carcasses were ever recovered.

Beluga whales are important subsistence resources for a sector of the Native population of Cook Inlet and are included in the marine mammals in Table III.C.3-3; the number of beluga whales harvested annually averages about 20 to 30. Marine mammals generally account for <10 percent of consumable subsistence resources in the Cook Inlet/Shelikof Strait communities.

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April 5, 1995

Judith Gottlieb
Regional Director
MMS Alaska OCS Region
Anchorage, Alaska
99508-4302

Dear Ms. Gottlieb,

I am writing to as a concerned citizen of Homer, Alaska, in reference to the Lease Sale 149 in lower Cook Inlet. I strongly feel that this sale should be reconsidered because of the following:

• Off shore drilling increases the turbidity of water, stirring up sand and silt, and decreasing sunlight reaching the photic zone, creating a subsequent impediment to organisms depending upon sunlight. MEL-01

• In addition, discharges of barium sulfate (drilling mud) used in the drilling process alter the chemistry and temperature of the water, making further negative impacts on native aquatic life and food chains. MEL-02

• Furthermore, the potential for leakage of raw petroleum products whether in the form of oil drippings seeping up from the drilling area, during transport, or as the odor of natural gas presents a further threat to life in and around Cook Inlet. MEL-03

The residents of the area in question are economically tied to the well being of the waters of lower Cook Inlet, whether in the form of commercial, sport, or subsistence fishing or in the rapidly growing tourist industry. Endangering these activities endangers the livelihood and quality of life for Alaskans living near these waters. I urge you to reconsider Lease Sale 149.

Sincerely,

Marie E. Lowe

Marie E. Lowe

RECEIVED
APR 17 1995
1:30pm
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

MEL-01
The effects of drilling on lower trophic-level organisms was addressed in Section IV.B.1 of the EIS.

MEL-02
The discharge of barium sulfate ($BaSO_4$) in the drilling muds is not likely to have a measurable effect on the water chemistry or temperature and aquatic life. As noted in Section III.A.5.b, the solubility of $BaSO_4$ is quite low (based on freshwater); the solubility of $BaSO_4$ is about 0.000006 that of salt (NaCl). Barium is found in the sediments of rivers and lakes surrounding Cook Inlet (Table III. A.5-2) and carried in the rivers and streams that discharge into Cook Inlet (Table III.A.5-3).

MEL-03
The threat of oil or natural gas leakage to marine life is expected to be minimal.

The MMS requires that all exploration-drilling units and production platforms be equipped with drip pans to collect any oil that may leak or spill as a result of drilling, testing, or production operations. Pipes carry the oil from the collection pans to an oil/water separator to remove the oil from the water before the latter is discharged.

Oil and natural gas are present in the marine environment from natural causes. There are natural oil and gas seeps in the upper part of Cook Inlet (Sec. III.A.5.c(4)(a)). Methane, the principal component of natural gas, also is found in the marine environment as a byproduct of the decay of organic material.

Also, as noted in Section III.A.5.c(4)(e), hydrocarbon-oxidizing microorganisms are found throughout the waters of Cook Inlet, and their presence indicates biodegradation of hydrocarbons in the water column is a continuing process.

CI

Bruce Babbit
Secretary of the Interior
1849 C Street N.W.
Washington, D.C. 20240

March 9, 1995

Re: Testimony from public hearing on draft EIS for proposed oil and gas lease sale 149 in Lower Cook Inlet, Alaska

Dear Secretary Babbitt;

My name is Craig Matkin, I am a marine mammal biologist and commercial fisherman and a 22 year resident of Alaska.

In glancing at the marine mammal section I notice inconsistencies and statements that lead me to suspect the accuracy of your environmental assessment. In fact I am very disappointed in the overall approach and feel there should be no lease sale based on such a flawed document. The document states (IIIB.18) that the North Pacific humpback whale population is 1200 to 2100 individuals and then states that there are an estimated 1247 humpbacks from Cook Inlet to the Shumagin Islands. This would indicate a substantial percentage (50%+) of the North Pacific population are feeding in the area from the lease sale 350 miles south to the Shumagins. It is then stated (section IVB.1 p56) that only 5% of the Pacific population use the lease sale area or adjacent waters. My personal observations indicate humpback whales are abundant in the Barren Islands, Shuyak and Kodiak waters immediately adjacent to the lease sale (in the hundreds of animals) during the summer season. Also, you state that there was no effect on humpbacks after the EVOS. However, you fail to mention that the the spill occurred when the vast majority of humbacks were still on their wintering grounds. (they dont arrive in the Sound until May or June). CM-01

The document states that "there was no mortality of Dall's porpoise or Pacific white sided dolphins observed during or afer the EVOS, althugh the spill occurred in Dall's porpoise habitat and passed through Pacific White sided dolphin habitat." How can you be so sure? There were no population studies before or after the spill. You go on to state that "it seems possible that effects did occur but unlikely given the large amount of scientific research conducted in the area at the time and the opportunity to detect disoriented, sickly, or dead animals." This statement is misleading. Dall's porpoise were not studied or observed in any consistent manner. Trained scientists that follow killer whales, dolphins and other species day after day have a difficult time picking out weakened or sick animals under any circumstanses. Thousands of marine mammals perish each year in the North Pacific of natural causes. Other than the very rare occurance of a beached carcass we see no evidence of this. Dead marine mammals generally sink or our consumed rapidly by scavengers. Pedators quickly dispatch weakened animals. Not a trace usually remains. You are on very shaky ground when you suggest that there was no Dall's porpoise mortality. CM-02

In assessing the effect of an oil spill on belugas in the lease area, the document first states that there could be 242 belugas exposed to a spill as that number was counted on a single day. It is stated that because belugas share some characteristics with killer whales you will use the number 7 as the number of belugas killed out of the 242 following a spill. Where does this number come from? Seven is the number of killer whales that were initially missing at the time of the EVOS and later confirmed as mortalities from the AB pod in Prince William Sound. (The final number that died in the year and a half following the spill was actually 13, but this number does not have the appeal of original "7" apparently). Now the 7 mortalities in AB pod represented about 20% of the pod at the time; this document indicated that only 15% of the pod actually died due to oil spill. If 15% of the group of 242 belugas were mortalities that would be about 36 whales killed. But I guess initially following an oil spill you just lose 7 whales, no matter what the size of the group. The document goes on to calculate recovery rates for belugas based on an estimated reproductive rate and assure us that in two years the population would be normal again. This type of approach would never withstand the scrutiny of any group of peer reviewers that I've been involved with. CM-03

These poorly developed representations of risk presented in the marine mammal section, cast strong doubts on the validity of the entire document. I pick out only a few examples but suggest you basically start over with this. No where is it mentioned just how toxic the fumes or oil can be if inhaled by a marine mammal. There is so little baseline data for cetaceans (whales) in the area of the sale and adjacent waters that any meaningful measurement of damages to them following a spill would be impossible. Until there is more data and a better assesment of risk this lease sale should be halted. CM-04

In the lease sale or adjacent waters substantial numbers of endangered humpback whales and fin whales feed on an annual basis. A potentially endangered Steller sea lion feeds and breeds in substantial numbers. Lets not make their recovery more difficult by chronic exposure to hydrocarbons or the effects of a large spill. Halt this lease sale.

Thank you for your attention,

Craig O Matkin

Craig Matkin
PO Box 15244
Homer, Alaska 99603

CM-01
Approximately half of the humpback whales estimated to comprise the North Pacific population occupy the area from Cook Inlet to the Shumagin Islands—this includes a large area that would not be characterized as adjacent to Cook Inlet. A relatively small proportion (5%) of the total occurring in this area would be expected to occur in the proposed lease area or adjacent waters (adjacent here is taken to mean immediate vicinity, for example, northern Shelikof Strait); the other 45 percent would be occupying more distant areas in the region. The commenter points out the primary reason it was stated that humpback whales experienced no known effects from the EVOS was that they had not yet arrived in the area from their southern wintering grounds. The precise numbers of humpback whales that might be expected in the sale area and immediately surrounding waters is speculative, because comprehensive surveys have not been done in the areas in question. If approximately 2,000 whales occupy the region in summer, 5 percent of this number would equal 100 whales.

CM-02
We did not state that we were sure that no mortality occurred. The text stated only that no mortality was observed, which to the best of our knowledge is a true statement. The statement in the text in Section IV.B.1.e regarding undetected effects has been revised.

CM-03
The number was calculated using the formula in Section IV.B.1.e.3. However, the estimated population of belugas in Cook Inlet (653) should have been used in the calculation rather than the number of belugas sighted on a given day (242). (A National Marine Fisheries Service unpublished report currently estimates the Cook Inlet beluga population at 898 whales.) The estimated percentage mortality used in the calculation was 15 percent (which had been adjusted for natural mortality), which included mortality only for 1989. Because the killer whale population declined from 36 to 25 from 1989 to 1992, presumably as a result of the EVOS, the adjusted percentage mortality should have been 31 percent. Using the formula, 653 (estimated population of belugas) x .31 (estimated percentage mortality of killer whales by EVOS) x .21 (SF) = 43 (estimated number of beluga mortalities). The recovery of the population to prespill numbers has been adjusted to 7 years.

CM-04
The potential effects of inhalation of fumes by marine mammals is discussed in Section IV.B.1.e.1.b. There is little baseline data on cetaceans to draw from. As discussed in Geraci and St. Aubin (1990), depending on the concentration of vapors and duration of exposure, the effects could range from mild irritation to death. Vapor concentrations could reach critical levels for the first few hours after a spill. If a cetacean were unable to leave the area during that time, it would inhale vapors and may be harmed. Most likely, the animals would experience some irritation of respiratory membranes. Cetaceans have been observed swimming in spilled oil on several occasions, including the *Argo Merchant* and the *Regal Sword* oil spills, with no apparent distress or difference in behavior.

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53 Glenn Drive
White Heath, Illinois 61884
April 11, 1995

Regional Director,
Minerals Management Service
Alaska Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

RECEIVED
APR 17 1995
1:30pm
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

Subject: Natural Gas and Oil Lease Sale 149 (Alaska Outer Continental Shelf, Cook Inlet)

I have reviewed that portion of the EIS involving biological resources, specifically pages III.B.1 thru III.B.23 and IV.B.1-1 thru IV.B.1-34 ('Biological Resources').

Although your report is voluminous (of necessity), it is extremely well-detailed and organized. I do, however, have a few questions and some suggestions that I trust you will consider.

In reference to the last sentence on page III.B.11 and to Table III.B-4-1 (Nonendangered Marine Mammal Species and Relative Frequency of Occurrence...), at what point does a species cease to be designated as 'uncommon' and begin to be designated as 'threatened'? RMM-01

Although the last sentence (III.B.11) specifically states that some of the 'uncommon' or 'rare' marine mammals are not discussed in the subsequent description sections, (i.e. the Minke, Killer, Beluga, Baird's Beaked, Cuvier's Beaked, and Bering Sea Beaked Whales), other whale species (the Fin, Humpback Sei, Blue, Right, and Sperm Whales) are discussed. I understand that, what seems to be a high population number for one species is not necessarily a high population number for another species, i.e. 1600 Blue Whale vs. 930,000 Sperm Whale. I do think the ordinary reader of this EIS would be interested in knowing how the determining number for various threatened and endangered species is arrived at. RMM-02

Is the sperm whale population of 600 for Alaska what places it on the endangered list? Or is the sperm whale still considered endangered, in spite of the entire population of 930,000 and regardless of it's population in Alaska? RMM-03

On page III.B.17, the last two sentences (beginning "Summer distribution of fin whales extends from central California to the Chukchi Sea. In Alaska, some whales spend the summer feeding over the continental shelf in the Gulf of Alaska, including portions of ....") are erroneously duplicated as the first two sentences on page III.B.18. RMM-04

On page III.B.20 (the 'Peregrine Falcon'), this appears to be either a contradiction of sources, an arithmetic error, or the result of my own ignorance as to the connotation of 'American' as used in this context. The EIS states that the Alaskan population (160 pairs) and the Californian population (125 pairs) alone total 285 pairs. Are there population figures available for the states other than Alaska and California? If so, I'm assuming the 285-pair count would be greatly increased; how would that affect the Peregrine Falcon's present status? RMM-05

In reference to the sentence in paragraph (4) on page III.B.21 ('Recent Christmas count and other survey information....'), I did not understand the use of 'christmas count'. Perhaps other readers have questioned this. RMM-06

On page III.B.23, paragraph 6 ('Terrestrial Mammals') is followed by paragraph 8 ('Mitigating Measures')...change the '8' to a '7'. RMM-07

This EIS is extremely interesting reading. I will be following the progress and results of the drilling process through the next decade. Thank you for the opportunity to comment.

Sincerely,

Rita M. May

Rita M. May
A Concerned Citizen

RMM-01
A species that is listed as uncommon may never be listed as threatened or endangered. The reference in the EIS to a species being uncommon or rare pertains only to the presence of that particular species in the sale area and does not refer to its overall population status. For example, the Pacific walrus is uncommon in Cook Inlet, which is beyond the normal range of the walrus. The walrus, with a population numbering between 250,000 and 300,000 animals (which may be at or may have exceeded the carrying capacity of the environment), is more typically found in the Bering Sea and Chukchi Sea.

RMM-02
The number of animals remaining in a population before the species is designated as threatened or endangered is determined by the agency with jurisdiction over that species. The determination can include a number of factors, such as population level prior to the decline, reasons for the population decline, recruitment into the population, quality and limitations of habitat, and other environmental considerations, such as pollutants. For example, the National Marine Fisheries Service has jurisdiction over whales. Many of the large whales were overharvested during commercial-whaling activities. The total world population of humpback whales currently is estimated at somewhat more than 10,000 animals, but the population prior to commercial whaling was estimated at more than 120,000 animals. For more information on how particular species are listed as threatened or endangered, you should contact the National Marine Fisheries Service or the Fish and Wildlife Service.

RMM-03
The relatively low population estimate for sperm whales in Alaska did not result in the sperm whale being placed on the list of endangered species. Although the estimated world population is quite large, there is much uncertainty as to the accuracy of the estimate as well as methods used to determine prewhaling population size and current reproductive success that will determine the future status of the population.

RMM-04
The printing duplication in the document has been deleted.

RMM-05
Ms. May is correct in assuming that American peregrine falcons exist in areas other than Alaska and California, and thus that the total population is greater than 285 pairs. We are concerned with those inhabiting Alaska for obvious reasons; the California population is considered because that is the probable destination of much of the oil that would be produced from the Sale 149 area and, as such, it is treated in the EIS. Many factors are considered in determining the status of an endangered species—sex and age composition of the population, reproductive success, potential pollution and habitat degradation problems, etc.

RMM-06
"Christmas count" refers to the annual survey of wintering birds organized by the National Audubon Society in hundreds of towns in the United States during the Christmas season. This count has occurred since the beginning of this century and, as such, represents a valuable database. Those interested in participating on the count are encouraged to contact their local Audubon chapter.

RMM-07
The discrepancy in paragraph numbering did not occur on the page noted, nor could it be found in the document.

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PO Box 375
Homer, AK 99603
907-235-5188

Judith Gottlieb, Regional Director
Minerals Management Services, Alaska OCS Region
949 E. 36th Avenue
Anchorage, AK 99508-4302

Dear Judith Gottlieb,

I am writing you concerning the Draft Environmental Impact Statement on Oil and Gas Lease Sale 149. I have detected a number of flaws and negligence in the D.E.I.S.

In talking to Craig Matkin, a whale biologist, I was surprised to hear that the MMS misconstrued the information about the impact of the Exxon Valdez Oil Spill on Killer Whales in Prince William Sound. Matkin was the biologist who conducted much of this research, and the figures in the D.E.I.S. do not match his.

Also, I am amazed that the MMS used the effects on the Killer Whale as a model to analyze the effects that an oil spill in Cook Inlet would have on Beluga Whales. The D.E.I.S. tries to justify this by stating that Killer Whales and Beluga Whales are similar because they both travel in groups and are medium-sized toothed whales. First of all, Killer Whales are biologically defined as dolphins and not whales. Secondly, comparing a Killer Whale and a Beluga Whale is like comparing a moose with a domesticated cow. Granted moose and cows are both members of the ungulate families, they both are four legged and both herbivores but they are very different animals with many biological differences. This analysis is inadequate and not scientifically acceptable for the E.I.S. MDM-01

I have also been conversing with seabird biologists and have come to the conclusion the D.E.I.S does not adequately address the seabird colonies in lower Cook Inlet. Seabirds were the hardest hit species during the Exxon Valdez oil spill. Biologist still are gathering data on these effects and their recovery from oil spill damage is still not completely understood. The D.E.I.S underestimates the impact that an oil spill will have on the colonies in lower Cook Inlet and it is unacceptable for the MMS to continue this sale until more information is gather for an adequate conclusion. MDM-02

The MMS should make sure that there is thorough scientific information on the impacts that the Exxon spill has had on all species involved. If there are any research projects that are still being conducted or that have not reached adequate conclusions, I suggest that the MMS put all further lease sales on hold until the proper information is available.

In addition to this flawed information, the D.E.I.S. completely neglects circulating gyres which provide nutrients to the marine and seabird life. MDM-03

The MMS also fails to address the psychological effects that a spill would have on the people of the lower Cook Inlet region. I would like to see what damage would be done to the humans who will be faced with the image of environmental distruction and dying wildlife populations. I would also like to see the psychological impacts on the humans when they must deal with the economic decline of the fishing and tourism industries after an oil spill. MDM-04

Furthermore, the D.E.I.S is not sufficient because it evaluates the effects of an oil spill based on a scenario which would occur in the month of April. An oil spill would have very different effects depending on the month in which it would occur. An oil spill occurring in the summer would have a significantly larger impact based on more abundant fish and wildlife populations. An oil spill occurring in the winter must be evaluated in a completely different manner based upon the difficulty for clean-up response during harsh winter winds and icing conditions. In order for the E.I.S. to be thorough enough, the MMS must include a scenario for every month of the year including every possible weather condition and how it would effect every species during that month. MDM-05

It is inadequate to base your analysis for an oil spill in lower Cook Inlet on the Prince William Sound model. To compare lower Cook Inlet with Prince William Sound is like comparing a calm pool to a violent whirl pool. Cook Inlet faces much harsher weather conditions including severe winds and icing conditions. The MMS must also take the world's second largest tide into consideration when evaluating lower Cook Inlet and must also address the intense seismic and volcanic activity of the region. All of these factors will result in a significant difference in the impacts of an oil spill and in the ability for clean-up response. MDM-06

I am extremely disappointed in the MMS flawed and negligent conclusion in the D.E.I.S. A number of the people in my community have put a lot of time and energy into dissecting the D.E.I.S. This has been an inconvenience on our part. It is not our job, it is yours and the MMS should have adequately addressed the issues the first time around. I suggest that you put more effort into other Environmental Impact Statements in the future to prevent such an inconvenience to those influenced my your work. MDM-07

I am opposed to Lease Sale 149 and I believe that the D.E.I.S. is reason alone why this should be canceled. I recommend that you listen to the people that are affected by this sale and adopt Alternative 2.

I thank you for your time and for your consideration of my letter. I look forward to your response and trust that you will make the correct decision. Cancel Lease Sale 149.

Sincerely,

Marla D. McPherson

MDM-01

Beluga whales also are considered as dolphins by some taxonomists. Both belugas and killer whales are medium-sized piscivorus toothed whales. Beluga whales would be expected to have similar cutaneous and respiratory responses to encountering spilled oil as killer whales. We are aware that there are potential problems with extrapolation of mortality information from killer whales and applying it to beluga whales. As stated in the text, there are no data on the effects of oil on beluga whales. There was no observed mortality on cetaceans during the EVOS, with the exception of killer whales (and that is a presumed mortality, because no killer whale carcasses were ever recovered). While there certainly are differences between beluga whales and killer whales and extrapolation of information from one species to another is speculative, it seems reasonable under the circumstances to use killer whale mortality from the EVOS as a basis to estimate beluga whale mortality. Even the Marine Mammal Commission, when discussing potential effects of oil on beluga whales, references studies that have been conducted on other cetaceans.

MDM-02

Although the seabirds, sea ducks, and sea otters were the species groups most seriously impacted by the EVOS, MMS believes that the assessment on birds was adequate and did not underestimate the impact on marine and coastal bird populations. The assumed 50,000-bbl spill in the DEIS is one-fourth the size of the EVOS, and the type of oil expected to be discovered in Cook Inlet is a much lighter crude oil than the Prudhoe Bay crude oil spilled from the EVOS. The 50,000 bbl-spill is expected to disperse much more rapidly than the EVOS and, therefore, contact and kill far fewer birds than the EVOS. It is difficult to impossible to accurately predict how many birds would be killed by the assumed 50,000-bbl spill due to the great variation in weather conditions, timing of the spill, number of birds on the water in the areas swept by the spill, and many other variables. In light of your comment, the upper end of the estimate of birds likely to be lost to the spill was increased to 100,000 (see Sec. IV.B.1.d., Effects on Marine and Coastal Birds).

MDM-03

The DEIS does not neglect the first-order circulation of Cook Inlet and Shelikof Strait. The gyre located adjacent to Kachemak Bay is shown on the schematic of mean circulation in Figure III.A.2-5. The simulated circulation includes the known gyres in Cook Inlet and Shelikof Strait.

MDM-04

Please see the responses to Comments TAG-19 and MAB-04; these deeper feelings of loss and ambiguity about the future are shared by many non-Natives as well.

MDM-05

The DEIS does not only evaluate oil spills that occur in April. The 200,000-bbl oil-spill analysis uses April as the starting month for a spill. This month was chosen by the DEIS analysts based on the sensitive resources that would be in the area during that time. Breeding seasons were considered to be a sensitive period. The Section IV DEIS analysis considered oil spills and their effects on environmental resources during all times of the year broken down into two seasons, summer and winter.

MDM-06

The MMS does not use a model designed for Prince William Sound as the basis of an analysis for Cook Inlet. The oil-spill-trajectory model was specifically designed with the model grid covering Cook Inlet and Shelikof Strait. The oil-spill-trajectory simulations are constructed from simulations of tidal, wind-driven, and density-induced flow fields. The tidal currents, both residual (time averaged) and time varying, are simulated using two-dimensional, vertically averaged simulation. The model is forced using the Schwiderski tidal constituents for 11 constituents (M_2, S_2, K_1, O_1, N_2, P_1, K_2, Q_1, MF, MM, SSA). Please see the responses to Comments AK-05 and AK-06. Seismic and volcanic hazards are discussed in Section III.A.1.

MDM-07

The MMS objectively has analyzed the potential effects of Sale 149 based on the issues and concerns noted by the public during the scoping process and the best scientific and sociocultural information available. Scoping is an information-gathering process to help identify major issues and primary areas of concern that should be addressed in an environmental impact statement. During the scoping process, which began in March 1992, more than 50 meetings were held in 11 Cook Inlet/Kodiak/Alaska Peninsula communities. The review of the DEIS and public hearings is part of the lease-sale process that provides the public one of many opportunities to comment on a specific lease sale. In the DEIS review, the public is invited to comment on any aspect of the document; this includes commenting on the analysis of the potential effects on the various resources, issues or areas of concern that were not addressed in the DEIS, or providing MMS with new or additional information for consideration. The alternative to the DEIS and public review of the document would be a final EIS with public participation essentially limited to the scoping process.

sent Express Mail 15 IV 95

Regional Director
and Project Chief, Sale 149 EIS
Minerals Management Service,
Alaska OCS Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

Comments on

Alaska Outer Continental Shelf

Cook Inlet Planning Area

Oil & Gas Lease Sale Draft Environmental

Impact Statement OCS EIS/EA MMS 94-0066

of

John Luther Mohr

included by reference:
Comments of DEIS proposed sale 107 Navarin Basin
109 Chukchi Sea
124 Beaufort Sea
126 Chukchi Sea
and Mineral Management Service responses which include material relevant to comments on Sale 149 DEIS.

POSITION ALTERNATIVE II NO SALE

A. The pressure on fisheries worldwide and on Pacific Ocean fisheries particularly, as newly enunciated by the United Nations Food and Agriculture Organization, is already excessive approaching the level of disaster. Even small additional stresses are not justifiable.

B. Secretary Babbitt has stated unequivocally that the role of the Department of Interior as promoter of extraction industries and defender of national natural resources has been damaging to the natural resources.

Babbitt, Bruce 1995 Policy Forum: Science: Opening the Next Chapter of Conservation History. Science 267(5206):1954-5.

C. Performance of MMS-AK as lead agency preparing the environmental documents has been critically inadequate.

D. Accordingly, knowledge of potential damage is subminimal.

Troubles with world fisheries have long been high and they are increasing. As New Zealand over-fished its orange roughy stock, its fishermen moved to Australian waters. Australia reacted promptly and sharply. Spanish fishermen who overfished European waters have been aggressively fishing waters off New-foundland, triggering very hostile Canadian reactions. The United Nations - Food and Agriculture Organization study, released this March 10, lists in order China, Peru, Japan, Chile, the United States, the Russian Federation, Thailand and Indonesia as the top commercial fishing nations; all of them hit the Pacific Ocean; and seven kinds of fish are shown as overfished with several more as "fully fished". These do not include pollock, now being used very heavily among other ways as pseudo-crab, which National Geographic 1995, 187(3): 24-5, notes is fished down with, among other consequences, damage to the Stellar's sea lion population.

Further, David Hill 1995 Research Notes: Ecology Pacific Warming Unsettles Ecosystems. Science 267(5206): 1911-2, notes that anchovy, sardine, mackerel and squid are down about 35% since the 1950s. Zooplankton in the California Current area is way down with serious effects (inter alia) on the rockfish - and in sequence Cassin's auklet down 60% and sooty shearwaters down 90%.

While United States commercial fishermen in general have been working in ways to have a sustained resource, many Asians fishing in the Pacific Ocean have been observed using exceedingly long nets and nets with too fine meshes as well as other grossly damaging practices. While much of this, not all of it, is far from Cook Inlet waters, Secretary Babbitt's observation about "forces beyond the fence", though directed at terrestrial matters, holds here too.

Government agencies responsible in offshore oil and gas matters do not have the resources needed to determine clearly what has already happened to food webs, breeding and other aspects of fisheries eco-connections. They do not have resources to learn all the problems that might be brought about in developments under Sale 149. As implied in Secretary Babbitt's essay, there is a tilt in his department's (and there is in some other agencies involved) actions favoring extractive industry over preservation and this is very obvious in past FEISs which have much that is harmonic with the stone-walling of the Nixon era. Moreover, if information were complete and totally trustworthy and monitoring could be really adequate, MMS, EPA and all the others involved could not assure that effects from development would not have a last straw effect "breaking the back" of one or more of the fisheries.

C. I have worked critically on a relatively small part of the Alaskan OCS DEISs, but if what I have found were the only part defective, it would still be serious enough to discredit and disqualify the documents. I note a few critical examples.

1. Barites. Barites are barium sulfate ores heavy enough to provide needed support for drill trains to be the regular choice among weighting agents in drilling slurries (muds). As voiced strongly by a Shell chemist at the 1980 Lake Buena Vista drilling discharge conference, barites are very variable in composition, as he implied, no two alike. Those taken from mineral veins are known to be high in such poisons as arsenic, mercury and zinc and have been excluded from use in some areas, Alaska among them. Barites such as those from Nevada laid down by ancient seas, are generally free from or very low in the poisonous minerals, but, coming from the seas, they are high in barium sea salts, barium halides, which are plainly characterized as poisonous in many editions of The Merck Index. In my comments on DEISs of Sales 124 and 126 I wrote of the problem with barium ions from the sulfate and the halides. MMS-AK's Sale 126 response in the FEIS reads "Barium ions are detoxified in seawater by the immediate precipitation of highly insoluable barium sulfate. If barium halides were exceedingly poisonous, as claimed by the commenter, they would not be used internally as a cardiac stimulant or bone-scanning agent in humans or for treatment of constipation in horses (Windholz et al., 1976)." Windholz et al. is identified in the Bibliography, p. 31 as The Merk Index, Ninth Edition, published by Merk and Company, which I find more murky than Mercky.

The Merck Index is a reference volume covering a broad range of compounds, mostly pharmaceutical, not a primary scientific publication. The edition cited in the FEIS is an old one, but about medical and veterinary uses it states in italics *formerly*. So do still older editions. In the current edition about a score of barium compounds are listed -- and listed as *poisonous*.

Medicinal grade barium sulfate used to provide opaqueness in the digestive tract for x-ray photographs is generally regarded as safe because it is not soluble in water, however, a toxicology text notes that deaths have been caused by it when tannic acid was present. [Thus any tannic compounds in lignite formulae used with drilling slurries may raise eco-problems, As lignite additives are commonly used, batch analysis should be required.]

Contrary to the claim in the FEIS that barium sulfate is insoluble in sea water and that barium ions are immediately attached to sulfate radicals and so removed from action, it is a well known fact that barium sulfate is somewhat soluble in sea water. Solubility increases with depth. It is markedly

more soluble where there is decomposing material. Various bacteria accept barium sulfate across their membranes, then convert it to organic barium compounds. Papers in the Journal of the Marine Biological Association of the United Kingdom have covered these matters.

While JMBAUK may not be available in Anchorage, studies funded by the Environmental Protection Agency should be.

Schatten, G., Simerly, C. and Schatten, H. 1983
The Effects of Barium Sulfate on Sea Urchin Fertilization and Development.
RIN-5760-83-37

subsequently published in the volume Wastes in the Sea 3, reports experiments with barium sulfate performed on eggs, sperm and fertilization and fertilized eggs of Florida sea urchins of two genera (Lytechinus and Arbacia): "at 10 millimolar barium sulfate, zero percent fertilization and development was noted", that is to say, barium sulfate definitely is soluble in sea water and it does disrupt some essential biological processes.

How MMS-AK reached its position about the removal of barium halides and the complete insolubility of barium sulfate in sea water is not clear. It could be from incompetance, ignorance, laziness, dishonesty or some combination of these. It is a significant marker of the level of unreliability of evidence and conclusions presented.

2. Hydrofluoric and hydrochloric acid: stimulation by acidization. FEIS 126 response to concern expressed about the use of these acids to remove silicate and limestone blockages in oil wells was that only small amounts are stored on platforms and that "it might not be economical to produce petroleum from a reservoir requiring large quantities of either acid." At a 1984 EPA workshop a health department chemist asked me why there were large tanks for hydrofluoric and hydrochloric acid in a nearby oilfield. In time I learned of stimulation by acidization from a University of Texas oil field practice primer. Since then I have found additional references, but while statements about HCl are likely to be clear and specific -for example as much as 100,000 gallons may be used in a single treatment-, precise information about HF is rare. However, I did recently stumble onto a Halliburton advertizement of its stimulation treatment (Production Profile: Halliburton Services Journal of Petroleum Technology 38(8): 1058, July 1984), "production more than doubled" from a well in Evangeline Parish, Louisiana following treatment with 11,000 gallons of its HF mix. In the same issue is an advertizement for a SPE Short Course on Stimulation by Acidizing.

Clearly acidizing is common (or it would not be covered in an oil field primer) and 11,000 gallons is not atypical. It is not a large quantity compared to the release in the Exxon Valdez spill and treatment of wells from a platform (as with wells on land) is called for generally after production has gone on for some time. However, the amount required to handle the "needs" of wells from a single platform - recognizing that each treatment likely requires thousands of gallons- is enough to make problems. These relate to where the acids are produced, level of concentration at which they are transported, stored and used; paths of transport and places of storage, complications from unintended releases at all points, who is required to respond at each point, what is their level of training, and what provisions are there to inform of the presence of the acids. These question are not addressed in any of the Alaskan documents; not doing so I find to be irresponsible. JLM-01

3. Produced Whate'er. Comments on DEIS 126 both by the Northern Alaska Environmental Center and by Mohr included concern about the wastes from oil production labelled formation waters or produced water. These are misleading labels because water is not ever the really troublesome component and is often a quite minor part. Mohr had cited Brian S. Middleditch, ed. The Buccaneer Gas and Oil Field Study, Marine Science 14 (hereafter, Buccaneer Report), much of whose 400+ pages covers these production wastes' problems. MMS response stated that "Alaska-specific information is provided in Section IV-C2" and that Middleditch was not cited.

In fact the IV-C.2 discussion is based on NRC 1985 Oil in the Sea, not Alaska-focused, Collins et al. 1983, not at all an Alaskan study, and the whole section is a small fraction of the size of the fifteen studies in Buccaneer Report.

Examination of the very limited treatment of "produced water" in DEIS 149 (this time not called formation waters) which are not included in "Other Discharges". does not yield any clear answers. There is more space than in FEIS 126, reaching nearly four pages (note: 4 as compared with 400 in Buccaneer Report), the sources being EBASCO Environmental 1990a, prepared for UNOCAL and other oil companies and EPA X, Envirosphere Company 1987a, done for UNOCAL and same, Alaska Oil & Gas Association comments of 1990, two papers by J. M, Neff and co-workers and Collins et al., 1983, as well as USEPA 1991 Water Quality Criteria Summary, May 1, 1991, mentioned as not including total hydrocarbon nor total aromatic categories. JLM-02

Although MMS-AK would appear to ignore Buccaneer Report as not related to Alaska, it uses Collins et al., a

Tulsa production, to establish the possible amount of formation "water". Since Brown et al. (an Arthur D. Little team including Neff) in the proceedings of the 1992 Produced Water Symposium is cited -it is about a Gulf of Mexico study- preparers of DEIS 149 must know of the information in that volume, but only those less than 20 pages out of the roughly 600 are noticed. The Neff and Douglas paper was done under Battelle and for Marathon Oil Company. Neff has been employed on projects for oil companies at least since the EPA IX NPDES Permits case, *Diamond N General et al., permittees,* in the early 1980s and has consistently provided answers supporting petroleum company wants. Douglas does not appear in the current edition of American Men & Women of Science. Note that Envirosphere Company 1987a is cited in the text but there is no 1987a in the Bibliography.

DEIS 149 Produced Waters section begins with "The discharge of produced waters also is an issue of significant concern------" with the second sentence, "Produced waters constitute the largest source of substances discharged into the marine environment." Unlike Buccaneer Report 1981 and Produced Water 1992 (proceedings of the Produced Water Symposium), both of which fall far short of the needed data on well waste, but still include a great amount about specifics encountered in some fields, (that are there is solid data), the Cook Inlet data (DEIS 149) "are assumed to be", "based on modeling", "can be compared", "estimated", "expected to be", "not expected to be", "extrapolated", "may range", "might be', "might range", "would be", "would reduce", "would range" and so on. JLM-03

As for toxicity studies, recalling that Buccaneer Report found more than 60 aromatic compounds, for example, the study appears to have been confined to an LC_{50} 96 hr. exposure of southern crustacean Mysidopsis bahia (of course there is no series of studies or a study showing how M. bahia sensitivities to various compounds or combinations of compounds compare with those of any Cook Inlet animal or plant). JLM-04

Conclusions in this section are based on multiple ignorances, on a pyramid of guesses. In academic jargon the preparers flunk the course and must take it over again. Since I cited Buccaneer Report in previous comments, the preparers are not unaware of its existence. The inclusion of Brown et al., 1992, shows awareness of the proceedings of the Produced Water Symposium. Despite this, such problems as troublesome biocides (presumably used under special permits from EPA), the broad range of aromatics encountered in other fields, benzo-alpha-pyrene in every produced water sample and every bottom sample (Middleditch and doctoral student of Middleditch), the heavy presence of sulfur particles in the water column with no examination of what is happening in the sediments below--are ignored by the DEIS 149 preparers. Giving attention to these factors would, of course, JLM-05 annoy those wanting approval of expansion of OCS oil and gas activity. JLM-05

JLM-06

Radioactivity, as I recall it, was noted as present in oil or gas operations in five of our states and in Europe in papers at the 1992 Produced Water Symposium. Industry had been silent on the matter previously. Then, in early 1993 Journal of Petroleum Technology, a rather comprehensive account of NORM, *naturally occurring radioactive materials*, by Peter Gray, formerly investigator for Phillips Petroleum. He stated that radon in natural gas has been known for nearly a century and that radioactive elements and their break-down products occur in many oil field operations at levels dangerous to the workers. He did not suggest what they mean for the neighborhood, but it should be MMS's duty, to borrow Secretary Babbitt's phrase, to look beyond the fence (among other things, there are fish out there).

It is significant that a 1995 late summer conference on produced water is being held in Trondheim, Norwy, and that issues discussed above, including radioactivity, are listed in the preliminary program.

JLM-07

All of the above demonstrates that the coverage of problems of formation wastes and their modifications in * EISs 124, 126 and 149 (and all those earlier) are inexcusably bad and explainable on no justifiable grounds. It appears that there has been deliberate avoidance of troublesome facts, probabilities and uncertainties. If this is true, there has been betrayal of the American people. Whatever, with such pervasive lack of reliable data of any precision, it is impossible to give honest assurance "the largest source of substances discharged into the marine environment" would not be critically negative for adjacent fisheries.

JLM-08

4. Mesoscale Current Information. Confidence in current predictions, particularly for areas with highly irregular boundaries, requires long-term (decades), all-seasons measuring at close intervals. Where records are most complete current patterns are known to change through the seasons and to vary somewhat in different years. Even the areas that have the most complete records, as those compiled by CalCOFI, the pattern is mesoscale; the current meters 30 miles from each other (with no measure of what is going where how fast in between). Cook Inlet records are not that good, a reflection of the high cost of current meters and of operating them. The guesses as to where things are transported are flawed.

5. Bioaccumulation, Synergism, etc. FEIS 126's dismissal of NAEC concerns about bioaccumulation does not reduce the likelihood of damages to ecosystems or to fisheries. Knowledge that the polychaete, Tharyx (a wide-ranging genus) accumulates arsenic is recent (JMBAUK). Dr. L. Cheng Lewin, at Scripps Institutionof Oceanography, showed that marine insects concentrate metal (cadmium, if I remember correctly).

* MMS-0009, received after the above was typed. does begin to look for radioactivity.

Knowledge of these bioconcentrations increases slowly, but that does not mean that the processes do not occur and that if we do not know about them, they do not matter.

Similarly, synergism may be significant even though MMS-AK has no information about it. As the agency lacks a comprehensive data base on, for example, VOCs that would be present if there were to be production waste discharges, it certainly does not know whether a pair of them or several of them together would be more damaging to our lungs or a Tanner crab's gills than the compounds acting singly. MMS-AK may lack the resources to do much about its ignorance, but a negative response does not negate synergistic reactions.

6. Where Releases Go. In response to the account of the defects in the major drilling discharge studies that make them unreliable, FEIS 124 states that more studies have been done. The fact is that the studies presented in the Lake Buena Vista and Calgary conferences are the key ones regularly referred to although they were so badly done they do not serve adequately even for the places at which they were done. Unfortunately most of the activity on drilling discharge movements has been with models. One should keep in mind that on these Brandsma, perhaps the most prominent worker in these mathematical manipulations, in a study for Santa Barbara County, Calif., prepared a set of field determinations needed as basis for a reliable discharge movement model. They have never been even closely approximated.

One may recall that it was a Dames and Moore Cook Inlet study from Ocean Ranger in which rhodamine WT - water tracer- was seen in a plume 13 km from source (the rig) and continuing beyond. And Jack Thompson, in his TAMU doctoral dissertation reported levels of compounds able to stimulate coelenterates at 12 km from source. That greater distances are not known is definitely because there have been no studies that really try to determine how far such things go from drilling sites.

Those are distances with solubles. Particulate matter is also able to be traced with considerable precision, but such studies have been avoided.
On seeing Mitchell, B. L., Simmonds, P. G. and Shair, F. H. 1973 Oil Spill Identification with Microencapsulated Compounds Suitable for Electron Capture. Environmental Science & Technology, 7(2):121-4 (the authors a Calif. Institute of Technology and Jet Propulsion Laboratory team), I asked Prof. Shair about the possibility of modifying the technique to trace drilling discharge portions; he assured me that such is practicable. Also John Proni, of NOAA, Miami, has proposed using microwave reflections much as is done in plotting movements of zooplankters. My Colleague, R. Pieper, who has performed such studies for years, tells me that too is practicable. These would give precise records of drilling

discharge movements, unlike the botched studies mentioned above.

7. Need for Alert Stewards. In testimony during *Diamond N General, et al.* proceedings, one industry witness gave an account with photographs, of what he characterized as highly successful culturing of abalones on an ARCO platform off Santa Barbara County, and Dr. June Lindstedt-Siva, of ARCO, gave at least one seminar talk about them. Shortly thereafter all mention of them stopped with no reason given for the silence. Bob Evans (newspaper segment appended), a prominent under-water photographer and a talented observer of under-water phenomena, told me on a number of occasions that he had seen "clouds" of particles from drilling discharges about the platforms (some of it fits the characterization of "barite haze" presented in an EPA-funded study of Gulf of Mexico activities) and these discharges killed the abalone culture and very many creatures on the sea bottom as well. Evans also spoke of his concerns at an EPA hearing in Santa Barbara. Until then he had sold many of his photographs to oil companies that then used them in their slick-paper PR magazines. He was immediately boycotted and remains so.

This leads to the FEIS statement that it makes no difference who pays for research; it is the scientific quality that matters. This harmonizes with the headline on an op-ed piece by a prominent food "authority": "Who Pays the Piper Does Not Own My Soul"; interestingly, I have not been able to find in her writings anything that could conceivably offend her funders. The important realities include the fact the EISs do not provide evidence that the preparers excell at determining what is solid science. Their methods in no way approach a system that has appropriate specialists and able representatives for all those who may be affected examine and rate the issues and the information involved.
Hammond, K. R. and Leonard Adelman 1976 Science, Values and Human Judgment. Science 194(22 Oct.):389-96, present(s) an approach not easily doable - but throwing light on some of the gross inadequacies in the preparation of MMS-AK's EISs.
One may also consider Hall, M.C. Scientists Sometimes Tell The Truth. Scientific Monthly 1938(August):152-60.

8. OCS Study MMS 95-0009. The March 1995 Current Water Quality in Cook Inlet, Alaska, Study arrives as I am finishing my comments. There has not been time to study it closely, but it does bring a number of things into focus. There are not enough sampling sites, samples are not taken often enough, and a single species of amphipod, *Rhepoxynius abronius*, from down the Pacific Coast a ways, though better than *Mysidopsis bahia*, does not provide reliable sensitivity testing for all marine plants and animals. (I have not found reference to any test plant used.) I note that reagents from Aldrich are used. JLM-09
An Aldrich official informed me during a meeting of the

trustees of the Biological Stain Commission though rhodamine WT was a DuPont product and DuPont had withdrawn from dye manufacture, the key product is still available -imported from India.
The toxicity testing in question is a classic of not-enoughness. NOAA's The Coastal Resource Coordinator's Bioassessment Manual HAZMAT 93-1 while prepared for different sets of problems, has better methods.

Prof. D. J. Reish, a pioneer in kindred marine testing, has observed that in general the short term tests used in the MMS 95-0009 study are for alarm level and do not detect levels that may interfere with breeding, sensitivities etc long term disruptions. The DEIS does not pay attention to the highly significant work of Morse on killing of settling stages of abalones by toxic concentrations orders of magnitude below those generally dealt with nor R. Zimmer-Faust's showing of serious damage by a chemical usually considered essentially benign.

9. Studies Not Included. EIS preparers have ignored European main science marine publications (not just Journal of the Marine Biological Association of the United Kingdom) that contain relevant new information (e.g. arsenic bioaccumulation mentioned above). They also neglect publications that are directed largely at offshore oil studies in Scotland (one Addy paper is cited), Norway and Netherlands, latitudes not much lower than those of Cook Inlet. A recent one from NIOZ (Nederlands Institut) on EBMs, ester-based drilling muds, treats problems that may be coming to Alaskan waters.

The real puzzle, though, is the absence of any reference to JLM-10

Bright, D.B., Durham, F.E., and J. W. Knudsen 1960 King Crab Investigations of Cook Inlet, Alaska 180 p. Allan Hancock Foundation, University of Southern California.

and

Bright, D. B. 1967 Life Histories of the King and "Tanner" Crab in Cook Inlet, Alaska. 265 p. doctoral dissertation. Biol. Sci., University of Southern California.

Hancock Foundation is sufficiently prominent in marine science that it should be known; dissertations are less prominent, but they are covered in University Microfilm lists.
The question moves to ----what other obviously pertinent studies have been missed or purposely omitted.

And this points too to the fact that the anomuran and brachyuran crab fisheries have very slim treatment in DEIS 149.

10. Ballast Water, Fouling Organisms Becoming Invaders. The work of James Carlton and others has drawn attention to the damage done by marine and estuarine "invaders" in American waters. The PWS RCAC The Observer's 5(1), 1, 1995 account of ballast water is wholly correct -"there is no evidence of serious invasions and vessels from lower latitudes have low likelihood of causing them" but there should be alertness. Ships or rigs moving from cold areas could pose more of a threat.

11. Industry Arrogance and Agency Revolving Doors. The EISs to date have blandly assumed virtuous, thoughtful behavior on the part of the players. At a Congresional sub-committee hearing Columbus Day, 1984 at Santa Monica College chaired by Representative Mel Don Levine, Levine asked Western Oil & Gas Association officer Spaulding whether problems could be so great that it would be best not to drill in some places (Channel Islands Marine Sanctuary was in question). Mr. Spaulding said "Mr. Chairman, I can think of no situation where the oil industry cannot invoke its ingenuity in order to cope with whatever circumstances you would care to define." (A cartoon from the late great periodical, Punch, relating to section 7, was included in the record of the Columbus Day hearing.)

After rig Ocean Ranger operated in Cook Inlet (the Dames & Moore report on work there included the following of tracer dye away from the rig), it moved to Newfoundland waters where ODECO operated it for Mobil. Although the waters are Canadian, the U. S. Coast Guard had jurisdiction. According to hearings (Royal Commission on the Ocean Ranger Disaster) the Captain asked for and was denied safety rehearsals, up-to-date lifeboats and related equipment and the like, because they would take time from drilling. The U. S. Coast Guard inspectors found more than 200 infractions of operating rules, but did not enforce compliance. A storm upset Ocean Ranger; all of the 84 people aboard were killed. The Captain, who resigned in frustration five weeks before the storm, provided major testimony.

It should be kept in mind that oil company cooperatives such as Clean Seas, Incorporated and Marine Spill Response Corporation hire retired Coast Guard officers. Some observers believe they detect evidence of influence on the behavior of some not yet retired.

Conclusion. Chapter XXII of Robert Sollen's history of offshore oil, now in manuscript form, is entitled Contamination of the Waters. It begins: "The offshore oil industry has dumped a lot of waste into the ocean, much of it quite legally. The rest was dumped illegally, in innocence, accidently, or in some combination of culpability. All of it degraded the water, and the debate over how much should be allowed probably will persist longer than the industry."

With Sollen's statement in mind I conclude that the protection of fisheries, a renewable resource, must take precedence over seeking oil and gas development in Lower Cook Inlet, particularly as knowledge and controls are inadequate for protection.

This is in the spirit of Thomas Jefferson's writings holding that the earth belongs to living people in usufruct and consonant with the Preamble of the Constitution which holds these things for ourselves and our posterity.

The expansion of outer continental shelf petroleum activities in Lower Cook Inlet under the limited controls and monitoring that can be mustered under present conditions endangers fisheries and other renewable resources that must be protected for posterity.

Submitted,

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ERL,GB 0244

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15. SUPPLEMENTARY NOTES

To be published in Wastes in the Sea, 3, by John Wiley and Sons, Inc., New York.

16. ABSTRACT

Fertilization and development of sea urchins offer an unrivaled system to study the cellular consequences of exogenous ions. At fertilization, a variety of events occur, including the acrosome reaction of the sperm, the cortical reaction of the egg, sperm incorporation, the union of the sperm and egg nuclei within the egg cytoplasm, bioelectric changes, the establishment of the block to polyspermy and the activation of the metabolism of the fertilized egg. These events require a complex repertoire of enzymatic and structural changes in cellular behavior and are regulated by ionic fluxes, particularly by changes in intracellular calcium concentration. Barium, a divalent cation, might be expected to mimic calcium in this marine system and to interfere with the cellular and developmental events normally regulated by calcium fluxes. Gametes from the Gulf coast sea urchins *Lytechinus variegatus* and *Arbacia punctulata* were studied by light, electron and time-lapse video microscopy to evaluate the interference by barium sulfate with normal fertilization and development. In barium sulfate concentrations above 1 millimolar, all the normal events at fertilization were drastically reduced; at 10 millimolar barium sulfate, zero percent fertilization and development were noted. These results indicate that high concentrations (> 1 mM) of barium sulfate can interfere with normal fertilization and development of sea urchins at sites that are usually regulated by calcium ions.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group

18. DISTRIBUTION STATEMENT Release to public	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES
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LOS ANGELES TIMES

National Perspec

ENVIRONMENT

America's Imperile

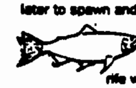
The depletion of fish in the North Atlantic has reached such proportions that Canadian patrols have intercepted a Spanish trawler off Newfoundland, and Massachusetts Gov. William F. Weld has asked that coastal regions of his state be declared a disaster area. The National Marine Fisheries Service reports that 40% of U.S. stocks are commercially depleted or becoming so, and another 43% are being taken at the maximum sustainable rate.

Pressure Points

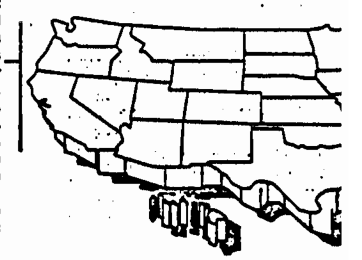
Areas of immediate concern to managers

Pacific Coast

Salmon are born in inland streams, migrate to the open ocean and return several years later to spawn and die at their birthplace.



Now this gantlet is rife with hazards for the hundreds of salmon runs that once teemed in California, Oregon and Washington. Dams, degradation along streams and climatic changes all have been blamed. Three salmon stocks have been declared endangered, and the once-productive coastal coho fishery was drastically restricted last year.



Total U.S. Catch

Commercial take in metric tons (1 metric ton equals 2,204.6 pounds)

1960	2.2
1965	2.2
1970	2.2
1975	2.2
1980	2.9
1985	2.8
1990	4.3
1993	4.7

The Money Fish

Total value of top U.S. money-makers, 1993

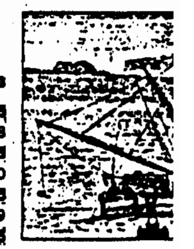
1. **Crab:** $510.5 million. Mainly snow crab from the Pacific and hard blue crab from the Atlantic.
2. **Pacific Salmon:** $423.5 million.
3. **Shrimp:** $412.9 million. Mostly from Gulf region.
4. **Pollock:** $358.4 million. A long-ignored bottom dweller from the North Pacific, now caught in massive trawler nets and processed into other food products. By volume, the largest fishery in the nation—about 31% of the entire commercial catch.
5. **Lobster:** $172.7 million. Mostly American lobster from Maine and Massachusetts.

Source: National Marine Fisheries Service

Catch by Region

1950 to 1993, in millions of pounds

	1950	1970	1990	1993
New England	1,001	531	663	606
Mid-Atlantic	492	140	205	258
Chesapeake	381	630	872	813
S. Atlantic	261	280	260	250
Gulf	571	1,698	1,624	1,718
Pacific	1,531	946	709	889
Alaska	482	546	5,099	5,906



World's Fishing Leaders

Percentage of total world catch, 1992

China	18%
Japan	9%
Peru	7%
Chile	6.6%
U.S.	5.7%
Russia	5.7%

U.S. Fish

In pounds per capita

1950
1970
1980
1987 (record)
1990
1993

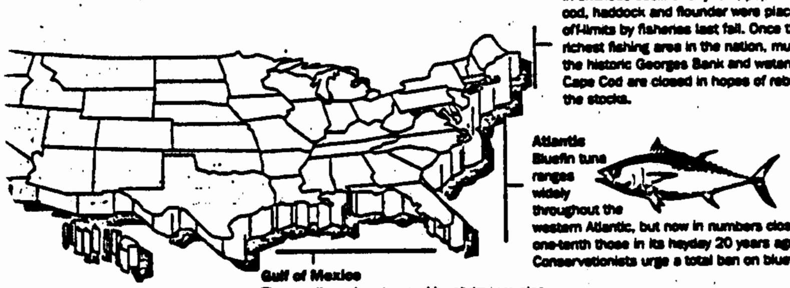
…l Perspective

ENVIRONMENT

…periled Fisheries

…sure Points

…immediate concern to managers and fishermen



1993
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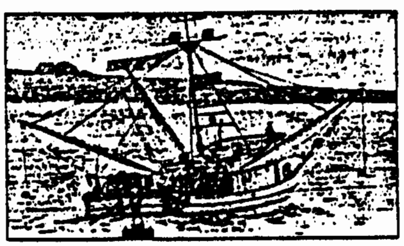
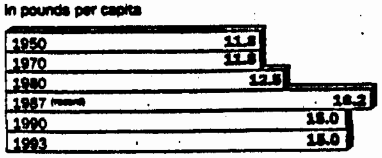


U.S. Fish Consumption

In pounds per capita



Mileposts

1637: Visiting Englishman Thomas Morton notes the Atlantic striped bass "in such multitudes . . . that it seemed to me that one might go over their backs dry-shod."

Mid-1700s: Atlantic striped bass becomes so scarce that a report railed about "very great numbers having been imprudently or even wantonly taken in one season."

1791: Secretary of State Thomas Jefferson tells Congress that the nation's fish resources had been annihilated during the Revolutionary War. He urges federal cash subsidies for fishermen.

1871: Commission of Fish and Fisheries is formed to probe decline of New England fish stocks.

1976: Congress passes the Magnuson Act, which sets up a 200-mile limit for foreign vessels and regional councils to manage the stocks. Critics say the councils—often dominated by commercial interests—don't do enough to restrain overfishing.

—DOUG CONNER

RCAC The Observer
Regional Citizens' Advisory Council
A publication of the Prince William Sound Regional Citizens' Advisory Council
Volume 5 No. [illegible] March 1995

Inside this issue

Harm from ballast water not evident; monitoring still needed, experts say

After years of environmental monitoring in Port Valdez, there is no evidence that effluent from the ballast water treatment facility (BWTF) at the Valdez Marine Terminal is causing significant alterations in the port's marine ecosystem, according to scientists who attended a two-day meeting in January. Participating in the meeting were scientists and others representing Alyeska Pipeline Service Co., RCAC, the Alaska Department of Environmental Conservation (ADEC), and the U.S. Environmental Protection Agency (EPA).

However, the meeting's participants noted, knowledge of the plant's potential effects on all components of the ecosystem is incomplete, and an important function of future environmental monitoring will be to prevent significant problems from developing.

These were some of the main points that emerged from the meeting, organized by RCAC to discuss the existing body of knowledge about the plant's effects on the ecosystem and to identify environmental monitoring tools that will be helpful in protecting the port from degradation in the future. Topics discussed included the environmental status of Port Valdez with respect to the BWTF, the strengths and weaknesses of Alyeska's current environmental monitoring programs, and ways in which those programs could be improved.

The group also heard presentations about the use of caged mussels for monitoring, and fish reactions to hydrocarbons.

RCAC was represented at the meeting by its consultants, Peter Chapman, EVS Consultants; Wayne Landis and Janice Wiegers, of Western Washington University; and Joe Bridgman, staff to RCAC's Terminal Operations and Environmental Monitoring Committee.

Representing Alyeska were Gene Dickason and Carl Rutz; and consultants Jack Anderson, of Columbia Analytical, Howard Feder of the University of Alaska; and David Shaw, University of Alaska.

Agency representatives were Judy Kitagawa, ADEC; John Karinen, National Marine Fisheries Services (NMFS)/Auke Bay Lab; and Anne Dailey, EPA. The meeting was moderated by Walter Brown.

RCAC hopes that the continuing scientific exchange will help state and federal regulators decide what monitoring requirements to include in the next federal waste water discharge permit for the BWTF. The old permit expired in June 1994 but remains in effect until EPA issues a new permit.

Chapman, one of RCAC's consulting scientists, was to brief the RCAC Board of Directors, March 9 in Valdez, on the ongoing dialogue regarding the BWTF and environmental protection of Port Valdez.

Some Valdez residents have worried for years about the effect of the effluent from the BWTF on marine life, in part because of the sheer volume of effluent – an average of almost 15 million gallons per day – discharged from the treatment plant into Port Valdez. The ballast is sea water contaminated with low concentrations of petroleum hydrocarbons and other compounds.

RCAC's consultants have not ruled out the possibility of significant environmental impacts showing up in the future, but the evidence collected to date does not suggest this will occur.

Environmental monitoring around the terminal and in the port has been carried on since before construction of the Alyeska terminal. The scientists who met in January noted that, compared to other marine ecosystems, there is a relative abundance of data regarding Port Valdez. Over the years monitoring has focused on hydrocarbon levels and animal populations in the port's sediments; changes in intertidal shellfish populations; the movements and habits of salmon fry from the Solomon Gulch Hatchery; the toxicity of BWTF effluent and toxicity testing of sediments from the bottom of the port; and other areas.

Most of the work has been carried on by scientists from the University of Alaska contracted to Alyeska. Their work has been reviewed by scientists for RCAC, EPA and ADEC.

RCAC has long advocated fine tuning the monitoring programs to provide more useful analyses of ballast water effluent and the aquatic environment in the vicinity of the terminal. RCAC's Terminal Operations and Environmental Monitoring Committee has been meeting with Alyeska to discuss the issue since early 1994.

Tanker escorts will change, but to what?

As major shippers of North Slope crude prepare to bring on new escort vessels to increase assistance capabilities in Prince William Sound, manufacturers of two different types of propulsion units touted their wares in recent presentations to industry, citizens and regulators.

Representatives of AquaMaster, manufacturer of a "Z-drive" propulsion unit, gave a presentation in Valdez in December. In February, Voith Schneider gave a presentation on cycloidal propulsion tractor tugs.

The shippers – BP Oil Shipping, ARCO Marine and SeaRiver (formerly Exxon) – have already promised the U.S. Coast Guard that they will use new escort equipment to address concerns raised by the Disabled Tanker Towing Study. The big question is what kind of escort tug they will settle on.

RCAC has recommended the Voith Schneider 7800 HP cycloidal propulsion tractor tug because of its performance in computer simulations conducted as part of the two-year Disabled Tanker Towing Study. Representatives of the shippers have said privately that they are very interested in the Z-drive. Both the cycloidal and the Z-drive can operate in an indirect, or dynamic mode – which is more effective than conventional tugs at steering a tanker – but the propulsion systems are different.

Three factors are likely to play heavily in the debate over which type of tug is best: cost, ability to get in position quickly, and safety or redundancy. By most accounts, the Z-drive would be less costly to build. Its proponents say the Z-drive has more "bollard" (or direct) pull in open water than the cycloidal tractor tug. But proponents of the cycloidal tractor point to its redundant engines as an advantage, particularly in the event that power is lost in one unit while the tug is retarding a tanker's advance. The cycloidal tractor tug can maintain its position

Continued on Page 3

NON PROFIT ORG

LOSS OF MARINE LIFE RECORDED

U.S., oil industry ignored warning over drilling mud, divers charge

11-22-81

By Hillary Hauser
News-Press Staff Writer

In July of 1978, two divers who for years had been photographing the marine life beneath the oil platforms of Santa Barbara Channel returned to familiar underwater territory and found it strangely different.

There was a deep layer of drilling mud and patches of "weird, white stuff" all over the bottom, as one of the divers noted in his ship's log. The divers — Robert Evans and Andy McMullen — saw dead crabs and urchins, some decaying rockfish, and hundreds of dead sea cucumbers spread over the bottom on one side of platform Hilda, one of Chevron's installations off Summerland.

A biological program the two had been working on for months was wiped out.

"We had 3,000 baby starfish around the bottom of that platform, and they were gone," Evans recalled. "But what was really strange was that the crabs had crawled out on top of the mud and they had died. They hadn't suffocated, because there they were, on top of the stuff. Crabs feed on dead things, and whatever they had eaten had killed them."

Evans and McMullen recorded the scene with video and still cameras, and they collected three jars of the "stuff" and debris from the bottom.

Evans, who was subsequently hired by Chevron to investigate the effects of drilling mud on the subsea environment, gave the samples to the oil company, and recently said that he has never been told what the samples contained.

Chevron officials say they do not know what happened to the samples.

The discharge of drilling mud is at the heart of a federal proposal to issue a blanket permit that would allow offshore oil drilling platforms to dump wastes into the waters off California — mostly off Santa Barbara — and eliminate the specific permits now required for each drilling operation.

Evans and McMullen began diving underneath Santa Barbara oil platforms in 1975 and have since amassed more than 900 dives between them.

Under contract to Exxon, they studied and photographed the build-up of platform marine life; under contract to Chevron, they were involved in an experiment using starfish to control mussel growth on the legs of platform Hilda; and for an American Petroleum Institute study, they made numerous dives to study the undersea environment of offshore platforms.

The two recorded their underwater forays with cameras, and Evans' photographs of the undersea life on the oil platforms appeared in numerous national magazines as illustrations of how platforms become artificial reefs.

About a month after their discovery of the drilling mud at platform Hilda, on Aug. 21, 1978, the two divers attended a meeting of the International Society of Petroleum Industry Biologists in Los Angeles where they were scheduled to show one of their films depicting the underwater environment of the oil platform.

During the symposium they invited oil company representatives to view the videofilm they had made of the underwater desolation they had seen at platform Hilda. They also told the officials that they had collected jars of drilling mud samples and said that they thought the drilling mud situation called for study.

Then, nothing happened.

"They were more interested in which company it was that had dumped the mud," Evans recalled. "They weren't interested in taking a close look at it."

"I'm not saying that drilling mud is or isn't bad," he said, "but the way they reacted to it, and what they did afterward, made me stop and think about the whole thing."

Andy McMullen wasn't about to let the matter drop. On Sept. 22, 1978, he wrote directly to the White House and relayed the information about the dive and about the Los Angeles meeting with oil industry representatives whom he described as "apathetic."

Before long, McMullen and Evans were contacted about the letter. Copies of it had filtered down from the White House to state and local agencies, oil industry presidents, regional heads and finally ended up at local oil company offices.

In November 1978, Chevron asked for and received from Evans the jars of drilling mud, the photographs and the videofilm Evans had shown in Los Angeles. The oil company then contracted Evans to go out and take additional samples of the mud he and McMullen had seen. Evans made repeated trips to platform Hilda over a

See Page A-5, Col. 1

MUD WASTE LINKED TO MARINE-LIFE DEATHS

Divers charge Chevron violated drilling guidelines

Continued from Page A-1

period of two months, making collections and turning in more samples to the oil company at the end of each trip. Then, he never heard from anyone.

"It was a hot potato," said Evans. "I gave these things back to the people who had caused the problem in the first place, and they didn't want it."

When contacted by the News-Press, Chevron officials said that they recalled photographs and samples Evans had given the company, but said they couldn't recall what had happened to them.

They did acknowledge the mud Evans had seen was the same material that would be dumped under EPA's current proposed waste discharge permit.

Bill Ryberd, Chevron's area supervisor for Santa Barbara, said he wasn't certain whether the company had contacted the state Lands Commission or the local Coastal Commission office about the drilling mud incident.

"Whichever the local group was," he said, "they checked it out and determined that it looked good."

No report had been sent by the oil company to the state Lands Commission in Sacramento, he said, but "Governor Brown and the higher-ups knew about it."

An official with the state Lands Commission's regional office in Long Beach told the News-Press they did receive a report — McMullen's letter — of the mud-dumping incident and had sent their own people to investigate.

Al Willard, a commission engineer, at first said the agency determined the material in question was "a pile of old drill cuttings that had been there prior to 1969" (the year in which the state clamped down on oil drilling in the tidelands area). However, he later said the commission had no divers and his recollection was that they did not send a diver down to inspect the site in question.

Instead, they made their determination, said Willard, from a videofilm supplied to them by the oil company, which he presumed to be Evans'. From that film, he said, they determined they were looking at a pile of old drill cuttings.

Later still, however, Willard telephoned the News-Press and said that he had located the file on the matter. His office had discussed the incident with the oil company at the time, he said, and it had appeared from the pictures that there had been a "spill of drilling mud from a downpipe."

He added that "there was damage to marine life down there," which he described as "a small amount of smothering from when the mud was deposited."

Chevron did have a permit from the Regional Water Quality Control Board to dispose of drilling mud at sea, but the requirements of the permit stipulate:

"The discharge shall not contain harmful concentrations of substances which are toxic or otherwise detrimental to human, animal, plant, bird or other aquatic life."

An exception to this requirement was explained by Water Quality Control Board executive officer Kenneth Jones to McMullen in a letter dated Nov. 29, 1978: "... if degradation of bottom life is due to the smothering effect of large amounts of mud rather than a toxic substance in the mud, this requirement does not apply."

Willard did say that the state agency required Chevron weld a plate over the downpipe, "so that no future incident could occur."

He said that the sea bottom began to resume normalcy in December, 1978.

Bill Meece, an engineer with the Regional Water Quality Control Board, told the News-Press that the board wrote McMullen that it had issued a permit for Chevron to discharge drilling waste under certain conditions, but said what McMullen observed "appeared to be a violation."

By law, discharge violations must be reported by the oil company to the state Lands Commission.

Meece told the News-Press that a major requirement of the Chevron permit was that the oil company had to monitor itself.

"They hire their own people for this," Meece said. "They use their own labs or use a commercial, certified lab. This is a main condition of the permit — that they monitor themselves."

He said his agency does inspect offshore operations. Inspectors are periodically sent to the platforms, he said, "to go through the requirements with the operators." Aerial inspections are also made, a procedure which Meece said is effective in picking up surface oil slicks.

The agency, he said, does not use divers for inspection purposes.

Meece said that when McMullen's White House letter informed his office of the drilling mud situation, his office responded by writing McMullen for more information. "We basically said that what he had observed appeared to be a violation and we asked him to send us more information. He didn't follow up on it."

"We certainly rely on the public," said the engineer. "That is our biggest source of information."

McMullen says he recalls the situation vividly. "They threw the burden back on me," he said. "It's like your house is being burglarized, you call the police, and they say, 'Well, could you bring the burglar in?' "

In January 1980, Dev Vrat from the Santa Barbara County environmental staff wrote the Environmental Protection Agency and Bureau of Land Management, suggesting Evans be contacted before permits were issued for oil drilling in the Santa Barbara Channel. Evans says he never heard from EPA, BLM, or anyone.

Both Evans and McMullen believe that because taxpayers are paying for bureaus such as the Environmental Protection Agency, the state Lands Commission and the Regional Water Quality Control Board, these bureaus should be doing the monitoring and not the public.

The two say they are disturbed by an underlying feeling that their samples, reports and letters were either buried or ignored.

"We really wanted to study the situation," Evans said. "We believed that if oil was an inevitability in this area we could help out. We have had visions of oil platforms being used for mariculture. The oil companies have been in the best place to do the most — but, what are they doing?"

NINETY-EIGHTH CONGRESS

Congress of the United States
House of Representatives

ENVIRONMENT, ENERGY, AND NATURAL RESOURCES SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENT OPERATIONS
RAYBURN HOUSE OFFICE BUILDING, ROOM B-371-B-C
WASHINGTON, D.C. 20515

SUBCOMMITTEE ON ENVIRONMENT, ENERGY AND NATURAL RESOURCES

DATE: Friday, October 12, 1984

TIME: 9:00 a.m.

PLACE: Santa Monica College Board Room
1900 Pico Boulevard, Santa Monica, California

SUBJECT: Subcommittee Hearing: Offshore Oil and Gas Leasing

WITNESS LIST

(1) William D. Bettenberg
Director
Minerals Management Service
Washington, D.C.

(2) Andrea Ordin
Chief Deputy Attorney General
State of California
Los Angeles, California

(3) Michael L. Fischer
Executive Director
California Coastal Commission
San Francisco, California

(4) Panel of City Representatives

The Honorable Ken Edwards
Mayor
City of Santa Monica
California

The Honorable Gary Brutsch
Outgoing Mayor
City of Hermosa Beach
California

The Honorable Archie Snow
Councilman
City of Redondo Beach
California

(5) The Honorable Christine Reed
Chairperson
Energy and Environment Committee
Southern California Association of Governments
Los Angeles, California

(over)

Mr. LEVINE. Let me ask you—and Mr. Spaulding, if you wish to answer this as well, I would be interested in your response.

Mr. Knowlton, in terms of your very strong testimony, you emphasized I think very forcefully and effectively the important national security considerations that are involved with regard to this whole issue and the issue of national energy policy and moving toward energy self-sufficiency. What I am wondering is whether you and/or your organization, or you, Mr. Spaulding, and/or your organization, can conceive of any circumstances where you have the following conflict:

On the one hand, you have an area where there is a significant resource available, or inherently available, of energy in terms of oil and gas. And on the other hand, in that very same area you find an extraordinarily sensitive environmental economic set of concerns. I pose that conflict to you in the hypothetical sense, regardless of what the area is.

Can either of you conceive of a set of circumstances where that conflict exists, where you would come to the conclusion that drilling simply shouldn't take place because despite the significant resources in that limited geographic area, the environmental, economic and air quality considerations are so great that they would outweigh the importance of drilling for the resource?

Mr. Knowlton, let me ask you first.

Mr. KNOWLTON. In a hypothetical case—I would kind of have to ask specifically what we are referring to. I do hear what you say and understand it. Of course, I would say obviously there would be certain situations, in very local conditions where this situation might be that it is best to not drill. I think what is happening, though, is that everyone has these situations and makes them be the most important situation. "it is not my problem, it is their problem."

We have to realize this country is dependent upon our petroleum industry to gain our reserves and do our drilling. We must do it wherever we feel we have the best opportunities. I live at Yuma Beach. I overlook the ocean, I know what it means. Somebody says "those dirty oil rigs out there destroy my view." I like them, they are esthetically attractive to me. It is nice to look there and see some lights out there shining.

So you see—and in Long Beach—there you are, a very critical area, a big city. I have lived there a long time, on Signal Hill. They have a huge tourism business. They have put up hotels. And they have oil wells all over the place. It can be done and done properly.

We have all seen oil operations done poorly. All we have to do is look back to the early 1900's here in California. It can also be done correctly. My answer to you is that done properly and correctly, I think those specific uses of yours would be very few.

Mr. LEVINE. Mr. Spaulding.

Mr. SPAULDING. Mr. Chairman, I can think of no situation where the oil industry cannot invoke its ingenuity in order to cope with whatever circumstances you would care to define.

I would add a further example to Mr. Knowlton's commentary in the case of the urban exploration and development which have taken place in the city of Los Angeles. These are extreme conditions under which the industry has performed very carefully, and

Another View

From Punch

"The one in the middle is paying for it."

from report of Columbus Day, 1984 hearing at Sta. Monica College

JLM-01

The list of activities associated with manufacture, storage, and transport of the acids used in acidizing are regulated by a variety of Federal, State, and local agencies to ensure safe handling and use. Documenting the procedures related to each of the activities is not within the scope of this EIS nor are the effects of accidental releases. In addition, the concerns about many of the aspects related to acidizing noted in the comment are not concerns that have been raised by the public and subsequently identified as significant issues in the Alaska OCS Region, the Gulf of Mexico OCS Region, or even in the Pacific OCS region—which is closer to the commenter's home than is the Alaska region. During the scoping or information-gathering process, the agency shall determine the significant issues to analyzed in depth in the EIS and identify and eliminate from detailed study the issues that are not significant.

JLM-02

The use of information from the discharges associated with petroleum production from upper Cook Inlet was considered appropriate as a basis for analyzing the potential effects of production discharges in lower Cook Inlet—if economically recoverable oil resources are discovered. The upper Cook Inlet fields certainly are much closer to the Sale 149 area than is the Buccaneer Field—which is located in the Gulf of Mexico (offshore Texas).

JLM-03

Because there are no producing fields in the Sale 149 area, any estimates of potential discharges must be based on assumptions; and it is important to remind the reader of these assumptions and the uncertainties associated with analyzing the effects. For these reasons, the words and phases noted in quotations marks in the comment are used.

JLM-04

Mysidopsis bahia is a species that has been used in many toxicity tests in various areas. As such, it provides a basis for comparisons between different types of compounds or environmental conditions tested. Species of Cook Inlet plants and animals that have been used in various toxicity tests are noted in Section III.A.5.c(4)(b).

JLM-05

The types of hydrocarbons found in the water column, sediments, and benthic biota of Cook Inlet are noted in Section III.A.5.c; the sources of these hydrocarbons also are noted. Most of the hydrocarbons appear to be of biogenic origin. Also, the presence in the subtidal sediments of polycyclic aromatic hydrocarbons derived from high temperature, incomplete combustion of wood, or fossil fuels are noted.

The heavy presence of sulfur in the water column of Cook Inlet has not been observed.

JLM-06

Two isotopes of Ra, ^{226}Ra and ^{228}Ra, are the radionuclides of most concern to human health (Hamilton, Meinhold, and Nagy, 1990). Ra constitutes most of the radioactivity in produced waters; it is highly soluble in the waters and has a tendency to bioaccumulate in organisms. The concentrations of both ^{226}Ra and ^{228}Ra in produced waters discharged into the coastal waters of Louisiana range from about 0 to 930 picocuries per liter (pCi/l); the average concentrations are about 160 pCi/L.

In produced waters from eight Cook Inlet wells, the concentrations of radioactive isotopes ranged from not detected to 4.2 $\pm$ 1.9 pCi/l for ^{226}Ra and not detected to 9.7 $\pm$ 2.1 pCi/l for ^{228}Ra; the lower detection limits for ^{226}Ra ranged from 0.4 to 1.9 pCi/l and for ^{228}Ra ranged from 2.9 to 3.9 pCi/l (AOGA, 1991). The concentration of ^{226}Ra in a single sample of Cook Inlet water was 1.2 $\pm$ 0.9 pCi/l; ^{228}Ra was not detected in the Cook Inlet water samples.

JLM-07

The MMS objectively has analyzed the potential effects of Sale 149 based on the issues and concerns noted by the public during the scoping process and the best scientific, economic, and sociocultural information available. There is no production in Alaskan OCS waters, hence information on the characteristics of produced waters for any of the planning areas is not available. In the absence of site-specific information, the characteristics of produced waters from the nearest producing fields are used to analyze potential effects of discharging produced waters into the marine environment. For Sale 149, the characteristics of the produced waters from the oil fields in upper Cook Inlet were used in the analysis. Based on available information, the analysis in Section IV.B of the EIS indicates the permitted discharges—and this includes produced waters—would not have a significant effect on Cook Inlet water quality. Also, the USEPA has permitted the discharge of produced waters in Cook Inlet on the basis that they will not cause irreparable harm nor unreasonable degradation to the marine environment.

In the analysis of potential effects of Sale 149 there has been no deliberate avoidance of troublesome facts, probabilities, and uncertainties. The results of Cook Inlet water-quality studies are noted in Section III.A.5 of the EIS, where it is noted the sediments do contain polycyclic aromatic hydrocarbons (derived from high temperature, incomplete combustion of wood, or fossil fuels), pyrogenic hydrocarbons (two samples—petroleum hydrocarbons in oil from a seep or spill), and hydrocarbons from fuel oil in boat harbors. Perhaps the event of most concern is the threat of a large oil spill—a very troublesome circumstance for many persons. Although the probably of a spill $\geq$1,000 bbl is estimated to be 27 percent, MMS assumes such a spill occurs for the purpose of analysis.

JLM-08

Although subarctic regions do not have as much data as temperate ones, the Cook Inlet region has a substantial amount of data compared with other subarctic regions. The oil-spill-trajectory model used all available temperature and salinity data from the NODC archives. These data represent all the USDOI, MMS; USDOC, NOAA; and University-funded studies. The MMS has funded a substantial number of physical oceanographic studies in lower Cook Inlet. The analysis did not define monthly means due to the data set, but rather chose seasonal means based on the amount of data available.

JLM-09

The commenter is correct that a single test organism and single bioassay test will not provide reliable sensitivity testing for all marine plants and animals. The cited report used several sensitive bioassay tests in addition to chemical procedures in its reconnaissance survey of sediment and water quality in Cook Inlet. These bioassay tests are quantitative in nature and nonsite specific to allow comparison with the national scientific bioassay literature and do not profess to represent sensitivity testing for all plants and animals. The MMS acknowledges that Rhodamine dye is still commercially available. Sensitive life-stage bioassays with nonmortality end points—as used in the cited study—are preferable to toxicity tests performed in hazardous materials testing, where high levels of toxics are anticipated.

JLM-10

The suggested references were published more than 25 years ago, and the information in Feder and Jewett (1987) is considered an appropriate reference for Cook Inlet subtidal communities.

TO FAX NO. 907-271-6805 FROM FAX NO. 907-235-5305

APRIL 17, 1995 13 PAGES

PROJECT CHIEF, SALE 149 EIS
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MICHAEL S. O'MEARA
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HOMER, ALASKA 99603

RE: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR PROPOSED LOWER COOK INLET OUTER CONTINENTAL SHELF OIL & GAS LEASE SALE 149

DEAR CHIEF:

After spending a good deal of time studying Proposed Lower Cook Inlet Outer Continental Shelf (OCS) Oil & Gas Lease Sale 149, I urge selection of Alternative II (No Lease Sale).

While the Draft Environmental Impact Statement (DEIS) for Sale 149 is in many ways inadequate, it provides enough information to clearly show that the proposal lacks economic, environmental, social, or national security merits. Sale 149 would harm important public lands and water, destabilize local communities and economies, and supply at most enough oil to feed U.S. consumption for two months. Given this, sale 149 would not be in the best interests of the residents of lower Cook Inlet or the majority of other citizens of Alaska and the United States. Diminishing the great value of public lands, fisheries, wildlife, local cultures, and established economies for the meager petroleum potential of the sale area would be both illogical and immoral. Why not drop this proposal immediately and save taxpayers the expense of preparing a final Environmental Impact Statement?

It has been suggested by some Minerals Management Service (MMS) representatives that simply holding a lease sale does not assure development will occur. While true, this statement is obviously made with intent to divert discussion from the potential impacts and real risks of the proposed action. I think it is fair to assume that MMS would not propose a sale unless it expected someone to bid on the offering. Anyone willing to bid, and pay for the right to explore, obviously hopes to find and produce oil. And while no physical effects can be expected prior to exploration and development, lower Cook Inlet communities have already been subjected to harmful social and political effects from proposed Sale 149. The people of lower Cook Inlet and all

citizens of this nation have every right to be concerned about both the pre-lease and post-lease consequences of this and other proposed sales.

Laking time to deal with all of the omissions, inconsistencies, and unsubstantiated conclusions in the DEIS, I will address only it's more basic flaws. For more detailed analysis, I direct you to comments submitted by the National Park Service (3), the Pacific Seabird Group, and Trustees for Alaska. All oppose proposed Sale 149, and reflect my own position regarding the issues.

Let me begin with a brief discussion of two important legal/policy conflicts.

THE OUTER CONTINENTAL SHELF LANDS ACT

Proposed Lower Cook Inlet OCS Oil and Gas Lease Sale 149 is in direct conflict with the OCS Lands Act. The goals of the Act state that the resources "should be made available for expeditious and orderly development, <u>subject to environmental safeguards</u>..." [emphasis added] (9a). Given the level of permitted facility discharges and accidental spillage predicted by the Draft Environmental Impact Statement (DEIS) for Sale 149, environmental safeguards are sorely lacking (1a). In addition, a development proposal which has already resulted in significant disruption of the City of Homer (17,18,19,20), the Kenai Peninsula's fastest growing and most socioculturally stable community (1b), can hardly be characterized as "orderly." A better description of the proposed action would be "chaotic" given DEIS predictions of two decades of periodic 1 to 3 year disruptions for lower Cook Inlet communities, commercial fisheries, and subsistence (1c). MSO-01

1995 <u>EXXON VALDEZ</u> RESTORATION PLAN

Lower Cook Inlet OCS Oil & Gas Lease Sale 149 is not compatible with the 1995, or future <u>Exxon Valdez</u> Oil Spill (EVOS) Restoration Plans. It is the first attempt to lease within the spill area. The DEIS for Sale 149 makes it clear that any production will be accompanied by significant levels of pollution from chronic discharges of drilling muds, cuttings, and produced waters, as well as periodic oil spills (1a). This will occur before the area has recovered from the EVOS (4a). This additional pollution will both disrupt recovery and interfere with restoration monitoring programs. MSO-02

The National Research Council has reported that: MSO-02

"...the environmental impact of one spill may overlap on the impact of a previous spill, with the result potentially exceeding that of either of the individual spills. Little is known of either the cumulative impact or of the long term biological recovery after such repeated spillage, partly because of the lack of sufficient follow-up studies. Thus there are inherent difficulties in distinguishing ecological perturbations due to a previous spill from those resulting from a subsequent accident [emphasis added] (10).

Confusion over effects of the EVOS and subsequent spills will invalidate scientific studies and obstruct future restoration planning and funding decisions. It is the position of the EVOS Trustee Council that:

"Monitoring the recovery of injured resources and services has been an important part of the restoration process since the spill occurred. Information about recovery is important in designing restoration activities and determining which activities deserve funding" (4b).

As an Exxon Valdez Oil Spill Trustee Council member, it is inconsistent for the office of U.S. Secretary of Interior to approve any activity which will inhibit recovery, or interfere with restoration efforts in the spill area.

These two issues alone should be reason enough to cancel Sale 149, but I would also like to address some examples of the deficiencies of the DEIS.

PRE-LEASE SALE IMPACTS

The DEIS is inadequate because it fails to discuss in any way the many preliminary impacts of Sale 149. It is inexcusable that the Minerals Management Service (MMS) has ignored a scenario so clearly identified and well described in the literature: MSO-03

"...observable and measurable impacts can take place as soon as there are changes in the social conditions -- which often means from the time of the earliest announcements or rumors about a project...Speculators buy property, politicians maneuver for position, interest groups form or redirect energies, stresses mount, and a variety of other social and economic impacts take place, particularly in the case of facilities that are large, controversial, risky, or otherwise out of the range of

ordinary experiences for the local community. These changes have sometimes been called 'pre-development' or 'anticipatory' impacts, but they are far more real and measurable than such terminology might imply. Even the earliest acts of speculators, for example, can drive up the real coasts of real estate" (9b). MSO-03

As stated previously, these impacts have been occurring on the lower Kenai Peninsula for some time and have already produced political and social upheaval within at least one community. Local government is being manipulated by state officials in direct opposition to citizen concerns. Homer's once popular mayor has become alienated from his constituency (17, 18, 19, 20). No mitigating measures have been put in place, or even proposed to deal with these impacts or their consequences.

SCIENCE WITH AN AGENDA

One of the inadequacies of the damage assessment studies for the EVOS was that they were conducted with a limiting slant. Government wanted to support monetary claims, and industry wanted to cast doubt on those claims (14). Science with an agenda is really a form of propaganda or public relations, providing little in the way of understanding for decision makers or the general public. The National Research Council conducted three different assessments of MMS environmental studies and found environmental information used in making OCS decisions to be inadequate (11, 12, 13). In spite of constructive criticism from the Council, the DEIS for Sale 149 still seems also to be agenda driven. MSO-04

While an extensive bibliography is included at the end of Volume II, some very important sources are missing. There is no reference to the work of Freudenburg & Gramling regarding the sociocultural impacts of the OCS program (9), or to the 1989, 1992, and 1993 National Research Council assessments of MMS environmental studies programs (11, 12, 13). There is no reference to Kenai Peninsula Borough property tax records for the 1970's Trans-Alaska Pipeline System (TAPS) boom period, which would clearly show a relationship between oil development and catastrophic property tax increases. There is no reference to the work of Riki Ott relevant to the misapplication of science surrounding the EVOS (14), or to any of the EVOS Trustee Council Restoration Framework and Restoration Work Plan documents. And why is there no reference to Regional Citizen Advisory Council documents dealing with everything from excessive air and water discharges to inadequacies in prevention and response capabilities? Please refer to the Homer oral testimony of Mr. Larry Smith for other examples. MSO-05

Of particular concern to me is the lack of any reference to the Alaska Oil Spill Commission Final Report. It is among the most comprehensive examinations of the various issues surrounding the EVOS, particularly with respect to prevention and response problems in Cook Inlet. Spill risk analysis done for the Commission paints a less optimistic, and perhaps more realistic, picture than those found in the DEIS. MSO-06

However, it is not enough to simply pad a bibliography with sources that were not utilized. MMS seems unable to apply the content and conclusions of some of the references they do list in the DEIS. For example, the work of James A. Fall, Steven J. Picou, and Christopher L. Dyer regarding the social disruption of communities by the EVOS clearly shows that, some of the most damaging and lasting impacts have to do with perceptions, feelings, and memories (8, 15, 5). The DEIS assumes that the only effects Sale 149 might have on subsistence use would result from spills. The psychological impacts of platforms discharging wastes in close proximity to subsistence areas are not examined. Yet this is likely to produce the same concerns in the minds of subsistence users as did residual oil from the EVOS. The DEIS accurately reports that during the spill, villagers suffered from a feeling of loss of control over their lives. Strangely, it fails to recognize that sale and development of leases in close proximity to subsistence users, over their protests, will result in the same feelings. MSO-07

There is also a tendency to improperly apply and interpret research cited in the DEIS. One of the best examples is misuse of three Cook Inlet water quality studies (1d). All were of short duration (up to 1 month) and involved a limited number of sampling sites (up to 29). Cook Inlet Regional Citizens Advisory Council (CIRCAC) clearly identified their's as a "pilot study" in preparation for more thorough, ongoing research. Both the University of Alaska, Anchorage Environmental and Natural Resources Institute/MMS and Marithon Oil Company studies are best described as "pilot studies" as well, given their limited scope. MSO-08

Since release of these three studies, MMS has consistently intimated to the public that they were comprehensive investigations of the fate and effects of oil industry related discharges in upper Cook Inlet. Results of these limited investigations have been used to conclude that oil industry discharges have had no effect on the Cook Inlet marine ecosystem.

Cook Inlet is 370 km long and 139 km wide at its mouth. MMS describes it as a "complex Gulf of Alaska estuary" (1e) and

admits that knowledge of its physical oceanography is incomplete (1d). It is both unethical and scientifically insupportable to draw conclusions regarding over 30 years of petroleum facility discharges, into a body so large and complex, from three pilot studies. MSO-08

The DEIS rejects recommendations for ongoing study of Cook Inlet waters in an effort to determine the fate and effects of oil industry discharges (1g). Taking the narrowest of views, MMS examines only the monitoring of specific facilities as part of their responsibilities. Public recommendations, however, were for a comprehensive effort to provide a meaningful baseline, examine possible ties to environmental changes and pollutants, and monitor the general quality of Cook Inlet Waters over time. Without an adequate baseline, is unlikely that it will be possible to determine the effects of routine discharges and spills predicted in the DEIS. According to the National Research Council: MSO-09

> "In the cases that have now reached a late stage of recovery, investigation is hampered by lack of sufficient knowledge about normal, unstressed ecosystems" (10).

This position was reiterated by Robert B. Spies, Chief Scientist for the EVOS Trustee Council and virtually all those presenting papers at the EVOS Symposium in Anchorage in February, 1993 (6).

Since MMS proposes development which assures a significant increase of marine pollution, it is government's responsibility to see that such studies are conducted. The law (43 U.S.C. 1346(b)) actually requires that studies be conducted both prior to and after leasing and development (9c). Resistance to this requirement sends a strong signal that MMS, like the oil industry, doesn't want to find out something that might conflict with their agenda -- sale and develop OCS leases.

SPILL PREVENTION AND RESPONSE

The DEIS makes insupportable claims regarding prevention and response capability in Cook Inlet (1f). MMS contends that contingency planning is adequate and that Cook Inlet Spill Prevention and Response Incorporated (CISPRI) is prepared to deal effectively with spills. The Alaska Department of Environmental Conservation (ADEC) is presently conducting a public review of the Prince William Sound Oil Tanker Contingency Plan and ADEC Draft Findings. The Prince William Sound Regional Citizens' Advisory Council (RCAC) has found MSO-10 them wanting with respect to Cook Inlet, Kennedy Entrance, and Kodiak Island: MSO-10

> "The area between Prince William Sound and Cook Inlet (Cape Puget to Kennedy Entrance) remain vulnerable to oil spills and is inadequately protected" (2).

The RCAC has summarized some of the major deficiencies in Cook Inlet spill prevention and response capability in its April review of PWS Oil Tanker Contingency Plans and relevant ADEC Draft Findings (16).

While the DEIS praises CISPRI's capability, an examination of the record will show that in responding to a series of small spills since 1989, little oil has been recovered. The fact remains that there is no vessel traffic system in Cook Inlet, no tanker escort vessels, no tugs on station which can tow a fully laden tanker. The same corporations wishing to bid on Sale 149 continue to actively oppose implementation of these reasonable prevention measures. During 1994 they successfully lobbied the Alaska Legislature to reduce the required per-barrel contribution to the state's spill prevention and response (470) fund. In the view of Walter Parker, former Alaska Oil Spill Commission Chairman, things are worse in Cook Inlet today than they were in Prince William Sound just prior to the EVOS.

SIGNIFICANT IMPACTS OF DEVELOPMENT

Another important failure of the DEIS is that it only attributes significant, negative impacts to spills. And the wording selected to describe those impacts often trivializes their effects. For example, a 50,000 barrel spill could be expected to "...very slightly reduce visual qualities and slightly reduce visitor rates..." in National Parks, Refuges, and Recreational Areas (1h). This is preposterous to anyone who lived through the EVOS! MSO-11

Sometimes the effort to verbally sanitize potential impacts doesn't even make sense. In discussing the exploration phase, the DEIS states that "Social stress induced from operation of a drilling platform in northern Cook Inlet waters also would be minimal, because offshore drilling platforms have been part of the northern Cook Inlet scene for decades" (1i). Northern Cook Inlet! Sale 149 is planned for southern Cook Inlet. Obviously this statement was left in from a previous DEIS, but it exposes MMS's inability to really understand the difference between communities of the central and southern Kenai Peninsula. You can be damn-well

sure that the appearance of drilling rigs south of Kalgin Island is going to cause plenty of social stress! MSO-11

The DEIS mentions, then ignores, the aesthetic and consequent economic effects of buggering up the spectacular view with as many as 20 production platforms. People come from all over the world to sport fish, kayak, or just stand on Baycrest Hill and look across the Inlet at the mountains over at Lake Clark National Park, Augustine volcano, Cape Douglas and the Barren Islands. They spend a lot of money getting here, and more during their stay. Some of us get through the winter on that money. Put oil platforms between our guests and those spectacular sights and they won't come back. And they'll recommend that their friends go to British Columbia. Some of us won't make it through the next winter.

If an appraisal was done on those public lands both before and after the arrival of oil platforms, be assured there would be a significant diminishment in value. Who's going to compensate the people for that loss -- MMS or the companies who get the leases?

By the way, the DEIS fails to even mention the Alaska Maritime National Wildlife Refuge in discussing public lands. That seems like a pretty big omission, considering it's our largest refuge and that it stands to be most directly impacted by exploration and development within the sale area. MSO-12

Then there is the matter of the commercial fisheries. Oil spills aren't the only thing that can cause problems for fishermen. But the DEIS fails to consider the other impacts. Among them is the potential marketing problems oil production can cause. If the general public comes to perceive lower Cook Inlet as polluted, commercial fishermen will have increasing difficulty selling their catch. Recent marketing strategies have been very successful in boosting sales of Cook Inlet salmon. Those strategies focus on selling fish from the "pristine waters of Cook Inlet." Given recent events that may be something of an exaggeration, but it doesn't matter -- perception is reality, and people outside believe. MSO-13

I've already pointed out that subsistence users can be impacted by routine exploratory and production operations as well as spills.

Finally, the DEIS unrealistically minimizes the potential for sociocultural impacts to lower Cook Inlet communities (1j). Information provided in DEIS Appendix G is inadequate as a basis for critique of the MMS Rural Alaska Model for MSO-14 population forecasts. However, I suspect that population estimates are low because they fail to incorporate figures on unemployed people drawn by the prospect of an oil boom. We recently saw this happen when ARCO announced the Sunfish discovery in upper Cook Inlet. Transients began to appear on the Kenai Peninsula almost immediately and grew in number until the discovery turned out to be a "bust." Coinciding with the Sunfish prospect was the influx of major chain stores such as K-Mart, and Fred Meyer. Their arrival certainly drew additional job seekers from outside of the Kenai Peninsula Borough, while driving out smaller, established business. MSO-14

The DEIS pays inadequate attention to the nature of the population brought in by oil and gas development, and its potential to impact lower Cook Inlet communities. MMS assumes the new population will settle and blend in with the existing central Peninsula "oil patch." This overlooks the effects of typical "compressed " oil company work scheduling (9d). By working two weeks on and one week off, for example, platform workers may choose to live where they wish, since the need to commute is infrequent. Homer is among the most desirable places to live in Alaska, and the potential for it to become a "bedroom" community for oil workers is high. Contrary to MMS predictions, influx of this highly paid, transient work force with little sense of place and values quite different than the existing resident population, promises to significantly alter the sociocultural patterns of the community. MSO-15

Oil workers will have greater than average disposable income. Purchase and sale of property in the Homer area would probably drive real estate prices up with a consequent increase in property taxes (9e). During the TAPS boom in the 1970's, land speculation increased my property taxes by 740% over a seven-year period -- with no comparable increase in services. No matter where they reside, given their greater disposable income and long periods of free time, recreating oil worker can be expected to compete with local sport and subsistence users for limited resources throughout the lower Cook Inlet area.

The DEIS predicts that most of the new infrastructure related to development of Sale 149 would center near existing facilities in the central Peninsula. While this may be true for some installations, it is unreasonable to believe that the oil industry would prefer an 80 mile run in typically difficult waters over facilities which could be placed closer at hand. Kachemak Bay is far and away the best harbor in Cook Inlet. One local contracting firm is presently MSO-16

developing a barge basin, staging area, and repair facility at the base of the Homer Spit. What better home base for rig tenders? MMS needs to take another, more realistic look at the potential for OCS related development to sprout up in lower Cook Inlet communities, and it needs to plan for mitigation of the adverse effects. MSO-16

CONCLUSION

By proposing to sell OCS leases in the Exxon Valdez spill area, MMS has moved into dangerous territory. Consequently, existing DEIS procedures are inadequate. As a member of the Exxon Valdez Trustee Council, the office of Secretary of Interior shares the responsibility to "...restore the environment injured by the Exxon Valdez oil spill..." (7). This mandate cannot be met if proposed OCS Sale 149 goes forward. In addition, other significant issues raised at the March 23, 1992 MMS Scoping Meeting have yet to be adequately addressed.

1. Exemptions to federal law and administrative regulations allow almost unlimited dumping of dangerous pollutants into coastal waters by the petroleum industry. MSO-17

2. There has been no comprehensive, scientific documentation of the fate and effects of these pollutants throughout Cook Inlet and Shelikof Strait. It is impossible to know whether or not there is a significant relationship between observed changes in habitat and decline of certain species. MSO-18

3. Biological baseline data for much of Cook Inlet and Shelikof Strait is incomplete. In absence of such data it is impossible to monitor the impacts of past, present, or future oil and gas development. MSO-19

4. Little has been done to reduce the risk of catastrophic spills in Cook Inlet. There is no vessel traffic system. There are no escort vessels for tankers and no vessel on station capable of towing a disabled tanker. Vessel communication and navigational aid systems are inferior to those found in Prince William Sound, yet weather and sea conditions in Cook Inlet and Shelikof Strait are typically more hazardous. MSO-20

5. Spill response capability in Cook Inlet and Shelikof Strait is totally inadequate. It has not been demonstrated that federal, state, local, and industry contingency plans are any better coordinated than before the Exxon Valdez spill. There is only one significant MSO-21

response vessel stationed in all of Cook Inlet. CISPRI has demonstrated an inability to control or clean up even a moderate spill. Alyeska sees itself as a "volunteer" organization which may or may not respond to Cook Inlet spills. The MSRC plans to have no presence in Alaska. MSO-21

Given the foregoing, the only rational course is to adopt DEIS Alternative II (no sale).

MICHAEL S. O'MEARA

Michael S. O'Meara

-- more --

ENDNOTES, O'Meara

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   - c. IV.B.1-76 & 80, IV.B.10-31 through 36
   - d. III.A.12
   - e. III.A.5
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   - f. IV.A.23
   - g. 1-15,16
   - h. Table II.I-1
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MSO-01
The permitting of discharges is one of the safeguards assured by the Federal Clean Water Pollution Control Act (Clean Water Act). This act directs the USEPA to develop comprehensive programs for preventing, reducing, or eliminating pollution of navigable waters of the United States. The program to control the discharge of pollutants is the National Pollutant Discharge Elimination System (NPDES) program. According to the Clean Water Act, all discrete sources of wastewater must obtain a permit which regulates the facility's discharge of pollutants into the waters of the United States. The NPDES permit establishes (1) limits on the pollutants discharged by the sources and (2) specific monitoring and reporting requirements. The Clean Water Act also provides that any NPDES permit issued for a discharge into marine waters be supported by a determination that the permitted discharge will not cause irreparable harm nor unreasonable degradation to the marine environment. In the past, the USEPA has issued a general NPDES permit authorizing the discharge of pollutants associated with exploration and production activities in Cook Inlet.

Unfortunately accidents do occur in most human activities; there are even natural events, such as earthquakes or storm surges, which also are unexpected and result in damage, harm, loss, and injury. As noted in Section IV.A.4, MMS has established stringent requirements for spill prevention and response and employs an inspection program to ensure industry compliance. To complement the regulatory programs in place, the petroleum industry uses state-of-the-art technology for prevention equipment and the most-current operating procedures while conducting operations on the OCS.

The lease sale process ensures public participation. The public's reaction to any controversial issue may be demonstrated through a range of emotions. Even proposed regulatory actions affecting commercial or sport fishing are met with a variety of emotional responses.

MSO-02
For Sale 149, exploration-drilling activities are estimated to begin in 1997 with the drilling of 1 to 2 wells per year; this is 7 years after the EVOS occurred. If commercially recoverable quantities of oil are discovered, the drilling of production and service wells is estimated to begin in the year 2000, 11 years after EVOS, and production in 2003. During this time, none of the other activities that affect the resources of the area and could disrupt recovery and interfere with restoration-monitoring programs have been stopped; these activities include commercial and sport fishing, the discharge of municipal wastewaters, and oil and gas production in upper Cook Inlet.

The MMS has conducted a water-quality monitoring study in Cook Inlet and is working with other groups, Cook Inlet Regional Citizens Advisory Council in particular, to continue this effort. The results of these and other studies will be one of the factors that will be taken into consideration when determining whether or not to approve Sale 149. Also, MMS believes Sale 149 is consistent with the mission of the Exxon Valdez Oil Spill Trustee Council which "is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthily productive world renowned ecosystem while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living."

Also, please see the responses to Comments TAG-08 and 09.

MSO-03
Please see the response to Comment MAB-04.

MSO-04
Please see the response to Comment APH-03.

MSO-05
The scale of activities associated with Sale 149 is expected to be less than that associated with the construction of the TAPS, and the Kenai Peninsula Borough property tax records probably would not significantly contribute to the analysis of the potential effects of Sale 149 on the economy of the affected area. The effects of the proposed oil and gas lease sale on the economy of the Kenai Peninsula Borough are analyzed in Section IV.B.1.h. The methodology for the forecasts are described in Appendix G of the EIS.

The MMS staff includes physical, biological, and social scientists working in their fields of training and experience with past and continuing experience in conducting and evaluating studies. These scientists are competent to review studies and make their own independent judgements without having to refer to the judgment of others.

The EVOS Trustee Council Restoration Framework and Restoration Work Plan documents basically are planning documents and, as such, generally do not provide information that would help in analyzing the potential effects of an oil and gas lease sale. The reports from the investigators of the Trustee Council-sponsored studies would be more useful in this regard. If information from any of the Trustee Council-sponsored studies is used, it is more likely that the original report by the investigator will be cited rather than the EVOS Trustee Council Summary Reports.

As noted in Section II.H, the analysis of the potential effects of Sale 149 assumes all laws and regulations are part of the proposal. As an adjunct to this assumption, it is assumed compliance with all laws and regulations. The MMS holds an inspection to ensure compliance and has the authority to require the lessee to modify operations and/or stop operations to ensure compliance. Reports documenting violations of facilities regulated by other agencies probably would not contribute information that would significantly influence any of the analyses.

The 1994 work by Freudenburg and Gramling has been added to the bibliography.

MSO-06
The Report of the Alaska Oil Spill Commission (AOSC), *Spill, The Wreck of The Exxon Valdez, Implication for Safe Marine Transportation*, contains considerable information about many aspects of the EVOS. This information is important to understand some aspects of the event—why it happened, how can similar events be prevented, and what can be done to respond more effectively and efficiently in the event of other large spills. However, some of the information in the AOSC report would not significantly contribute to analyzing the potential effects of a proposed oil and gas lease sale. There are some similarities in the types of information found in the AOSC report and the Sale 149 EIS. These similarities include the following:

- oil-spill prevention and response—EIS Section IV.A.4;
- fate of oil in the oceans—EIS Section IV.A.3;
- oil-spill response (changes resulting from the EVOS)—EIS Section IV.A.6;
- description of the Cook Inlet environment—EIS Section III
- concerns citizens of local communities have about oil spills, whether a threat or an actual spill—EIS Sections IV.B.1.j and k (Subsistence-Harvest Patterns

and Sociocultural Systems, respectively); and
- model of oil-spill trajectories—EIS Section IV.A.2

A number of the references used to prepare these parts of the AOSC report also were used to prepare the corresponding section in the EIS.

The absence of a reference to this report does not mean the effects of the EVOS have been ignored. Quite the contrary. Information from the studies of the effects of the EVOS have been evaluated and incorporated into the analysis of the effects of the assumed spill of ≥1,000 bbl for Sale 149.

MSO-07
A total of eight blocks off the southwestern end of the Kenai Peninsula opposite the communities of Port Graham and Nanwalek, and nine blocks offshore the Barren Islands have been deferred from the proposed sale area under Alternative IX. This should mitigate to some extent the visual symbolism of a threat from oil production, should this alternative be selected. Deferral of the blocks also provides greater distance from shore for emergency measures to be taken, should an oil-spill accident take place at a platform site. The discharge of waste material from a platform site is regulated and controlled through a permitting process of the USEPA.

Also, please see the response to Comment MAB-04.

MSO-08
The information about water-quality studies in Cook Inlet is a summary of the studies and notes the general areas where the samples were taken, their numbers, and the constituents analyzed. Thus the reader is informed about the limitations of the studies. In addition to the three studies noted by the commenter, there was also a series of studies conducted in the late 1970's (EIS Sec. III.A.5.c(4)(b)) that analyzed the hydrocarbons in the water column, marine biota, and surface sediments; these studies were conducted after nearly 500 MMbbl of oil had been produced from the fields of upper Cook Inlet. The results of these studies were used to interpret the potential effects of permitted discharges if commercially recoverable quantities of oil are discovered in the Sale 149 area. The results of these studies seem to be consistent with similar studies in other areas and with the limitations of the NPDES permit—please see the response to Comment MSO-01.

The MMS has not intimated to the public that the monitoring studies were comprehensive, but has noted what the results of the studies indicated.

The EIS acknowledges detailed information on localized processes is lacking; however, there is sufficient information about the physical oceanographic process to support the basic conclusions and to prepare a model that predicts oil-spill trajectories. As noted in the preceding paragraph, the potential effects of permitted discharges are based on more than three pilot studies.

MSO-09
The MMS has not rejected consideration of additional study of Cook Inlet waters to further delineate the fate and effect of oil-industry discharges. The MMS will continue to work cooperatively with CIRCAC to collect additional water-quality samples and other environmental data from Cook Inlet. The MMS is provided funding to the U.S. Geological Survey to complete additional trace-metal analyses on Cook Inlet sediments collected by the UAA, ENRI (1995) study. In addition, the Fiscal Years (FY) 1996-1997 Alaska Regional Strategic Plan (MMS, Alaska OCS Region, 1995) has added a proposed study to address contaminant fate and effect in outermost Cook Inlet and Shelikof Strait. Please see the response to Comment TAG-32.

MSO-10
The information in the EIS is a summary of oil-spill-cleanup techniques and strategies. This summary includes a discussion of the effectiveness of the response techniques based on the historical record. (The analysis in the EIS of the effects of a large spill assumes no cleanup.) The EIS notes that before exploration or development and production activities can be conducted on a lease, the lessee must have an approved oil-spill-contingency plan. This plan must satisfy the requirements of MMS and the U.S. Coast Guard (Sec. IV.A.4.b of the EIS). The MMS uses inspections, equipment-deployment drills, and table-top communications exercises to ensure that the lessee has trained, knowledgeable crews and well-maintained equipment to respond to a spill. Through planning and drills, MMS has determined the plans are, to use the commenter's term, adequate. The information in the EIS notes CISPRI is one of three oil-spill cooperatives in Alaska and notes their function—the discussion of effectiveness is not intended to be an evaluation of CISPRI's response capabilities.

Part of the comment also addresses tanker safety issues, which basically are the responsibility of the U.S. Coast Guard; please see the responses to Comments TAG-17 and AS-04.

MSO-11
The writer comments that wording in the DEIS trivializes effects. The writer states that the DEIS states in Table II.I-1 that a "50,000 barrel spill could be expected to. . .very slightly reduce visual qualities. . .in National Parks, Refuges, and Recreational Areas." This statement in Table II.I-1 has been corrected. The visual qualities that are diminished slightly would be due to oil rigs and platforms rather than a spill. In Section IV.B.1.m of the EIS, views of oil rigs and platforms rather than of oil spills are analyzed. The writer further states that the DEIS states in Table II.I-1 that a "50,000 barrel spill could be expected to. . .slightly reduce visitor rates. . .in National Parks, Refuges, and Recreational Areas." According to Table III.C.6-6 of the EIS, the number of visitors to Katmai and Lake Clark National Parks declined slightly between 1988 and 1989 and increased for Kenai Fjords National Park between 1988 and 1989.

Regarding the comment about drilling platforms in northern Cook Inlet, the text in Section IV.B.1.k has been modified.

The writer comments that "The DEIS mentions, then ignores, the aesthetic and consequent economic effects of buggering up the spectacular view with as many as 20 production platforms." Visual qualities are analyzed and identified as being affected in the conclusions in Section IV.B.1.m. Analysis and conclusions were not made about economic effects. The text has been revised in Section IV.B.1.m and in other appropriate alternatives. It should be noted that the largest number of platforms projected is 11 for the high case of Alternative I, as shown in Table IV.A.1-1 of the EIS.

MSO-12
A description of the Alaska Maritime National Wildlife Refuge has been added to the text in Section III.C.6.

MSO-13
Large oil spills routinely are sensationalized by the media, resulting in an exaggerated negative public perception of the spills effects on all fishes. However, the bulk of evidence from prior oil spills has shown that they actually have little to no measurable effect on most fish

populations, which is why commercial fishermen are again fishing the following year in areas that were affected by a spill. The economic effects of a large oil spill on the commercial-fishing industry are analyzed in Section IV.B.1.i of the EIS.

MSO-14
The RAM model is described in several technical reports [TR's]), the most recent being TR 124, *Alaska Statewide and Regional Economic and Demographic Systems*, which is available at many public libraries throughout the State or from the MMS Alaska OCS Region Resource Center. While transient unemployment is not incorporated into the model, it is likely to be short term and limited in numbers and, because the total length of this project is more than 30 years, we do not anticipate any long-term significant effects to the local population or sociocultural system to result in transient unemployed workers migrating to the area. If the proposed OCS lease sale occurs and results in development and production, it will create additional employment and direct and secondary income to the area that will influence companies to start businesses or expand existing operations. The RAM model incorporates the projections into the employment and population projections, but it is beyond our capability to predict whether additional major chain stores will move into the area and whether such action would have a positive or negative effect. Some might see the lower prices and increased variety as positive, while others see the previous small businesses being displaced as a bigger negative.

The connections between the arrival of unemployed transients on the Kenai Peninsula with either the ARCO Sunfish announcements or the arrival of national retail outlets is not apparent. There are times of the year when "transients" seem to consume the Peninsula, such as prospective fish-cannery workers or vacationing RV or camper occupants. Additionally, because retailers generally prepare market-share studies far in advance of constructing new facilities, it is unlikely there is a connection between the arrival of new national retail outlets and the Sunfish announcements.

MSO-15
Based on the proportion of KPB population living in Homer in 1990 (9% of total), Table IV.B.1.k-1 shows the estimated long-term resident population associated with the lease sale that might reside in Homer at about 210 people. Using the 2.54 average number of persons per household shown for Homer in the 1990 census, Homer would accommodate about 80 (mathematically 82.67) households. Homer accounted for about 1,400 households in 1990. The addition of 80 households would comprise an increase of about 5 to 6 percent of all households in Homer. Even if this were to happen and the immigrants possessed the characteristics predicted by the commenter, any change is character of the sociocultural systems in Homer should be marginal at best.

MSO-16
The developmental scenario for proposed Sale 149 is based on a best guess as to quantities of recoverable resources, types of technology utilized to develop the field, reasonable transportation assumptions, as well as assumptions on the logical location of infrastructure. The selection of Kenai as the primary base for marine support activity was made on the basis of: (1) history of use, (2) existing facilities, (3) and location of oil-field-support industries. From the early 1960's, Kenai has been the site of oil-field-support facilities. The community is the host to several oil-field-support industries as well as individuals who are employed in the industry. The existing Rig Tenders dock in Kenai has for many years served the needs of platforms located on State waters in the upper Cook Inlet and could be reasonably expected to do the same for platforms located in Federal waters. In regard to distances the support ship might be expected to travel, a review of the Sale 149 map will indicate the fact that many of the proposed sale blocks lie north of Homer, some closer to the community of Kenai. In any event, the specific location of support facilities will be an issue dealt with, in depth, in a developmental EIS, should recoverable quantities of hydrocarbons be found.

MSO-17
As noted in the response to Comment MSO-01, the USEPA is responsible for issuing the permits that authorize discharges and setting the limits on the effluents. These permits must be supported by a determination that the permitted discharge will not cause irreparable harm or unreasonable degradation to the marine environment.

MSO-18
The studies conducted on hydrocarbons and metals in the Cook Inlet marine environment are summarized in Section III.A.5 of the EIS. The receiving waters adjacent to the discharge points may contain levels of contaminants that are harmful to some organisms. However, the waters of Cook Inlet are very dynamic and dilution, and dispersion will reduce the contaminants to levels that will not harm most species. Also, the studies, with few exceptions, have not detected any accumulations of petrogenic hydrocarbons in the water column, sediments, or benthic biota.

The reasons for the decline of some species is unknown and require further study if they are to be determined.

MSO-19
The MMS believes the database for Cook Inlet is adequate to analyze the potential environmental effects of Sale 149. Data collection is a continuing process and may never be "complete." The impacts of past oil and gas development probably could not be monitored—some of the concerns expressed today about such development were a much smaller part of our collective conscience in the past than they are today. The amount of data on the biological resources in the Cook Inlet/Shelikof Strait area likely will expand with time, and this will improve our ability to monitor future impacts.

MSO-20
Please see the responses to the Comments KCN-05, UFA-06, and TAG-17.

MSO-21
See responses to Comments UFA-06, KCN-05 and 11, HPH-01, and MSO-10.

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April 18, 1995

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Project Chief:

As a resident of the Kenai Peninsula, and one who is directly affected by the outcome of the proposed lease sale, I wish to voice my opinion. I am not in favor of pursuing the proposed lease sale 149 for many reasons. I do favor Alternative II, the no-lease option.

My greatest concern about oil and natural gas exploration and leasing is its impact on the wildlife and their marine and terrestrial habitats. Although there have been tremendous technological strides made in developing hydrocarbon resources more cleanly and efficiently, it is virtually impossible to avoid negative impacts to adjacent and contiguous undeveloped areas upon which wildlife depends. In particular, the draft EIS did not address a trajectory model of a major oil spill, nor did it address the effect of spilled oil on the prey species of seabirds. LS-01

I am also concerned about the inevitable change that would occur to the social, political and economic base in the lease sale region. The amount of economically retrievable oil and gas reserves is unknown, but is not anticipated to be large. Thus, the economic "benefits" (as defined as increased economic activity in the lease sale region and profits to the oil companies) are short-term. The project, however, has long-term effects that are likely to damage or destroy currently existing industries such as tourism and commercial, sport, and subsistence fisheries. These industries can be considered "sustainable" whereas the extraction of non-renewable resources is not.

The expansion of the petro-industry on the Kenai Peninsula would require a change in infrastructure, which in turn requires an increase in the human population to support construction and maintenance. The local governments are not prepared (in terms of planned growth and municipal amenities) to accommodate a rapid influx of workers.

I hope you will consider my comments as you proceed with the environmental analysis.

Sincerely,

Leslie Slater

Leslie Slater

LS-01

The OSRA-trajectory model does not consider the size of an oil spill. For the trajectory analysis, it is assumed that an oil spill occurs and the path of the oil spill, under different environmental conditions, is recorded and contact to environmental resource areas and land segments are tabulated. For purposes of analysis in the DEIS, MMS considers a 50,000-bbl spill (Sec. IV) and a 200,000-bbl spill (Appendix C). The term "major" is a relative term. The MMS believes a 50,000-bbl spill to be a large spill and a 200,000-bbl spill to be representative of the two largest oil spills that have occurred in U.S. waters.

The EIS in Section IV.B.1.d (Effects on Marine and Coastal Birds) assesses the effects of a major spill (50,000 bbl) on prey species of marine and coastal birds, particularly effects on intertidal prey of sea ducks and shorebirds in Section IV.B.1.d. Effects on pelagic prey of seabirds, such as pollock, or sand lance (fish) are expected to be very low or insignificant because of the great abundance and broad distribution of these prey species; and the losses of these pelagic prey are not expected to reduce their availability to seabirds—see Section IV.B.1, Effects on Fisheries Resources. The EIS does address a trajectory model for a major spill of 200,000 bbl in Appendix C of the EIS.

March 7, 1995

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MMS, Alaska OCS Region
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Anchorage, AK 99508-4302

Dear Sir;

Thank you for the opportunity to comment on the proposed Oil and Gas Lease Sale 149. I strongly prefer Alternative II (no lease sale). I do not feel that the sale would be to the overall benefit of Cook Inlet communities or the environment. The southern Kenai Peninsula's life styles and economy is based on tourism, commercial, and sport fisheries. Oil development is simply not compatible with this economy or, I believe, the overwhelming public opinion of the residents of the community. Some more specific comments are:

- Cook Inlet is a dangerous shipping area. Strong currents and the poor oil shipping ports of Drift River and Nikiski, make the Inlet a likely area for major spills. There isn't even a tug in Cook Inlet that would be capable of saving a tanker! Cook Inlet needs to have a much improved safety procedures to deal with the current oil development in the upper Inlet before we even consider more leasing. **AS-01**

- Recently the EPA cited upper Cook Inlet oil developers with nearly a thousand reported violations regarding spills. The actual number is probably much higher since unreported spills are probably even more common. This shows that there is already a chronic pollution problem. We simply should not consider more leasing until industry gets better operating procedures and the EPA is stricter at enforcing fines (their proposed fines are merely 1/10th of that is allowable under the regulations). **AS-02**

- Studies on the pollutant levels in Cook Inlet fish need to be done. I highly value being able to catch and eat fish from the Inlet. **AS-03**

It needs to be determined what levels of pollutes, like mercury, are already in our fish. I understand that oil drilling mud's are exempt from water quality discharge regulations. They contain many heavy metals and are a very serious pollutant. No discharge of drilling mud's should be allowed, period in Cook Inlet or any other lease area. **AS-03**

- The tanker fleet is getting older and more and more prone to accident and cracks. The EIS should address the danger of the aging tanker fleet and what precautions will be taken to minimize risk. **AS-04**

Sincerely,

Art Sowls

AS-01
Please see the response to Comments KCN-05, UFA-06, and TAG-17.

AS-02
Violations of the USEPA National Pollution Discharge Elimination Systems permit, and not spills, are discussed in the response to Comment TAG-12. Spills of hazardous substances, regardless of size or content, must be reported to the U.S. Coast Guard and the Alaska Dept. of Environmental Conservation. As noted in Section III.A.5, studies of water quality do not indicate a chronic pollution problem from hydrocarbons; these studies included water, sediments, and benthic biota.

AS-03
The commenter stated that pollutant levels in regional fish should be determined, and that discharge of drilling muds should not be allowed.

The 1995 monitoring program for the Cook Inlet Regional Citizens Advisory Council includes analyses of biochemical changes in Cook Inlet fish. If biochemical changes are detected, they could indicate early signs of response to chemical pollutants. The results of this study will be available prior to Sale 149. Also, please see the response to Comment TAG-07.

The discharge of drilling muds is not expected to have any effect on the overall quality of the Cook Inlet water, as summarized in Section IV.B.1.a (3). The conclusion is based partly on water depths and on the strong tidal currents in Cook Inlet that rapidly exchange the seawater, as described in Section III.A.3.

Further, as summarized in Section IV.B.1.c (3), the discharge of drilling muds probably would have no effect on pelagic or semidemersal fishes. With regard to demersal fishes, the effect would be limited to only the short time periods when drilling materials are being discharged. An additional reason for the absence of effects from drilling muds on important commercial and sport fish, such as salmon and halibut, is their migrations. The seasonal and life history migrations of regional finfish are documented in Section III.B.2 and in Hood and Zimmerman (1986).

AS-04
Tanker safety and vessel qualifications are the responsibility of the U.S. Coast Guard. The U.S. Coast Guard and the Alaska Department of Environmental Conservation currently are evaluating the need for additional prevention measures for tanker operations in the area. However, all tankers entering U.S. waters must meet certain standards set by international protocols and U.S. maritime law. During the life of proposed Sale 149, tankers entering and trading in U.S. waters increasingly will be double-hull constructed. The OPA 90 regulations that mandate this change will ensure a trend toward a modern and technologically advanced tanker fleet.

As noted in Section II of the EIS, the analysis assumes all laws and regulations applicable to OCS operations are part of the proposal; compliance with these laws and regulations also is assumed. As an adjunct to these assumptions, it also is assumed that tanker operations will be conducted in compliance with U.S. Coast Guard and other agency regulations and vessel-classification standards.

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10132 Colville Street
Eagle River, Alaska 9957"-8361
11 April 1995

Dr. Raymond E. Emerson
MMS, Alaska OCS Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

Dear Sir:

I have the following review comments on the Draft Environmental Impact Statement for Oil and Gas Lease Sale 149:

General:

1)much of the proposed Sale 149 area has been leased previously and explored without adverse environmental impact, therefore preparation of yet another expensive environmental impact statement is redundant; an environmental assessment would suffice.

2)the MMS does not need to produce voluminous tomes to analyze proposed oil and gas leasing on the OCS; as well evinced by comparable state oil and gas leasing environmental analyses in its waters. RJW-01

3)how much public monies has the MMS expended cumulatively and for this document in Oil Spill Risk Analysis? Benefit:cost analysis should be determined. RJW-02

4)much of the document is unduly repetitive; this minimally insults the reader's intelligence as well as lengthens the document. RJW-03

5)since the public is taxed for this MMS/OCS program, Oil Spill Risk Analysismay have little or no economic benefit and it may have outlived its usefulness, especially in view of more recent EVOS studies. RJW-04

Specific:

1)cumulative activities impacts should be deleted since they are not within the purview of this early leasing document. They more properly should be analysed in later environmental impact statements governing development. RJW-05

2)Page I-11: Pollock-Spawning Area Deferral does not even mention this species, ostensibly the major reason for its analysis. RJW-06

3)Page III.A.18: Table III.A.5-8 is outdated. 1989-91 is hardly the most recently-available data. RJW-07

4)P III.B.4-8: Fisheries Resources: Concise, complete, and accurate, criteria that the remainder of this document should emulate.

5)Pages III.C.6, Tables III.C.3-2-3: Outdated data of questionable validity, moreso since more recent is available. RJW-08

6)Figures III C.3-1a, b, c, d, e, and f: all could be easily summarized into a single paragraph. RJW-09

7)Page III.C.7: In view of the subjective nature of the interview process an objective nalysis of the limitations inherent in this type of date collection should be ncorporated here. RJW-10

8)Figure C.3-2a: requires scale. RJW-11

9)Figure C.C.C.3-3: requires scale. RJW-12

10)Figure III.C.3-5: requires scale. RJW-13

11)Figure III.C.3-6: Figure is too dated. RJW-14

12)Figure III.C.4: 1983 numbers in 1995! Update. RJW-15

13)Pages III.C.18-22: In view of the limited potential adverse impacts on thes areas his section should be very much reduced in content. RJW-16

14)Figure IV.A.2-2: Rationale for the inordinately large number of land segments egments should be explained, e.g. how does #78 differ from #79? RJW-17

15)Table IV.A.2-1: Are there no fisheries resources in these areas? RJW-18

16)Section IV.A.: In view of what appears to be the area/time-limited innocuous effect f these small oilspills why waste money on extensive analysis? RJW-19

17)Figure IV.B.1-1: Delete. It's too simplistic. RJW-20

18)Figure IV.B.1-2: Delete. Routing may be more readily and accurately described in text sentence or two. RJW-21

19)Page IV.B.1-13: Paragraph 7: hardly an impact. Delete. RJW-22

20)Page IV.B.1-43: "SF" is at best a figment of the writer's imagination. Delete or explain derivation in accepted scientific analysis. RJW-23

Finally, before proceeding further the MMS needs to re-visit the National Environmental Policy Act of 1974; this to produce a more economical, factual, and scéentific EIS. RJW-24

Sincerely,

Robert J. Wienhold

Robert J. Wienhold

Copies

RJW-01
The MMS has determined that for oil and gas lease sales in Alaskan OCS waters, an EIS will be prepared instead of an environmental assessment, as the commenter suggested. The EIS provides more opportunity for public involvement in the leasing process than does an environmental assessment, and MMS believes this is an important part of the process.

The differences in the environmental analysis on the potential effects of oil and gas leasing between MMS (USDOI) and the State of Alaska are based, in part, on different laws and regulations. Federal laws and regulations pertain to the MMS leasing program, while State of Alaska laws and regulations pertain to State leasing.

RJW-02
Regulations implementing the National Environmental Protection Act specify that comments on an environmental impact statement shall be as specific as possible and may address either the adequacy of the statement or the merits of the alternatives discussed or both. This comment addresses neither of these.

The main emphasis of the comment appears to be directed toward determining a benefit/cost analysis of using an oil-spill-risk analysis. The monetary benefits of using the oil-spill-risk analysis would be very difficult to determine. Assigning a monetary benefit to a concept usually involves asking a number of individuals what is the value they would give to the concept; this generally results in a range of values. The use of the oil-spill-risk analysis generally has been accepted as a useful tool by the analysts and many of the EIS reviewers. Trying to query individuals about a monetary value they might assign the oil-spill-risk analysis does not seem to be a very beneficial use of MMS's limited resources.

The request for information on what it has cumulatively cost for the oil-spill-risk analysis involves nearly 20 years of research and modeling efforts in all the OCS areas (Atlantic and Pacific Oceans, Gulf of Mexico, and Alaskan waters). The time and expense to answer this question, and the question about the cost of the oil-spill-risk analysis for the Sale 149 DEIS, does not seem to contribute to an understanding of the environmental effects of Sale 149. However, it should be noted that the research efforts have contributed information and a greater understanding of the meteorological and oceanographic conditions in the areas studied.

RJW-03
The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) (40 CFR § 1502.10) recommend agencies use a standard format for EIS's unless there is a compelling reason to do otherwise; MMS uses the standard format in the preparation of its EIS's. The content of some of the various sections reflects responses to reviewer comments over time. The material presented has been determined to be appropriate to that EIS during the time it was prepared. Some repetition is necessary to summarize information and to accommodate readers who do not read the entire document.

RJW-04
The oil-spill-risk analysis is an integral part of analyzing the effects of an oil spill, because it provides an estimate of oil-spill trajectories and risk to shorelines and environmentally sensitive areas.

RJW-05
The CEQ regulations implementing the NEPA (40 CFR Parts 1500-1508) require EIS's to discuss the environmental impacts/effects of the proposed action. Environmental effects include those that are (1) direct—caused by the action and occurring at the same time and place, (2) indirect—effects caused by the action and occurring later in time or farther removed in distance but which are still reasonably foreseeable, or (3) cumulative—effects which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

The cumulative effects analysis is considered to be an important aspect of the environmental analysis for a proposed oil and gas lease sale. This analysis informs the public and the decisionmakers about the potential effects of the proposed action in relation and in combination with other activities in the area of the proposed lease sale.

RJW-06
Although the title of the alternative incorporates the name of a fish species, there are several major reasons for considering this area as a deferral alternative and these are noted in Section I.D.2.a(3). The third paragraph in this section specifically mentions pollock.

RJW-07
The purpose of the table was to provide an estimate of the amount of waste that is generated by the commercial-fishing industry. As shown in the footnotes, the percent of waste was based on information published in 1990; therefore it seemed appropriate to use fish-harvest data for a comparable period. This time period is also appropriate for it more or less coincides with some of the petroleum industry produced-water discharge information used in the analysis.

RJW-08
The MMS disagrees with the commenter's evaluation of the validity and suitability of the information presented in Tables III.C.2-3 and III.C.3-3. The most current information known to MMS is presented in the tables; if the commenter has additional information that could be used to update these tables, MMS would appreciate receiving it.

RJW-09
The figures in question each represent the times of annual subsistence harvests for 19 discrete subsistence resources by each of six Kodiak Island villages. The number of possible permutations suggests that a visual representation is a superior means of communication.

RJW-10
Interview data on subsistence harvests, sharing patterns, etc., rely on recall functions as opposed to the more objective means of data collection allowed by such means as harvest calendars. Even with the latter, however, data may be distorted based on perceived needs of the collector or the agency doing the data collection. The degree to which recall data distorts the accuracy of the data reported must be judged on a case-by-case basis; generalized judgments across data sets are possible but reduce the reliability of individual components.

RJW-11
Where no scale is shown, it is assumed the reader knows the drawing is not to any specific scale.

RJW-12
Please see the response to Comment RJW-11. It is assumed the commenter refers to Figure III.C.3-3 rather than Figure C.C.C.3-3, as stated.

RJW-13
Please see the response to Comment RJW-11.

RJW-14
The data shown on Figure III.C.3-6 is not too dated, as suggested by the commenter. It shows the extent of the area used for subsistence purposes over a 20-year period (in this case, 1962-1982) by residents of Chignik and Chignik Lagoon. This is done to account for normal variations in harvest patterns over the years. The reference in point is dated 1987. This is the most current data available.

RJW-15
The commenter refers to Figure III.C-4. Figures III.C.3-4a and III.C.3-4b do not show numerical data. If the commenter is referring to Table III.C.3-4, this is the most current subsistence-harvest data available for the Kodiak Island road-connected population.

RJW-16
While there may be a limited potential for adverse impacts on these areas, the intent of an environmental impact statement is to define as clearly as possible what potential impacts may result from events that may occur. The level of detail for describing the environment is a matter of judgment. In our judgment, the level of detail is appropriate. This section has been expanded in response to other comments.

RJW-17
The land segments (LS's) were created by dividing the shoreline in the modeled area into approximately equal-length segments. The number of land segments is typical of the scale used in this type of modeling simulation. Land Segment 79 is an island and is surrounded on all four sides by segments, as opposed to LS 78, which is segregated from the adjacent segments on only two sides.

RJW-18
Table IV.A.2-1 shows the types of animals associated with each environmental resource area. Fisheries resources are distributed throughout the entire modeled area, and it was not considered effective to allocate environmental resource areas for fisheries resources. The fisheries biologist used land segments to evaluate contacts to streams and rivers with important fisheries resources and the oil-spill-risk contours to evaluate oil-spill contact throughout the proposed Lease Sale 149 area.

RJW-19
Depending on the environmental resource, small spills are not always innocuous. For example, small amounts of oil are deadly for birds. All the impact-producing factors need to be carefully reviewed and evaluated, and small oil spills are one of those factors.

RJW-20

Figure IV.B.1-1 will be updated in the FEIS.

RJW-21
Figure IV.B.1-2 will be deleted in the FEIS and consolidated into Figure IV.B.1-1.

RJW-22
This short paragraph provides information about the fate of small spills and may be useful to some readers; it does not describe an impact.

RJW-23
The rationale for the "SF" is explained in Section IV.B.1.e(3).

RJW-24
The NEPA authorizes and directs that, to the fullest extent possible, all agencies of the Federal Government shall utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment. The CEQ regulations implementing NEPA (40 CFR Parts 1500-1508) require that an EIS provide full and fair discussion of significant environmental impacts and inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Statements shall be concise, clear, and to the point and shall be supported by evidence that the agency has made the necessary environmental analysis.

The above paragraph is only a partial list of the legal requirements of an EIS in direct response to the law and suggestions noted in the commenter's statement.

"The Valdez Oil Spill was a clot in the heart of the Earth."
Grant Sims, in Leaving Alaska

April 15, 1995

George Valiulis
Headquaters, Sale 149 EIS Coordinator
MMS (644) USDOI
381 Elden Street
Herndon, VA 22070-4817

U.S. Department of the Interior
MMS, Alaska Outer Continental Shelf Region
949 East 36th Avenue
Anchorage, Alaska 99508-4302

Re: Cook Inlet, Alaska Oil & Gas Lease Sale 149
Draft Environmental Impact Statement
Doc. # OCS EIS/EA MMS 94-0066

Good Day!

Please know that I have read this DEIS and appreciate the opportunity to comment on the Cook Inlet Oil and Gas Lease Sale 149. I hope you will consider the following observations worthy of your considered attention.

I lived in Alaska from 1981-1992, with time out to secure a BS in Public Policy & Administration and an MAIS focused in Arctic Studies. Most of the time I lived on the Kenai Peninsula and became familier with and concerned about the situations created by oil and gas development in the Cook Inlet and on the Kenai Peninsula.

EXPORTING ALASKA OIL TO ASIAN/WORLD MARKETS

The opening sentence of this DEIS states:

"Purpose: The purpose of the proposed action is to lease, develop, and produce oil and gas resources on the OCS in the Cook Inlet Planning Area to meet national energy demands". (Vol I:1-1)

SW-01

As I begin these comments on the Cook Inlet Oil & Gas Lease Sale 149, I have before me the March 16, 1995 Anchorage [Alaska] Daily News front page headline: "Oil export backers win a vote", and this is in part what it says: "The Senate Energy and Natural Resources Committee voted 14-4 Wednesday [March 15] to lift the ban on the export of North Slope crude oil". Alaska Senator Frank Murkowski hailed this vote as a "great day for Alaska", and promised to push Senate legislation that allows Prudoe Bay oil to be exported to Asian and other world-wide markets.

SW-01

I find this a puzzling paradox. If the United States and Alaska have enough domestic oil and gas to export, why is MMS promoting exploration of Cook Inlet and Alaska's 6600 mile Outer Continental Shelf (OCS) for more oil and gas? And why the hue-and-cry from the State of Alaska and the oil industry about declining Prudoe Bay oil supplies? Which is it? Too much domestic oil, or too little?

If Alaska already produces enough oil and gas to export, then quite obviously we must be meeting national energy demands and therefore do not need to lease, develop and produce domestic oil and gas resources in Cook Inlet nor anywhere else in Alaska's OCS. Could this "oil export fever" be caused by ARCO's recently drilled KUVLUM well in Prudoe Bay which is purported to be as large as the orginal North Slope Prudoe Bay oil field?

I am not a trained economist, but I fail to see the logic behind exporting Alaska crude to Asian and other world markets while at the same time importing Middle East oil and pushing for oil and gas exploration in Alaska's OCS to meet national energy demands. Surely the citizens of the United States, who own these potential OCS oil and gas deposits, should not bear the insurmountable risks associated with oil and gas exploration, extraction and production (i.e. the 1989 Exxon Valdez disaster) and the subsequent death and degradation of extremely fragile bioregions to produce oil to wholesale on world-wide markets.

THE TIME THE WATER DIED

SW-02

In your evaluation of effects from leasing, exploration and development of oil and gas, you downplay the significant impact oil and gas development has on endangered, threatened and other wildlife species and the human condition. The trite statement: "Overall effect of exploration-phase exposure of ________ (fill in the gap with a species name) to disturbance and contaminants is expected to be negligible", is found throughout both volumes of this DEIS and does little to speak to the truth of the negative impacts of oil and gas development on all species, including humans.

You ignore the magnitude of the environmental damage from the Exxon Valdez' eleven million gallon crude oil spill in Prince William Sound, and the human condition of drunkeness that led the captain of this huge oil tanker to run aground on Bligh Reef on March 23, 1989. Subsequent banning of tanker-crew alcohol consumption twenty-four hours prior to sailing may be the letter of the law, but I can assure you it is currently not the practice of the law.

You also overlook the significant interconnectedness of exploration, development and shipment of oil to and from refineries, thus giving the impression that oil and gas exploration, extraction and development are benign, environmentally safe activities. Nothing could be further from the truth.

I am reading from an Anchorage Daily News report dated August 5, 1989 titled: "Coping with the time when the water died", written by

Walter Meganack, Sr., Chief of the Native Village of Port Graham, Alaska (S11). Port Graham is a Native village located on the Kenai Peninsula's Cook Inlet, is in Land Lease Sale 149 area, and was one of the communities devastated by the March 1989 Exxon Valdez disaster. These words, spoken by Chief Meganack, depict some of the horrors brought about by this eleven million gallon oil spill:

"The land and the water are our sources of life. The water is sacred....So long as the water is alive, the Chugach Natives are alive....The excitement of the [spring] season had just begun. And then we heard the news. Oil in the water. Lots of oil. Killing lots of water. It is too shocking to understand. Never in the millenium of our tradition have we thought it possible for the water to die. But it is true. We walk our beaches. But the snails and the barnacles and the chitons are falling off the rocks. Dead. Dead water. We walk our beaches. But instead of gathering life, we gather death. Dead birds. Dead otters. Dead seaweed".

"The oil companies lied about the spill. Now they lie about the cleanup. Our people know what happens on the beaches. Spend all day cleaning one huge rock, and the tide comes in and covers it with oil again. Spend a week wiping and spraying the surface, but pick up a rock and there's four inches of oil underneath."

"Our villages were almost destroyed by chicken pox and tuberculosis. We fight the battles of alcohol and drugs and abuse. And we survive. But what we see now is death. Death - not of each other, but of the source of life, the water".

Chief Meganack's eloquent words tell a very different story then those told by preparers of this DEIS. I wonder whose stories are a better representation of the truth and reality of oil and gas development? The people living in the aftermath of the eleven million gallon Exxon Valdez crude oil spill, or the people within an agency whose mission is to develop oil and gas extraction in Alaska's outer continental shelf?

CUMULATIVE PETRO/CHEMICAL DISCHARGES INTO COOK INLET

An underlying theme of these DEIS' is that there are minimal adverse environmental impacts to Cook Inlet waters and wildlife from regulated and unregulated oil and gas discharges into Cook Inlet, due primarily to the Inlet's ability to "flush" itself. These understatements depict a lack of knowledge and an active denial of the cumulative impacts from the oil and gas waste-stream on Cook Inlet's ecosystems.

The last comprehensive study of lower Cook Inlet was completed by NOAA in 1979, and at that time NOAA expressed concern about the adverse impact oil and gas development would have on the lower Cook Inlet's marine food web. Benthic communities are extremely vulnerable to oil and gas pollution and act as "sinks" for poisonous petroleum by-products.

Even though Cook Inlet has some of the world's highest tidal fluctuations, people who fish these waters can tell you that some Inlet water sloshes back and forth or rotates around in large rotary currents. Consequently, over time, industrial poisons concentrate in the water column and are not dispersed as this DEIS states. SW-43

The marine food web in Cook Inlet's sub-Arctic waters is short, involving only four or five energy transfers - phytoplankton to zooplankton to fish to seabirds & marine mammals. This shortened food chain makes all Cook Inlet marine species very vulnerable to pollutant stressors, such as those petro/chemical wastes discharged into Cook Inlet from the Inlet's numerous oil and gas platforms, refineries and other related oil and gas activities. Many of the following permitted industrial pollutants are known to cause death, impair health and interfere with reproduction in fish, marine mammals and plants:

CURRENT COOK INLET NPDES PERMITTED DISCHARGES

WASTES	POUNDS PER YEAR
Nitrogen Compounds	3,300,000
Sulfuric Acid	2,400,000
Unidentified Compounds	630,000
Oil and Grease	140,000
Zinc	18,000
Ethylene Glycol	7,000
Chromium, Phenols, Sulfides, Polynuclear Aromatics, Cyclohexane	2,550
1,1,1 Tricholorethane	2,500
Benzene/Toluene/Ethylbenzene/Xylene (BTEX)	217
Arsenic, Cadmium, Nickel & Cyanide	22
TOTAL	6,580,489

These figures do not include the weight of the water in which these pollutants are diluted, nor does it include any other pollutants dumped into the Inlet by other industrial, commerical or municipal sewage discharges.

(Source: Cook Inlet Discharge Monitoring Report; prepared by Envirosphere Company for Region 10, USEPA, Seattle, WA.)

In addition to these permitted discharges, Cook Inlet acts a repository for pollutants from many accidental oil & gas industry spills & blowouts, yet this DEIS barely mentions the ongoing pollution of the Inlet from accidental spills and blowouts of existing facilities. It is obvious that increased oil and gas development in Cook Inlet can only exacerbate these occurences and further degrade the Inlet's fragile ecosystem, which has become a septic system for a witches brew of chemicals legally, illegally and accidently dumped into it's waters. SW-44

Listed on the following page are some recorded accidental spills and blowouts in Cook Inlet since 1985.

SOME ACCIDENTAL SPILLS & BLOWOUTS IN COOK INLET SINCE 1985

1985 * Blowout at Grayling platform
1987 * Tanker **Glacier Bay** struck rock near mouth of Kenai River dumping 180,000 gallons of crude oil into Cook Inlet waters. Very little oil was recovered.
1987-88 * Blowout at Steelhead platform. The fire burned for one week.
1988 * Tanker punctured while loading fuel at Nikiski dock. Undocumented amount of oil spilled.
1989 * 21,840 gallons crude oil from AMCCO platform spilled into Cook Inlet due to frozen valve. No recovery completed due to ice floes in Cook Inlet waters.
* Tug **Lorna B** capsized at Steelhead platform with 70,000 gallons of diesel fuel and an unknown amount of lube oil on board. The tug is still at the bottom leaking diesel and lube oil into Cook Inlet.
1990 * Worker left valve open at Drift River Terminal, spilling 90,000 gallons of crude oil into Cook Inlet.
* UNOCAL tanker **Coast Range** collided with ice at Drift River Terminal spilling 2280 gallons of crude oil into Inlet waters.
* UNOCAL urea plant released 13 million pounds of chemicals (mostly ammonia) into the air.
* The one billion gallon capacity Drift River Terminal, located on Cook Inlet shores beneath Mt. Redoubt, was hit with a massive mudslide from the eruption of Mt. Redoubt on January 2, 1990. According to the U.S. Coast Guard, water and debris from the volcano traveled down Drift River toward the terminal at a rate of 1.1 to 1.8 million cubic feet per second. Luckily, most of the debris was diverted into a nearby slough, but the floors of the terminal were flooded with 27 inches of mud, water and volcanic debris. Mt. Redoubt remains an active volcano.
* 4,000 gallons of crude oil were spilled at the Drift River Terminal.
1991 * Ruptures in pipelines spilled between 8250 and 24,000 gallons of crude oil onto the ground and into the Inlet.
1992 * ARCO/Chevron refinery pipeline broke at the Kenai terminal spilling 47,000 gallons of crude oil/water mix into the Inlet. Only 2400 gallons were recovered.
* A Zapata oil barge ran into an offshore oil platform, spilling 4,000 gallons of fuel into Cook Inlet. Only 40 gallons were recovered.
1992-95 * The USEPA recorded over 3,000 unauthorized oil/gas related discharges into Cook Inlet during this three year period of time.

(Sources are numerous: U.S. Coast Guard; MMS; Council on Environmental Quality; C.D. Evans; P.A. Coats; E.J. Fortier; J.C Bartonek: Kenai Peninsula Fisherman's Association; Alaska Greenpeace; Anchorage Daily News: NOAA; Alaska Clean Seas; National Institute of Standards and Technology; Alaska DEC; Shell Wester E & P, Inc; T.F. Milne; North Slope Borough Department of Wildlife.)

-5-

THE INTERCONNECTEDNESS OF ONSHORE POLLUTION AND COOK INLET OCS

I disagree with your comments on page I-9 of Volume I, wherein you respond to PACE's 1991 comments, stating that: "OCS activities from this proposed sale (or from past Cook Inlet OCS sales) have not contributed materials to any onshore disposal site". Where in heaven's name do you think the refineries and the LNG and urea plants get their crude oil and gas? These facilities have illegally dumped petroleum toxins all over the Peninsula. And what do you think happens to the drilling muds that are not dumped directly into Cook Inlet? I can show you 25,000 cubic yards of drilling muds from a UNOCAL gas well. This oily, gritty, toxic material is stored in the Kenai National Wildlife Refuge wetlands. Water from the wetlands eventually drain into Cook Inlet. SW-05

Let me assure you, oil and gas industrial waste streams that pollute the Kenai Peninsula's land and air and Cook Inlet's waters **are** directly related to all present and future OCS activities in Cook Inlet. The on-shore land and water pollution from all Cook Inlet OCS industrial activities does indeed impact the health of Cook Inlet waters and **should** be a part of this DEIS.

The four Nikiski facilities (three of which are located on the shores of Cook Inlet) are underlain with severly degraded groundwater that seeps into Cook Inlet through the porous bank sands beneath these facilities or runs into Cook Inlet via rivers and streams dumping directly into Cook Inlet. This groundwater has also poisoned their drinking water, just as dumping of oil and gas pollutants have poisoned many wells on the Kenai Peninsula.

The Tesoro Refinery, which is located in a wetland area near the Inlet, has a 980,000 gallon oil spill beneath it's facility. In 1992 the EPA fined Tesoro $250,000 for failure to cleanup this mess.

UNOCAL, located on the shores of Cook Inlet, is the world's largest urea plant, and in 1992 it earned the dubious honor of being the nations' second worst air polluter. Although UNOCAL's primary source of natural gas is onshore the company still pollutes Cook Inlet with its discharges into the Inlet, the millions of pounds of airborne pollutants it dumps into the air and it's improper handling of industrial toxins.

CONCLUDING COMMENTS

These are only a few incidences of the legacy of the oil and gas industry in the Cook Inlet bio-region, but based on personal knowledge and research, I find this DEIS fraught with biased inconsistencies, huge doses of denial and flagrant misrepresentations.

I love Cook Inlet, the Kenai Peninsula and Alaska, and I resent MMS' complacent, condescending capitulation to an oil and gas industry that continues it's unregulated pollution and degradation of this once pristine region of my world.

-6-

No new offshore oil and gas leasing should occur until the federal government adopts a regulatory policy that changes the burden-of-proof that puts the onus of environmentally safe oil and gas development on the industry rather than on regulatory agencies.

No new offshore oil and gas leasing should occur until the current refineries, LNG, and urea producing plants on Cook Inlet change to 100% closed-loop recovery systems.

No new offshore oil and gas leasing should occur until the United States adopts a comprehensive National Energy Policy which stresses alternative energy sources over fossil fuel dependent resource extraction.

Furthermore, no new offshore oil and gas leasing should occur until the United States conforms to the United Nations' Bruntland Report requirement, that environmentally sustained development not compromise the ability of future generations to meet their own needs. The federal governments' active promotion of OCS oil and gas development fails to meet this requirement.

I simply cannot support the prevailing dominant social paradigm that insists we continue on this destructive path of fossil fuel dependence, therefore, I do not support the MMS' proposed Cook Inlet Oil and Gas Lease Sale 149. Instead, I recommend that MMS adopt Alternative II- the No Lease Sale alternative, which removes the entire area of Cook Inlet from further oil and gas leasing.

Again, I thank you for the opportunity to comment on this draft environmental impact statement, and leave you to ponder this wise comment:

"The decade of the 1990s must be the turn-around decade. Otherwise it is only a question of what will collapse first - the environmental foundations on which we stand - or the fossil fuel intensive, environmentally insensitive economic support system from which we hang".

Zachary Smith, <u>The Environmental Policy Paradox</u>

Yours truly,

Suzann Winder

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CC: ACE, Alaska Greenpeace, Bruce Babbitt, EPA Region 10, USFWS, ADF&G, Cook Inlet Vigil, etc.

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SW-01
Currently, the U.S. imports approximately half of its oil resources and, from a national balance of payments and long-range national security interest, the dependence on foreign counties for such an important commodity puts the U.S. at risk. We participate in a global economy, and the price of oil is governed by the global market. Transportation costs of getting oil to the markets is a real cost that affects what consumers and users pay.

When we import more foreign goods than we export U.S. goods, we must make up the difference with dollars. The negative balance of payments weakens the buying power of the dollar, and we all must pay more in real costs for the goods that we as consumers use. Furthermore, our dependence as a Nation on foreign oil makes us susceptible to another oil embargo like the one of 1973 and the economic havoc it created. Because our national economy is affected by the cost of energy, the maintenance of a strong and viable oil and gas industry in the long term is desirable. However, the production of oil or local supply and demand in the U.S. is not uniform across the nation. Some areas have little or no production and must bring oil and energy products into the area by tanker or pipeline. Other areas, such as the west coast, have a surplus. This same phenomenon occurs in other products as well, and the U.S. has developed a superior transportation system to move goods to market. However, this movement of goods results in a transportation cost that must be incorporated into the cost of the product.

From an economic standpoint, it doesn't matter whether Alaskan oil is produced and exported to another nation or "exported" to another State—the final value and net economic value of the oil is affected by the transportation costs. If a system develops that exports Alaskan oil to the Far East, while importing foreign oil to the east coast at a lower net transportation cost, then the national economy and net balance of trade are positively affected because overall cost of transportation has been reduced. If during a time of crisis—such as another oil embargo—Alaskan oil production could be diverted to other locations within the U.S., the economics of transporting oil would be altered.

Encouraging and maintaining a strong and viable oil and gas industry in the U.S. keeps the capital and jobs associated with oil production and helps create a strong economy.

SW-02
The MMS objectively has analyzed the potential effects of Sale 149, and there has been no attempt to downplay these effects. The effects of petroleum-development activities on the various biological resources, including their populations and habitats, and on human activities will vary; some activities are expected to have minimal effects for most of the resources analyzed, while other activities may have significant effects on some or all of the resources. The effects on specific animal groups or species and on human activities are analyzed in detail in Section IV.B; the conclusions are based on these analyses and are not considered to be trite statements.

Although there is a 27-percent probability of an oil spill ≥1,000 bbl occurring, MMS has assumed for the purpose of analysis that such a spill occurs; this is not an example of downplaying the significant impacts of oil and gas development.

The experiences and effects of the *Exxon Valdez* oil spill have been included in the analysis where it has been appropriate.

The relationships between the various phases of petroleum development have not been overlooked, even though they may be discussed and their effects analyzed separately. The analysis of petroleum development in the EIS does indicate there are potential effects, but MMS believes such development can be accomplished safely and in an environmentally sound manner.

SW-03
As noted in Sections III.A.3, 4, and 5, the waters of Cook Inlet are well mixed. There are large amounts of freshwater from river and stream discharges and from the Gulf of Alaska that annually flow into Cook Inlet. Although gyres and rip tides may form and the water moves back and forth with the tides, the general circulation pattern in lower Cook Inlet is counterclockwise. Waters from the Gulf of Alaska flow into Cook Inlet through Kennedy Entrance and travel up the east side of the inlet, along the west coast of the Kenai Peninsula. The waters along the west side of Cook Inlet generally consist of a mixture of freshwater from the rivers and streams that discharge into the northern and western parts of the inlet and the waters from the Gulf of Alaska. Western Cook Inlet water generally flows in a southwesterly direction into Shelikof Strait. Thus there is constant mixing and replenishing of water in Cook Inlet. The studies noted in Section III.A.5 of the EIS do not indicate discharges are accumulating in the water column, as the commenter suggests.

SW-04
As noted is Section III.A.5 of the EIS, studies of the water column, benthic biota, and surficial sediments do not indicate petroleum hydrocarbons are accumulating in the environment; the presence of hydrocarbons from fuel oil has been found in benthic fauna near a boat harbor. Also, as noted in Section III.A.5, there are other activities that discharge pollutants into Cook Inlet; these include the effluents from municipal wastewater-treatment facilities and fish processors. Oil and grease (nonvolatile hydrocarbons) in the discharge from the municipal wastewater-treatment facilities is estimated to be between 3 and 4 times that in the produced water discharges from oil and gas production facilities in upper Cook Inlet. Biological oxygen demand (BOD—a measure of oxygen-depleting substances) in the discharges from municipal wastewater-treatment facilities, offshore oil and gas production facilities, and fish processors is about the same order of magnitude.

SW-05
To date, the oil and gas activities on the OCS parts of Cook Inlet and other Alaska areas have consisted of seismic exploration and exploration drilling; there are no OCS production facilities in Alaska. The crude oil and natural gas used in the refineries and LNG and urea plants come from production facilities located in State of Alaska waters of upper Cook Inlet, the Kenai Peninsula, and the North Slope. Regulations regarding the discharges from the facilities in the Cook Inlet region are the responsibility of the State of Alaska (Department of Environmental Conservation) and the USEPA; the Kenai National Wildlife Refuge is administered by the Fish and Wildlife Service.

Mr. Ray Emerson
Minerals Management Service
Anchorage, Alaska

Daniel Zatz
Box 2666
Homer Alaska 99603

4-19-95

Dear Mr. Emerson,

I am opposed to oil and gas lease sale 149. With regard to the lease sale and it's EIS, I would like to offer the following:

1. To offer this sale is in direct conflict to the OCS lands act. The Exxon Valdez Trusty Council (in which the Interior department plays a key role) has stated that for areas oiled by the Exxon Valdez oil spill to recover, the area must remain free from further spills. The DEIS for sale 149 clearly states that such spill will occur in spill affected waters -- a100% probability of small spills and up to a 72% probability of a major spill. When cumulative probabilities of a spill are considered the numbers go over 100% for at least one major spill. In consideration of the OCS Lands act, there is no acceptable alternative but to cancel this sale.

2. Cook Inlet is among the most Volcanically and Seismically active regions in the world. Mnt. Augustine, Redoubt and Spurr line the Western edge of the Inlet. There is no place in the lease area safe from the effects of a major eruption. No level of engineering protection can protect drilling platforms in the event of a major eruption. Furthermore, toxic ash falling on oiled waters will cause inconceivable pollution and death to this area. I would like a serious and comprehensive discussion of this issue if a final EIS is created, including answers to the following:

a. A discussion of historical effects of major eruptions-- including tsunamis generated within the state of Alaska estimated at over one thousand feet or more. Effects on undersea pipelines during eruptions throughout the worlds. DZ-01

b. A discussion of engineering technology capable of withstanding a WORSE CASE eruption. This should include oil platform structures, pipelines, and docking facilities capable of withstanding forces generated by volcanic activity including ocean-related effects. DZ-02

c. A discussion detailing the likely consequences of a major eruption on local communities and their ability to respond to a volcano-related oil spill. DZ-03

3. In drafting a final EIS it must be taken into account that the Oil and Gas industry in Upper Cook Inlet has repeatedly violated State and Federal environmental laws for discharges into the air, water and on land. The EIS must assume that the Oil and Gas industry is operating in a State that is funded in large part by the oil industry and which does not effectively enforce environmental regulations.

As such, a final EIS must include discussion of all discharges from anticipated production in Lower Cook Inlet, including both legal and ***illegal*** discharges based on historical records of illegal discharge in Upper Cook Inlet. Both legal and illegal discharge figures must be included in the EIS since this information is relevant to the total expect discharges of any new development and production in Cook Inlet. The final EIS must include the following: DZ-04

a. Discussion of total discharges of pollutants into the air, water and on land from Upper Cook Inlet oil and gas production. DZ-05

b. Discussion of illegal discharges of pollutants into the air, water and on land from Upper Cook Inlet oil and gas production.

c. Discussion of expected discharges of pollutants from any new oil and gas developments and production based on historical illegal discharge levels. DZ-06

d. Discussion of total discharges and the cumulative effects of this discharge. DZ-07

4. Regarding the Water Quality Study conducted by MMS: It is totally unacceptable to use this study to show that Cook Inlet waters are not affected by oil production. Problems regarding sample size, sampling location, duration of the sampling-- all are insufficient to indicate anything about the effects of oil production on our waters. To use this information to suggest that oil production has not polluted Cook Inlet is completely unsubstantiated. DZ-08

5. Please remove bias towards development. The people of this country are trusting you to produce a document based on the best science available. Also, much of the science throughout the document is flawed. Please address the following:

a. A 27% probability of on a major oil spill is not "minor".

b. Please study Beluga Whales instead of using Killer Whale data because no good studies for Belugas in Cook Inlet exist. Belugas in this area may qualify for threatened status, the deserve fair consideration since they will be one of the first animals to change colors in an oil spill. DZ-09

c. Please show the effects of a major (>200,000 bbl) oil spill during all months of the year. Include effects from spills caused by volcanic activity as well since human error is not the only probable cause of a spill in Lower Cook Inlet. DZ-10

d. Please calculate the effects of a 50,000 bbl spill using a valid trajectory model. The model used in the DEIS is clearly inappropriate for an area such as Cook Inlet. It may be useful in open water, but not here. All effects from a spill, including but not limited to effects on marine mammals and invertebrates should be recalculated accordingly. DZ-11

e. Please use wind information that takes into account true conditions in Lower Cook Inlet when calculating the movement and spreading of an oil spill. It's very hard to understand the DEIS, but it appears that wind information used to calculate the spreading of oil and the subsequent effects on wildlife was derived from wind velocities detected in areas that miss the heart of the lease sale area. From the Barren islands and west across the inlet, winds of over 90MPH are not uncommon. It is in such conditions that accidents will most likely occur. And yet, it appears wind information from this area was not included in calculations. I request the following: DZ-12

(1) If these winds were included, please make it easier to read this section.

(2) If winds in this area were not included, please use wind information from this area and all other areas to accurately assesses all possible winds in Lower Cook Inlet.

Many experienced seamen note that Cook Inlet has some of the wildest winds anywhere in the Northern Hemisphere. Care must be given to accurately asses the probability of a spill and the subsequent oil spill due to these winds. This should be given much attention because a proper EIS demands it, and also because so much life depends upon it. DZ-12

f. Throughout the DEIS references are made to the Exxon Valdez oil spill. In many cases, data from the EVOS spill is used to predict effects of an oil spill in Lower Cook Inlet. I think that using EVOS information to help establish grounds that an oil spill in Lower Cook Inlet would have minimal effect on the environmental is truly improper and insensitive to the life killed during the spill. I recognize that this comment doesn't help you make a tighter EIS, but it's important on a personal level. Scientifically speaking, use of EVOS information is simply invalid. Cook Inlet is a much different place than Prince William Sound. EVOS information cannot be used because: DZ-13

(1) Cook Inlet is a much smaller area. Oil will contact and contaminate shoreline much sooner than in PWS.

(2) Gyres in Cook Inlet will trap oil in the most productive areas for living organisms. Oil that does not contact the shoreline will remain in Lower Cook Inlet far longer than it did in PWS.

(3) While tidal movements are extreme (the second most severe in the world), the Inlet is very slow to flush. Oil that does not contaminate the shoreline will remain trapped much longer than during the EVOS spill.

(4) With much of the shoreline contacted by oil, wildlife will have fewer places to escape to. With consideration to Harbor seals which do not avoid oil, they will be much more likely to contact oil.

(5) Effects on inter tidal life will be far more severe because of more shoreline area contacted by oil.

g. Far more information is needed to address the effects on brown bears in Lower Cook Inlet in the event of a spill. This area is estimated to support one bear per square mile, and bears here depend on salmon runs and razor clams, among other foods. A more complete discussion about the effects on brown bears should include: DZ-14

(1) A more extensive analysis of effects of oil spills on salmon runs along the west coast of the inlet.

(2) Effects on clams populations.

(3) Effects on brown bears ingesting oil-contaminated fish, other seafood, and oiled vegetation (refer to Polar bear studies regarding consumption of oiled seafood).

(4) Effects on brown bears from oil spill clean-up crews.

(5) Effects to tourism due to oiling and death of McNeil River bears-- short term and long term.

(6) Effects to McNeil river from increased human and aircraft presence during oil spill clean up.

(7) Emotional effects upon tourists as they watch oiled bears die (this will be difficult to asses, I recognize that.) DZ-14

h. In the DEIS, EVOS information is used and then multiplied by .20 because the DEIS considers a spill much smaller than the EVOS. Rather, these figures should be multiplied by a whole number greater than 1. Using EVOS information without such attention is simply inappropriate. DZ-15

i. Gyres. I found no attention given to gyres in Cook Inlet. These areas may well be the core of the Inlets productivity because nutrients are trapped by circulating currents. Oil will also be trapped here, cause tremendous harm to the entire ecosystem. Gyres must be factored into any EIS. DZ-16

Clearly, the DEIS is deficient. Because of some of the major flaws-- including invalid trajectory information and inappropriate use of EVOS information-- a great deal of the document-- including all projected effects on wildlife and resulting economic and social harms from a spill-- must be rewritten. Since this is the majority of the document, and since the public must have an opportunity to comment on such a major rewrite, the MMS should draft a new DEIS. To proceed otherwise would improperly serve the public. When this happens, please allow communities more time to review the DEIS. We should have at least two months to review a document of this size- before public testimony is allowed.

6. Effects on the community before the sale must also be considered in the DEIS and EIS. Effects include:

(1) Literally hundreds of hours have been invested by individuals to asses the effects of the sale. While people working for MMS are paid to prepare these documents, the people of the affected community are not.

(2) Tension, frustration, and anger continue to build in this community. First at MMS, and now within the community as political battles have developed over this lease sale. Pressure continues to build, and the political process is now repeatedly compromised, further enraging the community.

(a) The City Council passed a resolution opposing oil and gas lease sale 149. The mayor vetoed it. First he stated that there wasn't enough public comment on in, then after 120 people came to speak he admitted (along with other councilmen who did not override his veto) that it was due to public pressure from Juneau. If the city of Homer opposes sale 149, legislators will cut funding to the city. This community is being blackmailed by an oil industry controlled legislator. This all sounds crazy, but it is documented. See the attached newspaper clippings. This sale is so screwed up that recall petitions have been started against city councilmen, and our mayor, who was loved by hundreds of residents of this community, is repeatedly scorned in the media. This sale has already had an affect here.

(3) The lease sale has alienated thousands of residents living outside city limits. City counsel members have stated publicly that they will not consider people living outside the city limits regarding opposition to sale 149. There is no precedent for such action, and the people affected have no true representation outside the city. Today two people suggest engaging in civil disobedience. This sale is affecting out community.

(4) I have personally invested over two hundred hours in learning about and opposing sale 149. I have invested well over a thousand dollars of my own money, and thousands of dollars worth of materials and equipment from my business. Working on this sale 149 has taken a significant toll on my business, and on my personal life.

Conclusion:

I have never been politically active in my entire life. However, the threats from this lease sale are beyond reason. Endangering the bears at McNeil river and along the entire west coast of the inlet, the humpback whales at the Barren islands, the otters, Stellar sea lions, seabirds, and inter tidal life for a few barrels of oil is totally inappropriate and unacceptable. I will continue to oppose this lease sale with all my energy and resources.

I will continue to keep track of the hours I am investing into fighting this lease sale. Though there may be no legal precedent, I believe the MMS should pay the citizens of the United States at a rate equal to or greater that of MMS employees for contributing to the MMS document.

Homer is a special place. It's a tight community that depends on the health of Lower Cook Inlet. We depend upon it for our fishing and tourism economy as well as for our peace of mind.

The fact that the Homer City Counsel has not taken a stand against this lease sale is a sad reminder of the political pressure the oil industry wields in Alaska. While each City Counsel member has public stated their opposition to sale 149, each has told me personally and has stated publicly that they cannot oppose the sale because of political pressure from borough and state legislators (see attached articles). We are being blackmailed by an oil industry controlled government. There is clear opposition to this lease sale in Homer. You saw it yourself on March 7th. I see and hear it everyday. I am certain that at least two city councilmen will loose their seats when their term expires. Changes in City governments such as this are also worth noting in the EIS.

Our contribution to the national good is made by providing fishing resources, national and international tourism, marine wildlife education and scientific research, and as guardians for the marine and terrestrial wildlife-- including threatened and endangered species. The highest value of Lower Cook Inlet is not to provide two months worth of oil and three thousand clean-up jobs, but to protect it from any pollution-- for the good of the nation.

Nobody would consider drilling for oil in the Grand Canyon just because oil was found there. Drilling in Yellowstone or Yosemite is completely unimaginable. Lower Cook inlet is our Grand Canyon, it's our Yellowstone. Protecting these waters from lease sale 149 is our obligation to this country. How one arm of the U.S. government can be charged with protecting the National Parks and Wildlife Refuges that surround Cook Inlet and at the same time the ***SAME*** department can propose to destroy it is one of the great questions the EIS should answer.

By proposing this lease sale, MMS has threatened our community and the life upon which it depends.

If a new DEIS or EIS is released, I would like to get a copy on a Macintosh computer disk. The disk sent to us of the current EIS has been useful. Page numbers would be helpful. Also, I think the DEIS should consider the amount of natural resources and energy required to create and print the document. These resources are also environmental impacts.

Practically speaking, MMS should store all the information gathered in the DEIS until such a time as the oil and gas industry operate with greater care for the environment. People here don't oppose oil development without good reason. They have been lied to and dumped upon too many times to trust the industry.

I suggest that MMS inform the oil companies that the public will be willing to consider drilling in Lower Cook Inlet when zero discharge is achieved over five to ten years; when environmental laws are adhered to; when toxic drilling mud sites are all cleaned up; when all oil spill prevention equipment, supplies and personnel are in place; when only double-hulled tankers travel the inlet, and when escort vessels and tractors tugs are all in place, not merely empty and deadly promises. The oil and gas industry needs to clean up its act in Alaska. If that means they don't want to stay, then they better go before they kill everything that makes this place special.

Though I am adamantly opposed to this lease sale, I appreciate how considerate and helpful everyone at the Anchorage MMS office has been during the last few months.

Please consider the community of life that will be affected by oil development in Lower Cook Inlet. Please cancel this sale.

Respectfully yours,

Daniel Zatz

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DZ-01
Please see the response to Comment JC-02.

DZ-02
In the process of creating the underlying assumptions upon which the Sale 149 DEIS is based, a catastrophic or very-high-effects scenario was developed, considered, and placed in Appendix C of the DEIS. It is assumed in our analysis that the offshore technology used to produce the forecast resources of the proposal would be able to function effectively, even during extremely difficult episodes of natural phenomenons. No structure can be made fully "earthquake-" or "volcano-" proof; however, oil platforms in State waters have operated during periods of intense volcanic and seismic activity since the early 1960's. Even so, the likelihood of offshore structures emplaced as a result of Sale 149 experiencing a Mount St. Helens-style eruption or 8.2 earthquake is very speculative. The return-rate forecasts for these types of major events vary from a few decades to several hundred years. As offshore technology continues to improve, so will the ability of offshore structures to withstand isolated seismic/volcanic events.

DZ-03
The commenter calls for a discussion detailing the likely consequences of a major volcanic eruption on local communities and their ability to respond to a volcano-related oil spill. The analysis of a possible 200,000-bbl oil spill contained in Appendix C approximates the worst magnitude of oil spill experienced to date in North America.

DZ-04
The EIS does include a discussion of the anticipated discharges from exploration and development and production activities based on the historical record and permit requirements (Secs. III.A.5 and III.A.6). Historical oil-spill rates are included in Section IV.A.2. The analyses of the potential effects of Sale 149 assume all appropriate laws and regulations are part of the proposed lease sale and OCS operations are conducted in accordance with these laws and regulations. The MMS has the authority to require operators of OCS exploration-drilling units or production platforms that are violating their discharge permits to cease or modify operations to comply with their discharge-permit requirements. The historical record for illegal discharges has not been documented as has the historical oil spill record and, as such, is not a credible basis for analyzing the effects of future discharges. Furthermore, the Cook Inlet experience (discharge-permit violations), (please see the response to Comment TAG-12) is not typical of OCS- monitored and -inspected operations.

DZ-05
Sections IV.B.1.n and IV.B.10.n of the Sale 149 EIS adequately assess the potential effects of the proposal and the cumulative case, respectively, on potential discharges of pollutants on air quality. Federal and State statutes and regulations define air-quality standards in terms of maximum allowable concentrations of specific pollutants for various averaging periods. These maxima are designed to protect human health and welfare. However, one exceedance per year is allowed, except for standards based on an annual averaging period. The standards also include Prevention of Significant Deterioration (PSD) provisions for NO_2, SO_2, and PM to limit deterioration of existing air quality that is better than that otherwise allowed by the standards. Limited incremental concentrations are specified for each PSD pollutant. There are three classes (I, II, and III) of PSD areas, with Class I allowing the least degradation. Class I also restricts degradation of visibility. That portion of the Tuxedni National Wildlife Refuge designated a National Wilderness Area is the only Class I area adjacent to the proposed sale area (State of Alaska, ADEC, 1992). The remaining areas adjacent to the sale area are Class II. Baseline PSD pollutant concentrations and the portion of the PSD increments already consumed are established for each location by the USEPA and the State of Alaska prior to issuance of air-quality permits.

With the enactment of the Clean Air Act Amendments of 1990, the USEPA has jurisdiction for air quality over blocks leased under this lease sale. The lease operators shall comply with the provisions of Part C of Title I and with the requirements promulgated by USEPA for OCS sources, including the provisions of Title I, Part C of the Clean Air Act (Prevention of Significant Deterioration of Air Quality). Section 328 states that for a source located within 25 miles of the seaward boundary of a State, requirements would be the same as would be applicable if the source were located in the corresponding onshore area.

The EPA-approved OCD model estimates discharge of air pollutants emitted for exploration, development, and production phases. These incremental increases over existing baseline levels of measured air pollutants are then assessed against allowable limits. The effects resulting from Sale 149 would not make the concentrations of criteria pollutants in the onshore ambient air approach the air-quality standards. Consequently, a minimal effect on air quality with respect to standards is expected. Principally because of the distance of emissions from land, the other effects of air-pollutant concentrations at the shore due to exploration, development and production activities, or accidental emissions would not be sufficient to harm vegetation.

In addition to Federal and State agencies, both industry and private organizations monitor ambient air conditions. As such, the possibility of "illegal" discharges of air pollutants is assumed unlikely.

DZ-06
Please see the response to Comment DZ-04.

DZ-07
An estimate (based on historical rates) of the total amount of material that might be discharged into Cook Inlet from the significant discharges associated with petroleum development, municipal wastewaters, and fish processing and from oil spills is discussed and the cumulative effects of the discharges and spills are analyzed for the cumulative case in Section IV.B.10.

DZ-08
This issue is addressed in the responses to Comments TAG-31 and TAG-32.

DZ-09
Please see the responses to Comments MDM-01 and NL-01.

DZ-10
As noted in Appendix C, a very large oil spill is a low-probability event but has the potential for very high effect on the environment. The place and timing of the spill was based on when and where such a spill might have the most effects on the most resources. The trajectory simulations consists of multiple trajectories to give a statistical representation over time and space, of possible transport under the range of wind and ocean current conditions that exist in the area. Simulations were carried out for two seasons, winter (October-March) and summer (April-September). One thousand hypothetical oil-spill trajectories were simulated for the winter and summer (2,000 total) for each of the 392 hypothetical spill sites (Fig. IV.A.2-1).

Two probability calculations are used to indicate the chance of a spill contacting a given resource area or land segment. The probability that an oil spill will contact a specific area within a given time of travel from a certain location of spill site is termed a conditional probability—the condition being that a spill is assumed to have occurred. Conditional probabilities depend only on the winds and currents in the study area. In addition to the winds and currents, the combined probabilities depend on the chance of spill occurrence, the estimated volume of oil to be produced or transported, and the oil transportation scenarios.

An analysis of the effects of a large oil spill (≥1,000 bbl) would show differences between the probabilities of oil contacting specific areas for only the two seasons (October-March and April-September) for which the trajectory simulations were run; these differences are shown in Appendix B, Table B2 through B12. Based on the conditional probabilities (wind and ocean current data), the chances of oil contacting a specific area would be the same for all months from October through March and from April through September. The effects on biological resources would depend upon which species are present in the area affected by a spill. The data base for spill ≥1,000 bbl is not large enough to indicate the probability of spills occurring during a specific month. Thus the calculations to determine combined probabilities will be based on wind and current data and the chance of spill occurrence, the estimated volume of oil to be produced or transported, and the oil transportation scenarios.

The chance of a volcanic eruption probably is a very low-probability event and the chance of an eruption causing an oil spill would be much lower. The historical OCS oil spill data base includes all spills from natural events and mans activities but the spill rate does not distinguish between these two causes. In doing an analysis of the effects of a low-probability event, MMS tries to select an event that seems reasonable even though the chance of such an event occurring is quite small. For a tanker spill, it is assumed that a relatively large amount of oil is discharged into the environment in a relatively short period of time (when compared to a platform or pipeline spill) regardless of the cause.

For above reasons, it does seem appropriate to show the effects of a major spill (>200,000 bbl) for every month of the year nor the effects of a spill caused by volcanic activity as requested by the commenter.

DZ-11
The MMS considers the trajectory model to be valid and an appropriate tool for evaluating spills in the DEIS. The trajectory model has undergone verification and "reasonability" tests such as (1) statistical analysis of sampling errors; (2) general circulation model (GCM) skill assessment (the skill of the GCM in representing the ocean circulation, and assessing the appropriateness of using the output in the OSRA); (3) OSRA model quality control (assuring the correct execution of the modeling exercise); and (4) risk analysis verification (running a hindcast analysis if possible and comparison with appropriate data sets).

Please see the responses to Comments JC-05 and AK-01.

DZ-12
The MMS recognizes the winds in the Sale 149 area can be high, particularly near the Barren Islands, as noted in Section III.A.2. In modeling the Sale 149 area, MMS personnel worked closely with investigators from NOAA's Pacific Marine Environmental Lab who have studied winds in Cook Inlet and Shelikof Strait since the late 1970's.

Also, please see the responses to Comments AK-05 and AK-06.

DZ-13
The use of information from the EVOS or any other spill provides some information that can be used to evaluate the effects of a large spill in Cook Inlet. The analysis of the effects of a large spill in Cook Inlet assumes the oil does not weather, so the time difference between when oil might contact the shoreline in Cook Inlet and when oil from the EVOS contacted the shore in Prince William Sound is not a factor. Also, in the Sale 149 EIS, the analysis of the effects of a large spill in Cook Inlet is based on a trajectory model that takes into account the tides, currents, and winds in the Cook Inlet region.

DZ-14
Section IV.B.1.G of the DEIS (Terrestrial Mammals) adequately assesses the potential effects of the assumed 50,000-bbl spill on brown bears. Section IV.B.1.g(1)(b) discusses the effects of oil ingestion by brown bears through oiled food sources with reference to studies of polar bears (Oritsland et al., 1981) and also references the EVOS study of oil effects on brown bears in which few bears (one confirmed death) were known to be affected by the >200,000-bbl spill. In Section IV.B.1.g(2)(b), the DEIS assesses the site-specific effects on brown bears and acknowledges that brown bears feeding on clams along the coast could ingest oil and suffer mortality. Brown bears feeding on salmon at the McNeil River are very unlikely to encounter oil on the salmon stream related to the assumed 50,000-bbl spill in the DEIS, because their feeding area along the McNeil River is upstream from the coast beyond the upper tide level of the river.

Tourists at the McNeil River are unlikely to see oiled brown bears along the river. The combined probability of one or more oil spills ≥1,000 bbl occurring and contacting the shoreline of McNeil Cove area (LS 24, Fig. IV.B.1.g-1) is 1 percent, which indicates that only a small amount of the spill or other spills is expected to oil the coastline of McNeil Cove and the McNeil River mouth. The DEIS recognizes that individual brown bears may be adversely affected by the spill and die as a result (perhaps a total of 10 bears killed over the entire coastline of the Cook Inlet and Shelikof Strait), but that the brown bear population on the Alaska Peninsula or the Kodiak area is not likely to be affected by the spill. There are no findings that indicate that the EVOS had population effects on brown bears in Prince William Sound, the Kenai Peninsula, Kodiak, or the Alaska Peninsula.

Generally speaking, it is concluded in the EIS for the proposal that trends for visitors to national parks and refuges would show a slight loss during the year after a spill (Sec. IV.B.1.m).

The effects of oil spills on lower trophic-level organisms, which include marine invertebrates such as clams, are analyzed in Section IV.B.1.b (4)(b).

The MMS believes the analysis of the effects on salmon in Sections IV.B.1.c and IV.B.12.c is appropriate and adequate for the Sale 149 EIS.

DZ-15
There are some specific analyses where a factor of 0.20 was used. Specific examples include estimating the mortality of sea otters, northern fur seals, and Pacific harbor seals in the event of a large—>1,000-bbl—oil spill. In these instances, the reason for using the 0.20 factor was stated. The 0.20 factor was not used in all the analyses, only in those where it was judged to be a reasonable estimate. There likely will be disagreement about the magnitude of an estimated multiplication factor.

DZ-16
Please see the response to Comment MDM-03.

C. <u>Public Hearing Comments and Responses</u>: Public hearings on the Sale 149 DEIS were held in the following Alaskan communities in March 1995: Anchorage on the 3rd, Kenai on the 6th, Homer on the 7th, and Kodiak, on the 8th. A public hearing teleconference also was held on the 3rd; the only community with participants was Seldovia (Nanwalek, Port Graham, Ouzinkie, and Port Lions were scheduled but did not have any participants).

Because of the volume, transcripts of the oral testimonies are not reproduced in the EIS; instead, speakers' issues that presented new or additional information or addressed the adequacy of the descriptive material or analysis have been excerpted verbatim and presented in this section. (The excerpted testimonies have been identified by the page and line numbers from the official public hearing transcripts; these numbers appear in parenthesis after the comment number.) A copy of the complete transcript for each of the hearings is available at the Alaska OCS Region, Public Information Center, in Anchorage.

During these hearings, many residents expressed concerns about how oil and gas development in Cook Inlet would affect their lifestlyles and the resources of the area; also see Section V.B.a.

The testimony given at the Sale 149 public hearings will help in the understanding of the importance of the lifestyles and the resources to the inhabitants of the Cook Inlet/Kenai Peninsula/Kodiak Island area.

Speakers at the public hearings are listed below in the order of their appearance. Speakers whose presentation has been excerpted are identified by a bullet (•).

Teleconference Pubic Hearing—Seldovia (March 3, 1995)

- Elizabeth Renz
- Eric Nordenson

Anchorage Public Hearing (March 3, 1995)

- •**Pam Miller** (APH-01 to 20)
- •**Marc Lamoreaux** (APH-21 to 23)
- Denty Owens
- •**Carl Hild** (APH-24-29)
- Dorthy Childers
- •**Tom Lakosh** (APH-30-40)
- Martha Levensaler
- •**David Harrison** (APH-41)
- George Matz
- •**Robert Wolf** (APH-42)
- Terry Burrell
- George Schmidt
- Kevin Tabler
- Paul Hohenlohe

Kenai Public Hearing (March 6, 1995)

- Don Gilman
- •**Loren Flagg** (KePH-01-05)
- •**Theo Matthews** (KePH-06 to 09)
- Ken Turnage

Homer Public Hearing (March 7, 1995)

- Tanya Inga
- May Ann Holthaus
- Paul Seaton
- Barbara McNinch
- Lhasha Mclean
- •**David Paxton** (HPH-01 to 03)
- Marla McPherson
- •**Jeff Wraley** (HPH-04)
- John Bushell
- •**Gail Parsons** (HPH-05)
- •**Joel Cooper** (HPH-06 to 09)
- Charles Davis
- Michael White
- •**Danial Zatz** (HPH-10 to 15)
- Patty Lightcap
- Bill Choate
- Dora Coen
- Nancy Hillstrand
- David Hillstrand
- Patrick McNamara
- •**Emily Johngren** (HPH-32 to 33)
- Rachel Adams
- Eric Ringer
- Steve Ruzanski
- Ken Castner
- Wendy Breiby
- Peggy Kleinleder
- Jonathan Allen Kleinleder
- Kima Butters
- •**Richard Bremicker** (HPH-34)
- Sonja Tobiessen
- Allison Teague
- Margi Blanding
- Michael Scott

Deborah Oppenheim
•**Nina Faust** (HPH-16 to 20)
Claus Lotscher
Brother Isaiah
Julie Cesarine
Joy Post
Abby Laing
•**Larry Smith** (HPH-21 to 22)
Larry Kuznar
Richard Tyler
•**Craig Matkin** (HPH-23 to 29)
Michelle Jennings
•**Edgar Bailey** (HPH-30 to 31)
Michael Armstong
Mako Haggerty
Yule Kilcher
Sallie Dodd-Butters
Dayton Butters
Megan Corazza
Lauren Carlton
•**Linda Redman** (HPH-35)
•**Mike O'Meara** (HPH-36 to 38)
Linda Feiler
Josh Brooks
Dean Sundmark
Konrad Schaad
Todd Radmaker
Patricia King
Willy Dunne
Dan Levinson
Chris Chavasse (See Responses to Letters)
•**Eric Bremicker** (HPH-39)
Chris Herreid
Teri Schumaker
Dave Lyon

Petitions: Two petitions were given to MMS officials at the Homer Public Hearing. These petitions are:

Alaskans for Clean Water which expressed the following (the petition was available at the Homer Public Hearing for signing; 497 persons signed this petition):

> We the undersigned strongly oppose Oil Lease 149 which will open 2 million acres of lower Cook Inlet for oil and gas development. We urge the Minerals Management Service to cancel this sale!

A second petition was signed by 37 persons aged 14 to 18 and stated:

> We the next generation in this community oppose the drilling of Kachemak Bay and the sale of the 2 million acres of land lease sale number 149. It will kill animals around these areas and will endanger our future lands.

Kodiak Public Hearing (March 8, 1995)

•**Kristin Stahl-Johnson** (KoPH 01-08)
Jane Eisemann
- Matt Lohr*
- Chris Arndt*
- Jeremy Votz*
- Mark Woitell*
- Aaron Star*
- Jodi Holfort*

Brian Johnson
Debra Nielson
Brian Large
Stacy Studebaker
Mike Sirofchuck
*Testimony read into the record by Jane Eisemann

Peter Allan
Rose Cobis
•**Mary Jacobs** (KoPH-09)
Bruce Short
•**Linda Freed** (KoPH-10)
Claire Holland
Oliver Holm
Mike Patitucci
Mariah Offer
Chuck McWethy
Susan Emerson
Danny Stihl
Isa Wirz

Anchorage Public Hearing -- Verbatim Excerpts and Responses to Comments

APH-01 (Page 8, Line 25; Page 9, Lines 1-8)
How do you justify canceling the lease sale in the Chukchi Sea and not that of lower Cook Inlet and Shelikof Strait? It is not demonstrably less ecologically sensitive. The subsistence cultures along the coast here are no less dependent upon a healthy marine ecosystem. It is arguably more important for commercial fishing if value can be measured in dollars. And as you know, lower Cook Inlet and Shelikof Strait supports a commercial fishing industry worth hundreds of millions of dollars per year.

Response
The deferral of Sale 148 in the Chukchi Sea was based on concerns expressed over natural resources and the low level of industry interest. The combination of the concerns raised during the prelease process regarding natural resources and the level of industry interest were considered together, and a decision was made to defer the sale to the next 5-year program. The Cook Inlet area has supported exploration and development for many years. We do not consider the area to be any less ecologically sensitive; rather, we have considered the demonstrated ability for industry to explore and develop in a manner that does not threaten the natural resources or the subsistence lifestyles of the area.

APH-02 (Page 9, Lines 9-15)
Why is there a moratorium on leasing and development in—excuse me—on development of leases in Bristol Bay? If leasing were to commence in Cook Inlet and Shelikof Strait, is the pressure for the dreaded buy-back likely to be any less than in Bristol Bay? We saw historically that the pressure for a buy-back in Kachemak Bay was highly effective, and this area is not so far removed from that.

Response
Please see the response to Comment JC-06.

Moore v. State of Alaska, 553 P. 2d 8 (1976)(Alaska).

On December 13, 1973, the State of Alaska sold rights to oil and gas leases in Kachemak Bay (Egan Administration). In 1974, fishermen and conservationists filed suit against the State challenging the sale. In May 1975, a memorandum of decision indicated that the legality of the sale was influenced by lease provisions that could halt activity should damage occur and protect fisheries. In March 1976, the Hammond Administration introduced legislation creating a marine sanctuary in Kachemak Bay, prohibiting issuance of oil and gas leases and authorizing State condemnation of outstanding oil and gas leases within the sanctuary. In January 1977, the State negotiated with major lessees for repurchase of all leases for $28 million (including rental payments, interest on investments, and exploratory costs).

APH-03 (Page 9, Lines 16-25; Page 10, Line 1)
Why is there a moratorium in most areas of the country, in large part as a result of the National Academy of Science's determination of the inadequacy of information necessary to make sound leasing decisions? Our scientific understanding in all areas reviewed by NAS—physical oceanography, ecology, and socioeconomics—is qualitatively meager for Cook Inlet and Shelikof Strait compared with the areas reviewed explicitly by the National Academy. No such review was done for Cook Inlet/Shelikof Strait, nor has a comprehensive assessment been made to understand the chronic and cumulative effects of development here.

Response
The NAS review of the scientific database for the Alaska environment has stated that some additional sociocultural work was needed but not necessarily any additional scientific studies. Instead, what was needed was more contact with the concerned communities by agency representatives and social scientists. This has been a major reason for the extensive community outreach program that has been initiated for each sale area. Scientific studies on the oceanography and marine biology have been deemed appropriate by the NAS.

Our scientific understanding of physical oceanography in Cook Inlet and Shelikof Strait is not qualitatively meager, as suggested by the commenter. In addition to a multitude of contractor reports and construction of four circulation models, the peer-reviewed scientific literature has produced at least 30 papers in the last 17 years relating to physical oceanography and contaminant transport for this relatively small planning area. This is an exceptionally high publication rate.

APH-04 (Page 10, Lines 15-21)
You have trivialized the long-term damage caused by EVOS to ecological systems and human communities of the spill-affected areas. Some of the important points that I think are missed in the DEIS:

First of all, recovery is patchy and incomplete. While some species have shown evidence of recovery, others are experiencing ongoing injuries and delayed recovery.

Response
The importance of the effects on the environment of the *Exxon Valdez* oil spill has directly and indirectly been considered when evaluating the immediate and long-term effects of oil spills—especially large oil spills. The effects of oil from the EVOS provides a model for assessing the effects of very large spills. The respective analysts are aware of the status of the species in Prince William sound, the Gulf of Alaska, Cook Inlet and Shelikof Strait affected by the EVOS.

The various aspects of recovery are addressed in the responses to Comments TAG-01, TAG-02, TAG-03, and TAG-08.

APH-05 (Page 10, Lines 22-25; Page 11, Lines 1-3)
Secondly, long-term effects occur most visibly in the intertidal zone and in species that either breed or feed in the intertidal and shallow subtidal zone. Oil-contaminated mussels continue to be a primary cause of long-term effects. Several species experiencing long-term effects depend on mussels for a significant portion of their diet. And because of ongoing long-term effects, the time period for recovery is yet unknown.

Response
The specific causes for what appear to be long-term effects, whether due to the activities of humans or due to natural causes, largely are unknown. This is because knowledge about the long-term cycle of natural population abundance in specific geographic locations is extremely limited for lower trophic-level organisms. While it is true that areas remain where oil-contaminated mussels still exist, it also is true

that these areas are relatively few in number and small in size. It is also worth mentioning that oiled intertidal areas such as these were observed long before the EVOS (particularly in Prince William Sound), with similar localized effects.

General aspects regarding the recovery of intertidal areas from the effects of the EVOS are addressed in the response to Comment TAG-03.

APH-06 (Page 11, Lines 4-9)
The extreme trauma caused by the *Exxon Valdez* oil spill to subsistence and commercial fishing based communities in the path of the spill has not yet been mended. The root cause of these problems was the breakdown of activities associated with subsistence and commercial fishing: the sharing and harvest of natural resources.

Response
Please see the response to Comment TAG-20.

APH-07 (Page 11, Lines 10-25; Page 12, Lines 1-9)
The Draft Environmental Impact Statement also fails to address the issue of environmental justice as mandated by the President's Executive Order No. 12898 on Federal actions to address environmental justice in minority populations and low-income populations. The proposed action is counter to even Department of the Interior's own stated Strategic Implementation Plan on environmental justice. This action disproportionately affects subsistence communities in the region. The public process outlined in the Plan has failed to adequately ensure protection of subsistence. The DEIS states:

"Generally, the coast in the proposed sale area and the marine environment offshore contain some of the most beautiful shore and ocean features in the world. The aesthetics are based on the near pristine environment."

And secondly, again quoting:

"Lower Cook Inlet and the Kenai Shelf are among the most productive high-latitude shelf areas in the world during the summer months."

The high ecological values of the area are, in part, reflected by the unsurpassed system of protected areas in the region. These areas are too precious for their ecological, cultural, spiritual, and economic values to risk for short-term profits of offshore oil and gas development.

Response
The environmental justice policy based on Executive Order 12898 requires agencies to incorporate environmental justice into their missions by identifying and addressing environmental effects of their proposed programs on minorities and low-income populations and communities. Please see the response to Comment TAG-25.

Environmental concerns generally were identified during the scoping process and are included primarily in the impact analyses of economic, sociocultural, and subsistence-harvest patterns in Section IV of this EIS.

APH-08 (Page 12, Lines 12-17)
The area encompasses or borders five national wildlife refuges, four national parks, and the State's highest concentration of designated critical habitat areas. And I believe that the DEIS discussion of the importance and value of these areas was incomplete. For example, Chugach State Park was omitted entirely from the discussion. The most recent recognition of Kachemak Bay as an international shore bird reserve is significant and also not included in the Draft EIS.

Response
The text in Section III.B.3 of the EIS has been revised in response to this comment and to Comment WD-01.

Chugach State Park is located more than 100 miles from the Sale 149 area. It borders the Municipality of Anchorage and Turnagain Arm. Given the distance from the area and the proximity to a metropolitan area, it is unlikely that Sale 149 would have any significant effect on the park. There is a large influx of freshwater in the northern part of Cook Inlet, and the general circulation pattern indicates water from the northern part of the inlet flows to the south. Furthermore, the OSRA estimates the combined probability of one or more ≥1,000 bbl occurring and contacting the area between East and West Forelands (Sea Segment 1, Fig. IV.A.2-7) to be 1 percent.

APH-09 (Page 12, Lines 18-25; Page 13, Lines 1-6)
Then I wonder why MMS does not respect the recommendations of its own sister agencies, for example, Fish and Wildlife Service and National Park Service, in considering the proposed action. The National Park Service has said,

"OCS activities could be counter-productive to efforts initiated by federal/state natural resource trustees to restore resources injured by the *Exxon Valdez* oil spill. We recommend that any leasing in lower Cook Inlet and Shelikof Strait be deferred until the full extent of injury to trust resources, including those of the National Park Service, is known and the damaged resources have recovered to appropriate pre-spill conditions."

Response
The National Park Service quotation is part of a letter responding to the Call for Information for Sale 149. The public hearing comment quotation does not include NPS's conditions and special habitats mentioned for special consideration if the proposed action were to proceed. The MMS believes the deferral of the Shelikof Strait and the mitigating measures that are part of the proposed action address the NPS concerns. The Secretary of the Interior will take into consideration the concerns noted by the NPS in making a decision whether or not to hold a lease sale.

APH-10 (Page 13, Lines 10-19)
The designation of Shelikof Strait as critical habitat under the Endangered Species Act for Steller sea lions, which are about to rise to the dubious distinction of endangered status in this area, is another consideration I think minimized in the DEIS. The DEIS minimizes the threat of disturbance to this species that is also highlighted by the steller sea lion recovery team. The area serves as critical habitat for other species at risk: harbor seals, belugas, steller eider, marbled mirialets [murrelets], fin and humpback whales, to name a few.

Response
Significant auditory or visual disturbance of Steller sea lions by activities associated with the proposed action (drilling, air/sea support) in the pelagic environment, as well as the distance at which a response may occur, has not been measured. Because these activities generally are likely to be remote from rookeries and most

designated critical habitat, we expect few to no interactions at a range that might be expected to result in effects lasting more than a few minutes to hours.

APH-11 (Page 13, Lines 19-21)
The importance of the area to year-around use by fin whales, documented by Kenai National Wildlife Refuges, is not discussed in the DEIS.

Response
Both summer and winter presence of fin whales in the Kodiak to Cook Inlet area are noted in the EIS in Section III.B.5.a(1). This seasonal use involves a limited proportion of the population and thus would not be characterized as significantly important at the population-level scale.

APH-12 (Page 14, Lines 11-15)
We request that you do not grant access to the oil and gas industry to this area, if solely because of the industry's contemptible history in upper Cook Inlet and the lack of an adequate regulatory structure to ensure safety and environmental protection.

Response
The MMS cannot base its decisions to approve or deny the right to operate on the OCS on the criteria listed by the commentor. The MMS does have the authority to require OCS facilities to be operated in a safe and environmentally sound manner and can require operators to modify their operations or stop if they are not in compliance with regulations.

Access by the oil and gas industry to the OCS begins with a lease sale in an OCS planning area, and the decision whether or not to hold a lease sale is made by the Secretary of the Interior (Sec. I.A.14 and 15 of the EIS). If a sale is held and leases granted, the lessee has the right to explore for oil and gas and develop and produce any discovered petroleum resources. However, before exploration or development activities can take place on any lease, the lessee must submit the appropriate exploration plan or development and production plan in accordance with 30 CFR 250 (Sec. IV.A.4.a of the EIS). These plans are available for public review and comment and must be approved by MMS (information based on proprietary data is, however, not available to the public). An oil-spill-contingency plan is submitted with these plans and provides information pertaining to the operator's planned response should an oil spill occur. The public and MMS review of these plans helps ensure exploration and development and production activities are conducted in a safe and environmentally sound manner. The MMS also supports an inspection program to prevent spills (Sec. IV.A.4.a(3) of the EIS).

Development of the offshore oil and gas facilities in the State waters of upper Cook Inlet began in the late 1960's, and the regulatory framework of the time was different than it is today. The operators of these facilities have had to make changes in their operations to comply with changing regulations.

APH-13 (Page 14, Lines 21-25; Page 15, Lines 1-2)
Recent discovery of 4,200 violations of Clean Water Act permits and subsequent $1.5 million enforcement action by EPA, which was made only after the violations were made public by Trustees for Alaska, Greenpeace, and Alaska Center for the Environment. We believe the enforcement action is weak because it addresses less than one-quarter of the violations that we know about, and it also does not seek maximum penalties.

Response
Please see the response to Comment TAG-12.

APH-14 (Page 15, Lines 3-8)
There's a lax permit structure allowing industry the license to pollute. From '87 to 1992, offshore oil platforms in Cook Inlet discharged 7-1/2 million gallons of produced waters, three—31.5 million gallons of drilling wastes, these containing acute toxins such as petroleum, mercury, cadmium, formaldehyde. There's lax regulatory oversight of pipelines and tanker safety in Cook Inlet.

Response
Please see the response to Comment TAG-12.

APH-15 (Page 15, Lines 9-11)
The industry has resisted efforts to instill better safety measures such as tanker tug escorts.

Response
Please see the response to Comment APH-34.

APH-16 (Page 15, Lines 18-25; Page 17, Lines 1-4)
There is a lack of effective spill cleanup methodologies for Cook Inlet. The Oil Spill Commission report stated—and I think their analysis is much more in-depth than Minerals Management Service's own in the Draft Environmental Impact Statement—I quote:

> "The extreme environmental conditions in Cook Inlet, with tides of 30 feet and currents of 8 knots, cause spreading to occur so rapidly that effective response with mechanical recovery is not likely to be successful."

And we know also that other methods of spill cleanup are unproven.

Response
Please see the responses to Comments UFA-06 and KCN-05 and 011.

APH-17 (Page 16, Lines 5-13)
MMS has attempted to use the CIRCAC and MMS studies to conclude that Cook Inlet has a clean bill of health. This is scientifically unfounded given the short-term nature of the studies, few sampling stations, and questionable credibility of the CIRCAC contractor. We urge the independent evaluation and design of a comprehensive study to determine chronic and cumulative effects in the Inlet and the National Academy of Science's review of adequacy of information for Cook Inlet and Shelikof Strait.

Response
The CIRCAC contractor, Arthur D. Little, is nationally renown and probably is one of the top five aquatic hydrocarbon laboratories in North America. Arthur D. Little chemists and chemical oceanographers have been at the forefront of developing state-of-the-art hydrocarbon analytical methods. The contractor participates in NIST interlaboratory calibration exercises. One of the CIRCAC report authors, Dr. Sauer, has been conducting and publishing marine-hydrocarbon studies in the peer-reviewed scientific literature over at least the last 15 years. Another Arthur D. Little environmental chemist, Dr. Neff, has served on MMS's national scientific advisory panel.

Although an individual study may only last 1 to a few years, the MMS environmental assessment program is long term and has conducted environmental contamination and effects studies in Cook Inlet, including hydrocarbon-accumulation studies, for over the past 20 years.

The issue of independent, peer review of Cook Inlet studies is addressed in the response to Comment TAG-32. The scientific data available for the Gulf of Alaska, including Cook Inlet, in terms of offshore oil and gas development needs, were summarized in a peer-reviewed book, *The Gulf of Alaska Physical Environment and Biological Resources* (Hood and Zimmerman, 1986). The peer-reviewed analysis of management needs of scientific data (Hameedi, 1986) found that (p. 597):

> Present information is adequate to identify both the areas and the phenomena that are hazardous to industrial structures and operations, to calculate oil-spill trajectories and weathering states, to identify those shoreline segments that have potential to retain spilled oil, and to describe important marine bird, mammal, and fish habitats.

APH-18 (Page 18, Lines 23-25; Page 17, Line 1)
The Draft Environmental Impact Statement does not accurately represent the value of Cook Inlet fisheries. Upper Cook Inlet is not discussed and represents an additional multi-million-dollar value.

Response
The EIS is based on the best scientific information available, which includes the economic value of upper Cook Inlet and Kodiak commercial fisheries. The value of these fisheries was estimated to be between $50 and $135 million annually and $50-$100 million, respectively.

APH-19 Page 17, Lines 1-5)
The DEIS does not discuss recent studies indicating a much higher level of productivity and diversity of the northern Inlet for planktonic organisms and larval fish species. This study, that I have a copy of, was suppressed by ARCO, so I'd like to make this known to you.

Response
The MMS does not have a copy of the commenter's referenced report. The MMS has been criticized for using information from documents that have not been peer reviewed; however, this comment suggests the use of such information might be alright under certain circumstances.

APH-20 (Page 17, Lines 5-7)
Upper Cook Inlet is likely to be affected by chronic and catastrophic oil spills and pollution from lower Cook Inlet development.

Response
Past and recent studies do not indicate the Cook Inlet marine environment has been adversely affected by the discharges (permitted or accidental) from any of human's activities in the area; these activities include the permitted discharges from municipalities, the petroleum and commercial-fishing industries, and accidental petroleum (crude or product) spills. Furthermore it is not anticipated any future oil and gas development in lower Cook Inlet would adversely affect the marine environment—discharge permits limit the amount of toxic substances that might be discharged, and the oil-spill rate trend appears to be decreasing. Furthermore, new facilities would be equipped with current state-of-the-art technologies and would be more efficient in removing potentially toxic substances from the discharges. The discharges also might be injected into the subsurface, if suitable geologic formations exist in the areas of any future oil and gas development.

APH-21 (Page 18, Lines 18-25; Page 19, Lines 1-2)
Tidal action scours the bottom leaving little sediment to analyze for petroleum pollution. Mollusk reproduction tests conducted by Minerals Management Service failed when the mollusks died from suspended sediments. That such tests were conducted highlights the poor state of scientific understanding of the (indiscernible). We don't even know what kind of bottomfish should be tested for petroleum hydrocarbon effects in the upper Inlet. These fish and the enzyme tests may be the best tests to date for oil pollution, and they should be done before leasing out the Inlet.

Response
This issue is addressed in the response to Comment CIM-01.

APH-22 (Page 19, Lines 3-9)
The Cook Inlet beluga tissue sampling for analysis of oil pollutants has been opportunistic and far from comprehensive. Some archive tissues should be analyzed for back-cast baseline data for a range of pollution indicators. Those studies which haven't been done yet. Marine mammal tissues should contain indicators of petroleum pollution as these toxins accumulate up the food chain.

Response
Please see the response to Comment CIM-02.

APH-23 (Page 20, Lines 19-23)
It is now thought that the Cook Inlet does not flush itself as was once thought, but rather, the water sloshes back and forth like in a bathtub. The marine mammal subsistence resources may be swimming in an accumulation of toxic brew.

Response
Please see the response to Comment CIM-04.

APH-24 (Page 25, Lines 14-21)
But, for example, the one on marine mammals doesn't include the endangered species because the endangered and threatened species are on another map. Now, I don't think that's a good idea. I think if you're going to have one map for marine mammals, you list all the marine mammals on this whether they're endangered, threatened, depleted, strategic, non-strategic, whatever the classification. I think you should list all your marine mammals on one graphic.

Response
In an effort to control printing costs, this EIS contains no color graphics. In turn, this reduces the number of features that can be displayed clearly on a given map; thus in the interest of avoiding confusing multiple-pattern overlays on a single marine mammal map, we have opted for clarity of separation provided by two maps.

APH-25 (Page 26, Lines 5-15)
I think, also, when you make a listing of endangered and threatened species, you have the

areas where they occur, but in many areas now, for fishery interaction, the trawl boats, fishery boats are told that they have to maintain a buffer zone around known habitats, haul-outs, rookeries. And so this might be something to consider as well. If there's a known habitat that goes up through Cook Inlet for any of these species, you may want to institute a buffer zone around these. It's not like you have the extreme ability to go up to the edge of a habitat area and protect it. So you may want to look at this.

Response

The Steller sea lion analysis does consider the existence of critical habitat established around rookeries from which vessels are excluded. Three of the alternatives for this proposed action (Alternatives IV, V, and VII) include similar buffers that would provide sea lions, as well as other marine mammals and seabirds, greater separation from disturbing activities associated with the proposed action. For example, Chisik Island, part of the Alaska Maritime NWR on the west side of Cook Inlet, and the Barren Islands, populated with sea birds, sea lions and whales, are buffered by these alternatives.

APH-26 (Page 26, Lines 22-25; Page 27, Lines 1-4)

And I would be real concerned, and I'd like to see some better modeling done, on how fast, if there was an oil spill done at a time when there was an extreme high tide, with possibly a bore tide, would that oil float on that—the crest of that wave and move well up into the Inlet very quickly. I think those types of things need to be considered. Add a little bit of wind behind it, and you can definitely have a quite influential spreading of oil in a very rapid time period.

Response

Please see the response to Comment MDM-06.

APH-27 (Page 2,7 Lines 5-18)

I would like to see some kind of graphic put in here that would look at the various subsistence use areas. You have different maps showing where there is a habitat for various species, but there is no comprehensive map looking at subsistence use. And this would include all marine and coastal resources. I think it should include invertebrates, it should include plants, it should include the marine mammals and other animals that are used—utilized by the communities along Cook Inlet.

I think this graphic would give you a better outline of how far these regions are and if there needs to be buffer zones and protected areas for these habitats. It—that would provide a better idea for scoping the size of this particular sale.

Response

Please see the response to Comment IPC-04.

APH-28 (Page 28, Lines 1-11)

Resident killer whales seem to stay closer to shore. They seem to interact with fisheries more often. They have different acoustical social interactions among their pods, as the transient animals who spend more time offshore do not interact with the fisheries quite as much and move over a greater area of terrain. So that in looking at this particular area, you may really want to pay some attention to those resident killer whale pods that would be at the lower end of Cook Inlet because these are the animals that do not move around quite so much and come there for (indiscernible - cough) time and could have the greatest amount of interaction.

Response

We are not familiar with the stock assessment report or any studies that have specifically looked at resident versus transient killer whales in Cook Inlet. If the commenter has such information, we would appreciate receiving it.

APH-29 (Page 28, Lines 21-25; Page 29, Lines 1-13)

One of the things that has come up as we've been evaluating the drop in the population of harbor seals in the Gulf of Alaska—there's been a significant drop, starting in the late '70's and has just continued—the islands off the southern end of Kodiak, the pup counts there are down by 90 percent over the past 20 years. This is just an unbelievable drop in that time period, and the concern is that it's not so much that the pups are dying immediately, but it appears that the juveniles are not surviving.

The pups are not surviving through the yearling stage, and it's during this time period they're feeding near shore. They don't have the ability to dive deep, so they're staying close to shore for their survival. And, you know, there's investigation going on now to get better information on that. And this is an area I think would be real critical for the harbor seal habitat areas at the southern end of your sale area, that you do some specific studies, looking at that inter—that near-shore area.

Response

Please see the responses to Comments MMC-10 and IPC-05.

APH-30 (Page 35, Lines 17-23)

First and foremost, the nature of the remote subsistence communities dictates that should their subsistence harvests be adversely impacted, they are likely to be required to flee the area to sustain themselves since the cost of substituting those foods with flown-in foods is prohibitive. And essentially, any impact upon those subsistence harvests constitutes essentially genocide.

Response

The DEIS examines impacts on subsistence harvests and concludes that oil spills would be the primary factor that could disrupt harvests for specific lower Cook Inlet communities. The size of the spill used for purposes of analysis was roughly 20 percent of the EVOS. The subsistence harvests of the communities in question were impacted by the EVOS. Although changed by the experience, these communities are still in place.

These remote (nonroad-connected) communities in lower Cook Inlet by necessity use aircraft or vessels to transport food, fuel, building materials, household appliances, school supplies—literally everything needed for everyday living—except for the wild foods collected when available and stored for use throughout the year. Additional transportation costs would be accrued by households or the local store for importing additional food.

APH-31 (Page 36, Lines 5-11)

And there is a glaring absence of subsistence users from urban communities who use the resources along the Cook Inlet. There has been as many as 10,000 subsistence permits issued to people from Anchorage that use the western shore—or eastern shore here of Cook Inlet, and I didn't see any reference to those permittees whatsoever, much less the other types of non-commercial fishermen that use those resources.

Response
Permits are available annually from ADF&G for individuals to harvest adult salmon at specified places in upper and lower Cook Inlet with gill- or dipnets. These are variously called subsistence- or personal-use permits, depending on the area or court decision involved. The analysis of effects on subsistence harvests in this EIS was community-based and was not intended to address the "meat" fisheries carried out by predominantly urban residents of southcentral Alaska.

APH-32 (Page 36, Lines 15-25)
And what I see here is a underestimate—a ten-fold underestimate of the damage to fisheries, of the actual damages to fisheries, that have been granted in Phase II-A of the *Exxon Valdez* trial.

I believe the estimate was from $11.1 to $44.5 million when, in fact, it had been well over $300 million determined to be the damage by the jury. And I'm wondering how in heaven's name those estimates were obtained when a jury of our peers has determined that there were quite a bit more damages than have been recognized by the Minerals Management Service.

Response
EVOS loss estimates were based on the latest scientific information (i.e., Cohen, 1993). We know of no scientific data that would support $300 million losses. To the best of our knowledge, the Cook Inlet commercial-fishing industry has an annual value of only $50 to $135 million. If the commenter has better scientific information in this regard, we would appreciate receiving it.

APH-33 (Page 37, Lines 15-24)
I might make note, though, that there is a question as to whether the areas to be leased are within the jurisdiction of the federal government or that of the State of Alaska since those territories were deeded to the State of Alaska—to the Territory of Alaska and turned over to the State of Alaska when we obtained statehood, that all the waters clear to the national boundary between Big Diomede and Little Diomede were deeded to the Territory and then to the State of Alaska. So there is a question as to whether there is federal jurisdiction in this area in the first place.

Response
The Alaska Statehood Act specifically states that the Submerged Lands Act is applicable to the State of Alaska. The Submerged Lands Act establishes the seaward boundaries of each coastal State.

The Submerged Lands Act, (Public Law 83-31, May 22, 1953; 67 Stat. 29) states:

> The term 'boundaries' includes seaward boundaries of a State . . .but in no event shall the term 'boundaries' or the term 'lands beneath navigable waters' be interpreted as extending from the coast line more than three geographical miles into the Atlantic Ocean or the Pacific Ocean. . ..

The Submerged Lands Act goes on to state:

> Any States admitted subsequent to the formation of the Union which has not already done so may extend its seaward boundaries to a line three geographical miles distant from its coast line. . ..

The Alaska Statehood Act, Public Law 85-508, January 3, 1959, 72 Stat.339), in Sec. 6(m) states:

> The Submerged Lands Act of 1953 states: '. . .shall be applicable to the State of Alaska and the said State shall have the same rights as do existing States thereunder.'

The Alaska Statehood Act also states in Sec. 8(b)(2):

> The boundaries of the State of Alaska shall be as prescribed in the Act of Congress. . .and all claims of this State to any areas of land or sea outside the boundaries so prescribed are hereby irrevocably relinquished to the United States.

Please see also the response to Comment ALS-01.

APH-34 (Page 38, Lines 4-10)
And I've been actively engaged in the contingency planning process, and the industry has still denied the best available technology that was a condition of lease and permit for the Trans-Alaska Pipeline and the North Shore Oil Fields, that we are not having the escort vessels that we requested, we're not having the salvage tugs that are required to cope with tanker—disabled tanker problems in open waters.

Response
Tanker safety and whether or not tugs should be used to escort tankers in Cook Inlet are the responsibility of the U.S. Coast Guard (USCG). The National Ocean Service of the National Oceanic and Atmospheric Administration has proposed the Prince William Sound and Cook Inlet Navigation Safety and Efficiency Project to work jointly with the USCG to identify issues and design solutions associated with navigation safety and pollution prevention. If Sale 149 results in new offshore exploration or development activities in the Cook Inlet region, operators will have to prepare field-development strategies and transportation plans for any produced crude as well as submit oil-spill-response plans for any new activities. These plans will undergo public review and must be approved before activities can begin. The issue of escort vessels, tugs, and pipeline safety will, at this time, undergo a thorough public examination.

APH-35 (Page 38, Lines 11-16)
And what I—is—the reason why I mentioned tankers is it's clear that the oil from this lease development will not be totally consumed at Nikiski, and it will have to be either shipped out again as crude oil or refined product. And the Impact Statement is clearly deficient in assessing the impact from shipping of the refined or crude product.

Response
Please see the response to Comment UFA-05.

APH-36 (Page 38, Lines 17-25; Page 39, Line 1)
There is also a question of need of development of this oil when the industry, at this present time, is trying to obtain waivers from the provisions of law which prevent the export of oil. Their rationale for the release from this export—this oil export ban is that there is a glut of oil on the West Coast, that we can't possibly consume all of the oil we're producing in Alaska, and therefore, we have to ship it off to some foreign compy[company]—country, therefore the—defeating the intent to decrease oil imports to protect our national security.

Response

The need to reduce U.S. net oil imports through increased production is real and significant. Importing oil adds to our deficit balance and trade and the continuing flow of dollars to foreign countries, along with jobs and capital investment. The global price of oil is set in the international market, and the U.S. free market system does not support differential pricing between domestic and foreign oil, even if the costs of producing oil are higher. Because the west coast has adequate production, much of the Alaskan oil is shipped east either through pipelines or through the Panama Canal—and this results in additional transportation cost, which reduces the value of Alaskan oil. However, if Alaskan oil is shipped to the Far East and European or other oil is imported to the east coast, the cost of transportation is reduced along with the net balance of oil imported. This type of arrangement avoids unnecessary transportation costs, while decreasing our balance of payments and reliance on foreign oil. Economically, the balance of trade deficit will be beneficially affected by this arrangement. In the long run, the amount of oil produced from fields may increase, because the lower marginal costs of operating will increase the amount of oil that can be produced and add to the efficiency of producing oil from a field. This issue is covered in additional detail in the response to Comment SW-01.

APH-37 (Page 39, Lines 12-20)

And it seems beyond me why these Native cultures would be endangered, the commercial fishing would be endangered, and all of the recreational opportunities in Cook Inlet and these national parks which have been cited, and reserves, would be endangered by such a risky venture in areas where there's such high tidal currents and ice floes. And if there were any sort of justification for the production of this oil, I can see where a cost/benefit analysis would come into play at that point.

Response

As indicated in your analysis, economic evaluation is necessary to help evaluate competing resources. During the decision process, the Secretary of the Interior is given the EIS analysis, public comments, and the Governor's section 19 comments (on the Proposed Notice of Sale), along with additional cost and benefit analysis for the proposal and all alternatives analyzed in the EIS. This analysis includes the marginal probability of success or finding an economically viable oil and gas resource. The probability and effects of an oil spill are factored into the analysis, and the decision is then made whether to proceed, delay, or cancel the sale.

APH-38 (Page 40, Lines 10-16)

It's clearly an ethnocentric attitude that the federal government has been pursuing, and that it is time that we recognized the rights of these indigenous people to maintain their lifestyle and culture in the lands that they have occupied for millennia, and that the production—such meager production, unnecessary production, for such a short period of time certainly cannot warrant the risk to these cultures.

Response

The MMS does recognize the rights of indigenous people to maintain their lifestyle and culture. We have worked with many diverse groups to encourage cooperation and understanding and to develop reasonable alternatives that provide for multiple use of the OCS's resources rather than exclude certain types of potential users.

Also, please see the response to Comment TAG-25.

APH-39 (Page 40, Lines 17-24)

I—and I've looked also at the effects on the commercial and she—the commercial fisheries, and I notice that these are very vague and incomplete analyses of the resources at risk. I believe that there is, you know, commercial clam harvests on the western shore of Cook Inlet, which are not referenced here anywhere. There are, you know, all types of subsistence fisheries in the entire area which are not specifically referenced.

Response

The analysis in the EIS is supposed to focus on significant environmental issues, and commercial fishing has been identified as a significant environmental issue. The commercial harvest of finfishes is considered to be economically more significant than the harvesting of shellfishes, which includes clams. Therefore, the focus of the analysis on commercial fishing is on the finfishes. The effects of Sale 149 on shellfishes are summarized in Section IV.B.1.i(1).

The statement addressing concerns about the subsistence fishery is addressed in the response to Comment APH-31.

Also, please see the response to Comment KIB-17.

APH-40 (Page 41, Lines 22-25; Page 42, Lines 1-22)

Of particular regard I'm concerned about this sentence:

> "However, the financial compensation received by the commercial fishing fleet during the cleanup process was not factored into this—these estimates. That compensation was estimated to have exceeded, by several orders of magnitude, the revenue lost due to the spill."

And I'm highly concerned that that indicates that oil spills should be looked at as an economic benefit. And I believe that's totally abhorrent to the concept of preventing environmental damages. In effect, what it's saying, that people should be encouraged to—or people should be encouraged to look upon oil spills as favorable because of the economic—the favorable economic impact that they have, as opposed to the harmful environmental damage and resulting—resultant economic impact.

And I therefore request that any—that that particular phraseology and section of this report be stricken, and that the financial—quote/unquote, "financial compensation from oil spill activities" be totally removed from any cost/benefit analysis due to the fact that it is the duty, under all common law of persons causing threat to the public health, safety, and decency, to mitigate their harmful effects to the public good, and that any such compensation is a liability, a civil liability, as opposed to an economic benefit.

Response

The statement "That compensation was estimated to have exceeded, by several orders of magnitude, the revenue lost due to the spill" was part of a paper presented at the *Exxon Valdez* Oil Spill Symposium in Anchorage in February 1993. The symposium was sponsored by the *Exxon Valdez* Oil Spill Trustee Council, University of Alaska Sea Grant College Program, and American Fisheries Society, Alaska Chapter.

In the text of the EIS, the quoted statement also is followed by the statement "Although participation in the EVOS cleanup and compensation to individual commercial fishermen was not evenly distributed, some fishermen received substantial compensation while others received little or none."

The MMS believes both of these statements reflect one aspect of the EVOS-cleanup operations that was a concern to many individuals. Based on the comments we have heard in scoping meetings, conversations with public officials, and in public hearings, some of the fishermen who participated in the cleanup operations were able to invest their earnings in new equipment; while those who did not participate were less fortunate and may be at a disadvantage in competing for fisheries resources. Public knowledge of the consequences of the inequitable distribution of cleanup work among the fishing-vessel owners may help to prevent this from happening in the future.

APH-41 (Page 51, Lines 4-9)
In your report, you say all of our comments that Chickaloon Village made in Homer and in this room here are being negated because you say that you don't know whether they should be dealt with or not. They must be dealt with because you have no legal authority to propose a oil and gas lease sale in my territory without the consent of our people.

Response
Please see the responses to Comments ALS-01 and APH-33.

APH-42 (Page 59, Lines 18-23)
First, as representing UCIDA, the United Cook Inlet Drift Association, we've met frequently with MMS on this lease sale and given our input, and our input has always been that we would like to see no oil development north of our south line, which is the latitude of Anchor Point; 59-46-12 is our exact Loran line that we have to stay above.

Response
The area north of Anchor Point has been proposed to be deleted from the Sale 149 area as part of the proposed Alternative VII—the Northern Deferral Alternative.

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Kenai Public Hearing -- Verbatim Excerpts and Responses to Comments.

KePH-01 (Page 11, Lines 12-21)
That no seismic activity or drilling be permitted in the areas described above between May 1 and August 30. This restriction will help avoid physical conflicts within the fishing area and also reduce the risk of a fishing closure resulting from pollution caused by the oil industry. From strictly a biological standpoint, this proposed seasonal restriction is also justified. Critical life forms of commercially important fish and shellfish are present in high abundance in the marine waters of Cook Inlet during the May 1 through August 30 period.

Response

Potential conflicts between seismic activity and commercial-fishing activities could result from pre- or post-lease activities. Geological and geophysical activities prior to leasing shall be conducted so as not to unreasonably interfere with or harm other uses of the area (30 CFR § 251.3-5). The MMS encourages operators to meet with other users of an area where geophysical activities are planned to resolve potential conflicts before operations begin. Potential conflicts involving post-lease seismic activities may be addressed through the Protection of Fisheries Stipulation, which states, in part,

> Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the natural gas and oil industry and activities.

The stipulation also states:

> The lessee shall coordinate planned exploration and development activities, including plans for seismic surveys, drill rig transportation, or other vessel traffic, with fishermen operating in the area to prevent unreasonable fishing gear conflicts.

The final EIS will analyze a Seasonal Drilling Restriction on 29 blocks in the northeastern portion of the sale area where some fisheries are restricted to a small corridor. The Seasonal Drilling Restriction period being analyzed is from June 15 through August 15. Seasonal restrictions on drilling operations also are addressed in the Protection of Fisheries Stipulation.

Also, the area north of Anchor Point has been proposed to be deleted from the Sale 149 area as part of the proposed Alternative VIII, Northern Deferral Alternative. In addition, areas around the perimeter of the Sale 149 area have been proposed to be deleted from the Sale 149 area as part of various other alternatives, which include Alternative V (Coastal Fisheries) and Alternative VII (General Fisheries). Also, as noted in ITL No. 2, Information on Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans, lessees are advised that environmentally sensitive areas should be considered when developing oil-spill-contingency plans.

KePH-02 (Page 11, Lines 22-25; Page 12, Line 1)

If drilling does eventually take place on any of the tracts within the proposed lease sale, and development takes place, we would strongly encourage zero discharge. The zero discharge is now being used in the Gulf of Mexico in critical, important areas, and we think the time has come for Cook Inlet.

Response
Please see the response to Comment KBC-01, last paragraph.

KePH-03 (Page 12, Lines 18-21)
No surface entry. Again, there are technologies that sub-sea wells can be utilized. You don't have to have platforms out there in the commercial fishing area. Sub-sea wells are used in other parts of the world.

Response
Depending on the characteristics of the reservoir, directional drilling—no surface entry—may or may not be a reasonable alternative. The reservoir rock may not be strong enough to support a horizontal wellbore and crumble. Drilling and maintaining of a horizonal wellbore is more expensive than drilling and maintaining a vertical well, and this affects the economics associated with developing and producing a reservoir. Horizontal wells may be less efficient in producing oil from the reservoir, which could result in less oil being recovered.

A stipulation has been proposed, Stipulation No. 7—No Surface Entry during Development and Production, and its effects are evaluated in the final EIS. Minimizing potential conflicts between petroleum development and production operations also are addres in the Protection of Fisheries Stipulation.

KePH-04 (Page 12, Lines 22-23)
Buried pipelines. Certainly if there are going to be pipelines, they can be, and should be, buried.

Response
As noted in Section II.J.1.a (Purpose of Stipulation No. 4—Transportation of Hydrocarbons), the Regional Supervisor, Field Operations (RS/FO), in considering an application of pipeline right-of-way, shall consider the potential effect of the pipeline on human, marine, and coastal environments and shall prepare an environmental analysis of such an action. As part of this environmental analysis, the RS/FO will consider the views of appropriate Federal, State, and local government agencies as well as private organizations, industry, and individuals.

KePH-05 (Page 13, Lines 4-14)
I believe this was added to that, that during the transportation phase that a requirement be put in there that—for tug escorts.

Right now we have no tugs in the Inlet that are capable of assisting a tanker, a laden tanker, in distress. If a tanker loses power or steering, there is absolutely no help within a reasonable time frame. It would have to come from Valdez. They have the only tractor tugs that would be—have this kind of capability. So we'd ask that that requirement be put in, that if, in fact, as part of this, production take place from the sale.

Response
Please see the response to Comment APH-34.

KePH-06 (Page 15, Lines 22-25)
We feel that there should be no surface entry, i.e., no stationary production platforms. Production can be accommodated through bottom wells and pipelines to shore. I mean, we have discussed this technology with the industry.

Response
As noted in Section II.J.2 a potential stipulation has been added to the final EIS to analyze the effects of limiting the number of blocks where surface entry will be allowed. Minimizing potential conflicts between petroleum development and production operations also are addres in the Protection of Fisheries Stipulation.

KePH-07 (Page 16, Lines 1-15)
Now, to get the oil to shore, you have to have a pipeline. Now, we really feel you must have a mitigation measure that requires buried pipelines. There is no alternative to this. For salmon fishermen, it's not such a big deal in terms of gear conflicts, but when you get into halibut and crab pots, whatnot, they simply could not cope with a pipeline above the surface. So it's needed from that point of view.

The other point is similar to the one referenced by Mr. Flagg. The oil industry in Cook Inlet is fighting the requirement for tug escort vessels. They're stipul— they simply state that, "We don't need them; we can drop anchor. You know, if we lose power, we can drop anchor." Well, I'd just submit to you that you drop anchor on a pipeline, and you've got problems. It better be buried and buried deep. And that's just common sense.

Response
The burial of any pipeline segment will be determined on a case-by-case basis after a thorough review of all available environmental, social, and economic factors. According to 30 CFR CH. II para 250.153 (a) (1): pipelines greater than 8-5/8 inches in diameter and installed in water depths less than 200 feet shall be buried to a depth of at least 3 feet unless they are located in pipeline congested areas or seismically active areas as determined by the Regional Supervisor (RS). Nevertheless, the RS may require burial of any pipeline if the RS determines that such burial will reduce the likelihood of environmental degradation or that the pipeline may constitute a hazard to trawling operations or other uses. A trawl test or diver survey may be required to determine whether or not pipeline burial is necessary or to determine whether or not a pipeline has been properly buried. In regard to the vessel transportation and safety issues raised in this comment, please see the response to Comment HPH-34.

KePH-08 (Page 17, Lines 2-21)
So therefore, the question of liability is very vital to our membership. The Oil Pollution Act of 1990 has—limits the liability of processors. It forces commercial fishermen to either elect to go through the federal process and give up access to courts or go through courts and give up access to the federal process.

So what I would suggest as a mitigation term is one that would require lessees—since you know and I know that if a spill happens in the wrong time, your document states there will be loss of commercial fishing income, something similar to the voluntary Exxon Payment Program that we established should be a mitigation term. Producers should agree that in the event of a spill when commercial fishing time is lost, there will be a voluntary program that will send out rather rapid payments to allow people to continue with their lives—to meet their boat payments and their permit payments.

I understand this is going a little afield, but this is the core of many concerns. A spill is inevitable; lost fishing income is inevitable. A mitigation term must take account to that.

Response
The requirements of the Oil Pollution Act are part of the Federal process. An individual's rights to access through the courts is not diminished. Options for compensation of losses would include the Fishermen's Contingency Fund, among others. Companies holding leases are required to maintain this fund at a specified level.

KePH-09 (Page 17, Lines 22-25; Page 18, Line 1)
And also, if there are production platforms on the ground, I mean, I assure you there is 100-percent certainty there will be gear conflicts, nets wrapped around the platform, fishing time lost. You also need a mitigation term to deal with that.

Response
The final EIS will analyze a restriction on multiple opertions for the entire sale area, a seasonal drilling restriction from June 15 to August 15, and a no-surface-entry restriction for 29 blocks in the northeastern portion of the sale area. Potential restrictions on multiple operations and seasonal restrictions on drilling operaions also are addressed in the Protection of Fisheries Stipulation. In addition, a deferral alternative has been added to the analysis that would defer all blocks north of Anchor Point. A new stipulation has been added to the proposal for Fisheries Protection, which requires lessees to work with commercial-and subsistence-fishing groups. The Transportation of Hydrocarbons stipulation and the regulations at 30 CFR 250.152, "Design requirements for DOI pipelines," and 30 CFR 250.153, "Installation, testing, and repair requirements for DOI pipelines," provide for design and burial of pipelines for environmental reasons and when pipelines "may constitute a hazard to trawling operations or other uses."

Homer Public Hearing -- Verbatim Excerpts and Reponses to Comments

HPH-01 (Page 15, Lines 7-13)
My main concern is that in your document, 38.2, there's only one paragraph, paragraph 3, "Volcanism." What we need here is that we have no contingency plan whatsoever for a catastrophic event in this Environmental Impact Statement. In other words, you say a contingency plan. We are sitting on a cluster of volcanoes here in the bay, in a subduction (ph) zone, and I won't bore you with the geology with that.

Response
Under 30 CFR 250.30, lessees are required to submit exploration plans or development and production plans before conducting any of these activities on their leases. Section 30 CFR 250.42 requires an Oil Spill Contingency Plan be submitted with or prior to submitting the exploration or development and production plans. Oil-spill-contingency plan requirements include (1) identification of response equipment, (2) dispersant-use plan, (3) provisions for inspecting and maintaining equipment, (4) procedures for early detection of an oil spill, (5) actions to be taken in the event of an oil spill, and (6) provisions for monitoring and predicting spill movement. Exploration and development and production plans are available for public review and comment. Plans may be revised or modified based on the review comments, and the Director may approve or disapprove the final plans. 30 CFR 250.130 requires that all OCS platforms and structures shall be designed, fabricated, installed, used, and maintained to ensure their structural integrity for the safe conduct of operations considering the specific environmental conditions at the location. The above-listed requirements help to ensure safe operations and environmental protection.

HPH-02 (Page 15, Lines 14-20)
But—and this plan does not address, number one, that if drilling rigs are to—or exploration rigs are to be moved in, there are no hydraulic shutoff valves whatsoever on the surface floor. Number two, all the oil, you know, all the dock terminals should be placed above the 100-foot line, period. And I'll get into that in just a second. And number three, like I say, there's absolutely no contingency plan.

Response
Exploration-drilling units must comply with all the requirements of 30 CFR 250 Subpart B, Pollution Prevention and Control and Subpart D, Oil and Gas Drilling Operations. These requirements have been the subject of public, industry, and Government review.

The location of onshore facilities is subject to borough and local zoning ordinances. In addition, all coastal facilities must comply with local and State requirements of coastal management programs.

Oil-spill-contingency plans (OSCP's) are submitted with the exploration plan. These plans must be approved before operations can begin on any lease; part of the approval process includes public review of the plans. The OSCP's must satisfy the requirements and provision identified in 30 CFR.42 and the Planning Guidelines for Approval of Oil Spill Contingency Plans developed jointly by the MMS and U.S. Coast Guard (Sec. IV.A.4.b of the EIS).

HPH-03 (Page 16, Lines 20-24)
Bad idea. These are synclines, anticlines; the lines contract and expand. If we are to install these oil lines, they need to be double-wall with the back air compressor going back through the line. Any deviation in pressure, shut it down.

Response
Pipelines must comply with all the requirements of 30 CFR 250 Subpart J, Pipelines and Pipeline Rights-of-Way as well as the requirements of other appropriate regulatory agencies. They must be designed and constructed to withstand the expected environmental forces in areas where they are laid.

HPH-04 (Page 22, Lines 9-16)
Another disturbing element of this lease sale is the failure to quantify the long-term and chronic impacts of this oil lease on Cook Inlet waters and everything that lives in or around it. Long-term effects to wildlife, to me, are nowhere to be found in this document. I find it a rather remarkable leap of faith to say since no one has looked for long-term problems, we should assume none are there. Is this a case of out of sight, out of mind, or just the blind leading the blind?

Response
Long-term effects are difficult to quantify and usually require long-term monitoring. In the case of the EVOS, many studies are continuing. The EVOS studies have shown some residual effects on habitats where the oil has been entrained into intertidal habitats, such as mussel beds, and appears to be affecting the productivity or survival of species, such as harlequin ducks (see Sec. IV.B.4. in the EIS).

For the most part, Sale 149 is not likely to have long-term effects on the environment. In the case of most marine mammals, most effects are expected to be temporary sublethal effects. The EIS recognizes that long-term effects may occur to marine and coastal birds (such as sea ducks and shorebirds). If some of the oil from the assumed 50,000-bbl spill is entrained into intertidal habitats, the EIS predicts that these effects on birds may persist for several years (see onclusion to effects on marine and coastal birds, Sec. IV.B.1-d).

HPH-05 (Page 27, Lines 23-25; Page 28, Lines 1-2)
For instance, in Volume 2, you give an analysis of a 200,000-barrel oil spill. The projection may be accurate for the scenario you have chosen in the month of April, but why April? This could happen any month, and a much more sensitive month would change these figures dramatically.

Response
The month of April was chosen for the 200,000-bbl-spill analysis, because this was considered a sensitive/vulnerable month for the most biological resources—the time when birds, marine mammals, and terrestrial mammals are breeding or would be using coastal habitats.

HPH-06 (Page 30, Lines 21-25; Page 31, Lines 1-6)
I'm very unclear about the laws and regulations that MMS must follow. I know that the EIS provides summaries of Acts, as amended, related statutes, and summaries of the requirements for exploration and development and production activities. But I've decided that since I'm

living in a community that has—that can have OS—CS development, I figure I'd better know the laws in their entirety so I can better understand how OCS development takes place, and so I can understand whether the development is being carried out according to the law. Or so I'm asking—so I'm asking MMS to provide or direct me to where I can obtain these laws in their entirety.

Response
The OCS Report MMS 86-0003, *Legal Mandates and Federal Regulatory Responsibilities for the Alaska Outer Continental Shelf*, USDOI, MMS, Alaska OCS Region, provides a synopsis of the numerous Federal statutory and regulatory authorities governing mineral-related operations on the OCS. It provides a summary of the various laws pertinent to mineral-resource activities on the OCS as well as Federal regulation titles and OCS Orders. Although this volume was last updated in 1986 and some of the laws and regulations have been amended or changed, the report will assist you in identifying laws and regulations that may be of interest to you. The report is no longer available locally, but a copy can be ordered from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161, telephone (703) 487-4650, publication number TB 87-121927. For copies of the most current version of a particular law or regulation, please contact Minerals Management Service, Alaska OCS Region, Resource Center, 949 E. 36th Avenue, Anchorage, AK 99508, or telephone 1-800-764-2627, Public Affairs.

HPH-07 (Page 31, Lines 7-16)
My question is in rega—I have a question in regarding (sic) Alternative 2. I know that this alternative would be tantamount to cancellation of Sale 149, and should this sale not be held, the energy that would have flowed into the U.S. economy for resources leased under this sale would need to be provided by substitute sources, as stated on page 2-4, Volume 1. What I would like to know is why equal or more attention was not given to possible substitutes for the resources expected to be produced as a result of the proposed action.

Response
Energy alternatives to the proposed action are discussed in Appendix D of the EIS.

HPH-08 (Page 32, Lines 7-16)
I would like—I'd like to also address the time allowed to review this document and the technical nature of the document. It is obvious that the general public does not have the time and are overwhelmed by the size and the scientific nature of this EIS, and that they cannot comment on it in a way that MMS sees applicable to the EIS. I think it should be the responsibility of MMS to see to it that everyone in the public sector of the proposed area is contacted and explained in a comprehensible and understandable way how they are going to be affected by the proposed action.

Response
The MMS has attempted to reach as many people as possible during the Sale 149 EIS process. This process has included over 50 public meetings in Kenai Peninsula and Kodiak Island area communities; the first of these meetings was held in March 1992. The time and place of these meetings have been advertised in local newspapers and over radio and television. Also, Sale 149 articles have appeared in local newspapers and features on local radio and television stations. The EIS is written to inform the public and the decisionmakers of the potential effects of a proposed oil and gas lease sale in lower Cook Inlet. The Sale 149 EIS addresses many issues and some of these are rather complex, especially when addressing a public with a broad range of interests, vocations, and education experiences. The potential effects of Sale 149 on this public will depend on each individuals' particular situation and concerns. Each person will be affected differently, and how they will be affected is a personal evaluation.

HPH-09 (Page 32, Line 25; Page 33, Lines 1-7)
I'd also want to address the fact of how this EIS will be addressed if the export ban is lifted, as I'm hearing in the media. If the export ban is lifted, then the need to meet the energy demand for this country will be at odds with exporting the oil that will be sent overseas. Therefore, it won't be meeting the energy demand of this country, but it will be meeting the energy demand of other countries. And that is at direct odds with the purpose of this EIS.

Response
The country is interested in the net amount of oil imported into the U.S. If by eliminating the oil-export ban, we can reduce transportation costs—as explained in the Comment WS-01, which lowers the balance of trade deficit—then such an arrangement makes economic sense. Furthermore, if the cost of transporting oil is reduced, then the mineral-extraction operation has a lower marginal cost per barrel and the field will produce more oil. Therefore, over the long-run, the total amount of oil produced actually may be increased. Even if production isn't significantly increased, the savings associated with the difference in transportation costs are significant.

HPH-10 (Page 41, Lines 22-25; Page 42, Lines 1-6)
For example—some more—humpback whales, on pa—in Section 3.B.1.8, it reads that the current North Pacific humpback whale population numbers around 2,000 animals and that about 2,000 individuals use the waters in or adjacent to Cook Inlet. So roughly half the humpback whale population of the North Pacific uses these waters. A few pages later, in the environmental assessment of a 50,000-barrel spill, the document reads that only 5 percent of the humpback whales will be affected. What happened to the other 45 percent? You'll find that at Section 4.B.156.

Response
Approximately half of the humpback whales estimated to comprise the North Pacific population occupy the area from Cook Inlet to the Shumagin Islands—this includes a large area that would not be characterized as adjacent to Cook Inlet. A relatively small proportion (5%) of the total occurring in this area would be expected to occur in the proposed lease area or adjacent waters (adjacent here is taken to mean immediate vicinity, for example, northern Shelikof Strait); the other 45 percent would be occupying more distant areas in the region.

HPH-11 (Page 42, Lines 7-12)
As I mentioned, beluga whales are also discussed. This section reads that since not much is known about beluga whales, we're going to have to rely on killer whale biology to figure out what's going to happen to beluga whales in a spill. That's not acceptable. You'll have to do more homework on beluga biology.

Response
Please see the response to Comment MDM-01.

HPH-12 (Page 43, Lines 10-18)
All of the wildlife mortality probability assessments are based on trajectory models that assume oil will flow from a spill area to one point. This—the document calculates—the EIS calculates the effects of a spill on wildlife based on the premise that oil will flow from a spill, hit land, and that's it. And that's crazy. You even say it in your own document, what's going to happen. When there's a spill, it may cover half of lower Cook Inlet. It's going to hit more than just one spot.

Response
Please see the response to Comment MAB-02.

HPH-13 (Page 43, Lines 19-25; Page 44, Line 1)
Another problem with the EIS. A spill is assumed to happen in 15-knot winds. Cook Inlet is known for some of the wildest winds anywhere. In October, there were winds of over 100 miles an hour in the Barren Islands for nearly a week. Looking at the effects of a spill under only ideal conditions is totally inadequate. Using an average wind speed is completely misleading, and you should be using worst case scenarios if you really care about the validity of the EIS.

Response
Please see the responses to Comments AK-05, AK-06, DZ-12, and IPC-06.

HPH-14 (Page 44, Lines 3-11)
Furthermore, on winds, the wind information calculated in the EIS appears to have been gathered using average wind velocity and direction from Kenai, Homer, Kodiak, and an area considered Marine Area A, which looks like Shelikof Strait. Taking samples from these areas misses wind conditions for the very heart of the sale area, which is significant. It's at a break in the Alaska Range where Lake Iliamna is where the wildest winds come from; 60-, 70-, 100-knot winds are not so uncommon, and yet none of your data reflects that.

Response
Please see the responses to Comments AK-05 and DZ-12.

HPH-15 (Page 44, Lines 12-18)
The 2,000-barrel spill projections, it was already mentioned, but I need to repeat it. I think it's outrageous that you only ran the environmental assessment for this for only the month of April. It's totally inadequate. Try running the numbers in late summer when sea birds are fledging, when humpback whales are in the Barrens, when bears are walking the beaches, and things will look much, much worse.

Response
Please see the response to Comment HPH-05.

HPH-16 (Page 54, Lines 12-22)
The Kachemak Bay Conservation Society strongly opposes Lease Sale 149 and urges the federal government to cancel the sale. The Clean Water Act is supposed to protect our waters from pollution. However, under its provisions, oil companies are granted permits to pollute. The drilling platforms in upper Cook Inlet have not abided by their permits. We are concerned about chronic, long-term pollution. What are the effects of such pollution on the marine food web? It's finally time to consider zero discharge for all rigs in the Inlet.

We also have strong concerns about the impacts of exploration, development, and production.

Response
Please see the response to Comment MSO-01 regarding permit discharges authorized under the Clean Water Act. Permit-discharge violations are addressed in the response to Comment TAG-12. Past and recent studies do not indicate the Cook Inlet marine environment has been adversely affected by discharges from the municipalities, petroleum industry, or commercial fishing. Also, see Section III.A.5 of the EIS for summaries of the Cook Inlet water-quality studies. For information regarding zero discharge, see the response to Comment KBC-02.

HPH-17 (Page 55, Lines 7-11)
Another concern is that despite having some of the most treacherous waters in the world in Cook Inlet, we have yet to institute any tug requirements for tankers or any coherent tanker traffic navigational safety plan, a major requirement of the Alaska Oil Spill Commission.

Response
Please see the response to comment APH-34.

HPH-18 (Page 56, Lines 21-23)
And besides that, federal oil lease sales generate no returns to the State from bids or royalties.

Response
The State of Alaska receives money from the OCS Program through 8(g) payments, the Land and Water Conservation Fund, and the Historic Preservation Act.

The 1978 Outer Continental Shelf (OCS) Lands Act Amendments provided for certain coastal states and the Federal Government to share revenues earned from OCS leases, generally 3 to 6 geographical miles beyond the State's coastal boundary. This area, known as the 8(g) zone, is named after the enabling paragraph of that legislation. Between 1978 and 1986, revenues earned in the 8(g) zone were placed in escrow, pending agreement on a formula for dividing those earnings.

In 1986 the U.S. congress determined that coastal states would receive 27 percent of the 8(g) income held in escrow with the remaining 73 percent going to the Federal Government. At that time the escrow account contained about $6 billion. The settlement also identified an additional $650 million to be inclemently paid to the states over a 15-year period; 3 percent of their share for each of the first 5 years, 7 percent annually for the second 5 years, and 10 percent annually for the final 5 years. Now in the "7-percent years" of the agreement, the 1994 payment to the State of Alaska was $9.38 million. The total amount of OCS oil and gas lease 8(g) money the State of Alaska has received has been more than $389 million.

A special fund, called the Land and Water Conservation Fund (LWCF), is used to help states in planning for, buying, and using land and water areas for parks and recreation. About 85 percent of the money in this fund comes from rents, royalties and bonuses generated from the OCS. From 1989 through 1993 Alaska has received more than $1.3 million from this fund; 22 projects throughout the State received LWCF funds.

The Historic Preservation Act Fund receives all of it money from the OCS program and the State of Alaska has received about $5 million to fund 34 projects throughout the State.

Also, the MMS is responsible for collecting, accounting for, auditing, and disbursing revenues associated with mineral leases on Federal and Indian lands. Disbursements are made to states on a monthly basis as bonuses, rents, royalties and other revenues are collected. The State is entitled to a share of the mineral revenues collected from Federal lands located with the States's boundaries and Alaska gets a 90-percent share, as prescribed by the Alaska Statehood Act. In 1994, the State of Alaska received over $5 million as its share of the mineral revenues collected on Federal lands in Alaska.

HPH-19 (Page 57, Lines 7-16)
Environmental degradation that oil development will bring includes reduced air quality, chiefly from the natural gas flares. Homer and lower Cook Inlet currently have excellent air quality. In contrast, the Kenai/Nikiski area is do—which is dominated by the oil industry, is already the most polluted area in EPA's Region X because of toxic emissions. The toxic emissions from an oil rig equal a small city. It's not acceptable to us to add the equivalent of several numerous small cities' toxic emissions to lower Cook Inlet. There.....

Response
Sections IV.B.1-10.n of the Sale 149 EIS adequately assess the potential effects of the potential discharges of pollutants on air quality. Federal and State statutes and regulations define air-quality standards in terms of maximum allowable concentrations of specific pollutants for various averaging periods. The USEPA, and the State of Alaska, DEC, as delegated by the USEPA, are charged with administering the Clean Air Act, as amended. Contrary to the statement of the commenter, both the USEPA and DEC have demonstrated their responsibilities through continued monitoring, documentation, and enforcement procedures.

HPH-20 (Page 57, Lines 23-25; Page 58, Lines 1-5)
Prevention and response capability in Cook Inlet is also below par. While Nikiski and Drift River are among the most dangerous ports, the Inlet is the only significant shipping area not protected by large-scale oil spill response organizations such as the Marine Spill and Prevention Corporation or the Alyeska CISPRI and Alaska Clean Seas, which, unfortunately, are inadequately—are inadequate as presently constituted.

Response
Please see the responses to Comments UFA-06 and KCN-05.

HPH-21 (Page 68, Lines 3-7)
This is some of the "Alaska Marine Ice Atlas," and it was evidently not used for a reference in the analysis of ice effects for other activities associated with this oil and gas lease sale. It comes from the Arctic Environmental Information Data Center at the University of Alaska.

Response
The sea-ice information in the Sale 149 EIS was derived from two sources, LaBelle and Wise (1983), the *Alaska Marine Ice Atlas*, and Brower et al. (1988), the *Climatic Atlas of the Outer Continental Shelf Water and Coastal Regions of Alaska, Volume 1, Gulf of Alaska*.

HPH-22 (Page 71, Lines 8-15)
Anyway, I really do think that the cumulative effects of development activities section of this document is particularly weak. It lacks a real history of prevention; it doesn't lay out the costs and benefits very clearly. It's really important to know where the money is going to go and what it's going to be used for. If it's going to go downstream and profits to big oil, then it's going to have an entirely different effect than if it was spread around here.

Response
The MMS believes the analysis in Section IV.B of the EIS adequately addresses the cumulative environmental effects associated with Sale 149. Aspects of oil-spill prevention and response are described in Section IV.A.4 of the EIS. Some aspects of economic "benefits and costs" are described in Section III.C.1 and analyzed in Section IV.B.1.h of the EIS. "Where the money goes and what its being used for" is not part of an environmental analysis and is beyond the scope of the EIS.

HPH-23 (Page 83, Lines 7-25; Page 84, Line 1)
For the North Pacific humpback whale population, you list numbers of 1,200 to 2,100 as a population for the entire North Pacific. Then you state that there's an estimated 1,247 humpbacks from Cook Inlet to the Barren Island—r to the Shumagin Islands—excuse me—during the feeding season. Now, that would indicate that 50 percent or more of this entire North Pacific humpback whale population uses this area. Now, this is the area from the lease sale down to the Shumagin Islands about 350 miles south, and it would be the path that oil would take if it was to leave the oil spill—or the lease area.

Now, as he said, as Daniel stated, later on in this document—I list the page numbers here, and I will provide those, but I'm not going to go through it—you say that only 5 percent of the Pacific population uses the lease sale area or the adjacent waters. This is directly conflicting. I can't fathom this, how you can come up with something like this. It looks to me like bits and pieces of this were done by different people, shoved together, and there wasn't much communication on it.

Response
Please see the response to Comment HPH-10.

HPH-24 (Page 84, Lines 2-11)
You state there was no effect on humpback whales after the *Exxon Valdez* oil spill in Prince William Sound. Well, what you failed to mention is that the humpbacks weren't even there at the time of the oil spill; they're migratory. In March of the—by far, the majority of the whales are on the feeding ground. Maybe a few that might be earlier over winter in the Sound, but a majority are on the feeding—are on the breeding grounds in the tropical Pacific, and they don't arrive till May or June. At that point in time, the free oil was on the beaches or down the coast.

Response
The commenter points out the primary reason it was stated that humpback whales experienced no known effects from the EVOS was that they had not yet arrived in the area from their southern wintering grounds.

HPH-25 (Page 84, Lines 12-25; Page 85, Lines 1-3)
The document states there was no mortality of Dalls (ph) porpoise or Pacific white-sided dolphins observed during or after the *Exxon Valdez* oil spill, even though the oil spill occurred in Dalls (ph) porpoise habitat. Well, how can you be so sure of this? It's—well, you go on to say that,

"It seems possible that the effects—that effects did occur on these porpoises but unlikely given the large amount of scientific research conducted in the area at the time and the opportunity to detect disoriented, sickly, or dead animals."

Well, first of all, there was absolutely no baseline data on Dalls (ph) porpoises in Prince William Sound before the spill, and there was no way to assess damages afterward. There were no directed studies on Dalls (ph) porpoise. They were not observed or followed in any consistent manner following the oil spill.

Response
Please see the response to Comment CM-02.

HPH-26 (Page 85, Lines 16-25; Page 86, Lines 1-25; Page 87, Line 1)
In assessing the effect of the oil spill on belugas in the lease area, the document first states that there could be—or that there were 242 belugas seen at one time in Cook Inlet on a single day. It goes on to state that because belugas share some of the characteristics with killer whales, you'll use the number 7 as the number of belugas killed out of the 242 that were counted following a sizeable spill.

Now, where does the number 7 come from? It's pretty interesting. This is something I never would have dreamed up. Seven is the number—besides being a lucky number, I guess—is the number of killer whales that were initially missing at the time of the *Exxon Valdez* oil spill from AB pod in Prince William Sound. They were later confirmed as mortalities in a system that's used up and down the Pacific coast. So that's where this number comes from.

Now, the actual number that disappeared out of AB pod in that first year following the oil spill was 13, but I guess the number 7 is a better number. At any rate, that's where it comes from.

Now, the seven mortalities in the AB pod represented about 20 percent of that pod of 36 animals. I'm quite certain—I'm the one that documented this. However, for reasons I can decipher from the EIS, only 15 percent of the pod was lost or—was lost due to the oil. I don't know what happened to the other near 5 percent, or the other individuals. Somehow they decided that part of these whales wasn't killed by the oil. I'm not sure how they got there.

But what this tells you is that no matter what the size of a group, when you have an oil spill, you lose seven animals. That's the first thing that happens. It's something that I had no idea of and is one thing I learned from this document. I think that if you took 15 percent of the 242 belugas, you'd come up with a number more along the lines of 36, if you wanted to say that a certain percentage was always lost at the beginning of an oil spill. That might make a little more sense, but I still think it's tenuous at best.

Response
Please see the response to Comment CM-03.

HPH-27 (Page 87, Lines 2-8)
The document goes on to calculate recovery rates for belugas based on estimated reproductive rates and assures us that in two years the population would be returned to normal again. This type of approach would never, never withstand the scrutiny of any peer review group that I've ever dealt with. I wouldn't begin to launch something like this on a peer reviewed scientific group.

Response
Please see the response to Comment CM-03.

HPH-28 (Page 87, Lines 9-15)
These poorly developed representations of risk presented in the marine mammal section casts a shadow on the validity of the entire document, which I will take time to review. I pick out the examples of interest at this time. Nowhere is it clearly mentioned just how toxic the fumes or oil can be to a marine mammal if it's inhaled, or to any mammal for that matter.

Response
The potential effects of inhalation of fumes by marine mammals is discussed in Section IV.B.1.e(1)(b) of the EIS. There is little baseline data on cetaceans to draw from. As discussed in Geraci and St. Aubin (1990), depending on the concentration of vapors and duration of exposure, the effects could range from mild irritation to death. Vapor concentrations could reach critical levels for the first few hours after a spill. If cetaceans were unable to leave the area during that time, they would inhale vapors and could be harmed. The animals most likely would experience some irritation of respiratory membranes before making their way out of the slick. Observations off Atlantic and gulf coasts suggest that exposure of cetaceans to oil/fumes does not always have a lethal effect.

HPH-29 (Page 87, Lines 16-22)
There's so little baseline data visitations in the area that the sale of these waters or adjacent areas—or there is so little baseline data for whales in this area that the sale of these waters is incredibly premature. I can't see how you can make any secure statements about what might happen to the whales in the area when you don't even know how many are out there for most of the species.

Response
The analysis of the effects of Sale 149 on whales is supported by the best available information on (1) population distribution, habitat use, and seasonal occurrence and (2) effects of potentially adverse factors associated with sale activities on individual organisms. Available evidence indicates that whales are not harmed significantly by either noise or oil spills, and that only small numbers of a few species are likely to be present in the sale area or immediate vicinity—that is, we expect only a few individuals to be exposed to adverse factors and exhibit sublethal effects and thus feel secure in expecting a minimal effect on individuals as well as populations.

HPH-30 (Page 91, Lines 6-11)
I'm very much concerned about the long-term chronic pollution, which I don't think was adequately addressed in the Environmental Impact Statement, not to mention the likelihood of major spills, which is virtually a foregone conclusion over the long term. This region, as we've heard over and over, has already suffered enough with the Exxon spill in '89.

Response
Studies that have analyzed the water, sediment, and benthic biota for hydrocarbons were conduced in the late 1970's and in 1993 (Sec. III.A.5.c(4)(b)). The late 1970's studies were conducted more that a decade after oil and gas production began in upper Cook Inlet. The studies in 1993 were done after nearly a billion barrels of oil had been produced. Through 1992, there were a number of oil spills in Cook Inlet, including the *Glacier Bay* spill of 3,100 bbl of North Slope crude oil in 1987 and the transport into Cook Inlet of oil from the *Exxon Valdez* spill of 1989. Also, as noted in Section III.A.5.d(2)(a), the wastewater discharges from municipalities contain hydrocarbons. In general, these studies have shown the hydrocarbons present in the water, sediment, and benthic biota are of recent biogenic origin, and petrogenic hydrocarbons are not accumulating in the marine environment.

However, it is recognized that, in the areas of discharges, the concentrations of contaminants may exceed permit discharge limits and/or may be harmful to some marine organisms. (Permits allow for discharges to exceed limits within a specified area, the mixing zone, around the discharge outlet.) Within several hundred meters of the discharge outlet, the discharges are mixed and diluted in the receiving waters and the concentrations of contaminants reduced to background or levels, often below detection limits, that generally are not harmful to most marine organisms.

To date, the studies do not indicate any chronic pollution in Cook Inlet and, given the dynamic nature of the Cook Inlet marine environment, chronic pollution is not expected.

HPH-31 (Page 92, Lines 9-18)
I find it very interesting when it was mentioned here by you folks that one of the purposes of this whole process is to inventory the oil that we have in this country. Well, I find it rather hypocritical at the same time that we're talking about opening ANWR and opening up new areas like this and special areas of concern, to lift the export ban. On one hand, we're talking about energy independence for the U.S., and on the other hand, we want to lift the export ban and ship it to Japan and the Far East. Now, does this make sense? I don't think so.

Response
The Nation is interested in the "net" amount of oil imported into the U.S. If by eliminating the oil export ban we can reduce transportation costs, as explained in the response to Comment SW-01, then we are lowering the balance of trade deficit—an arrangement that makes good economic sense. Furthermore, if the cost of transporting oil is reduced, then the mineral-extraction operation has a lower marginal cost per barrel and the field will produce more oil. Therefore, over the long-run, the total amount of oil produced actually may be increased. Even if production is not significantly increased, the savings associated with the difference in transportation costs would be significant. Furthermore, providing an atmosphere where there are lower marginal costs of production will encourage larger international firms to stay in the U.S. and not move their capital and jobs for foreign countries.

HPH-32 (Page 113, Lines 3-8)
The EIS never seems to mention what effect exploration and development will have on the immediate areas. For example, in a section about flare emissions, they say the effect on shore will be minimal because the emissions will have dispersed by then. What about the water and its inhabitants under the flares?

Response
Flaring is a highly efficient means of disposal—approximately 99-percent effective. As such, potential effects will be minimal in the area immediate to the flaring. Sections IV.B.1-10.n of the EIS adequately assess the potential effects of the potential discharges of pollutants on air quality.

HPH-33 (Page 114, Lines 5-12)
With the adverse effects on commercial fisheries, the EIS discusses space use conflicts, but also mentions a 15- to 65-percent economic loss from an oil spill. Of course, this adversely affects fishermen and canneries. The EIS does not mention what unavoidable adverse effects there would be on Homer's tourism industry. Fishing and tourism are Homer's main sustainable economies. An oil industry will conflict with them.

Response
The text in Section III.C.6 has been modified to add reference to the importance of recreational fishing in Homer. Tourism is described at a more aggregate level in Section III.C.6.c. Potential impacts on recreational fishing and tourism, however, are analyzed at a more aggregated and regional level in Section IV.B.1.m(2).

HPH-34 (Page 129, Lines 24-25; Page 130, Lines 1-7)
I haven't read the whole EIS, but from what I understand, there isn't any mention of razor clams in there. They mention intertidal organisms and low-energy beaches or something. Well, these are high-energy beaches. The razor clam beds are famous all over Alaska and probably the world, and those would be tremendously affected by any oil spills. And we have, you know, Kachemak Bay full of stuff—king crab, tanner crab, otters, kelp beds, besides all the smaller organisms that feed everything.

Response
The DEIS was not intended to detail the many specific and individual fisheries (such as clam harvests) within Cook Inlet. Such a task would greatly increase the size of the DEIS, while missing its primary purpose, which is to assess the possible impacts of the proposal on the Cook Inlet commercial-fishing industry.

Also, please see the response to Comment KIB-17.

HPH-35 (Page 150, Lines 24-25; Page 151, Lines 1-6)
I would like to see the Statement recorded—I would like to see recorded in this document an accurate indication of the overall environmental impact that has already occurred in the lower Cook Inlet region over the past 30 years. It is important to know this because I think it would show how fragile the water here is. The Environmental Impact Statement needs to reflect the overall impact of pollution as well as the actual situation of all the sea life and coastal wildlife.

Response
Much of the baseline data for the Cook Inlet marine environment has come from studies that began in the late 1970's through the National Oceanic and Atmospheric Administration's Outer Continental Shelf Environmental Assessment Program (OCSEAP). Offshore oil and gas development in upper Cook Inlet began in the mid-1960's. Information from OCSEAP has been included in the water-quality description in Section III.A.5 of the EIS. Past and recent studies do not indicate the Cook Inlet marine environment has been adversely affected by discharges from the municipalities, petroleum industry, or commercial fishing. See also Section III.A.5 of the EIS for summaries of the Cook Inlet water-quality studies.

HPH-36 (Page 159, Lines 19-21)
And there are important impacts omitted, too. For example, in discussing that issue, nowhere in there did I find reference to what the visual impacts of the rigs would be.

Response
The visual impact of rigs and platforms is analyzed in the beginning of Section IV.B.1.m.

HPH-37 (Page 159, Lines 22-25; Page 160, Lines 1-2)
Nor did I find any indication of what those rigs working out there and discharging produced waters, cuttings, and what have you, what that—what influence that would have on those people in the villages who were involved in subsistence, aside from a spill. A spill isn't the only thing that will have impacts.

Response

The effects of discharges from exploration and development and production activities on subsistence are analyzed in Sections IV.B.1.j (1) and (2), respectively, of the EIS.

HPH-38 (Page 160, Lines 3-11)

And I'm going to really wrap it up now, but there's—the one glaring omission that I'd like to mention tonight is nowhere in this document is there any mention of the planning phase impacts. This lease sale has already had impacts here. The fact that I have had to spend the last two weeks trying to deal with this issue, and will spend much more time, is one of those impacts. I could have been working; I could have been visiting my mother in Los Angeles; I could have been on vacation. That's an impact.

Response

Public hearings on a draft EIS for a proposed OCS oil and gas lease sale are part of the lease-sale process described in Section I.A. This process, including hearings, ensures the public has an opportunity to comment on the lease sale and on the draft EIS. These comments and responses become part of the final EIS, which is part of the decisionmaking process as to whether or not to hold a lease sale and if held, what areas will be offered for leasing and what mitigating measures will be implemented. The alternative to public involvement in the lease-sale process could be no public input into the lease-sale decisions.

HPH-39 (Page 186, Lines 10-16)

In the EIS it seems you've missed over—or forgotten to include a whole section of damage that bringing this oil out of the ground will do, and that's what the oil will do after it's burned as gasoline. It will be burned in the United States and all over the world, and put tons and tons of pollution into the air. And I didn't see anything in that—about that in the EIS.

Response

he MMS agrees there are potential air-quality impacts resulting from the burning of gasoline—one of the end products from oil development and production. Some of these effects were assessed in Sections IV.B.1-10.n of the EIS, which addresses the potential effects of discharges of pollutants on air quality produced by (1) diesel-fire-power-generating equipment needed for drilling exploratory and delineation wells; (2) tugboats, supply boats, and crew boats in support of drilling activities; (3) piston-driven engines or turbines used to provide power for drilling; and (4) heavy-construction equipment used to install platforms and pipelines. Gasoline combustion and other domestic uses of hydrocarbon products fall under the Federal, State and, where delegated, local regulations and statutes. While the Clean Air Act provides the legislative framework for Federal, State and local air-quality guidelines, it should be pointed out that State and local regulations cannot be less stringent than those legislated in the Clean Air Act, as amended.

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Kodiak Public Hearing -- Verbatim Excerpts and Responses to Comments.

KoPH-01 (Page 9, Lines 7-10)
OCS 149 would be the first sale in the *Exxon Valdez* oil spill region, and this proposal is completely inconsistent with the Trustees agencies' responsibility for restoration of damaged resources from the oil spill.

Response
The mission of the *Exxon Valdez* Oil Spill Trustee Council "is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthily productive world renowned ecosystem while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living." The MMS believes Sale 149 is consistent with the Trustee Council's stated mission.

KoPH-02 (Page 10, Lines 4-10)
There—even though there was such a significant amount of oiled shoreline, there was no—there has been no significant research on the long-term impacts of EVOS in our effort. And though most of the effort has been focused on the Sound, because everyone considers the *Exxon Valdez* a Prince William Sound spill, we still don't know what the long-term impacts are here.

Response
The EVOS Trustee Council Draft Fiscal Year 1995 Work Plan has listed 93 project proposals to continue long-term monitoring studies of biological resources impacted by the EVOS in Prince William Sound and in Cook Inlet-Shelikof Strait, including such studies in Cook Inlet as: Mussel Bed Restoration and Monitoring in Prince William Sound and Gulf of Alaska; Kenai River Ecosystem Restoration Pilot Enclosure Study; and Clam Restoration (Nanwalek, Port Graham, Tatitlek) (EVOS Trustee Council, 1994).

KoPH-03 (Page 10, Lines 16-21)
The same justifications which sought—which created the buy-back of the Bristol Bay lease sales, stopped the joint Chukchi Sea sale, created the buy-back of Kachemak Bay sales in the past are all the same justifications of why we should not have oil development in—or continue to expand that oil development to impact Kodiak.

Response
Please see the responses to Comments JC-01 and APH-01.

KoPH-04 (Page 10, Lines 23-25; Page 11, Lines 1-3)
Having worked for four years on spill prevention response and preparedness development on—in working with the Prince William Sound RCAC, I can definitely state that we are not there yet in terms of prevention and response. There is no significant oil industry effort to prevent or protect Kodiak outside of Prince William Sound or the lower Cook Inlet from existing oil spills and existing Cook Inlet operations.

Response
The MMS has established stringent requirements for spill prevention and response and employs an inspection program to ensure industry compliance. To complement the regulatory programs in place, the petroleum industry uses state-of-the-art technology for prevention equipment and the most current operating procedures while conducting operations on the OCS. Additionally, the petroleum industry must maintain a constant state of readiness for oil-spill response to meet the MMS's stringent response requirements. The goal of the MMS oil-spill prevention program is to ensure that the lessee is prepared to respond to any size spill—from a small operational spill to a large worst-case spill. To achieve this goal, MMS requires oil-spill-contingency plans for all operations. Further, MMS uses inspections, equipment deployment, and table-top communications exercises to ensure that the lessee has trained, knowledgeable crews and well-maintained equipment to respond to a spill.

In addition to the equipment that the MMS, Alaska OCS Region, requires to be available at the site of operations, local oil-spill-response cooperatives may provide spill-response equipment. The Alaska OCS Region policy requires that spill-response equipment be staged at the site of operations in sufficient quantities to respond to a small operational spill as well as provide an initial response for a worst-case spill until additional response equipment arrives at the site.

Three oil-spill cooperatives located in Alaska have equipment inventories for mechanical, dispersant, and in situ burning responses. All of the oil-spill cooperatives listed in this section have substantially increased their equipment inventories since the *Exxon Valdez* ran aground in March 1989. Additionally, both Alaska Clean Seas (ACS) and CISPRI have changed their focus to response cooperatives and now provide manpower and direct spill-response expertise in addition to response equipment. The oil-spill cooperative closest to the proposed sale area is CISPRI. In addition to CISPRI's equipment located at their warehouses in Nikiski, Alaska, CISPRI maintains a dedicated response vessel—the *Banda Seahorse*—and a spill-response barge. Both the *Banda Seahorse* and the spill-response barge maintain dedicated oil-spill-response equipment on board.

KoPH-05 (Page 11, Lines 4-12)
There's no vessel traffic system in Cook Inlet. There's no protection at Hinchinbrook—outside of Hinchinbrook Entrance for vessels that leave Prince William Sound, travel around the Kenai Peninsula, and enter Cook Inlet carrying the same North Slope crude that they're highly protected (sic) inside the Inlet and we—inside the Sound. And we continue to be exposed to those risks, and there is no demonstration of, I would call it, good faith to date that we will be protected from another major oil spill.

Response
Please see the response to Comment APH-34.

KoPH-06 (Page 11, Lines 24-25; Page, 12 Lines 1-5)
The reason that there were 4,200 violations recited in the NPDES permits in upper Cook Inlet, and why the EPA took so long, eight years, to bring enforcement action against those folks, is because they don't have the enforcement capability that these laws are supposed to protect us

with. And on top of that, those rigs are self-reporting. So if there's 4,200 violations, what was it that wasn't reported?

Response
Please see the response to Comment TAG-12.

KoPH-07 (Page 12, Lines 14-20)
On top of that, none of the—the proposed OCS 149 and the current responses to—or the current planning to respond to oil spills does not fully consider the human or socioeconomic impacts and repercussions of a spill. The social research after the *Exxon Valdez* clearly demonstrates that there are extreme stress impacts from technological disasters on natural resource dependent communities.

Response
he EIS sections on sociocultural systems assess impacts from oil-spill events. The 50,000-bbl spills used for the purpose of analysis are 20 percent the size of the EVOS.

KoPH-08 (Page 13, Lines 8-13)
The National Science Foundation makes it very clear that no—none— no more oil lease sales in the Outer Continental Shelf should go forward without a clear understanding of these socioeconomic impacts, as well as the biological impacts, which we have very little understanding of those in Alaska.

Response
Please see the response to Comment APH-03.

KoPH-09 (Page 36, Lines 8-17)
But I've been participating in—on a committee with Cook Inlet RCAC for the past almost five years. And from the time I got on, we recommended a tug to be an escort tug in Cook Inlet, and there still is no escort tug. Cook Inlet is still the only place in the western world where a tanker is routinely docked and undocked without tug assist. And this is the one thing that everybody that's looked into this feels like it's important, is that, Are the oil companies showing good faith if they continue fighting having a tug in Cook Inlet? And this is a continuation of that.

Response
Please see the response to Comment APH-34.

KoPH-10 (Page 41, Lines 6-9.
Part of the Kodiak Island Borough Assembly Resolution 91-49)
"And whereas, the Kodiak Island Borough has urged that oil and gas leasing and exploration not take place in the Cook Inlet planning area until the long-term impacts of the *Exxon Valdez* oil spill have been established. . ."

Response
The current OCS Natural Gas and Oil Resource Management Program for Mid-1992 to Mid-1997 was approved and adopted on June 30, 1992.

SECTION VI

CONSULTATION AND COORDINATION

Section VI—Table of Contents

VI. CONSULTATION AND COORDINATION

VI. CONSULTATION AND COORDINATION

A. Development of the Proposal: The proposed Cook Inlet Sale 149 is one of 13 proposed OCS sales included in the OCS Natural Gas and Oil Resource Management Comprehensive Program 1992-1997. Official coordination with other Government agencies, industry, and the public regarding this proposal began on June 17, 1991, with an Information Base Review. An Information Transfer Meeting held January 28-30, 1992, in Anchorage, provided an additional opportunity for the public to comment on information that could enhance the EIS analysis.

As a means of obtaining information to assist MMS in determining the level of industry and public interest in Sale 149, a Request for Interest and Comments was published August 29, 1991, for leasing 254 blocks covering 1.2 million acres. Seventeen comments were received. A Notice of Request for Comments on New Alternatives was announced December 19, 1991, and resulted in an expansion of the area to be considered for Sale 149 from 254 blocks and 1.2 million acres to 761 blocks and 3.7 million acres.

On February 7, 1992, a Call for Information and Notice of Intent to Prepare an EIS was published in the *Federal Register* requesting expressions of industry interest in blocks within the Call area and requesting public comments on environmental issues related to possible oil and gas leasing in the area. Responses were received from three oil and gas companies, the State of Alaska, three Federal Agencies, three environmental entities, one fishing group, three area and local representatives, and one individual. The nominations received indicated interest in all 761 blocks.

Following evaluation of the area nominations and environmental information received in the process described above, the MMS submitted a recommendation for the area selection to the Secretary. On August 13, 1992, the Secretary of the Interior selected 761 blocks as the Sale 149 area for further environmental study. However, on January 27, 1994, the DOI announced its decision to defer the Shelikof Strait area from the Sale 149 proposal. This decision was based on environmental concerns and reduced industry interest in the area. The revised area consists of 402 blocks (see Sec. I.A for more details). Of these blocks, the Secretary also stipulated that no more than 250 blocks will be leased.

B. Development of the EIS: During preparation of this EIS, Federal, State, and local agencies; industry; and the public were consulted to obtain descriptive information, to identify significant effects and issues, and to identify effective mitigating measures and reasonable alternatives to the proposal. The information received was considered in preparing the EIS. In addition, scoping meetings were held to more clearly and specifically identify issues and alternatives to be studied in the DEIS. Scoping meetings were held in March 1992 in Kodiak, Port Lions, Larsen Bay, Chignik, Homer, Seldovia, Nanwalek, Port Graham, Soldotna, and Anchorage; scoping information can be found in Section I.D. In addition, dialogue meetings were held in the communities of Port Graham, Karluk, Nanwalek, Seldovia, Ouzinkie, Homer, and Kodiak in September 1992. Monthly meetings are being held in Kodiak and Homer throughout the EIS process to facilitate as much public input as possible. Departmental agencies with interest and expertise in the OCS were consulted during the development of the proposed lease stipulations for the proposal (see Sec. I.A).

Workshops to help the public understand the organization of information in an EIS, using the Sale 149 draft EIS as an example, were held in February 1995 in the following Alaska communities; Kenai, February 6; Homer, February 7; Kodiak, Seldovia, and Port Graham, February 8; and Nanwalek, February 9.

Public hearings on the draft EIS were held in March 1995 in the following Alaska communities: Anchorage, March 3; Kenai, March 6; Homer, March 7; and Kodiak, March 8. The communities of Nanwalek, Port Graham, Seldovia, Ouzinkie, and Port Lions were invited to take part in a teleconference on March 3, but only Seldovia participated. Oral and written comments were received and are responded to in this final EIS.

C. List of Contacts for Preparation and Review of the EIS: The following are the major Federal, State, and local government agencies; special interest groups; members of the oil industry; other organizations; and the public (1) who were contacted, sent copies of the draft EIS for review and will be sent copies of the Final EIS or (2) who provided comment on the draft EIS that addressed the adequacy of the descriptive material or analysis or provided new or additional information (Sec. V) and will be sent copies of the final EIS (if a mailing address has been provided).

Federal Agencies:

Bureau of Indian Affairs
Bureau of Land Management
U.S. Coast Guard
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
Marine Mammal Commission
National Biological Service
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
National Park Service

State of Alaska:

Department of Fish and Game
Department of Transportation and Public Facilities
Division of Government Coordination
University of Alaska, Anchorage
University of Alaska, Juneau Center for Fisheries and Ocean Science
University of Alaska, Seward Marine Center

Local Governments and Native Organizations:

Aleutians East Borough
Bristol Bay CRSA
Cenaliulriit
Chickaloon Village
City of Chignik
City of Homer
City of Kenai
City of Kodiak
City of Larsen Bay
City of Port Lions
City of Seldovia
City of Soldotna
Kenaitze South Central Foundation
Kenai Peninsula Borough
Kodiak Area Native Association
Kodiak Island Borough
Lake and Peninsula Borough
Municipality of Anchorage
Native Associations in Kodiak, Dillingham, Anchorage, and Seldovia
Northwest Arctic Borough
Sitnasuk Native Corporation
Village of Nanwalek (English Bay)
Village of Port Graham

Special-Interest Groups:

Alaska Center for the Environment
Alaska Draggers Association
Alaskans for Clean Seas
Alaska Legal Services Corporation
Alaska Marine Conservation Council
Alaska Public Interest Research Group
Alaska Wildlife Alliance
American Oceans Campaign
Area K Seiners Association
Center for Alaskan Coastal Studies
Cook Inlet Regional Citizens Advisory Council
Cook Inlet Seiners Association
Green Party of Alaska
Greenpeace
Kachemak Bay Conservation Society
Kenai Peninsula Fishermen's Association
Kodiak Conservation Network
Legasea
National OCS Coalition
National Parks and Conservation Association
National Wildlfie Federation
Natural Resources Defense Council
North Gulf Oceanic Society
Northwest Setnetters Association
Pacific Seabird Group
Public Awareness Committee for the Environment
Sierra Club
U.S. Public Interest Research Group
Talkeetna Environmental Center
Trustees for Alaska
The Wilderness Society
United Fishermen of Alaska
United Fishermens Marketing Association

Petroleum Industry:

Alaska Oil and Gas Association
American Petroleum Institute
Amoco
ARCO
ARCO Alaska, Inc
Aspen Exploration
BP Alaska Exploration, Inc
Marathon Oil Company
Mobil Exploration and Production
National Ocean Industries Association
Phillips Petroleum Company
Texaco, Inc.

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State of Oregon
Azis Armand
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Pamela Brodie
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APPENDICES

A Resource Estimates

B Oil-Spill-Risk Analysis

C The 200,000-Barrel Oil-Spill Analysis

D Energy Alternatives to the Proposed Action

E MMS Alaska OCS Region Studies Program

F Prehistoric Resources Analysis

G Methodology for Employment and Population Forecasts

H Supporting Figures for the Section on Subsistence

I Endangered Species Act Section 7 Consultation and Documentation

J Fate and Effects of Exploratory Phase Oil and Gas Drilling Discharges in the Cook Inlet Planning Area, Lease Sale 149 (Prepared by the U.S. Environmental Protection Agency)

K Environmental Impact Statement Cooperating Agency Agreement Between Minerals Management Service and the Environmental Protection Agency, Region 10 and Memorandum of Agreement between the U.S. Environmental Protection Agency (EPA), Region 10, and the Minerals Management Service (MMS), Alaska Outer Continental Shelf Region Coordinating the EPA National Pollutant Discharge Elimination System (NPDES) Permit Compliance Program with the MMS Offshore Inspection Program

PETROLEUM GEOLOGY OF COOK INLET

Cook Inlet and Shelikof Strait are part of a large forearc basin between the Aleutian Trench and the active volcanic arc on the Alaska Peninsula. The southeastern boundary of the basin is the Border Ranges fault system, which separates the basin from metamorphic rocks of a large accretionary complex that is exposed in the Chugach and Kenai Mountains and on the Kodiak Islands. The northwestern boundary of the basin is the Bruin Bay fault, which separates the basin from igneous rocks of the Alaska-Aleutian Range batholith that is exposed on the Alaska Peninsula. The basin-bounding faults and most of the subsurface structural features trend northeast-southwest parallel to the axis of the basin. The Augustine-Seldovia arch, which is oriented east-west transverse to the main structural trend, separates the forearc basin into two depocenters. The northern depocenter in Upper Cook Inlet contains as much as 25,000 feet (7,600 m) of Cenozoic strata. The southern depocenter in Lower Cook Inlet (LCI) and Shelikof Strait contains a thin Cenozoic section over as much as 36,000 feet (11,000 m) of Mesozoic strata (Fig. A-1).

All of the oil and gas fields discovered in the Cook Inlet basin to date are in State waters or onshore. The petroleum is contained in sandstone and conglomerate reservoirs of Tertiary age in northeast-trending compressional folds. Oil pools are restricted to the West Foreland, Hemlock, and lower Tyonek Formations of Eocene to Oligocene age. The source of the oil is thought to be primarily Middle Jurassic siltstones of the Tuxedni Group. All of the major oil fields involve Tertiary reservoirs overlying Jurassic rocks. Migration pathways are most likely the large unconformity separating the Tertiary and Jurassic rocks and large-scale faults associated with the compressional folds. The oil fields have associated gas deposits. Large dry-gas deposits, comprised of biogenic methane, occur in sandstone reservoirs within the upper Tyonek, Beluga, and Sterling Formations of late Miocene to Pliocene age (Fig. A-2).

One COST (Continental Offshore Stratigraphic Test) well was drilled in LCI in 1977 and the first OCS lease sale was held that year. Thirteen exploratory wells were drilled between 1978 and 1985 in LCI and Shelikof Strait (Fig. A-3). Three of those wells were abandoned at shallow depth because of hole problems. They were redrilled at approximately the same location. All wells were plugged and abandoned. Two wells had significant oil shows in Late Cretaceous strata. Both of those wells, the Marathon Y-0086 well and the Arco Y-0097 well, tested noncommercial oil in drill-stem tests.

The primary problem with wells drilled in Federal waters to date has been poor reservoir-rock potential. The reservoirs that produce in Upper Cook Inlet are all within Tertiary strata. The Tertiary section in Federal waters is relatively thin, and potential reservoirs are too shallow over most of the area to be exploration targets (Fig. A-4). Future exploration success in most of the OCS portion of the Cook Inlet basin will depend on finding adequate reservoir rocks within the Mesozoic stratigraphic section.

The Mesozoic section is mostly marine and includes rocks from Late Triassic through Late Cretaceous age. Late Triassic limestone and chert beds near Puale Bay on the Alaska Peninsula appear to have excellent source-rock potential. The rocks are organic rich with oil-prone kerogen types. Those beds probably underlie the offshore area, although the OCS wells were too shallow to encounter them.

The Talkeetna Formation of Early Jurassic age is largely volcanic and is considered to be economic basement. The Middle Jurassic strata contain some excellent petroleum source-beds in marine siltstones, particularly in the lower Tuxedni Group, but the volcaniclastic sandstones and conglomerates do not have good reservoir-rock properties. The overlying Naknek Formation of Late Jurassic age contains very thick sandstone and conglomerate beds, which were encountered in all but two of the wells. This section, however, has uniformly low porosity and permeability because of cementation and the presence of zeolite minerals.

Early Cretaceous rocks include marine siltstones, bioclastic limestones, and sandstones. The sandstones have a higher quartz content, and the pore spaces are less degraded by zeolite minerals than with the sandstones of the underlying Jurassic strata. As a result, the Early Cretaceous section may have good reservoir-rock potential offshore.

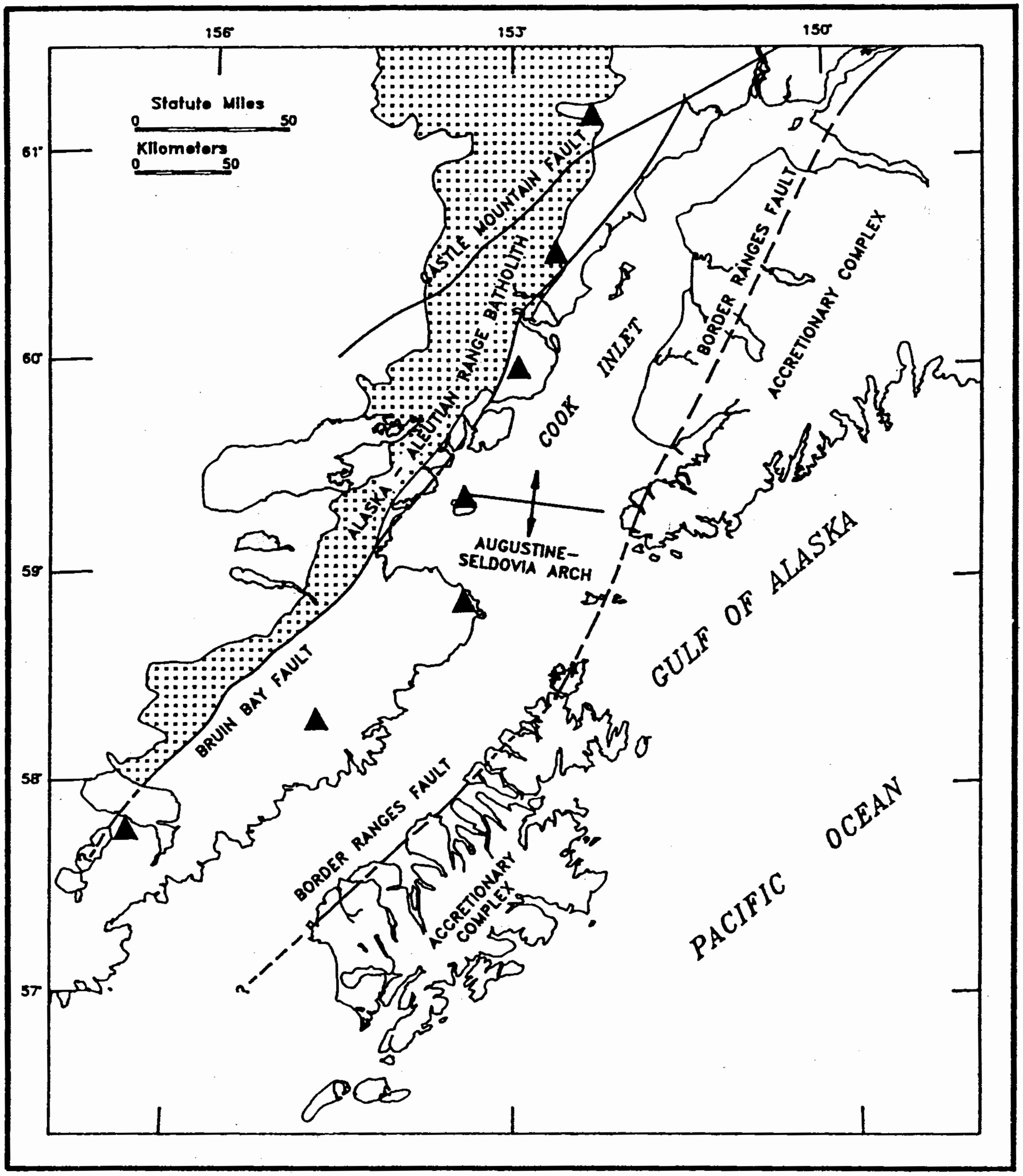


Figure A-1. Map Showing Major Structural Features of the Cook Inlet Region. Major Quaternary Volcanoes are Shown as Triangles.

TERTIARY	MIOC.	BELUGA FM.	NON-MARINE SANDSTONE SILTSTONE COAL
	MIOC. / OLIG.	TYONEK FM.	
	OLIG.	HEMLOCK CGL.	SS. & CGL.
	EOC.	WEST FORELAND FM.	TUFFACEOUS SILTSTONE & CGL.
CRETACEOUS	LATE	KAGUYAK FM.	MARINE SILTSTONE & SANDSTONE
	EARLY	HERENDEEN FM.	MARINE SILTSTONE & LIMESTONE
JURASSIC	LATE	NAKNEK FM.	MARINE SANDSTONE & SILTSTONE
	MIDDLE	CHINITNA FM. & TUXEDNI GROUP	MARINE SILTSTONE
	EARLY	TALKEETNA FM.	VOLCANICS
TRIASSIC & OLDER		BASEMENT COMPLEX	LIMESTONE, CHERT, GREENSTONE

Figure A-2. Generalized Stratigraphic Column for Lower Cook Inlet.

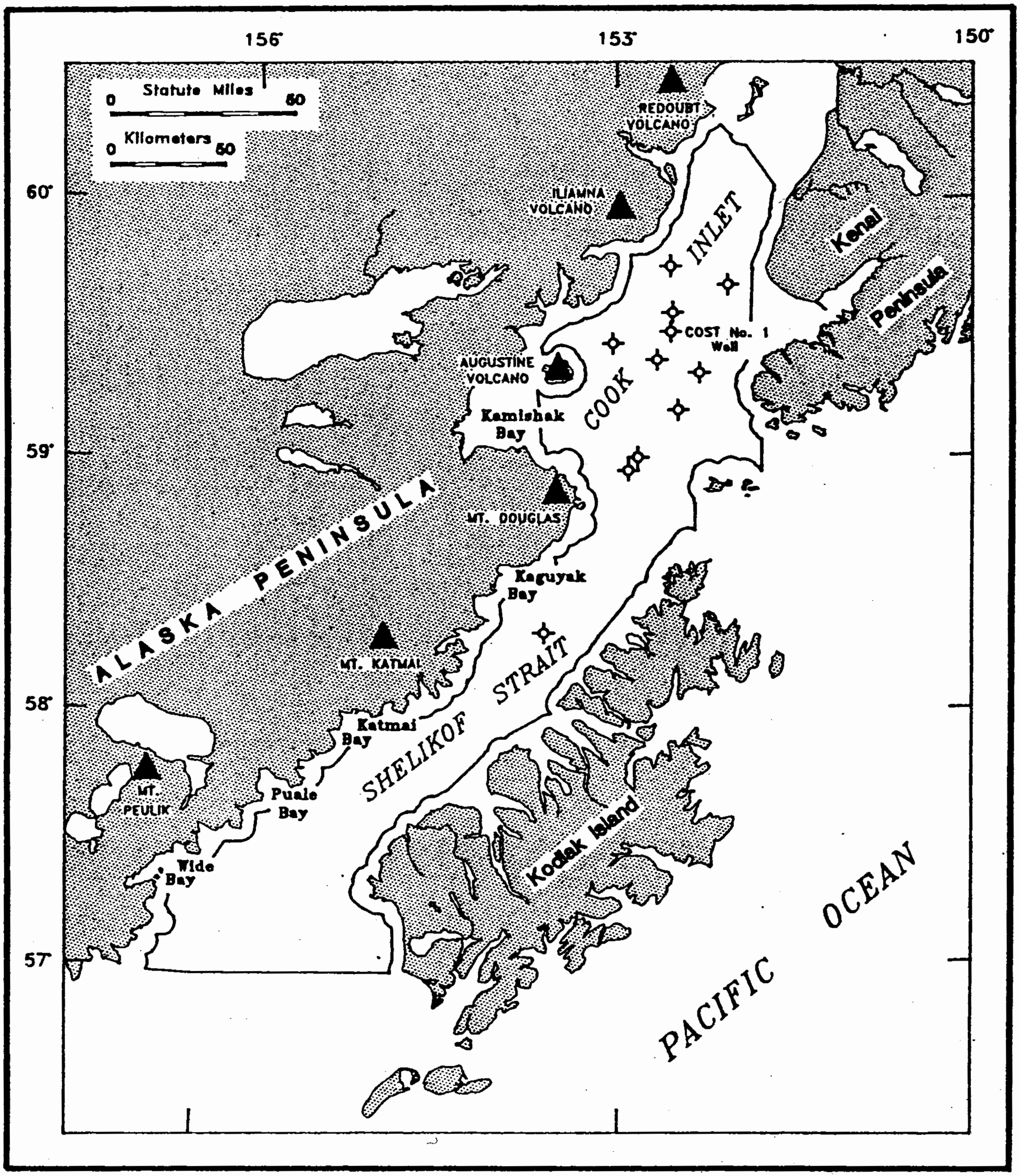


Figure A-3. Location Map of the Cook Inlet Planning Area. The Locations of the COST No. 1 Well and Dry Holes from Previous Lease Sales are Shown.

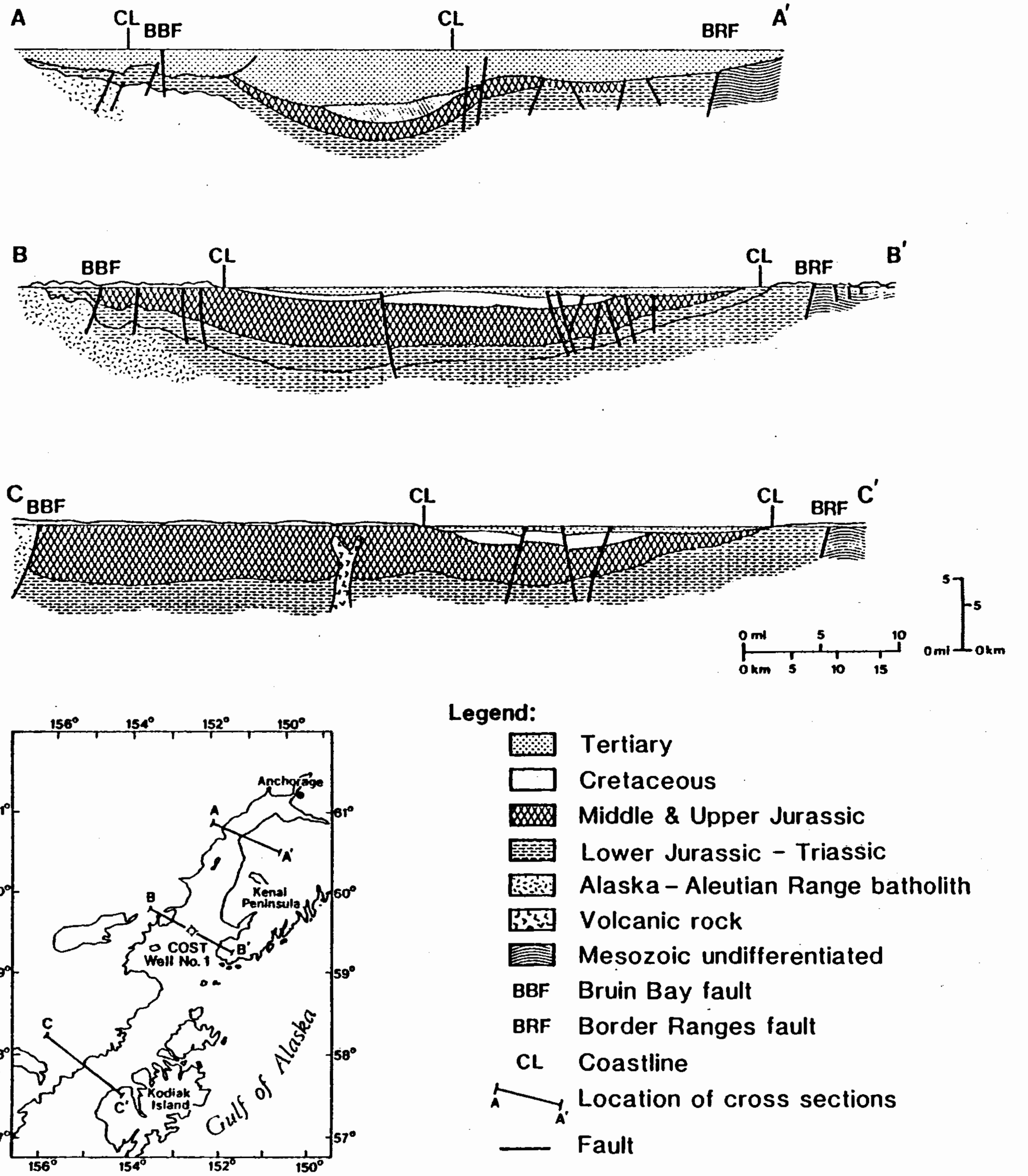


Figure A-4. Geologic Cross Sections of Upper Cook Inlet, Lower Cook Inlet, and Shelikof Strait. The Relatively Thin Tertiary Section in Federal Waters is Illustrated.

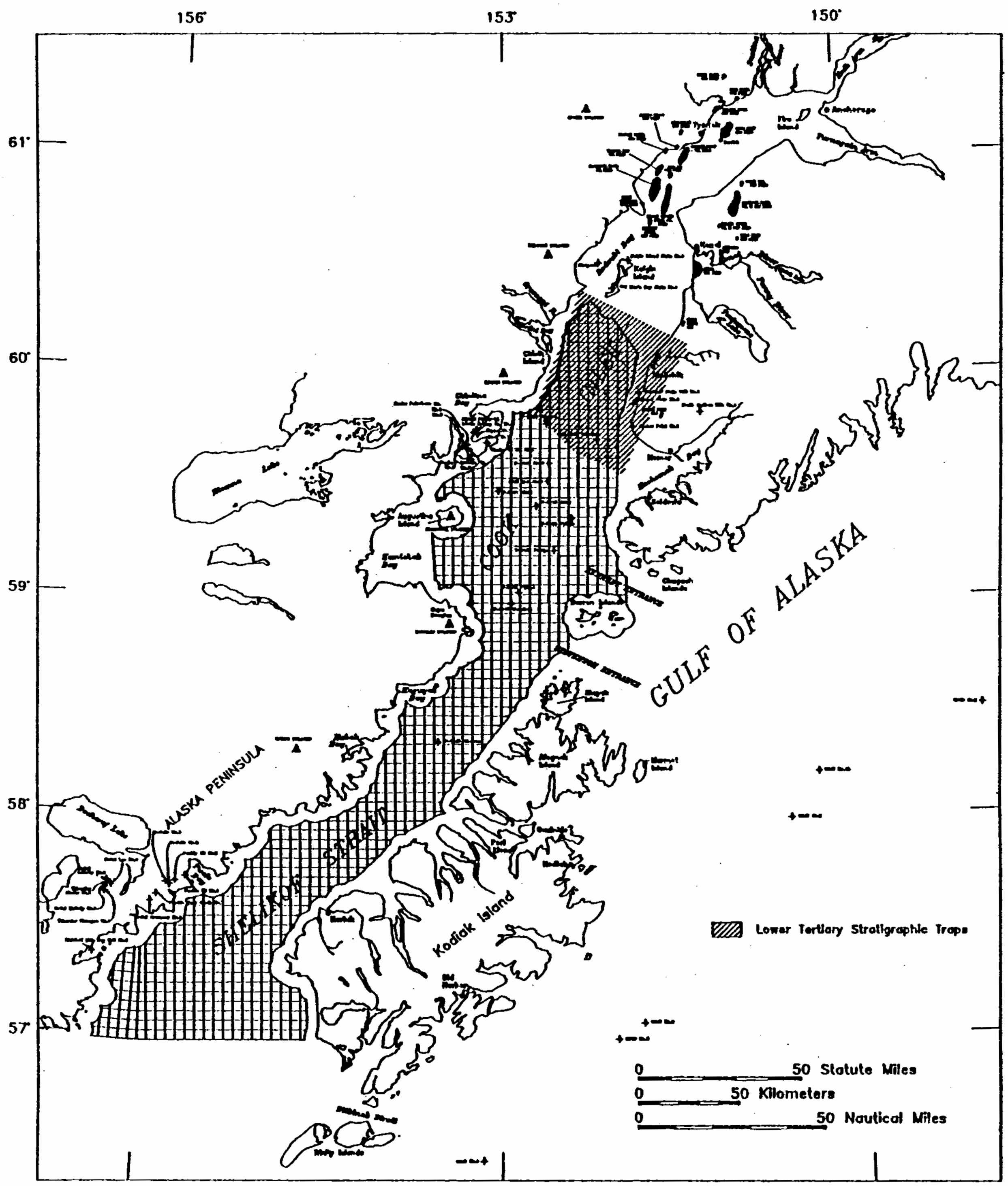


Figure A-5. Map Showing the Distribution of the Tertiary Play.

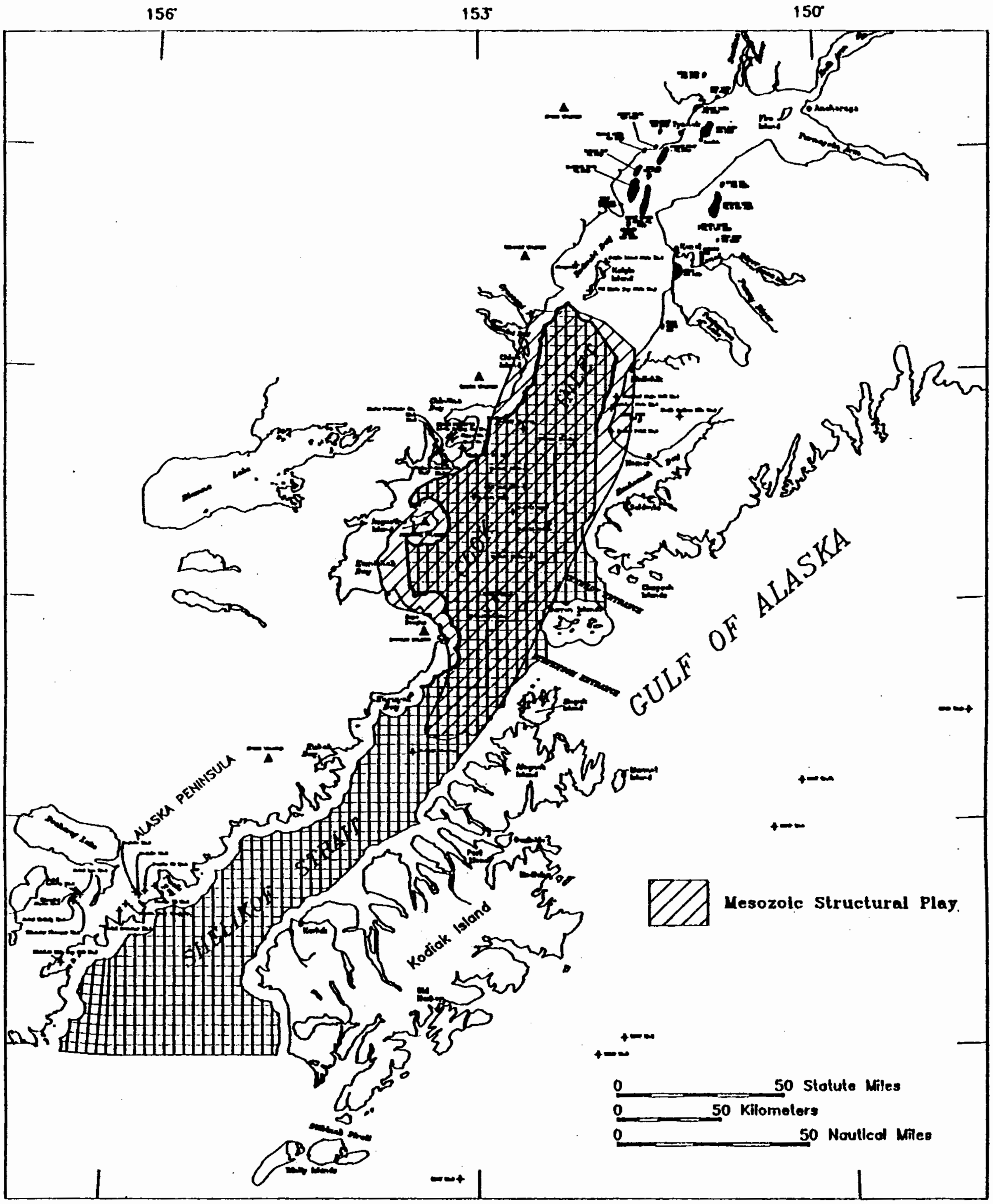


Figure A-6. Map Showing the Distribution of the Mesozoic Structural Play.

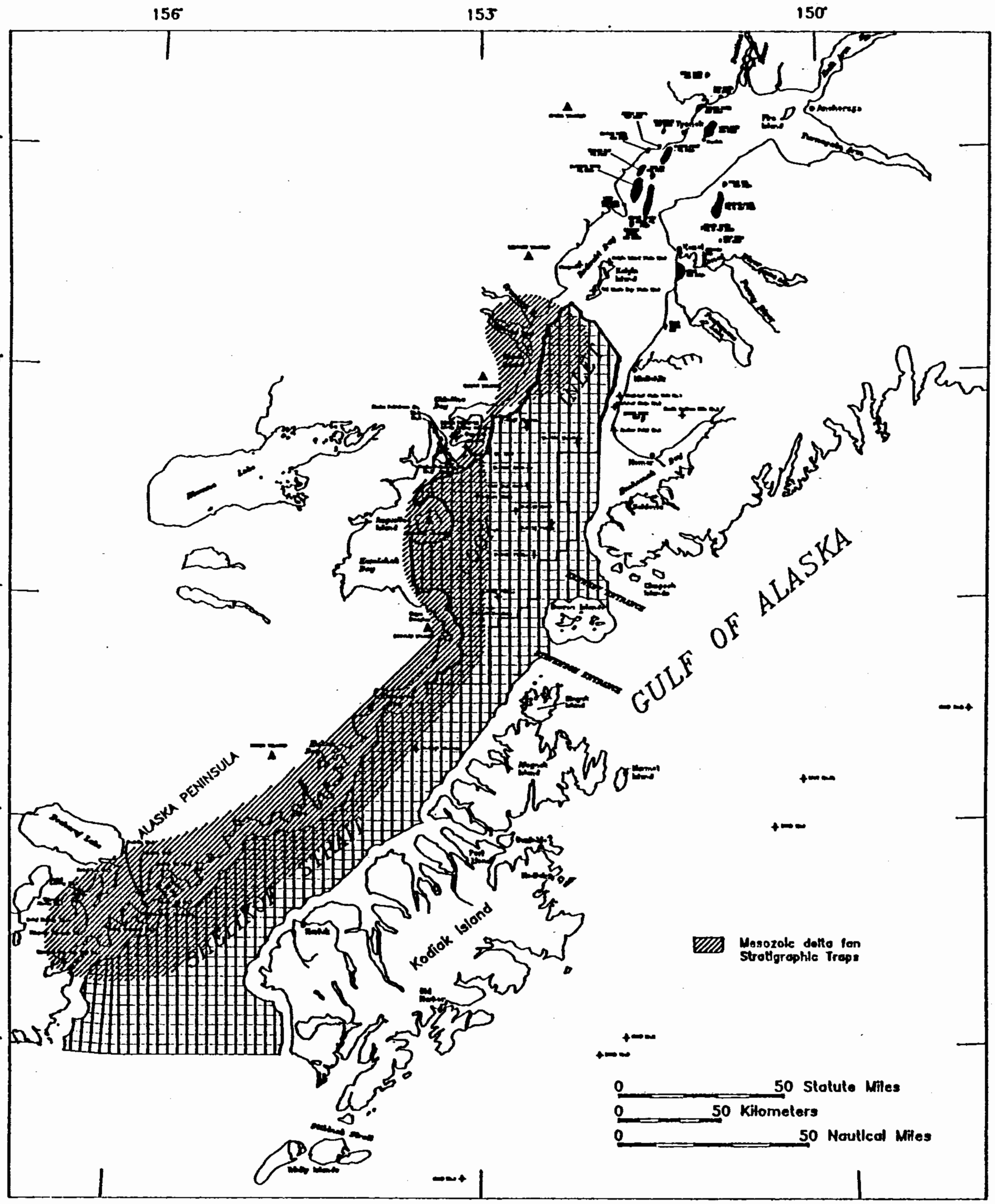


Figure A-7. Map Showing the Distribution of the Mesozoic Stratigraphic Play.

The Kaguyak Formation of Late Cretaceous age may have the best reservoir-rock potential in the Mesozoic section. This formation is 3,000 to 5,000 feet (900-1500 m) thick and contains mostly marine siltstones and fine-grained sandstones. However, coarse sandstone beds are exposed on the Alaska Peninsula in an ancient submarine fan complex. Fan-delta deposits with relatively porous and permeable sandstone beds also occur in the upper Kaguyak Formation in an isolated outcrop and in several of the offshore wells. Both submarine fan and fan-delta deposits may contain good reservoir beds in both stratigraphic and structural traps in the sale area. Petroleum source beds are probably present in Late Triassic carbonates and Middle Jurassic siltstones. Those beds are thermally mature for petroleum generation offshore. Possible migration routes include the numerous faults that penetrate the Mesozoic section.

The northern part of the sale area, north of the Augustine-Seldovia arch, contains a relatively thick Cenozoic section. That area probably has good reservoir beds in nonmarine Eocene and Oligocene sandstones and conglomerates, which are continuous with the producing strata of Upper Cook Inlet. Stratigraphic traps may be present but structural traps are probably rare. Migration of petroleum from underlying source beds may be a problem, however, because the intervening Cretaceous strata may pose a barrier except where those beds are penetrated by faults.

Three petroleum-exploration plays are recognized in the sale area. The plays are as follows:

(1) The Tertiary Play: This play (Fig. A-5) is restricted to the northernmost part of the sale area, north of the Augustine-Seldovia arch, and involves mostly stratigraphic traps. Potential source rocks are carbonates in the Upper Triassic and siltstones in the Middle Jurassic Tuxedni Group. The Hemlock and Tyonek Formations of Eocene and Oligocene age are the primary reservoir targets.

(2) The Mesozoic Structural Play: This play (Fig. A-6) covers most of the sale area and involves anticlines and fault traps. Many of the mapped anticlines were tested unsuccessfully in previous exploratory drilling. Potential source rocks may be carbonates in the Upper Triassic or siltstones in the Middle Jurassic Tuxedni Group. The best reservoir rocks are probably sandstones in the Lower Cretaceous Herendeen Formation or the Upper Cretaceous Kaguyak Formation.

(3) The Mesozoic Stratigraphic Play: This play (Fig. A-7) is probably best developed in the central and southern parts of the sale area. This play involves stratigraphic traps in turbidite sandstones within marine siltstone sections. The turbidites may have developed in submarine fan complexes in the Upper Cretaceous Kaguyak Formation. Potential source rocks may be carbonates in the Upper Triassic or siltstones in the Middle Jurassic Tuxedni Group.

OIL AND GAS RESOURCE ESTIMATES

Before possible impacts can be analyzed, the undiscovered oil and natural gas likely to be developed and produced as a result of a lease sale must be assessed. Minerals Management Service (MMS) estimates two types of undiscovered resources prior to the sale. First, the geologic oil and gas endowment, irrespective of economics, is assessed. Second, an economics program is used to determine the portion of the endowment that would be economically recoverable at various prices. The impact assessment is based on a range of economically recoverable oil and gas resources.

To estimate the endowment, a computer program is used to assess resources for geologic plays, without economic constraints being applied. A geologic play is a group of geologically related prospects with a similar hydrocarbon source, reservoir, and trapping mechanism. Geologic prospects are untested geologic features having the potential for trapping and accumulating oil and gas.

The technique of geologic play assessment allows specific information about the geology of an area to be converted to estimates of the number and sizes of possible resource accumulations. For Cook Inlet, the geologically recoverable resources for the entire basin were assessed. Then, the portion of the potential resource in the sale area was estimated. Ignoring economics, the ultimate potential for the base case in the sale area is estimated to be 500 MMbbl. The high side potential is estimated to be 1.2 billion barrels. The geologic plays extend beyond the sale area, so the resource potential for the entire basin is greater.

To determine the economic viability of the plays, economically recoverable resources were estimated at various fixed prices. Numerous runs of an economic computer model were made to develop economically recoverable resources at various price levels. These results are summarized on the price-supply curve, shown as (Fig. A-8). The graph relates volumes of resources on the horizontal axis to prices on the vertical axis.

Each of the computer runs of the economics model had different marginal probabilities for the existence of economically recoverable resources, because of differing price assumptions. To display the results on a single figure, the results were all adjusted based on the condition of geologic favorability (i.e., the chance of hydrocarbon resources existing in the area without regards to economics). The chance of geologic favorability is 90 percent for the planning area. The adjusted results were used to construct the price supply curves shown on (Fig.A-8).

The figure displays two possible price-supply curves. One curve is a mean or average curve, while the other shows a high side potential. The ultimate recoverable endowment is represented by two vertical bars, one for the mean case and one for the high case. As prices increase, the curves show corresponding increases in the resource amounts, gradually approaching the ultimate amount (vertical bar) at the highest prices.

Considerable uncertainty exists with respect to the volumes of undiscovered resources. Geologic information becomes available through drilling, eventually reducing uncertainty and risk. To factor this uncertainty into the analysis, the resource estimates are presented as ranges of possible values, over a range of likely prices.

The ranges for the base case and the high case are displayed on the price-supply curves as boxes. The box concept illustrates in a graphical manner the uncertainty associated with the results. Changes in the results can be attributed to numerous variables, such as price, geologic factors, and industry interest. For example, a change in industry interest or additional geologic information could cause a shift in the position of the box, both vertically and horizontally. The range of resources encompassed by the "box concept" does include industry interest as one of the variables considered and incorporated.

The results of the economic runs were analyzed to select the ranges for the base and high cases. The base case is estimated to range from 100 to 300 MMbbl, corresponding to a range of oil prices from $16/bbl to $22/bbl. The high case is estimated to range from 550 to 1100 MMbbl, corresponding to a range of oil prices from $18/bbl to $30/bbl. These cases represent resources estimated to be leased, explored, developed, and produced as a result of the sale.

The low case is not displayed on the price supply curve. Prices for a low case scenario are estimated to range from $12/bbl to $16/bbl, with a corresponding range of resource values up to 24 MMbbl. Industry would not be expected to develop such low volumes. Therefore, the low case is defined as an exploration only case, where only exploratory drilling would occur, without any economic discoveries or development activities.

EXPLORATION AND DEVELOPMENT SCENARIOS

Activity Schedules

Five Exploration and Development (E&D) schedules for the sale area proposal are attached (Tables A-1 through A-5). The first three schedules show ranged parameters for the low case, base case, and high case. The low case indicates exploration-only for a range in oil price between $12 and $16 per barrel. Oil discoveries for the low case could range up to 24 MMbbl; however, the economic analysis indicates that resources of this size cannot be produced at a profit, therefore, no oil production infrastructure is expected. The base-case scenario for oil prices of $16 to $22 per barrel provides infrastructure estimates for oil production ranging from 100 to 300 MMbbl. The high-case scenario for oil prices of $18 to $30 per barrel provides infrastructure estimates for oil production of 550 to 1,100 MMbbl from the Sale 149 area. For

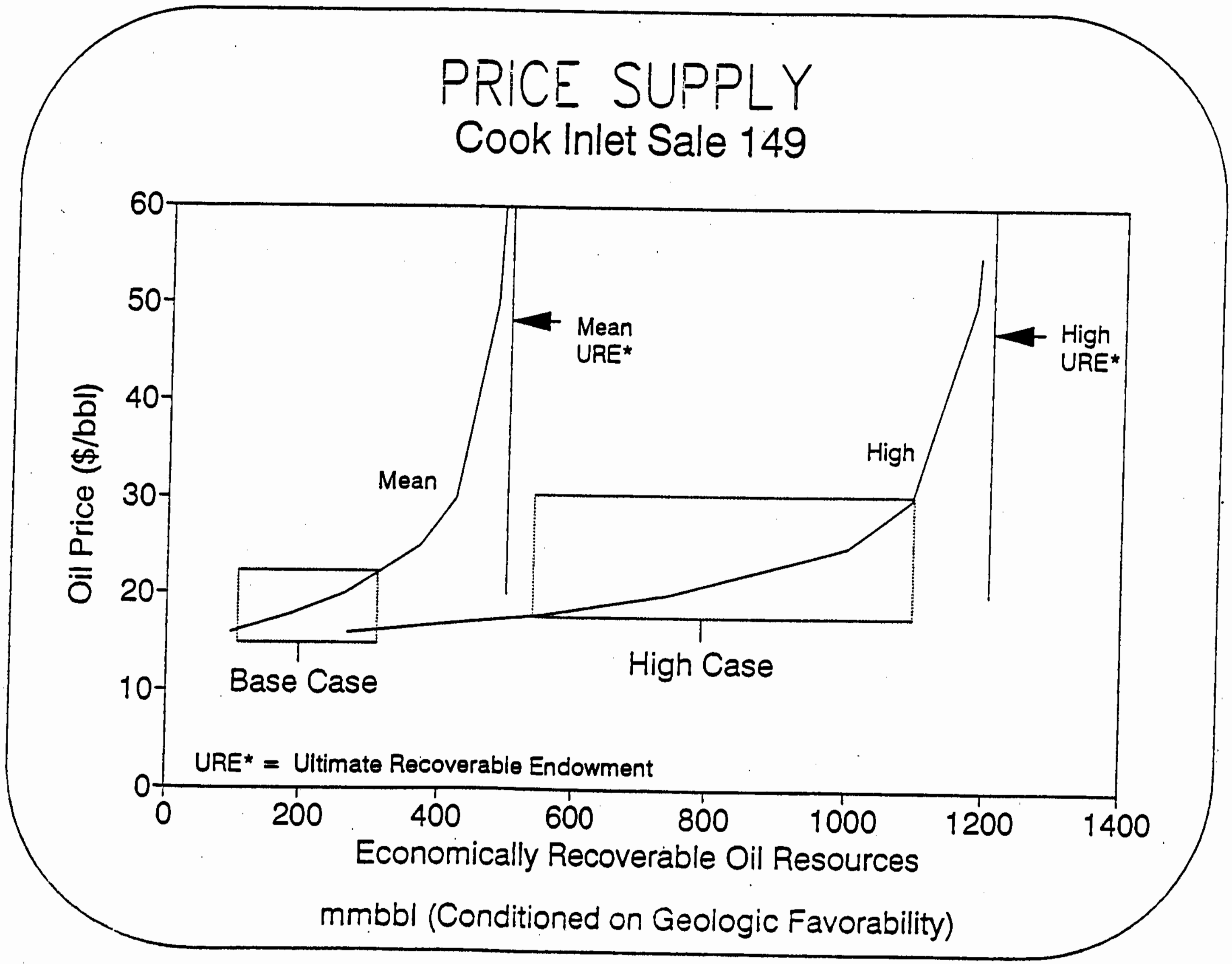


Figure A-8. Price-Supply Curves for Economically Recoverable Resources.

Table A-1
Exploration and Development Schedule
Cook Inlet Sale 149, Exploration-only Case for the Sale Area Proposal

Sale Year	Exploration Wells	Delineation Oil Wells		Explor/Delin Rigs	Production Platforms		Prod/Service Wells		Production Rigs	Number of Shorebases	Production		Pipeline Miles	
		Oil	Gas		Oil	Gas	Oil	Gas			Oil MMbbl	Gas Bcf	Oil	Gas
1996														
1997	1			1						1.0				
1998	2			1										
1999														
2000														
2001														
2002														
2003														
2004														
2005														
2006														
2007														
2008														
2009														
2010														
2011														
2012														
2013														
2014														
2015														
2016														
2017														
2018														
2019														
2020														
2021														
2022														
2023														
2024														
2025														
Totals	3	0	0	1[1]	0	0	0	0	0	1.0	0	0	0	0

[1]Maximum exploration/delineation or production drilling rigs operating in any single year.
[2]Any discoveries are expected to be below the minimum economic resources required for development.

Table A-2
Exploration and Development Schedule
Cook Inlet Sale 149, Ranged Base Case for the Sale Area Proposal

	Exploration Wells		Delineation Wells		Exploration/ Delineation Rigs		Production Platforms		Production/ Service Wells		Production Rigs		Number of Shorebases		Production MMbbl		Pipeline Miles	
Year	$16	$22	$16	$22	$16	$22	$16	$22	$16	$22	$16	$22	$16	$22	$16	$22	$16	$22
1996																		
1997	1	2	2	4	1	1							0.1	0.1				
1998		3	1	4	1	1												
1999							1	1					0.3	0.3				
2000							1	2	10	20	1	2	0.4	0.4				
2001								2	14	40	2	4	0.2	0.2			75	75
2002										24		3			7			75
2003															8	19		
2004															8	25		
2005															8	25		
2006															8	25		
2007															8	25		
2008															7	25		
2009															7	22		
2010															6	19		
2011															5	17		
2012															5	15		
2013															4	14		
2014															4	12		
2015															3	11		
2016															3	10		
2017															3	9		
2018															2	8		
2019															2	7		
2020															2	6		
2021																6		
2022																		
2023																		
2024																		
2025																		
Totals	1	5	3	8	1[1]	1[1]	2	5	24	84	2[1]	4[1]	1.0	1.0	100	300	75	150

[1]Maximum exploration/delineation or production drilling rigs operating in any single year.

Table A-3
Exploration and Development Schedule
Cook Inlet Sale 149, Ranged High Case for the Sale Area Proposal

Year	Exploration Wells		Delineation Wells		Exploration/ Delineation Rigs		Production Platforms		Production/ Service Wells		Production Rigs		Number of Shorebases		Production MMbbl		Pipeline Miles	
	$18	$30	$18	$30	$18	$30	$18	$30	$18	$30	$18	$30	$18	$30	$18	$30	$18	$30
1996																		
1997	3	6	4	6	1	2							0.1	0.1				
1998	3	7	4	9	1	2												
1999	2	7	4	9	1	2												
2000							2	2	10	10	1	1	0.3	0.3				
2001							3	3	60	60	6	6	0.4	0.4			100	100
2002							3	4	40	70	4	7	0.2	0.2			50	100
2003								4	12	70	1	7			35	70		
2004								4		70		7			46	92		
2005								3		60		6			46	92		
2006										20		2			46	92		
2007															46	92		
2008															46	92		
2009															41	81		
2010															35	70		
2011															31	63		
2012															28	56		
2013															25	50		
2014															22	44		
2015															20	40		
2016															18	36		
2017															16	32		
2018															14	29		
2019															13	25		
2020															12	23		
2021															10	21		
2022																		
2023																		
2024																		
2025																		
Totals	8	20	12	24	1[1]	2[1]	8	20	122	360	6[1]	7[1]	1.0	1.0	550	1,100	150	200

[1]Maximum exploration/delineation or production drilling rigs operating in any single year.

Table A-4
Exploration and Development Schedule
Cook Inlet Sale 149, Base[1] Case for the Sale Area Proposal

Sale Year	Exploration Wells	Delineation Oil Wells	Explor/Delin Rigs	Production Platforms	Prod/Service Wells	Production Rigs	Number of Shorebases	Production MMbbl	Pipeline Miles
1996									
1997	2	2	1				0.1		
1998	1	3	1						
1999				1			0.3		
2000				1	10	1	0.4		
2001				1	20	3	0.2		
2002					18	2			125
2003								12	
2004								17	
2005								17	
2006								17	
2007								17	
2008								17	
2009								14	
2010								13	
2011								12	
2012								10	
2013								9	
2014								8	
2015								7	
2016								6	
2017								6	
2018								5	
2019								5	
2020								4	
2021								4	
2022									
2023									
2024									
2025									
Totals	3	5	1[2]	3	48	3[2]	1.0	200	125

[1]For puposes of analysis, the Base Case is represented by the mid-point of the estimated resource range of 100-300 MMbls.
[2]Maximum exploration/delineation or production rigs operating in any single year.

Table A-5
Exploration and Development Schedule
Cook Inlet Sale 149, High[1] Case for the Sale Area Proposal

Sale Year	Exploration Wells	Delineation Oil Wells	Explor/Delin Rigs	Production Platforms	Prod/Service Wells	Production Rigs	Number of Shorebases	Production MMbbl	Pipeline Miles
1996									
1997	4	6	2				0.1		
1998	5	8	2						
1999	2	3	1						
2000				2	10	1	0.3		
2001				3	60	6	0.4		75
2002				3	60	6	0.2		75
2003				3	40	4		50	
2004					28	3		67	
2005								67	
2006								67	
2007								67	
2008								67	
2009								59	
2010								52	
2011								46	
2012								41	
2013								36	
2014								32	
2015								29	
2016								26	
2017								23	
2018								21	
2019								18	
2020								17	
2021								15	
2022									
2023									
2024									
2025									
Totals	11	17	2[2]	11	198	6[2]	1.0	800	150

[1]For purposes of analysis, the High Case is represented by the mid-point of the estimated resource range of 550-1,100 MMbbls.
[2]Maximum exploration/delineation or production drilling rigs operating in any single year.

purposes of environmental analysis, a midpoint in these resource ranges can be used to provide a generalized model of future exploration, development, and production activities. The infrastructure models for the generalized, midpoint base case and high case are given in Table A-4 and Table A-5. There is no change for the generalized low case from Table A-1.

The exploration and development activity schedules assume no litigation or regulatory delays. Exploration drilling is assumed to begin in the first year following Sale 149. Delineation wells on oil discoveries are assumed to be drilled by the same exploration rig immediately after the discovery well. We have assumed an aggressive development schedule, where discoveries that are made in years 1 and 2 following the sale year are developed from production platforms installed in years 3 to 5. The construction of a pipeline system between the offshore production platforms and the onshore facilities in Nikiski will take 1 to 2 years and must be completed before production can begin. If this schedule can be maintained, it will take approximately 7 years from Sale 149 for production to commence on the first platform installed, with peak production occurring in years 8 through 12. The production stream will last approximately 19 years from the developed fields.

Operations

The most likely exploration rig will be a heavy duty semisubmersible or a jack-up rig. The most likely support base for exploration would be the Kenai, although alternate support bases may be chosen from other Kenai Peninsula locations.

The technology used for field development is determined, in part, by environmental conditions, the thickness and continuity of reservoirs, and recoverable oil reserves in the discovered field(s). The most likely development method for the oil resources discovered within the sale proposal is through the use of steel production platforms. Typically, service wells on these platforms will utilize up to one quarter of the total well slots. Concrete gravity-based or floating production platforms similar to those operating in the North Sea would also be feasible for Cook Inlet. Depending on reservoir characteristics, site conditions, and geographic location, floating production systems coupled to subsea well templates may provide the best development alternative.

The most feasible way to transport the oil from any discoveries in the sale proposal would be to install approximately 125 miles of offshore pipeline, including gathering lines, from the field(s) to existing production facilities in the Nikiski area. The offshore pipeline system would not have to be buried because it will not hinder water circulation, will not create any navigational hazards, and will not be susceptible to sea ice damage. However, design considerations should allow for the strong tidal currents present in the Cook Inlet. From Nikiski, the oil will be utilized locally or transported by tankers to the West Coast. Because the Nikiski refinery receives about sixty tankers of Alaska North Slope (ANS) crude oil from Valdez annually, a Cook Inlet discovery that supplies the Nikiski refinery would help decrease ANS oil tanker traffic from Valdez. Since the ANS crude also contains a significant volume of residual product, a Cook Inlet discovery may help decrease shipments of residual product from Nikiski to Asian markets.

Natural gas is determined to be uneconomic in this offshore area for the foreseeable future. The costs of platforms, wells, pipelines, a liquefaction plant, LNG tankers, and regasification facilities are much higher than the projected return based on current price forecasts for natural gas. The local demand in Alaska is not great enough to accept the additional supply of relatively high cost natural gas from offshore areas, and the market price for gas is not projected to rise sufficiently during the sale scenario to change this conclusion. Any associated gas produced with the oil will be used to fuel production equipment or will be reinjected for reservoir pressure maintenance.

Estimates of Muds and Cuttings for the Base Case

Based on the assessment of geologic plays in the Cook Inlet, exploration and delineation wells will average about 6,000 feet true vertical depth. Assuming discoveries at this depth, development wells will average about 7,500 feet drilled depth. Consequently, the average exploration or delineation well will use about 360 short tons of dry mud and produce approximately 440 short tons of dry rock cuttings. The average development well will use approximately 80 to 370 short tons of dry mud and produce about 560 short tons of dry rock cuttings.

The mud discharged to the marine environment will have this typical composition:

Component	Weight %
Barite	63.0
Clay	24.0
Lignosulfonate	2.0
Lignite	1.5
Sodium Hydroxide	1.5
Other	8.0
Total	100.0

Source: Petrazzuolo, 1983.

Change in Levels of Activity from the Base Case to the Deferral Alternatives

Three deferrals are under consideration as sale alternatives for Sale 149. These are the Wildlife Concentration, the Fisheries (Modified), and the Pollock Spawning deferral. All of the deferrals will, to some extent, reduce the exploration opportunities and lower the economically recoverable resource potential of Sale 149. (Also, see the Addendum to Appendix A for information on two deferral alternatives that were analyzed in the final EIS but not in the Draft EIS; the addendum is located on the last page of thie appendix.) Recognizing that the distribution of oil pools is probably not uniform over the sale proposal area and that there is no way to accurately predict the location of economic-sized pools prior to exploratory drilling, a generalized method to derive the potential resources affected by the deferral alternatives must be employed. Using the judgement of geologists evaluating the Cook Inlet province for the current National Assessment, we have estimated the resources affected by the deferral alternatives as fractional proportions of the base case resources.

The estimated portions of economically recoverable resources located in the Wildlife Concentration area, Fisheries (Modified) area, and Pollock Spawing area are 20 percent, 30 percent, and 25 percent, respectively. Subtracting these resource proportions from the base case volume of 200 MMbbls used for purposes of general analysis leaves a potential resource volume of 160 MMbbls in Sale 149 for the Wildlife Concentration alternative, 140 MMbbls for the Fisheries (Modified) alternative, and 150 MMbbls for the Pollock Spawning alternative.. The modifications to the E&D activities should these deferral alternatives be adopted are listed in Table A-6.

Table A-6
Changes in Levels of Activity from the Base Case to the Deferral Alternatives, Cook Inlet, Sale 149

Alternative	Exploration Wells	Delineation Wells	Exploration Rigs	Production Platforms	Prod/Service Wells	Production Rigs	Production Startup	Peak Production (Mmbbl)	Pipeline Miles
I - Base Case	3	5	1	3	48	3	Year 7	17	125
IV - Wildlife Concentration	3	4	1	3	41	3	Year 7	14	120
V - Coastal Fisheries	2	3	1	2	29	2	Year 7	12	100
VI - Pollock-Spawning Area	3	4	1	3	40	3	Year 7	13	95
VII - General Fisheries[1]	2	-	1	-	-	-	-	-	-
VIII - Northern	2	3	1	2	29	2	Year 7	12	125
IX - Kennedy Entrance	3	5	1	3	48	3	Year 7	17	125

1. Exploration only scenario.

Addendum to Appendix A

Change in Levels of Activity from the Base Case for the Deferral Alternatives.

Two additional deferral alternatives were added to the previous four deferral alternatives after public review and comment on the Sale 149 Draft EIS; these new deferral alternatives are the Northern Deferral Alternative (Alternative VIII) and the Kennedy Entrance Deferral Alternative (Alternative IX).

Recognizing that the distribution of oil pools probably is not uniform over the entire Sale 149 area and that there is no accurate way to predict the location of economic-sized fields prior to exploratory drilling, a generalized method was used to determine resources possibly affected by removal of those blocks in the Northern Deferral Alternative from Sale 149.

Based on the judgement of the MMS geologists most familiar with the petroleum potential of the Cook Inlet region, it is estimated that approximately 30 percent of the economically recoverable resources may be located in the Northern Deferral Alternative. Subtracting these resources from the base-case volume of 200 MMbbl leaves a potential resource volume of 140 MMbbl. The estimated exploration and development and production activities associated with the remaining Sale 149 area are indicated in Table A-6.

For the Kennedy Entrance Deferral Alternative, the deferred area—17 blocks—represents about 5 percent of the Sale 149 area. Because of the uncertainties associated with predicting economic-sized fields, as noted above, and the relatively small size of the deferred areas, it is assumed the resource estimate for the Kennedy Entrance Deferral Alternative is the same as for the base case—200 MMbbl. Also, the estimated exploration and development and production activities for this deferral alternative would be the same as those estimated for the base case (Table A-6).

APPENDIX B

Oil-Spill-Risk Analysis

List of Oil-Spill-Risk Analysis Tables and Figures that Follow

Table B-1

Estimated Mean Spill Number and Probabilities of One or More Spills ≥1,000 Bbl Resulting over the Assumed Production Life of Proposed Cook Inlet Sale 149

Source	Reserve Volume Produced (Bbbl)	Resource Volume Produced (Bbbl)	Platform Spill Rate	Pipeline Spill Rate	Tanker Spill Rate (Sale Area)	Estimated Mean Number of Platform Spills	Estimated Mean Number of Pipeline Spills	Estimated Mean Number of Tanker Spills	Estimated Mean Number of Spills Total	Probability of One or More Platform Spills	Probability of One or More Pipeline Spills	Probability of One or More Tanker Spills	Probability of One or More Spills Total
Altenative I and IX													
Low Case[1]		0.04											
Base Case and Kennedy Entrance Deferral		0.20	0.6	0.67	0.45	0.12	0.13	0.06	0.31	11	12	6	27
High Case		0.80	0.6	0.67	0.45	0.48	0.54	0.24	1.26	38	42	21	72
Alternative IV													
Wildlife Concentration Deferral		0.16	0.6	0.67	0.45	0.10	0.11	0.05	0.26	10	10	5	23
Alternative V and VIII													
Coastal Fisheries and Northern Deferral		0.14	0.6	0.67	0.45	0.08	0.09	0.04	0.21	8	9	4	19
Alternative VI													
Pollock Fisheries Deferral		0.15	0.6	0.67	0.45	0.09	0.10	0.04	0.23	9	10	4	21
Cummulative Case													
Federal Production		0.20	0.6	0.67	0.45	0.12	0.13	0.06	0.31	11	12	6	27
State Production[2]													
Middle Ground Shoal	0.021												
McArthur River	0.057												
West McArthur River	0.1												
Trading Bay	0.01												
Sunfish[3]	0.077												
Granite Point	0.016												
Beaver Creek	0.001												
Swanson River	0.016												
State Total	0.298		0.6	0.67	0.45	0.18	0.20	0.09	0.47	16	18	9	37
Tankering													
Valdez to Nikiski[4]	0.494												
Foreign Import[5]	0.006												
Tanker Total[6]	0.50		--	--	0.45			0.23	0.23			21	21
Cumulative-Case Total	0.80	0.20	0.6	0.67	0.45	0.30	0.33	0.38	1.01	26	28	31	64

Source: USDOI, MMS, Technical Analysis Group (1994), and USDOI, MMS, Alaska OCS Region (1994)

1 The low case is an exploration-only scenario; spills are assumed not to occur. The base case is based on the estimated resources likely to be leased, discovered, and produced as a result of the Cook Inlet Lease Sale 149 and assumes the existence of economically recoverable hydrocabons in the Sale 149 area. The high case is based on similar estimated resources that are not significantly higher than the base case.

2 State production figures were estimated from State of Alaska, Dept. of Natural Resources (1992)

3 Anchorage Daily News (1994)

4 Valdez to Nikiski Alaska North Slope Crude Loadings (USDOT, Office of Maritime Administration, 1991)

5 Letter from Tesoro Alaska Petroleum Company (December 1992)

6 Pipeline and platform spills are not considered for Alaska North Slope Crude tankered from Valdez and foreign import crude tankered from abroad.

Table B-2. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Environmental Resource Area Within 3 days, Cook Inlet OCS Lease Sale 149

Environmental Resource Area	Hypothetical Spill Site P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
Land	49	40	23	30	37	68	44	19	27	13	1	n	n
Env. Resource 1	65	22	1	n	n	26	32	n	n	n	n	n	n
Env. Resource 2	7	16	1	n	n	n	8	n	n	n	n	n	n
Env. Resource 3	2	7	37	1	n	n	38	60	10	1	n	n	n
Env. Resource 4	1	13	31	47	1	n	2	20	8	n	n	n	n
Env. Resource 5	n	2	8	18	n	n	n	5	1	n	n	n	n
Env. Resource 6	n	n	n	3	7	n	n	13	93	31	n	n	n
Env. Resource 7	n	n	1	20	55	n	n	5	10	n	n	n	n
Env. Resource 8	n	n	n	n	6	n	n	n	2	7	n	n	n
Env. Resource 9	n	n	n	n	19	n	n	n	n	n	n	n	n
Env. Resource 10	n	n	n	n	1	n	n	n	n	n	n	n	n
Env. Resource 11	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 12	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 13	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 14	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 15	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 16	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 17	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 18	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 19	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 20	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 21	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 22	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 23	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 24	n	n	n	n	n	n	n	n	n	1	2	n	n
Env. Resource 25	n	n	n	n	n	n	n	n	n	17	98	43	3
Env. Resource 26	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea Segment 1	n	n	n	n	n	23	n	n	n	n	n	n	n
Sea Segment 2	23	1	n	n	n	59	8	n	n	n	n	n	n
Sea Segment 3	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea Segment 4	n	n	n	n	n	n	n	n	n	n	n	n	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent

Table B-3. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Environmental Resource Area Within 10 days, Cook Inlet OCS Lease Sale 149

Environmental Resource Area	Hypothetical Spill Site P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
Land	92	86	80	80	81	97	90	79	75	50	20	8	2
Env. Resource 1	72	26	5	1	n	36	38	3	1	n	n	n	n
Env. Resource 2	12	22	4	n	n	2	17	2	1	n	n	n	n
Env. Resource 3	4	11	40	6	2	1	41	63	17	5	1	n	n
Env. Resource 4	6	29	55	57	3	1	11	44	24	7	1	n	n
Env. Resource 5	3	8	21	28	1	n	3	19	12	3	n	n	n
Env. Resource 6	n	1	4	7	14	n	1	17	95	47	10	1	n
Env. Resource 7	n	3	10	36	64	n	1	15	26	6	1	n	n
Env. Resource 8	n	n	1	3	12	n	n	2	7	19	5	1	n
Env. Resource 9	n	1	2	8	37	n	n	3	5	2	n	n	n
Env. Resource 10	n	n	n	2	6	n	n	n	1	n	n	n	n
Env. Resource 11	n	n	n	2	6	n	n	1	1	n	n	n	n
Env. Resource 12	n	n	n	1	5	n	n	n	n	n	n	n	n
Env. Resource 13	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 14	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 15	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 16	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 17	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 18	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 19	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 20	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 21	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 22	n	n	n	n	n	n	n	n	n	n	n	1	n
Env. Resource 23	n	n	n	n	n	n	n	n	1	3	5	8	4
Env. Resource 24	n	n	n	n	1	n	n	n	1	7	13	6	2
Env. Resource 25	n	n	n	n	n	n	n	n	1	27	98	61	19
Env. Resource 26	n	n	n	n	n	n	n	n	n	2	2	1	n
Sea Segment 1	1	n	n	n	n	23	n	n	n	n	n	n	n
Sea Segment 2	28	5	2	n	n	61	12	1	n	n	n	n	n
Sea Segment 3	n	n	n	n	3	n	n	n	n	n	n	n	n
Sea Segment 4	n	n	n	n	n	n	n	n	n	1	1	3	1

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent

Table B-4. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Environmental Resource Area within 30 days, Cook Inlet OCS Lease Sale 149

Environmental Resource Areas	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
Land	**	**	**	99	99	**	**	99	97	82	57	38	20
Env. Resource 1	73	26	6	2	n	37	38	4	1	n	n	n	n
Env. Resource 2	12	22	5	1	n	2	17	4	2	1	n	n	n
Env. Resource 3	4	11	40	7	3	1	41	63	19	7	1	n	n
Env. Resource 4	7	31	57	58	4	1	12	47	27	11	4	1	1
Env. Resource 5	4	10	24	29	1	n	3	20	13	5	1	n	n
Env. Resource 6	n	2	5	8	14	n	2	17	95	52	17	6	3
Env. Resource 7	1	4	12	39	65	n	3	17	30	9	4	1	1
Env. Resource 8	n	1	2	4	13	n	n	4	8	23	8	5	1
Env. Resource 9	1	1	5	11	40	n	1	6	9	4	2	n	n
Env. Resource 10	n	n	1	3	7	n	n	1	2	1	n	n	n
Env. Resource 11	n	n	1	4	9	n	n	2	2	1	1	n	n
Env. Resource 12	n	n	1	2	7	n	n	1	1	n	1	n	n
Env. Resource 13	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 14	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 15	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 16	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 17	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 18	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 19	n	n	n	n	n	n	n	n	n	n	1	1	1
Env. Resource 20	n	n	n	n	n	n	n	n	n	3	5	5	3
Env. Resource 21	n	n	n	n	n	n	n	n	n	1	n	1	n
Env. Resource 22	n	n	n	n	n	n	n	n	n	1	3	4	4
Env. Resource 23	n	n	n	n	n	n	n	n	2	9	16	24	20
Env. Resource 24	n	n	n	n	1	n	n	n	2	10	23	20	9
Env. Resource 25	n	n	n	n	n	n	n	n	2	32	98	67	27
Env. Resource 26	n	n	n	n	n	n	n	n	n	5	5	4	1
Sea Segment 1	1	n	n	n	n	23	n	n	n	n	n	n	n
Sea Segment 2	28	6	4	n	n	61	12	2	n	n	n	n	n
Sea Segment 3	n	n	1	2	5	n	n	n	n	n	n	n	n
Sea Segment 4	n	n	n	n	n	n	n	n	n	4	8	11	9

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent

Table B-5. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Winter Season Will Contact a Certain Environmental Resource Area within 3 days, Cook Inlet OCS Lease Sale 149

Environmental Resource Area	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
Land	62	61	45	53	59	80	60	41	48	34	5	n	n
Env. Resource 1	56	17	n	n	n	41	24	n	n	n	n	n	n
Env. Resource 2	19	22	2	n	n	1	19	1	n	n	n	n	n
Env. Resource 3	5	6	37	1	n	1	36	54	9	2	n	n	n
Env. Resource 4	10	31	47	34	n	1	17	36	12	1	n	n	n
Env. Resource 5	2	8	19	15	n	n	3	14	3	n	n	n	n
Env. Resource 6	n	1	2	5	6	n	1	11	93	41	3	n	n
Env. Resource 7	n	2	10	44	61	n	n	17	23	1	n	n	n
Env. Resource 8	n	n	1	3	6	n	n	n	4	14	1	n	n
Env. Resource 9	n	n	1	9	39	n	n	1	4	n	n	n	n
Env. Resource 10	n	n	n	2	6	n	n	n	n	n	n	n	n
Env. Resource 11	n	n	n	n	2	n	n	n	n	n	n	n	n
Env. Resource 12	n	n	n	n	2	n	n	n	n	n	n	n	n
Env. Resource 13	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 14	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 15	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 16	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 17	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 18	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 19	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 20	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 21	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 22	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 23	n	n	n	n	n	n	n	n	n	2	2	3	n
Env. Resource 24	n	n	n	n	n	n	n	n	2	8	8	n	n
Env. Resource 25	n	n	n	n	n	n	n	n	n	15	97	54	8
Env. Resource 26	n	n	n	n	n	n	n	n	n	1	n	n	n
Sea Segment 1	n	n	n	n	n	22	n	n	n	n	n	n	n
Sea Segment 2	8	n	n	n	n	54	3	n	n	n	n	n	n
Sea Segment 3	n	n	n	n	1	n	n	n	n	n	n	n	n
Sea Segment 4	n	n	n	n	n	n	n	n	n	n	n	n	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent

Table B-6. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site the During Winter Season Will Contact a Certain Environmental Resource Area within 10 days, Cook Inlet OCS Lease Sale 149

Environmental Resource Area	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
Land	96	96	94	94	94	99	97	95	92	76	48	29	12
Env. Resource 1	57	18	2	n	n	45	25	2	1	n	n	n	n
Env. Resource 2	21	23	5	n	n	3	22	4	1	n	n	n	n
Env. Resource 3	7	9	38	3	1	2	37	56	12	5	1	n	n
Env. Resource 4	20	39	57	38	1	5	26	47	18	6	3	n	n
Env. Resource 5	9	13	27	18	1	2	10	23	9	2	1	n	n
Env. Resource 6	1	2	4	9	7	1	2	13	94	49	13	5	1
Env. Resource 7	5	8	19	50	64	n	5	26	34	8	3	1	n
Env. Resource 8	1	2	3	5	7	1	1	3	7	19	8	3	1
Env. Resource 9	3	3	6	15	45	n	2	8	12	4	2	n	n
Env. Resource 10	1	2	3	5	9	n	1	3	3	1	n	n	n
Env. Resource 11	n	1	1	4	8	n	n	1	1	2	n	n	n
Env. Resource 12	1	1	2	5	11	n	n	2	3	1	n	n	n
Env. Resource 13	n	n	n	n	2	n	n	n	n	n	n	n	n
Env. Resource 14	n	n	n	1	2	n	n	n	n	n	n	n	n
Env. Resource 15	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 16	n	n	n	1	2	n	n	n	n	n	n	n	n
Env. Resource 17	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 18	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 19	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 20	n	n	n	n	n	n	n	n	1	1	3	3	2
Env. Resource 21	n	n	n	n	n	n	n	n	n	n	n	1	n
Env. Resource 22	n	n	n	n	n	n	n	n	n	1	3	5	3
Env. Resource 23	n	n	n	n	n	n	n	n	2	9	17	19	17
Env. Resource 24	n	n	n	1	n	n	n	n	2	14	24	16	8
Env. Resource 25	n	n	n	n	n	n	n	n	1	19	97	64	28
Env. Resource 26	n	n	n	n	n	n	n	n	n	2	4	1	1
Sea Segment 1	n	n	n	n	n	23	n	n	n	n	n	n	n
Sea Segment 2	8	1	n	n	n	55	4	n	n	n	n	n	n
Sea Segment 3	n	1	2	6	12	n	1	2	2	1	n	n	n
Sea Segment 4	n	n	n	n	n	n	n	n	n	3	8	12	6

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent

Table B-7. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Winter Season Will Contact a Certain Environmental Resource Area within 30 days, Cook Inlet OCS Lease Sale 149

Environmental Resource Area	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
Land	**	**	**	99	98	**	**	**	98	88	73	60	44
Env. Resource 1	57	18	2	1	n	45	25	2	1	n	n	n	n
Env. Resource 2	22	23	5	n	n	3	22	4	1	n	n	n	n
Env. Resource 3	7	9	39	3	1	2	37	56	12	6	1	1	n
Env. Resource 4	20	40	58	38	2	5	27	48	19	7	3	1	n
Env. Resource 5	10	13	28	19	1	2	10	24	10	3	2	n	n
Env. Resource 6	2	3	4	9	7	1	2	13	94	50	16	8	4
Env. Resource 7	6	9	20	51	65	1	6	26	34	9	4	2	1
Env. Resource 8	1	2	3	6	7	1	1	3	7	20	10	5	2
Env. Resource 9	3	3	7	16	45	n	3	8	13	5	2	1	n
Env. Resource 10	2	2	3	5	9	n	1	3	4	2	n	n	n
Env. Resource 11	1	1	2	4	8	n	n	1	1	2	n	1	n
Env. Resource 12	1	1	3	6	11	n	1	2	3	2	1	n	n
Env. Resource 13	n	n	n	n	2	n	n	n	n	n	n	n	n
Env. Resource 14	n	n	1	1	2	n	n	n	n	n	n	n	1
Env. Resource 15	n	n	n	n	n	n	n	n	n	n	n	n	n
Env. Resource 16	n	n	n	1	2	n	n	n	n	n	n	1	1
Env. Resource 17	n	n	n	n	n	n	n	n	1	1	1	1	1
Env. Resource 18	n	n	n	n	1	n	n	n	n	n	1	n	1
Env. Resource 19	n	n	n	n	n	n	n	n	n	n	1	2	3
Env. Resource 20	n	n	n	n	n	n	n	n	1	3	8	11	10
Env. Resource 21	n	n	n	n	n	n	n	n	n	n	1	1	1
Env. Resource 22	n	n	n	n	n	n	n	n	n	2	6	9	8
Env. Resource 23	n	n	n	n	n	n	n	n	2	12	23	27	26
Env. Resource 24	n	n	n	1	n	n	n	n	2	16	29	21	13
Env. Resource 25	n	n	n	n	n	n	n	n	2	20	97	67	32
Env. Resource 26	n	n	n	n	n	n	n	n	n	3	6	4	3
Sea Segment 1	n	n	n	n	n	23	n	n	n	n	n	n	n
Sea Segment 2	8	1	n	n	n	55	4	n	n	n	n	n	n
Sea Segment 3	1	1	3	6	12	n	1	2	3	1	n	n	n
Sea Segment 4	n	n	n	n	n	n	n	n	n	5	14	18	13

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent

Table B-8. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Land Segment within 3 days, Cook Inlet OCS Lease Sale 149

Land Segment	Hypothetical Spill Site P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
18	n	n	n	n	3	n	n	n	n	n	n	n	n
19	n	n	n	n	4	n	n	n	n	n	n	n	n
20	n	n	n	n	4	n	n	n	n	n	n	n	n
21	n	n	n	n	10	n	n	n	1	n	n	n	n
22	n	n	n	12	10	n	n	3	5	n	n	n	n
23	n	n	2	9	n	n	n	1	n	n	n	n	n
24	n	n	1	2	n	n	n	n	n	n	n	n	n
26	n	1	n	n	n	n	n	n	n	n	n	n	n
27	n	3	8	4	n	n	1	3	n	n	n	n	n
28	n	1	1	n	n	n	1	n	n	n	n	n	n
29	2	8	3	1	n	n	2	1	n	n	n	n	n
30	4	13	1	n	n	n	7	n	n	n	n	n	n
31	13	8	n	n	n	2	7	n	n	n	n	n	n
32	15	1	n	n	n	8	5	n	n	n	n	n	n
33	4	n	n	n	n	7	2	n	n	n	n	n	n
35	2	n	n	n	n	21	1	n	n	n	n	n	n
36	n	n	n	n	n	1	n	n	n	n	n	n	n
37	n	n	n	n	n	2	n	n	n	n	n	n	n
38	n	n	n	n	n	5	n	n	n	n	n	n	n
39	n	n	n	n	n	6	n	n	n	n	n	n	n
40	2	n	n	n	n	10	n	n	n	n	n	n	n
41	2	n	n	n	n	3	1	n	n	n	n	n	n
42	4	1	n	n	n	1	9	n	n	n	n	n	n
43	1	n	1	n	n	n	4	2	n	n	n	n	n
44	n	1	3	n	n	n	3	3	n	n	n	n	n
45	n	n	2	n	n	n	n	3	n	n	n	n	n
46	n	n	n	n	n	n	n	n	5	n	n	n	n
47	n	n	n	1	2	n	n	n	4	n	n	n	n
48	n	n	n	n	n	n	n	n	9	6	n	n	n
49	n	n	n	n	n	n	n	n	1	1	n	n	n
74	n	n	n	n	1	n	n	n	n	n	n	n	n
75	n	n	n	n	1	n	n	n	n	2	n	n	n
76	n	n	n	n	n	n	n	n	n	2	n	n	n
79	n	n	n	n	n	n	n	n	n	n	1	n	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent, all land segments with all values less then 0.5 percent are not shown

Table B-9. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Land Segment within 10 days, Cook Inlet OCS Lease Sale 149

Land Segment	Hypothetical Spill Site P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
15	n	n	n	n	1	n	n	n	n	n	n	n	n
16	n	n	n	n	1	n	n	n	n	n	n	n	n
17	n	n	n	n	2	n	n	n	n	n	n	n	n
18	n	n	n	2	9	n	n	1	1	n	n	n	n
19	n	n	1	3	12	n	n	1	2	1	n	n	n
20	n	n	1	2	9	n	n	1	1	n	n	n	n
21	n	n	1	3	12	n	n	1	3	1	n	n	n
22	n	1	4	18	11	n	n	7	13	2	n	n	n
23	n	2	9	15	n	n	n	7	5	1	n	n	n
24	1	2	5	6	n	n	n	5	2	1	n	n	n
25	n	1	3	3	n	n	n	3	2	n	n	n	n
26	1	5	4	2	n	n	2	4	1	n	n	n	n
27	1	7	17	10	1	n	3	12	5	1	n	n	n
28	1	5	4	1	n	n	4	4	1	n	n	n	n
29	5	16	9	3	n	n	7	7	1	n	n	n	n
30	10	20	4	n	n	2	16	2	1	n	n	n	n
31	17	10	2	n	n	4	11	1	n	n	n	n	n
32	26	3	n	n	n	15	10	n	n	n	n	n	n
33	8	2	n	n	n	14	4	1	n	n	n	n	n
34	n	n	n	n	n	1	n	n	n	n	n	n	n
35	5	1	n	n	n	24	3	n	n	n	n	n	n
36	n	n	n	n	n	1	n	n	n	n	n	n	n
37	n	n	n	n	n	2	n	n	n	n	n	n	n
38	n	n	n	n	n	5	n	n	n	n	n	n	n
39	1	n	n	n	n	7	1	n	n	n	n	n	n
40	3	n	n	n	n	13	1	n	n	n	n	n	n
41	4	1	n	n	n	5	2	n	n	n	n	n	n
42	5	2	1	n	n	2	10	1	n	n	n	n	n
43	1	2	3	n	n	n	5	4	1	n	n	n	n
44	n	2	5	1	n	n	6	6	2	1	n	n	n
45	1	1	3	1	n	n	1	4	2	n	n	n	n
46	n	n	n	n	n	n	n	1	6	2	n	n	n
47	n	n	1	3	5	n	n	3	6	2	1	n	n
48	n	n	n	n	n	n	n	n	10	10	2	n	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent, all land segment with all values less then 0.5 percent are not shown

Table B-9. (Continued) Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Land Segment within 3 days, Cook Inlet OCS Lease Sale 149

Land Segment	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
49	n	n	n	n	n	n	n	n	1	3	1	n	n
50	n	n	n	n	n	n	n	n	n	2	1	n	n
51	n	n	n	n	n	n	n	n	n	1	1	1	n
69	n	n	n	n	1	n	n	n	n	n	n	n	n
70	n	n	n	n	1	n	n	n	n	n	n	n	n
71	n	n	n	1	1	n	n	n	n	n	n	n	n
72	n	n	n	n	2	n	n	n	n	n	n	n	n
73	n	n	1	n	2	n	n	n	1	n	n	n	n
74	n	n	n	1	4	n	n	n	1	n	n	n	n
75	n	n	n	1	3	n	n	n	2	7	1	n	n
76	n	n	n	n	1	n	n	n	1	6	2	1	n
77	n	n	n	n	n	n	n	n	1	3	4	1	n
78	n	n	n	n	n	n	n	n	n	1	2	1	n
79	n	n	n	n	n	n	n	n	n	2	3	2	n
82	n	n	n	n	n	n	n	n	n	n	n	1	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent. All land segment with all values less than 0.5 percent are not shown.

Table B-10. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Land Segment within 30 days, Cook Inlet OCS Lease Sale 149

Land Segment	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
10	n	n	n	n	1	n	n	n	n	n	n	n	n
11	n	n	n	n	1	n	n	n	n	n	n	n	n
13	n	n	n	n	1	n	n	n	n	n	n	n	n
14	n	n	n	n	1	n	n	n	n	n	n	n	n
15	n	n	n	1	3	n	n	1	1	n	n	n	n
16	n	n	n	1	2	n	n	1	n	n	n	n	n
17	n	n	n	1	4	n	n	n	n	n	n	n	n
18	n	1	1	3	10	n	n	1	1	1	n	n	n
19	n	n	2	4	14	n	n	2	4	2	n	n	n
20	n	n	1	2	9	n	1	1	3	1	1	n	n

Table B-10. (Continued)

Land Segment	Hypothetical Spill Site												
	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
21	n	n	1	4	12	n	n	1	4	1	1	n	n
22	1	2	4	19	12	n	1	9	13	3	1	1	n
23	1	2	9	16	n	n	1	7	5	1	1	n	n
24	1	3	7	7	n	n	1	6	2	1	n	n	n
25	1	2	3	3	n	n	1	3	3	1	n	n	n
26	1	6	5	3	n	n	2	5	1	n	n	n	n
27	1	8	19	11	1	n	4	13	7	3	1	n	n
28	2	6	5	1	n	n	5	5	1	1	n	n	n
29	6	18	10	4	n	n	8	9	2	2	1	n	n
30	10	20	4	1	n	2	17	3	2	1	n	n	n
31	18	10	2	1	n	4	12	2	n	n	n	n	n
32	26	4	1	n	n	16	10	n	n	n	n	n	n
33	9	2	1	n	n	14	4	1	n	n	n	n	n
34	n	n	n	n	n	1	n	n	n	n	n	n	n
35	5	2	1	n	n	25	3	n	n	n	n	n	n
36	n	n	n	n	n	1	n	n	n	n	n	n	n
37	n	n	n	n	n	2	n	n	n	n	n	n	n
38	n	n	n	n	n	5	n	n	n	n	n	n	n
39	1	n	n	n	n	7	1	n	n	n	n	n	n
40	4	1	1	n	n	13	2	n	n	n	n	n	n
41	4	1	n	n	n	5	2	n	n	n	n	n	n
42	5	2	1	n	n	2	10	1	n	n	n	n	n
43	1	2	3	1	n	n	5	5	1	n	n	n	n
44	1	2	5	2	1	n	6	7	3	1	n	n	n
45	1	2	3	1	n	n	1	5	3	1	n	n	n
46	n	n	n	n	1	n	n	1	7	3	1	n	n
47	n	1	2	3	5	n	1	3	8	3	1	n	n
48	n	n	n	n	n	n	n	n	10	11	4	1	1
49	n	n	n	n	n	n	n	n	1	4	4	1	n
50	n	n	n	n	n	n	n	n	n	2	2	n	n
51	n	n	n	n	n	n	n	n	n	4	2	1	n
52	n	n	n	n	n	n	n	n	n	1	1	n	n
53	n	n	n	n	n	n	n	n	n	n	1	n	n
69	n	n	n	n	1	n	n	n	n	n	n	n	n
70	n	n	n	n	1	n	n	n	n	n	n	n	n
71	n	n	n	1	1	n	n	n	n	n	n	n	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown.

Table B-10. (Continued) **Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Summer Season Will Contact a Certain Land Segment within 30 days, Cook Inlet OCS Lease Sale 149**

Land	Hypothetical Spill Site												
Segment	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
72	n	n	n	n	2	n	n	n	n	n	n	n	n
73	n	n	1	1	3	n	n	1	1	n	n	n	n
74	n	n	n	1	5	n	n	1	2	n	n	n	n
75	n	n	1	1	3	n	n	1	2	9	2	2	1
76	n	n	n	n	1	n	n	n	1	8	4	2	n
77	n	n	n	n	n	n	n	n	1	5	7	4	1
78	n	n	n	n	n	n	n	n	n	1	3	1	1
79	n	n	n	n	n	n	n	n	1	3	8	7	2
81	n	n	n	n	n	n	n	n	n	n	1	1	1
82	n	n	n	n	n	n	n	n	n	n	3	4	2
83	n	n	n	n	n	n	n	n	n	1	2	3	3
84	n	n	n	n	n	n	n	n	n	n	1	2	3
85	n	n	n	n	n	n	n	n	n	1	n	1	n
87	n	n	n	n	n	n	n	n	n	n	n	1	n
90	n	n	n	n	n	n	n	n	n	n	1	n	n

Note: *.* = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown.

Table B-11. **Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Winter Season Will Contact a Certain Land Segment within 3 days, Cook Inlet OCS Lease Sale 149**

Land	Hypothetical Spill Site												
Segment	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
18	n	n	n	2	11	n	n	n	1	n	n	n	n
19	n	n	n	2	11	n	n	n	1	n	n	n	n
20	n	n	n	1	7	n	n	n	1	n	n	n	n
21	n	n	n	4	13	n	n	1	4	n	n	n	n
22	n	1	6	20	4	n	n	9	9	n	n	n	n
23	n	2	10	12	n	n	n	7	1	n	n	n	n
24	n	1	3	3	n	n	n	1	n	n	n	n	n
25	n	1	1	n	n	n	n	n	n	n	n	n	n
26	1	4	n	n	n	n	2	1	n	n	n	n	n

Table B-11. (Continued)

Land	Hypothetical Spill Site												
Segment	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
27	2	10	9	3	n	n	4	7	1	n	n	n	n
28	n	1	1	n	n	n	1	1	n	n	n	n	n
29	4	11	3	n	n	n	5	1	n	n	n	n	n
30	15	19	2	n	n	1	16	1	n	n	n	n	n
31	16	7	n	n	n	5	10	1	n	n	n	n	n
32	9	1	n	n	n	16	4	n	n	n	n	n	n
33	2	n	n	n	n	10	1	n	n	n	n	n	n
34	n	n	n	n	n	2	n	n	n	n	n	n	n
35	1	n	n	n	n	27	n	n	n	n	n	n	n
36	n	n	n	n	n	1	n	n	n	n	n	n	n
37	n	n	n	n	n	1	n	n	n	n	n	n	n
38	n	n	n	n	n	3	n	n	n	n	n	n	n
39	n	n	n	n	n	4	n	n	n	n	n	n	n
40	n	n	n	n	n	4	n	n	n	n	n	n	n
41	1	n	n	n	n	2	1	n	n	n	n	n	n
42	5	n	n	n	n	2	8	n	n	n	n	n	n
43	1	n	2	n	n	n	3	1	n	n	n	n	n
44	1	n	2	n	n	n	2	2	n	n	n	n	n
45	1	1	3	n	n	n	1	4	1	n	n	n	n
46	n	n	n	n	n	n	n	n	4	1	n	n	n
47	n	n	n	2	2	n	n	2	6	3	n	n	n
48	n	n	n	n	n	n	n	n	13	13	n	n	n
49	n	n	n	n	n	n	n	n	1	1	n	n	n
50	n	n	n	n	n	n	n	n	n	1	n	n	n
70	n	n	n	n	1	n	n	n	n	n	n	n	n
72	n	n	n	n	2	n	n	n	n	n	n	n	n
73	n	n	n	1	2	n	n	n	n	n	n	n	n
74	n	n	n	1	3	n	n	n	n	n	n	n	n
75	n	n	n	n	1	n	n	n	2	4	n	n	n
76	n	n	n	n	n	n	n	n	n	4	n	n	n
77	n	n	n	n	n	n	n	n	1	3	1	n	n
78	n	n	n	n	n	n	n	n	n	1	1	n	n
79	n	n	n	n	n	n	n	n	n	2	2	n	n

Note: *.* = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown.

Table B-12. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Winter Season Will Contact a Certain Land Segment within 10 days, Cook Inlet OCS Lease Sale 149

Land Segment	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
10	n	n	n	n	1	n	n	n	n	n	n	n	n
11	n	n	n	1	1	n	n	n	n	n	n	n	n
12	n	n	n	n	1	n	n	n	n	n	n	n	n
13	n	n	n	n	2	n	n	n	n	n	n	n	n
14	n	n	n	1	1	n	n	n	n	n	n	n	n
15	n	n	n	2	2	n	n	n	n	n	n	n	n
16	n	n	n	n	2	n	n	n	n	n	n	n	n
17	n	n	n	1	2	n	n	n	1	n	n	n	n
18	1	1	3	5	15	n	n	3	4	1	n	n	n
19	n	1	1	5	13	n	1	3	6	1	1	n	n
20	n	n	1	2	8	n	n	1	2	2	n	n	n
21	n	n	2	6	15	n	n	3	7	1	n	n	n
22	2	3	9	21	5	n	2	13	13	3	1	n	n
23	2	5	17	14	n	1	3	11	4	1	1	n	n
24	2	3	8	5	n	n	3	8	3	1	n	n	n
25	2	3	3	2	n	n	2	4	2	n	n	n	n
26	4	6	2	1	n	1	5	3	1	n	n	n	n
27	5	14	13	5	n	1	7	11	3	2	n	n	n
28	2	3	2	n	n	n	4	3	1	n	n	n	n
29	6	13	5	1	n	1	8	4	1	n	n	n	n
30	18	21	5	n	n	3	20	3	1	n	n	n	n
31	18	8	1	n	n	8	11	2	n	n	n	n	n
32	12	2	n	n	n	19	7	n	n	n	n	n	n
33	3	n	n	n	n	12	2	n	n	n	n	n	n
34	n	n	n	n	n	2	n	n	n	n	n	n	n
35	2	n	n	n	n	28	1	n	n	n	n	n	n
36	n	n	n	n	n	1	n	n	n	n	n	n	n
37	n	n	n	n	n	2	n	n	n	n	n	n	n
38	n	n	n	n	n	3	n	n	n	n	n	n	n
39	n	n	n	n	n	4	n	n	n	n	n	n	n
40	1	n	n	n	n	5	n	n	n	n	n	n	n
41	1	n	n	n	n	2	1	n	n	n	n	n	n
42	5	1	n	n	n	3	8	1	n	n	n	n	n
43	1	n	3	n	n	1	3	2	1	n	n	n	n
44	1	1	4	n	n	n	3	3	2	1	n	n	n
45	1	2	4	1	n	n	2	5	1	n	n	n	n

Table B-12. (Continued)

Land Segment	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
46	n	n	n	n	n	n	n	n	5	2	1	n	n
47	1	1	2	4	3	n	1	3	7	5	1	n	n
48	n	n	n	n	n	n	n	n	14	16	4	1	1
49	n	n	n	n	n	n	n	n	2	2	1	1	n
50	n	n	n	n	n	n	n	n	n	2	1	n	n
51	n	n	n	n	n	n	n	n	n	2	2	1	n
53	n	n	n	n	n	n	n	n	n	n	1	n	n
67	n	n	n	n	1	n	n	n	n	n	n	n	n
68	n	n	n	n	1	n	n	n	n	n	n	n	n
69	n	n	1	1	2	n	n	n	n	n	n	n	n
70	n	n	1	2	2	n	n	1	1	n	n	n	n
71	n	n	n	2	1	n	n	1	1	n	n	n	n
72	n	n	1	1	3	n	n	1	1	n	n	n	n
73	1	1	1	2	3	n	n	1	1	n	n	n	n
74	n	1	1	3	4	n	n	1	1	n	n	n	n
75	n	n	1	1	2	n	n	1	3	7	2	n	n
76	n	n	n	n	n	n	n	n	1	7	4	1	n
77	n	n	n	n	n	n	n	n	1	6	6	2	1
78	n	n	n	n	n	n	n	n	n	1	3	1	n
79	n	n	n	n	n	n	n	n	n	4	9	5	2
80	n	n	n	n	n	n	n	n	n	n	1	n	n
81	n	n	n	n	n	n	n	n	n	n	1	2	n
82	n	n	n	n	n	n	n	n	n	1	3	4	2
83	n	n	n	n	n	n	n	n	n	1	3	4	2
84	n	n	n	n	n	n	n	n	n	n	1	2	2
85	n	n	n	n	n	n	n	n	n	n	n	1	n

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown.

Table B-13. Conditional Probabilities (expressed as percent chance) That an Oil Spill Starting at a Hypothetical Spill Site During the Winter Season Will Contact a Certain Land Segment within 30 days, Cook Inlet OCS Lease Sale 149

Land Segment	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5	T6	T7	T8
10	n	n	n	n	1	n	n	n	1	n	n	n	n
11	n	n	1	1	2	n	n	n	n	n	n	n	n
12	n	n	n	1	1	n	n	n	n	n	n	n	n
13	n	n	n	1	2	n	n	1	n	n	n	n	n
14	n	n	n	1	1	n	n	n	n	n	n	n	n
15	n	1	1	2	2	n	n	n	1	n	n	n	n
16	n	n	n	1	2	n	n	n	n	1	n	n	n
17	1	n	n	1	2	n	n	n	1	1	n	n	n
18	1	1	3	5	15	n	1	3	4	1	n	n	n
19	1	1	1	5	13	n	1	3	6	1	1	n	n
20	n	1	1	2	9	n	n	1	3	2	1	n	n
21	n	n	2	6	15	n	n	3	7	1	n	1	n
22	2	4	9	21	5	n	2	13	13	4	2	1	n
23	3	5	17	14	n	1	3	11	5	1	1	n	n
24	2	4	9	5	n	n	3	8	3	1	1	n	n
25	2	3	3	2	n	n	2	4	2	1	n	n	n
26	4	6	3	1	n	1	6	4	1	n	n	n	n
27	5	14	14	5	n	1	7	12	3	2	n	n	n
28	2	3	3	n	n	n	4	4	1	1	n	n	n
29	7	14	5	1	n	1	8	4	2	n	n	n	n
30	19	21	5	n	n	3	20	4	1	n	n	n	n
31	18	8	1	n	n	8	11	2	n	n	n	n	n
32	12	2	n	n	n	19	7	n	n	n	n	n	n
33	3	n	n	n	n	12	2	n	n	n	n	n	n
34	n	n	n	n	n	2	n	n	n	n	n	n	n
35	2	n	n	n	n	28	1	n	n	n	n	n	n
36	n	n	n	n	n	1	n	n	n	n	n	n	n
37	n	n	n	n	n	2	n	n	n	n	n	n	n
38	n	n	n	n	n	3	n	n	n	n	n	n	n
39	n	n	n	n	n	4	n	n	n	n	n	n	n
40	1	n	n	n	n	5	n	n	n	n	n	n	n
41	1	n	n	n	n	2	1	n	n	n	n	n	n
42	5	1	n	n	n	3	8	1	n	n	n	n	n
43	1	n	3	n	n	1	3	2	1	n	n	n	n
44	1	1	4	n	n	n	3	3	2	1	n	n	n
45	1	2	4	1	n	n	2	5	1	n	n	n	n
46	n	n	n	n	n	n	n	1	5	2	1	n	n
47	1	1	2	4	3	n	1	3	8	5	1	1	n
48	n	n	n	n	n	n	n	n	14	16	5	1	1
49	n	n	n	n	n	n	n	n	2	2	2	1	n
50	n	n	n	n	n	n	n	n	n	2	1	1	n
51	n	n	n	n	n	n	n	n	n	2	3	2	1
52	n	n	n	n	n	n	n	n	n	1	1	1	1
53	n	n	n	n	n	n	n	n	n	n	1	1	n
54	n	n	n	n	n	n	n	n	n	n	1	1	n
55	n	n	n	n	n	n	n	n	n	n	n	1	n
56	n	n	n	n	n	n	n	n	n	n	n	1	n
66	n	n	n	n	1	n	n	n	n	n	n	n	n
67	n	n	n	n	1	n	n	n	n	n	n	n	n
68	n	n	n	1	1	n	n	1	n	n	n	n	n
69	n	1	1	1	2	n	n	1	1	n	n	n	n
70	n	n	1	2	2	n	1	1	1	n	n	n	n
71	n	1	1	2	2	n	n	1	1	n	n	n	n
72	n	n	1	1	3	n	n	1	1	n	n	n	n
73	1	1	1	2	3	n	n	1	1	n	n	n	n
74	n	1	1	3	4	n	n	1	1	n	n	n	n
75	n	n	1	1	2	n	1	1	3	7	2	1	1
76	n	n	n	n	n	n	n	n	1	8	5	2	1
77	n	n	n	n	n	n	n	n	1	7	7	3	2
78	n	n	n	n	n	n	n	n	n	2	3	1	1
79	n	n	n	n	n	n	n	n	n	5	10	7	4
80	n	n	n	n	n	n	n	n	n	n	1	1	n
81	n	n	n	n	n	n	n	n	n	1	1	3	1
82	n	n	n	n	n	n	n	n	n	2	5	6	4
83	n	n	n	n	n	n	n	n	n	2	6	6	5
84	n	n	n	n	n	n	n	n	n	1	2	4	5
85	n	n	n	n	n	n	n	n	n	n	1	1	2
86	n	n	n	n	n	n	n	n	n	n	1	1	2
87	n	n	n	n	n	n	n	n	n	n	1	1	1
88	n	n	n	n	n	n	n	n	n	n	1	1	1
89	n	n	n	n	n	n	n	n	n	n	n	1	1
90	n	n	n	n	n	n	n	n	n	1	1	3	3

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown

Table B-14. Combined Probabilites (expressed as percent chance) of One or More Spills ≥1,000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting Environmental Resource Areas and Land Segments Over the Assumed Production Life of the Lease Area, Cook Inlet OCS Lease Sale 149

Environmental	Within 3 Days				Within 10 Days				Within 30 Days			
	Base Case		High Case		Base Case		High Case		Base Case		High Case	
Resource Area	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean
Land	15	0.2	47	0.6	24	0.3	66	1.1	26	0.3	70	1.2
Env. Resource 1	6	0.1	22	0.3	7	0.1	25	0.3	7	0.1	25	0.3
Env. Resource 2	2	0.0	7	0.1	2	0.0	9	0.1	2	0.0	9	0.1
Env. Resource 3	3	0.0	11	0.1	4	0.0	14	0.1	4	0.0	14	0.2
Env. Resource 4	6	0.1	22	0.2	8	0.1	28	0.3	8	0.1	29	0.3
Env. Resource 5	2	0.0	9	0.1	4	0.0	13	0.1	4	0.0	14	0.2
Env. Resource 6	1	0.0	6	0.1	2	0.0	8	0.1	2	0.0	9	0.1
Env. Resource 7	3	0.0	10	0.1	4	0.0	15	0.2	4	0.0	16	0.2
Env. Resource 8	n	0.0	1	0.0	1	0.0	3	0.0	1	0.0	4	0.0
Env. Resource 9	1	0.0	2	0.0	1	0.0	5	0.1	2	0.0	6	0.1
Env. Resource 10	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	2	0.0
Env. Resource 11	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0
Env. Resource 12	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0
Env. Resource 13	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 14	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 15	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 16	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 17	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 18	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 19	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 20	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0
Env. Resource 21	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 22	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0
Env. Resource 23	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0	2	0.0
Env. Resource 24	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0	2	0.0
Env. Resource 25	1	0.0	5	0.0	2	0.0	6	0.1	2	0.0	7	0.1
Env. Resource 26	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Sea Segment 1	1	0.0	5	0.0	1	0.0	5	0.1	1	0.0	5	0.1
Sea Segment 2	4	0.0	15	0.2	4	0.0	16	0.2	4	0.0	17	0.2
Sea Segment 3	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0
Sea Segment 4	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0

Table B-14. (Continued)

Land	Within 3 Days				Within 10 Days				Within 30 Days			
	Base Case		High Case		Base Case		High Case		Base Case		High Case	
Segment	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean
18	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	2	0.0
19	n	0.0	1	0.0	n	0.0	2	0.0	1	0.0	2	0.0
20	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	2	0.0
21	n	0.0	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0
22	1	0.0	4	0.0	2	0.0	6	0.1	2	0.0	6	0.1
23	1	0.0	3	0.0	1	0.0	6	0.1	1	0.0	6	0.1
24	n	0.0	2	0.0	1	0.0	4	0.0	1	0.0	4	0.0
25	n	0.0	1	0.0	1	0.0	3	0.0	1	0.0	3	0.0
26	n	0.0	2	0.0	1	0.0	3	0.0	1	0.0	4	0.0
27	1	0.0	4	0.0	2	0.0	7	0.1	2	0.0	8	0.1
28	n	0.0	2	0.0	1	0.0	3	0.0	1	0.0	4	0.0
29	1	0.0	4	0.0	2	0.0	6	0.1	2	0.0	7	0.1
30	1	0.0	6	0.1	2	0.0	8	0.1	2	0.0	9	0.1
31	1	0.0	5	0.1	2	0.0	7	0.1	2	0.0	7	0.1
32	2	0.0	6	0.1	2	0.0	9	0.1	2	0.0	9	0.1
33	1	0.0	3	0.0	1	0.0	5	0.1	1	0.0	5	0.1
35	1	0.0	5	0.1	2	0.0	6	0.1	2	0.0	7	0.1
38	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0
39	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0
40	n	0.0	2	0.0	1	0.0	2	0.0	1	0.0	2	0.0
41	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0
42	1	0.0	2	0.0	1	0.0	3	0.0	1	0.0	3	0.0
43	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0
44	n	0.0	1	0.0	n	0.0	2	0.0	1	0.0	2	0.0
45	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	2	0.0
46	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0
47	n	0.0	1	0.0	n	0.0	2	0.0	1	0.0	2	0.0
48	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0
73	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0
74	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0
75	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0
76	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0
77	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0
79	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown.

Table B-15. Combined Probabilities (expressed as percent chance) of One or More Spills ≥ 1.000 Barrels, and the Estimated Number of Spills (Mean), Occurring and Contacting Environmental Resource Areas and Land Segments over the Assumed Production Life of the Lease Area, Cook Inlet OCS Lease Sale 149 (Alternative Deferrals)

	Within 3 Days						Within 10 Days						Within 30 Days					
	Wildlife Concentration Deferral		Pollock Spawning Area Deferral		Coastal Fisheries Deferral		Wildlife Concentration Deferral		Pollock Spawning Area Deferral		Coastal Fisheries Deferral		Wildlife Concentration Deferral		Pollock Spawning Area Deferral		Coastal Fisheries Deferral	
	Prob.	Mean	Prob.	Mean	Prob.	Mena	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean
Land	12	0.1	12	0.1	10	0.1	19	0.2	19	0.2	17	0.2	21	0.2	20	0.2	19	0.2
Env. Resource 1	4	0.0	6	0.1	4	0.0	5	0.0	6	0.1	5	0.0	5	0.0	6	0.1	5	0.0
Env. Resource 2	1	0.0	2	0.0	1	0.0	2	0.0	2	0.0	2	0.0	2	0.0	2	0.0	2	0.0
Env. Resource 3	3	0.0	2	0.0	2	0.0	3	0.0	3	0.0	3	0.0	3	0.0	3	0.0	3	0.0
Env. Resource 4	5	0.1	4	0.0	4	0.0	7	0.1	6	0.1	6	0.1	7	0.1	6	0.1	6	0.1
Env. Resource 5	2	0.0	1	0.0	1	0.0	3	0.0	2	0.0	2	0.0	3	0.0	3	0.0	2	0.0
Env. Resource 6	1	0.0	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	2	0.0	2	0.0	2	0.0
Env. Resource 7	2	0.0	1	0.0	2	0.0	3	0.0	2	0.0	3	0.0	3	0.0	2	0.0	3	0.0
Env. Resource 8	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Env. Resource 9	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Env. Resource 10	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 11	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 12	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 13	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 14	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 15	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 16	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 17	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 18	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 19	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 20	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 21	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 22	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 23	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 24	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 25	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Env. Resource 26	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Sea Segment 1	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Sea Segment 2	3	0.0	3	0.0	3	0.0	3	0.0	4	0.0	3	0.0	3	0.0	4	0.0	3	0.0
Sea Segment 3	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Sea Segment 4	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0

Table B-15. (Continued) **Combined Probabilities (expressed as percent chance) of One or More Spills ≥ 1.000 Barrels, and the Estimated Number of Spills (mean), Occurring and Contacting Environmental Resource Areas and Land Segments over the Assumed Production Life of the Lease Area, Cook Inlet OCS Lease Sale 149 (Alternative Deferrals)**

	Withhin 3 Days						Within 10 Days						Within 30 Days					
	Wildlife Concentration Deferrral		Pollock Spawning Area Deferrral		Coastal Fisheries Deferral		Wildlife Concentration Deferral		Pollock Spawning Area Deferral		Coastal Fisherries Deferral		Wildlife Concentrration Deferral		Pollock Spawning Area Deferral		Coastal Fisheries Deferral	
	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean
21	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0
22	1	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
23	1	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
24	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
25	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0	n	0.0	1	0.0	1	0.0	n	0.0
26	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
27	1	0.0	1	0.0	1	0.0	2	0.0	2	0.0	1	0.0	2	0.0	2	0.0	1	0.0
28	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
29	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	2	0.0	2	0.0	1	0.0
30	1	0.0	1	0.0	1	0.0	2	0.0	2	0.0	1	0.0	2	0.0	2	0.0	1	0.0
31	1	0.0	1	0.0	1	0.0	1	0.0	2	0.0	1	0.0	1	0.0	2	0.0	1	0.0
32	1	0.0	1	0.0	1	0.0	2	0.0	2	0.0	2	0.0	2	0.0	2	0.0	2	0.0
33	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
35	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
40	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0
42	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0	n	0.0	1	0.0	1	0.0	n	0.0

Note: ** = Greater than 99.5 percent; n = less than 0.5 percent. All land segments with all values less than 0.5 percent are not shown.

Table B-16. **Combined Probabilities (expressed as percent chance) of One or More Spills ≥ 1.000 Barrels, and the Estimated Number of Spills (mean), Occurring and Contacting Environmental Resource Areas over the Assumed Production Life of the Lease Area, Cook Inlet OCS Lease Sale 149 (Alternative Deferrals)**

	Within 3 Days				Within 10 Days				Within 30 Days			
	Base Case		Northern Deferral		Base Case		Northern Deferral		Base Case		Northern Deferral	
	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean
Land	15	0.2	10	0.1	24	0.3	17	0.2	26	0.3	19	0.2
Env. Resource 1	6	0.1	2	0.0	7	0.1	3	0.0	7	0.1	3	0.0
Env. Resource 2	2	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
Env. Resource 3	3	0.0	2	0.0	4	0.0	3	0.0	4	0.0	3	0.0
Env. Resource 4	6	0.1	5	0.1	8	0.1	7	0.1	8	0.1	7	0.1
Env. Resource 5	2	0.0	2	0.0	4	0.0	3	0.0	4	0.0	3	0.0
Env. Resource 6	1	0.0	1	0.0	2	0.0	2	0.0	2	0.0	2	0.0
Env. Resource 7	3	0.0	2	0.0	4	0.0	4	0.0	4	0.0	4	0.0
Env. Resource 8	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Env. Resource 9	1	0.0	1	0.0	1	0.0	1	0.0	2	0.0	1	0.0
Env. Resource 10	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 11	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 12	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 13	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 14	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 15	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 16	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 17	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 18	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 19	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 20	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 21	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 22	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Env. Resource 23	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0
Env. Resource 24	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0
Env. Resource 25	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
Env. Resource 26	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Sea Segment 1	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0	1	0.0
Sea Segment 2	4	0.0	2	0.0	4	0.0	2	0.0	4	0.0	2	0.0
Sea Segment 3	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0
Sea Segment 4	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0	n	0.0

Table B-17. **Combined Probabilities (expressed as percent chance) of One or More Spills ≥ 1.000 Barrels, and the Estimated Number of Spills (mean), Occurring and Contacting Land Segments over the Assumed Production Life of the Lease Area, Cook Inlet OCS Lease Sale 149 (Alternative Deferrals)**

	Withhin 3 Days				Within 10 Days				Within 30 Days			
	Base Case		Northern Deferrral		Base Case		Northern Deferral		Base Case		Northern Deferral	
	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean	Prob.	Mean
19	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0	1	0.0
21	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
22	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
23	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
24	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
25	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
26	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
27	1	0.0	1	0.0	2	0.0	2	0.0	2	0.0	2	0.0
28	n	0.0	n	0.0	1	0.0	1	0.0	1	0.0	1	0.0
29	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
30	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
31	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
32	2	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
33	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0	1	0.0
35	1	0.0	1	0.0	2	0.0	1	0.0	2	0.0	1	0.0
40	n	0.0	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0
42	1	0.0	n	0.0	1	0.0	n	0.0	1	0.0	n	0.0
44	n	0.0	n	0.0	n	0.0	n	0.0	1	0.0	n	0.0
47	n	n	n	n	n	0.0	n	0.0	1	0.0	n	0.0

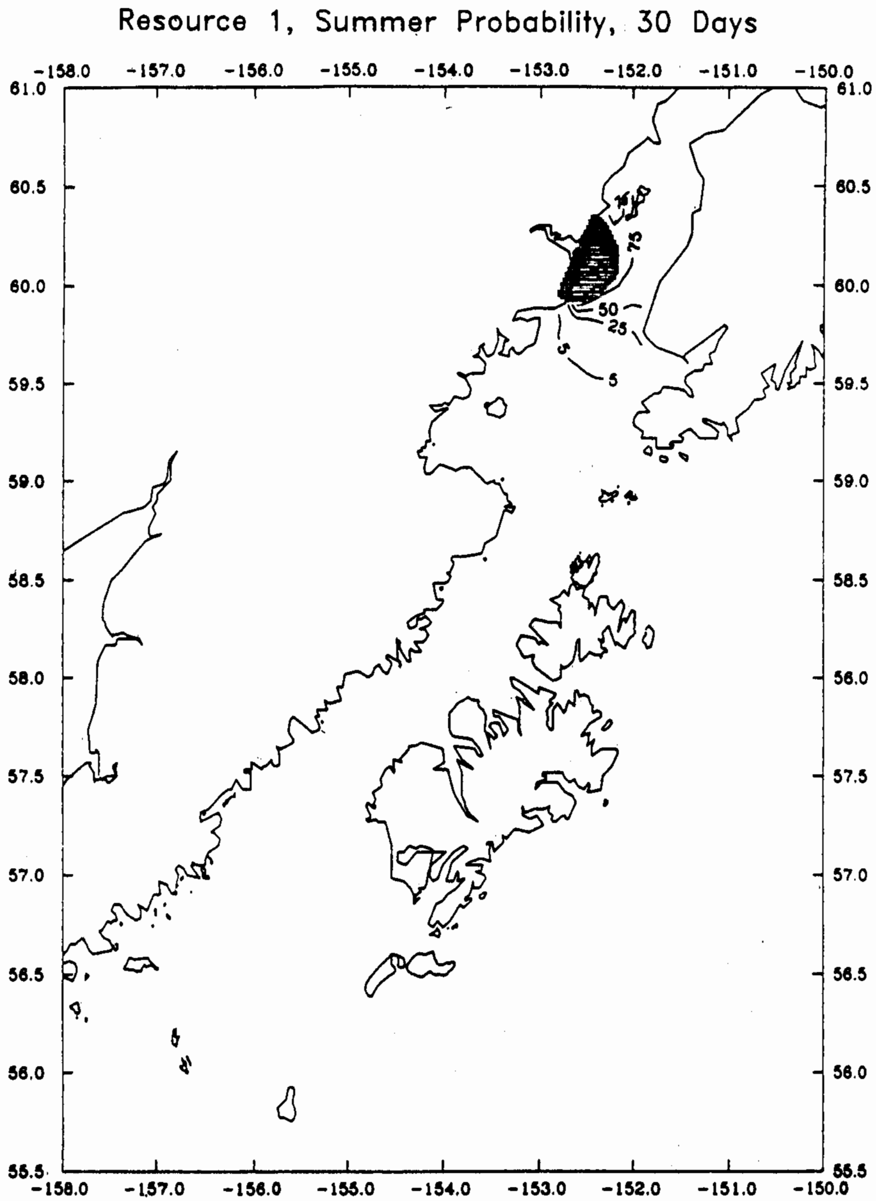


Figure B-1. Conditional Risk Contours for Environmental Resource Area 1, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

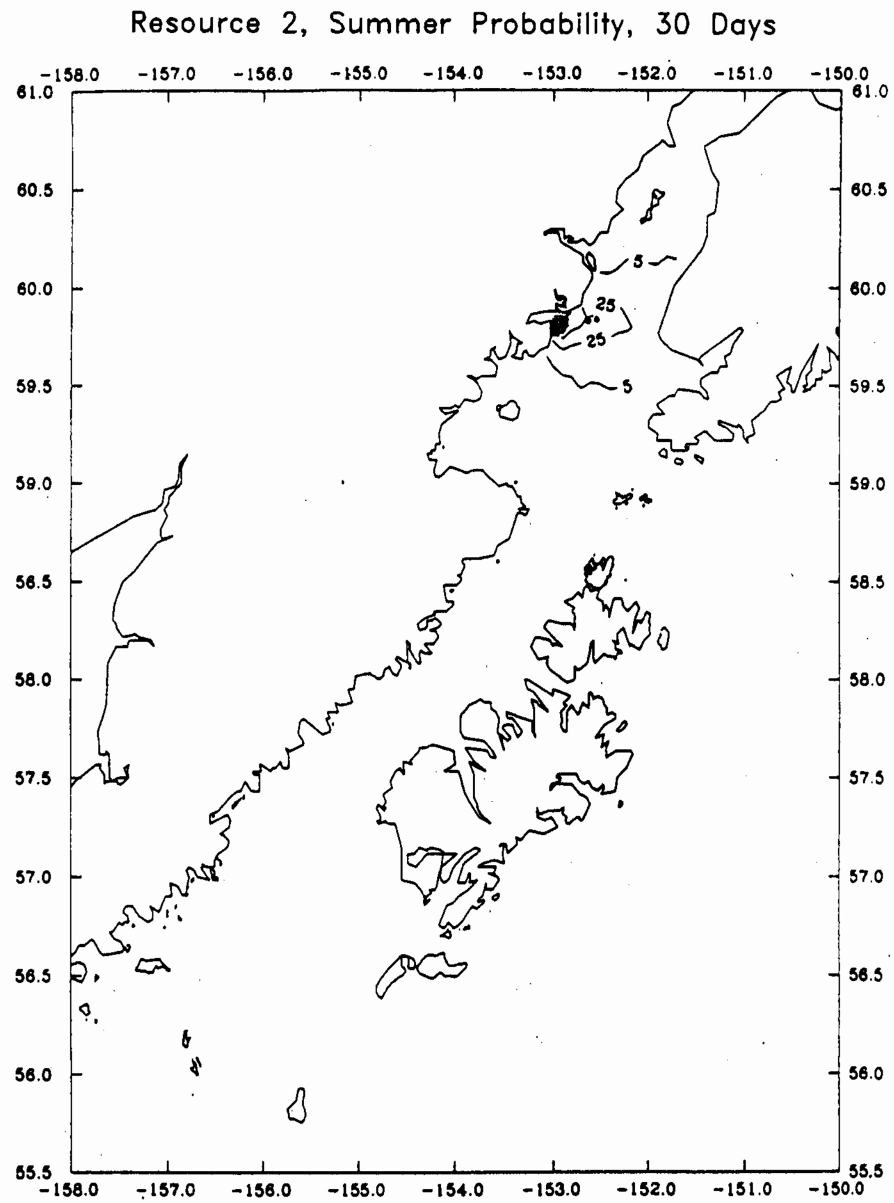


Figure B-2. Conditional Risk Contours for Environmental Resource Area 2, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

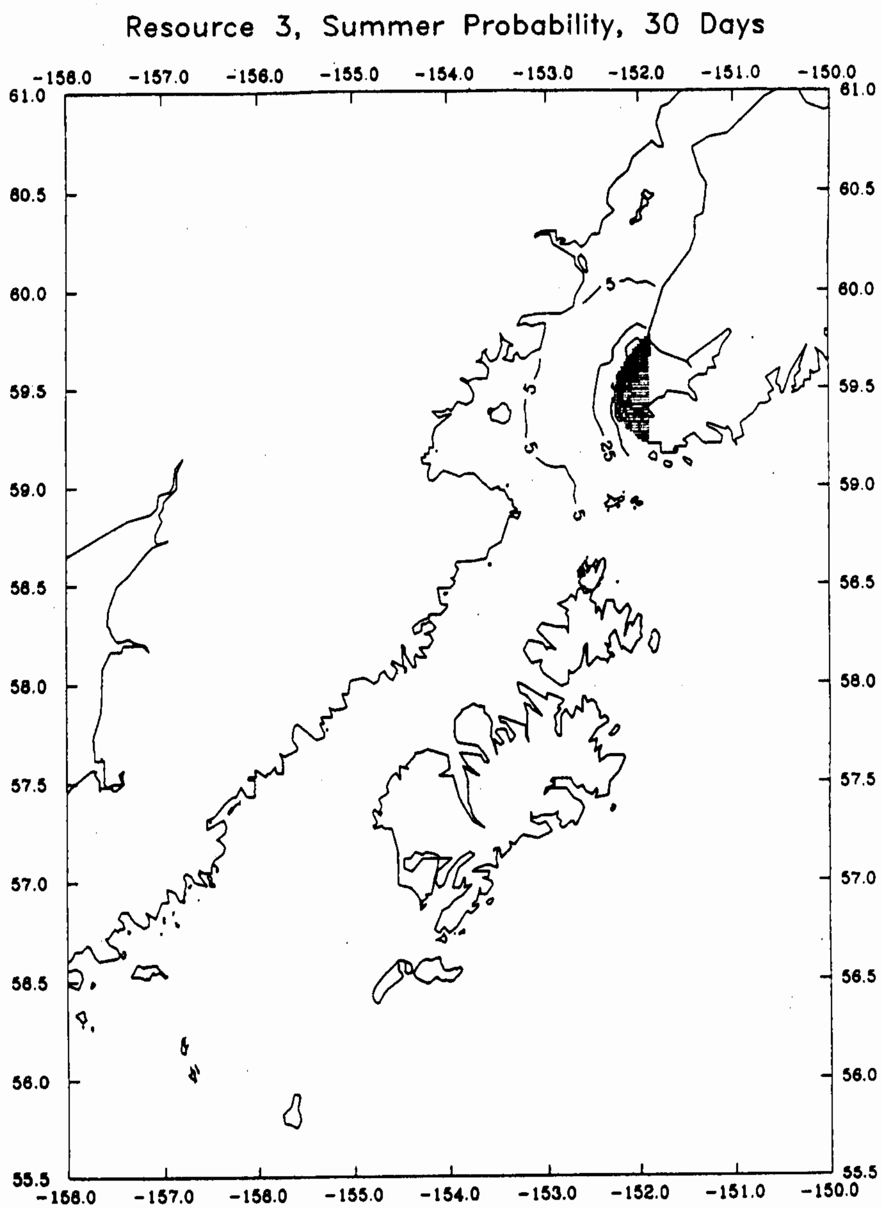


Figure B-3. Conditional Risk Contours for Environmental Resource Area 3, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

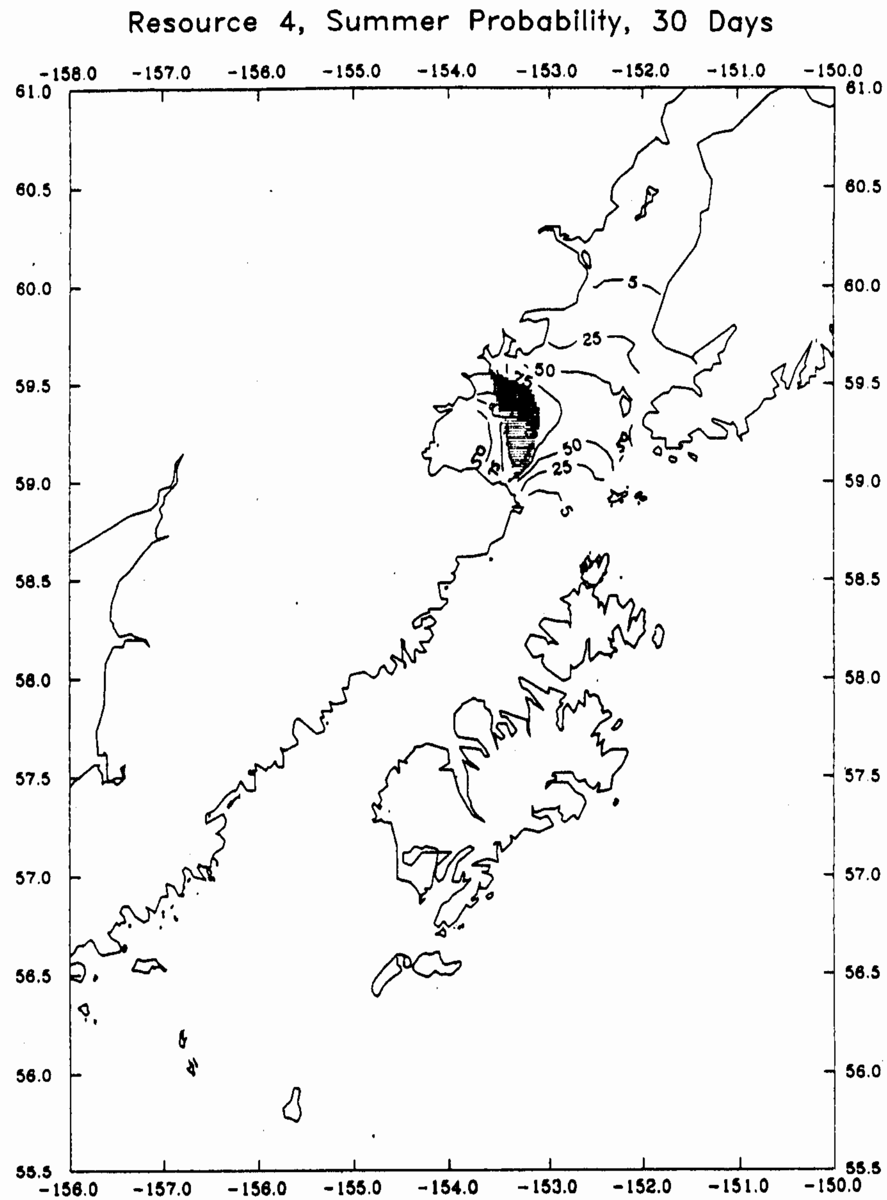


Figure B-4. Conditional Risk Contours for Environmental Resource Area 4, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

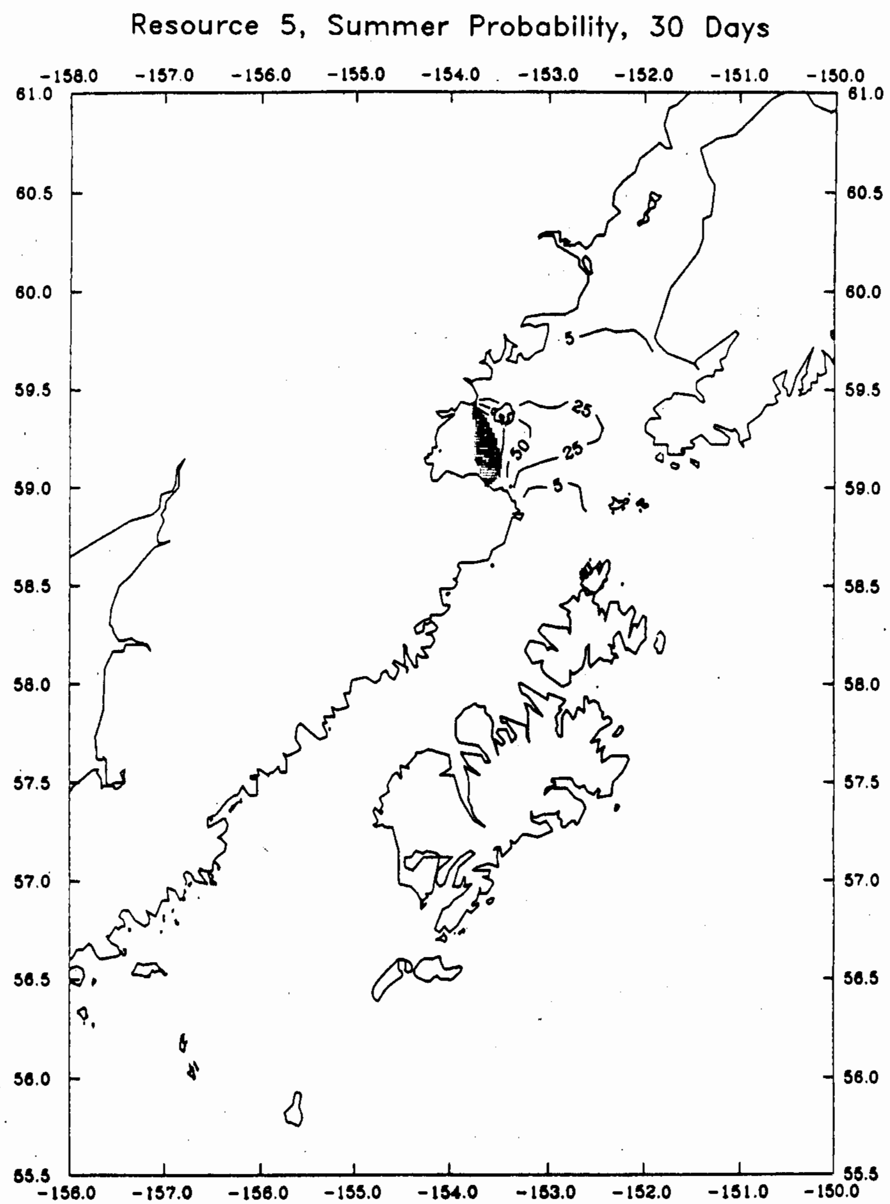


Figure B-5. Conditional Risk Contours for Environmental Resource Area 5, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

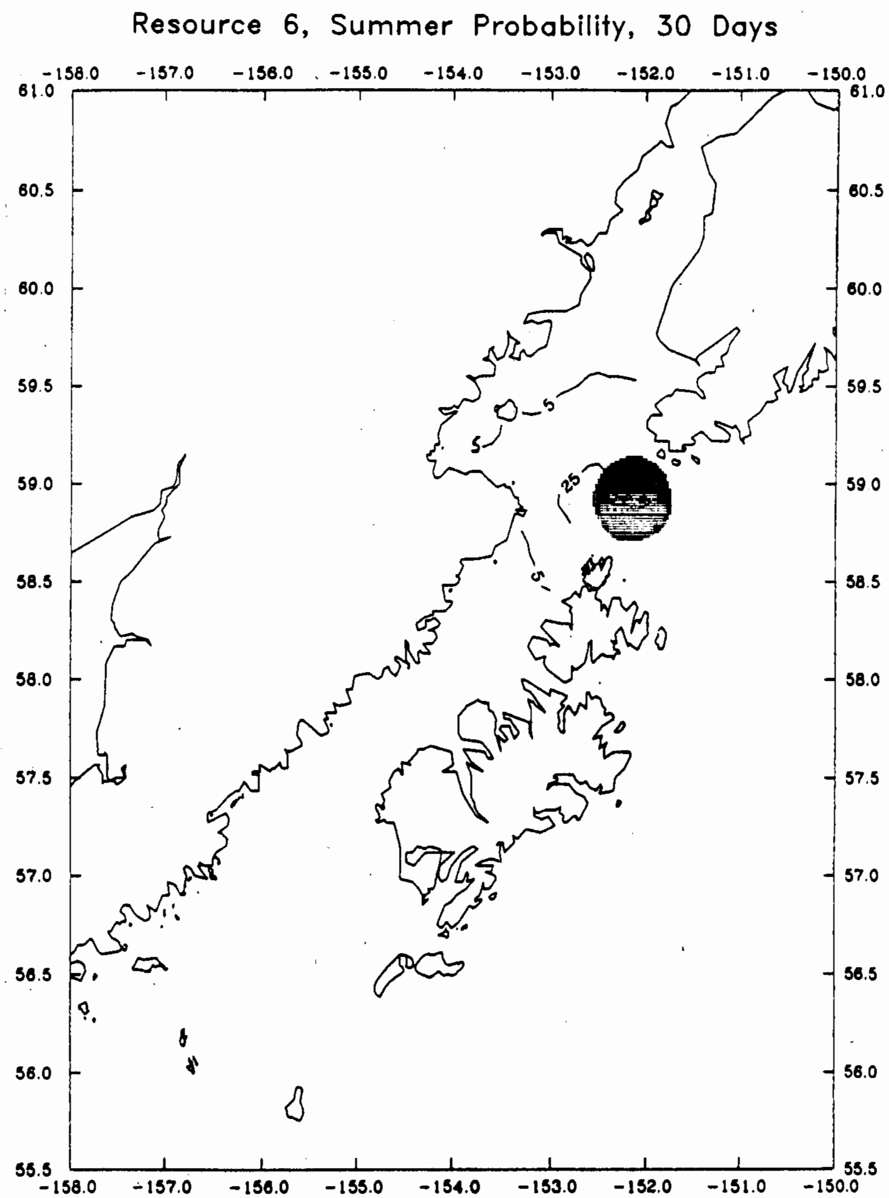


Figure B-6. Conditional Risk Contours for Environmental Resource Area 6, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

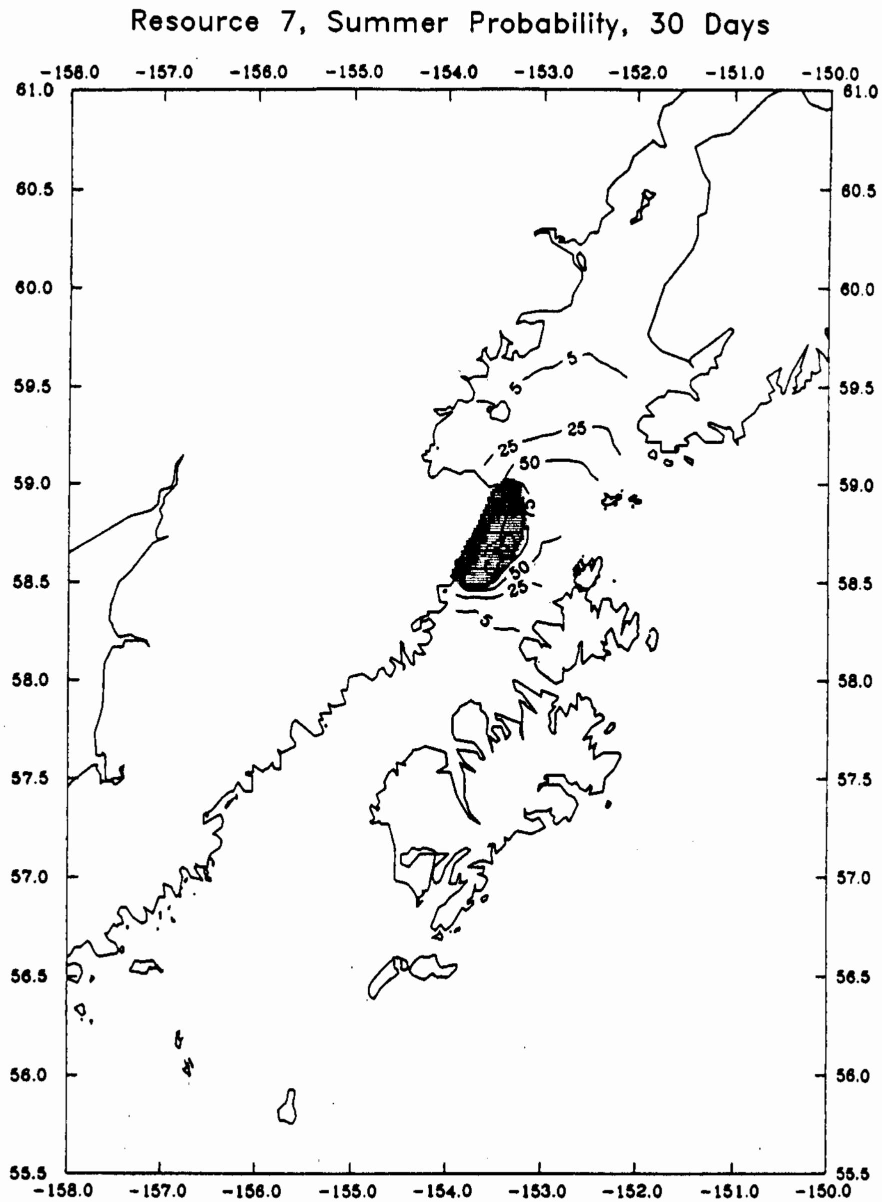


Figure B-7. Conditional Risk Contours for Environmental Resource Area 7, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

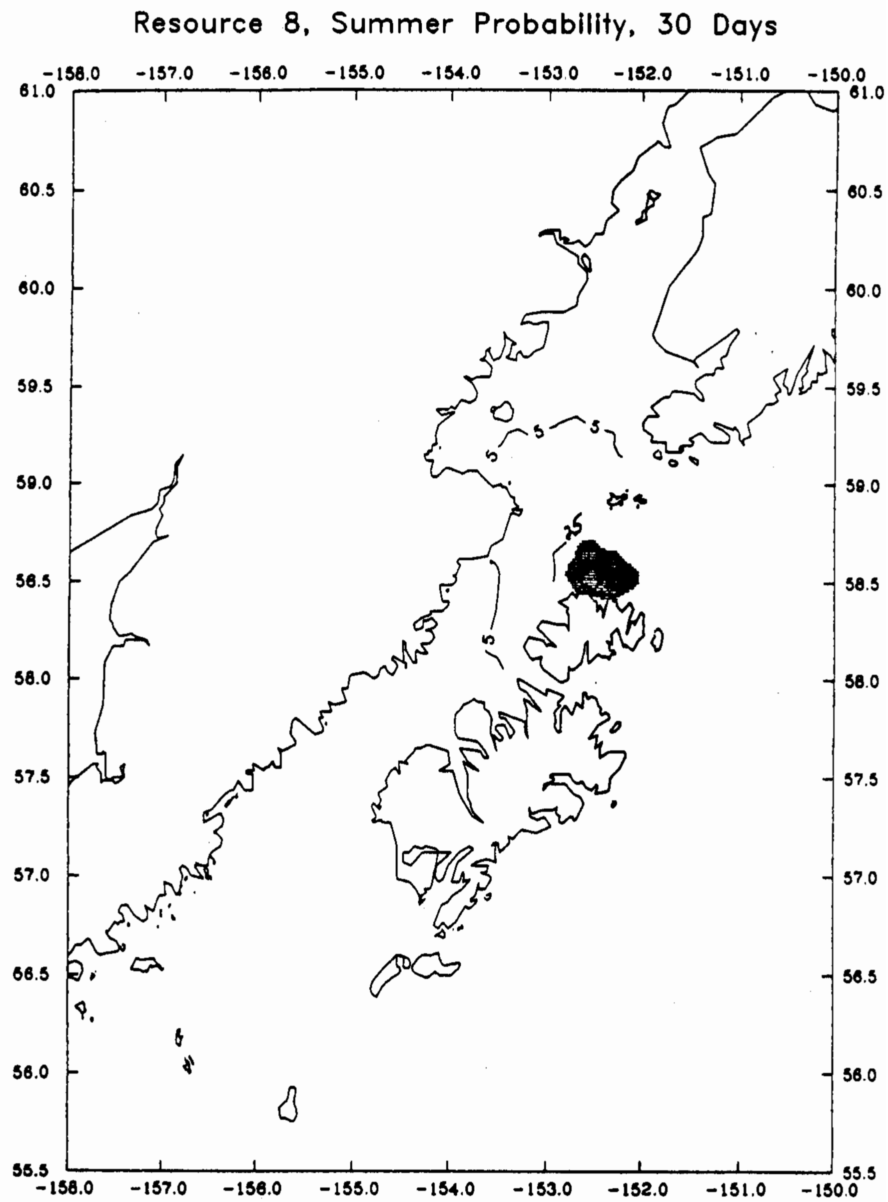


Figure B-8. Conditional Risk Contours for Environmental Resource Area 8, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

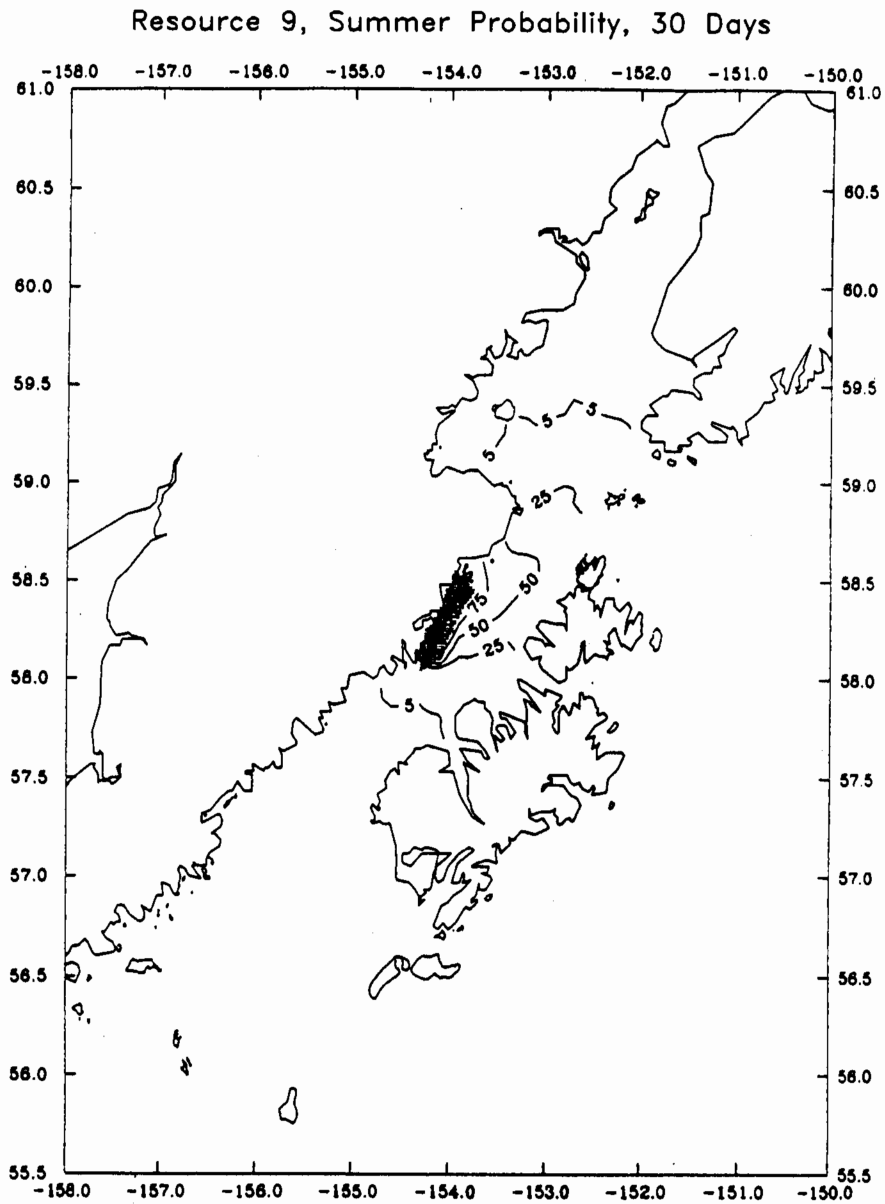


Figure B-9. Conditional Risk Contours for Environmental Resource Area 9, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

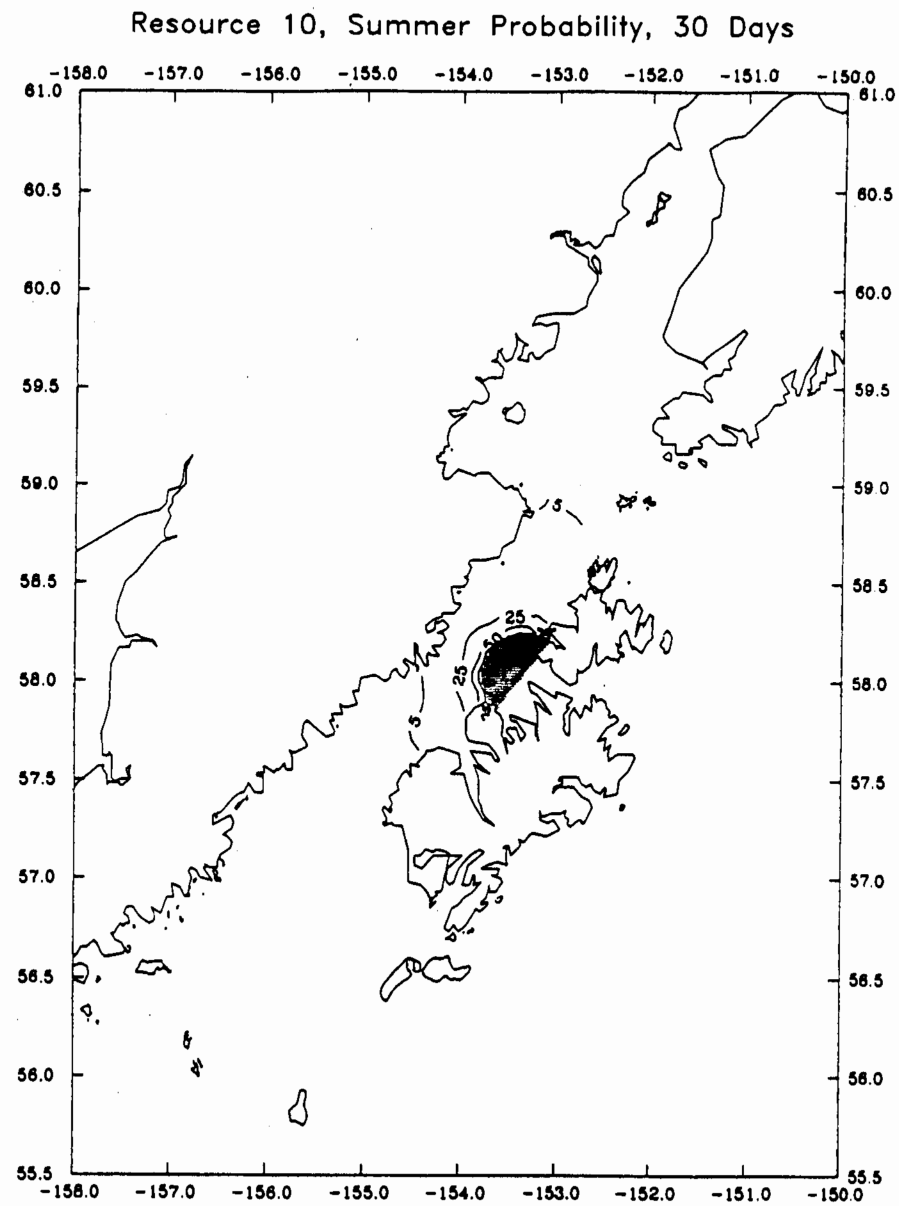


Figure B-10. Conditional Risk Contours for Environmental Resource Area 10, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

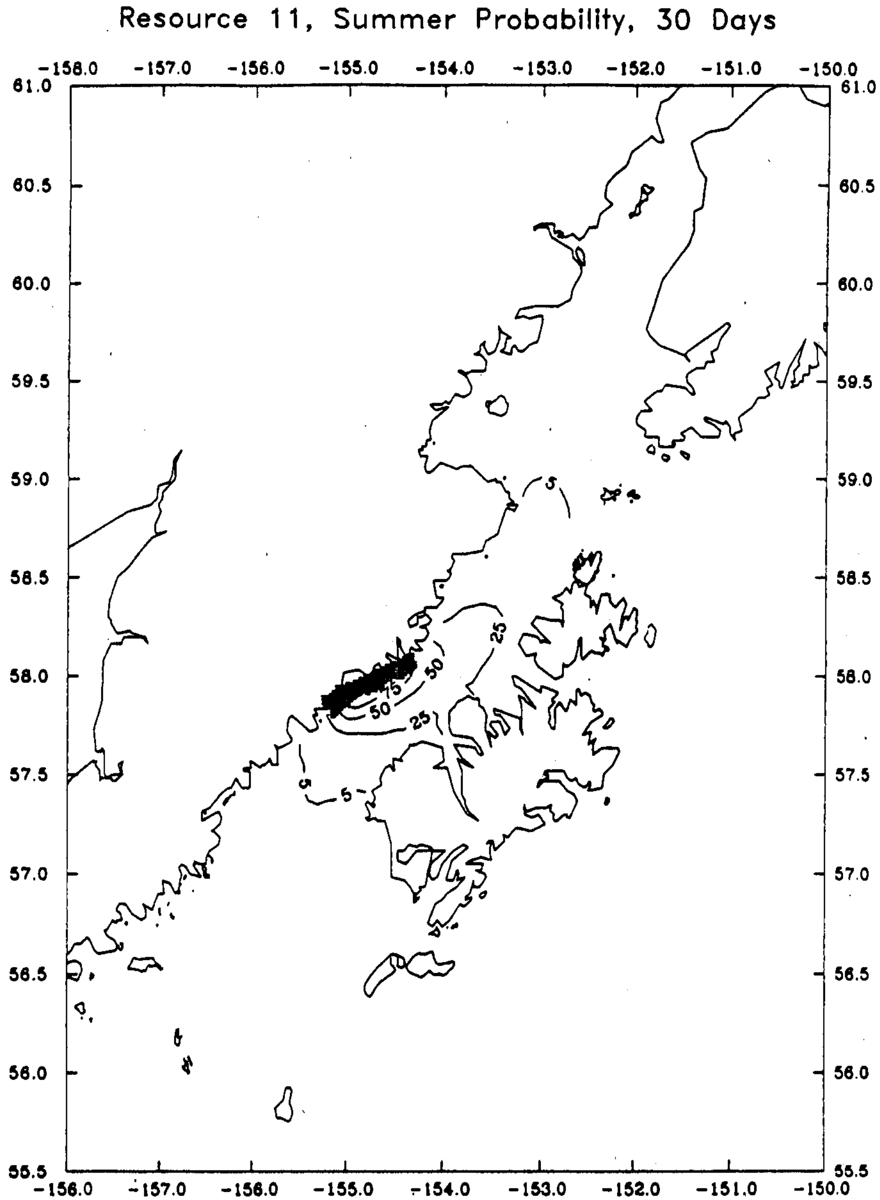


Figure B-11. Conditional Risk Contours for Environmental Resource Area 11, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

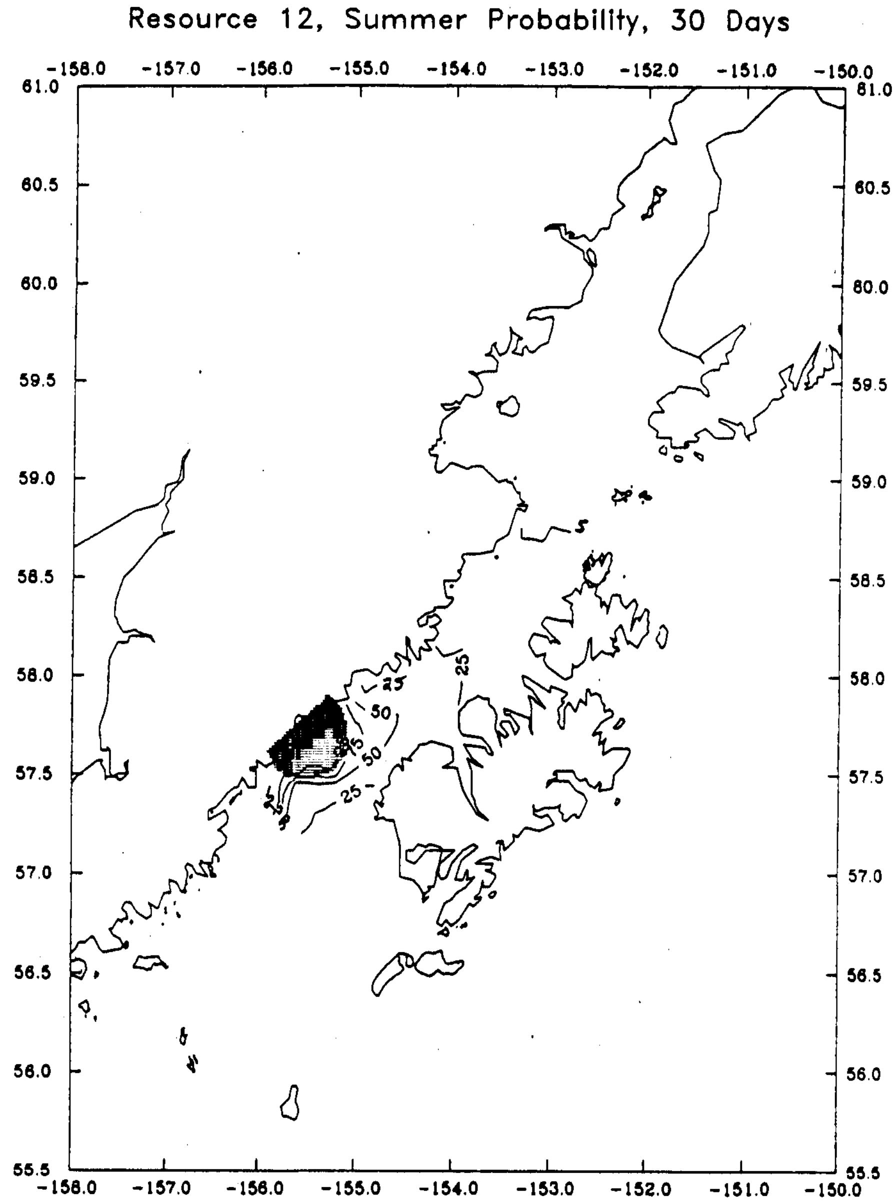


Figure B-12. Conditional Risk Contours for Environmental Resource Area 12, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149

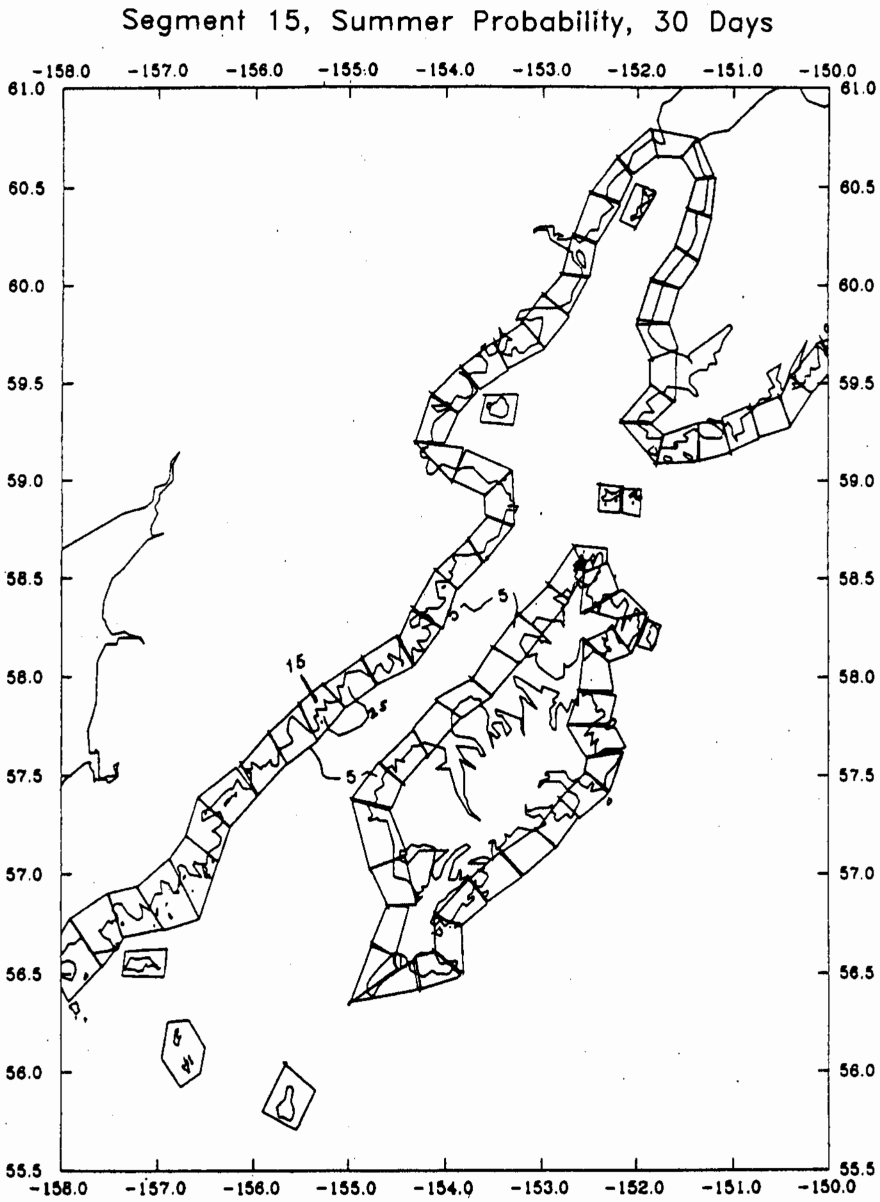


Figure B-13. Conditional Risk Contours for Land Segment 15, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

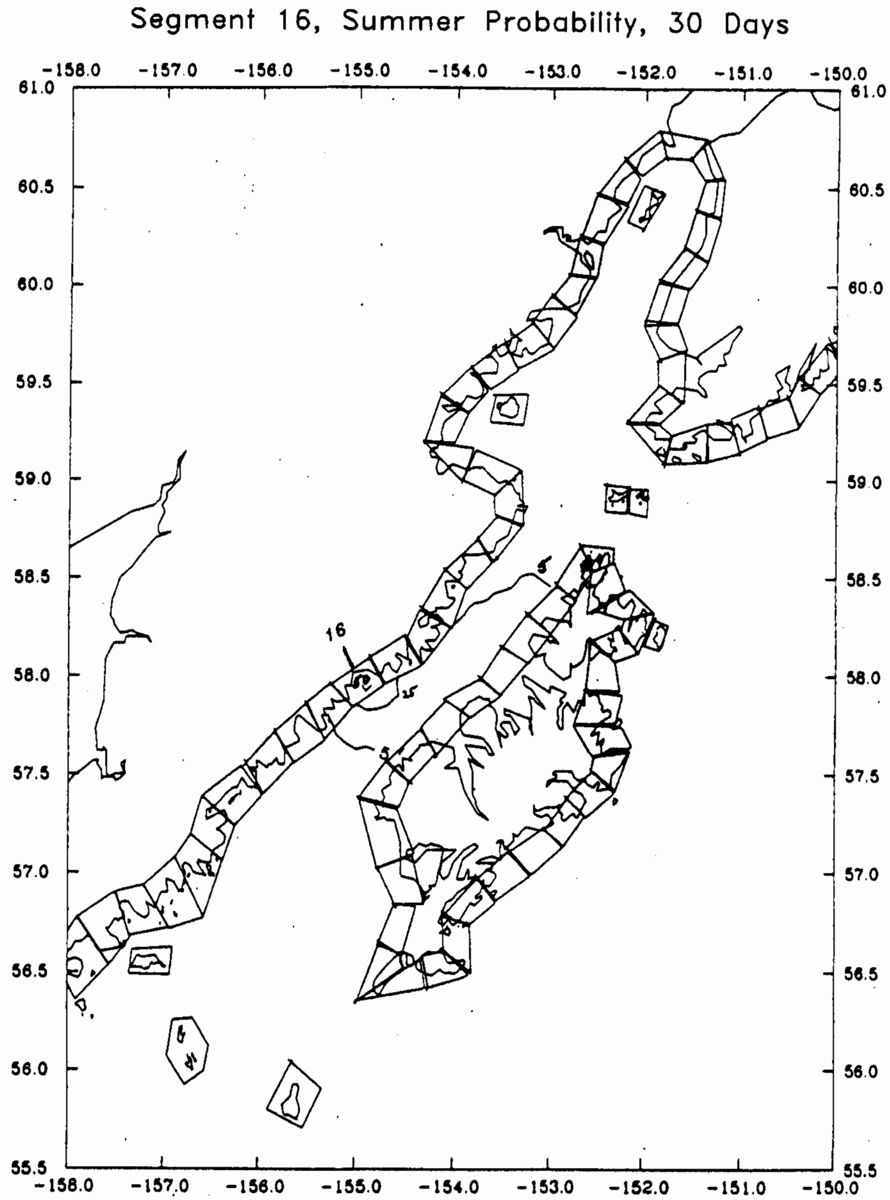


Figure B-14. Conditional Risk Contours for Land Segment 16, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

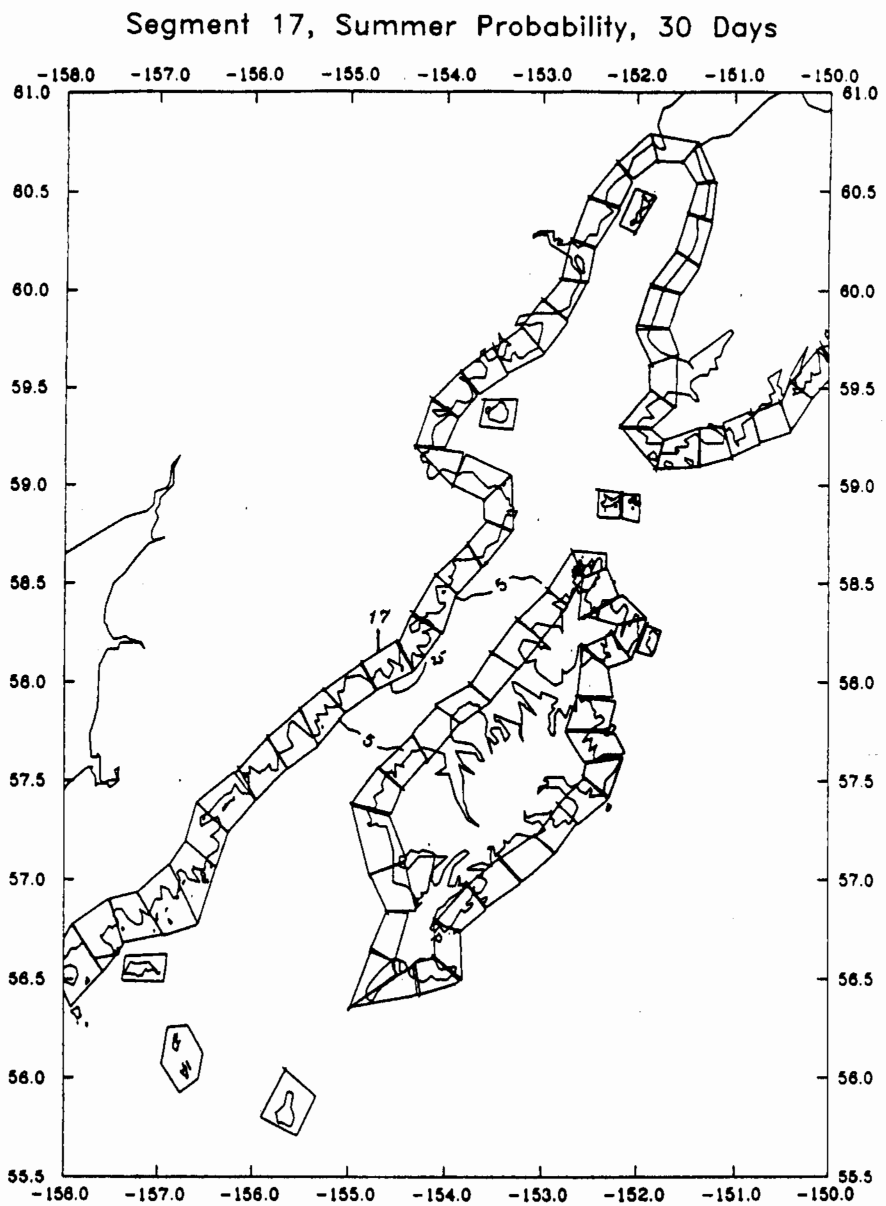


Figure B-15. Conditional Risk Contours for Land Segment 17, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

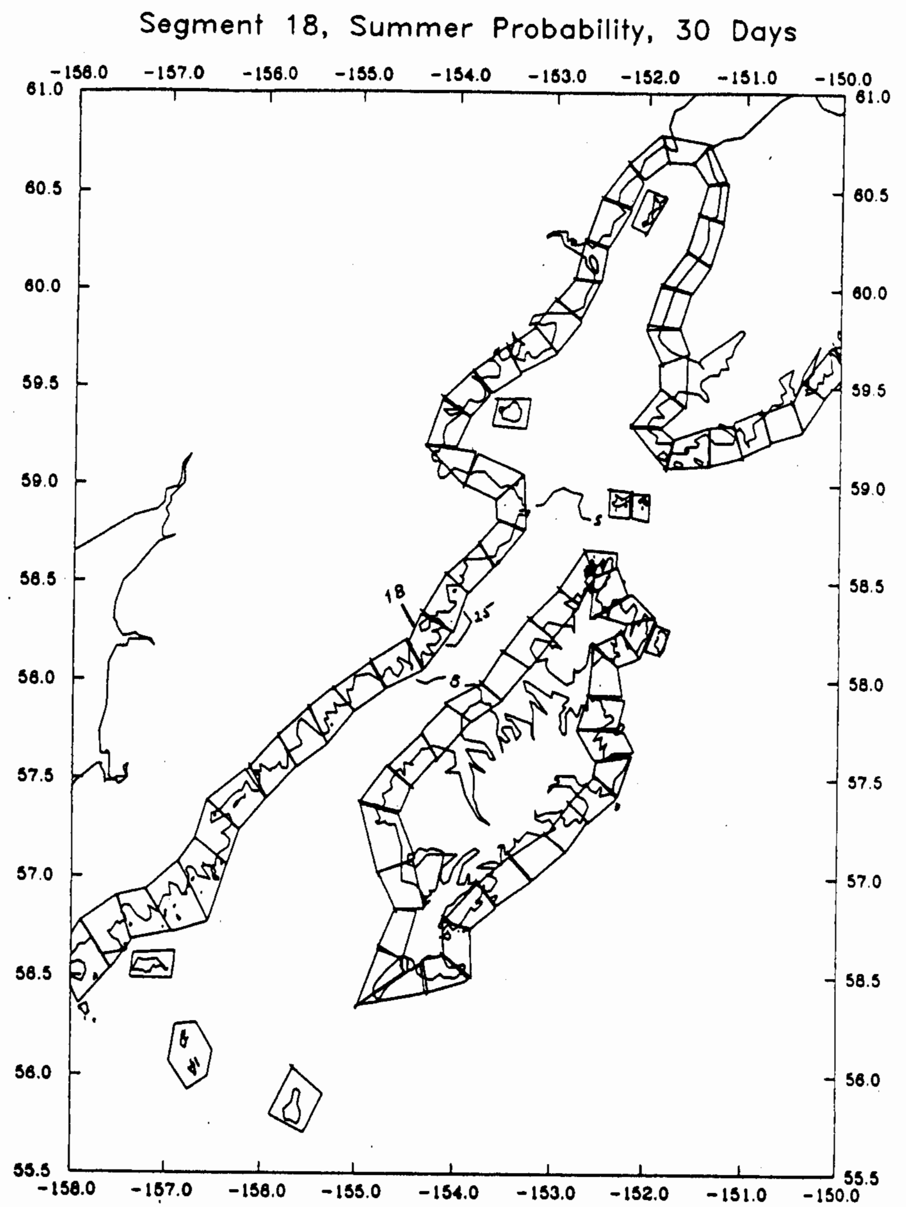


Figure B-16. Conditional Risk Contours for Land Segment 18, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

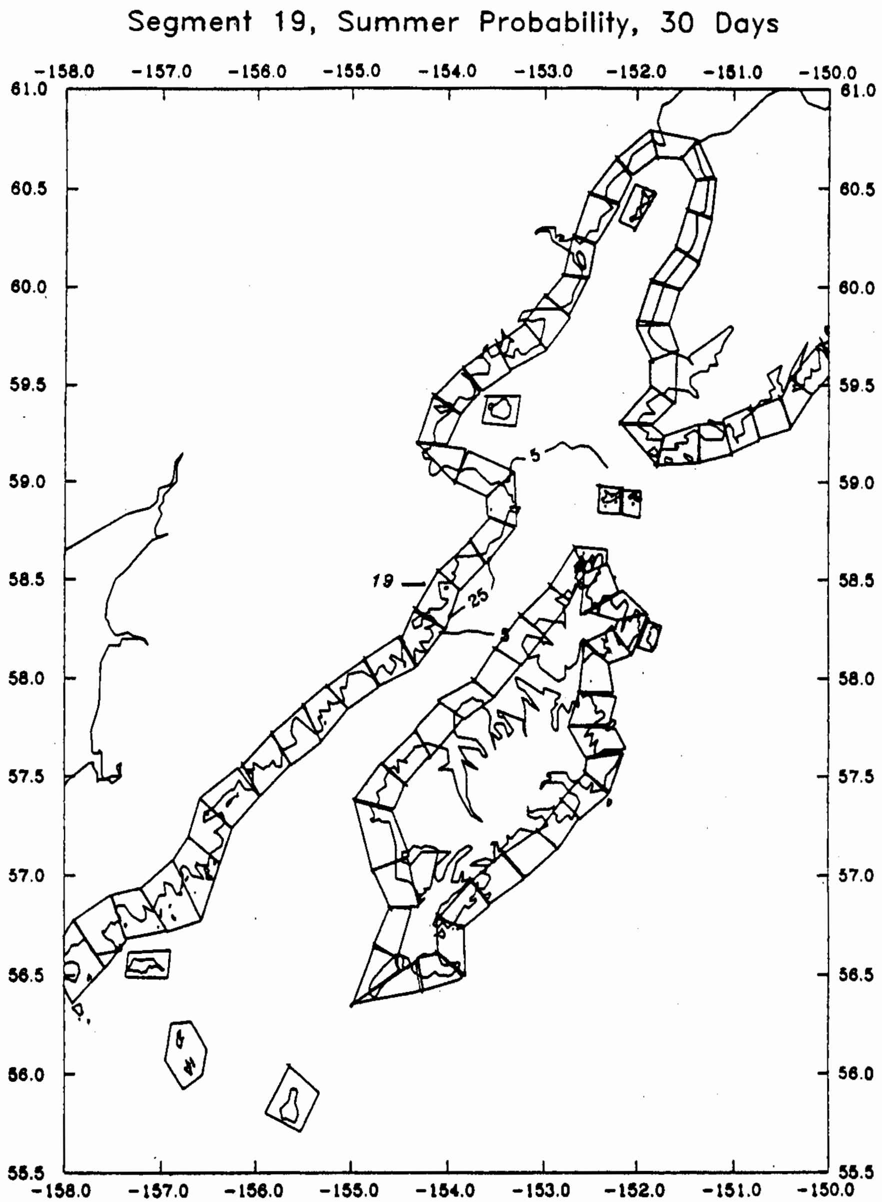


Figure B-17. Conditional Risk Contours for Land Segment 19, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

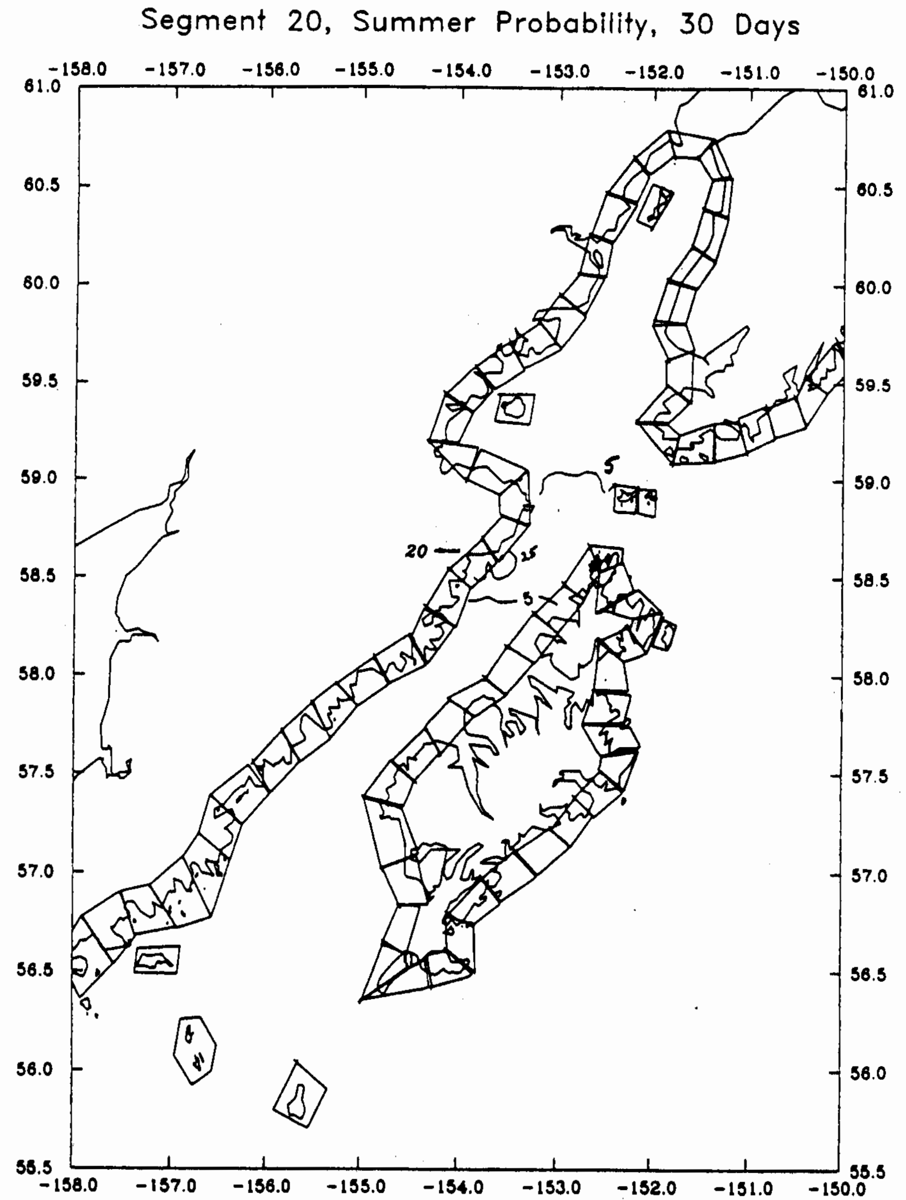


Figure B-18. Conditional Risk Contours for Land Segment 20, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

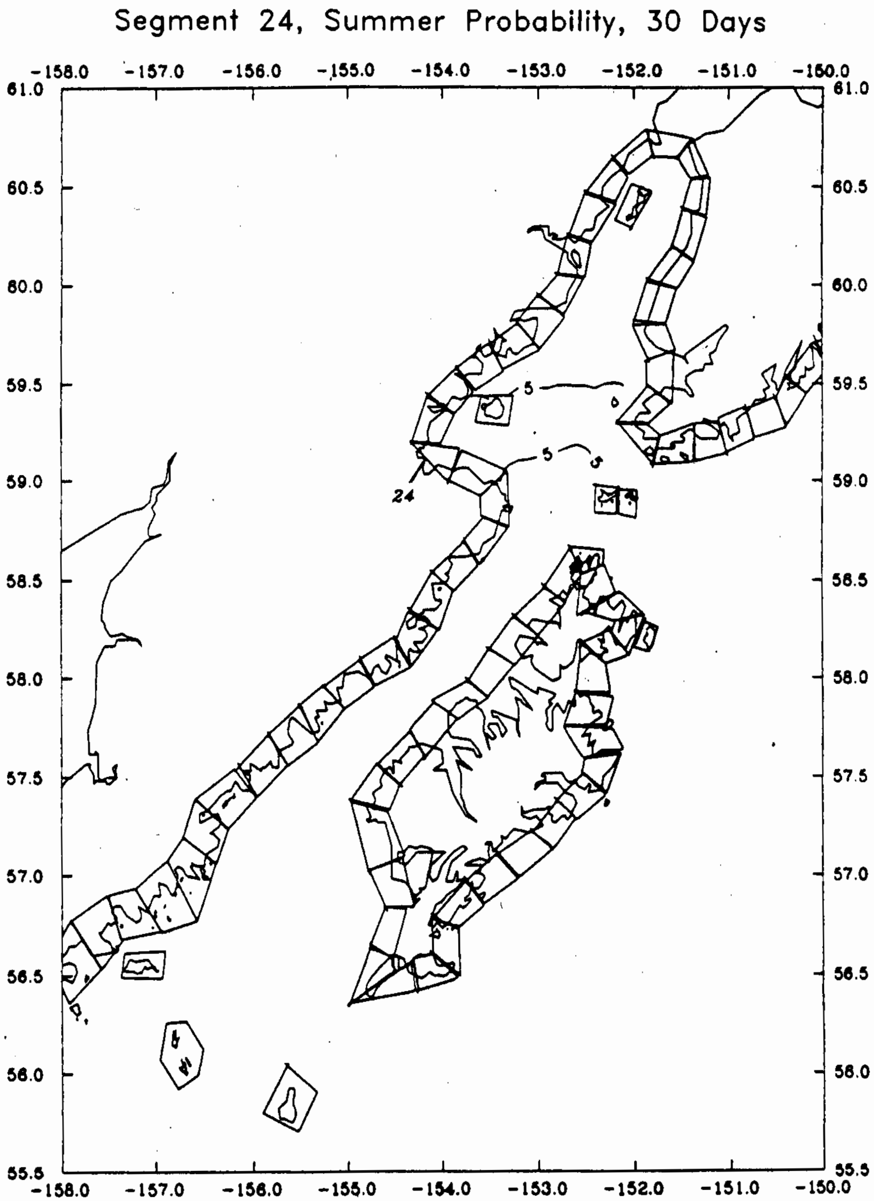


Figure B-19. Conditional Risk Contours for Land Segment 24, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

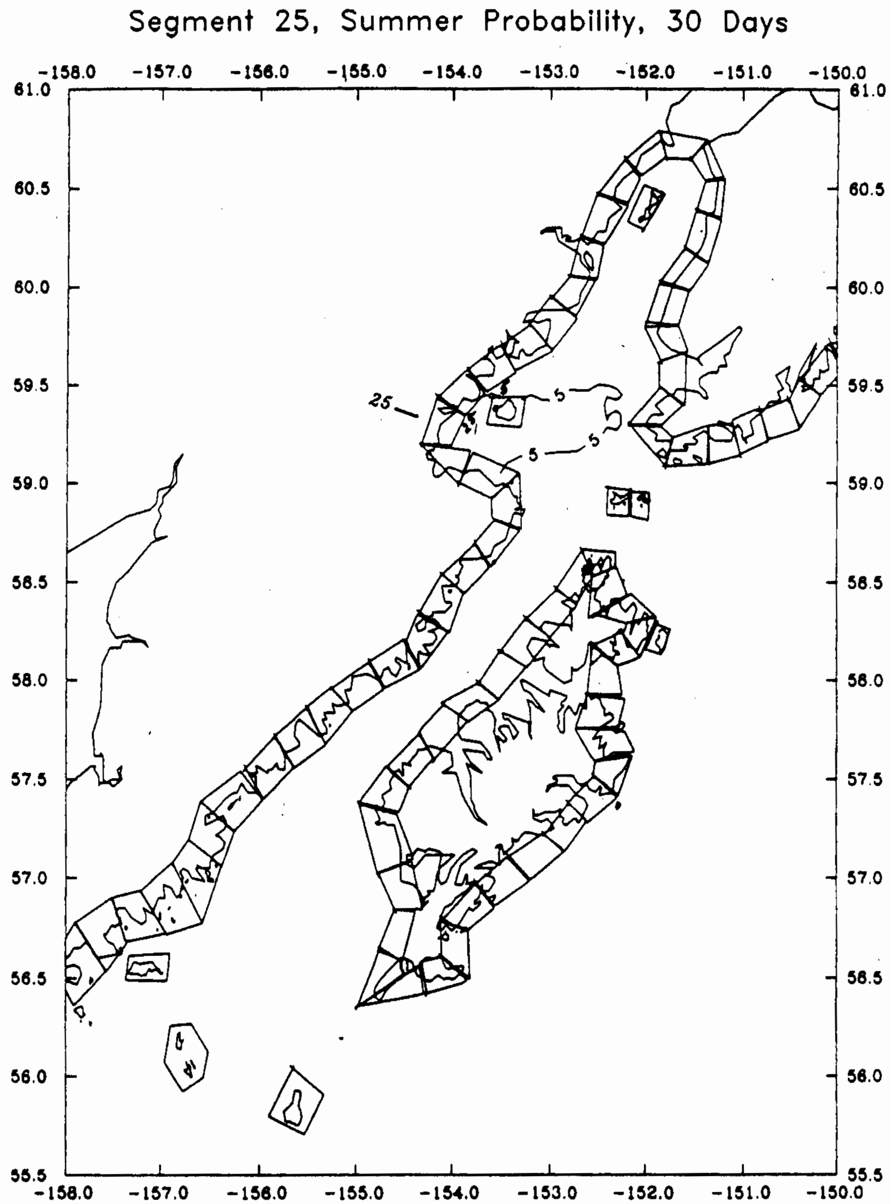


Figure B-20. Conditional Risk Contours for Land Segment 25, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

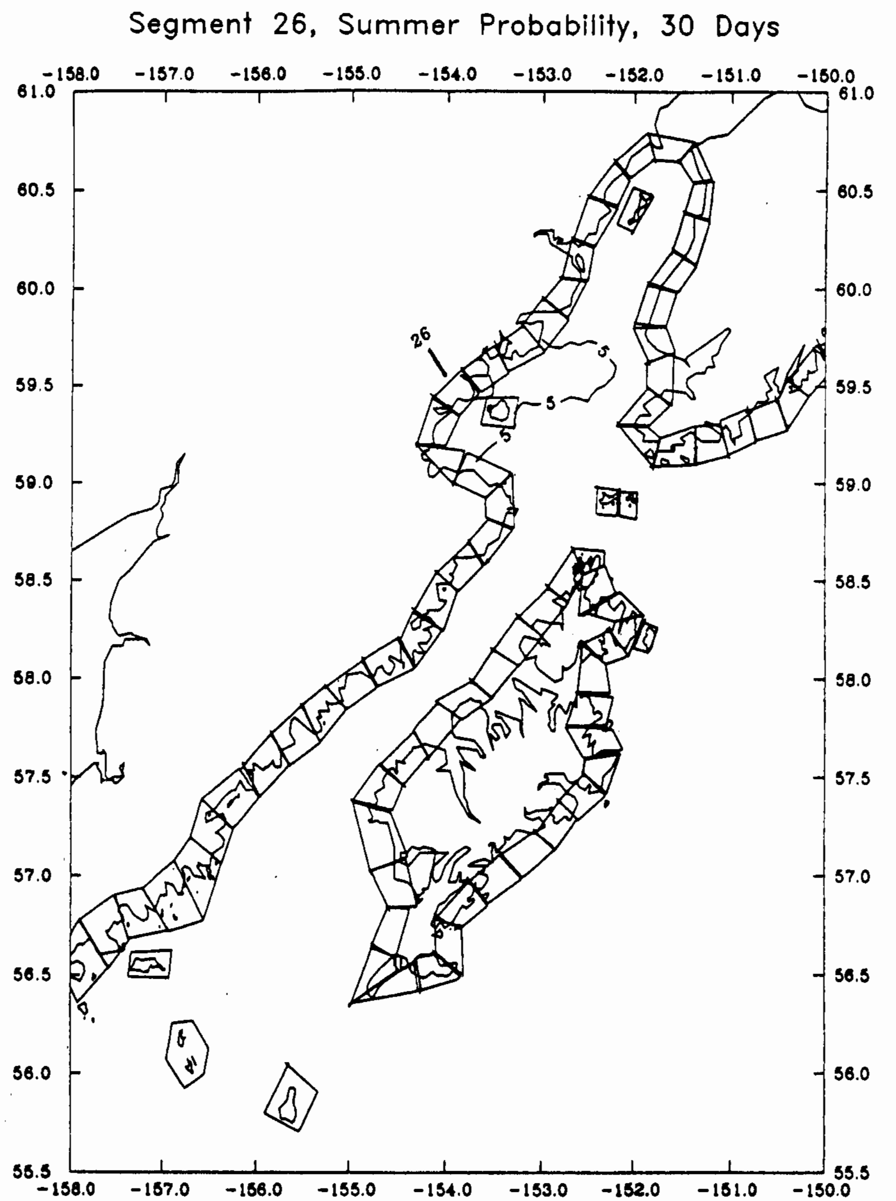


Figure B-21. Conditional Risk Contours for Land Segment 26, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

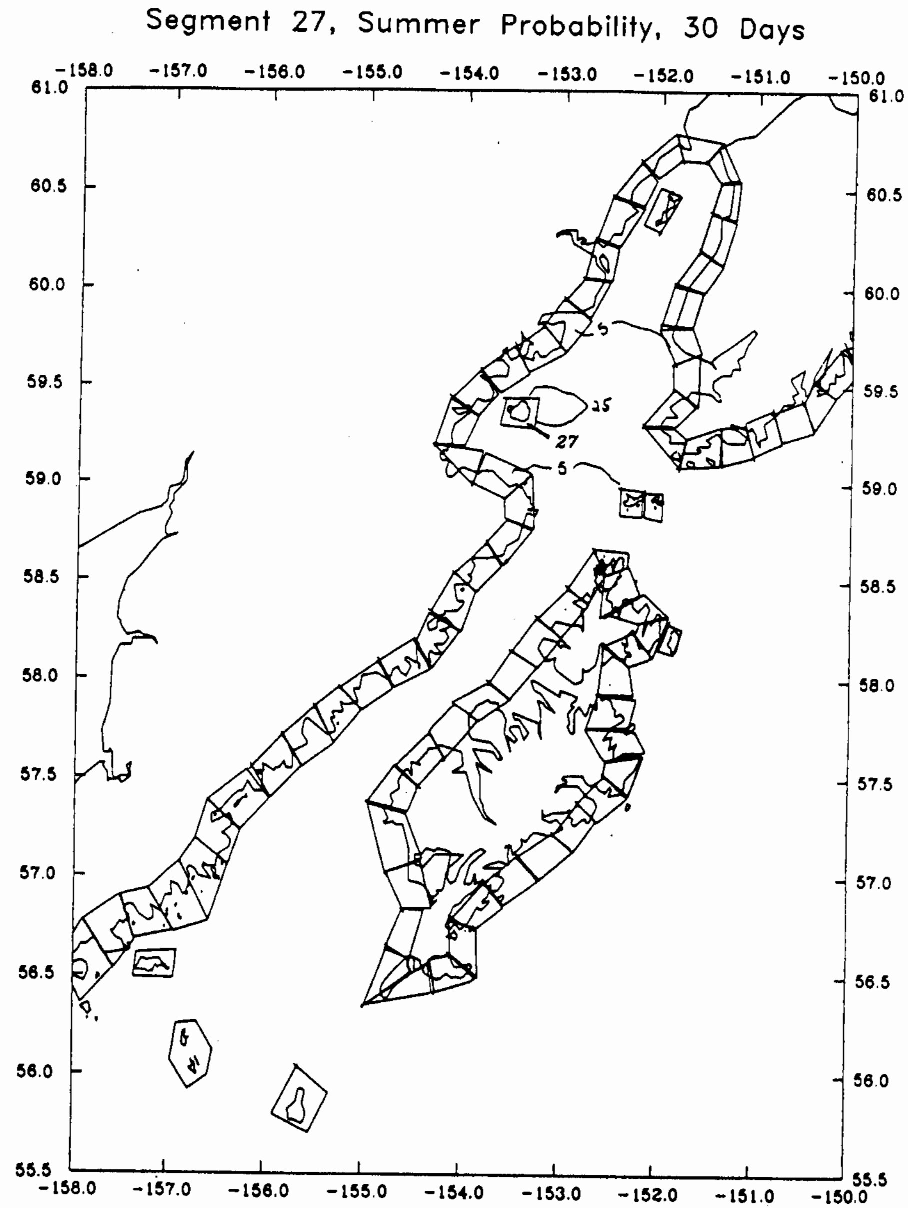


Figure B-22. Conditional Risk Contours for Land Segment 27, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

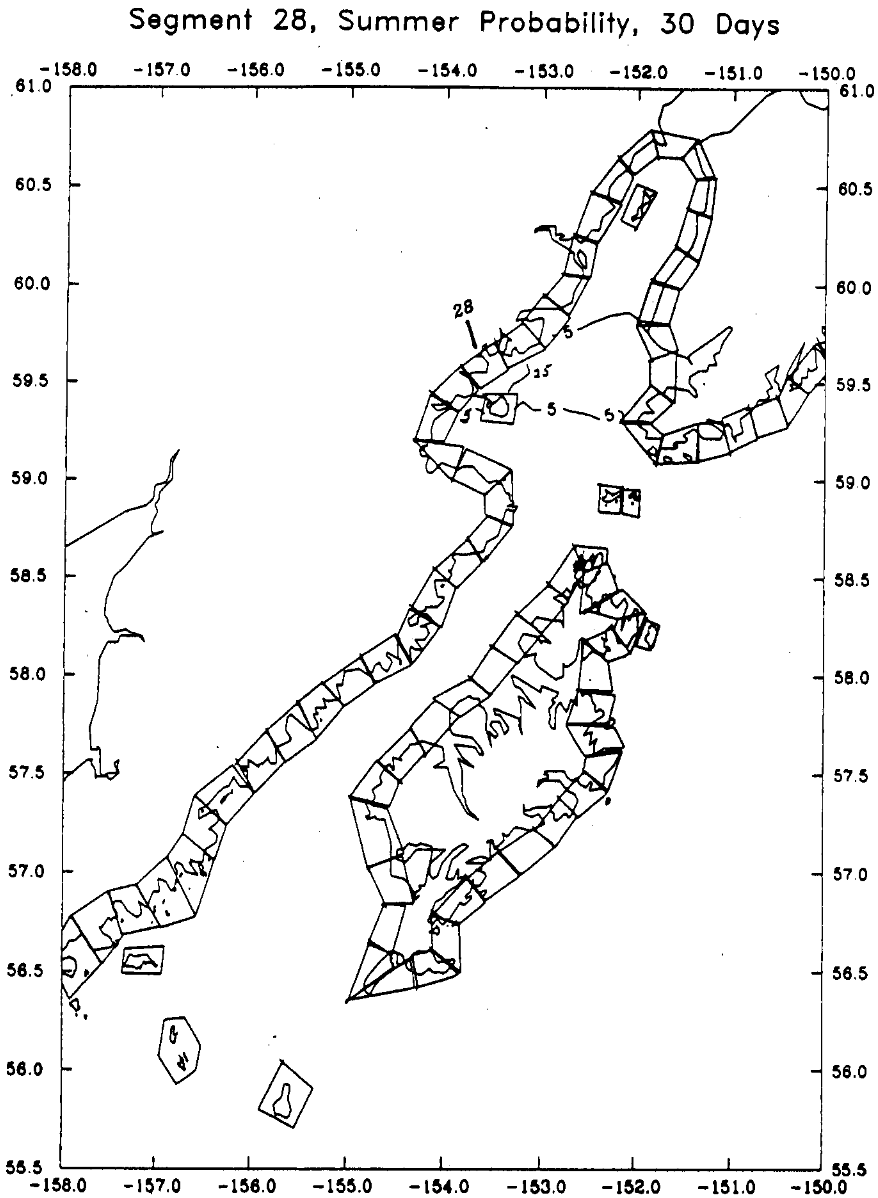


Figure B-23. Conditional Risk Contours for Land Segment 28, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

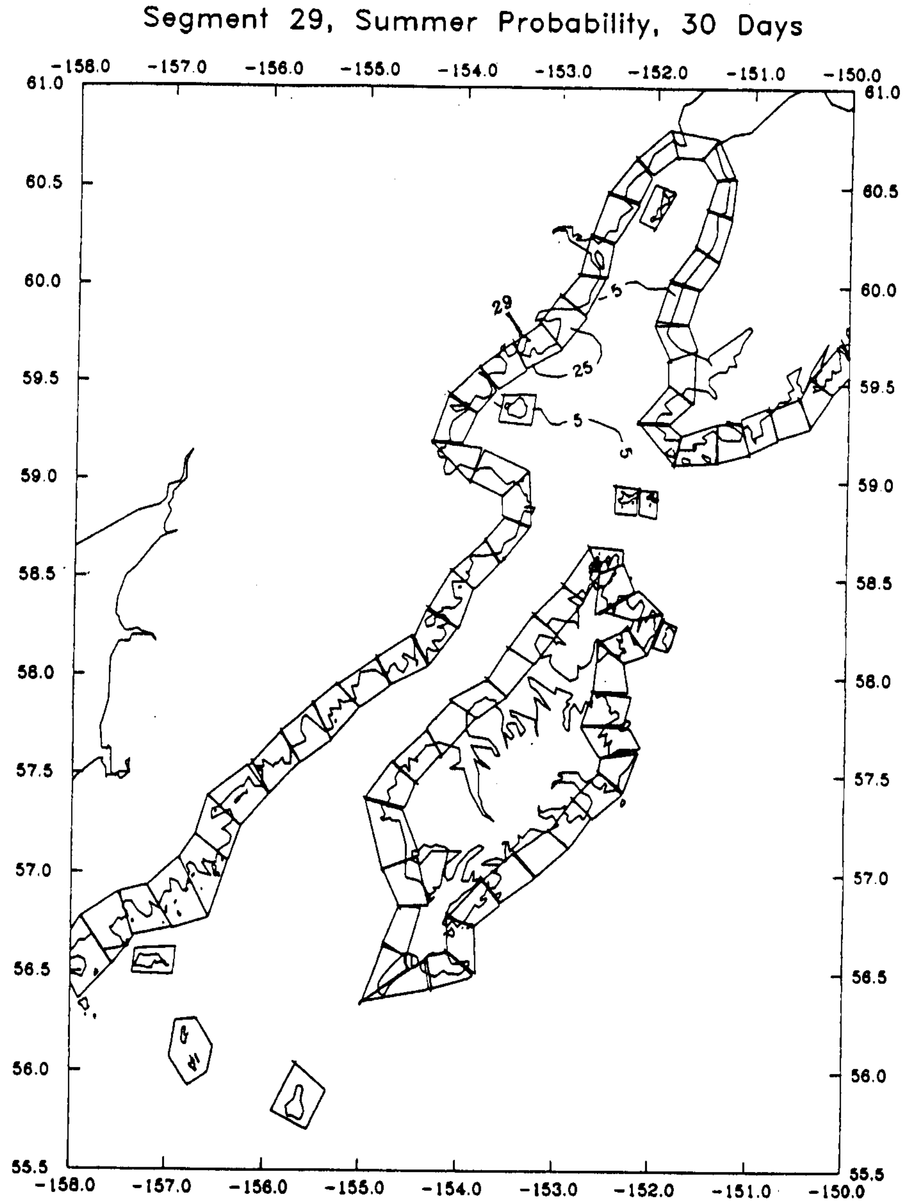


Figure B-24. Conditional Risk Contours for Land Segment 29, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

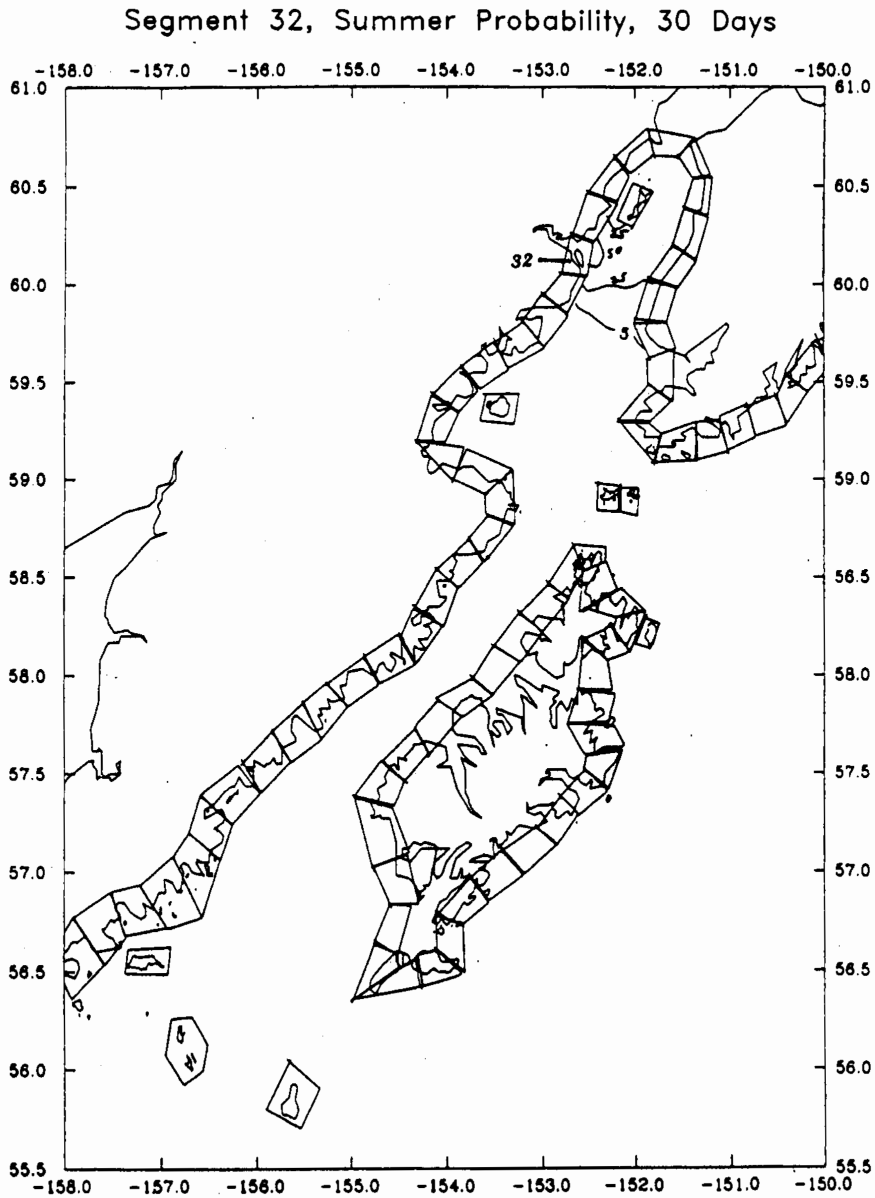


Figure B-25. Conditional Risk Contours for Land Segment 32, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

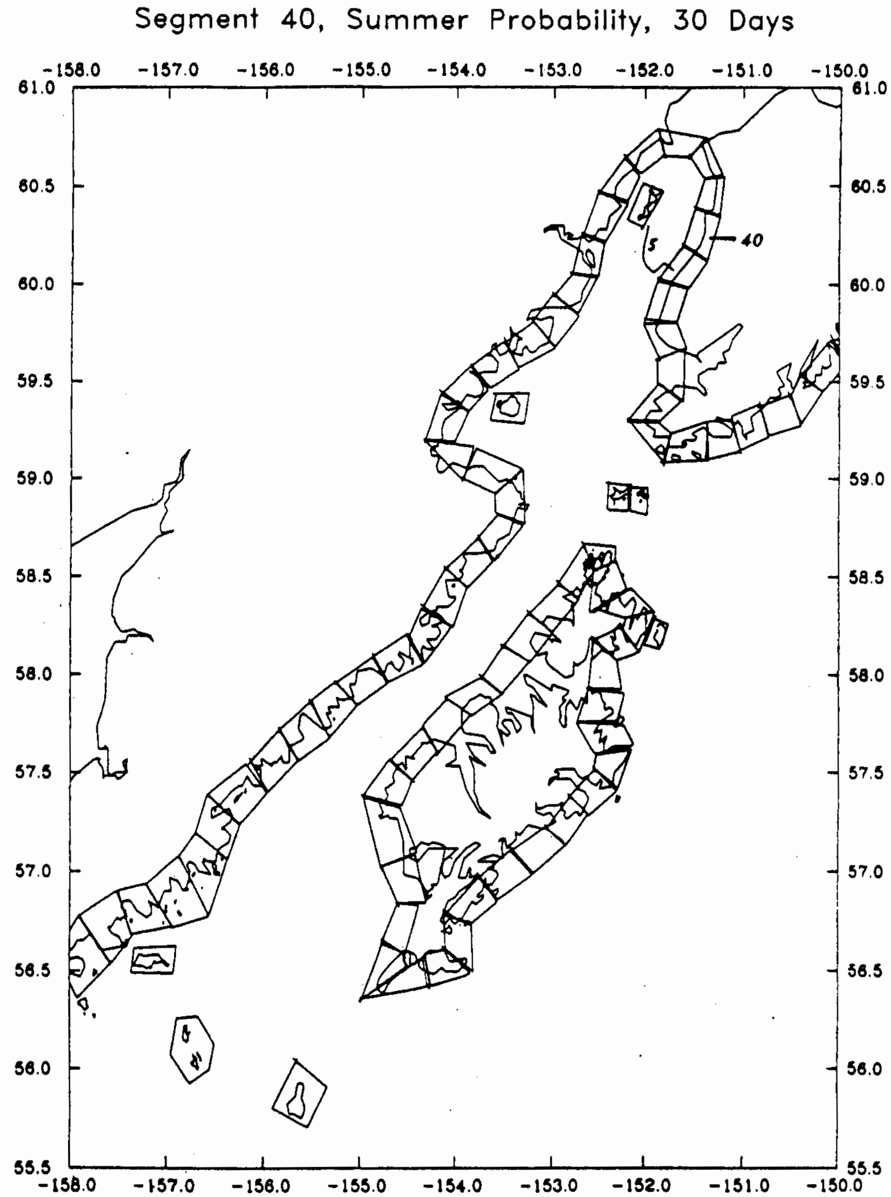


Figure B-26. Conditional Risk Contours for Land Segment 40, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

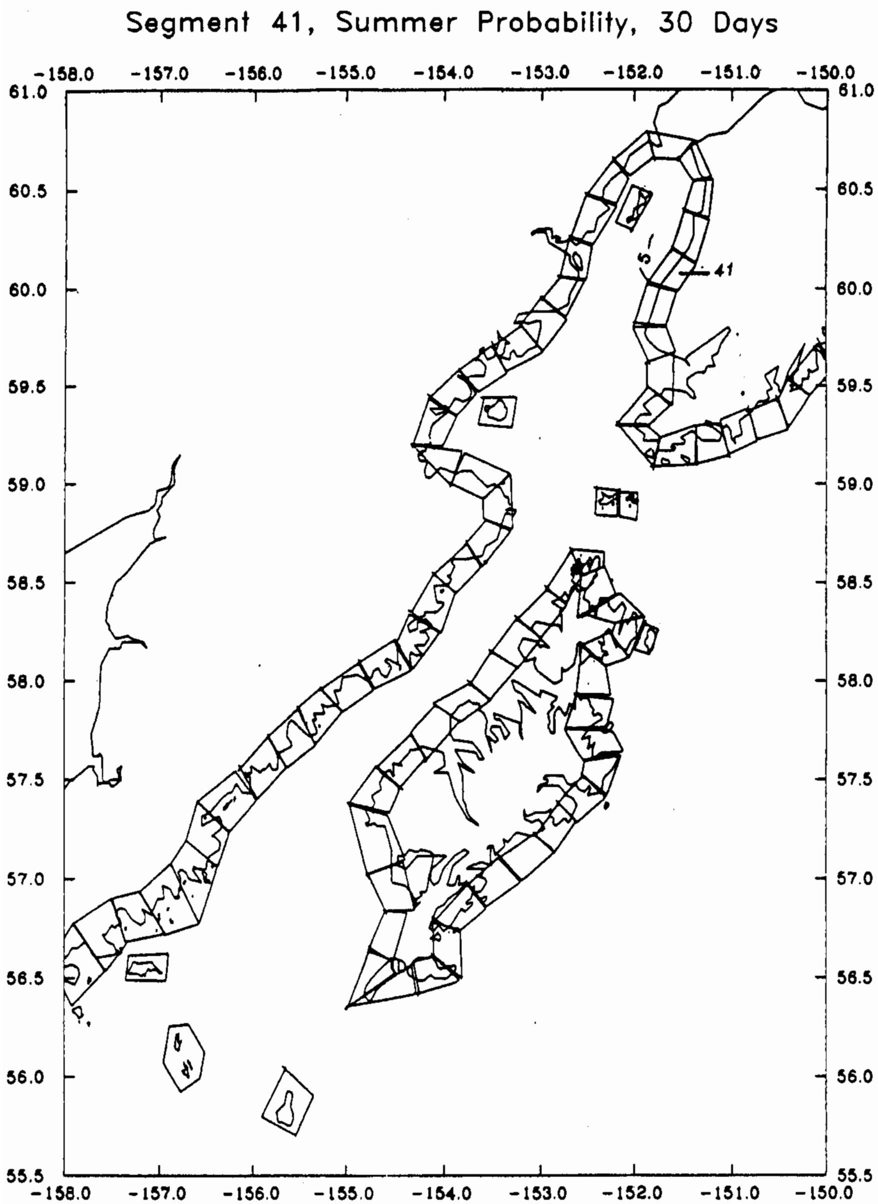


Figure B-27. Conditional Risk Contours for Land Segment 41, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

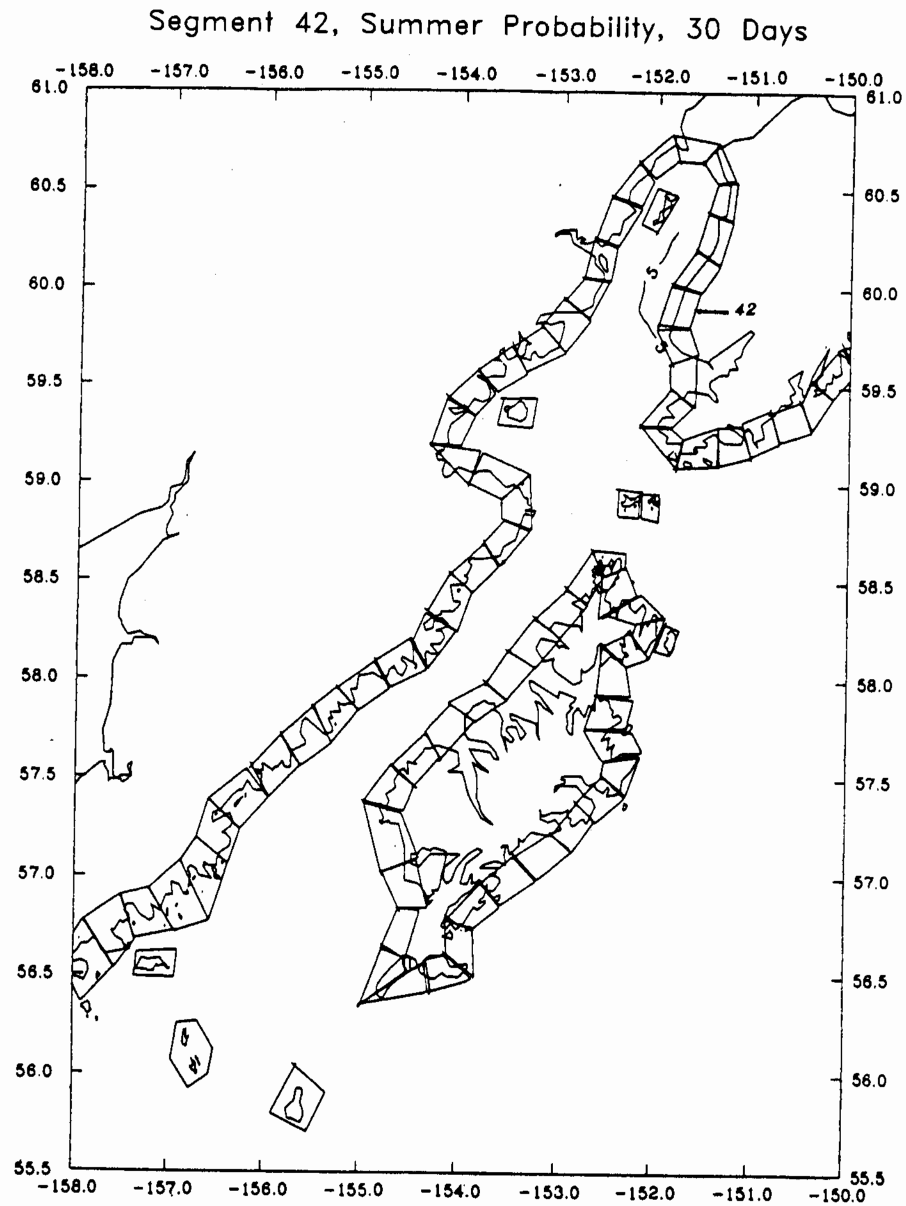


Figure B-28. Conditional Risk Contours for Land Segment 42, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.

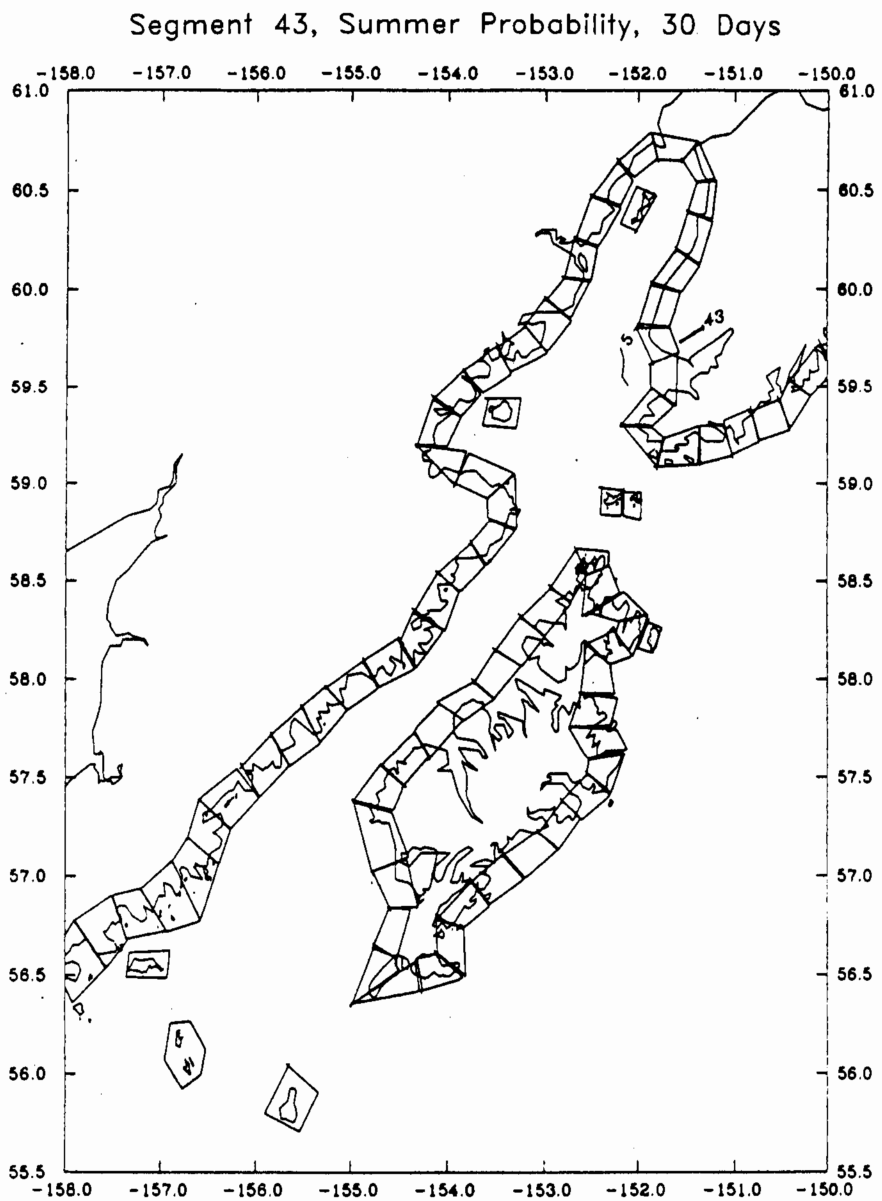


Figure B-29. **Conditional Risk Contours for Land Segment 43, 30-Day Summer Probabilities, for Proposed Cook Inlet OCS Lease Sale 149.**

APPENDIX C

The 200,000-Barrel Oil-Spill Analysis

A 200,000-BARREL OIL-SPILL ANALYSIS

I. ASSUMPTIONS FOR THE 200,000-BARREL-OIL SPILL

The potential effects of a catastrophic spill of 200,000 barrels (bbl) are analyzed on representative areas of sensitive resources in the Cook Inlet/Shelikof Strait region. A very large oil spill is a low-probability event but has the potential for very high effects on the environment. Kennedy Entrance was chosen for this analysis based on the diversity of exposed sensitive environmental resources from an oil spill in this area. The spill size was chosen based on the two largest tanker spills in U.S. waters, the *Burma Agate* near Galveston (247,500 bbl) and the *Exxon Valdez* in Prince William Sound (240,500 bbl) (Anderson, 1993, personal comm.). The selected area is affected by a 200,000-bbl hypothetical spill with characteristics identified in the following scenario.

Tanker-Spill Scenario: A hypothetical tanker spill occurs along hypothetical spill site T4 with onshore winds in April (Fig. C-1). The 70,000 deadweight ton tanker releases 200,000 bbl of Cook Inlet crude oil. Weather conditions hamper cleanup activities in the first few days and the oil rapidly is washed ashore, contacting the coastline within hours and affecting the exposed portion of the area within 30 days after its release.

Tables B-2 through B-4 and B-8 through B-10 in Appendix B list estimated conditional probabilities (expressed as percent chance) that an oil spill starting at hypothetical spill site T4 in the summer season will contact individual land segments (LS's), sea segments, and environmental resource areas (ERA's) within 3, 10, and 30 days. Figures C-1 and C-2 graphically present the estimated conditional probabilities (expressed as percent chance) that an oil spill starting at hypothetical spill site T4 in the summer season will contact individual land segments, sea segments, and environmental resource areas within 3, 10, and 30 days, assuming a 200,000-bbl spill occurs along hypothetical spill site T4 in Kennedy Entrance just north of the Barren Islands.

The hypothetical 200,000-bbl spill occurs approximately 18 kilometers due northeast of the Barren Islands in Kennedy Entrance along hypothetical tanker segment T4. The current regime in the vicinity of this hypothetical 200,000-bbl spill is characterized by an inflow of the Alaska Coastal Current and tidal currents of considerable velocity. In the deep waters of Kennedy Entrance, the current usually is regular and appears to have less force than on the sides of the passage.

Within 3 days during summer, the Oil-Spill-Risk Analysis (OSRA) estimates oil-spill-contact to the Barren Islands, Chugach Bay, East Chugach Island, Perl Island, Elizabeth Island, Koyuktolik Bay, Port Chatham, Douglas Reef, and Cape Douglas (LS's 21, 22, 46, 47, and 48) from a spill occurring along tanker segment T4 (Fig. C-2). During the summer by the end of day 10, the OSRA estimates oil-spill contact to Kamishak Bay, Hallo Bay, Kukak Bay, Shuyak Island, northern Afognak Island, and southern Kachemak Bay (LS's 18-20, 23-30, 45, and 73-77) from a spill occurring along tanker segment T4 (Fig. C-2). By the end of day 30, the OSRA estimates contact on the northern side of Kachemak Bay, Marmot Island, and Alinchak Bay (LS's 15, 43, 44, and 79) from a spill occurring along tanker segment T4 (Fig. C-2).

During summer by the end of day 3, the OSRA estimates oil-spill contact to ERA's 3 through 8 from a spill occurring along tanker segment T4 (Fig. C-2). By the end of day 10, the OSRA estimates oil-spill contact to ERA's 1, 2, 9 through 11, and 23 through 25 from a spill occurring along tanker segment T4 (Fig. C-2). By the end of day 30, the OSRA estimates contact to ERA 12 from a spill occurring along tanker segment T4 (Fig. C-2).

Using the oil-weathering model of Kirstein, Payne, and Redding (1983), the mass balance estimates from the *Amoco Cadiz* oil spill (Gundlach et al., 1983) and the *Exxon Valdez* oil spill (EVOS) (Wolfe et al., 1993), and Table C-1, a qualitative mass balance for a hypothetical catastrophic oil spill of 200,000 bbl is presented in Table C-2. Approximately 30 percent of the oil is dispersed into the water column. A large component, approximately 28 percent, comes ashore. Approximately 30 percent of the oil is lost to the atmosphere due to evaporation. After 60 days, the oil (7,000 bbl) represented by the slick is no longer visible as a coherent slick and is in the form of tarballs and tar particles suspended in the water column.

As stated in the mass balance, approximately 55,000 bbl would be onshore after 60 days. The approximate 55,000 bbl of oil is estimated to landfall portions of the shores of lower Cook Inlet and Shelikof Strait, based on the OSRA results discussed above from a spill along hypothetical spill site T4.

Table C-1
Hypothetical 200,000-Bbl Tanker-Spill-Size Examples for Cook Inlet Planning Area[1]

Spill Size	200,000 bbl					
Time After Spill in Days	1	3	10	30	45	60
200,000-Bbl Spill[2]						
Oil Remaining (%)	81	71	54	38	34	31
Oil Dispersed (%)	2	7	20	33	36	38
Oil Evaporated (%)	15	20	24	28	29	29
Thickness (mm)	5.3	2.0	1.4	0.7	0.5	0.2
Area of Thick Slick (km^2)[3]	4.7	7.4	12	17	19	21
Discontinuous Area (km^2)[4]	56.2	234.4	1,096.5	4,570.9	7,762.5	11,220

Source: USDOI, MMS, Alaska OCS Region, 1993.

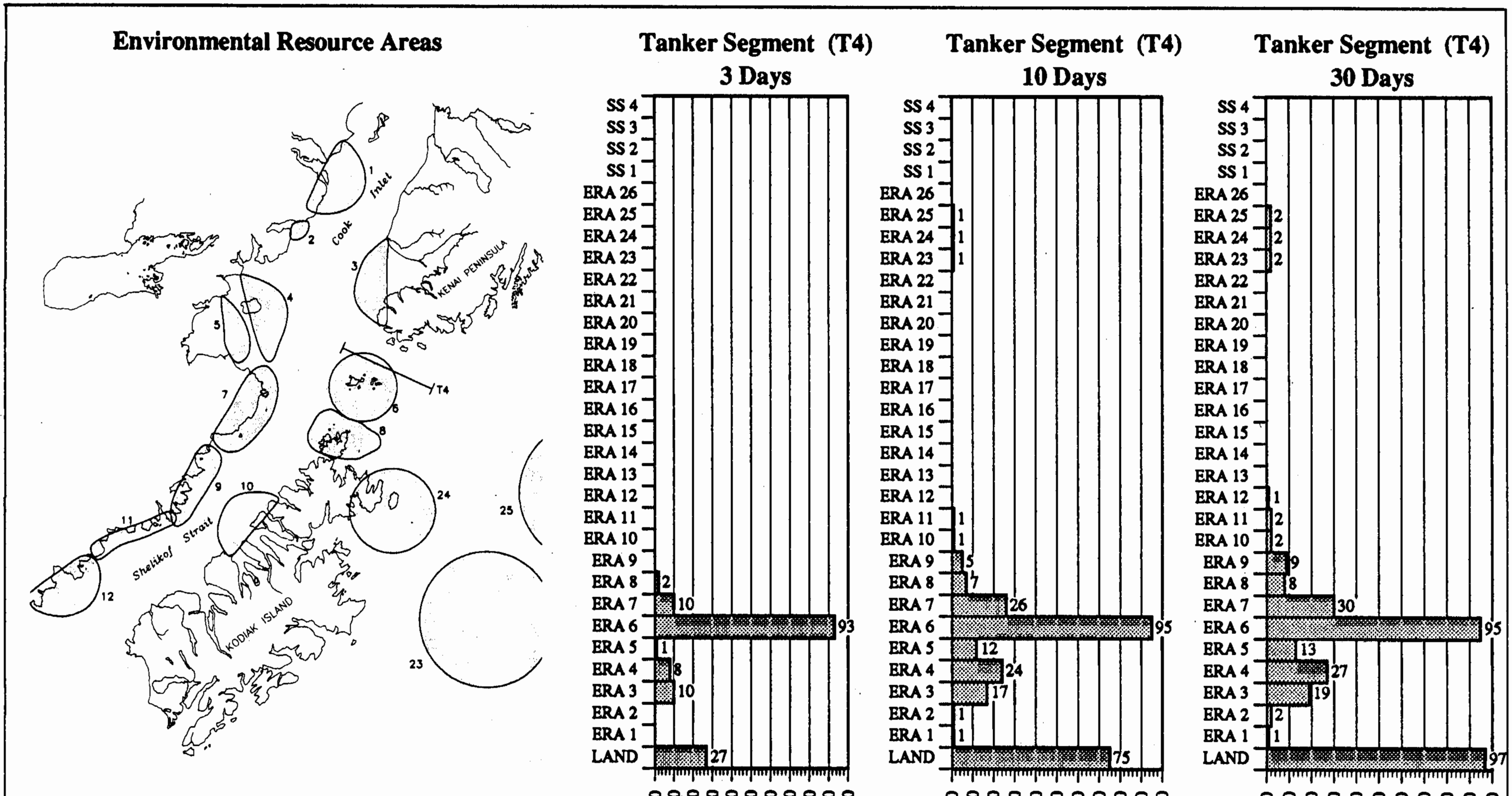
1 Calculated with the SAI oil-weathering model of Kirstein, Payne, and Redding (1983). These examples are discussed in the Fate and Behavior portion of Section IV.A. The examples are for a Cook Inlet Crude type.
2 April 14.2-knot-wind speed, 4.3-°C, 1.2-meter-wave height. Average Weather Marine Area A, Brower et al. (1988).
3 This is the area of oiled surface.
4 Calculated from Equation 6 of Table 2 in Ford (1985) and is the discontinuous area of a continuing spill or the area swept by an instantaneous spill of a given volume.

Table C-2
Mass Balance of Oil Through Time of a Hypothetical 200,000-Bbl-Oil Spill Near Kennedy Entrance

Days	1	3	10	30	45	60
Oil Evaporated[1]	30,000[2]	40,000	48,000	56,000	58,000	58,000
Oil Disbursed[1,3]	4,000	9,000	31,000	55,000	57,000	60,000
Oil Sedimented[1,3]	0	5,000	9,000	11,000	13,000	16,000
Oil Onshore[1,3]	0	17,000	30,000	40,000	45,000	55,000
Oil Remaining[1,3]	162,000	125,000	78,000	36,000	23,000	7,000

Source: MMS, Alaska OCS Region, 1993.

1 Calculated with the SAI oil-weathering model of Kirstein, Payne, and Redding (1983). The examples are for a Cook Inlet crude type in April 4.8-°C sea-surface temperature and 14.2-knot winds.
2 Barrels.
3 Modified to fit fate calculations of Gundlach et al. (1983) and Wolfe et al. (1993).

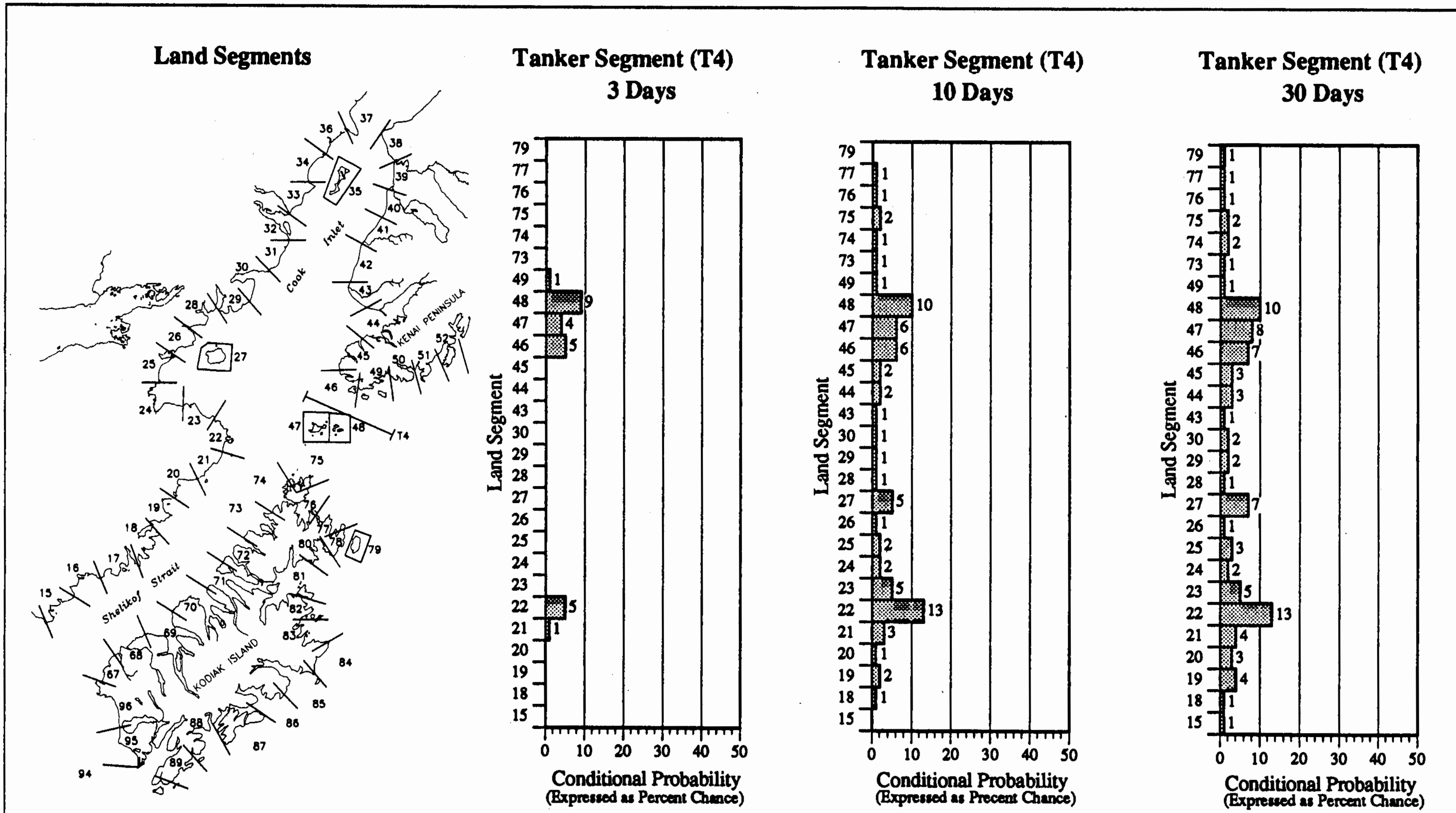


	3 Days	10 Days	30 Days
ERA 25		1	2
ERA 24		1	2
ERA 23		1	2
ERA 12			1
ERA 11		1	2
ERA 10		1	2
ERA 9		5	9
ERA 8	2	7	8
ERA 7	10	26	30
ERA 6	93	95	95
ERA 5	1	12	13
ERA 4	8	24	27
ERA 3	10	17	19
ERA 2		1	2
ERA 1		1	1
LAND	27	75	97

Note: Only ERA's with >0.5 conditional probability (expressed as percent chance) are shown on the locater. ERA's 13-22 and SS's 1-4 have <0.5 conditional probability (expressed as percent chance).

Source: Appendix B, Tables B-2 through B-4.

Figure C-1. Estimated Conditional Probabilities (expressed as percent chance) That an Oil Spill Greater Than or Equal to 1,000 Barrels Starting at Hypothetical Tanker Segment 4 (T4) in the Summer Season Will Contact a Certain Environmental Resource Area (ERA), Sea Segments (SS), and Land within 3, 10, or 30 Days, Cook Inlet Sale 149.



Note: Only land segments with >0.5 conditional probability (expressed as percent chance) are shown on this graph. All other land segments have <0.5 conditional probability (expressed as percent chance) for 3, 10 and 30 days from a spill originating at T4.

Source: Appendix B, Tables B-8 through B-10.

Figure C-2. Estimated Conditional Probabilities (expressed as percent chance) That an Oil Spill Greater Than or Equal to 1,000 Barrels Starting at Hypothetical Tanker Segment 4 (T4) in the Summer Season Will Contact a Certain Land Segment within 3, 10, or 30 Days, Cook Inlet Sale 149.

Theoretical calculations of slick size from a hypothetical spill of 200,000 bbl were investigated using the equations of Ford (1985) and Kirstein, Payne, and Redding (1983). Table C-2 shows the estimated areal extent of a continuous thick slick and a discontinuous slick through time.

The estimated length of shoreline affected is calculated from the equations of Ford (1985). The equation describes the median length of coastline affected from empirical studies. Table C-3 presents calculations of the median number of kilometers of coastline that potentially would be affected by a spill of 200,000 bbl. The median number of kilometers of coastline potentially affected is greater than the amount of shoreline available from the land segments estimated to be contacted after 3 days. This assumes that the median amount of shoreline oiled is cumulative. This indicates there is potential for 100-percent-shoreline coverage along LS's 21, 22, 46, 47, and 48. After 10 and 30 days, there is less than an estimated 100-percent-shoreline coverage along the land segments contacted by the oil-spill-trajectory model from hypothetical spill site T4, because the amount of shoreline available becomes greater than the median amount of shoreline oiled.

II. 200,000 BARREL OIL-SPILL ANALYSIS, EFFECTS ON

A. Water Quality: Accidental oil spills would add substances that may be foreign to or increase the concentration of constituents already present in the water column of Cook Inlet/Shelikof Strait. In general, the added substances may cause sublethal effects in some marine organisms if concentrations are greater than the chronic criteria and lethal effects if concentrations are greater than acute criteria. As noted in Section IV.B.1.a(1)(b)2)a) of the EIS, this analysis will consider 15 micrograms per liter (μg/l) to be a chronic criterion and 1,500 μg/l—a hundredfold higher level—to be an acute criterion for total hydrocarbons.

The effects of a very large, 200,000-bbl-oil spill on water quality are based on the amount of oil dispersed into the water column; the characteristics of the oil spill are noted in Tables C-1 and C-2. The concentrations can be simply estimated from the amount of oil dispersed into the water column for each time interval by assuming (1) the extent of the discontinuous area estimated for the surface extends into the water column; (2) the depth of mixing is 4.8 meters (m) after 3 days, 10 m after 10 days, and 30 m after 30 days; (3) the concentration of the dispersed oil is uniform in the "mixed" watermass; (4) other processes, except sedimentation, affecting degradation of oil or removal of oil from the water column are neglected; and (5) the weight of a barrel of oil is 314.26 pounds (lb).

As noted in Sections III.A.3, 4, and 5, the waters of lower Cook Inlet generally are vertically well mixed, and some of the characteristics of the water column in Kennedy Entrance is estimated to range from 4.2 m (Redfox Bay along the north coast of Afognak Island) to 5.5 m (Seldovia) (Brower, et al., 1988). For the depth-of-mixing estimates, it is assumed the oil will be dispersed into the water column to a depth equivalent to the tidal range, 4.8 m, after 3 days; during this time interval, the area affected by the spill will have experienced six tidal cycles. At the end of 10 days, the oil is assumed to have dispersed to a depth of 10 m; during this time there will have been about 20 tidal cycles and two to three changes in the meteorologic events that affect wind-driven waves and surface currents. At the end of 30 days, the oil is assumed to have dispersed to a depth of 30 m; during this time, there will have been about 60 tidal cycles and 7 to 10 changes in the meteorologic events that affect wind-driven waves and surface currents. The depth of mixing assumptions are discussed in Section IV.B.1.a(c) of the EIS. The depth of mixing during the first day is assumed to be 1 m. Table C-2 shows the estimates of the amount of oil removed by sedimentation.

For a 200,000-bbl spill, the estimated concentration of oil dispersed into the water column after (1) 1 day is 10,142 μg/l; (2) 3 days is 1,140 μg/l; (3) 10 days is 403 μg/l; (4) 30 days is 57 μg/l; (5) 45 days is 35 μg/l; and (6) 60 days is 25 μg/l. The high concentrations of oil associated with estimating dispersal in the water column may represent an upper range of dispersed-oil concentrations reached during the first several days following a large spill; these concentrations are greater than the total hydrocarbon acute criterion of 1,500 μg/l that was used to evaluate the effects of a 50,000-bbl, and smaller, spill in Section IV of the environmental impact statement. After >10 days, the concentrations of the dispersed oil are within the range of concentrations reported for tanker spills of 0.18 and 1.6 million barrels of oil (National Research Council, 1985; Gundlach et al., 1983). The amount of dispersed oil in the water after 30 to 60 days emphasizes the time it will take before the oil is reduced to concentrations that are below the total hydrocarbon chronic criteria, 15 μg/l, and eventually disappears from the water. Dilution rates associated with permitted discharges, Section IV.B.1.a(1) of the EIS, suggest the dispersion rates of oil droplets in the water column may be greater than those estimated for this spill.

Table C-3
Median Number of Kilometers of Coastline that Could be Oiled by a Spill of 200,000 Barrels Through Time

Day	Coastline Available along Trajectories in Kilometers[1]	Median Amount of Coastline Oiled	Percent of Oil Coverage
1	unknown	257[2,3]	unknown
3	321	234	100%
10	1,900	204	36%
30	1,990	166	43%
45	unknown	93	unknown
60	unknown	53	unknown

Source: MMS, Alaska OCS Region, 1993

1 Calculated from the database GOA–SHO of Gundlach et al. (1990)

2 Calculated from Equation 6 of Table 2 in Ford (1985) using 14.2-knot-wind speed, 4.3 °C, 1.2-m-wave height and 59° Latitude

3 Median number in kilometers

Conclusion: The water quality would be reduced from good (unpolluted) to polluted by the presence of hydrocarbons from a large (200,000-bbl) oil spill that has a relatively low probability of occurring. Contamination (the presence of hydrocarbons in amounts $>15\ \mu g/l$) would be temporary (last for about 2 months, or more) and affect an area of about 10,000 km^2.

B. **Lower Trophic-Level Organisms:** The 200,000-bbl-oil spill would affect lower trophic-level organisms by exposing some of them to petroleum-based hydrocarbons. The effects of petroleum on lower trophic-level organisms are discussed in the base case and are summarized below. This analysis considers the effect of a 200,000-bbl-oil spill on lower trophic-level organisms.

The effect of petroleum-based hydrocarbons on phytoplankton, zooplankton, and benthic organisms ranges from sublethal to lethal. Where flushing times are longer and water circulation is reduced (e.g., bays, estuaries, and mudflats), adverse effects are expected to be greater and the recovery of the affected communities is expected to take longer. Large-scale effects on plankton due to petroleum-based hydrocarbons have not been reported. Assuming that a large number of phytoplankton were contacted by an oil spill, the rapid replacement of cells from adjacent waters and their rapid regeneration time (9-12 hours) would preclude any major effect on phytoplankton communities. Observations in oiled environments have shown that zooplankton communities experienced short-lived effects due to oil. Affected communities appear to recover rapidly from such effects because of their wide distribution, large numbers, rapid rate of regeneration, and high fecundity. Large-scale effects on marine plants and invertebrates due to petroleum-based hydrocarbons have not been reported. The sublethal effects of oil on marine plants include reduced growth and photosynthetic and reproductive activity. The sublethal effects of oil on marine invertebrates include adverse effects on reproduction, recruitment, physiology, growth, development, and behavior (feeding, mating, and habitat selection).

Figure C-2 indicates that the conditional probability of an oil spill contacting the shore (within 10 days) ranges from 1 to 6 percent for 23 land segments (LS's 18-21, 23-30, 43-47, 49, 73, 77) and from 10 to 13 percent for two others (LS's 48 and 22). Table IV.A.3-1 indicates that after 10 days, the 200,000-bbl spill would be 1.4 millimeters (mm) thick, whereas Table IV.A.3-1 indicates that after 10 days, the 50,000-bbl spill would be .8 mm thick. Thus, the 200,000-bbl spill would contact about 10 percent more shoreline than the base-case spill and would be almost twice as thick when it did so.

This analysis has conservatively assumed that the 200,000-bbl spill would contact 50-percent more shoreline (rather than the 10% indicated above) with twice as much oil as that of the base-case spill. The 200,000-bbl spill also is estimated to contact a great deal more intertidal shoreline outside and downcurrent of the sale area. In terms of surface area (open water) contacted within the sale area, the 200,000-bbl spill is estimated to cover a discontinuous surface area of 1,096.5 square kilometers (km^2), or 185 km^2 more (about 20%) than that of the base case (Table IV.A.3-1, 10 days). Within the sale area, all of the above differences in the two oil spills are estimated to increase base-case effects on marine plants and invertebrates in the intertidal area by about 50 percent and increase effects on plankton in open-water areas by about 20 percent (as indicated below). However, these increases are expected to have little effect on recovery times in Cook Inlet. This is primarily due to the high rate of hydrologic exchange in open-water areas and the amount of heavy wave action in most intertidal areas.

Based on these estimates and assumptions (see also the base case), the 200,000-bbl-oil spill is estimated to have sublethal and lethal effects on 1 to 4 percent of the phytoplankton and zooplankton populations in the sale area. Recovery is expected to take 1 or 2 days for phytoplankton and up to 1 week for zooplankton. The total percentage of plankton affected could increase to 6 percent, if many embayments were contacted by the spill. Recovery within the affected embayments is expected to take 1 to 2 weeks. Most marine plants and invertebrates in subtidal areas are not likely to be contacted by an oil spill (contact estimated at <5%); however, marine plants and invertebrates in intertidal and shallow subtidal areas are likely to be contacted by an oil spill. The 200,000-bbl-oil spill also is estimated to have lethal and sublethal effects on about 30 to 45 percent of the intertidal and shallow subtidal marine plants and invertebrates in the sale area (50% over that of the base case). Recovery of these communities is expected to take 2 to 3 years in high-energy habitats and up to 7 years in lower energy habitats. Small oil spills (estimated total of 555 bbl) may adversely affect individual lower trophic-level organisms in small areas immediately around the spills. However, they are not expected to have perceptible population-level effects on lower trophic-level organisms.

Conclusion: The 200,000-bbl-oil spill is estimated to have lethal and sublethal effects on 1 to 6 percent of the plankton in the sale area. Recovery is expected to take 1 or 2 days for phytoplankton and up to 1 week for zooplankton. The spill also is estimated to have lethal and sublethal effects on about 30 to 45 percent of the intertidal and shallow subtidal marine plants and invertebrates in the sale area. Recovery of these communities is expected to take 2 to 3 years in high-energy habitats and up to 7 years in lower energy habitats. Less than 5 percent of the subtidal benthic populations in the sale area are expected to be affected.

C. **Fisheries Resources:** A 200,000-bbl-oil spill from a tanker accident that occurred in Kennedy Entrance in April would have some adverse effect on pelagic, semidemersal, and demersal fishes that inhabit or migrate within the lower Cook Inlet/Shelikof Strait region. These adverse effects, ranging from sublethal to lethal in the event of contact by oil, would not, however, reach any appreciable number of finfishes. As analyzed in Section IV.B.1.c, the 200,000-bbl-oil spill does not reach any large ocean area with persistent toxicity (Malins, 1977). These factors, when compared with the large regional finfish populations, the seasonal migratory behavior of many species, the low densities within a given habitat, and the wide distribution of the populations over this region and within the sale area, would cause only a very small percentage of a population (<5% of even the indigenous species of the area) to be contacted by a 200,000-bbl spill.

The primary species at hazard during this season probably would be pink salmon fry. Pink salmon have economic importance and are abundant over much of Alaska from the Southeast northward into Southcentral and into the Alaska Peninsula and Aleutian Islands. In addition, they are an excellent surrogate for other salmon species. Pink salmon fry would be leaving spawning streams in the Kennedy Entrance area at this time. As revealed by the EVOS studies in Prince William Sound, these juvenile pinks could suffer reduced growth due to the metabolic cost of depurating a spill-related hydrocarbon burden (Wertheimer et al., 1993; Carls et al., 1993), and the slower growth of juvenile pinks may have caused an incremental reduction in survival to adulthood. Small numbers of smolt from other salmon species also might be contacted. The coastal areas that are oiled, however, do not represent a large segment of the pink salmon spawning habitat or migratory routing for the lower Cook Inlet region. In Prince William Sound, for example, a relatively small segment of the pink salmon streams was oiled by the EVOS. In three salmon-management districts with 209 identified spawning streams, 29 (14%) actually were on oiled shorelines (Maki et al., 1993). A 200,000-bbl-oil spill in the outside waters of Kennedy Entrance would have the potential to contact fewer of the larger number of pink salmon spawning streams and, given the depth at which pink salmon fry and other salmon usually migrate, perhaps <1 percent of the migrants would be at risk from this 200,000-bbl-oil spill.

Pacific herring also might be adversely affected by a 200,000-bbl oil spill, because this species spawns extensively over much of the coastal area of this region, but usually later on in this season. The number of herring and their spawn affected is indeterminate; however, the loss likely would be large in the coastal areas contacted by oil where herring spawn. Given the size and distribution of herring populations and the limited coastal area contacted, there probably would not be a large-scale loss of herring from this 200,000-bbl-oil spill.

Some semidemersal fishes might be injured by contact with this large oil spill but, given their usual habitat in deeper waters, only the limited, low-concentration water-soluble fractions of the oil would reach these depths where it is no longer at concentrations toxic to semidemersal fishes (Kineman, 1980). In April, some pelagic eggs/larvae of semidemersal fishes might be at the surface but at comparatively low densities, because the pelagic zone where these occur extends to 50 m in deeper waters. Eggs/larvae also are generally widely distributed. For these reasons, no appreciable number of eggs/larvae of semidemersal fishes would be vulnerable to the 200,000-bbl-oil spill.

Demersal fishes, well offshore and at depth, are not likely to be contacted or affected by the oil spill. Those demersal species with pelagic eggs/larvae might be affected in the immediate zone of the oil spill, but the numbers so affected would not comprise large numbers of the total populations. This is because densities per square meter of seawater do not range above units of tens, while egg complements of most demersal species range in the thousands (Bakkala, 1975).

Conclusion: A 200,000-bbl-oil spill resulting from a tanker accident in Kennedy Entrance in April could have some effect on small numbers of migrating salmon fry/smolt. However, such a spill is unlikely to have a population-level effect on any salmonid species. Eggs and larvae of pink salmon, semidemersal, and demersal fishes could suffer increased mortality. Such mortality is not expected to have a population-level effect on pink salmon but may cause a reduction in survival of an entire herring year-class. Some individual demersal fishes are expected to be killed by the spill, but this mortality is not expected to affect demersal fish populations.

D. Marine and Coastal Birds: This analysis assumes that a 200,000-bbl tanker oil spill occurs under stormy conditions in April about 18 km northeast of the Barren Islands in Kennedy Entrance to Cook Inlet along tanker segment T4. Within 3 days, the spill from tanker segment T4 is estimated to contact the Barren Islands, Chugach Islands, and as far west as Cape Douglas. The OSRA estimates a 93-percent chance of oil contacting the Barren Islands seabird-foraging area (ERA 6) within 3 days during summer from T4 (Fig. C-2). At this time, the spill is estimated to have spread or swept over 234.4 km^2 of sea surface (Table C-1). The oil spill is estimated to have swept over much of the Barren Islands' seabird primary-foraging and -concentration area during the time when the adult murres are rafting on the water near the colonies. Several thousand to perhaps tens of thousands of seabirds are expected to be killed by the spill in the Barren Islands area.

Common murres that nest on the Barren Islands are believed to have declined as a result of the EVOS and have not completely recovered since that spill. The further loss of several thousand murres from this spill is expected to retard recovery of the murre population in the near future. Other seabirds (such as murres and puffins) that nest in the Barren Islands are expected to suffer high losses (perhaps $\geq$10,000) from this spill. Murres and puffins and other alcid species with low reproductive rates are expected to take more than one generation (probably <3 generations) to completely recover.

Within 10 days during summer, the tanker spill from T4 is estimated to contact Shuyak and the northern part of Afognak Islands (LS's 73-77) and the Alaska Peninsula (LS's 18-22) as far south as Kukak Bay (LS 18). The numerous small seabird colonies along the coast of Shuyak and Afognak Islands, especially the diving species (cormorants and puffins), are expected to suffer many losses (perhaps several hundred to thousands) from the spill. Some of the oil from the spill that contacts the Alaska Peninsula is expected to contaminate intertidal prey organisms of sea ducks and shorebirds. This contamination is expected to reduce the productivity of some nesting sea ducks and perhaps shorebirds in oiled areas where the contamination is expected to persists for perhaps 5 years, or more (such as in mussel and clam beds).

Within 30 days during summer, the spill from T4 is estimated to contact the north side of Kachemak Bay (LS 43) and to reach as far south in Shelikof Strait as Puale Bay (LS 15). The loss of sea ducks and marble murrelets is expected to increase (perhaps the loss of several thousand birds). The murre population of Puale Bay is expected to suffer some losses (perhaps thousands) from the spill at this time. This population was affected by the EVOS and the further loss of murres to this population is expected to retard its recovery.

Conclusion: The 200,000-bbl tanker oil spill is expected to result in the loss of several thousand to perhaps $\geq$100,000 seabirds and sea ducks. Murre populations on the Barren Islands and perhaps at Puale Bay are expected to take more than one generation (probably <3 generations) to fully recover from the losses. Puffins and other alcid populations affected by the spill are expected to take more than one generation (probably <3 generations) to recover; and local nesting populations of sea ducks and shorebirds that occur in areas that remain contaminated are expected be affected for perhaps $\geq$5 years.

E. Nonendangered Marine Mammals (Pinnipeds, Cetaceans, and the Sea Otter): This analysis considers the potential effects of a 200,000-bbl-oil spill on individual pinnipeds, cetaceans, and sea otters. The spill scenario was selected to show the potentially catastrophic effects of a 200,000-bbl spill on the physical environment and biota of the lower Cook Inlet region. This hypothetical tanker spill takes place in April along transportation segment T4 about 18 km northeast of the Barren Islands in Kennedy Entrance. This analysis assumes oil contact on marine mammals in certain environmental resource areas and land segments based on the conditional probability of contact to those areas. Areas with a conditional probability of contact >5 percent are considered oiled. The effects of oiling, in terms of calculated marine mammal mortalities, are presented for the affected area. The actual effects of oil contact on marine mammals (clinical symptoms, physiological effects, behavior alteration, etc.) are discussed in full for the base case (Sec. IV.B.1.e).

Conditional Probabilities: The conditional probabilities estimate the probability of a spill from a specific location contacting any fraction of environmental resources, land segments, or sea segments during the summer (April-September) or winter (October-March) seasons and at intervals of 3, 10, and 30 days. The conditional probabilities are expressed as percent chance of contact to the various environmental resource areas and land and sea segments.

There is a general pattern of contact to land and the various environmental resources throughout the sale area. The areas or resources closest to a spill point (such as pipeline, platform location, or tanker route) are the most likely areas or resources to become oiled within the first 3 days. In the following 30 days, there is estimated to be some spreading into surrounding areas.

After 3 days, the probability of oil contact to Kachemak Bay (ERA 3), Outer Kamishak Bay (ERA 4), the Barren Islands (ERA 6), and Cape Douglas (ERA 7) exceeds 5 percent. Of these resource areas, the Barren Islands have the highest chance of oil contact at 93 percent. Potentially affected nearshore marine mammals are harbor seals and sea otters in Kachemak Bay, Augustine Island, and the Barren Islands and sea otters around Cape Douglas. In offshore waters, pelagic fur seals and nonendangered cetaceans are at risk of oil contact. All of these marine mammals could be exposed to toxic volatile petroleum hydrocarbons still present in the spilled oil after 3 days, when the threat of inhalation effects are highest.

Thirty days later, the spilled oil will have weathered to some extent, and the environmental resource areas where chance of contact exceeds 5 percent extends to Inner Kamishak Bay (ERA 5), south to Hallo/Kukak Bays (ERA 9), Shuyak Island (ERA 8) and the southwestern Kenai Peninsula (LS 46). Contact to these resources represents the maximum spread of oil under this scenario. At this time, potentially affected animals include all of those contacted after 3 days, with the addition of harbor seals and sea otters at Inner Kamishak Bay and around Shuyak Island and sea otters along Hallo/Kukak Bays. Though the oil has weathered to some extent, all direct-contact effects are assumed possible for each marine mammal species in the affected area. The assumptions of the effects analysis, including the sale-specific mortality factor (SF), are presented in full for the base case (Sec. IV.B.1.e). For this spill scenario, the SF has been adjusted for spill size to 0.77.

1. <u>Oil-Spill Effects on Pinnipeds</u>: The effects of oil contact on pinnipeds (fur and harbor seals), based on the conditional probabilities associated with the transportation segments, are discussed in detail in Section IV.B.1.e, the base case, and summarized here.

a. <u>Northern Fur Seals</u>: Fur seals at risk to oil contact would be foraging around the Portlock and Albatross Banks. These seals represent most age-classes including adults and subadults transiting the Gulf enroute to the Pribilof Island breeding grounds and also nonbreeding seals. An estimate for fur seal numbers around the banks at a given time in April probably is 1,000 to 3,000 seals.

It is difficult to estimate fur seal mortality under any spill scenario, because there has never been a major oil spill near concentrations of northern fur seals. After the EVOS, it was estimated that 42 percent of Prince William Sound sea otters were killed (comparing prespill to postspill population estimates; Garrott, Eberhardt and Burn, 1993), and observed decreases of 31 percent were noted for harbor seals at oiled trend sites. Fur seals are similar to sea otters in that they rely on their fur for thermoregulation; but since they are pinnipeds, fur seals are closer to harbor seals physiologically and in other important life-history characteristics. Using the sea otter mortality estimate from the EVOS and adjusting with the SF yields 1,260 estimated fur seal mortalities.

Using the harbor seal mortality estimate from the EVOS and applying the SF yields 716 estimated fur seal mortalities.

The latest population estimate for the Pribilof fur seal population is 982,000 (Antonelis, 1993, personal comm.), and the estimated natural mortality of Pribilof fur seals is 16 percent for females and 29 percent for males (Reed, et al., 1987). The level of spill mortality (716-1,260) from this 200,000-bbl spill is only 0.13 percent of the population and would not be expected to have a population-level effect on fur seals.

b. <u>Pacific Harbor Seal</u>: Harbor seals are present throughout the nearshore environment of the sale area. Any large spill in the sale area is likely to contact harbor seals or harbor seal habitat. For harbor seals, oil-spill effects under this scenario probably would be extreme.

An estimate of harbor seal mortality can be derived using the data from the EVOS adjusted by the SF. A recent maximum count is 522 seals for Kachemak Bay, about 1,441 seals for Outer and Inner Kamishak Bay (including

Augustine Island), 52 seals for the Barren Islands, and 58 seals for Shuyak Island, for a total of 2,073 seals in the affected area (Loughlin, 1992). If all seal sites are assumed oiled, an estimate of harbor seal mortality from such a spill would be 495 estimated harbor seal mortalities, using the harbor seal mortality estimate from the EVOS and adjusting for the SF.

The effect of such mortality on the seal population of lower Cook Inlet cannot be estimated, as Cook Inlet seal numbers have decreased about 50 percent in the last 13 years for unknown reasons. It is unlikely all seal habitat and seals in the affected area would become oiled, so this estimate probably is high. But, oil-spill-related mortality probably would have a negative effect on the local harbor seal population.

2. **Oil-Spill-Effects on Cetaceans:** The effects of oil contact to cetaceans (gray, minke, killer, and beluga whales, Dall's and harbor porpoises, and the Pacific white-sided dolphin), based on the conditional probabilities associated with the transportation segments, are discussed in detail in Section IV.B.1.e(2), the base case. They are summarized here with relevant additions and modifications.

a. **Gray Whale:** Gray whales are abundant in the Gulf of Alaska during spring and fall during their migration through the area. Probably < 1 percent of the eastern Pacific population would occur in lower Cook Inlet/Shelikof Strait, which is a secondary migration route for the species. A 200,000-bbl spill would be most likely to contact gray whales in the continental shelf waters between eastern Kodiak Island and the Portlock and Albatross Banks. It is difficult to determine the level of effects such a spill would have on gray whales. Almost no data exist on spill effects to baleen whales (see Sec. IV.B.1.e for potential effects to cetaceans), and the observational data that do exist suggest minimal effects. Observations of baleen whale interactions during past spills indicate gray whales probably would not be affected by a 200,000-bbl-oil spill and, if they were, the effect probably would be displacement until the spill and spill-related activity dissipates.

b. **Minke Whale:** Minke whales are abundant in the Gulf of Alaska during spring/summer and, in the sale area, mostly are found in continental shelf waters <200 m deep. A 200,000-bbl spill would be most likely to contact minke whales in the continental shelf waters between eastern Kodiak Island and the Portlock and Albatross Banks. It is difficult to determine the level of effects such a spill would have on minke whales. Almost no data exist on spill effects to baleen whales (see Sec. IV.B.1.e for potential effects to cetaceans), and the observational data that do exist suggest minimal effects. Observations of baleen whale interactions during past spills indicate minke whales probably would not be affected by a 200,000-bbl-oil spill and, if they were, the effect probably would be displacement until the spill and spill-related activity dissipates.

c. **Killer Whale:** Killer whales can occur throughout the sale area, so they could be present and contact oil in the affected area under this scenario. Portlock and Albatross Banks (ERA's 20, 23, 25) are areas of high productivity and pinnipeds, small and large cetaceans, and many fish species feed on and around the banks. Thus, killer whales probably frequent the area also and may be contacted by the 200,000-bbl spill. The largest aggregation of killer whales in the western Gulf of Alaska in 1992 was 81, although the mode for sightings was 4 (Dahlheim, et al., 1993). Using the EVOS mortality rate for the AB pod adjusted by the SF results in 9 estimated killer whale mortalities.

Recruitment rates for the AB pod have been 13.8 percent in 1988, 4.5 percent in 1991, to 9.1 percent in 1992, with no recruits in 1989 or 1990, for an average annual rate over the 5 years of 5.48 percent. Using the 5.48 percent recruitment rate, the population affected by the 200,000-bbl spill would recover to prespill numbers in about 2 years, although pod age and social structure may take longer.

d. **Beluga Whale:** Beluga whales are common in Cook Inlet and generally frequent shallow nearshore waters, bays, and estuaries. Belugas could be at risk from the 200,000-bbl spill in the vicinity of Kamishak or Kachemak Bays. Recently, as many as 242 belugas have been counted in Cook Inlet on a single day. It is possible, that as many as 242 could be in the spill area. There are no data on the effects of oil on beluga whales in the wild. Further, little is known about the Cook Inlet beluga population in terms of recruitment or mortality rates. Belugas tend to travel in groups and are medium-sized toothed whales, both characteristics shared with killer whales. One method of estimating potential beluga whale mortality from a hypothetical spill is to use killer whale data from the EVOS and adjust using the SF. This results in 28 estimated beluga whale mortalities.

Because there are no good estimates of Cook Inlet beluga recruitment rates, they will be estimated using the National Marine Fisheries Service (NMFS) (USDOC, NOAA, NMFS, 1991) general estimate for cetacean maximum net productivity (MNPL = 2%) X a recovery factor (.5) based on the status of the stock. For Cook Inlet belugas, a conservative population size is 500 individuals postspill, so 500(.02)(.5) = 5 individuals per year would be recruited into the population. Recovery to prespill numbers for Cook Inlet belugas would take about 6 years, although group age and social structure may take longer to recover.

e. **Dall's Porpoise and Pacific White-Sided Dolphin:** Both the Dall's porpoise and the Pacific white-sided dolphin are present in highest numbers in the Gulf of Alaska during the spring/summer season. Dall's porpoises can be found throughout the sale area, usually in groups of 2 to 20 individuals. Highest aggregations are likely to occur around the Portlock and Albatross Banks. Similarly, Pacific white-sided dolphins frequent the banks but in larger schools of over 100 individuals.

There was no mortality of Dall's porpoises or Pacific-white sided dolphins observed during or after the EVOS, although the spill occurred in Dall's porpoise habitat and passed though the northern Gulf of Alaska in Pacific white-sided dolphin habitat. It is possible that effects did occur but went undetected, yet that seems unlikely given the large amount of scientific research conducted in the area at the time. Both of these species are fast swimming and highly mobile, so it is possible they can detect and avoid spilled oil. Interestingly, Atlantic white-sided dolphins were observed swimming and foraging in an oil slick caused by the *Regal Sword* with no apparent ill effects (Goodale, Hyman, and Winn, 1981). Effects of the 200,000-bbl spill would probably be minimal on these species.

f. **Harbor Porpoise:** Harbor porpoises inhabit the nearshore waters throughout the sale area and could be contacted by the 200,000-bbl spill. However, it is likely that spill effects would be similar to the closely related Dall's porpoise. Harbor porpoises usually are sighted singly or in pairs, so the risk of a spill contacting large numbers of them is small. Just as with Dall's porpoises, no mortality was observed from the EVOS to harbor porpoises, and effects to harbor porpoises due to this scenario are expected to be minimal.

3. **Oil-Spill Effects on Sea Otters:** Probably no marine mammal is more vulnerable to the effects of an oil spill than the sea otter. These effects on sea otters are presented in Section IV.B.1.e(3), the base case. The 200,000-bbl spill would contact sea otters in three major high-use areas, Kamishak Bay, Kachemak Bay (south side), and Hallo/Kukak Bays. The spill effects on sea otters would be the most severe of any other marine mammal. About 8,000 sea otters reside in these resource areas, so mortality rates from a hypothetical spill may be estimated using data from the EVOS and adjusting with the SF. This results in 2,587 estimated sea otter mortalities.

Recovery to prespill numbers could take 5 to 9 years at a 5- to 10-percent annual rate of increase (Eberhardt and Siniff, 1988). Local populations on nearby Afognak, Shuyak, and the Barren Islands are at carrying capacity and are likely food limited (Kvitek et al., 1992), so recovery of sea otters in the affected areas could be accelerated by immigrants from these nearby sea otter population centers or from other unaffected areas.

Conclusion: Effects on marine mammals from the 200,000-bbl-oil spill have been determined. Mortalities were estimated using EVOS criteria adjusted for spill size using the SF and determined to be 716 to 1,260 for fur seals, 495 harbor seals, 9 killer whales, 28 beluga whales, and 2,587 sea otters. Fur seal mortality was considered to have no effect on the fur seal population. Recovery rates for mortality from the 200,000-bbl spill could not be determined for harbor seals, but probably would take 5 to 9 years for sea otters. Recovery to prespill numbers was estimated to take 1 to 2 years for killer whales and perhaps 6 years for beluga whale populations, acknowledging that age and social structure of the affected groups may take longer. Spill effects were determined to be minimal for gray and minke whales, Dall's and harbor porpoises, and Pacific white-sided dolphins.

F. **Endangered and Threatened Species:** The assumed 200,000-bbl-tanker spill occurring 18 km northeast of the Barren Islands in Kennedy Entrance (tanker segment T4) in April is estimated to contact (chance >0.5%) the Barren Islands (ERA 6) and northern Shelikof Strait (ERA's 7 and 8) within 3 days; mid-Shelikof Strait (ERA's 10 and 11) and northern Albatross Bank (ERA 23) by day 10; and southern Shelikof Strait (ERA 12) by day 30 (Fig. C-1; Appendix B, Tables B-2, 3, and 4). The estimated area swept by the spill at 10, 30, and 60 days is equivalent to 6, 26, and 63 percent of the proposed sale area, respectively (Table C-1). Comparatively, the spill assumed for the proposed base case (50,000 bbl) sweeps 20 percent of the proposed sale area within 30 days

(Table C-1). Physiological and mechanical effects of oil on individuals are expected to be similar to those described for the base case of the proposal (Sec.IV.B.1.f).

Although numbers of gray, humpback, and fin whales typically do not peak in the vicinity of the proposed sale area until May, small numbers may be contacted as this spill sweeps south from the Barren Islands through Shelikof Strait. However, the potential number of contacts is constrained by the relatively low estimated conditional probability (expressed as percent chance) of spill contact, < 11 percent from tanker segment T4, in most nearshore environmental resource areas frequented by the majority of these whales (Table C-1). Only temporary sublethal effects are expected to result, probably involving < 1 percent of these species' eastern Pacific populations. The portion of the spill that moves out of Kennedy Entrance and south across the banks east of Kodiak Island during the spring migration period potentially could contact greater numbers, at least of gray whales, because most of these migrants travel this corridor; however, the estimated conditional probability (expressed as percent chance) of oil contact from T4 to ERA's 23, 24, and 25 is < 1 percent in summer after 10 days and < 2 percent after 30 days (Fig. C-2). Given the generally minor effects likely to result if oil contacts a whale, the large areas over which oil may disperse, the low (< 2%) conditional probability (expressed as percent chance) of contact in the primary migration corridor, the relatively low (< 11%) chance of contact in most of Shelikof Strait, and the intermittent occupation of this latter area, individual effects are expected to be sublethal and population effects minor.

Steller sea lion rookeries on Marmot Island and in the Barren Islands, as well as haulouts there and in the Chugach Islands, northern Kodiak archipelago, and the upper two thirds of Shelikof Strait, represent about 65 percent of the Alaska Peninsula-Kenai Peninsula regional population. In April, adults are occupying the haulouts and rookeries, but no pups would be present. The estimated conditional probability (expressed as percent chance) of spilled oil contacting the Barren Islands (ERA 6) and northernmost Shelikof Strait (ERA 7) is 95 and 30 percent, respectively, from tanker segment T4 in summer after 30 days (Fig.C-1). The estimated conditional probability (expressed as percent chance) of spilled-oil contact at the Marmot Island rookery (ERA 24) and all other haulout sites is < 10 percent. Haulouts along lower Shelikof Strait and rookeries south of the strait are not estimated to be contacted by oil spills in summer after 30 days.

Several hundred to a thousand or more adult and subadult/juvenile individuals potentially would experience varying degrees of oiling if all high probability sites were contacted. Because of its timing prior to the breeding season (May-July), no pups would be present and so little mortality is expected to result from such an incident, although oiling may affect production of young and survival of juveniles, and heavily oiled individuals may experience elevated stress that could intensify any other debilitating problems, potentially causing death. Any substantial mortality could intensify the population decline occurring in this region in recent decades. Even if the spill stays at sea, oil is expected to contact some adults in pelagic waters, resulting in sublethal effects. Any spill cleanup activity on or near a rookery during the breeding season following this spill could disrupt pup-female interactions, potentially causing some mortality.

Because of the infrequent to rare occurrence of the short-tailed albatross, Aleutian Canada goose, and peregrine falcon in or near the proposed Sale 149 area, effects of a large oil spill is not expected to exceed those discussed for a single spill of average size under the proposed base case (Section IV.B.1.f). Given the sporadic occurrence of wintering Steller's eiders in the vicinity of the sale area, the relatively low estimated conditional probability of oil contact in areas south of the sale area where eiders may winter in greater abundance (< 11%), and the occurrence of the spill approximately at the onset of spring migration when individuals would be departing the area, effect of this large spill is not expected to significantly exceed that described for the proposed action (requiring up to three generations for recovery).

Conclusion: Some gray, humpback, and/or fin whales are likely to contact oil and experience sublethal effects from the spill assumed for this scenario; however, because only small numbers of the three species are likely to be present during this period, population effects are expected to be minor. Adult, subadult, and/or juvenile Steller sea lions occupying pelagic areas or haulouts where oil comes ashore are likely to be oiled to varying degrees. However, with primarily sublethal effects, mortality is expected to be limited, although production of young and juvenile survival could be affected adversely. No pup mortality is expected because the spill occurs just prior to the breeding season. Overall mortality resulting from a spill contacting rookeries, haulouts, and pelagic areas is expected to require more than two generations for recovery. Effect of this scenario on short-tailed albatross, Aleutian Canada goose, and peregrine falcon is expected to be minimal as determined for the base case of the proposal. Also as determined for the base case, wintering Steller's eider are expected to require as many as three generations to recover from this spill.

G. Terrestrial Mammals: This analysis assumes that a 200,000-bbl tanker oil spill occurs under stormy conditions in April about 18 km northeast of the Barren Islands in Kennedy Entrance along tanker segment T4. Within 3 days, the spill from T4 is estimated to contact the Chugach Islands (LS's 46 and 49) and Port Chatham area and land as far west as Cape Douglas (LS 22). The OSRA estimates a 27-percent chance of a spill from T4 contacting land within 3 days during summer (Fig. C-1). At this time, the spill is estimated to have spread or swept over 234.4 km^2 of sea surface and oiled a median estimate of 234 km of coastline, exposing an estimate of 70 to 190 river otters to the oil. A percentage of these river otters (perhaps 20-30 otters) are expected to be directly oiled by the spill or ingest enough oil through grooming and through ingestion of oiled prey to result in their death.

Within 10 days, the spill from T4 is estimated to contact Kamishak Bay (LS's 24-29), Hallo Bay (LS 19), Kukak Bay (LS 18) on the Alaska Peninsula, and Shuyak Island and the northern part of Afognak Island (LS's 73-77). Within 30 days, the spill from T4 is estimated to contact the north side of Kachemak Bay (LS 43) and to reach as far south in Shelikof Strait as Puale Bay (LS 15). Oil that beaches along the coast of Kamishak, Hallo, and Kukak Bays is expected to contact important brown bear spring-concentration areas and result in the contamination of invertebrate prey (clams) of brown bears, exposing the bears to ingestion of oiled carrion and of animals killed or injured by the oil. A small number of bears (perhaps ≤ 10) are expected to be lost from the spill. Oil that contacts Afognak Island is expected to contaminate kelp and other intertidal vegetation that may be eaten by Sitka black-tailed deer that winter along the island coast; but, because the spill is assumed to occur during April, when the deer are less dependent on foraging along the coast as they do during the winter and are not expected to be seriously affected by the spill. However, river otters that inhabit Afognak Island and the Alaska Peninsula-Kamishak Bay are expected to suffer some direct losses (perhaps 50-100 animals) from the spill; and other river otters in oil-contaminated areas are expected to suffer sublethal effects that reduce their fitness and change their behavior and distribution for perhaps ≥ 1 year (may be as long as 3-5 years) after the spill.

Some of the oil from the spill that contacts the Alaska Peninsula is expected to contaminate intertidal prey organisms of river otters and brown bears. This contamination is expected to reduce the productivity of some river otters in oiled areas, where the contamination is expected to persists for >1 year (perhaps 3-5 years) (such as in mussel and clam beds).

Conclusion: The 200,000-bbl tanker oil spill is expected to result in the loss of some river otters (perhaps ≥ 100) and brown bears (perhaps ≤ 10). River otters and brown bears that reside in areas that remain contaminated are expected be affected for >1 year (perhaps as long as 3-5 years for river otters). Sitka black-tailed deer are not expected to be seriously affected by the spill. The overall populations of river otter, brown bears, and other terrestrial mammals in the sale area are not expected to be affected by this tanker spill.

H. Economy: The most relevant historical experience in Alaskan waters to a tanker spill of 200,000 bbl is the EVOS of 1989, which spilled 240,000 bbl. This spill generated enormous employment that rose to the level of 10,000 workers directly doing cleanup work in relatively remote locations. Smaller and smaller numbers of cleanup workers returned in the warmer months each year following 1989 until 1992. Numerous local residents quit their jobs to work on the cleanup at often significantly higher wages. This generated a sudden and significant inflation in the local economy (Cohen, 1993). Anecdotal information indicates that housing rents in Valdez in 1989 increased from 25 percent in some cases to sixfold in others, and inflated rents continued into 1990. Prices of food and other goods increased only slightly (Henning, 1993, personal comm.).

The number of cleanup workers actually used for a spill associated with the 200,000-bbl-oil spill would depend to a great extent on what procedures are called for in the oil-spill-contingency plan, how well prepared with equipment and training the entities responsible for cleanup are, how efficiently the cleanup is executed, and how well in reality the coordination of cleanup among numerous responsible entities is executed. A 200,000-bbl spill could generate the same number of workers associated with the EVOS, or 10,000 cleanup workers. Price inflation probably would occur in the Kenai Peninsula Borough for as long as large numbers of cleanup workers were in the region. Local housing rents probably would triple for 1 year following a major spill.

Conclusion: An oil spill of 200,000 bbl would generate 10,000 cleanup jobs for 6 months in the first year, declining to zero by the fourth year following the spill. Local communities would experience a tripling of housing rents for 1 year. This is substantially greater than the base case.

I. Commercial Fisheries: The 200,000-bbl-oil spill would affect the Cook Inlet commercial-fishing industry by exposing it to petroleum-based hydrocarbons. The estimated economic effect of the 200,000-bbl-oil spill on the Cook Inlet commercial-fishing industry is based on what occurred during the *Exxon Valdez* and *Glacier Bay* oil spills and primarily depends on the highly variable EVOS cost estimates (ranging from $9-43 million/year for 2 years). From 1983 to 1993, the value of the Cook Inlet commercial fishery appears to have ranged between about $50 and $135 million/year. Based on the above, in any 2-year period when the value of the Cook Inlet commercial fishery is estimated to be about $50 million/year, a 2-year loss of about $9 million/year represents an 18-percent/year loss for 2 years; whereas a 2-year loss of about $43 million/year represents an 86-percent/year loss for 2 years. In a 2-year period when the value of the Cook Inlet commercial fishery is estimated to be closer to $135 million/year, a 2-year loss of about $9 million/year represents a 7-percent/year loss for 2 years; whereas a 2-year loss of $43 million/year represents a 32-percent/year loss for 2 years. However, because the occurrence of a large oil spill would preclude any knowledge of what the commercial fishery would have been worth had it not occurred, the value of the commercial fishery at the time of the assumed 200,000-bbl-oil spill is assumed to be the average annual value (1983-1993) of the Cook Inlet commercial fishery (about $65 million). Thus, in terms of the average annual value of the Cook Inlet commercial fishery, it is estimated that the assumed oil spill of 200,000 bbl would result in an economic loss of about 15 to 65 percent/year for 2 years.

Table IV.A.3-1 indicates that after 10 days, the 200,000-bbl spill would be 1.4 mm thick. The 200,000-bbl spill would contact about 10 percent more shoreline than the base-case spill and would be almost twice as thick when it did so.

However, this analysis has conservatively assumed that the 200,000-bbl spill contacts 50-percent more shoreline (rather than the 10% indicated above) with twice as much oil as that of the base-case spill. The 200,000-bbl spill also is assumed to contact a great deal more intertidal shoreline outside and downcurrent of the sale area. In terms of surface area (open water) contacted within the sale area, the 200,000-bbl spill is estimated to cover a discontinuous surface area of 1,096.5 km^2, or 185 km^2 more (about 20%) than that of the base case (Table IV.A.3-1, 10 days).

Within the sale area and in Shelikof Strait, the 200,000-bbl spill is estimated to increase contact in shoreline areas by about 50 percent and to increase contact in open-water areas by about 20 percent. Due to the high rate of hydrologic exchange and the amount of heavy shoreline wave action, these increases are not expected to result in additional closures over that of the base-case, because the base-case spill is large enough by itself to close all Cook Inlet commercial fisheries. However, because there is likely to be twice as much shoreline oil, oil from the 200,000-bbl spill is likely to remain in shoreline sediments longer. For the purposes of analysis, this additional time is estimated to be sufficient to have an additional adverse economic effect of 20 percent over that of the base-case on Cook Inlet and Kodiak commercial fisheries.

Based on these estimates and assumptions, losses to the average annual Cook Inlet commercial fishery (see also the base case) from the 200,000-bbl-oil spill, would increase lower EVOS base-case loss estimates by .20, or from $9 to $22 million/year (34% of the average annual fishery value), and upper EVOS base-case-loss estimates by .20, or from $43 to $52 million/year (80% of the average annual fishery value). Thus, in terms of the average annual value of the Cook Inlet commercial fishery, the assumed 200,000-bbl-oil spill is estimated to result in an economic loss of about 35 to 80 percent/year for 2 years. Estimated losses to the Kodiak commercial-fishing industry are expected to be less than half of those estimated for Cook Inlet, or about 15 to 35 percent/year for 2 years following the assumed 50,000-bbl Cook Inlet oil spill. Assuming an average annual value of $75 million, this amounts to an estimated loss of about $11 (.15 x 75) to $26 (.35 x 75) million/year to the Kodiak commercial-fishing industry. However, the EVOS experience has demonstrated that compensation to the commercial-fishing industry for participating in the cleanup of a large Cook Inlet oil spill is likely to exceed these economic losses by several orders of magnitude.

Conclusion: Based on the assumptions discussed in the text, adjusted EVOS loss estimates, and the average annual value of the Cook Inlet commercial fishery, the assumed 200,000-bbl-oil spill is estimated to result in economic losses to the Cook Inlet commercial-fishing industry ranging from 35 to 80 percent/year for 2 years following the spill. Losses to the Kodiak commercial-fishing industry from the same spill are estimated to range from about 15 to 35 percent/year for 2 years following the spill.

J. Subsistence-Harvest Patterns: Section III.C.3 describes the subsistence-harvest patterns for those communities in southcentral Alaska that potentially could be affected by the 200,000-bbl-spill case. Appendix H contains community-specific summaries of subsistence-harvest inventories.

The OSRA estimates oil-spill contact within 3 days during summer at the southern tip of the Kenai Peninsula (LS 46), to the area around Nanwalek and Port Graham (LS 45) and the northern reaches of Afognak Island (LS's 73-77) within 10 days, and the southern Kenai Peninsula (LS 43) within 30 days (Fig. C-2). In so doing, the subsistence-harvest areas of southern Kenai Peninsula communities, Nanwalek and Port Graham across Kachemak Bay, Ouzinkie and Port Lions on Kodiak Island, and the road-connected community of Kodiak would be affected.

The effects on subsistence-harvest patterns in these communities would be comparable with the effects from the EVOS of 1989, because both tanker spills would occur in the spring and are of approximately the same size. The primary difference is in the geography of the spills, with the 200,000-bbl spill assumed to occur within Kennedy Entrance, which makes the affected communities more instantaneously subject to contact. As shown on Table C-4, subsistence harvests in Nanwalek were half as much in 1989 as they were in 1987 (538 lb/household in 1989 vs. 1,093 lb/household in 1987); Table C-5 shows this also to be the case in Port Graham (322 lb/household in 1989 vs. 652 lb/household in 1987). The annual round of harvest activities for these communities (Fig. III.C.3-3) indicates that some harvests, such as for harbor seal and marine invertebrates, could have begun before but others, such as for salmon, would begin after the April spill. The instantaneous nature of the event would not permit opportunistic "stocking up" of available resources. Using the EVOS experience for a gauge (see Sec. III.C.3), effects on subsistence harvests would be expected to last at least for 4 years, especially for intertidal resources and some fish species. Comparable data are not available for other southern Kenai Peninsula communities, although the effects would be expected to last as long.

For Kodiak Island, Table C-6 shows that subsistence harvests in Ouzinkie were about one quarter as much in 1989 as they were in 1987 (282 lb/household in 1989 vs. 1,267 lb/household in 1987). Table C-7 shows Port Lions harvests in 1989 to be about 40 percent of 1987 harvests (427 lb/household in 1989 vs. 1,098 lb/ household in 1987). The annual round of harvest activities for these communities (Fig. III.C.3-4a) indicates that some harvests, such as for harbor seal, sea lion, and halibut, could have begun before but others, such as for most salmon species, would begin after the April spill. Additionally, each of these communities collected more than 1,000 lb of seaweed in 1986 to use as garden fertilizer; this is assumed not to happen in the 200,000-bbl-spill case. As in the southern Kenai Peninsula case, effects on subsistence harvests could be expected to last at least for 4 years, especially for intertidal resources and some fish species. Within the Kodiak road-connected community, 15 percent of the households are estimated to use the affected area for salmon fishing and 12 percent to use it for deer hunting. These households would be expected to have to go elsewhere on the islands for these activities.

Conclusion: Subsistence harvests in the 200,000-bbl-spill case would be reduced or substantially altered by as much as 80 percent in one or more Kodiak Island and southern Kenai Peninsula communities for at least 1 year and, to a lesser extent, for selected subsistence resources 3 to 4 years beyond.

K. Sociocultural Systems: The 200,000-bbl-spill case estimates oil to provide 100-percent shoreline coverage within 3 days at the southern tip of the Kenai Peninsula (LS 46), to contact the area around Nanwalek and Port Graham (LS 45) and the northern reaches of Afognak Island (LS's 73-77) within 10 days, and the southern Kenai Peninsula (LS 43) within 30 days. In doing so, the subsistence-harvest areas of southern Kenai Peninsula communities, Nanwalek and Port Graham across Kachemak Bay, Ouzinkie and Port Lions on Kodiak Island, and the road-connected community of Kodiak would be affected. Effects for these communities in reduced subsistence harvests should be comparable with the effects from the EVOS of 1989, because both tanker spills occur in the spring and both are of approximately the same size. The location of the 200,000-bbl spill in Kennedy Entrance suggests that spill effects on these communities should be relatively instantaneous, with little time to prepare, and could be expected to last at least 4 years.

Considerable stress and anxiety would be expected over the loss of subsistence resources, contamination of habitat, fear of the health effects of eating contaminated wild foods, and the need to depend on the knowledge of others about environmental contamination (Maganak, 1990; Fall, 1992; McMullen, 1993). Individuals and communities

Table C-4
Subsistence Harvests in Nanwalek, 1981, 1987, and 1989

	Total Number of Resources Harvested by Sampled Households	Edible Weight of Harvested Resources by Samplesd Households	Mean Edible Weight per Sampled Houshold	Percentage of Edible Weight
Nanwalek, 1981; 29-household sample of 29 total households				
Salmon	13,035[a]	13,035	450	69.9
Nonsalmon Fish	1,702	3,223	111	17.2
Big Game	1	2	58	---
Small Game/Furbearers	Not Reported			
Marine Mammals	16	1,184	41	6.4
Birds	46	58	2	---
Marine Invertebrates	366[a]	366	13	2.0
Plants and Berries	731[b]	731	25	3.9
Totals		18,655	644	
Nanwalek, 1987; 33-household sample of 40 total households				
Salmon	3,629	14,164	429	39.2
Nonsalmon Fish	13,401[a]	13,401	406	37.1
Big Game	12	1,119	34	3.1
Small Game/Furbearers	1	8	0	---
Marine Mammals	31	2,744	83	7.6
Birds and Eggs	624	509	15	1.4
Marine Invertebrates	2,315[a]	2,315	70	6.4
Plants and Berries	1,840[a]	1,840	56	5.1
Totals		36,100	1,093	
Nanwalek, 1989; 33-household sample of 41 total households				
Salmon	2,149	7,573	230	42.8
Nonsalmon Fish	3,797[a]	3,797	115	21.4
Big Game	7	1,852	56	10.4
Small Game/Furbearers	1	8	0	---
Marine Mammals	24	1,632	50	9.3
Birds and Eggs	477	309	9	1.7
Marine Invertebrates	1,999[a]	1,999	61	11.3
Plants and Berries	546[a]	546	17	3.1
Totals		17,716	538	

Source: Paige, Scott, and Brown, 1991.

a In pounds.
b In quarts.

Table C-5
Subsistence Harvests in Port Graham in 1981, 1987, and 1989

	Total Number of Resources Harvested by Sampled Households	Edible Weight of Harvested Resources by Samplesd Households	Mean Edible Weight per Sampled Houshold	Percentage of Edible Weight
Port Graham, 1981; 42-household sample of 48 total households				
Salmon	2,883	14,110	336	52.2
Nonsalmon Fish	2,763[a]	9,359	223	34.6
Big Game	3	616	15	2.3
Small Game/Furbearers	Not Reported			
Marine Mammals	15	750	18	2.8
Birds	231[a]	326	8	1.2
Marine Invertebrates	3,297[a]	1,507	36	5.6
Plants and Berries	340[b]	340	8	1.2
Totals		27,008	644	
Port Graham, 1987; 54-household sample of 63 total households				
Salmon	3,333	14,911	276	42.3
Nonsalmon Fish	12,079[c]	12,079	224	34.4
Big Game	6	829	15	2.3
Small Game/Furbearers	2	8	0	—
Marine Mammals	36	1,912	35	5.4
Birds and Eggs	607	497	9	1.4
Marine Invertebrates	2,566[c]	2,566	48	7.4
Plants and Berries	2,444[c]	2,444	45	6.9
Totals		35,246	652	
Port Graham, 1989; 48-household sample of 61 total households				
Salmon	1,374	5,029	1,053	2.6
Nonsalmon Fish	7,548[c]	7,548	157	48.8
Big Game	1	43	1	–
Small Game/Furbearers	2	8	0	—
Marine Mammals	15	1,128	24	7.5
1.6Birds and Eggs	301	253	5	
Marine Invertebrates	1,090[c]	1,090	23	7.1
Plants and Berries	342[c]	342	7	2.2
Totals		5,441	322	

Source: Paige, Scott, and Brown, 1991.

a Partially in pounds.
b In quarts.
c In pounds.

Table C-6
Subsistence Harvests in Ouzinkie in 1982, 1986, and 1989

	Total Number of Resources Harvested by Sampled Households	Edible Weight of Harvested Resources by Samplesd Households	Mean Edible Weight per Sampled Houshold	Percentage of Edible Weight
Ouzinkie, 1982; 32-household sample of 70 total households				
Salmon	3,605	18,478	577	46.8
Nonsalmon Fish	2,387	6,640	208	16.9
Big Game	8	3,992	125	10.1
Small Game/Furbearers	130	218	7	0.6
Marine Mammals	49	3,464	108	8.8
Birds and Eggs	2,041	1,29	340	3.2
Marine Invertebrates	5,410[a]	5,410	169	13.7
Plants and Berries	not reported			
Totals		39,495	1,234	
Ouzinkie, 1986; 34-household sample of 62 total households				
Salmon	4,139	20,614	606	47.8
Nonsalmon Fish	7,322[a]	7,322	215	17.0
Big Game	96	7,100	209	16.5
Small Game/Furbearers	233	386	11	0.9
Marine Mammals	44	3,211	94	7.4
Birds and Eggs	1,949	937	28	2.2
Marine Invertebrates	3,019[a]	3,019	89	7.0
Plants and Berries	511[a]	511	15	1.2
Totals		43,100	1,267	
(+ est. 1,495 lb of seaweed harvested for garden fertilizer)				
Ouzinkie, 1989; 35-household sample of 69 total households				
Salmon	584	3,259	93	33.0
Nonsalmon Fish	1,617[a]	1,617	46	16.3
Big Game	34	2,014	58	20.6
Small Game/Furbearers	20	40	1	0.4
Marine Mammals	952[a]	952	27	9.6
Birds and Eggs	1,155	728	21	7.4
Marine Invertebrates	859[a]	859	25	8.9
Plants and Berries	386[a]	386	11	3.9
Totals		9,855	282	

Source: Paige, Scott, and Brown, 1991.

a In pounds.

Table C-7
Subsistence Harvests in Port Lions in 1982, 1986, and 1989

	Total Number of Resources Harvested by Sampled Households	Edible Weight of Harvested Resources by Samplesd Households	Mean Edible Weight per Sampled Houshold	Percentage of Edible Weight
Port Lions, 1982; 55-household sample of 89 total households				
Salmon	3,355	17,606	320	35.2
Nonsalmon Fish	1,531	17,663	321	35.3
Big Game	144	6,221	113	12.4
Small Game/Furbearers	200	272	5	0.5
Marine Mammals	13	1,448	26	2.9
Birds and Eggs	652	473	9	1.0
Marine Invertebrates	6,401[a]	6,401	116	12.7
Plants and Berries	not reported			
Totals		50,084	910	
Port Lions, 1986; 65-household sample of 90 total households				
Salmon	6,587	34,253	527	48.0
Nonsalmon Fish	11,796[a]	11,796	182	16.6
Big Game	193	15,541	39	22.8
Small Game/Furbearers	259	184	3	0.3
Marine Mammals	51	1,387	21	1.9
Birds and Eggs	64	432	7	0.6
Marine Invertebrate	6,933[a]	6,933	107	9.7
Plants and Berries	761[a]	761	12	1.1
Totals		71,287	1,098	
(+ est. 1,052 lb seaweed harvested for garden fertilizer)				
Port Lions, 1989; 36-household sample of 67 total households				
Salmon	1,184	6,341	176	41.2
Nonsalmon Fish	3,497[a]	3,497	97	22.7
Big Game	42	2,723	76	17.8
Small Game/Furbearers	17	12	0	0.0
Marine Mammals	56[a]	56	2	0.5
Birds and Eggs	343	276	8	1.9
Marine Invertebrates	1,699[a]	1,699	47	11.0
Plants and Berries	764[a]	764	21	4.9
Totals		15,368	427	

Source: Paige, Scott, and Brown, 1991.

1 Total number of resources harvested by sampled households.
2 Edible weight of harvested resources by sampled households.
3 Mean edible weight per sampled household.
4 Percentage of edible weight.
a In pounds.

would be increasingly stressful during the time needed to modify subsistence-harvest patterns by selectively changing harvest areas, if available. Within the Alutiiq communities, associated culturally significant activities would be modified or decline as well, such as the organization of subsistence activities among kinship and friendship groups and the relationships among those that customarily process and share subsistence harvests.

The 200,000-bbl-spill case also would be expected to affect individuals and institutions in ways similar to the *Exxon Valdez* experience. As shown by the EVOS, some individuals found a new arena for pre-existing personal and political conflict, especially over the dispensation of money and contracts. In the smaller communities, cleanup work produced a redistribution of resources, creating new schisms in the community (Richards, no date). Many members of small communities were on the road to sobriety prior to the spill, but after the spill some people began drinking again, producing the re-emergence of the numerous alcohol-related problems that were there before, such as child abuse, domestic violence, and accidents (Richards, no date).

Institutional effects included additional burdens being placed on local government, disruption of existing community plans and programs, strain on local officials, difficulties dealing with the spiller, community conflict, disruptions to customary habits and patterns of behavior, emotional effects and stress-related disorders, confronting environmental degradation and death, and violation of community values (Endter-Wada, 1992). Postspill stress resulted from this seeming loss of control over individual and institutional environments as well as from secondary episodes such as litigation, which produced secrecy over information, uncertainty over outcomes, and community segmentation (Smythe, 1990; Picou and Gill, 1993). Attempts to mitigate effects met with a higher priority placed on concerns over litigation and a reluctance to intervene with people for fear it might benefit adversaries in legal battles (Richards, no date).

<u>Conclusion</u>: Sociocultural systems in one or more southern Kenai Peninsula and Kodiak Island communities would undergo severe individual, social, and institutional stress and disruption in the year of the 200,000-bbl spill that would last at least 4 years thereafter.

L. <u>Archaeological and Cultural Resources</u>: This analysis assumes that a 200,000-bbl tanker oil spill occurs under stormy conditions in April about 18 km northeast of the Barren Islands in Kennedy Entrance along tanker segment T4. Within 3 days during summer, the spill from T4 is estimated to contact the Barren Islands (LS's 47 and 48), Chugach Islands (LS's 46 and 49), and as far west as Cape Douglas (LS 22) (Fig. C-2). The OSRA estimates a 93-percent chance of a spill from T4 contacting the Barren Islands area (ERA 6) within 3 days during summer (Fig. C-1), where there are about 75 archaeological sites. At 3 days, the spill is estimated to have spread or swept over 234.4 km^2 of sea surface (Table C-1). The OSRA estimates that the land segments of western Kodiak Island (LS's 73-79), the Alaska Peninsula (LS's 15, 18-30), and Kachemak Bay (LS's 43-46) are contacted within 30 days during summer from a spill at T4. Archaeological sites onshore and in the intertidal zone would be disturbed by cleanup operations, and submerged archaeological sites could be disturbed if oil got in the water column and reached the sites in the bottom sediments of certain lease blocks. It is estimated that this type of disturbance effect would be minimal. It is estimated that <1 percent of submerged archaeological resources would be disturbed. (Blocks that have a high probability of archaeological sites are listed in the Prehistoric Resources Analysis, Appendix F, and also in Section III.C.) Assuming the spill occurs, accidental disturbance from workers and indiscriminate disturbance or looting of shoreline sites by others during cleanup would result in disturbance and permanent loss of information from an estimated 1,000 sites affected by the spill (see the discussion of the EVOS by Reger, 1993, and Bittner, 1993). During this time, an estimated 3 percent of all the archaeological sites in the lease area, or an expected 30 archaeological sites, are estimated to be disturbed with permanent loss of all information.

<u>Conclusion</u>: The effect of the 200,000-bbl spill on archaeological sites would be a disturbance of an estimated 30 sites, which would be a permanent loss of about 3 percent of the known archaeological resources.

M. <u>National and State Parks and Related Recreational Places</u>: This analysis assumes that a 200,000-bbl tanker oil spill occurs under stormy conditions in April about 18 km northeast of the Barren Islands in Kennedy Entrance to Cook Inlet. Within 3 days during summer, a spill from T4 is estimated to contact the spill on the Barren Islands (LS's 47 and 48), Chugach Islands (LS's 46 and 49), and as far west as Cape Douglas (LS 22) (Fig. C-2). The OSRA estimates a 93-percent chance of a spill from T4 contacting the Barren Island shoreline within 3 days, during summer, where there are about 75 archaeological and recreation sites (Fig. C-2). At 3 days, the spill is estimated to have spread or swept over 234.4 km^2 of sea surface. The oil spill is estimated to have swept over much of the Barren Islands shoreline and tidal zone, which contains recreational sites, and swept over the tidal zone clamming beds. Disturbance to national and State parks and related recreational place resources would be due to spill and cleanup damage. Spills would spoil intertidal and shore areas of the same land segments discussed in the analysis of the base case. These land segments are inhabited by brown bears, moose, caribou, and other grazing animals; salmon, trout, and other fishes; and birds of many kinds and are used by many people for hunting, recreation, sportfishing, hiking, sightseeing, and other recreational and subsistence purposes. The shores of these land segments have physical characteristics such as cliffs, waterfalls, and beaches that bring tourists from all over the world. Details on the uses are found in Section III.C.6, and information on the specific resources and physical characteristics of the environment is found in Section III. Damage would be done during cleanup; however, the recovery of the biological resources also is important in the parks and recreational areas just as it was for these resources during the EVOS cleanup. During this time, an expected <3 percent of national forest, wildlife refuge, and recreational area sites would be changed but would recover within 3 years.

Conclusion: The effect of the 200,000-bbl spill on national and State parks and related recreational places would be to change an estimated <3 percent of national forest, wildlife refuge, and recreational sites for a period of 3 years and lower the visitor rates by an estimated 1 percent for the same period of time.

N. Air Quality: Under this analysis, a 200,000-bbl-oil spill would affect onshore air quality in the Cook Inlet. Emissions would result from evaporation and burning of the spilled oil.

Air-quality regulations and procedures are discussed in Section IV.B.1.n. That discussion also describes the methodology used to model the air-quality effects associated with this proposed lease sale. The USEPA-approved OCD model was used to calculate the effects of pollutant emissions due to the proposal on onshore air quality. Because the Class I PSD areas allow for the least amount of degradation, the modeling scenario (i.e., source location) chosen for this analysis is the one that results in the maximum potential effect to the air quality of the designated national wilderness area of the Tuxedni National Wildlife Refuge, the only Class I area adjacent to the proposed sale area. The maximum-potential effect at any location in the Class II area would be the same. In all likelihood, effects to the Tuxedni National Wilderness Area would be lower than those calculated by the model.

Evaporation of spilled oil is a source of gaseous emissions. Modeling predictions of hydrocarbon evaporation (Payne et al., 1984a,b; 1987) from a 200,000-bbl slick over 30-day periods estimate that 56,000 bbl—or 7,817 tons—of hydrocarbons would evaporate. Because approximately 10 percent of gaseous hydrocarbons are nonmethane volatile organic compounds (VOC), 781.7 tons of VOC would be lost to the atmosphere. The movement of the oil slick during this time would result in lower concentrations and dispersal of emissions over an area several orders of magnitude larger than the slick itself.

In situ burning is a preferred technique for cleanup and disposal of spilled oil in oil-spill-contingency plans. For catastrophic oil spills, in situ burning may be the only effective technique for spill control.

Burning could affect air quality in two important ways. Burning would reduce emissions of gaseous hydrocarbons by 99.98 percent and slightly increase emissions—relative to quantities in other oil and gas industrial operations—of other pollutants (Table IV.B.1.n-3). If the oil spill were ignited immediately after spillage, the burn would combust 33 to 67 percent of the crude oil or higher amounts of fuel oil that otherwise would evaporate. On the other hand, incomplete combustion of oil would inject about 10 percent of the burned crude oil as oily soot, plus minor quantities of other pollutants, into the air (Table IV.B.1.n-4). For a 200,000-bbl spill, setting fire at the source could burn up to 85 percent of the oil—with 5 percent remaining as residue or droplets in the smoke plume—in addition to the 10-percent soot injection (Evans et al., 1987). Clouds of black smoke from a 360,000-bbl oil-spill tanker fire 75 km off the coast of Africa locally deposited oily residue in a rainfall 50 to 80 km inland. Later the same day, clean rain washed away most of the residue and allayed fears of permanent damage.

Coating portions of the ecosystem in oily residue is the major, but not the only, potential air-quality risk. Recent examination of polycyclic aromatic hydrocarbons (PAH) in crude oil and smoke from burning crude oil indicate that the overall amounts of PAH change little during combustion, but the kinds of PAH compounds present do change. Benzo(a)pyrene, which is often used as an indicator of the presence of carcinogenic varieties of PAH, is present in crude-oil smoke in quantities approximately three times larger than in the unburned oil. However, the amount of PAH is very small (Evans, 1988). Investigators have found that overall, the oily residue in smoke plumes from crude oil is mutagenic but not highly so (Sheppard and Georghiou, 1981; Evans et al., 1987). The

Expert Committee of the World Health Organization considers daily average smoke concentrations of more than 250 micrograms per cubic meter to be a health hazard for bronchitis.

Large fires create their own local circulating winds—toward the fire at ground level—that affect plume motion. In any event, soot produced from burning oil spills tends to sump and wash off vegetation in subsequent rains, limiting any health effects to the very short term. Accidental emissions are, therefore, expected to have a low effect on onshore air quality.

Conclusion: Effects on onshore air quality due to a 200,000-bbl spill would very according to whether burning is used for mitigation. Through evaporation, an unburned spill would add an estimated 781.7 tons of VOC to existing air quality. Burning would reduce emissions of gaseous hydrocarbons while slightly increasing emissions of other pollutants. Evaporation with and without burning likely would produce emissions exceeding air-quality standards; however, effects would be short term. Consequently, a minimal effect on air quality with respect to standards is expected. Principally because of the distance of emissions from land, the other effects of air-pollutant concentrations at the shore would not be sufficient to harm vegetation. A light, short-term coating of soot over a localized area could result from burning the oil spill.

O. Coastal Zone Management: In the event of a 200,000-bbl-oil spill, greater effects would be experienced by most biological resources; in some coastal environments, especially intertidal areas; by subsistence users; and on cultural and archaeological resources. Water quality would exceed the acute criterion for hydrocarbons for the protection of marine life for 3 days and would continue to exceed the chronic criterion for >1 month. Because these greater levels of effects are perpetrated by an accidental oil spill along a transportation route that is not inherently more dangerous than other potential routes, most Statewide and district policies that apply in the base case also apply in this analysis. Statewide standards and district policies related to coastal development; geophysical hazards; energy facilities; transportation and utilities; and historic, prehistoric, and archaeology resources can be applied better when an actual development is proposed. Nothing in the scenario is inherently in conflict with these policies. The broader Statewide standards and district policies related to subsistence; habitat; and air, land, and water quality can be applied more easily with the information available at the lease-sale stage. The greater level of effects identified in the other sections of this appendix do not translate into greater potential for conflict with these Statewide standards and district policies for the reason stated above—the spill that is the source of the effects is accidental and does not reflect a particular siting decision for transporting oil to the market. Regardless of the method used for transshipment, all oil leaving the State of Alaska goes by tanker. Mitigating measures reinforcing the MMS regulations related to oil-spill-contingency plans (OSCP's) and regulations ensuring safe drilling operations ameliorate potential conflict on the drilling site, but in this instance the spill occurs while the product is being transported to market. Tanker traffic is not controlled by MMS; however, OSCP's are required for tankers and would need to be in place before the oil was transported.

Conclusion: Potential conflicts with the Statewide standards and district policies of the Alaska Coastal Management Program are comparable to those in the base case. Conflicts with the Statewide standards and district policies related to site-specific decisions are not inherently in conflict with the scenario. Potential effects related to subsistence; habitat; and air, land, and water quality are more severe in this case and serve to emphasize the potential for conflict with these broader policies that was evident in the base case.

APPENDIX D

Energy Alternatives to the Proposed Action

ENERGY ALTERNATIVES TO THE PROPOSED ACTION

A. <u>Energy Alternatives Considered</u>: For the EIS prepared in response to the Comprehensive Program 1992-1997, an extensive list of possible alternatives to OCS oil and natural gas was considered. This list is reproduced in Table D-1 below. Many of these alternatives are very expensive, environmentally unattractive, or both. On the basis of cost and environmental attractiveness, the list of alternatives whose environmental effects would be considered in depth was reduced to the shorter list reproduced in Table D-2. A complete discussion of the rationale behind these lists can be found in *Comparative Environmental Analysis of Energy Alternatives to OCS Oil and Gas* in USDOI, MMS, 1992, the EIS for the Comprehensive Program 1992-1997, Volume III. This document is incorporated by reference.

TABLE D-1
Possible Energy Alternatives to OCS Oil and Gas

Oil and Gas Supply Substitutes	
-U.S. Onshore Conventional Oil -Domestic Enhanced Oil Recovery -Tar Sands -Imported Oil -Oil from Shale	-U.S. Onshore Conventional Gas -Tight Sands Gas -Coalbed Methane -Devonian Shale -Imported Gas
Fuel Substitutions	
-Nuclear (electric) -Coal -Coal Synfuels (liquids or gas) -Geothermal -Hydro (electric) -Wind (electric) -Tidal Power -Ocean Thermal (electric) -Photovoltaic -Solar Radiation Concentrators	-Solar Ponds -Wood (natural or plantation) -Methanol (from natural gas or coal) -Ethanol (from corn, sugar cane, or biomass) -Agricultural Biomass -Municipal Waste -Hydrogen -Peat -Waste Heat
Conservation	
-Improved Building Shells -More Efficient Conversion Technologies (e.g., CAFE, Appliance Efficiency) -Reduced Amounts of Goods and Services	

TABLE D-2
Energy Alternatives Considered for Environmental Analysis

Energy Alternatives to OCS Oil:	Energy Alternatives to OCS Natural Gas:
• Supply Substitution - Increased onshore domestic oil production - Increased import of oil • Fuel substitution in transportation - Imported methano—from foreign natural gas - Gasohol—ethanol from corn - Compressed natural gas—from domestic natural gas - Electric cars • Conservation measures - Transportation—increased fuel economy/diesel engines/public transportation - Industrial—reduced consumption of plastics	• Supply substitution - Increased onshore domestic gas production - Increased liquid natural gas (LNG) imports • Fuel substitution in electricity generation - Coal - Nuclear - Residual fuel oil • Renewable sources of electricity generation - Wind - Solar Thermal - Photovoltaic - Hydropower • Conservation measures - Conservation in residential gas appliances

New technology might change this most likely list over time; however, there is little basis for anticipating which alternatives might become more attractive in the future. Thus, the present section only analyzes the environmental effects associated with those alternatives listed in Table D-2.

The following sections consider the nature and environmental effects of alternatives to the oil and natural gas that may be produced from leases sold in Sale 149. Tables D-3 and D-4 show the equivalent quantities of alternative energy sources that may be required should this lease be canceled.

B. Effects Associated with Replacements for Oil Produced from Sale 149:

1. Oil-Supply Substitutes:

a. Increased Oil Imports: The major environmental effects associated with the expanded importation of oil include: (1) the generation of greenhouse gases and regulated air pollutants from both transportation and dockside activities, emissions of pollutants (NO_x, SO_x, and VOC's) implicated in the formation of acid rain, and tropospheric and stratospheric ozone formation; (2) degradation of water quality from oil spills occurring from either accidental or intentional discharges or tanker casualties; (3) possible destruction of flora and fauna and recreational and scenic land and water areas from oil spills; and (4) the public aversion to the risk of increased oil spills.

b. Increased Onshore Domestic Crude Oil Production: The greatest potential for significantly increasing the domestic crude-oil supply lies in successful application of enhanced oil recovery (EOR) processes to known reservoirs and by additional drilling in existing fields (infill drilling). The EOR processes fall into the categories of chemical flooding, miscible flooding, and thermal recovery methods. A key feature common to all three methods is the need to inject liquids or gases to mobilize and displace otherwise unrecoverable oil. The EOR activities usually do not impose significant additional negative effects in areas where primary and secondary recovery already has occurred.

The major environmental effects associated with expanded domestic onshore oil production using EOR techniques include: (1) potential degradation of local ambient-air quality from atmospheric emissions of dust, engine exhaust, off-well gases, gas-flaring products, particulates, SO_2, CO, NO_x, H_2S, and hydrocarbons and the consequent formation of acid rain and tropospheric ozone and depletion of stratospheric ozone; (2) potential degradation of local and national air quality due to emissions of greenhouses gases, especially CO_2 used in miscible flooding; (3) possible degradation of both surface-water and groundwater quality from spills or leaks of process chemicals during handling, mixing, or injection and increased potential for chemical contamination of drinking water by injected fluids left in the reservoir; (4) expanded land use through more intensive field development (i.e., more wells, roads, injection lines, and facilities); and (5) health risks to workers from the handling of the toxic chemicals used in thermal and chemical recovery processes.

2. Fuel Substitution in Transportation:

The transportation sector consumes over 40 percent of petroleum products sold in the United States. Any reduction in demand for petroleum by the transportation sector would have a significant impact on overall demand. Demand for petroleum by the transportation sector might be reduced in two ways: first by substituting a less polluting alternative for the oil, and second by conserving fuel through improvements in private and public vehicle efficiency.

a. Viable Alternative Transportation Fuel: Viable alternative transportation fuels include imported methanol, ethanol distilled using domestic corn, compressed natural gas, and electricity.

The major environmental impacts associated with expanded use of imported methanol as an alternative to gasoline include: the deterioration of air quality from the emissions of various regulated pollutants during tanker transportation; possible water and land degradation from spills, leaks, and port expansion; and handling related health and safety issues.

Expanded production of ethanol for use as a blending component in gasoline would result in severe adverse environmental impacts. Bioconversion plants generate more regulated air pollutants per unit of energy output than any other fuel production process mentioned in this analysis. The production of ethanol produces no net increase in greenhouse gases. Nevertheless, the emissions of NO_x would have negative impacts on stratospheric ozone. Both water runoff from corn production and spills and leaks of wastewater from ethanol conversion plants contribute to water quality degradation. Increased corn production for additional ethanol would have widespread, adverse impacts on the land in terms of soil erosion, loss of wildlife habitat, and the depletion of soil quality. The nontoxic solid wastes produced during ethanol conversion degrade the environment by occupying large areas of land and by introducing materials that leach into groundwater and surface water supplies.

Domestically produced natural gas can be compressed and used as a substitute for gasoline in passenger vehicles. The environmental impacts of natural gas for passenger car use are the same as natural gas for other uses from a production and transportation perspective. These impacts are summarized in the discussion of domestic onshore production.

The environmental impacts associated with electricity as a gasoline substitute are dependent upon the primary energy source used to produce the electricity. Some of these impacts are considered in the subsequent natural gas section.

3. Conservation Measures:

a. Increased Fuel Economy in the Transportation Sector: Conservation of oil in the transportation sector can take many forms. One option is increasing fuel efficiency in conventional gasoline-powered vehicles by implementing new technologies that allow a vehicle to operate more efficiently with no loss in performance or size. Other measures include driving smaller and lighter cars, driving at slower speeds, replacing gasoline engines with diesel engines, and using public transportation more frequently. All of these measures are believed to have positive net impacts on the environment.

b. Reduced Consumption of Plastics: Within the industrial sector, oil's main future use will be as a chemical feedstock. A major end use category for petrochemicals is plastics. Because petroleum hydrocarbons are the major feedstock for plastics, the reduced consumption of plastics is an energy alternative to OCS oil production.

To reduce consumption of petroleum by reducing plastic feedstock consumption, an alternative must be found for the end use product made from plastic resin. In most cases, the easiest alternative is to make the final product from a different material. One example would be less use of plastic in an automobile through the substitution of steel, but this substitution could lead to greater energy consumption. Additional steel would require additional coal with all of its attendant environmental impacts. Additionally, if metal is substituted into an automobile, the extra weight will make it less fuel-efficient, raising its gasoline use. This increased demand for gasoline would increase environmental impacts from oil production and transportation whether the crude oil was OCS-produced or imported oil. As seen from this example, reduced use of plastic products in the vehicle may not reduce oil use. This effect will most likely be true for many alternatives to plastic products. Although impacts associated with plastic production will be decreased if an alternative is implemented, there will always be other impacts associated with the substitute's production and use.

C. Effects Associated with Replacements for Natural Gas Produced from Sale 149:

Commercial natural gas production is not expected from tracts leased in Sale 149. Nevertheless, it is possible that natural gas may be produced from these tracts at some time in the future. In the unlikely event that commercial natural gas production does occur from these tracts, this section discusses possible alternatives to that gas and the environmental effects associated with each alternative.

1. Gas Supply Substitution:

a. Increased Onshore Domestic Natural Gas Production: Over the next 10 years, tight sands gas and coalbed methane reserves have the potential to contribute substantially to the U.S. supply of natural gas. Methane gas from coal seams has an excellent chance for development and is already successfully marketed from several areas. Total reserves in the United States are estimated to range between 80 and 400 Tcf. Thirteen western tight gas basins have been identified and are estimated to contain in excess of 400 Tcf of nonassociated gas in place.

The environmental impacts that result from producing unconventional reserves of natural gas from tight sands and coalbed formations will entail a slightly increased risk to the environment over conventional gas production. As with conventional production, there will be emissions of noise and regulated pollutants from diesel and gas-fueled support equipment, compressor engines, and fugitive leaks from accessory equipment. Emissions of SO_x, NO_x, and VOC's could potentially exacerbate acid rain levels and increase tropospheric ozone formation. Additionally, the emissions of NO_x could have negative impacts on stratospheric ozone. There will also be emissions of greenhouse gases, especially methane and CO_2, but these quantities will be less than those generated from conventional production activities. The primary wastes of onshore gas production are "produced water" that exists naturally in oil and gas formations and drilling fluids. The major environmental water quality concern associated with tight sands gas and coalbed methane recovery have to do with the use of hydraulic fracturing where the potential exists for contamination or disruption of aquifers from injection of toxic fracturing fluids. Conventional land preparatory activities adversely affect ecosystems, soil, wildlife, and possibly wetlands depending on where the wells are located. The major societal impacts are risks to workers from handling the toxic chemicals added to the fracturing fluid.

b. Increased LNG Imports: The production and liquefaction of natural gas has environmental impacts, but these impacts, except for the global warming impact, will be felt in the countries where the natural gas is produced and subsequently liquified. Effects considered here begin at the point where the tanker transporting the imported liquified natural gas (LNG) enters U.S. waters.

The only major environmental impact associated with expanded LNG use would occur if an LNG carrying tank punctures or leaks during unloading or use. Because LNG readily vaporizes but does not disperse quickly and remains near ground level, accidental ignition of the vapor clouds would have tremendous explosive power. Regulated pollutant emissions during transport and unloading are not a significant problem due to special

combustion systems built into LNG ships, the nature of natural gas, and the special unloading process used for this fuel.

2. Fuel Substitution for Gas in Electricity Generation:

a. Coal: The major environmental impacts of expanded coal use include: deterioration of ambient air quality from emissions of regulated pollutants, aldehydes, and toxins from surface mining activities; noise from mining activities; the elimination of vegetation and displacement or destruction of wildlife habitat associated with surface mining; deterioration of water quality and possible elimination of aquatic life from acid mine drainage and mine water runoff which may contain toxic trace substances; the problem of disposal of solid wastes produced during mining; the visual intrusions on the land from surface mining residuals; and occupational hazards and risks to workers from exposure to physical danger, noise, solvents, coal dust, and potential mutagens and carcinogens, such as polycyclic aromatic hydrocarbons.

b. Nuclear: The major environmental impacts associated with an expanded use of nuclear energy include: potential releases of small amounts of radiation during mining, processing, and the use of radioactive materials; surface water and groundwater deterioration from the disposal of low-level radioactive wastes and considerable public anxiety about radiation.

c. Residual Fuel Oil: Residual fuel oil is a heavy petroleum product remaining after the more valuable petroleum products have been distilled from crude oil. The United States both produces and imports residual fuel oil. On the margin, the additional residual fuel needed to replace OCS gas would be imported. Consequently, the environmental impacts of importing and then distributing residual fuel oil within the United States are considerable to be similar to those arising from imported crude oil.

3. Renewable Sources of Electricity Generation: In general, renewable energy resources are often considered to be environmentally benign by comparison with most "conventional" energy resources like fossil fuels, which are not renewable. The term renewable refers to energy flows which are continuously generated and are of a physical nature rather than of a chemical nature as are fossil fuels. Although these energy flows are continuously generated, they are not always available; i.e., the sun continuously generates radiant energy, but due to the rotation of the earth, cloud cover, etc., the energy is not always available. Most of these renewable energy sources have been utilized in the past, though past applications were often rudimentary and on a small scale.

Currently, however, some of these sources are being developed commercially on a large-scale to deliver energy in the form of electricity or heat.

The total environmental impacts of the renewable energy source will depend on the technologies used, the scale of operation, and the geographical distribution of the systems. Because the energy sources are physical in nature rather than chemical, their environmental impacts primarily will be physical.

a. <u>Wind</u>: Wind turbines are used to convert wind into useful mechanical or electrical energy. Almost all turbines re erected in clusters called "wind farms." Expanding generation of electricity with wind power would generate the following major environmental impacts: disturbance of sizable land areas as thousands of giant windmills disrupt existing uses and impact wildlife, the possibility of erosion and changes in drainage patterns in certain areas, visual impacts, considerable noise, and interference with television reception. In addition, the establishment of large windmills will produce an indirect environmental impact by increasing the demand for steel, and thus iron and coal with all their attendant problems.

b. <u>Solar Thermal</u>: Solar thermal electric plants concentrate the radiant energy from the sun to create steam which is used to generate electricity. The active systems which are considered to be both economical and efficient include central receivers, parabolic dishes and solar troughs. The central receiver system utilizes an array of sun-tracking mirrors (heliostats) which reflect solar radiation onto a receiver mounted on top of a central tower. Parabolic dishes and troughs are distributed-collector systems which track the sun. The basic difference between the central receiver and the distributed collector systems is that in the former, the solar energy radiating on a large area is transmitted to a central point as radiation, while in the latter, the energy is carried as heat in a fluid.

The major environmental impacts associated with increased use of solar energy production include: use of large land areas for sitings of reflectors or heliostats, some water quality degradation due to the discharge of waste rinse solutions, loss of wildlife habitat, intense reflections from heliostats, visual disturbances, and the emissions associated with the fabrication of materials used to construct the systems.

c. <u>Photovoltaic</u>: Photovoltaic energy systems use chemical processes to convert the sun's radiant energy directly into electricity. The major environmental impacts associated with the expanded use of photovoltaics as a source of electricity include: the deterioration of air quality from emissions of toxic air pollutants released during production of the photovoltaic cells and from leaks at the plant; the problem of disposing of toxic and nontoxic solid wastes produced during the production of the cells; and the potential for adverse land impacts from photovoltaic plant construction and decommissioning.

d. <u>Hydropower</u>: Hydroelectric power projects use the energy of flowing water to generate electricity. Usually hydro projects require a dam to create a reservoir of water except in those instances where a naturally occurring waterfall provides the energy to drive the generators. The water from the reservoir flows through generator turbines which produce the electricity. At present, hydropower is a major source of energy for electricity generation worldwide.

Since hydropower exploits the energy in an existing body of water, the environmental consequences of constructing and operating a hydro facility result principally from modifying free-flowing waters. The severity of the impacts will vary from site to site depending on the type of project and specific fish species and terrain that are affected.

The major environmental impacts associated with increased hydroelectric power generation include: microclimatic changes surrounding the reservoir; aquatic habitat, and water quality degradation due to water losses downstream and fluctuations in water levels and releases of toxins caused indirectly from thermal stratification; adverse impacts on flora and fauna and disruption of wildlife habitats from flooding and hydropower construction activities; erosion of stream beds, estuaries, deltas, and seashores from increased river velocity; potential losses or gains to recreation and tourism; visual intrusions on the landscape from excavation of dam building materials; and societal impacts such as population relocation, the potential expansion of agriculture, and control of flooding.

4. <u>Conservation</u>: Consumers could realize significant reductions in natural gas use through the use of more efficient gas appliances. These savings could accrue to the residential and commercial sectors through the adoption of more efficient furnaces and better insulated water heaters. Firms in the industrial sector could lower their natural gas consumption by installing more efficient gas using equipment, improving insulation, and using

energy saving process improvements.

Reductions in natural gas consumption through conservation would lead to reduced negative environmental effects associated with the production and transportation of natural gas. The only negative environmental effects associated with conservation might be some minor impacts related to increased production of insulating materials and other effects associated with production of more efficient equipment to replace obsolete equipment that had not yet worn out.

D. Energy Equivalents:

Table D-3
Energy Anticipated to Be Produced from the Proposed OCS Sale 149—Cook Inlet

Anticipated Production	
Total Crude Oil Production	2.00×10^8 (bbl)
Total Natural Gas Production	0.00 (cf)
Energy Equivalent	
Crude Oil BTU Equivalent @ 5.80×10^6 BTU/bbl[1]	11.60×10^{14} (BTU)
Natural Gas BTU Equivalent @ 1.03×10^3 BTU/cf[2]	0.00 (BTU)
Total Oil and Gas BTU Equivalent[3]	11.60×10^{14} (BTU)

Table D-4
Equivalent Amounts of Energy Needed from Other Sources to Replace Anticipated Oil Production from the Proposed OCS Sale 149—Cook Inlet

Alternative Energy Source	Amount of Resource Needed to Provide an Equivalent Amount of BTU's
Onshore Domestic Oil Production	2.00×10^8 (bbl)
Imported Oil	2.00×10^8 (bbl)
Methanol @ 2.71×10^6 BTU/bbl[3]	4.28×10^8 (bbl)[4]
Ethanol @ 3.55×10^6 BTU/bbl[5]	3.27×10^8 (bbl)[6]
Compressed Natural Gas @ 5.63×10^3 cf/BOE[7]	11.26×10^{11} (cf)[8]
Electric Cars (not directly convertible to BTU)	

Table D-5
Energy Potentially Available from Other Sources
to Replace Any Possible Gas Production from the
Proposed OCS Sale 149—Cook Inlet

Alternative Energy Source Equivalents
Onshore Domestic Gas @ 1.03×10^3 BTU/cf
Liquid Natural Gas Imports @ 1.03×10^3 BTU/cf
Coal @ 2.17×10^7 BTU/T[9]
Nuclear @ 6.51×10^8 BTU/T of ore[10]
Residual Fuel Oil @ 6.29×10^6 BTU/bbl[11]
Wind (not directly convertible to BTU's)
Solar Thermal (not directly convertible to BTU's)
Photovoltaic (not directly convertible to BTU's)
Hydropower (not directly convertible to BTU's)

[1] and [2] USDOE, Energy Information Administration (EIA), *Monthly Energy Review*, p. 152-3. August 1993.
[3] Oak Ridge National Lab. (ORNL), *Transportation Energy Data Book*: Ed. 9, prepared for the USDOE. April 1987.
[4] 2.00×108^8 bbl oil (5.80×10^6 BTU/1 bbl oil) x (bbl methanol/2.71×10^6 BTU).
[5] ORNL, *Transportation Energy Data Book*.
[6] 2.00×10^8 bbl oil x (5.80×10^6 BTU/1 bbl oil) x (1 bbl ethanol/3.55×10^6 BTU).
[7] (5.80×10^6 BTU/1 bbl oil) x (1 cf gas/1.03×10^3 BTU).
[8] (5.63×10^3 cf/1 BOE) x 2.00×10^8 bbl.
[9] EIA, *Monthly Energy Review*, p. 153.
[10] Science and Public Policy Program, 1975, pp. 6-9; cited in USDOI, MMS, Alaska OCS Region, 1990 (Beaufort Sea Sale 124 FEIS).
[11] EIA, *Monthly Energy Review*, p. 151.

APPENDIX E

MMS Alaska OCS Region Studies Program

ENVIRONMENTAL STUDIES PROGRAM

The Alaska Environmental Studies Program (ESP) was initiated by the U.S. Department of Interior in 1974 in response to the Federal Government's decision to propose areas of Alaska for offshore gas and oil development. The purpose of the studies program is to establish information needs and implement studies to assist in predicting, assessing, and managing potential effects on the human, marine, and coastal environments of the OCS and coastal areas that may be affected by gas and oil development. To attain the program goals, data on specific environmental, social, and economic concerns arising from offshore leasing are required. The ESP then monitors any effects during and after oil exploration and development.

The Alaskan ESP is in the Leasing and Environment office of the MMS Alaska OCS Region in Anchorage, Alaska. When the Alaska ESP began in 1974, BLM requested that the National Oceanic and Atmospheric Administration (NOAA) institute a marine environmental studies program to provide assessment information on the biological and physical sciences. The MMS-funded NOAA/Outer Continental Shelf Environmental Assessment Program (OCSEAP) performed a portion of the Alaskan ESP; however, recommendations of the GAO to consolidate certain functions and decreased funding resulted in the phasing out of the OCSEAP component.

The Social and Economic Studies Unit (SESU), a component of the Alaska Region ESP, was established in 1975 because of the unique characteristics of Alaska's Native population and the relative isolation, remoteness, and nonindustrial nature of the State of Alaska. Initially, Peat, Marwick, Mitchell and Company managed these studies under contract. As the Alaska studies program has evolved, MMS has increased its capabilities in information gathering and marine-resource assessment, and this has led to direct contracting for certain studies. The SESU management and contracting functions have been performed inhouse since Fiscal Year (FY) 1980.

Following reviews by scientific panels (physical oceanography, ecology, and socioeconomics) from the National Research Council (NRC)/National Academy of Sciences (NAS), it was concluded that "The ESP's studies have provided important and useful information to inform decisions about OCS oil and gas leasing and, in the process, have contributed significantly to the accumulation of knowledge about the continental shelf areas of the United States" (NAS, 1993). As part of the review, specific recommendations for addressing programmatic needs were provided. For Alaska, the NRC/NAS stated as a regional priority "In Alaska, MMS should pursue a balanced studies program that focuses on topics of greatest scientific uncertainty and on areas of greatest vulnerability and leasing interest. It should pay special attention to studies that will help in assessing the postlease effects of OCS oil and gas activities if and when they occur."

The NAS (1992) concluded that the Alaska social and economic studies component is a "credible and comprehensive" program, "capable of collecting and analyzing the information needed for assessment and management of effects on the human environment."

The MMS-funded studies in the Cook Inlet/Shelikof Strait area began in 1975. These efforts assembled historical information and collected new data. Research topics and objectives of the Alaska OCS Region Environmental Studies Program are described below.

Physical and Biological Studies

The bulk of the physical and biological studies in the lower Cook Inlet/Shelikof Strait area occurred during 1975 to 1983, in response to information needs for the initial OCS lease sales in the region. Only a limited amount of work occurred in subsequent years due to competing priorities for information from other planning areas scheduled for leasing. The MMS/NOAA publication, "The Gulf of Alaska: Physical Environment and Biological Resources," encapsulates the results of many ESP-sponsored studies conducted in the region.

Contaminant Distribution

These studies are intended to establish predevelopment hydrocarbon and trace metal concentrations in the water column, biota, and sediments of OCS regions. Such studies were conducted during 1977 to 1982 in the Cook Inlet/Shelikof Strait area. Additional studies of heavy metal and hydrocarbon concentrations in the water column, sediments, and tissues of selected biota were conducted in 1992 in Cook Inlet. This more recent work benefits from advances in the state-of-the art of trace contaminant analysis that have occurred since the initial studies were performed.

Geologic Hazards

Extensive studies of geologic hazards in the lower Cook Inlet/Shelikof Strait region were conducted during 1975 to 1983. They addressed volcanism, seismicity, surface and near-surface faulting, sediment instability, erosion and deposition, and stratigraphy.

The major objectives of the seismic studies were to identify earthquake hazards, locate active faults, and identify precursors of volcanic activity. The ESP funding was used to augment seismograph programs conducted by the U.S. Geological Survey and University of Alaska. This allowed the investigators to use additional or improved instruments and thereby to acquire more detailed and voluminous data.

Shipboard reconnaissance surveys were conducted in order to identify potential hazards to OCS structures in the context of a regional framework. Certain geologic features, identified as potentially troublesome during those surveys, were studied in greater detail. This more site-specific work included sediment coring, sidescan sonar surveys, and deployment of ocean bottom seismometers.

Pollutant Transport

The transport and transformation of petroleum-related contaminants are significant considerations in the assessment of potential effects of OCS oil development. Petroleum and other contaminants introduced into the environment can be transported in the atmosphere, in the water column, and by sea ice. During transport, petroleum undergoes continual physiochemical change due to processes such as evaporation, flocculation, emulsification, and biodegradation. Transport studies are designed to provide information that will enable the Department of the Interior and other agencies to: 1) to minimize potential risks to sensitive environments; 2) predict oil-spill trajectories, coastal landfalls, and effects of oil-spill-cleanup operations; and 3) assist in planning the location of long-term environmental monitoring sites in the study area.

No systematic physical oceanographic or meteorological studies had been conducted in the lower Cook Inlet/Shelikof Strait region prior to 1976, when ESP studies were initiated. Transport studies were designed to proceed from a regional description of oceanographic and meteorological features to analyses of processes. Oceanographic investigations included literature summaries, current measurements, hydrographic station data, remote data sensing, radar mapping of surface currents, and computer modeling. Meteorologic studies concentrated on field observations and computer simulation of coastal wind patterns. Further study efforts were devoted to analysis and synthesis of data and to continued modeling activities involving petroleum weathering, transformation, and spreading. In addition, rig-monitoring studies of the fate and effects of drilling fluids and drilling discharges took place in Cook Inlet during 1980 to 1981.

Biological Resources

A major reason for conducting biological studies in the Cook Inlet/Shelikof Strait region was to identify populations, communities, and ecosystems that are at risk from pollutants resulting from accidents such as oil spills, as well as routine operational discharges. Significant fisheries resources occur in the region, as well as a variety of other living resources.

A large number of studies of animal distribution and abundance, migration patterns, feeding sites, and population behavior have been conducted to identify potential ecological sensitivity and vulnerability and to support the descriptive/predictive analyses in this EIS. Site-specific "process" studies have furnished details on trophic and population interactions, sensitivity to disturbance, habitat dependency, and physiological characteristics of unique or potentially sensitive species and communities.

Effects Research

"Effects" studies are used to predict possible causal relationships between OCS-related activities and biological/chemical changes, to help develop stipulations and regulations that may mitigate effects, as well as to identify potential indicators that may be useful in monitoring of OCS oil and gas activities. A large number of laboratory studies of the effects of crude oil, drilling discharges, and disturbances on marine organisms and populations have been sponsored by the Alaska ESP and other MMS offices since 1974. Many are generic and thus applicable to Cook Inlet/Shelikof Strait biota and ecosystems. In addition, there have been some studies conducted in the inlet proper.

Monitoring

The intent of monitoring studies is to identify perturbations due to OCS activities. In order to isolate such perturbations from natural fluctuations in the environment and its biota, monitoring usually requires long term collection of data. Study designs and data-collection procedures are carefully designed to allow statistically based hypothesis testing. The MMS has sponsored several workshops to develop monitoring programs in Alaska. Two ongoing monitoring studies have relevance to the Cook Inlet/Shelikof Strait Planning Area. The Alaska Marine Mammal Tissue Archival Project obtains marine mammal tissues and maintains them in cryogenic storage for possible retrospective analysis. The goal of this project is to have available tissues reflective of predevelopment conditions for analytical comparison with those reflecting perturbed conditions. The seabird monitoring program addresses the well-being of colonial seabirds via periodic determination of the abundance and productivity of selected species at designated colonies. In 1992, colonies at Tuxedni Island and several other lower Cook Inlet locations were visited.

SOCIAL AND ECONOMIC STUDIES

Studies in this discipline were initiated in 1976 at the urging of the State of Alaska and with recognition by the USDOI that the societies of rural Alaska were especially vulnerable to the influences of industrial development. Also, social and economic studies are mandated by Section 20 of the OCS Lands Act Amendments, which includes monitoring of the human environment. Very little data existed to allow MMS social scientists to predict social effects from offshore development. Because of the nature of subsistence dependence in the communities of coastal Alaska and the nonwestern character of Native cultures, the study of the effects of offshore petroleum development goes beyond conventional economic considerations. To meet these needs, several core-study topics were undertaken for nearly every lease-sale area in the Alaska region, including regional socioeconomic and sociocultural systems studies, statewide and local economic and demographic forecasts, commercial-fishing effects, petroleum-technology assessments, and transportation-system effects.

As the understanding of social systems and the predictions of the potential effects caused by development have evolved, social and economic studies are now more focused and issue-oriented. Special topical studies focus on analyzing the effects of western economic development on specific aspects of a social or cultural system, such a rural structural economic change and the relationship between market and subsistence economies, level and geography of subsistence activities, traditional family relations, leadership roles, and cultural values. A series of monitoring studies are now also a component. In addition to time-series-data studies, which are a form of monitoring, information about social indicators as measures of local community and regional well-being is being gathered. Sociocultural monitoring studies begun in FY 1985 will track community cultural change, social health, and values. Some of these studies will include information from communities effected by the *Exxon Valdez* oil spill.

Studies reports for social and economic research sponsored by MMS in the proposed Cook Inlet/Shelikof Strait lease area are included in the attached Studies List.

Studies List, Cook Inlet/Shelikof Strait

Attached is a list of studies conducted in the Cook Inlet/Shelikof Strait OCS areas under the MMS Environmental Studies Program. This list shows the subject or title, principal investigator(s), research unit number (RU), MMS study number, and year(s) of funding for studies identified as directly or indirectly contributing to the database relevant for this proposed lease sale. The reader is advised that environmental/social and economic effect assessments made in this EIS are likely to use a broader data base than the studies listed in Table E-1; for example, additional studies conducted by other MMS offshore leasing offices and other Federal, State, university, or international agencies may be pertinent data sources.

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Environmental Studies

(Studies identified by research unit numbers were funded through the Outer Continental Shelf Environmental Assessment Program; the remainder were directly funded and administered by BLM or MMS. Dates indicate years for which funding was provided. Highlighted () studies involved work within the planning area; others provide relevant information.)

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APPENDIX F

Prehistoric Resources Analysis

PREHISTORIC RESOURCE ANALYSIS
PROPOSED SALE 149, COOK INLET

Purpose: In accordance with the Minerals Management Service (MMS) Handbook for Archaeological Resource Protection (#620.1-H, June 17, 1985), this archaeological analysis was prepared for offshore Lease Sale 149 for the Cook Inlet area. The analysis is intended to identify areas of possible prehistoric archaeological site potential and to aid the MMS in making recommendations to the Secretary on archaeological resource lease stipulation requirements and mitigation.

The MMS archaeological resources protection program is conducted under the authority of the OCS Lands Act (OCSLA), as amended (43 U.S.C. §1331 et seq.); the National Historic Preservation Act (NHPA), as amended (16 U.S.C. §470 et seq.); the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 et seq.); Executive Order 11593; and the Department of the Interior, Solicitor's Opinion M36928, November 24, 1980.

Project Area Description: The proposed lease area is approximately 1.9 million acres and contains 403 blocks (Fig. F-1). All blocks are included in this archaeological analysis. The Sale 149 area contains lease blocks that have been offered for lease in Sale CI (1977) and Shelikof Strait/Lower Cook Inlet Sale 60 (1981). Sale 114, scheduled for the Gulf of Alaska/Lower Cook Inlet, was previously canceled. Exploration on leases from previous sales has resulted in the drilling of 13 wildcat oil and gas wells. All wells were plugged and abandoned.

Method: The report focuses on Quaternary geology related to the detectability and potential occurrence, location, and survivability of archaeological resources. Analyses employed in this summary include data from high-resolution seismic-reflection surveys (Petty Ray Geophysical Co., 1976), seafloor samples, and geomorphology. The report summarizes previous analyses of Quaternary geology and archaeological resource potential and includes unpublished data from inhouse studies.

The method used to develop the archaeological analysis was established in the Handbook for Archaeological Resource Protection (MMS 620.1-H, August 11, 1986).

The procedures outlined in Chapter 2, Section D.1-4 of the handbook are as follows:

Integration of the geophysical/geological and archaeological information is the focus of the prehistoric resource analysis. It includes a technical interpretation of existing geophysical/geological data to establish sea-level changes and to identify relict landforms. This technical interpretation will provide the basis for evaluating the potential for prehistoric resource occurrence (habitability) within the proposed lease-sale area. The process of integration begins at the broadest database level and proceeds toward the specific. Preparation of the analysis is conducted in the following manner:

1. **Review the Baseline Study:** If the regional baseline study indicates that the entire proposed lease-sale area lies within an area of low probability for the occurrence of prehistoric resources, and no new data exist that contradict the regional baseline study findings, then no further prelease prehistoric resource analysis or postlease prehistoric resource reports will be required.

2. **Review the Sea-Level Data in the Proposed Lease-Sale Area to Establish the Best Estimate of Paleo-Sea Level When Blocks of Medium or High Probability Occur in the Proposed Lease-Sale Area:** Blocks that a regional baseline study indicates are medium or high probability, but were not above sea level during times of potential human habitation (habitability), will require no further prelease prehistoric resource analysis or postlease prehistoric resource report.

3. **Examine the Geophysical/Geological Literature for Information Regarding Forces or Processes that Might Have Destroyed Potential Prehistoric Resources (Survivability) or Rendered them Unrecoverable:** Examples of such forces and processes are: (a) glacial scouring, (b) sea-ice gouging, (c) subaerial exposure, (d) inlet migration, (e) transgressive seas, and (f) sedimentation.

The block will require no further prelease prehistoric resource analysis or a postlease prehistoric resource report if the block exhibits any of these processes to an extent that it would be expected that prehistoric resources did not survive and/or are not recoverable.

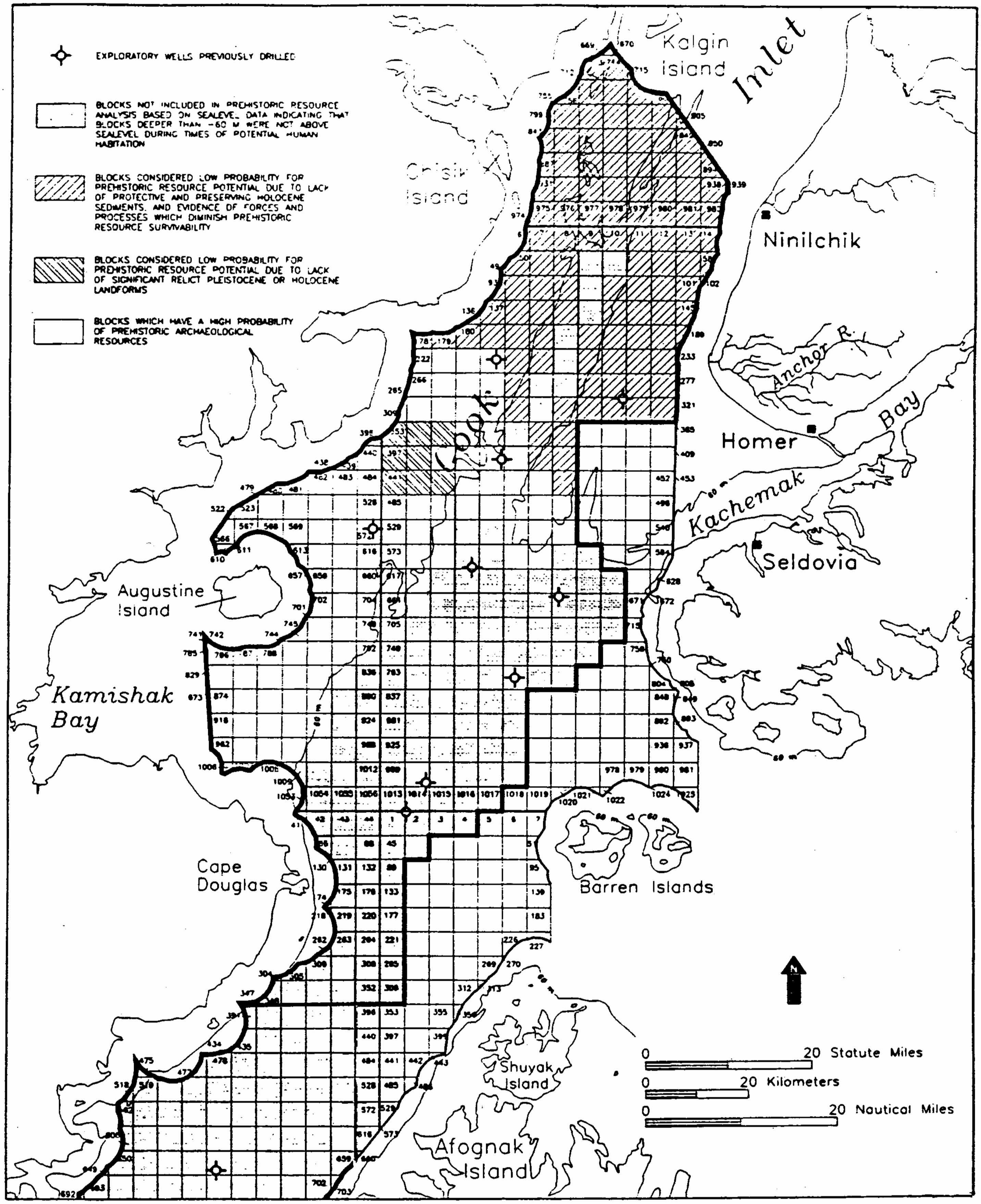


Figure F-1. High Probability Are for Prehistoric Archaeological Resources.

4. **Examine the U.S. Geological Survey Geology Report, Existing Shallow-Hazards Survey Data, etc., for Indications of Significant Landforms:** If sufficient data exist to make a determination, those blocks that do not contain significant relict Pleistocene or Holocene landforms will require no further prelease prehistoric resource analysis or postlease prehistoric resource report. Those blocks that are not excluded from further consideration shall require a prehistoric resource report under the archaeological lease stipulation or Right-of-Way (ROW) permit requirements.

Review of Baseline Study and Previous Work in the Sale 149 Area: Onshore Quaternary glacial geology of the Cook Inlet area is among the most studied and documented in the world (Karlstrom, 1952, 1953, 1956, 1957, 1958, 1959, 1964; Dobrovolny and Miller, 1950; Miller and Dobrovolny, 1957, 1959; Krinsley, 1952, 1953). Offshore studies in lower Cook Inlet have been related primarily to marine geological processes and geologic hazards analysis for oil and gas exploration (Bouma et al., 1977, 1978a, 1978b; Hein, et al., 1977; Hampton et al., 1978; Whitney et al., 1979; Whitney and Thurston, 1980; Thurston and Whitney, 1979, Whitney et al., 1981). In the course of evaluating geologic hazards for Federal oil and gas lease sales in lower Cook Inlet, submerged glacial features were mapped (Thurston, 1985).

Cultural-resource assessments including summaries of previous work and updated analyses have been published by Dixon et al. (1979, 1986), Friedman and Schneider (1984), Mobley et al. (1990), and Haggarty et al. (1991). An in-house report summarizing the geomorphic processes pertaining to the occurrence and survivability of cultural resources was prepared for the Gulf of Alaska/Lower Cook Inlet Sale 114 (Miller, 1988). A geologic report covering all aspects of the geology and geophysics of the planning area is in press (Comer et al., 1994).

The new data, which may serve to update the regional baseline study, will be incorporated into the existing baseline study for the Sale 149 area.

A. **Quarternary Geology:**

Regional Quaternary Geology: Lower Cook Inlet is a tidal embayment of the North Pacific Ocean that projects north-northeast for over 150 mi (240 km) into the Southcentral Alaska coast. Lower Cook Inlet narrows to the north from a width of 85 mi (140 km) at the latitude of Kamishak and Kachemak Bays to 30 mi (50 km) near Kalgin Island. The inlet occupies a structural trough that lies between the Chugach and Kenai Mountains on the southeast, the Talkeetna Mountains on the northeast, and the Alaska-Aleutian Range on the northwest. Lower Cook Inlet opens to the southwest into Shelikof Strait, which extends for another 170 mi (270 km) to a juncture with the North Pacific Ocean.

Lower Cook Inlet and Shelikof Strait are structural troughs formed by plate subduction tectonics. These structural lows and the mountains surrounding them have been sculpted into their present morphology primarily by the direct or indirect action of glaciers. The processes responsible in the past for shaping the geomorphology of this region are active today: earthquakes, structural offset, volcanism, ice fields, alpine glaciation, tsunamis, and high-velocity-tidal currents. Several historically active volcanoes line the northwestern side of Cook Inlet and Shelikof Strait. They include, north to south, Mount Spurr (1953, 1992), Mount Redoubt (1989-90), Mount Iliamna (numerous steam and ash eruptions), Mount Augustine Island (1812, 1883, 1902, 1935, 1963-64, 1976, 1986), and Mount Katmai/Novarupta (1912). The mountains and lowlands surrounding Cook Inlet and Shelikof Strait exhibit the full range of glacial features including ice fields; active alpine glaciers; arêtes; horns; hanging valleys; U-shaped valleys; drumlins; erratic boulders; outwash plains; eskers; glacial lakes; and ground, terminal, medial, and lateral moraines.

The offshore geology of Cook Inlet and Shelikof Strait also displays evidence for past glaciations. High-resolution seismic data from lower Cook Inlet reveal seafloor and subsurface features originating from glaciers and modified by high tidal currents and Holocene marine deposition (Thurston, 1985). The seafloor features include sand waves, megaripples, sand ribbons, lag gravel, and ice-rafted boulders with associated comet marks. The subsurface features include terminal, lateral, and ground moraines; lacustrine, glaciofluvial, and glaciomarine deposits; drainage channels; tunnel valleys; eskers; outwash fans; and sand waves. High-resolution geophysical data from Shelikof Strait reveal extensive deposits of Pleistocene glaciomarine and Holocene marine deposits. The Shelikof Strait seafloor generally is featureless with the exception of a few tectonic structures, such as fault scarps and possible remnant volcanic features (Hoose and Whitney, 1980).

B. Late Pleistocene and Holocene Chronology: Five major Pleistocene glaciations have been recorded in the region (Karlstrom, 1964). These glaciations and the age of their maximum advances are the Mount Susitna (200,000-230,000 B.P.), the Caribou Hills (155,000-190,000 B.P.), the Eklutna (90,000-110,000 B.P.), the Knik (50,000-65,000 B.P.), and the Naptowne (20,000-25,000 B.P.). In addition, there is abundant evidence of the "Little Ice Age" advance in the Holocene, which has been termed the Alaskan Glaciation (Karlstrom, 1964). The Late Pleistocene and Holocene events are the focus of this summary because prehistoric cultural occupation possibly occurred during this time interval.

The Holocene and late Pleistocene glacial chronology of the Cook Inlet region is depicted in Table F-1 (Karlstrom, 1964).

C. Extent of Glaciations: During the first three glaciations (Mount Susitna, Caribou Hills, and Eklutna), ice completely filled the Cook Inlet trough to elevations of 4,000 to 2,000 ft (1,300 to 630 m), extending from the Talkeetna Mountains in the north through Cook Inlet and Shelikof Strait out to the edge of the continental shelf. Evidence for this distribution is the presence of ice-erosional landforms and the stratigraphic position and relative elevations of moraines in surrounding mountains and lowlands of the Cook Inlet region (Karlstrom, 1964). In addition, evidence from seismic surveys in lower Cook Inlet and Shelikof Strait, such as glacial erosion and moraine deposits, attest to the presence of glaciers in the offshore areas. On the Kodiak shelf, ubiquitous ground moraine deposits and glacially eroded bedrock are evidence that ice covered the continental shelf during these early glacial advances (Thrasher, 1979). During the last two glaciations (Knik and Naptowne), ice coalesced across the lower Cook Inlet trough and filled Shelikof Strait out to the continental shelf (Fig. F-2) (Karlstrom, 1964; Whitney et al., 1980). A large proglacial lake covering the upper Cook Inlet region to the Talkeetna Mountains formed behind the ice dam in lower Cook Inlet. Lake levels reached elevations of +275 ft (84 m) about 12,000 B.P. The youngest lake strandlines were formed between 9,500 and 10,500 B.P. and may date the last time ice coalesced across lower Cook Inlet.

D. Late Wisconsin Sea-Level Stillstands: Past sea-level stands have been calculated for the Cook Inlet region from lowland-coastal bog and tidal bog stratigraphy, which record past water-table levels, and radiocarbon dating of organic material (Karlstrom, 1964).

Sea-level stillstands have been deduced from analysis of bathymetry (Dixon et al., 1979; 1986). Relative depths of seafloor features, such as benches, sills, and closed depressions, are related to sea-level stillstands. Using this method, stillstands have been postulated for six isobath lines at -125 m, -82 m, -66 m, -55 m, -38 m, and -28 m. Stillstands are thought to be associated with periods of maximum glaciation when relatively lower sea levels prevailed. The six isobaths were therefore correlated to regional and worldwide glacial maximums (Dixon et al., 1979; 1986) and assigned the following ages: -125 m from between 21,500 and 18,000 B.P.; -82 m from between 15,000 and 14,800 B.P.; -66 m at about 13,750 B.P.; -55 m at about 12,700 B.P.; -38 m from between 9,770 and 9,330 B.P.; and -28 m at about 8,700 B.P.

In lower Cook Inlet, a prominent notch is identified on seismic profiles along the western limb of the bathymetric ramp. The notch lies at a depth of -65 m and may correspond to the -65-m stillstand of Dixon et al., 1979; 1986. Outwash fans from glacial streams reaching their base level also formed in the area of the ramp at about -65- to -80-m water depth.

B. Offshore Geology:

1. Bathymetry: In Federal waters, bathymetric relief ranges from less than 10 m near Kalgin Island in the north to greater than -240 m along the southeastern side of Shelikof Strait. Lower Cook Inlet generally is configured as a two-tier plateau, with the shallower (-10 to -90 m, -60-m average) northern part separated from the deeper (-90 to -200 m, -170-m average) southern part by an arcuate, open-to-the-south "ramp" feature (Bouma et al., 1977; Whitney et al., 1979). The northern tier is dissected to a depth of -45 m by a central sea valley, which bifurcates in the north around Kalgin Island, and the "Kachemak" channel, which forms the axis of Kachemak Bay. The northern plateau area also is covered with seafloor bedforms, including sand waves with amplitudes approaching 15 m (Fig. F-3).

The southern tier is characterized by shallower slopes and deep closed basins (Fig. F-4) separated by narrow ridges, such as the ridge defined by the -125-m isobath that connects the Barren Islands to the Kenai Peninsula and

Table F-1
Cook Inlet Region
Holocene and Late Pleistocene Glaciation Chronology

Glaciation North America	Glaciation Alaska	Maximum Advance or Retreat	Years Before Present	Sea Level Stand (in feet)
Holocene	Alaskan	Tunnel II Advance	500-150	-.5 to -2
"	"	Tunnel I Advance	1000	-4.5 to -2.5
"	"	Retreat	1050	-4
"	"	Tustumena III Advance	2000	-13.5 to -9.5
"	"	Retreat	2500	-13.5
"	"	Tustumena II Advance	3000	-15.5 to -14.5
"	"	Tustumena I Advance	4000	> -15.5
"	"	Pro Tustumena	5000	-
"	Naptowne	Retreat	5500	+5 to +10
"	"	Tanya III Advance	6000	-14*
"	"	Retreat	6500	-
Wisconsin (Valderan Adv.)	"	Tanya II Advance	7000	-32*
"	"	Tanya I Advance	8500	-90*
"	"	Retreat	9000	-
"	"	Skilak III Advance	9500	-105*
"	"	Skilak II Advance	10,500	-130*
(Two Creekan Retreat)	"	Skilak I Advance	12,000	-187*
(Woodfordian Advance)	"	Retreat	12,500	-
"	"	Killey Advance	14,000	-250*
"	"	Moosehorn Advance	17,000	-330*

[1] Extrapolated from worldwide sea-level data from Dott and Batten, 1971.

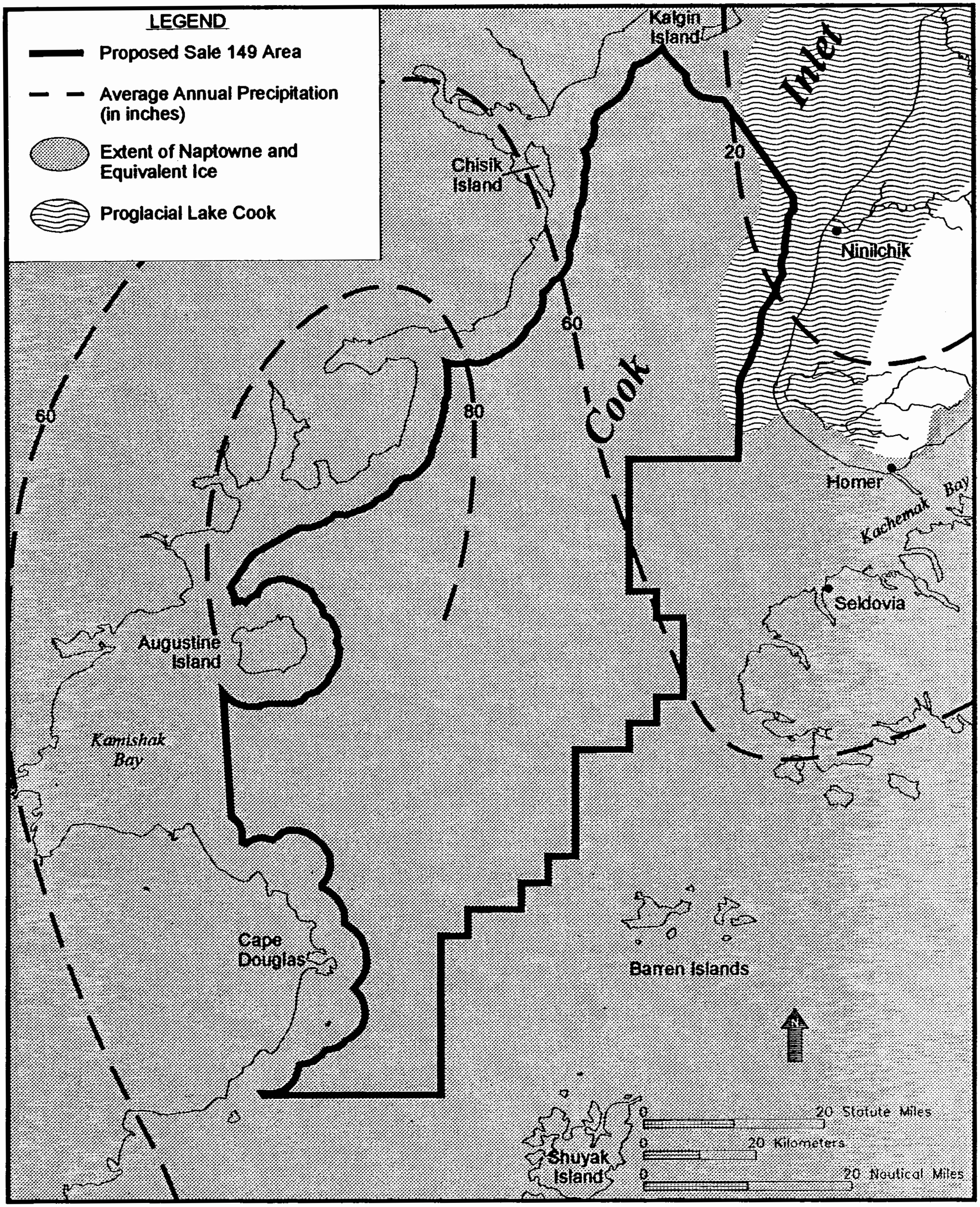


Figure F-2. Lower Cook Inlet Showing Modern Rainfall, Proglacial Lake Cook, and Extent of Naptowne and Equivalent Ice. (After Karlstrom, 1964)

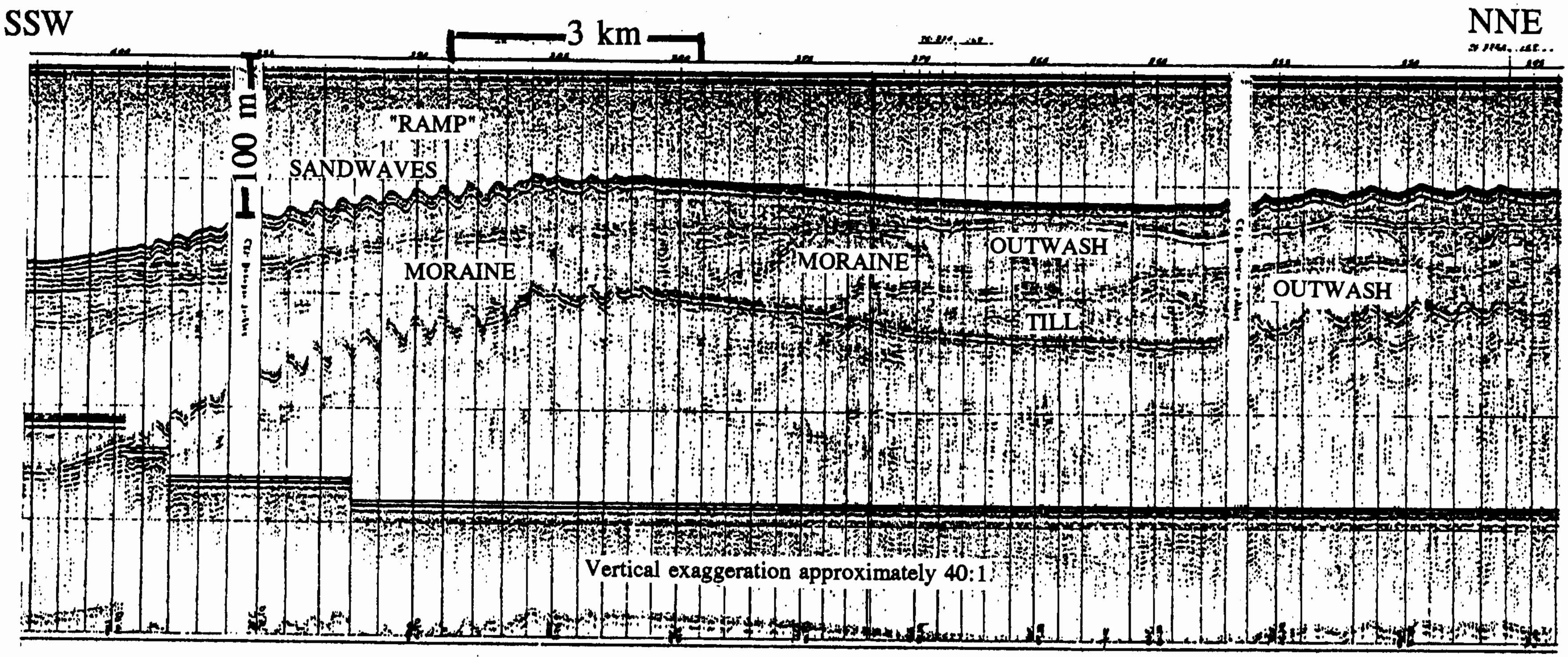


Figure F-3. Minisparker High-Resolution Seismic Profile of the Northern Tier of Lower Cook Inlet Bathymetry including the Ramp. Glacial deposits and stratigraphic features (moraines, till and outwash) overlain by Pleistocene (?) sand (sand waves) and Holocene marine deposits. Seismic profile courtesy of Fugro-McClelland.

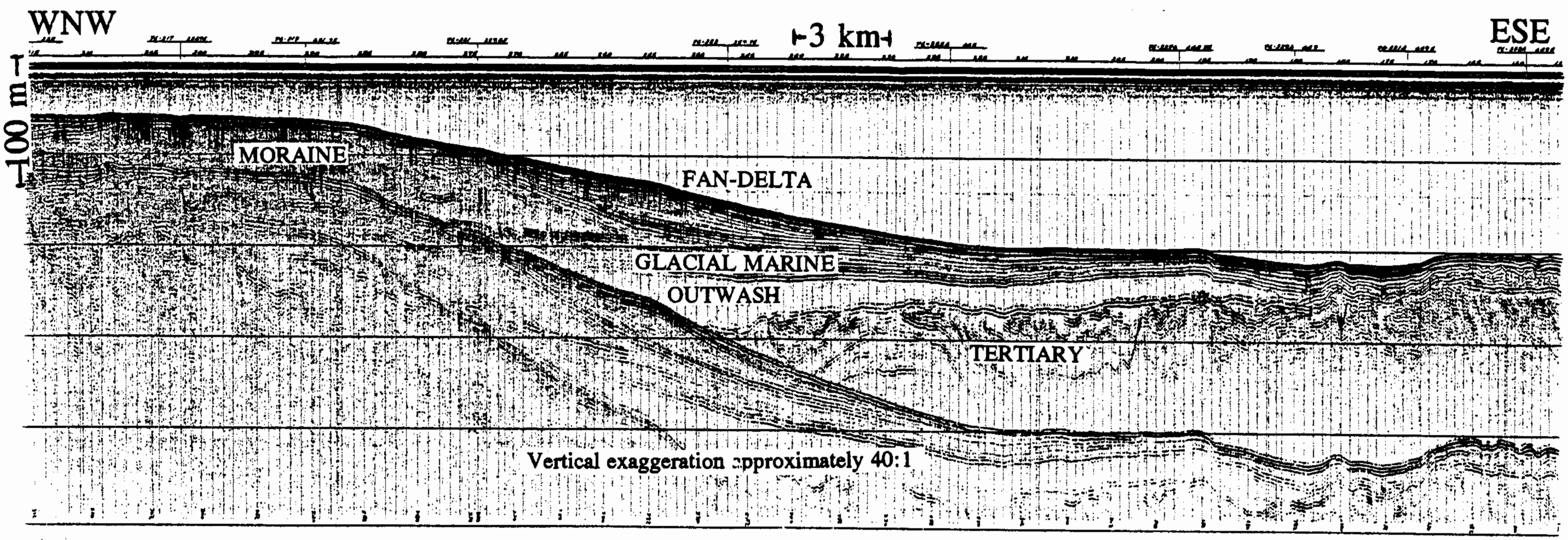


Figure F-4 **Minisparker Profile across the Western Moraine Complex, Western Ramp, Fan Delta, and Central Depression of Lower Cook Inlet.**

Afognak Island (Fig. F-5). At water depths shallower than this ridge, Cook Inlet is connected to Prince William Sound waters to the southeast via Kennedy and Stevenson Entrances. Cook Inlet is open to the southwest and continues as Shelikof Strait. In Shelikof Strait, water depths generally exceed -100 m.

The seafloor of the central strait is broad and generally flat with closed basins. The northwestern side of the strait exhibits relatively steep slopes descending from the mountain front with water depths of around -100 m in the north and over -190 m in the south. Areas of deepest water occur along the southeastern side of the strait adjacent to Kodiak Island, where they reach -240 m.

2. **Geomorphology:** A study of bathymetry and subsurface deposits (Thurston, 1985) resulted in the classification of lower Cook Inlet morphology into four provinces: (I) 0 to -60 m: Constructional morphology, glacial deposition and subordinate erosion; (II) -60 to -120 m: Constructional morphology, glacial and marine deposition with subordinate hydraulic erosion; (III) -120 to -190 m: Erosional morphology, gently sloping seafloor formed by glacial erosion and subordinate glacio-marine deposition; and (IV) >-190 m: Erosional morphology, closed basins formed by glacial erosion and subordinate glacio-marine deposition. Geomorphological provinces I and II correspond to the area of the northern bathymetric tier and the ramp. Geomorphological provinces III and IV correspond to the southern bathymetric tier and Shelikof Strait. Bathymetric characteristics of the northern part of lower Cook Inlet are manifestations of thick deposits of glacial moraine and associated strata. The ramp feature is the manifestation of the joining of two arcuate morainal lobes from Kachemak and Kamishak Bays. The bathymetric profile of the southern plateau and Shelikof Strait is due to deep scour by glaciers and thin Pleistocene and Holocene marine and glacio-marine sediment cover.

3. **Quaternary Deposits:** The Quaternary unconformity is present throughout the sale area (Thurston, 1985). The surface was eroded into underlying rock by ice flowing out of Cook Inlet and Shelikof Strait. It is characterized by truncated tilted Tertiary strata overlain in the north by unstratified or poorly stratified moraine or till deposits and in the south by stratified glaciofluvial, glaciomarine, and marine sediments. The relative depth of the unconformity surface is a direct measure of the intensity of ice erosion and, by inference, ice depth. The greatest relief exhibited by the unconformity surface in lower Cook Inlet occurs north of Cape Douglas, where it lies at -250 m, and southwest of the Barren Islands, where it lies at depths of -300 m. These areas of deep ice scour correspond to the route of thick ice tongues that flowed into lower Cook Inlet and Shelikof Strait from the Alaska-Aleutian Range and from what appears to have been a spreading center on the site of the Barren Islands. An isopach map of Quaternary sediment shows that the area of thickest Quaternary deposits also occurs where the unconformity surface is at its deepest level (Thurston, 1985).

Quaternary deposits consist of ground moraine and drift deposits; lateral and terminal moraines; outwash sediments; and glacio-fluvial, glacio-marine, lacustrine, and marine sediments. Seafloor sediments have been sampled and their distribution mapped (Bouma et al., 1976; 1977). Generally, the northern area is mantled by coarse sand and gravel; the mid-inlet is covered by medium- to fine-grained sand that is sculptured into bedforms; and sediments of the southern inlet and Shelikof Strait that consist of fine-grained sand, silt, and clay.

Sediment provenance is spatially determined within the Cook Inlet trough. Microtexture analyses of bottom sediments (Hampton et al., 1978) indicate that quartz grains in the northern part of lower Cook Inlet showed characteristics of unaltered glacial affiliation. Bottom quartz grains in the central sand-wave area show characteristics of glacial deposits altered by hydraulic reworking. Seafloor sediments in the west and south show chemical overgrowth over a glacial texture, which is indicative of high-residency time in a low-energy environment. Clay mineralogy studies (Hein et al., 1977) indicate that suspended sediment sampled from the eastern side of the inlet was derived from the Copper River, which flows into Prince William Sound to the east. These sediments are carried by the counterclockwise Alaska gyre into the inlet via the Kennedy and Stevenson Entrances, where they travel up the east side of lower Cook Inlet. Suspended sediments sampled on the western side of the inlet have Susitna and Matanuska River mineralogical characteristics.

4. **Seafloor Features:** The seafloor of lower Cook Inlet is characterized by a wide variety of bedforms and other geomorphic features (Fig. F-6). The seafloor of Shelikof Strait generally is featureless with the exception of some tectonic relief (Hoose and Whitney, 1980).

a. **Lag Gravel:** Areas of the northern lower Cook Inlet near Kalgin Island are covered with lag gravel. These sediments were deposited by glaciers and subsequently winnowed of their fine- and

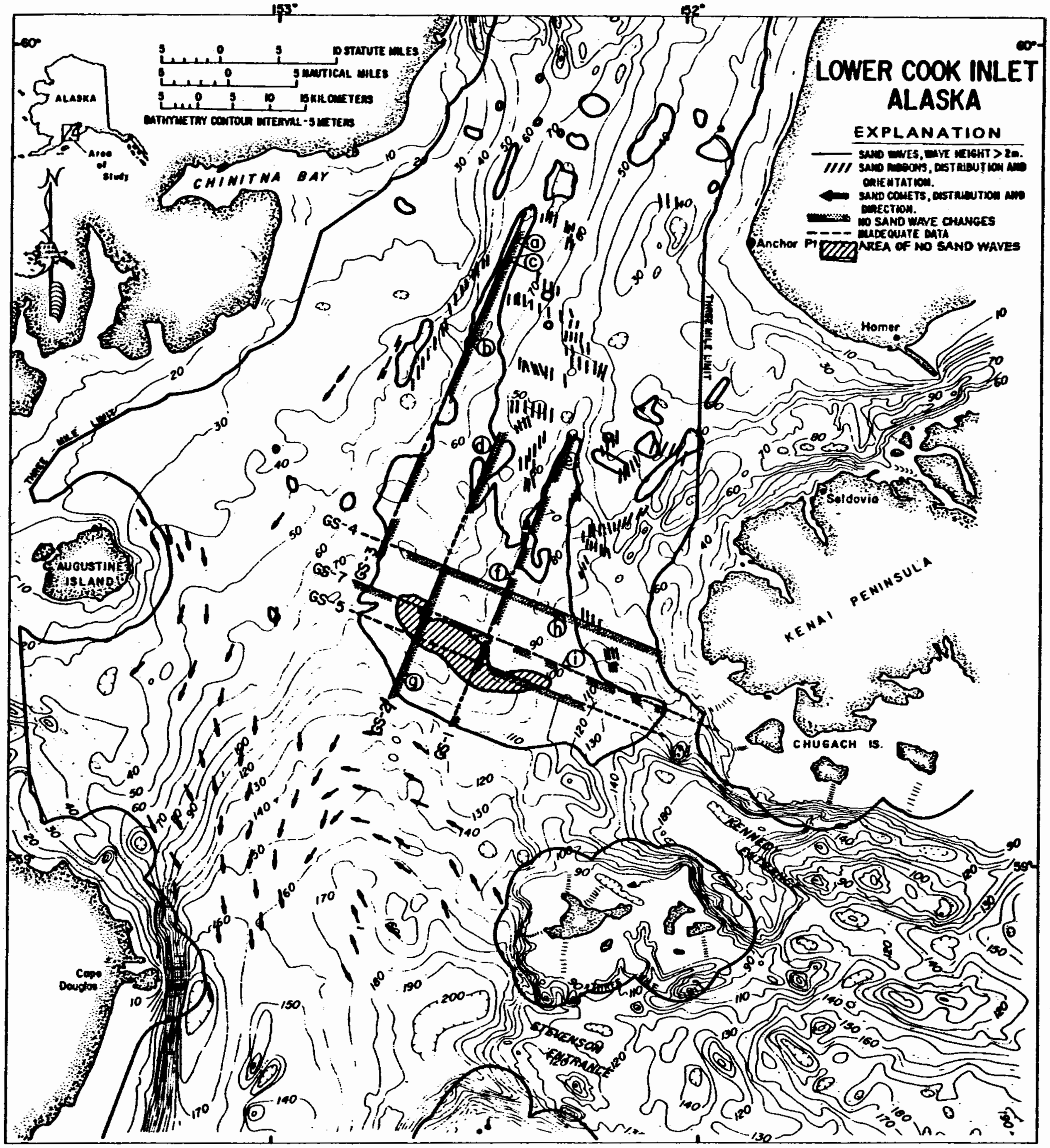


Figure F-5. Lower Cook Inlet Bottom Features. Profile lines are from Whitney and others, 1981, sandwave migration study. Shaded lines indicate no detectable movement in a 5-year span, letters in circles are profile sections presented in Whitney and others, 1981.

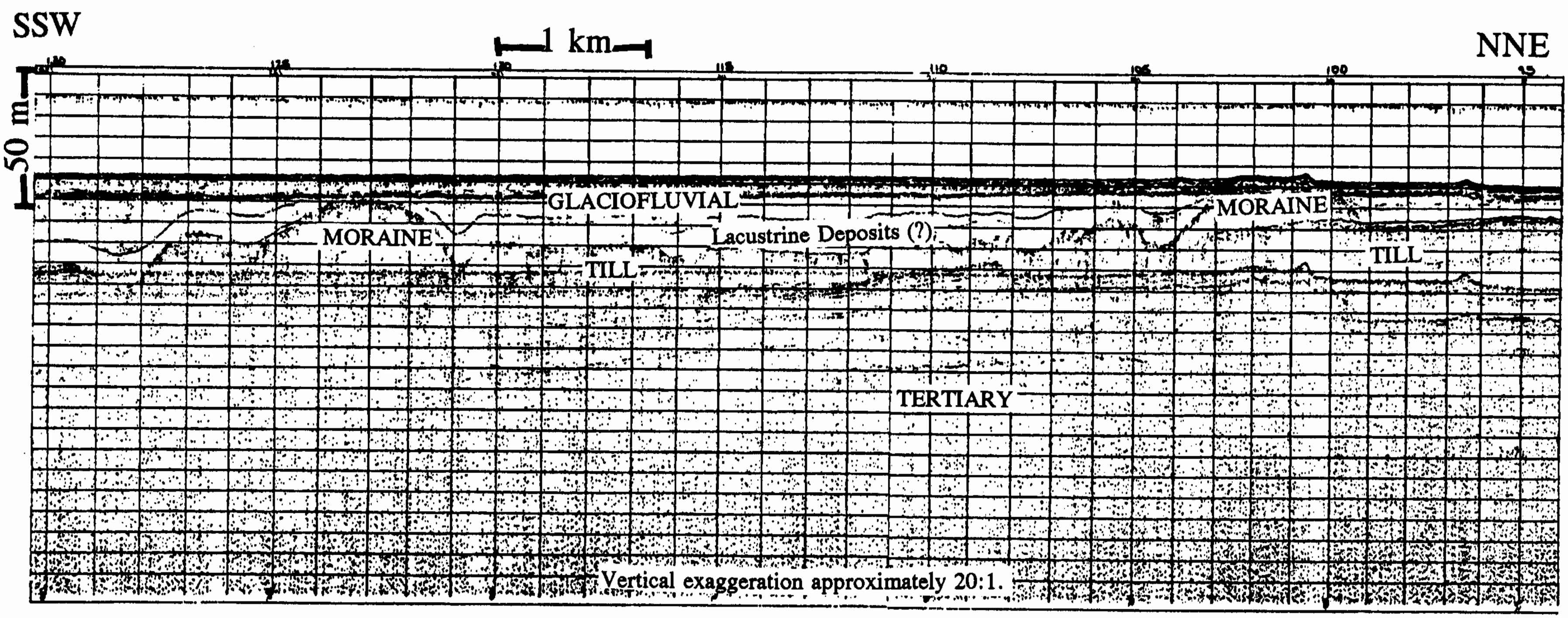


Figure F-6. Acoustipulse High Resolution Seismic Profile Showing the Kamishak Bay Outer and Inner Moraine Lobes. The contour following strata above the moraine are possible lacustrine and/or volcanic ash deposits. Seismic profile courtesy of Fugro-McClelland.

medium- grain size particles. Microtexture analysis of sediment grains indicates that these deposits display textures associated with unaltered glacial sediment (Hampton et al., 1978).

b. **Sand Ribbons**: Sand ribbons are found in the northern and central lower Cook Inlet in areas flanking the sand-wave field and the central and Kachemak channels. These bedforms consist of strips of sand oriented generally north-south, parallel to the prevailing tidal currents. The strips of sand are separated by lag gravel and support sand ripples, which are oriented transverse to the current direction. Sand ribbons are believed to form in bottom areas where currents are moderately higher than the minimum to entrain sand grains and where there is a limited supply of sand.

c. **Sand Waves**: The lower Cook Inlet sand-wave field covers approximately 850 km^2 of the seafloor (Whitney et al., 1979). These bedforms reach amplitudes of 15 m and wavelengths of 600 m. Sand waves occur in water depths ranging from less than -40 m to over -120 m. A study of the sand-wave dynamics using comparative sidescan-sonar images and seismic profiles after a 4- and 5-year period showed no evidence that these large bedforms migrate (Whitney et al., 1979). Sand grains are known to move in response to the tidally induced bottom currents (Bouma et al., 1979), which can reach 1 knot (kn) in the central inlet area, and microtexture analysis indicates reworking of these sediments; however, bedform-migration studies and the absence of microtextures of the sand-wave-field type south of the ramp indicate that there is no net movement of bedforms or sediments. Sand waves in deepwater, where currents may not be strong enough to form such features, and the presence of buried sand waves near the apex of the ramp suggest the possibility that the sand-wave field is at least partially relict.

d. **Comet Marks**: Comet marks are formed by the creation of an erosional tail of lag gravel behind an obstruction on the seafloor (Thurston, 1985). These features are interpreted as having at their head an ice-rafted boulder that lies in a shallow depression and has a tail of coarse material pointing away, downcurrent. The circulation pattern in lower Cook Inlet indicated by these features is counterclockwise in the southern deeper part and generally south along the west side of the inlet (Fig. F-5).

5. **Subsurface Features:**

a. **Moraines:**

(1) **Northern Inlet**: Kalgin Island, just north of the planning area boundary, is a terminal moraine from an ice lobe that flowed east from the Alaska Range into Redoubt Bay. The Quaternary unconformity in the northern lower Cook Inlet is covered by unstratified, hummocky, mounded, and heavily dissected strata which are most likely ground moraine and till deposits. There are several stratigraphic intervals represented in these type of deposits.

(2) **Central Inlet**: The geomorphological structure called the ramp (Bouma et al., 1978) has an inverted V-shape and exhibits bathymetric relief of over -60 m. The ramp is formed by the joining of two moraines; the Kamishak Bay moraine forms the western limb, and the Kachemak Bay moraine forms the eastern limb (Thurston, 1985). In cross-section, the moraines have a domal shape (Fig. F-6). The position of these moraines indicates the maximum advance of ice into the midpart of the inlet during the Knik and Naptowne maximums. The Kamishak Bay moraines appear to have been deposited by ice flowing northwest out of the Cape Douglas area. This moraine complex is composed of an inner and an outer spatulate-shaped belt (Fig. F-7). The outer belt represents the terminal phase of ice advance and the inner belt may be a recessional phase of the same advance or a later, less-intense advance. The Kachemak Bay moraine generally is not as well preserved as those in the west. It forms an arcuate mound with a domal cross section for most of its discernable length.

(3) **Southern Inlet**: In water deeper than -100 m, moraines are found around the western side of the Barren Islands. These moraines are well preserved and exhibit domal cross sections. These may be terminal moraines from ice flowing from a now exhausted or submerged spreading center at the site of the Barren Islands, or these moraines may be medial moraines from large ice lobes flowing from the Kenai Mountains and the Alaska-Aleutian Range mountain fronts.

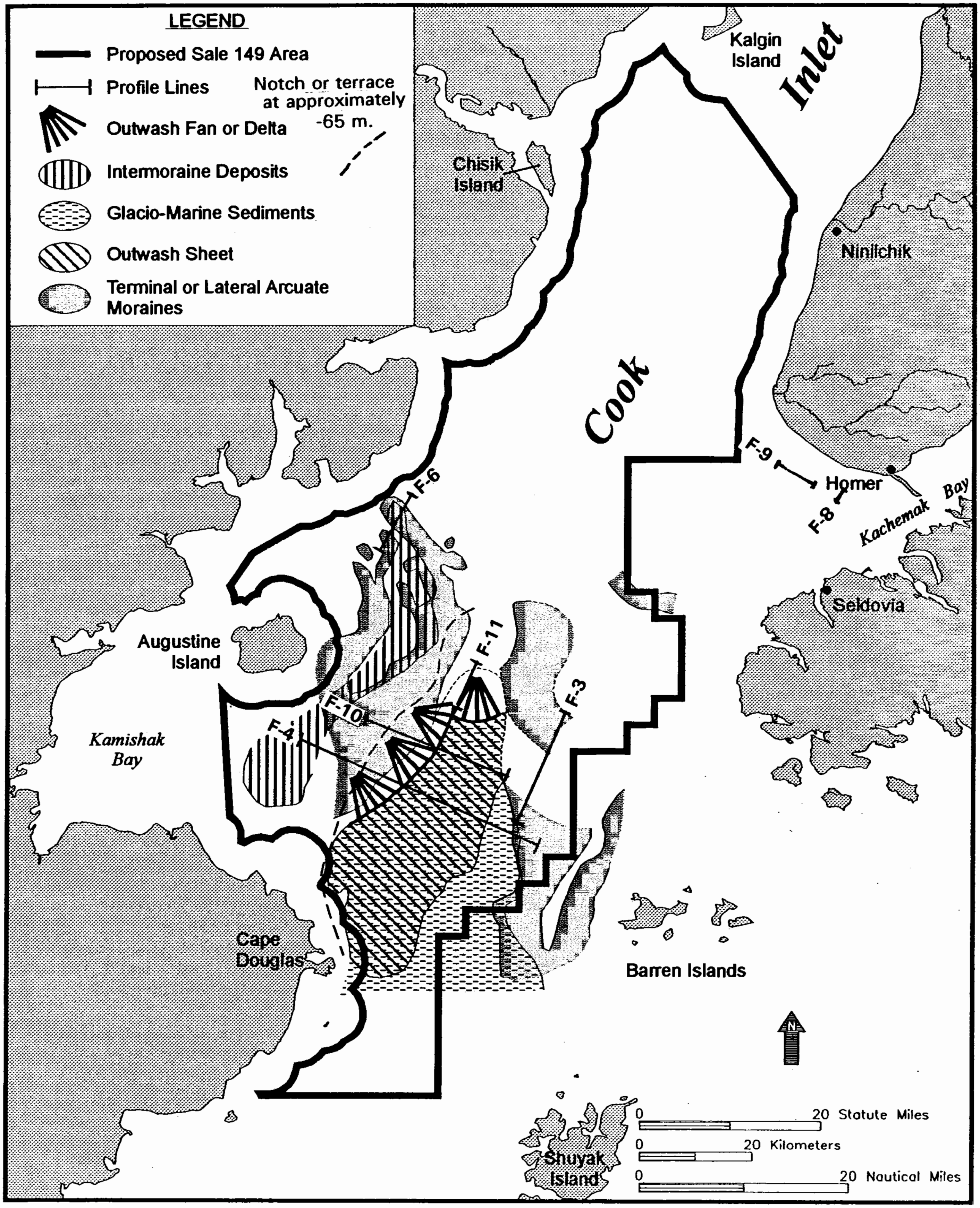


Figure F-7. Subsurface Glacial Features. Location of profiles in Figures F-3, F-4, F-6, F-8, F-9, F-10, and F-11 are shown.

b. <u>Channels:</u> A network of buried channels is present in the central part of lower Cook Inlet. Buried channels are absent south of the ramp. These channels are discontinuous and branching, and they dissect different stratigraphic levels. Buried channels fit into one of three categories:

(1) <u>Glacial Channels or Valleys</u> (Fig. F-8) exhibit a U-shaped profile and are generally wider and more continuous than hydraulic channels. They are the predominate type of channel observed in the northernmost area.

(2) <u>Tunnel Valleys</u> were sub-ice glacial-drainage channels. These channels generally are characterized by the presence of eskers; ice-contact stream deposits, which form sinuous mounds of unstratified sediments in the central channel (Fig. F-9).

(3) <u>Glacial Outwash Stream Channels</u>, which formed in front of the glacier and carried melt water to the Pacific Ocean, are characterized by cut-and-fill structures, short and discontinuous courses, and multiple or overlapping channels. Because of their relative position at the apex of the ramp, these channels may be, in part, due to streams formed when the ice damming lower Cook Inlet was breached and water from the large pro-glacial lake broke out and flowed to the sea.

c. <u>Outwash Fans:</u> At the apex of the ramp where the Kamishak and Kachemak moraines meet, there are distinct delta-type outwash fans (Figs. F-4 and F-10). These fans are interpreted to have formed as the result of glacial outwash streams dumping their sediment bedload at the paleoshoreline. The present depth of these fans indicate that they were formed at the shoreline during a sea-level lowstand or stillstand of from -65 to -80 m. This depth range is in general agreement with stillstand depths of -66 m and -82 m proposed by Dixon et al. (1979; 1986). As in the case of the buried channels, these fans also may be partially from the breakout of water from and the draining of the large pro-glacial lake in upper Cook Inlet.

d. <u>Sand Waves:</u> Large sand waves in the area of the apex of the ramp are buried beneath outwash and glacio-marine deposits (Fig. F-11).

e. <u>Lacustrine Sediments:</u> Covering the inner belt and deposited against the inner wall of the outer belt of the Kamishak Bay moraine, seismically transparent strata of uniform thickness mimic underlying topography (Fig. F-6). The uniform thickness of these deposits, even over terrain relief, indicates a low-energy depositional environment and the seismic "transparency" indicates that the deposits are texturally homogenous. These are characteristics of lacustrine deposits. The proximity to Augustine Island may mean that these deposits are ash laid down in a low-energy depositional environment. These probably represent lacustrine deposits laid down in a lake formed by damming of meltwater runoff by the outer morainal belt.

<u>Summary:</u> During the Naptowne Glaciation, sea-level stillstands occurred at approximately 18,000 to 21,500 B.P. (-125 m), 14,800 to 15,000 B.P. (-82 m), 13,700 B.P. (-66 m), 12,700 B.P. (-55 m), 9,770 to 9,330 B.P. (-38 m), and 8,700 B.P. (-28 m). Pro-glacial lake strandline elevations indicate that ice last coalesced across the central Cook Inlet at about 9,500 to 10,500 B.P. The southeast facing slope of the outer Kamishak Bay moraine on the west side of the inlet has been notched by water at a stillstand of -65 m, placing the age of the outer moraine feature at pre-Skilak Advance (older than 12,500 B.P.). Outwash fans, which are younger than the south facing outer Kamishak Bay moraines, also occur at -65 to -80 m, corresponding to ages of 12,700 to 15,000 B.P. The inner moraine complex stands at a higher relative elevation than the outer moraine and is undoubtedly younger.

Effects of isostatic rebound and vertical tectonic movements have not been well documented in the Cook Inlet region. According to Dixon et al. (1986), there was some tectonic uplift associated with beach deposits on the western side of the inlet. The apparent rise of Augustine Island volcano in the last 10,000 years may have affected the relative elevation of the western side of the inlet. The Alaska earthquake of 1964 resulted in up to 2 ft (.6 m) of tectonic subsidence of the Cook Inlet and Shelikof Strait region. Geomorphological evidence suggests that the area of the Kenai Mountains may have subsided substantially since the Wisconsin maximum glaciation (Mobley et al., 1991).

Ice scour and moraine deposits of various types and ages on the shelf and the absence of moraine deposits in the Shelikof Strait attest to the fact that ice completely filled Shelikof Strait and spilled out to the continental shelf during the Moosehorn and Killey advances.

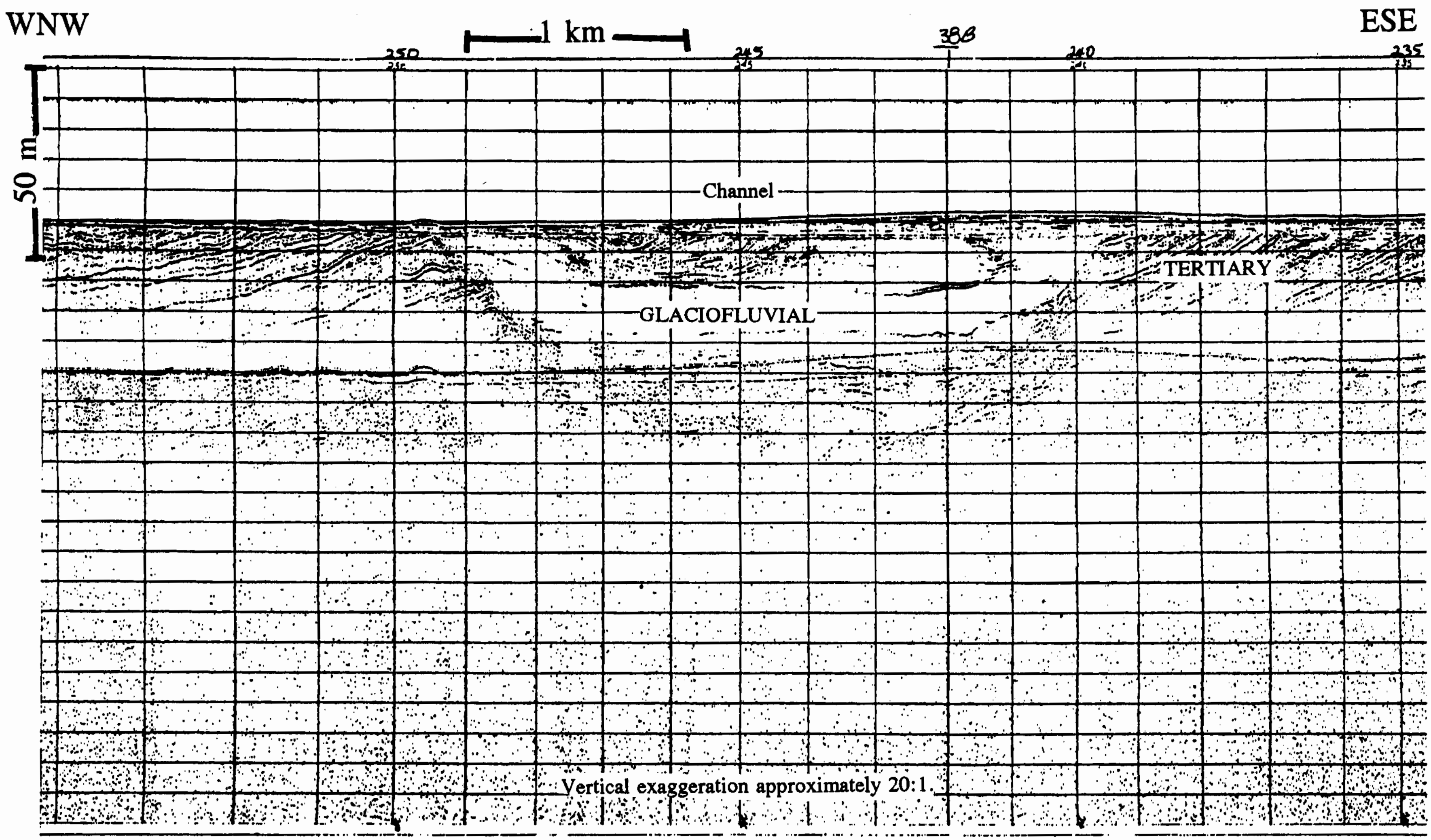
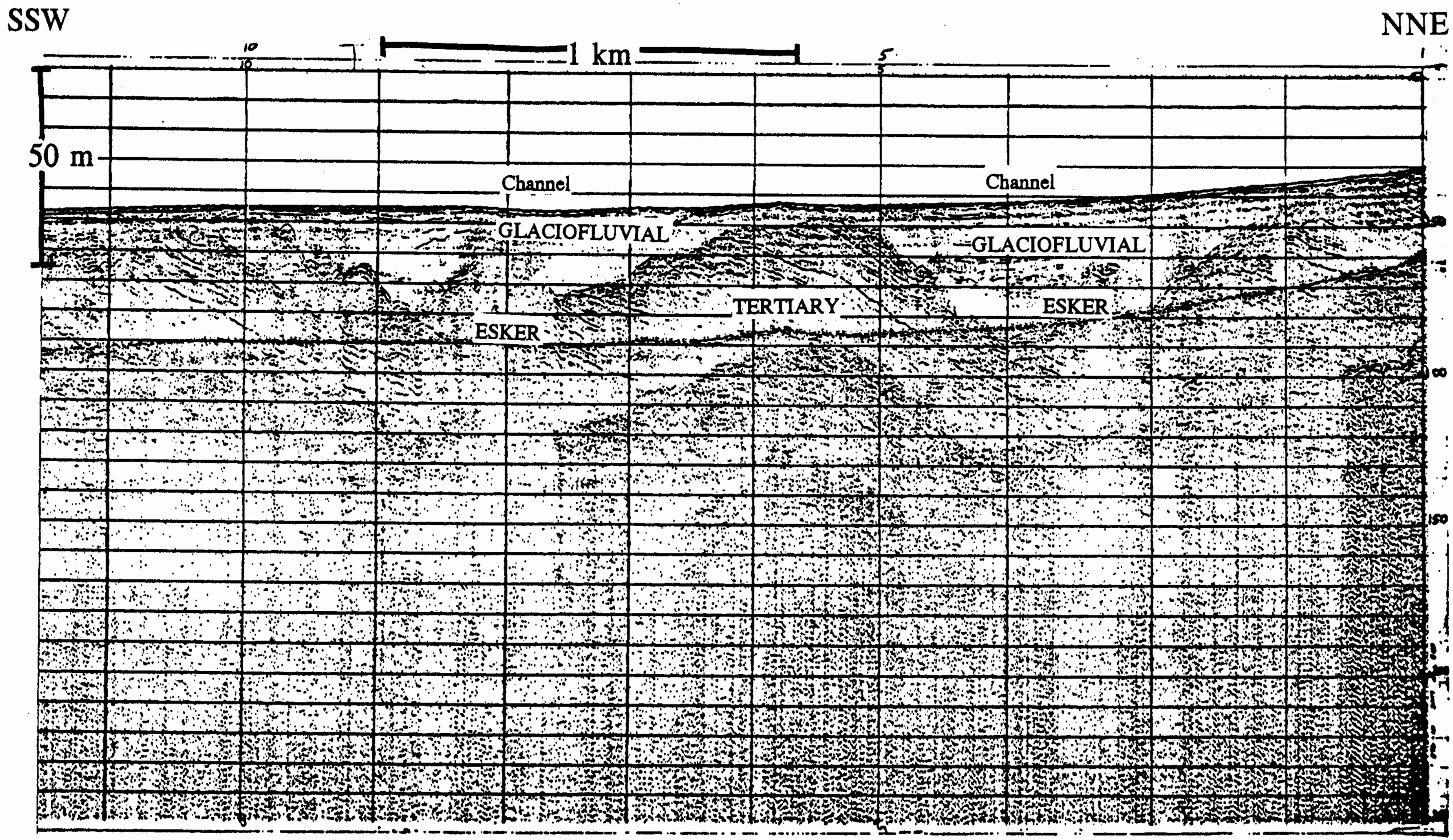


Figure F-8. Buried Channel Feature near Kachemak Bay Cut into Tertiary Bedrock. The shape of the channel indicates that it was initially eroded by ice. The migrating channel axis in the upper part indicated that is was subsequently filled by water draining receding glaciers. Seismic profile courtesy of Fugro-McClelland.



1-9. Buried channel feature near Kachemak Bay cut into Tertiary bedrock. The channel shapes indicate initial erosion by ice and possible eskers in the channel bottoms may indicate that melt water ran under the glacier. Data courtesy of McClelland Engineers.*

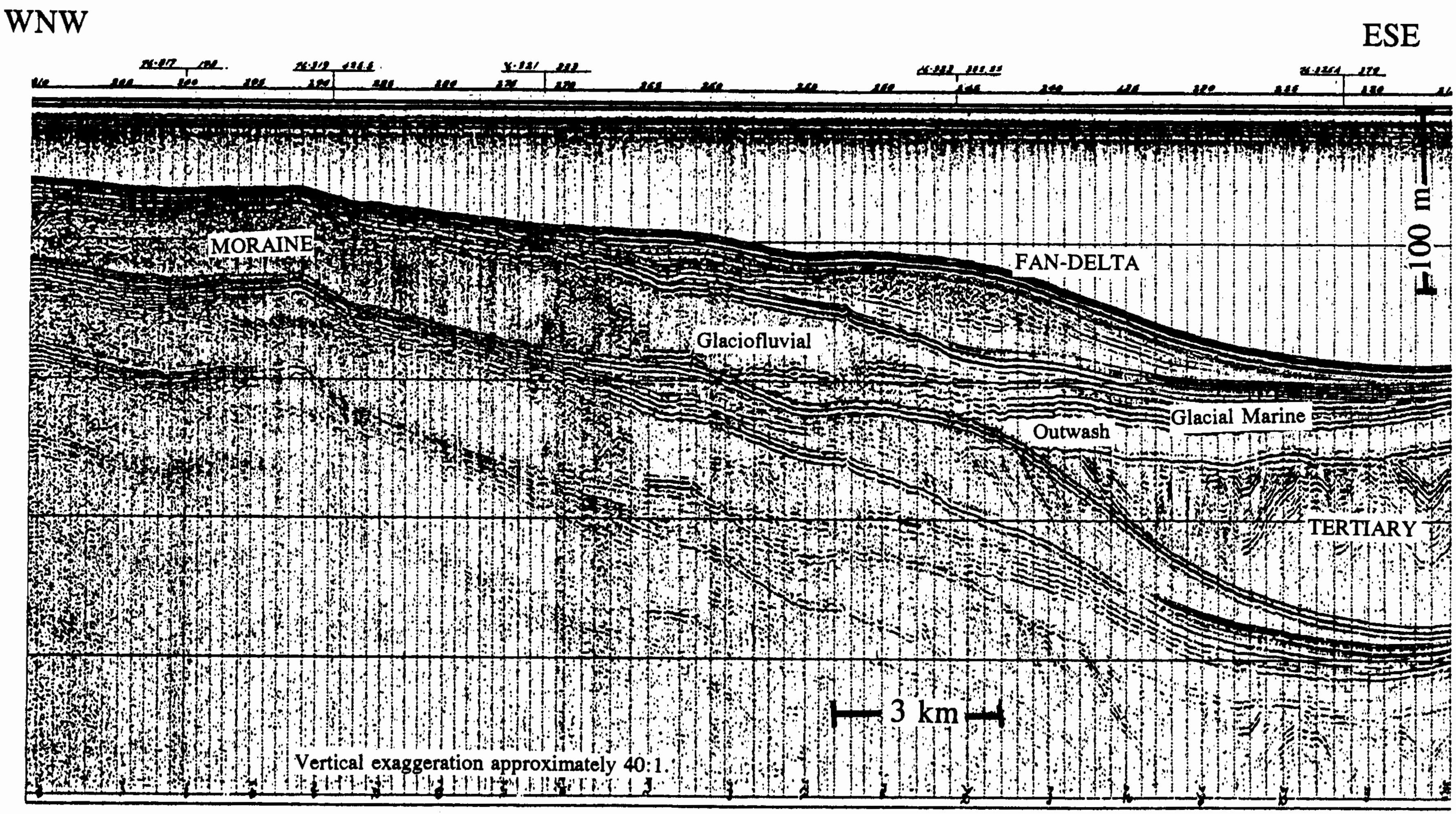


Figure F-10. Minisparker Profile of the Transition between the Norther Bathymetric Tier and the Southern Bathymetric Province, Separated by the Ramp. Here it can be seen that the norther tier is underlain by moraine and other glacial deposits, the ramp is a manifestation of an outwash fan, and the southern provinces are underlain predominantly by outwash, glacial marine, and marine deposits. Seismic profile courtesy of Fugro-McClelland.

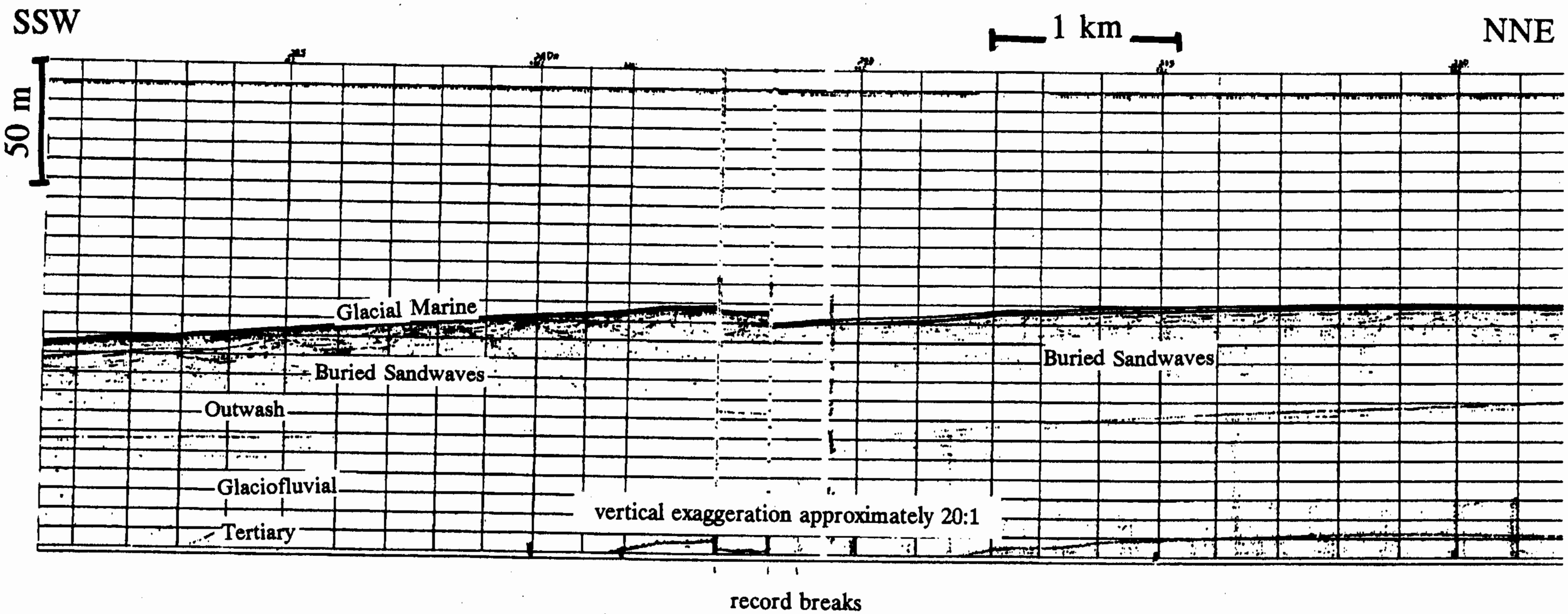


Figure F-11. Acoustipulse High-Resolution Seismic Record Showing Buried Sand Waves in the Vicinity of Augustine Island. Seismic profile courtesy of Fugro-McClelland.

Ice-rafted boulders forming comet marks in the deepwater of lower Cook Inlet indicate that the last ice retreating from the trough formed tidewater glaciers.

Sand waves in the central inlet may have formed at lower sea-level stands (-65 m) and been stranded in deeper water by a rapid rise in sea level after the last major ice advance.

Review of Bathymetric Data to Determine Habitability:

Paleo Sea Levels: The sea-level stillstand of -55 m of Dixon et al. (1979 and 1986) represents the time period of 12,700 B.P. To be conservative, the -60-m isobath is used as the cutoff point for consideration of cultural resource potential. Therefore, only features with cultural-resource potential located within Geomorphological Province I (0- to 60-m-water depth) will be considered for further analysis.

The most recent available bathymetric data for protraction diagrams NO 4-6, NO 5-1, NO 5-2, NO 5-3, NO 5-4, NO 5-5, and NP 5-8 were used to identify the 60- m-bathymetric contour (Fig. F-1). Those blocks within the -60-m contour were then evaluated to determine the presence of significant landforms that would have potential for habitability. If a habitability analysis could not be performed for a block, then that block was retained for further assessment.

Review of Geological Geophysical Data to Determine Survivability and Detectability of Archaeological Resource Sites: The lower Cook Inlet is characterized by erosive processes that are not conducive to archaeological resource-site preservation. These processes include strong bottom-density currents, high tidal range, winter ice cover, and scouring. Lack of protective Holocene sediments reduce the probability of survivability of archaeological sites.

High-velocity tidal currents presently sweep the seafloor of lower Cook Inlet. Tidal ranges from 8.5 m in the southern inlet to 11 m at Anchorage generate rapid and complex tidal currents. At the Forelands, between upper and lower Cook Inlet, surface currents reach 10 to 12 kn. In the southern Cook Inlet, average current velocities are 3 to 4 kn. In the central inlet, ebb and flow tidal currents with velocities nearing 1 kn have been measured 10 m off the seafloor (Whitney et al., 1979). Seafloor areas in water depths corresponding to the sea-level stillstands of 12,700 B.P. (-60 m) are predominately covered by deposits characterized as lag gravels, sand ribbons, and sand-wave fields. All of these features formed during and after the transgression to present sea level. It is not likely that any prehistoric archaeological sites could have survived exposure to these high-energy processes necessary to produce the large bedforms and seafloor characteristics.

Review to Identify Significant Landforms: Areas of lower Cook Inlet that display potentially significant landforms are found in the northern bathymetric plateau (Geomorphological Province I and II). These features include possible lake-shore, morainal-high-ground, and stream-shore environments. Morainal high-ground features and possible paleo-lake-shore environments are well preserved in the Kamishak Bay moraines on the west side of the inlet. For the most part, these deposits lie above the -60-m isobath. The moraines of the eastern part of the northern plateau are deeper than -60 m and are much less distinct in their form due to erosional modifications.

Buried channels in the central inlet may have been partially due to short glacial runoff streams that drained the glacial ice front. Ice fronts were very close to the ocean, as evidenced by many ice-rafted boulders in the southern inlet that were dropped from bergs that calved into the transgressing Cook Inlet water. These factors diminish the probability for prehistoric resource-site occurrence and survivability.

Prehistoric Archaeological Resource Site Potential and Recommendations: As a result of this analysis, 761 blocks were analyzed to determined the prehistoric archaeological resource potential (Fig. F-1). All blocks within the -60-m bathometric contour that contain landforms significant for habitation, and having Holocene sediments for protection and preservation of archaeological sites, and that are devoid of erosional characteristics are considered as high probability for prehistoric archeological resource potential.

A total of 149 blocks have been identified as meeting these requirements, or needing additional analysis, to determine their prehistoric archaeological resource potential. The blocks on which there is a high probability of prehistoric archaeological resources are:

Protraction Diagram	Blocks
NO 5-1	438-440, 479-484, 522-528, 566-572, 610-611, 613-616, 657-660, 701-704, 741-742, 744-748, 785-792, 829-835, 873-878, 918-922, 962-966, 1006-1009
NO 5-2	222-224, 265-269, 309-313, 306-357, 399-401, 444-447, 485-487, 490-493, 529-531, 534-536, 573-575, 578-579, 617-618, 661-662, 705
NO 5-3	41, 304-305, 347-348, 391, 475, 518-519, 562

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APPENDIX G

Methodology for Employment and Population Forecasts

METHODOLOGY FOR EMPLOYMENT AND POPULATION FORECASTS

The employment and population forecasts prepared for the Sale 149 EIS were calculated using the MMS Manpower Model, the Rural Alaska Model (RAM), and a third model created for this sale. Using the Exploration and Development Report for the sale, the number of wells, platforms, shore bases, and miles of pipeline were input to the Manpower Model.

The Manpower Model predicts the number of onshore and offshore short-term and long-term, skilled and unskilled workers. This is input to the RAM. Among other variables, the RAM predicts the number of direct OCS resident workers that are input to the third model.

The third model was constructed for the purpose of the analysis related to Sale 149 with current population and employment data. This model starts with 1990 Census data, population, and employment for the local areas. It is assumed that population and employment without Sale 149 will grow at a rate of 0.9 percent annually. The figure 0.9 percent is derived from the report *Economic Projections: Alaska and the Southern Railbelt 1992-2020* (Institute for Social and Economic Research, University of Alaska, Anchorage, October, 1992).

The terms "a job" and "an employee," as used in the analysis of effects on the economy, are defined as one full-time-equivalent worker working for 1 year. A "resident employee" is defined as a resident of the region, either the Kodiak Island Borough region or the western Kenai Peninsula region.

The 1990 population and employment for the Kodiak Island Borough is used, and the ratio of employment and population according to the 1990 Census is 53 to 1. Direct OCS resident employment generated by the RAM are input to this model.

Indirect OCS resident employment is 0.126 times direct OCS resident employment according to the RAM. Resident employment with the sale is the sum of the resident employment without the sale plus direct OCS resident employment plus indirect OCS resident employment. Resident population with the sale is equal to the resident employment divided by 53.

APPENDIX H

Supporting Figures for the Section on Subsistence

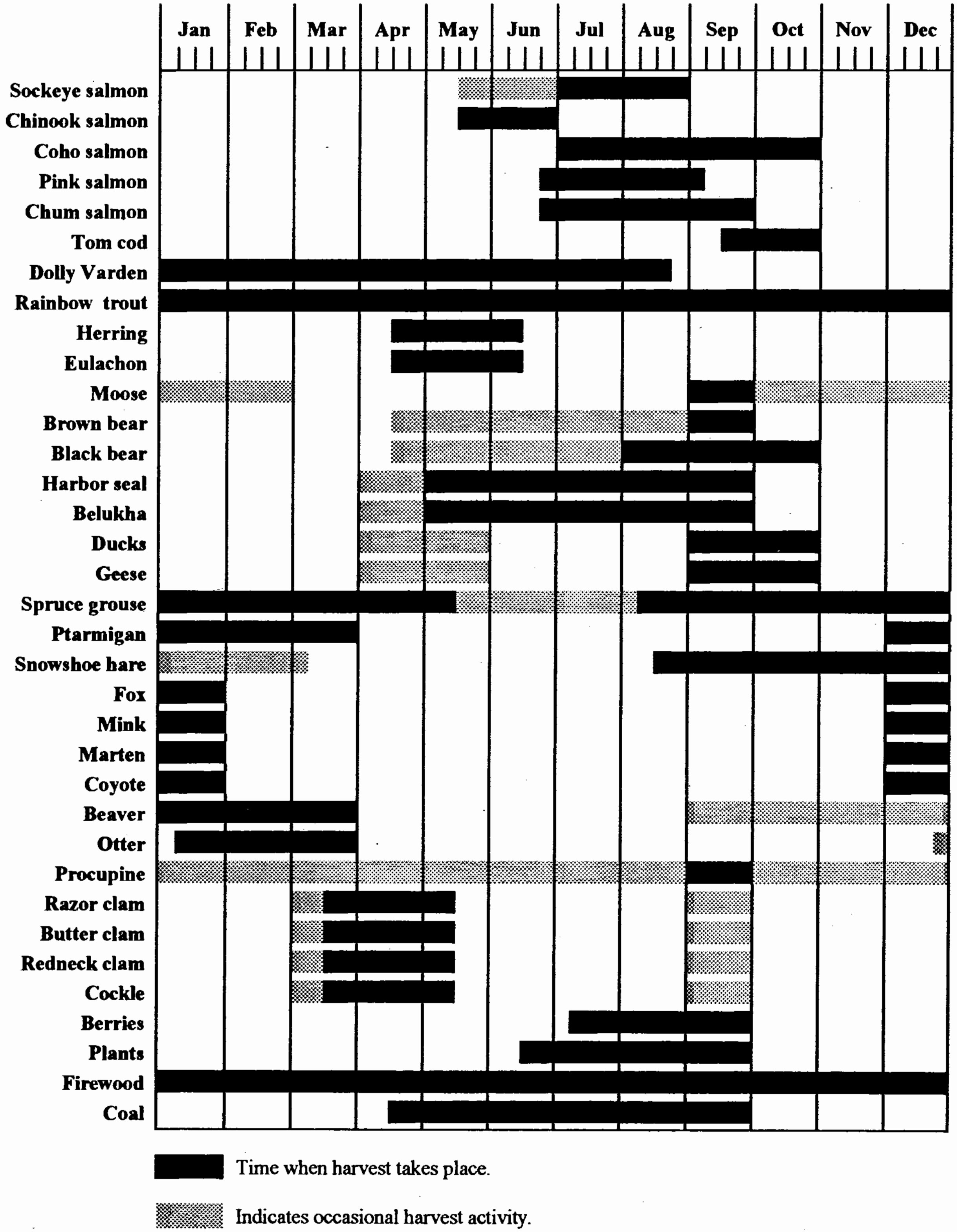


Figure H-1. Tyonek Typical Annual Round of Harvest Activities.

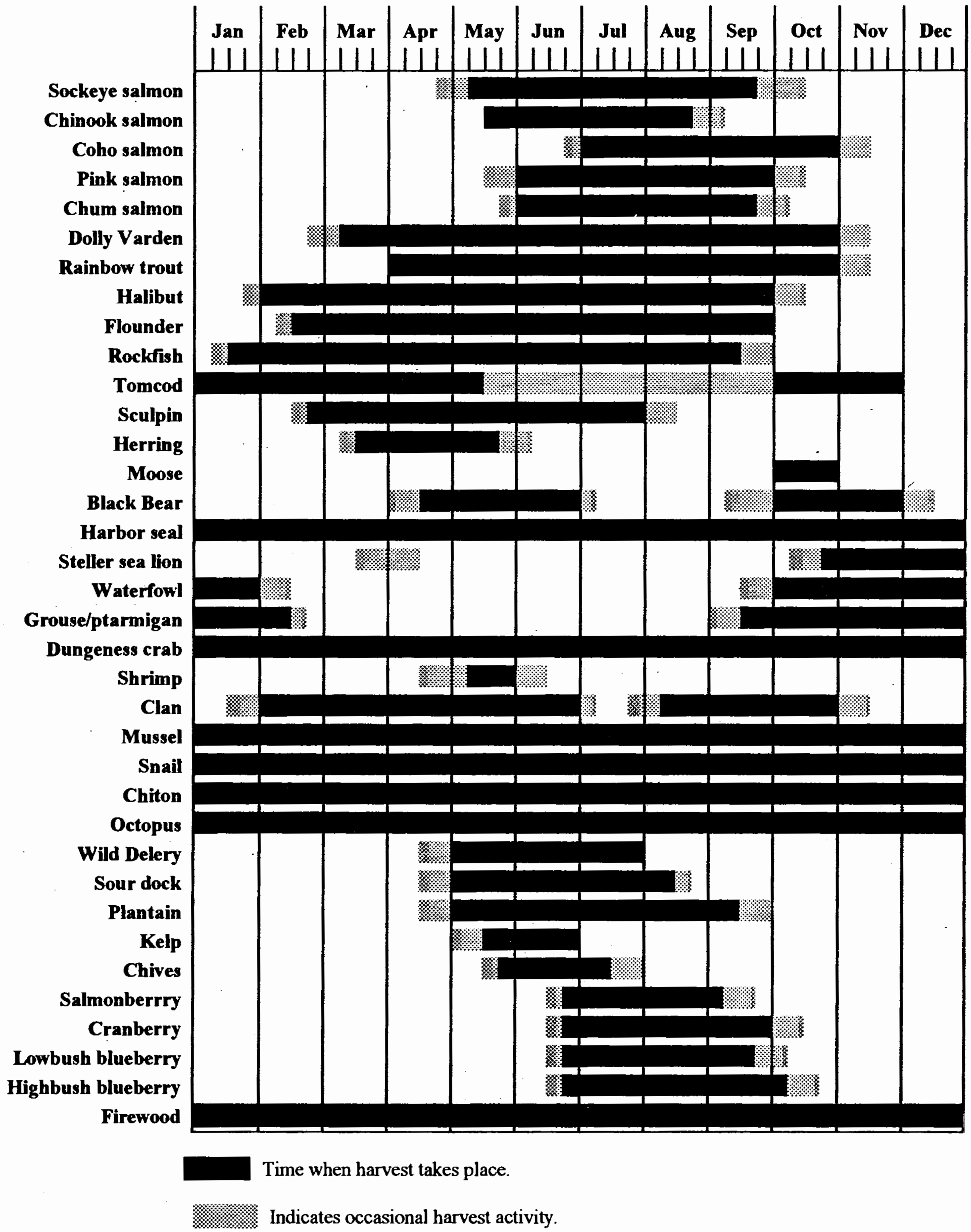


Figure H-2. Nanwalek and Port Typical Annual Round of Harvest Activities.

Figure H-3. Chignik Typical Annual Round of Harvest Activities.

APPENDIX I

Endangered Species Act
Section 7
Consultation and
Documentation

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Washington, DC 20240

MAR 25 1993

Memorandum

To: Director, U.S. Fish and Wildlife Service

From: Deputy Associate Director for Resources and Environmental Management W. W

Subject: Endangered Species Act Section 7 Formal Consultation for Proposed Natural Gas and Oil Lease Sale 149

The Minerals Management Service (MMS) is preparing an Environmental Impact Statement (EIS) for proposed natural gas and oil Lease Sale 149 in the Cook Inlet/Shelikof Strait area offshore south-central Alaska. This is the fifth sale proposed for the area and is tentatively scheduled for late 1994. The first, Sale CI, was held on October 27, 1977; the second, Sale 60, on September 29, 1981; and the third, Sale RS-2, on August 5, 1982. Sale 88 for the Gulf of Alaska and Cook Inlet, scheduled initially for October 1984, was cancelled.

Under section 7(a)(2) of the Endangered Species Act, the MMS requests formal consultation with the U.S. Fish and Wildlife Service (FWS) on the leasing and any exploration that may occur as a result of proposed Sale 149. Because information in previous FWS biological opinions may be out of date, this consultation may result in an opinion that differs from earlier ones.

The attached biological evaluation describes the specifics of the proposed sale, as well as potential effects of postlease activities on endangered species. The draft oil spill risk analysis, also attached, contains estimated spill probabilities and trajectory analyses for the proposed sale area in a new format that is easier to read and interpret. An analysis of potential oil spill-related impacts from possible transportation scenarios outside the sale area is included in the final EIS on the Comprehensive Outer Continental Shelf (OCS) Natural Gas and Oil Resources Program for 1992-1997, which was issued and distributed in April 1992. As for past sales, MMS headquarters and Alaska Region staff will try to provide FWS representatives with any additional information they may require, meet with them as necessary, and answer any questions they may have.

To facilitate the timely beginning and completion of this consultation, we are sending copies of this memorandum and the attachments to the FWS Alaska Regional Director in Anchorage and to the Anchorage Ecological Services Field Office. (For his information, we are also sending copies of these materials to the

FWS Regional Director for Region 1 in Portland, Oregon.) Rather than result in delays and confusion, which apparently happened in the past, the above-noted distribution of materials is intended to avoid delays and enable FWS to start the consultation as soon as the responsible office (presumably the Anchorage Ecological Services Field Office) receives this memorandum.

Our objective in seeking preparation of the biological opinion for proposed Sale 149 in as timely a manner as possible is to allow us to include it in the draft EIS. To do so, we must have it in hand before the end of July. Having the opinion in the EIS ensures public disclosure of information considered in leasing decisions. Your assistance in expediting this consultation will be appreciated.

If, during consultation, FWS were to consider a potential finding of "jeopardy," we strongly request that, in accordance with 50 CFR 402.14(g)(5), our respective staffs discuss the finding as well as reasonable and prudent alternatives as early as possible during the consultation. Such discussions would be essential to ensure that the alternatives are within our authority to control or implement and that they would be feasible, appropriate, and effective. We request the same consideration for any new "conservation recommendations" FWS might make relative to proposed Sale 149. Finally, if different reasonable and prudent measures were to be considered necessary or appropriate to minimize the impacts of any incidental take that might occur as a result of leasing and exploration, we also strongly request that our staffs discuss such incidental take and the associated measures early in the consultation for the same reasons we would want to discuss a potential jeopardy finding and attendant reasonable and prudent alternatives. Through these discussions, if they should be needed, MMS believes it would be possible to minimize or prevent later problems or misunderstandings and greatly expedite timely and effective conclusion of the formal consultation.

It is understood that by providing us with a new opinion for proposed sale 149, FWS will not be foreclosing on opportunities to reconsider that opinion as future lease sales are proposed for this area. It remains our position that additional lease sale proposals in a region or planning area will provide an appropriate occasion for further consultation and that a new formal consultation may be requested at that time. These formal proceedings will augment the ongoing informal consultations presently occurring throughout all phases of the OCS leasing program.

If you have any questions about this consultation request, please contact Mr. Jackson E. Lewis, Minerals Management Service, Mail Stop 4360, 381 Elden Street, Herndon, Virginia 22070-4817

(Commercial and FTS Telephone: 703-787-1742), or Dr. Joel D. Hubbard, Minerals Management Service, 949 East 36th Avenue, Room 603, Anchorage, Alaska 99508-4302, (Commercial and FTS Telephone: 907-271-6670).

2 Attachments

cc: (w/attachments)
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503-6119

Regional Director
U.S. Fish and Wildlife Service
911 NE. 11th Avenue
Portland, Oregon 97232-4181

Ecological Services Field Office
U.S. Fish and Wildlife Service
605 West 4th Avenue, Room G-62
Anchorage, Alaska 99501
(ATTN.: Mr. Gary Wheeler)

bcc: (all copies w/o attachments)
Official File (BEOA) (ENV 7-1C and Sale 149)
AD/OMM
DAD/OSM
DAD/REM
RD/Alaska Region
RS/LE,RS/FO, Alaska Region
Hubbard/Swanton, Alaska Region
EPPD RF
Chief, BEOA
Lewis/Sun/Turner
Valiulis, BEPC
BEOA/BES/TAG
BEOA RF

LMS:EPPD:MS4360:Lewis:03-24-93:9-787-1742:Lewis:149FWS1.mem

United States Department of the Interior

TAKE PRIDE IN AMERICA

MINERALS MANAGEMENT SERVICE
Washington, DC 20240

MAR 26 1993

Dr. Nancy Foster
Acting Assistant Administrator for Fisheries
National Marine Fisheries Service
Department of Commerce
Washington, D.C. 20235

Dear Dr. Foster:

The Minerals Management Service (MMS) is preparing an Environmental Impact Statement (EIS) for proposed natural gas and oil Lease Sale 149 in the Cook Inlet/Shelikof Strait area offshore south-central Alaska. This is the fifth sale proposed for the area and is tentatively scheduled for late 1994. The first, Sale CI, was held on October 27, 1977; the second, Sale 60, on September 29, 1981; and the third, Sale RS-2, on August 5, 1982. Sale 88 for the Gulf of Alaska and Cook Inlet, scheduled initially for October 1984, was cancelled.

Under section 7(a)(2) of the Endangered Species Act, the MMS requests formal consultation with the National Marine Fisheries Service (NMFS) on the leasing and any exploration that may occur as a result of proposed Sale 149. Because information in previous NMFS biological opinions may be out of date and because locally occurring species have been listed and delisted, this consultation may result in an opinion that differs from earlier ones.

The enclosed biological evaluation describes the specifics of the proposed sale, as well as potential effects of postlease activities on endangered species. The draft oil spill risk analysis, also enclosed, contains estimated spill probabilities and trajectory analyses for the proposed sale area in a new format that is easier to read and interpret. An analysis of potential oil spill-related impacts from possible transportation scenarios outside the sale area is included in the final EIS on the Comprehensive Outer Continental Shelf (OCS) Natural Gas and Oil Resources Program for 1992-1997, which was issued and distributed in April 1992. As for past sales, the MMS headquarters and Alaska Region staff will try to provide the NMFS representatives with any additional information they may require, meet with them as necessary, and answer any questions they may have. To facilitate completion of this consultation, we are sending copies of this letter and the enclosures to the NMFS Western Alaska Field Office in Anchorage.

We ask that the biological opinion on the proposed action be prepared in as timely a manner as possible to allow MMS to include it in the draft EIS. To do so, we must have it in hand before the end of July. Having the opinion in the EIS ensures public disclosure of information considered in leasing decisions. Your cooperation in attaining this goal will be appreciated.

If, during consultation, NMFS were to consider a potential finding of "jeopardy," we strongly request that, in accordance with 50 CFR 402.14(g)(5), our respective staffs discuss the finding as well as reasonable and prudent alternatives as early as possible during the consultation. Such discussions would be essential to ensure that the alternatives are within our authority to control or implement and that they would be feasible, appropriate, and effective. We request the same consideration for any new "conservation recommendations" NMFS might make relative to proposed Sale 149. Finally, if different reasonable and prudent measures were to be considered necessary or appropriate to minimize the impacts of any incidental take that might likely occur as a result of leasing and exploration, we also strongly request that our staffs discuss such incidental take and the associated measures early in the consultation for the same reasons we would want to discuss a potential jeopardy finding and attendant reasonable and prudent alternatives. Through these discussions, if they should be needed, MMS believes it would be possible to minimize or prevent later problems or misunderstandings and greatly expedite timely and effective conclusion of the formal consultation.

It is understood that by providing us with a new opinion for proposed sale 149, NMFS will not be foreclosing on opportunities to reconsider that opinion as future lease sales are proposed for this area. It remains our position that additional lease sale proposals in a region or planning area will provide an appropriate occasion for further consultation and that a new formal consultation may be requested at that time. These formal proceedings will augment the ongoing informal consultations presently occurring throughout all phases of the OCS leasing program.

If you have any questions about this consultation request, please contact Mr. Jackson E. Lewis, Minerals Management Service, Mail Stop 4360, 381 Elden Street, Herndon, Virginia 22070-4817 (Commercial and FTS Telephone: 703-787-1742), or Dr. Joel D.

Hubbard, Minerals Management Service, 949 East 36th Avenue, Room 603, Anchorage, Alaska 99508-4302 (Commercial and FTS Telephone: 907-271-6670).

Sincerely,

James W. Workman
Deputy Associate Director for
Resource and Environmental
Management

2 Enclosures

cc: (w/enclosures)
Mr. Ron Morris
National Marine Fisheries Service
Western Alaska Field Office
701 C Street
Anchorage, Alaska 99513

bcc: (all copies w/o enclosures)
Official File (BEOA) (ENV 7-1C and Sale 149)
AD/OMM
DAD/OSM
DAD/REM
RD/Alaska Region
RS/FE,RS/FO, Alaska Region
Hubbard/Swanton, Alaska Region
EPPD RF
Chief, BEOA
Lewis/Sun/Turner
Valiulis, BEPC
BEOA/BES/TAG
Offshore Chron (1)/(2)
BEOA RF
LMS:EPPD:MS4360:Lewis:03-22-93:9-787-1742:Lewis:149NMFS2.JEL

APR 6 1992

Mr. Steve Pennoyer
Director, Alaska Region
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Dear Mr. Pennoyer:

The Minerals Management Service has initiated the planning process for leasing and exploration associated with the proposed Outer Continental Shelf (OCS) Oil and Gas Lease Sale 149. This lease sale is proposed for September 1994 in the Cook Inlet area (map attached).

In accordance with the Endangered Species Act section 7 regulations governing inter-Agency cooperation, we are providing a notification of the listed and proposed species and critical habitat that will be included in our biological evaluation.

In our biological evaluation, we will review species included on the following list that may be present in the vicinity of the proposed lease area; also included are several species that occur at more southern latitudes, because tankers are expected to transport Cook Inlet oil through or near areas occupied by their populations. It is our understanding that there are no proposed or designated critical habitats for any listed species in OCS regions potentially affected by activities associated with Sale 149; however, should critical habitat be proposed or designated for the Steller sea lion, we would expect to confer on such areas and include them in our evaluation.

Common Name	Scientific Name	Status
Blue whale	Balaenoptera musculus	Endangered
Fin whale	Balaenoptera physalus	Endangered
Gray whale	Eschrichtius robustus	Endangered
Humpback whale	Megaptera novaeangliae	Endangered
Right whale	Balaena glacialis	Endangered
Sei whale	Balaenoptera borealis	Endangered
Sperm whale	Physeter macrocephalus	Endangered
Steller sea lion	Eumetopias jubatus	Threatened
Guadalupe fur seal	Arctocephalus townsendi	Threatened
Green sea turtle	Chelonia mydas	Endangered
Leatherback sea turtle	Dermochelys coriacea	Endangered
Loggerhead sea turtle	Caretta caretta	Threatened
Pacific ridley sea turtle	Lepidochelys olivacea	Endangered

Please review our list and notify us of your concurrence or revisions and any new information concerning occurrence of these species in relation to the proposed project area. To facilitate the review, we have provided a copy of this letter to your Anchorage field office. Upon receipt of your reply, we will begin preparation of the biological evaluation reviewing the potential effects of the proposed action.

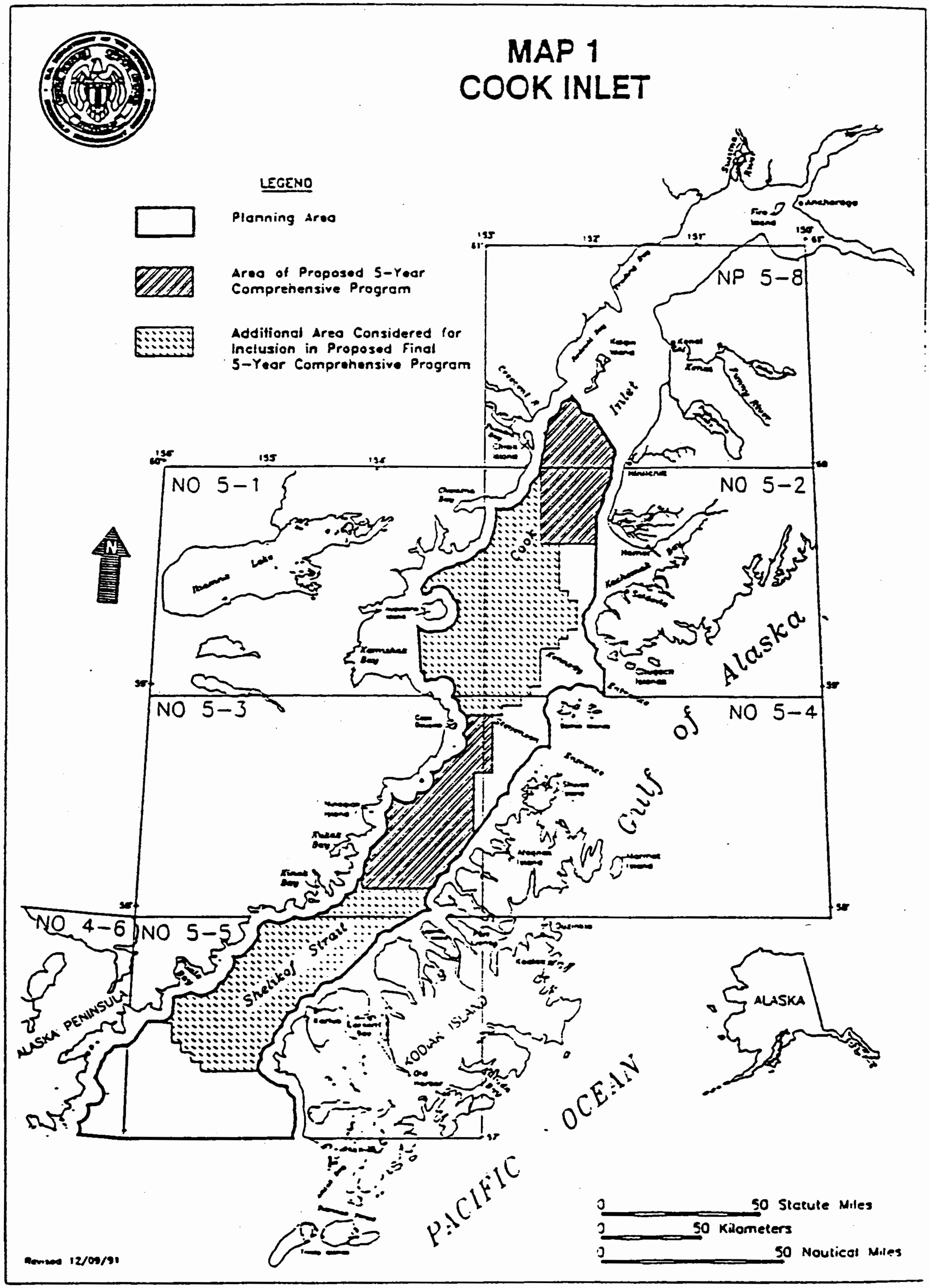
We look forward to working with you and your staff in protecting and conserving endangered and threatened species. If you have any questions concerning this proposed action, please contact Joel Hubbard at (907) 271-6670.

Sincerely,

(sgnd) Alan D. Powers
Regional Director

Attachment

cc: Anchorage Field Office,
NOAA/NMFS


MAP 1
COOK INLET
LEGEND
Planning Area
Area of Proposed 5-Year Comprehensive Program
Additional Area Considered for Inclusion in Proposed Final 5-Year Comprehensive Program
NP 5-8
NO 5-1
NO 5-2
NO 5-3
NO 5-4
NO 4-6
NO 5-5
Anchorage
Cook
Inlet
Iliamna Lake
Gulf of Alaska
Shelikof Strait
ALASKA PENINSULA
KODIAK ISLAND
PACIFIC OCEAN
ALASKA
N
50 Statute Miles
50 Kilometers
50 Nautical Miles
Revised 12/09/91

Memorandum

To: Regional Director, U.S. Fish and Wildlife Service

From: Regional Director, Alaska OCS Region

Subject: Endangered Species - Proposed Oil and Gas Lease Sale 149 (Cook Inlet/Shelikof Strait)

The Minerals Management Service has initiated the planning process for leasing and exploration associated with the proposed Outer Continental Shelf (OCS) Oil and Gas Lease Sale 149. This lease sale is proposed for September 1994 in the Cook Inlet/Shelikof Strait planning area (map attached).

In accordance with the Endangered Species Act Section 7 regulations governing interagency cooperation, we are providing a notification of the listed and proposed species and critical habitat that will be included in our biological evaluation.

In our biological evaluation, we will review species included on the following list that may be present in the vicinity of the proposed lease sale area; also included are several species that occur at more southern latitudes, because tankers are expected to transport Cook Inlet oil through or near areas occupied by their populations. It is our understanding that there are no proposed or designated critical habitats for any listed species in OCS regions potentially affected by activities associated with Sale 149.

Common Name	Scientific Name	Status
Southern sea otter	Enhydra lutris nereis	Threatened
Short-tailed albatross	Diomedea albatrus	Endangered
Bald eagle (Pac. pop.)	Haliaeetus leucocephalus	Endangered
American peregrine falcon	Falco peregrinus anatum	Endangered
Arctic peregrine falcon	Falco peregrinus tundrius	Threatened
Aleutian Canada goose	Branta canadensis leucopareia	Threatened
Brown pelican	Pelicanus occidentalis	Endangered
Light-footed clapper rail	Rallus longirostris levipes	Endangered
California least tern	Sterna antillarum browni	Endangered
Marbled murrelet	Brachyramphus marmoratus	Proposed (WA,OR,CA)

Please review our list and notify us of your concurrence or revisions and any new information concerning occurrence of these species in relation to the proposed project area. As necessary or appropriate, we request that you coordinate with other FWS regions or personnel concerning species that may occur outside the jurisdiction of the FWS Alaska region. If such coordination were needed, we would expect to receive a consolidated FWS response to this memorandum. Also, should the Steller's eider Polysticta stelleri be proposed for listing (petition to propose for listing found to be warranted), we would expect to confer on this species and include it in our evaluation. To facilitate the review, we have provided a copy of this memorandum to your Anchorage Ecological Services field office. Upon receipt of your reply, we will begin preparation of the biological evaluation reviewing the potential effects of the proposed action.

We look forward to working with you and your staff in protecting and conserving endangered and threatened species. If you have any questions concerning this proposed action, please contact Joel Hubbard at (907) 271-6670.

Attachment
cc: USFWS, Anchorage Ecological Services Field Office

BIOLOGICAL EVALUATION FOR THREATENED AND ENDANGERED SPECIES WITH RESPECT TO THE PROPOSED COOK INLET/SHELIKOF STRAIT OIL AND GAS LEASE SALE 149

(Partial Copy)

PREPARED FOR INITIATION OF SECTION 7 CONSULTATION IN ACCORDANCE WITH THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

Minerals Management Service
Alaska OCS Region
January 1993

I. BACKGROUND

The United States Department of the Interior (USDOI), Minerals Management Service (MMS), has initiated the presale process for the Cook Inlet/Shelikof Strait Oil and Gas Lease Sale 149, tentatively scheduled for September 1994. Sale 149, if held, would be the fourth Federal offshore sale in the Cook Inlet/Shelikof Strait Planning Area. The oil and gas lease sale held in October 1977 (Sale CI) was followed by Lease Sale 60 (September 1981) and Reoffering Sale RS-2 (August 1982). Of 100 leased tracts, none are still active; a total of 14 exploratory wells have been drilled.

This evaluation document describes the proposed lease sale to the extent feasible; the listed, proposed, and candidate species most likely to be affected; effects of proposed leasing and exploration activities; and mitigating measures to reduce potentially adverse effects on these species. Because the purpose of this document is to provide information to be used in an incremental-step consultation on Sale 149 leasing and exploration, we present the most detailed information on these phases. Our evaluation includes less detail on development and production activities due to their uncertainty at this time; however, we have attempted to provide sufficient information on these phases to provide an adequate basis for an opinion regarding the likelihood of the entire action violating Section 7(a)(2) of the Endangered Species Act (ESA), as amended. Should commercially producible quantities of oil be discovered and development and production be proposed, we would evaluate the need for further consultation regarding these activities. We also would consider the need for further consultation if additional species were listed or critical habitat designated, if the proposed action were substantially modified, or if significant new effects-related information were to become available.

Descriptions of the endangered and threatened species that occur in the Cook Inlet/Shelikof Strait Planning Area or could be affected by actions occurring or originating there, and analyses of potential effects of similar proposed actions, may be found in the following previously issued Environmental Impact Statements (EIS's) and biological opinions that are herein summarized and incorporated by reference as described in the Interagency Cooperation Regulations, 50 CFR 402.12(g):

- Lower Cook Inlet Oil and Gas Lease Sale CI Final EIS (USDOI, BLM, 1976)
- Lower Cook Inlet-Shelikof Strait Lease Sale 60 Final EIS (USDOI, BLM, 1981)
- Gulf of Alaska/Cook Inlet Lease Sale 88 Final EIS (USDOI, MMS, 1984)
- OCS Natural Gas and Oil Resource Management Comprehensive Program 1992-1997 Final EIS (USDOI, MMS, 1992)
- Lower Cook Inlet-Shelikof Strait Sale 60 Biological Opinion (USDOC, NMFS, 1980)
- Gulf of Alaska/Cook Inlet Sale 88 Biological Opinions (USDOI, FWS 1983; USDOC, NMFS, 1984)
- Southern California Lease Offering Final EIS (USDOI, MMS, 1983)
- Northern California Lease Sale 91 Draft EIS (USDOI, MMS, 1987)
- Southern California Biological Opinions (USDOI, FWS, 1983; USDOC, NMFS, 1983)

III. DESCRIPTIONS OF LISTED, PROPOSED, AND CANDIDATE SPECIES IN THE VICINITY OF THE LEASE AREA AND TRANSPORTATION ROUTES

A complete description of most listed and proposed species associated with the Cook Inlet/Shelikof Strait Planning Area or transportation routes is provided in the final EIS's for the Comprehensive Program and Lease Sales as well as the biological opinions prepared by the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS) that are listed on page I-7. Descriptions of species not discussed in these documents have been extracted from *Federal Register* (*FR*) Notices, Recovery Plans, and other pertinent literature sources. The following is a summary and update of this information in relation to proposed Sale 149.

A. Cetaceans: The endangered gray, fin, humpback, sei, blue, right, and sperm whales were the cetacean species identified, in concurrence with the NMFS, for inclusion in this biological evaluation (see page I-1).

1. Gray Whale: Since receiving protection by the International Whaling Commission (IWC) in 1946, the eastern Pacific gray whale population has increased from a few thousand individuals surviving commercial harvest to more than 21,000 (Breiwick et al., 1989; Rice, Wolman, and Braham, 1984; Withrow, 1989; USDOC, NMFS, 1991a). Evidence that the eastern North Pacific stock has recovered to near its estimated original population size and appears not to be in danger of extinction has prompted the (NMFS) to issue a determination (58 *FR* 3121) that this stock should be removed from the List of Endangered and Threatened Wildlife.

Most gray whales calve and breed from late December to early February in protected waters along the west coast of Baja California. Recent observations suggest that some calving occurs as far north as Washington prior to arrival on the calving grounds (Dohl et al., 1983; Jones and Swartz, 1987).

Northward migration, primarily of individuals without calves, begins in February; some cow/calf pairs delay their departure from the calving area until well into April (Jones and Swartz, 1984). A majority of gray whales migrating through the Southern California Bight follow routes near the mainland or Channel Islands and nearshore waters of coastal Mexico during both spring and fall migrations. Most whales occur within 15 km of land, but have been observed up to 200 km offshore (Bonnell and Dailey, 1990). Much of the migration route north of Point Conception to and from summer feeding grounds in the northern Bering and southern Chukchi Seas lies within a few kilometers of the coast or adjacent islands. Gray whales approach the Sale 149 area along the perimeter of the Gulf of Alaska in April, May and June, and again in November and December (Rice and Wolman, 1971). Although there have been numerous sightings of gray whales in Shelikof Strait, most of the population follows the outer coast of the Kodiak archipelago from the Kenai Peninsula in spring or Alaska Peninsula in fall. Spring concentrations occur along eastern Afognak Island and northeastern, central, and southeastern Kodiak Island. A few gray whales may overwinter in the Gulf of Alaska region (Berzin and Rovnin, 1966), and an unknown number summer along the west coast of North America (56 *FR* 58870).

Gray whales feed primarily in the northern Bering and southern Chukchi Seas during the summer months. Benthic amphipod crustaceans appear to be the primary prey species; polychaete worms, molluscs, and schooling fish also are taken (Rice and Wolman, 1971).

2. Fin Whale: The North Pacific fin whale population, protected from commercial harvest by the IWC since 1976, currently exceeds 16,000 individuals (USDOC, NMFS, 1991a), less than half the estimated pre-exploitation population. Distribution and abundance in the western Gulf of Alaska are not well known.

Summer distribution of fin whales extends from central California to the Chukchi Sea. In Alaska, some whales spend the summer feeding over the continental shelf in the Gulf of Alaska, including portions of lower Cook Inlet, Shelikof Strait, outer banks of the Kodiak archipelago, and along the Alaska Peninsula. Based on commercial catch statistics, fin whales may be showing site fidelity to Alaska Peninsula waters and the area between the Shumagin and Trinity Islands, but the numbers inhabiting these areas are substantially below historic levels (Brueggeman et al., 1987).

Fall migration occurs from September to November with some fin whales possibly wintering in the Gulf of Alaska; however, most of the North Pacific population is believed to winter far offshore at latitudes from central California to Baja California. Peak breeding period for this species extends from November to February. Northward migrating fin whales enter the Gulf of Alaska from March to June, and peak occurrence in the Kodiak Island-northern Gulf of Alaska area is reached by May (Fiscus et al., 1976; Berzin and Rovnin, 1966). Fin whales feed primarily on euphausiid crustaceans, herring, and capelin (Nemoto, 1970).

3. Humpback Whale: The North Pacific humpback whale population, estimated to number between 1,200 and 2,100 individuals, remains greatly depleted from precommercial whaling levels of about 15,000 (Rice, 1978). Humpbacks were protected from commercial harvest by the IWC in 1966. Abundance in the area from the Shumagin Islands to Cook Inlet has been estimated at 1,247 whales (Brueggeman et al., 1988).

Wintering humpbacks that breed and calve from October to March off Mexico occupy summer feeding grounds extending from the Farallon Islands of central California to the Chukchi Sea in Alaska. Currently, it is thought that a majority of North Pacific humpbacks, including those summering in Alaska, winter in Hawaiian waters (Baker et al., 1986; USDOC, NMFS, 1991b). The limited data available suggests that waters along the south side of the Alaska Peninsula to the eastern Aleutians may be of particular importance to summering humpbacks (Brueggeman et al., 1987). Whales are present in this area from July to November with peak numbers in July and August. Substantial numbers of humpbacks have been sighted between the Kenai Peninsula and Afognak Island (Rice and Wolman, 1981). A large proportion of the summering population forages over the continental shelf. Northward migration from Mexican waters begins in March and April. Spring migrants have been observed in March in southeast Alaska, and occurrence over Portlock and Albatross Banks east of the Kodiak archipelago peaks in May. Fall migration from the Gulf of Alaska usually starts in December. Mating and calving occur from October to March on the southern range off Mexico and Hawaii. Humpback whales feed primarily in summer on euphausiid crustaceans and occasional herring, cod, and pollock (Wolman, 1978).

4. Sei Whale: The North Pacific sei whale population is estimated at 9,110 individuals (Horwood, 1987; USDOC, NMFS, 1991a); a definite trend for this species since its protection by the IWC in 1976 (Mizroch et al., 1984) is not evident.

Sei whales are found offshore in the Gulf of Alaska and south of the Aleutian Islands in summer, with numbers peaking in May and June. Southward migration begins in August or September; sei whales occur in substantial numbers offshore of central California in late summer and early fall. During January to March, most are found off Baja California but range north to Point Piedras Blancas in central California. Calving occurs from September to February, peaking in November, while most breeding occurs from October to March with a peak in December. Sei whales feed primarily on copepod (*Calanus spp.*) crustaceans; they also eat euphausiid crustaceans, herring, sandlance, and pollock.

5. Blue Whale: The North Pacific blue whale population is estimated at 1,600 individuals; despite numerous recent sightings off Mexico and California (Calambokidis et al., 1990; Reilly and Thayer, 1990), little census data useful for determining population status has been acquired since commercial whaling was terminated by the IWC in 1967.

In spring, summer, and fall, blue whales range from California to Alaska. They are present from April or May to October off northern California and Oregon, primarily over the continental shelf and slope from 3 to 80 km offshore. In Alaska, blue whales occur in relative abundance south of the Aleutian Islands and, according to whaling records, large numbers once occurred over Portlock Bank east of Afognak Island. Migration south from the Gulf of Alaska usually begins by September to wintering areas from Baja California to the equator. Blue whales feed primarily on small euphausiid crustaceans.

6. Right Whale: Though sighting information is limited, records suggest there probably are a few hundred right whales remaining in the North Pacific (USDOC, NMFS, 1991a). This species was protected by the IWC in 1935.

Whaling records and more recent reports indicate right whales occur in the western Gulf of Alaska, especially east and south of Kodiak Island, and eastern Aleutians from May to September. Definitive data are lacking concerning migration, wintering and breeding; analysis of sighting data suggests that they winter in mid-Pacific (Hawaiian Islands) and western North Pacific waters (Scarff, 1986; USDOC, NMFS, 1991c). Reliable sightings have occurred along the U.S. west coast south to 20° N. (USDOC, NMFS, 1991c). Migration probably occurs mainly along a broad front over the continental shelf. Right whales feed primarily on copepod (*Calanus spp.*) and small euphausiid crustaceans.

7. Sperm Whale: The North Pacific sperm whale population is estimated to be 930,000 (USDOC, NMFS, 1991a). An estimate of 600 for the Gulf of Alaska has been reported (State of Alaska, ADFG, 1982).

Typically, sperm whales inhabit deeper waters off the continental shelf from the Equator to the Gulf of Alaska and Bering Sea. Generally, only mature males enter Alaskan waters. They are present mainly in spring, summer, and fall, undertaking their northward migration from March to June and the southward migration from September to December. Substantial numbers occur regularly east and south of Kodiak Island and west along the Aleutian

Islands (Nishiwaki, 1966; Berzin and Rovnin, 1966). The area occupied in winter generally lies between Hawaii and California. Sperm whales feed primarily on squid and fish.

B. Pinnipeds: The threatened Steller sea lion and Guadalupe fur seal were the pinniped species identified, in concurrence with the NMFS, for inclusion in this biological evaluation (see page I-1).

1. Steller Sea Lion: The total adult/juvenile (nonpup) Steller (northern) sea lion population in Alaska was estimated to have been 47,960 animals in 1989 (Loughlin et al., 1992) and declining, especially in the area from the central Aleutian Islands to at least the Kenai Peninsula in the Gulf of Alaska where a decrease of 82 percent since 1960 and 63 % since 1985 has occurred (55 *FR* 49208; Loughlin et al., 1990; Merrick et al., 1987). An estimated 23,749 sea lions occupied the Gulf of Alaska (excluding southeast Alaska) in 1989. According to estimates presented by Loughlin et al. (1992) and USDOC, NMFS (1991d), numbers were stable or had increased somewhat in 1989 in the western Aleutians, southeast Alaska (estimated nonpup population 9,244), British Columbia (estimated 6,109), and Oregon (estimated 2,261). Numbers are declining in California (estimated 1,764). Counts made in previous years suggest fewer than 1,000 animals occupy Washington waters, where there are no rookeries. Pup counts in the above areas suggest their status and trends are similar to the adult population. Counts made in Alaska from the Kenai Peninsula to Kiska Island in 1990 showed no overall significant change from 1989, but numbers were somewhat higher at eastern (20%) and central (5%) Aleutian sites and lower (17%) in the central Gulf of Alaska area (Merrick et al., 1991). The count made in 1991 documented a 7-percent overall decline from 1990 in the Alaskan population; and the 1992 count (34,835) indicates a 4.6-percent decline from 1991 (36,451), with increases in the eastern and western Aleutians more than offset by decreases elsewhere (Merrick, personal comm., 1992).

Steller sea lions occur over the continental shelf throughout the Gulf of Alaska south to southern California (Loughlin et al., 1984). In Alaska, rookeries are located throughout the Aleutian Islands, on the Pribilof Islands, Sandman Reefs, Shumagin Islands, Semidi Islands, Chirikof Island, Marmot Island, Barren Islands, Pye Islands, and the eastern Gulf of Alaska. Rookeries farther south are located at five sites in British Columbia, at Rogue and Orford Reefs in Oregon, and at Ano Nuevo Island, Sugarloaf/Cape Mendocino, and St. George Reef in California (USDOC, NMFS, 1991d). Recommendations for designating critical habitat currently are under consideration by the NMFS (58 *FR* 17181).

In Alaska, sea lions occupy rookeries from May to late July. Postbreeding-season movements between rookeries and haulouts often are extensive in the Gulf of Alaska, and California males may travel to sites as far north as southeast Alaska. Females generally return to the rookery of their birth to breed (Kajimura and Loughlin, 1988). Sea lions feed primarily on pollock and capelin; some squid also are eaten.

2. Guadalupe Fur Seal: The current estimate of this species' population is 2,000 animals (Fleischer, 1987). Breeding occurs only on Isla de Guadalupe off Baja California, and individuals appear regularly in the California Channel Islands (Bonnell and Dailey, 1990). Arrival at the rookery begins in late May, and females probably nurse their pups for at least 8 months. Males begin to leave the rookery by late July.

C. Sea Otter: The threatened southern sea otter was a carnivore species identified, in concurrence with the FWS, for inclusion in this biological evaluation (see page I-3).

1. Southern Sea Otter: A 1992 survey of the California sea otter population recorded 2,101 animals (USDOI, FWS, 1993). Otters range in central California from Point Año Nuevo south to the Santa Maria River. Otters also have been translocated to San Nicolas Island off southern California. In California, sea otters inhabit shallow nearshore waters less than 18-m deep, rarely moving more than 2 km offshore (Riedman, 1987). Otters breed and pup throughout the year, but peak periods occur in most areas; pups remain with the female from 4 to 8 months. Sea otters in California feed almost entirely on macroinvertebrates (Bowlby et al., 1988; Estes et al., 1981; Riedman and Estes, 1987). (Note: The Canadian Government has determined the sea otter to be an endangered species in British Columbia [COSEWIC, 1992]).

D. Birds: The endangered short-tailed albatross, brown pelican (California), California clapper rail, light-footed clapper rail (California), bald eagle (California), American peregrine falcon , and California least tern; the threatened Aleutian Canada goose, bald eagle (Washington, Oregon), ~~and~~ arctic peregrine falcon, western snowy plover, and marbled murrelet (Washington, Oregon, California), were the avian species identified, in concurrence with the FWS, for inclusion in this biological evaluation (see page I-3).

1. Short-Tailed Albatross: The short-tailed albatross has staged a slow recovery since the 1950's (currently, 7% annual population growth rate) to its current population of about 500 individuals (Hasegawa, personal comm., 1992). Although of rare occurrence, apparently this species still occurs over much of its historic range in the North Pacific, including coastal areas from Alaska to Baja California (Hasegawa and DeGange, 1982).

2. Brown Pelican: In 1986, the population of brown pelicans nesting on Anacapa and Santa Barbara Islands in southern California was estimated to be 7,349 pairs (Harlow, personal commun., as cited in USDOI, MMS, 1987). Most pelicans nest on islands in the Gulf of California or off mainland Mexico.

The breeding season in California extends from March through early August. Postbreeding pelicans may occur from southwestern Mexico to British Columbia. They usually appear north of Point Conception by July. Important roost sites during the postbreeding period include the Long Beach breakwater, offshore rocks from Pismo Beach to Morro Bay, and Monterey Bay. Late summer/early fall concentrations also occur in southern Oregon and southern Washington coastal areas (Lowe, personal commun., as cited in Briggs et al., 1989). Most pelicans forage within 20 km of the coast (Briggs et al., 1987).

3. Aleutian Canada Goose: Current breeding range of the Aleutian Canada goose includes several islands in the central and western Aleutians, and Kiliktagik and Anowik Islands in the Semidi Islands south of the Alaska Peninsula (USDOI, FWS, 1991b; USDOI, FWS, 1993). Peak counts on the wintering areas (California, Oregon) suggest the current population is about 9,000 individuals (Dahl, Univ. Wash., personal commun., 1993). Those wintering in northern coastal Oregon, estimated at 132 individuals, (Lowe, FWS, personal commun., 1993) breed in the Semidis (25+ pairs in the summer of 1990).Those staging or wintering in southern coastal Oregon and northern coastal California breed in the Aleutians. Several coastal islands in Oregon and California are used by wintering geese for roosting. Sightings have been made in May in a bay east of the town of Kodiak (MacIntosh, personal commun., 1993). The Aleutian Canada goose was reclassified from endangered to threatened status as of 1991 (55 *FR* 51106).

4. Bald Eagle (WA, OR, CA): Breeding range of lower 48 bald eagle populations includes Washington, Oregon (threatened), and northern California (endangered). Surveys in 1989 recorded 366 active pairs in Washington, 165 in Oregon, and 83 in California. A majority of Washington pairs nest in the Puget Sound-San Juan Island-Strait of Juan de Fuca area, and about 20 to 25 percent are located along the Pacific coast (McAllister, personal commun., 1989, as cited in USDOI, MMS, 1992). The greatest concentrations on the outer coast occur on the Olympic Peninsula and the lower Columbia River Basin. About one third of pairs in Oregon are located along the coast or lower Columbia River Basin. The onset of breeding in these areas generally occurs from January to March. Although some eagles that overwinter in coastal Washington are migrants from farther north, most are residents, and no large winter roosts are known to occur along the coast. In Canada, large numbers of eagles are present throughout the year on the Queen Charlotte Islands and Vancouver Island.

5. Peregrine Falcon: Based on 1991 surveys, the population of arctic peregrine falcons in Alaska is estimated to be 160 pairs; the American peregrine population is about 225 pairs, while 125 pairs are estimated in California (Ambrose, personal commun., 1991).

Arctic peregrine falcons nest on the Seward Peninsula and north of the Brooks Range; American peregrines nest south of the Brooks Range. Peregrines usually are present in Alaska from about mid-April to mid-September. Egg laying begins in early May in interior Alaska and early June on the North Slope; the young fledge in late July and mid-August, respectively. These subspecies probably do not make significant use of the proposed Sale 149 area; occasional individuals may winter in the region. Peregrines that occur along the California coast probably are residents, although some winter movements may occur. Most major river mouths and estuaries in northern California are important foraging areas.

Limited data regarding migration routes suggest that peregrines from the North Slope and eastern interior Alaska generally follow the central flyway while those from the western interior follow the Pacific flyway. Peregrines probably occur in the Gulf of Alaska/Cook Inlet area only irregularly during migration (FWS, 1982).

Reclassification of these two subspecies currently is under study by the FWS (56 *FR* 26969 June 12, 1991). The Canadian Government has determined the American peregrine falcon to be an endangered species in British Columbia (COSEWIC, 1992).

6. California Clapper Rail: No information received from USFWS.

7. Light-Footed Clapper Rail: An estimated 178 pairs of light-footed clapper rails bred in southern California in 1987; the estimate for northern Baja California was 240 pairs. Nesting occurs in 16 saltwater marshes within this range (Eddleman et al., 1988).

8. Western Snowy Plover: Currently, 28 western snowy plover breeding sites are known from the Pacific coast: 2 in southern Washington, 6 in Oregon, and 20 in coastal California. In Oregon, three sites contain 81 percent of that State's breeding population, and eight areas support 78 percent of the breeding population in California (57 *FR* 1444 January 14, 1992). Nesting typically occurs on unvegetated beach strands, sand spits, and other open areas influenced by wave action (Stenzel et al., 1981). Nesting occurs from mid-March to about mid-August, with an additional month required for the chicks to attain flight (Warriner et al., 1986). Adults and chicks usually leave the nest territory soon after the latter hatch. Snowy plovers forage in the sandy intertidal zone as well as in dry sandy areas above this zone and along the edges of saltmarshes and ponds.

9. California Least Tern: The estimated breeding population of least terns was over 1,800 pairs in 1991. The breeding season begins in late April when terns establish small colonies on sandy beaches or mud flats from Baja California to San Francisco Bay. Breeding is limited to about 25 colonies, primarily in southern California. Southward migration to Mexican wintering areas begins in August and most individuals have departed by late September (Garrett and Dunn, 1981).

10. Marbled Murrelet (WA, OR, CA): The FWS has determined the marbled murrelet to be a threatened species in Washington, Oregon, and California (57 *FR* 45328 October 1, 1992). The Canadian Government also has determined the marbled murrelet to be a threatened species in British Columbia (COSEWIC, 1992). The population estimated to breed in Washington is 5,000 birds (Speich et al., in press). Fewer than this number inhabit coastal Oregon (Marshall, 1988; Varoujean and Williams, 1987), and recent estimates of fewer than 1,000 pairs may represent this segment of the population more accurately (Nelson, 1992, as cited in 56 *FR* 45328). About 2,000 birds are estimated to occur in California (Carter and Erickson, 1988; Carter et al., 1990; Marshall, 1988). An estimated 20,000 to 45,000 inhabit British Columbia waters (Rodway and COSEWIC, 1990). Marbled murrelets occur in coastal waters from the Aleutian Islands eastward to Prince William Sound and southward to central California.

Marbled murrelets spend most of their lives on the ocean, coming inland to nest in semicolonial aggregations that are concentrated in the remaining larger patches of old-growth and old-growth/mature forests. Nesting occurs from mid-April to late September (Carter and Sealy, 1987; Hamer and Cummins, 1990, 1991; Singer et al., 1991, 1992). Marbled murrelets do not attain sexual maturity until their second year, and not all adults may nest every year. Studies along the central Oregon coast indicate a recruitment rate of less than 2 percent over the past 4 years (Nelson, 1992). Murrelet concentrations almost always occur offshore of old-growth and mature forests with gaps in offshore distribution reflecting the absence of older forests onshore such as between San Mateo County and Humboldt County in California and between Tillamook County in Oregon and the Olympic Peninsula in Washington (Nelson, 1990; Ralph et al., 1990). Marbled murrelets feed primarily on fish and invertebrates in nearshore marine waters. Seasonal changes in distribution and abundance of murrelets indicate that local migration takes place (56 *FR* 28362).

E. Reptiles: The endangered green, leatherback and Pacific ridley sea turtles, and threatened loggerhead sea turtle, were the reptile species identified, in concurrence with the NMFS, for inclusion in this biological evaluation (see page I-1).

1. Green Sea Turtle: Sightings of green sea turtles have been recorded from Chile to British Columbia. Aside from a live beachcast individual in northern California, no sightings have been made off the California coast in recent years. They are observed in a limited portion of southern San Diego Bay. Egg laying probably occurs on west coast beaches of Mexico and south between May and September (Mager, 1984).

2. Leatherback Sea Turtle: Aerial surveys off Washington and Oregon between April and September 1989 recorded 14 leatherbacks offshore in July and September (Brueggeman, personal commun., 1989, as cited in USDOI, MMS, 1992); individuals have been sighted as far north as Alaska (Mager, 1985). Nearly all sightings made during a 3-year survey off California occurred during summer and fall; individuals were distributed between 10 and 185 km offshore, with most over the continental slope (Dohl et al., 1983). Estimates from the early 1970's place the eastern Pacific nesting female population at 8,000 individuals (Pritchard, 1971).

3. Loggerhead Sea Turtle: In the eastern Pacific, loggerheads nest on beaches of Central and South America. Southern California is accepted as this species' northern limit because no sightings have been made farther north. A loggerhead was captured near Santa Cruz Island in 1978 (Guess, 1982).

4. Pacific Ridley Sea Turtle: Major nesting beaches of the Pacific, or olive, ridley are found on the Pacific coast of Mexico. This species is an infrequent visitor to waters north of Mexico; they have been observed off Humboldt County, California, in December and off La Jolla, California, in August. Fewer than 80,000 adults were estimated to exist in 1983 (Mager, 1984; 1985).

F. Other Coastal Species: The FWS identified a variety of listed, proposed, and candidate species occurring in coastal saltmarsh or foredune (or other strand habitats) of Washington, Oregon, and/or California for inclusion in this biological evaluation (see page I-3). These include 4 mammals (saltmarsh harvest mouse, Point Arena mountain beaver, suisun ornate shrew, saltmarsh vagrant shrew); 1 bird (California black rail); 1 reptile (southwestern pond turtle); 1 amphibian (California red-legged frog); 2 fishes (winter-run chinook salmon and delta smelt); 5 insects (Oregon silverspot butterfly, El Segundo blue butterfly, Smith's blue butterfly, Myrtle's silverspot butterfly, and Behren's silverspot butterfly); and 18 plants (saltmarsh bird's beak, Howell's spineflower, Monterey spineflower, robust spineflower, Menzies' wallflower, beach layia, Tidestrom's lupine, Gambel's watercress, California sea-blite, Ventura marsh milk-vetch, coastal dunes rattleweed, Pt. Reyes paintbrush, surf thistle, soft bird's-beak, seaside bird's-beak, Nipomo Mesa lupine, Wolf's evening-primrose, and Ballona cinquefoil).

Point Arena mountain beavers occupy four sites at Manchester State Beach, Mendocino County, California. This subspecies occupies a total of 10 sites in the county, with 3 to 20 individuals per site. Mountain beavers occupy extensive burrow systems in stabilized sand dune/coastal scrub habitat and feed on herbaceous plant material and bark/leaves of scrub species.

During their downstream migration from the Sacramento River, juvenile winter-run chinook salmon forage throughout San Francisco Bay between early January and late April for 1 week to 2 months or more, depending on water conditions. The center of delta smelt abundance currently is the Sacramento River channel of the Sacramento-San Joaquin River Delta; they are rare in Suisun Bay. Delta smelt, an estuarine species associated with brackish water of the Sacramento-San Joaquin estuary for most of the year, spawn primarily in freshwater blind sloughs and channel margins in the Delta between February and mid-June; adults die after spawning. The pelagic larvae, as well as adults, feed on zooplankton, particularly various life- stages of copepods.

The Oregon silverspot butterfly ranges from central Oregon to extreme southwestern Washington. The few remaining coastal salt-spray meadows where this species' obligatory host plant *Viola adunca* occurs comprise critical reproductive habitat; only two such meadows of appreciable size exist, both located in Lane County, Oregon. Eggs are laid in August/September, and larval diapause and development require until the following July. The El Segundo blue butterfly appears restricted to small remnants of the El Segundo Dune ecosystem in Los Angeles County, California. Smith's blue butterfly occurs on coastal portions of the Monterey dune complex at Seaside and Fort Ord, Monterey County, California. Several populations of Myrtle's silverspot butterfly occupy coastal dune habitats in California; two populations within Sonoma State Beaches in Sonoma County, and a population at Pt. Reyes National Seashore. Egg and larval development, and winter diapause, occur between early September and late June.

Some populations of most of the plant species listed above occur in coastal foredune habitat of northern and central California. Saltmarsh bird's-beak (southern California) and California sea-blite occur in coastal marshes, Gambel's watercress in coastal dune lakes, and Wolf's evening primrose on coastal bluffs in California and Oregon.

IV. EVALUATION OF EFFECTS FROM LEASING AND EXPLORATION

Leasing and exploration potentially may result in acoustic, visual, and altered habitat effects on behavior, distribution, and abundance of individuals or populations occurring in or adjacent to the lease area. In addition, pollutants (e.g., fuel, lubricants) accidentally released and drilling muds and cuttings released during exploration activities may cause adverse effects on individuals either through direct contact or indirectly as a result of effects on prey populations or important habitats. Based on industry's record on the Outer Continental Shelf, the probability of crude oil release during exploration is assumed to be zero. Species whose typical distribution, or distribution of listed populations, occurs well beyond the Cook Inlet/Shelikof Strait Planning Area boundary are discussed in Section V.

A. Effects on the Gray Whale: Exploration activities potentially disturbing to gray whales include drilling operations, aircraft and vessel traffic, and seismic surveys. Gray whales have been observed to migrate past drilling units along the California coast without displaying atypical behavior. Avoidance reactions to playback of drilling platform underwater sounds have been observed when whales were within 20 m of the sound source (Malme et al., 1989). Malme et al. (1985) derived minimum avoidance criteria of 500 m for a drilling platform and 1 km for a drillship; conservatively, most whales are expected to exhibit avoidance of such noise sources at 1 to 4 km. The Sale 149 scenario assumes that a single drilling unit will be in operation during each of three exploration years. If located in an area traversed by gray whales during spring (April-June) or fall (November-December) migration, drilling operations potentially could cause a few whales to divert their direction of travel for an hour or less, resulting in displacements of several hundred meters to a few kilometers from the site (Malme et al., 1984). Such displacement is expected to have a negligible effect, because it is likely to involve less than 1 percent of the eastern Pacific population temporarily avoiding a small portion of a secondary migration route (lower Cook Inlet/Shelikof Strait) during the exploration phase.

Likewise, aircraft and vessels servicing exploration rigs are expected to influence the behavior of only small numbers of gray whales in a restricted portion of this secondary migration area. Gray whales overflown by aircraft at altitudes below 450 m (approx. 1,500 ft) may dive in response to the noise and visual stimulus. However, if the aircraft remains on a direct course the whales are expected to continue their normal activities following its departure. Vessels that approach no closer than several kilometers are not expected to disturb the whales, and avoidance of vessels by gray whales is expected to occur only when separation is 550 m or less (Bogoslovskaya et al., 1981). Vessels that maintain a constant speed and course probably will cause little disturbance of gray whales. In the most likely scenario, a small number of whales traveling in the vicinity of a platform supply route could be exposed briefly to a vessel or aircraft causing the whales to dive or divert their direction of travel briefly. However, because only one vessel and two helicopter supply trips per day are anticipated, travel routes followed by the few whales likely to traverse this secondary migration area are expected to intersect those of vessels or aircraft infrequently, and thus interactions are expected to be few, responses brief (a few minutes to tens of minutes), and effects negligible.

Gray whales are likely to be present in the vicinity of the proposed lease area in spring and fall when some seismic-survey activity may occur. However, gray whales appear tolerant of distant seismic noise. For example, in experiments conducted along the California coast during the gray whale migration, whales consistently showed no significant avoidance response to an airgun-array vessel at distances of about 3 km or greater (Malme et al., 1984). Conservative criteria developed by Malme et al. (1985) suggest whales will exhibit avoidance of seismic activity at 1 to 2 km. In addition, observation of bowhead whales disturbed by nearby seismic operations recovering typical surface-respiration-dive characteristics 30 to 60 minutes after exposure suggests that, to the extent bowhead and gray whale response to disturbance is similar, response to such a stimulus typically is brief. The likelihood of the relatively few whales traveling through this secondary migration area intersecting with seismic vessels operating for short periods in limited areas is expected to be low. Consequently, few whales are expected to interact with seismic-survey vessels and any avoidance responses should be brief, lasting an hour or less, and result in negligible effects.

As a result of a fuel or other contaminant spill, a few migrating gray whales could experience skin contact, membrane irritation, baleen fouling, respiratory distress caused by inhaling sublethal concentrations of contaminant vapor, consumption of contaminated prey, or avoidance of a limited area. However, because potential sources of contamination would be highly localized in an area used only secondarily by migrating whales, where strong winds and currents would promote rapid dilution of the extremely small quantities of contaminants likely to be released

(≤3 bbl), no whales are expected to experience the transitory tissue irritation, baleen fouling, contaminated prey, or area avoidance that could occur in the event of a larger spill. Burial of benthic prey by muds and cuttings discharged at a drill site, or interference with whales' ability to locate prey, is expected to involve such a restricted area that there would be no adverse effect.

Conclusions: Because potential sources of gray whale disturbance are likely to be localized in a small portion of the proposed sale area, used only secondarily by small numbers of whales during migration (April-June, November-December), less than 1 percent of the eastern Pacific population is expected to be exposed to exploration-phase disturbance and exhibit adverse effects for the equivalent of up to 1 day per migration period; individual whales are expected to be affected for an hour or less per exposure incident. Given the small quantities of potential contaminants likely to be released, and the rapid dilution that would occur following any spill, exposure of gray whales to spilled contaminants at detectable concentrations is not expected to occur. Overall effect of exploration phase exposure of gray whales to disturbance and contaminants is expected to be negligible.

B. Effects on the Fin Whale: Fin whales, like the gray, are expected to occur in the proposed sale area or adjacent waters in relatively low numbers (less than 1% of the Pacific population). Considered a species of more offshore distribution, fin whales are most likely to occur east and southwest of Kodiak Island during spring (April-June) or fall (September-November) migration; some individuals spend the summer over the Gulf of Alaska shelf, and individuals have been observed in the Kodiak Island area in winter (Zweifelhofer, personal commun., 1993).

Fin whales are expected to respond to potentially disturbing exploration activities essentially as described for the gray whale; that is, minor behavioral responses or diversion of travel direction in the vicinity of a platform, vessel or aircraft, lasting an hour or less. Likewise, no fin whales are expected to be exposed to contaminant or discharge concentrations beyond those that would result in negligible effects.

Conclusions: Because potential sources of fin whale disturbance are likely to be localized in a small portion of the proposed sale area, used only secondarily by small numbers of whales during migration (April-June, September-November) or summer periods, less than 1 percent of the Pacific population is expected to be exposed to disturbance and exhibit adverse effects; individual whales are expected to be affected for an hour or less per exposure incident. Given the small quantities of potential contaminants likely to be released, and the rapid dilution that would occur following any spill, exposure of fin whales to spilled contaminants at detectable concentrations is not expected to occur. Overall effect of exploration-phase exposure of fin whales to disturbance and contaminants is expected to be negligible.

C. Effects on the Humpback Whale: Humpback whales, like the gray, are expected to occur in the proposed sale area or adjacent waters in relatively low numbers (less than 5% of the Pacific population). In this area, peak numbers occur during July and August when substantial numbers forage over the shelf between the Kenai Peninsula and the eastern Aleutians. Humpbacks generally are present in this area from April to December.

Humpback whales are expected to respond to potentially disturbing exploration activities essentially as described for the gray whale; that is, minor behavioral responses or diversion of travel direction in the vicinity of a platform, vessel, or aircraft, lasting an hour or less. Likewise, no humpback whales are expected to be exposed to contaminant or discharge concentrations beyond those that would result in negligible effects.

Conclusions: Because potential sources of humpback whale disturbance are likely to be localized in a small portion of the proposed sale area, used only secondarily by relatively small numbers of whales during migration and summer periods, less than 5 percent of the Pacific population is expected to be exposed to exploration-phase disturbance and exhibit adverse effects; individual whales are expected to be affected for an hour or less per exposure incident. Given the small quantities of potential contaminants likely to be released, and the rapid dilution that would occur following any spill, exposure of humpback whales to spilled contaminants at detectable concentrations is not expected to occur. Overall effect of exploration-phase exposure of humpback whales to disturbance and contaminants is expected to be negligible.

D. Effects on the Sei, Blue, Right, and Sperm Whales: These whales are expected to occur in the proposed sale area or adjacent waters in even lower numbers than the three species discussed above (i.e., much less than 1% of their Pacific populations). These species generally are considered of more offshore distribution, more likely to occur east and southwest of Kodiak Island foraging over the Outer Continental Shelf and slope or deeper waters from May through September.

These species are expected to respond to potentially disturbing exploration activities essentially as described for the gray whale; that is, minor behavioral responses or diversion of travel direction in the vicinity of a platform, vessel, or aircraft, lasting an hour or less. Likewise, no whales are expected to be exposed to contaminant or discharge concentrations beyond those that would result in negligible effects.

Conclusions: Since potential sources of sei, blue, right, and sperm whale disturbance are likely to be localized in a small portion of the proposed sale area, entered infrequently by small numbers of these whales during migration (April-June, September-November) or summer periods, much less than 1 percent of their Pacific populations are expected to be exposed to disturbance and exhibit temporary adverse reactions; individual whales are expected to be affected for an hour or less per exposure incident. Given the small quantities of potential contaminants likely to be released, and the rapid dilution that would occur following any spill, exposure of these whales to spilled contaminants at detectable concentrations is not expected to occur. Overall effect of exploration phase exposure of Sei, blue, right, or sperm whales to disturbance and contaminants is expected to be negligible.

E. Effects on the Steller Sea Lion: Exploration activities potentially disturbing to Steller sea lions include aircraft and vessel traffic, seismic surveys, and drilling operations. Although the possible impacts of various types of disturbance on sea lions have not been studied specifically, any disturbance may cause increased energy expenditure; and operation of aircraft over or vessels near rookeries is observed to cause adult stampedes that may result in trampling or abandonment of pups. However, only under exceptional circumstances would close approach of the two major rookeries adjacent to the Sale 149 area, Marmot Island and Sugarloaf Island, be expected to occur. Routine aircraft or vessel approach of haulouts in the Kodiak archipelago that might result in avoidance of such areas is not expected to occur.

The Sale 149 scenario assumes that a single drilling unit will be in operation during each of three exploration years, supported by one vessel and two helicopter supply trips per day. Sea lions may avoid potential foraging areas, and traditional rafting areas, near the drill rig and supply routes; however, such displacement is expected to have a negligible effect because it is likely to involve less than 2 percent of the Gulf of Alaska population temporarily avoiding a small proportion of their local range in the vicinity of a drill rig.

Travel routes of the few sea lions likely to traverse the area between shore facilities and the drill rig are expected to intersect those of supply or seismic vessels or aircraft infrequently, and thus interactions are expected to be few, avoidance responses brief (a few minutes to tens of minutes), and effects negligible. No onshore construction projects are likely to be located near sea lion rookery or major haulout areas. Potential disturbance from human presence is expected to be mitigated by the orientation program stipulation.

As a result of a fuel or other contaminant spill, a few sea lions could experience skin contact, membrane irritation, fouling of the pelage, respiratory distress caused by inhaling sublethal concentrations of contaminant vapor, consumption of contaminated prey, or avoidance of a limited area. However, because potential sources of contamination would be highly localized in a region where strong winds and currents would promote rapid dilution of the extremely small quantities of contaminants likely to be released ($\leq$3 Bbl), no sea lions are expected to experience the transitory tissue irritation, pelage fouling, contaminated prey, or area avoidance that could occur in the event of a larger spill.

Conclusions: Because potential sources of Steller sea lion disturbance are likely to be localized in a small portion of the proposed sale area, less than 2 percent of the Gulf of Alaska population is expected to be exposed to disturbance and exhibit adverse effects for the equivalent of up to 1 week annually; individual sea lions are expected to be affected for a few minutes to tens of minutes per exposure incident. Given the small quantities of potential contaminants likely to be released, and the rapid dilution that would occur following any spill, exposure of sea lions to spilled contaminants at detectable concentrations is not expected to occur. Overall effect of exploration-phase exposure of Steller sea lions to disturbance and contaminants is expected to be negligible.

F. Effects on the Short-tailed Albatross: Although nonbreeding short-tailed albatrosses formerly (pre-1900) were sighted frequently in inshore and shallow offshore waters of Alaska, including the proposed Sale 149 area, sightings have been rare since this time and predominantly in the western Aleutians since 1950 (Hasegawa and De Gange, 1982). Sighting frequency of the previous 30-year interval suggests that fewer than five individuals would be expected to occur in the vicinity of the Sale 149 area over the life of the field, with the probable number being one.

Aircraft probably are the only potential source of disturbance of this species; however, in view of the small proportion of the sale area likely to be traversed by support aircraft, exposure of a single albatross to such disturbance is expected to be an extremely rare event, lasting a few minutes to tens of minutes, and result in negligible effect. Albatrosses routinely ingest floating material such as plastic items; the effect of ingesting such items has not been determined with certainty. If such material (e.g., styrofoam packing or insulation) were blown off a rig or supply vessel, an albatross could encounter it; but the expected rarity of albatross occurrence and debris of oil and gas industry origin in this area suggests that such encounters will not take place. It is not expected that the rarely occurring short-tailed albatross would be exposed to concentrations of fuel or other spilled contaminant potentially causing tissue irritation, plumage fouling, or consumption of contaminated prey in this region where sources of contamination would be highly localized and strong winds and currents would promote rapid dilution of the small quantities of contaminants likely to be released (≤ 3 bbl).

Conclusions: Because potential sources of short-tailed albatross disturbance and ingestible floating materials are likely to be localized in a small portion of the proposed Sale 149 area, and this species is of extremely rare occurrence in the vicinity of the area, 0.2 percent of the population or less potentially could be exposed to disturbance and floating materials and exhibit adverse effects for a few minutes to tens of minutes per exposure incident. Given the small quantities of potential contaminants likely to be released, the rapid dilution that would occur following any spill, and the expected rarity of this species' occurrence in the area, exposure of a short-tailed albatross to spilled contaminants at detectable concentrations is not expected to occur. Overall effect of exploration-phase exposure of the short-tailed albatross to disturbance, debris, and contaminants is expected to be negligible or none.

G. Effects on the Aleutian Canada Goose: The small Aleutian Canada goose population (25+ pairs) breeding or summering on Kiliktagik and Anowik Islands in the Semidi Islands is not expected to experience adverse effects from exploration-phase activities because of its distance from the proposed Sale 149 area (approx. 110 mi). Occurrence of individuals in the vicinity of the sale area east of the town of Kodiak has been documented recently (MacIntosh, NMFS personal commun., 1993).

Conclusion: Because proposed Sale 149 exploration activities would be far removed from areas of known Aleutian Canada goose occurrence, this species is not expected to experience adverse effects.

H. Effects on the Peregrine Falcon: Migrating peregrine falcons following the Pacific flyway from western interior nesting areas, or occasional overwintering individuals, potentially could occur seasonally in coastal areas adjacent to the proposed Sale 149 area, although such occurrence is expected to be irregular and infrequent (less than 3% of the Alaskan population). Such individuals could be disturbed on rare occasions by aircraft flights from an air-support site (e.g., Kenai, Kodiak) to a drill rig in the sale area; avoidance responses exhibited by peregrines exposed to nearby aircraft are expected to last for a few minutes to tens of minutes per incident. Because the frequency of such support flights is likely to be only one to two per day, intersection of their flight paths with those of uncommon migrant, or overwintering, peregrine falcons is expected to be infrequent and effects on the population negligible.

Conclusion: Because potential sources of peregrine falcon disturbance are likely to be localized in a small portion of the proposed Sale 149 area, and this species is of uncommon occurrence in the vicinity of the area, less than 3 percent of the population potentially could be exposed to disturbance and exhibit avoidance effects for a few minutes to tens of minutes per exposure incident. Overall effect of exploration-phase exposure of the peregrine falcon to disturbance is expected to be negligible.

I. Cumulative Effects: Cumulative effects are defined in Section 7 of the Endangered Species Act (50 CFR section 402.02) as ". . . those effects of future State or private activities not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation."

State or private actions reasonably certain to occur within or near the proposed sale area would include State of Alaska oil and gas lease sales (Nos. 67A-W, 76, 78, 85), transport of crude oil between Valdez and Nikiski or lower 48 ports, transport of crude oil or refined petroleum products from Cook Inlet to lower 48 and Far East ports, transport of liquefied natural gas from Cook Inlet to the Far East, commercial-fishing operations, subsistence-harvest activities, recreational- and tourist-industry activities, and winter-habitat loss or contamination. The State of Alaska currently is considering whether holding Lease Sales 78 and 85 will be in the best interests of the State.

Generally, whales remain far enough offshore so as to be found mainly in Federal waters; however, in some areas (e.g., Cook Inlet/Shelikof Strait) gray, fin, or humpback whales, for example, do enter State waters where they could be exposed to potentially adverse factors associated with State leasing. If exploration and development/production activities occur on State leases, whales could experience disturbance effects similar to those described for the proposed action under consideration. However, State sale areas primarily are confined to areas north of Kachemak Bay, where endangered whale sightings are rare, and thus effects from these sales are not expected to substantially increase overall impact on whales. Likewise, although State Sale 85 proposes to offer leases along Shelikof Strait, few migrating whales are expected to encounter activities in this area sufficiently disturbing to cause more than brief behavioral responses. Migrating gray whales appear to ignore or exhibit minor temporary avoidance responses to all but nearby vessels and other potentially disturbing stimuli; if fin and humpback whales respond similarly, their typical activities are not expected to be altered significantly. Vessels carrying tourists to areas frequented by whales are not expected to cause overall disturbance effects of the whale populations to increase significantly except that where whales are exposed routinely to vessel noise in constricted waters (e.g., humpback whales in Glacier Bay National Park/Preserve) avoidance of local areas may occur. The other whale species (sei, blue, right, sperm) are not expected to be affected by activities occurring in State waters or nearshore waters elsewhere because of their typically offshore distribution.

Most recent oil spills in Cook Inlet have not spread beyond the inlet while at potentially harmful concentration, and thus have remained outside the area usually frequented by the small numbers of gray, fin, or humpback whales that enter the proposed sale area. No changes in distribution/abundance, mortality, or other potential effects on humpback whales have been related to the *Exxon Valdez* oil spill (Dahlheim and Loughlin, 1990). Entanglement of whales in fishing gear apparently occurs infrequently in most areas. Less than 26 percent of stranded gray whales examined show evidence of fisheries interactions (Heyning and Dahlheim, in press; Heyning and Lewis, 1990); NMFS has concluded that gray whale mortality related to fisheries is likely to be insignificant at the present population level. Subsistence harvest of endangered whales in the vicinity of proposed Sale 149 does not occur. Neither winter habitat loss nor contamination currently is known to be a significant problem for whale populations.

If exploration and development/production activities occur on State leases, Steller sea lions could experience disturbance effects similar to those described for the proposed action under consideration. However, State sale areas are confined primarily to areas north of Kachemak and Kamishak Bays, where sea lion sightings are rare, and thus effects from these sales are not expected to substantially increase overall impact on sea lions. However, State Sale 85 proposes to offer leases along Shelikof Strait adjacent to eight sea lion haulout areas (no rookeries) and, because this area has no history of leasing, estimating the level of industrial activity is more speculative than for areas where development has occurred. Although potentially greater numbers of sea lions could encounter activities associated with development on State leases in the Shelikof Strait area than expected for proposed Sale 149, no rookeries or the mortality potentially resulting from their disturbance would be involved. Thus, industry-sea lion interaction associated with State leases is expected to result primarily in the avoidance of a small number of localized foraging or rafting areas, and brief behavioral responses to vessels or aircraft encountered in pelagic waters. These sublethal effects are expected to involve less than 5 percent of the western Gulf of Alaska population. Disturbance factors elsewhere in the sea lion range are expected to cause negligible effects on the population.

Most recent oil spills in Cook Inlet have not spread beyond the inlet while at potentially harmful concentration, and thus have remained outside the area where the greatest numbers of sea lions are concentrated. As yet, no changes in distribution/abundance, mortality, pup production, or other potential effects on sea lions have been related to the *Exxon Valdez* oil spill (Calkins and Becker, 1990), although the populations' decline may mask some effects. The impact of the incidental catch of sea lions during commercial-fishing operations on the Gulf of Alaska population is unknown (Loughlin and Nelson, 1986) but has decreased since 1985 to perhaps a few hundred individuals per year (55 *FR* 49208 November 26, 1990). Subsistence harvest of sea lions in the Gulf of Alaska probably is fewer than 100 individuals (Haynes and Mishler, 1991), with an unknown effect on the population. Tourist-industry effect on the sea lion population probably is negligible because buffers have been established around rookeries. Cumulative impact of all factors on the Steller sea lion population is expected to be substantial, although any estimate of severity is confounded by the dramatic decline of its population throughout much of Alaska in recent decades.

Because the short-tailed albatross rarely, if ever, occurs in the vicinity of proposed State leases, no increase in potential overall impact is expected to occur as a result of these actions. Other factors listed above are not expected to affect the albatross population because of the low probability of interaction.

The small Aleutian Canada goose population in the Semidi Islands is not expected to experience adverse effects from proposed State lease sales or Cook Inlet spills because of its distance from the site of these actions. Fishing, tourist industry, and subsistence activities are not expected to have adverse effects. If continuing progress is made in securing and managing winter and migration habitat, effects on the goose population in these areas is not expected to contribute significantly to cumulative impact.

State lease sales and other activities described above are expected to have little effect on peregrine falcon populations. Onshore activities have the greatest potential for adverse effects, but the infrequent occurrence of peregrines in the vicinity of proposed State sale areas suggests that noise and other activities should have only occasional, brief adverse effects on the peregrine falcon. It is improbable that oil spills or fisheries activities would have a significant effect on peregrine populations. Potential effects in areas south of Alaska are expected to be similar to those occurring within the state, although potential habitat loss is unknown. The successful recovery progress exhibited by both peregrine subspecies breeding in Alaska suggests that the minor increases in potential disturbance from actions listed above is not likely to significantly affect these populations.

V. DEVELOPMENT AND PRODUCTION

This section describes the Sale 149 base-case development and production scenario and possible effects on listed, proposed, and candidate species. The estimated level of activity associated with base-case development and production is summarized from the Exploration and Development Report, Cook Inlet/Shelikof Strait Sale 149, included as Appendix A.

A. Scenario: The discovery of economically recoverable oil in the sale area is expected to initiate planning, design, and construction of a production platform, support facilities, and transportation infrastructure for petroleum exploitation in leased Federal waters of the Cook Inlet/Shelikof Strait area.

Work on offshore and onshore production and transportation facilities would not begin until the engineering and economic assessments of the potential reservoirs have been completed and the conditions of all the permits have been evaluated. The first delineation well is projected to be drilled in 1996. A production platform is projected to be completed by 1998, with production well drilling commencing in 1999. Production would be expected to begin in 2001 and end in 2019.

The development and production scenario selected by MMS represents a composite of the various feasible options that could be developed for the environmental analysis. It resulted from discussions within MMS and with other government agencies and industry. Considered in developing this scenario were the existing

infrastructure, locations of sites with potential as support facilities, resource estimates, and scenarios developed for previous OCS sales in the Cook Inlet/Shelikof Strait area.

The facility locations and development/production scenario incorporate assumptions that were made for the purpose of identifying potential environmental effects of characteristic activities. The assumptions do not represent an MMS recommendation, preference, or endorsement of any facility, site, or development/production plan. A summary of the major base-case development and production assumptions (see Tables 1 and 2) follows:

- A total of 1,257 trackline miles of shallow-hazard seismic surveys would be conducted for the production platform, covering approximately 38 mi^2. Approximately 100 additional miles of survey would be conducted for the offshore pipeline.

- One steel-jacketed ice-resistant production platform would be installed by 1998. Twenty-six production and service wells would be expected to be drilled from five rigs during the period 1999 through 2001. Target depth is estimated at 7,200 ft.

- Each production/service well will require the disposal of up to 750 short tons of drilling muds and 1,350 short tons of dry rock cuttings.

- Marine support for exploratory drilling in Shelikof Strait is expected to be staged from a facility located in one of the bays on the western shore of Kodiak Island, probably near the offshore pipeline terminal. It is likely to include a heliport and airfield and occupy fewer than 20 acres. Should commercially recoverable quantities of hydrocarbons be discovered, marine support for Cook Inlet probably would be staged from Nikiski. Supply vessels would average one or two trips/day to the platform (30-60/month) with the frequency diminishing as production proceeds.

- Air support for Shelikof Strait operations is expected to originate at the Kodiak airport, with some traffic from the marine support facility. Air support for Cook Inlet would be expected to originate from the municipal airport in the Kenai/Nikiski area, with some support possible from a helipad operated by an oil-field contractor. Helicopter trips would average two per day (60/month) and would be expected to decline through the production period.

- Hydrocarbons produced in the Shelikof Strait area would be transported via pipeline to an oil-storage terminal in a bay on the western shore of Kodiak Island. Produced crude would be transported via barge from this facility every 3 days (10/month) to Nikiski where it would be stored for trans-shipment via tanker to the lower 48 or processed for sale within Alaska. Should commercially recoverable quantities of hydrocarbons be discovered in Cook Inlet, produced crude would be transported via subsea pipeline to Anchor Point and onshore pipeline to Nikiski.

B. Evaluation of Effects from Development and Production: Development- and production-phase activities, like those occurring during exploration, potentially may result in acoustic, visual, and altered habitat effects on behavior, distribution, and abundance of individuals or populations occurring in or adjacent to the lease area or along tanker routes. Also, pollutants (eg., fuel, lubricants, crude oil) accidentally released and drilling muds and cuttings released during development or production may cause adverse effects on individuals either through direct contact or indirectly as a result of effects on prey populations or important habitats. Pollutants other than crude oil and fuel in substantial volume are not expected to cause significant impacts, because they are likely to rapidly become diluted near the point of release and/or are not known to be harmful to species considered below. In addition, cleanup activities associated with any oil spill may result in disturbance.

The chance of a substantial oil spill (≥ 1,000 bbl) occurring during development/production is low: using base case resource and transportation assumptions, the probability of one or more spills from a platform, pipeline, or tanker/barge is 10, 26, and 33 percent, respectively. The expected number of spills from each source is 0.10, 0.11, and 0.19, respectively; the most likely number is zero, although one spill in the sale area is assumed for this analysis. For tankers alone, between Alaska and lower-48 ports, spill probability is 4 percent, with the expected number being 0.04. The relatively low resource-level estimate for Sale 149 suggests that a significant increase in oil tankered south is not likely to result from this sale. An estimated 16 small spills between 1 and 50 bbl in size (average = 5 bbl) are expected to occur. The oil-spill-risk-analysis probabilities cited in discussions below were developed from base-case assumptions and thus represent the expected probability of a substantial spill occurring and contacting specific areas or biological resources, given the projected oil volume of 160 million barrels.

1. Effects on Whales:

Gray whale: If gray whale secondary migration-route areas (lower Cook Inlet/Shelikof Strait) are contaminated by an oil spill when whales are present, some could experience one or more of the following: skin contact with oil, baleen fouling, membrane irritation or ulceration, respiratory distress caused by inhalation of hydrocarbon vapors, avoidance of oiled areas and, if the whales are feeding, a localized reduction in food resources, the consumption of some contaminated prey items or benthic substrate, and local displacement from contaminated feeding areas. However, because these areas are used by less than 1 percent of the eastern Pacific population, only small numbers of individuals potentially could be contacted by a spill. The probability of a spill occurring and contacting nearshore areas of Shelikof Strait to the Barren Islands within 30 days ranges from 1 to 8 percent.

In the presence of an oil spill, whales may contact oil as they surface to breathe and react as whales observed off the California coast by changing their swimming direction, thereby avoiding surface oil, or maintaining swimming direction but breathing less frequently, remaining submerged for longer periods, and/or swimming faster while in oiled waters. Prolonged contact with skin or eyes may result in irritation or ulceration; however, brief contact is not expected to result in serious long-term harm to whales. Whales that feed in oiled areas may experience short-term fouling of their baleen; however, oil should not obstruct waterflow through the baleen significantly, and filtering efficiencies are expected to return to normal within minutes after feeding in oil. Hydrocarbon vapor inhaled by whales may result in respiratory distress. However, because most toxic vapors will have dissipated within 24 hours of oil exposure to air it is unlikely that more than a few of the small number of gray whales in the proposed lease area would be exposed, and no lasting effects are expected. Because limited feeding by gray whales occurs during migration, displacement from local feeding areas, localized reduction of food resources, or consumption of contaminated prey items or benthic substrate are expected to affect only a small number of whales in the sale area.

Because of the low probability of small, rapidly-dispersing oil spills occurring in the vicinity of lower-48 ports and contacting gray whales, such spills are not expected to interfere with gray whale migration along the Pacific coast or to result in detectable effects.

Development and production activities potentially disturbing to whales, as well as any effects of drilling muds and cuttings released, would be similar to those associated with exploration as discussed in Section IV. The addition of dredging for pipeline construction and continuous platform activity during development and production is not expected to result in significantly greater disturbance effects than determined to be negligible during exploration. Likewise, oil-spill-cleanup activities, principally the operation of vessels, are not expected to result in significantly greater overall disturbance effects although, if they occur while whales are present, the probability of whale-vessel interaction could be elevated. Gray whales may exhibit minor avoidance response if their travel path takes them within 300 m of a tanker passing Pacific coast states during the whale migration; but only a small proportion of the population is expected to be affected, with detectable effects lasting less than an hour.

Because less than 1 percent of the eastern Pacific gray whale population potentially could be exposed to an oil spill along the secondary migration route in the proposed lease area for a relatively brief interval, and no detectable effects are expected to result from small spills along the Pacific coast, the overall effect of development and production on the eastern Pacific gray whale population is expected to be negligible.

Fin and Humpback Whales: Effects of potentially adverse factors on fin and humpback whales, including disturbance factors and pollutants, are expected to be essentially as described for the gray whale. Because less than 1 and 5 percent of their Pacific populations, respectively, are expected to occur in the proposed lease area during migration or the summer season, and no detectable effects from small spills or disturbance are expected to occur along the Pacific coast for either species (USDOI, MMS, 1987), the overall effect of development and production on Pacific populations of fin and humpback whales is expected to be negligible.

Sei, Blue, Right, and Sperm Whales: Effects of potentially adverse factors to which any individuals of these whale species may be exposed are expected to be essentially as described for the gray whale. However, because they occur dispersed in very low numbers in the vicinity of the proposed lease area and tanker routes to Pacific coast ports (< 1% of their Pacific populations), the overall effect of development and production on Pacific populations of sei, blue, right, and sperm whales is expected to be negligible.

2. Effects on Pinnipeds:

Steller Sea Lion: Oil spills are expected to result in adverse effects if they contact Steller sea lions, haulouts or rookeries when occupied, or large proportions of major prey populations. Potential effects of oil exposure, including surface contact, inhalation, and ingestion, are discussed in USDOI, MMS (1992) and by Geraci and St. Aubin (1988, 1990). Because the insulation of older sea lions is provided by a thick fat layer, oil contact is not expected to cause death from hypothermia; however, sensitive tissues (e.g., eyes, nasal passages, mouth, lungs) are likely to be irritated or ulcerated by exposure to oil or hydrocarbon fumes. Oiled individuals probably will experience effects that may interfere with routine activities for a few hours to a few days; movement to clean-water areas is expected to relieve most symptoms. Oil may be transferred to pups, which probably are more sensitive to exposure, by females returning from feeding trips. The extent to which sea lions avoid areas that have been oiled is not known; individuals observed in Prince William Sound after the *Exxon Valdez* spill did not avoid oiled areas (Calkins, 1990). Based on modeled oil-spill trajectories for Cook Inlet/Shelikof Strait and information concerning the *Exxon Valdez* spill movement, any oil spill in the proposed lease area could contact one or more sites of sea lion concentration. However, the probability of a spill occurring and contacting areas where sea lion haulouts or rookeries are located is low, ranging from 1 to 6 percent. Contact in areas to the northeast of this region is not likely (probability = 0%); areas to the southwest may be contacted (probability = 0-1%), but oil will be weathered and dispersed and relatively harmless. A spill that moves into the vicinity of larger rookeries or haulouts adjacent to the sale area or along the Alaska Peninsula during the breeding season is expected to contact up to several hundred individuals.

Although substantial adult mortality is not likely to occur, such an incident may result in adverse effects on production of young and survivorship of oiled juveniles, potentially accelerating the current population decline and requiring more than 1 generation for recovery. In pelagic areas, near minor rookeries or haulouts, or during the nonbreeding season, individuals may not be as concentrated, so numbers contacted by a spill are not expected to exceed 100 individuals or require more than one generation for recovery. Small spills of less than 50 bbl (average = 5 bbl) are assumed not likely to contact areas of sea lion concentration, including those adjacent to the sale area as well as in the lower-48 states, before weathering/dispersal renders them harmless.

Containment and cleanup operations associated with an oil spill near a sea lion rookery may result in some disruption of female-pup bonds, pup mortality from trampling by disturbed adults, and temporary abandonment of the affected areas. Although the considerable distance between many rookeries suggests that this is likely to be a local effect, the occurrence of much of the regional populations' pup production at just a few rookeries suggests that such activity near a major rookery could result in losses requiring up to 2 generations for recovery under current population dynamics, unless mitigated by avoidance during the breeding season. Effects of potentially disturbing activities associated with development and production, generally occurring far removed from sea lion concentrations, are expected to be negligible as determined for similar activities occurring during exploration.

The overall effect of development and production on the Steller sea lion is expected to result in loss of fewer than 100 individuals, requiring two generations or less for recovery.

Guadalupe Fur Seal: The small numbers of Guadalupe fur seals occurring seasonally in southern California waters are not expected to be contacted by the few small oil spills likely to occur in this area. Any mortality resulting from chance contact would be indistinguishable from natural variation in the population.
The overall effect of development and production on the Guadalupe fur seal is expected to be negligible.

3. Effects on the Sea Otter: Sea otters are extremely sensitive to fouling of the fur by oil, which destroys their insulative capacity and results in an oiled individual succumbing to hypothermia. In addition, pulmonary emphysema from inhalation of toxic fumes and lesions of various organs caused by oil ingested as a result of grooming are important factors contributing to decreased physiological function and to mortality. Otters in northern and central California are expected to be contacted by a spill only if tankers spill oil while approaching or entering port, because the usual routes pass well offshore in these areas. At current rate of increase, the California population is expected to recover losses from an oil spill within 3 years. Although tanker routes approach the California coastline more closely farther south, no spill is expected to move sufficiently far northward to contact substantial numbers of sea otters. Given the low probability of a tanker spill associated with this sale, and the expectation that the sale will result in a relatively small increase in oil tankered south, sea otter mortality resulting from development and production is not expected to exceed a few tens of individuals, requiring no more than 3 years for recovery.

4. Effects on Birds:

Short-tailed Albatross: Effects of exposure of short-tailed albatrosses to disturbance or ingestible floating materials resulting from development and production activities are expected to be negligible, as noted for exploration. Exposure of albatrosses to oil potentially could result in effects ranging from tissue irritation to plumage fouling and death from hypothermia; intake of oil through consumption of contaminated prey, by preening, or inhalation of hydrocarbon fumes could interfere with various physiological functions and/or cause organ damage. However, as a result of short-tailed albatross rarity in the vicinity of both the proposed sale area and transportation corridors, the low probability of a substantial oil spill, and existence of strong winds and currents that would promote rapid dilution of any spill in the lease-sale area in particular, short-tailed albatrosses are not expected to be exposed to an oil spill of detectable concentration. Albatrosses are not expected to be contacted by small spills or be influenced by oil-spill-cleanup activities.

The overall effect of development and production on the short-tailed albatross is expected to be negligible.

Brown Pelican: Exposure of brown pelicans to oil would be expected to have the general effects noted for the previous species. Although pelicans appear vulnerable to oil spills as a result of spending some time on the sea surface, few oiled individuals were observed during two of three recent California spills; this may have been due to the considerable time they spend off the water either roosting on land or in flight while foraging, or chance low abundance where the spills occurred. Mortality resulting from the third spill suggests, however, that some pelican mortality is likely from a substantial oil spill off southern California. Effects could be expected to range from 50 to 100 individuals contacted by a spill occurring away from nesting colonies or outside the breeding season, with recovery occurring within 1 year, to hundreds of individuals contacted and 20 to 50 percent mortality if a spill occurred in the vicinity of the Channel Islands nesting colonies during the breeding season, requiring 1 to 3 years for recovery (USDOI, MMS, 1992). The relatively modest numbers of postbreeding individuals that disperse to northern areas (e.g., Oregon, southern Washington) in the brief late-summer to early-fall period, whose distribution is dictated by ephemeral prey availability, are not expected to be exposed to an oil spill associated with offshore tankering. The expectation that small spills will be dispersed and weathered to nontoxic concentration, as well as indications that natural oil seeps in southern California are not known to cause problems for pelicans, support the view that small spills will not result in discernible effects on the pelican population.

Potential disturbance of roosting pelicans by cleanup activities associated with any oil spill is expected to be temporary, minor, and easily mitigated.

The overall effect of development and production on the brown pelican is expected to involve the loss of fewer than 100 individuals, which may be recovered by the population within 1 year.

Aleutian Canada Goose: Exposure of Aleutian Canada geese to oil would be expected to have the general effects noted for the previous species. Geese could be vulnerable to oil spills during the breeding season if they spend time in the intertidal zone, or in or flying low over waters surrounding the nesting island in the Semidi Islands southwest of the proposed sale area. However, the lack of a substantial intertidal zone suitable for use by geese in this area, the observation that breeding Aleutian Canada geese seldom rest on or fly low over saltwater, and the considerable distance a weathering and dispersing oil spill must traverse from the sale area to the Semidi Islands, support the view that these geese are not expected to be exposed to an oil spill during the breeding season. The probability a spill will occur and contact the Semidi Islands is less than 0.5 percent; and if oil were spilled in the extreme southern portion of the proposed sale area, the conditional probability of spilled oil contact is less than 5 percent. Potential disturbance of nesting geese by cleanup activities associated with any oil spill that reaches the vicinity of the Semidi Islands is expected to be easily mitigated. Likewise, spill contact probabilities for bays east of the town of Kodiak, where some geese may stop during migration, are the same as for the Semidis.

This population of Aleutian Canada geese, although occupying Oregon coastal habitats for part of the winter period, is not expected to be contacted by any tanker spill, because tankers remain well offshore when traversing waters adjacent to this State. Also, although Aleutian Canada geese occupy coastal habitats in northern California (e.g., Castle Rock staging area), no mortality from an oil spill is expected because of the low probability of a substantial spill occurring and contacting these areas (<1%).

Because potentially disturbing activities associated with development and production would be far removed from the Semidi Islands, Aleutian Canada geese are not expected to experience any effect from such activities.

The overall effect of development and production on this species is expected to be negligible, affecting less than 1 percent of the population.

Western Snowy Plover: Western snowy plover nest sites located on California beaches just above the intertidal zone may be contacted by waves driven by onshore winds, especially during high tides, and thus eggs and/or adults potentially could be contacted by an oil spill during the nesting season. Adults foraging in the intertidal zone could be contacted by oil reaching the shore. However, low probability of a substantial spill, few reports of effects on shorebirds from recent California spills, and this species' habits of nesting at scattered sites, double brooding, and renesting following nest loss, suggest that recovery from any effects of small spills will be rapid.

The overall effect of development and production on the western snowy plover is expected to be minor, affecting a small percentage of the population and requiring 1 year or less for recovery.

California Least Tern: Nesting colonies of California least terns in bays and estuaries are not expected to experience substantial oil-spill contamination under typical weather conditions (non-storm surge), because equipment to prevent oil from entering these habitats from offshore locations is readily available throughout the region of concern. Also, fewer than four tanker spills per year, averaging under 20 bbl (most less than 1 bbl), would be expected to occur in San Francisco Bay, where several tern colonies are located. The low probability of a substantial spill, few reports of effects on terns from recent California spills, scattered nesting colonies, and presence of adults at the colonies for just 4 months each year suggest that recovery from any impacts of small spills will be rapid.

The overall effect of development and production on the California least tern is expected to be minor, affecting a small percentage of the population and requiring 1 year or less for recovery.

Marbled Murrelet: Exposure of marbled murrelets to oil would be expected to have the general effects noted for the previous species. Pacific coast marbled murrelet populations, particularly those in northern Washington and central California, may be vulnerable to a spill from a tanker approaching ports in these areas. Murrelets typically forage in small local concentrations within a few kilometers of shore adjacent to their old-growth forest nesting habitat (Carter and Erickson, 1988); generally, this habitat is not coincident with port facilities for tankers. However, currents and prevailing winds could transport oil spilled by a tanker approaching San Francisco Bay, for example, into the lesser of two areas of murrelet concentration identified by Sowls et al. (1980), located between Half Moon Bay and Santa Cruz, resulting in some murrelet mortality. While mortality associated with a substantial spill could involve 100 individuals or more, requiring 4 to 6 years for recovery, the probability of such an occurrence is very low. A small spill, averaging 5 bbl, is much more likely to occur and is expected to result in the loss of fewer than 10 individuals (< 0.5% of California population), requiring 1 year or less for recovery. Any spill in the northern Washington area are expected to have similar effects. Spill-cleanup activities are not expected to impact murrelets.

The overall effect of development and production on the lower-48 marbled murrelet population is expected to be minor, affecting a small percentage of the population and requiring 1 year or less for recovery.

Bald Eagle: Exposure of bald eagles to oil would be expected to have the general effects noted for the previous species. Eagles present in coastal areas of northern Washington may become oiled through contact with oiled prey or substrate in the vicinity of a spill, or affected indirectly through a reduction in prey. While mortality associated with a substantial spill could involve tens of individuals, requiring up to 4 years for recovery, the probability of such an occurrence is very low. A small spill, averaging 5 bbl, is expected to result in the loss of fewer than five individuals, most often none, requiring 1 year or less for recovery. Eagles occupying Oregon or northern California coastal areas are not expected to be contacted by any tanker spill, because tankers remain well offshore when traversing waters adjacent to these areas. Disturbance of eagles by cleanup activities associated with any oil spill that reaches a nesting territory during the breeding season potentially could result in a minor loss of productivity for that year; otherwise, such activity is expected to cause only temporary interruption of typical behavior.

The overall effect of development and production on the lower-48 bald eagle population is expected to be minor, affecting a small percentage of the population and requiring 1 year or less for recovery.

Peregrine Falcon: Peregrine falcons present in the vicinity of the sale area during migration may become oiled through contact with oiled prey or substrate in the vicinity of a spill, may ingest oil, or may be affected indirectly through a reduction in prey such as seabirds or shorebirds. However, the probability of contact would be reduced by their transient occurrence in the area and their habit of not typically taking prey directly from the water. Exposure of peregrines to oil would be expected to have the general effects noted for the previous species. Although reduction in prey abundance by an oil spill could result in short-term, localized reductions in food availability, it is unlikely to have a significant effect on migrant falcons. Relatively few peregrines are expected to be exposed to the small oil spills that may occur near west coast ports, resulting in little mortality. Potential sources of peregrine falcon disturbance are likely to be localized in a small portion of the Sale 149 area and, because this species is of uncommon occurrence in the area, less than 3 percent of the population potentially is expected to be exposed to disturbance and exhibit avoidance effects for a few minutes to tens of minutes per exposure incident. The effect of oil-spill-cleanup activities on peregrine falcons is expected to be negligible.

The overall effect of development and production is expected to result in loss of 10 or fewer peregrine falcons, requiring 2 years or less for recovery.

5. Effects on Sea Turtles: The low frequency of sightings of the four sea turtle species in U.S. Pacific coast waters suggests that densities are likely below the level at which contact with any oil spill would be expected, or that they would ingest oiled prey or tarballs. Also, the small proportion of time typically spent at the water surface by these species would limit the potential for oil contact. As a result, marine turtles are not expected to experience any lethal or sublethal effects from any oil spills associated with transporting Sale 149 oil. If any sea turtle mortality did occur as a result of an oil spill, its effect is expected to be indistinguishable from natural variation in sea turtle distribution and abundance in this region.

6. Effects on Other Coastal Species: Many listed, proposed, and candidate species occupy coastal habitats that are not expected to be exposed to the same risk of effect as offshore habitats. In particular, foredune and adjacent inland habitats in coastal Oregon and California inhabited by Point Arena mountain beaver, suisun ornate shrew, Oregon silverspot butterfly, Myrtle's silverspot butterfly, Behren's silverspot butterfly, El Segundo blue butterfly, Smith's blue butterfly, Howell's spineflower, Monterey spineflower, robust spineflower, Menzies' wallflower, beach layia, Tidestrom's lupine, Gambel's watercress, coastal dunes rattleweed, Pt. Reyes paintbrush, surf thistle, soft bird's-beak, seaside bird's-beak, Nipomo Mesa lupine, Wolf's evening-primrose, and Ballona cinquefoil are not expected to be contacted by any oil spill originating from a tanker transporting Sale 149 oil under typical weather and oceanographic conditions; this is suggested by the lack of such an occurrence associated with several spills that have occurred along the Pacific coast in recent years, as well as the relatively low probability of shore contact (< 15% within 10 days) and sporadic distributions of these species. Also, none of the *Federal Register* notices or recovery plans published by the Fish and Wildlife Service refer to a potential for adverse effects from oil spills for these species. Adverse effects on one or more of these species could occur as a result of oil-spill-cleanup activities; however, effects of such activities could be mitigated effectively.

In addition, coastal saltmarshes, bays with constricted entrances, and lower portions of freshwater tributaries to such bays are not expected to experience substantial oil-spill contamination under typical weather conditions (non-storm surge), because equipment to prevent oil from entering these habitats from offshore locations is readily available throughout the region of concern. Also, fewer than four tanker spills per year, averaging under 20 bbl (most less than 1 bbl), would be expected to occur in San Francisco Bay. However, if this general magnitude of spilled oil were to enter habitats occupied by the saltmarsh vagrant shrew, saltmarsh harvest mouse, California clapper rail, light-footed clapper rail, California black rail, California red-legged frog, southwestern pond turtle, winter-run chinook salmon, delta smelt, saltmarsh bird's-beak, California sea-blite, or Ventura marsh milk-vetch, the following effects would be expected to occur, moderated by the season of spill occurrence, spill size, tidal influence, and weather conditions.

Only small numbers of shrews and harvest mice are expected to be displaced from contaminated areas or killed if oil entered coastal marshes; effects would be mitigated in several marshes by the presence of areas of higher elevation and the existence of nearby diked, nontidal marshes. Recovery from such losses is expected to require no more than 2 years. Given the habit of clapper rails, at least, of remaining in tidally influenced areas throughout the tidal cycle (USDOI, FWS, 1989), the effect on rails is expected to involve the loss of some individuals of any or all three species; loss of more than a few clapper rails is expected to require from 2 to 7 years for recovery. Migrating chinook salmon, both adults and smolts, are expected to avoid temporarily any areas contaminated by an oil spill near or in San Francisco Bay; any temporary disruption of their migration is not expected to be discernible from natural variation in distribution. Freshwater spawning areas are not expected to be contacted by a spill. Mortality is not expected to occur in this species from the potential level of oil-spill contact assumed (Rice, 1973). Although larval delta smelt developing in the brackish mixing zone of the Sacramento-San Joaquin River Delta may be sensitive to oil exposure, neither this habitat nor the freshwater spawning habitat upstream is expected to be contacted by a minor oil spill in view of their considerable distance from potential spill sites and protective equipment available in this area. Saltmarsh bird's-beak, California sea-blite, and Ventura marsh milk-vetch, while occurring in habitats regularly influenced by tidal action, are not expected to be contacted by oil released in a minor spill because of the considerable distance of most of the occupied coastal marshes (e.g., Morro Bay) from potential spill sites and the availability of protective equipment in this area.

VI. CONCLUSIONS

Considering that no oil spills are expected to occur during exploration, and that a low level of support activity is projected, we conclude that proposed Sale 149 will have no effect, and that the resulting exploration activities will have a negligible effect on endangered and threatened species (gray, fin, humpback, sei, blue, right, and sperm whales; Steller sea lions; short-tailed albatrosses; Aleutian Canada geese; peregrine falcons) that may occur in or near the proposed sale area. In view of these projected low levels of activity and impact, we believe that exploration activity would be unlikely to adversely affect any endangered or threatened species' population to the point of jeopardy, especially if proposed mitigating measures (see Sec. VII and Appendix G) are included in the proposed lease sale. Also, we accept the opinion of NMFS and FWS in their biological opinions for Lower Cook Inlet-Shelikof Strait Sale 60 and Gulf of Alaska/Cook Inlet Sale 88 where it is concluded that the reinitiation of consultation will be required for the development and production phase. Therefore, we conclude that given the development and production scenario projected for Sale 149 and the uncertainty as to if, when, or where these activities will occur, there is no basis for issuing at this time a jeopardy opinion for either the development and production incremental step or the entire action.

VII. MITIGATING MEASURES

Stipulations and Information to Lessees (ITL's) are measures that can be included in the leasing process to reduce or eliminate the identified potential effects to endangered, threatened, or candidate species. Stipulations that are included in the lease are legally binding. The ITL's advise lessees of other legal responsibilities (such as those set out in the ESA), provide direction to assist them in complying with these responsibilities, and help to make them aware of the provisions of other protective measures. The Secretary of the Interior decides which stipulations and ITL's will be included in the sale prior to issuance of the final notice of sale. Stipulations and ITL's similar to those suggested for other Federal offshore oil and gas lease sales have been developed for the Secretary's consideration for proposed Sale 149. A detailed description of the stipulations and ITL's for Sale 149 are included as Appendix G. Several of the stipulations and ITL's were developed in response to biological opinions received from NMFS and FWS during Section 7 ESA consultations for prior Federal offshore sales, as well as information received in response to informal queries to personnel of other agencies. Examples are "Information on Sensitive Areas to be Considered in the Oil Spill Contingency Plans," "Information on Steller Sea Lion," and "Information on Oil-Spill-Response Preparedness." These measures, together with the stipulations for "Protection of Biological Resources" and "Orientation Program" and the ITL for "Bird and Marine Mammal Protection," if adopted, would help prevent potentially adverse effects on endangered, threatened, or candidate species from the proposed Cook Inlet/Shelikof Strait oil and gas lease sale.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Rd.
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:
WAES/DES

RECEIVED
JUN 23 1995
REGIONAL DIRECTOR, ALASKA OCS
Minerals Management Service
ANCHORAGE, ALASKA

JUN 20 1995

Memorandum

To: Regional Director, Alaska OCS Region
Minerals Management Service

From: Acting Regional Director
Region 7

Richard A. Pospahala

Subject: Section 7 Consultation for Natural Gas and Oil Lease Sale 149, Cook Inlet - Final Biological Opinion

This responds to your March 25, 1993, request for formal section 7 consultation pursuant to the Endangered Species Act of 1973 (Act) (16 U.S.C. 1531 et seq.; 87 stat. 884, as amended) for Lease Sale 149 and associated exploration activities in lower Cook Inlet, Alaska. A chronology of the consultation actions up to present, regarding Lease Sale 149, is provided in Attachment 1. Although this is an "incremental step" consultation on leasing and exploration, information was also provided by your office on potential development and production scenarios so that the U.S. Fish and Wildlife Service (Service) could evaluate the likelihood of the entire action proceeding without violation of section 7(a)(2)[1] of the Act.

For a description and understanding of proposed exploration activities, the Service relied primarily on the January 1993 Biological Evaluation for Threatened and Endangered Species (Biological Evaluation), and subsequent updates, provided by your agency. Representatives of the Service's Anchorage Ecological Services Field Office also discussed the project with Dr. Joel Hubbard of the Alaska Outer Continental Shelf Regional Office.

The following text is organized into three main Sections: Summary, Leasing and Exploration, and Development and Production. Each section describes the

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[1]Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

action, discusses the environmental baseline, and states the Service's biological opinion.

SUMMARY

The Service has evaluated, in detail, the first two increments of the proposed oil and gas development in lower Cook Inlet and found that those two increments would not jeopardize any listed species for which the Service is responsible. Impacts of the full extent of oil and gas development also have been assessed, according to 50 CFR 402.14(k)(5), and the Service has determined there is a reasonable likelihood that the entire action, including development and production, will not violate section 7(a)(2) with regard to listed species.

LEASING AND EXPLORATION

Description of the Proposed Action

Originally, the proposed lease sale area encompassed lower Cook Inlet and Shelikof Strait. We were informed by a February 9, 1994, memorandum from your Acting Regional Director, Alaska Outer Continental Shelf Region, of changes to the proposed lease sale, including deletion of the Shelikof Strait portion. The following project description reflects the most current information available to us.

Lease Sale 149, the fourth sale proposed for the lower Cook Inlet planning area, is tentatively scheduled for 1996. The sale will offer 402 blocks, comprising an area of approximately 2.0 million acres (0.81 million hectares). The lease area is located roughly from Kalgin Island in Cook Inlet, southwest to northern Shuyak Island in the Kodiak Archipelago. The blocks lie approximately 3 to 24 miles (5-40 km) offshore in water depths from 30 feet to greater than 650 feet (10-200 m).

An estimated total of 319 trackline miles (514 km) of shallow-hazard seismic surveys would be conducted, covering an area of approximately 71.2 square miles (184 km^2). Although different levels of activity and a variety of exploration methods are possible, semisubmersible, drillship, or jack-up rig are the most likely drilling platforms for exploration wells. During a 2-year period, a total of 3 exploration and 5 delineation wells would be drilled.

Activities interrelated and interdependent to the proposed action include oil spills originating from platforms, pipelines, or tanker vessels; and the deposition of plastic waste in the marine environment.

Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "...those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation."

State or private actions reasonably certain to occur within or near the proposed sale area would include State of Alaska oil and gas lease sales (67A-W, 76, 78, 85), transport of crude oil between Valdez and Nikiski or to U.S. ports south of Alaska, transport of crude oil or refined petroleum products from Cook Inlet to U.S. ports south of Alaska and to ports in the Far East, transport of liquified natural gas from Cook Inlet to the Far East, commercial fishing operations, recreational and tourist-industry activities, and winter habitat loss or contamination. The State of Alaska is currently considering whether holding Lease Sales 78 and 85 will be in the best interest of the State.

Environmental Baseline

The listed species of concern to the Service during the leasing and exploration phases of Lease Sale 149 are the threatened Aleutian Canada goose (*Branta canadensis leucopareia*) and the endangered short-tailed albatross (*Diomedea albatrus*). Although the endangered American peregrine falcon (*Falco peregrinus anatum*) may occur in the lease sale area during migration, its presence is considered transitory and irregular, and this species would not be affected by the proposal. The Arctic peregrine falcon (*F. p. tundrius*) has recently been removed from the list of threatened and endangered species (59 FR 50796). No other threatened or endangered species for which the Service has responsibility are known to occur in the lease area.

The Service recently proposed that the Alaska breeding population of the Steller's eider (*Polysticta stelleri*) be listed as a threatened species (59 FR 35896). This species occurs during the winter in protected marine waters, including those of lower Cook Inlet. However, limited information is available regarding the numbers of eiders using the lease sale area. Should the Steller's eider become a listed species, the Minerals Management Service (MMS) should consider re-initiating consultation with the Service.

The harlequin duck (*Histrionicus histrionicus*), the Alaska population of the marbled murrelet (*Brachyramphus marmoratus*), and the Kittlitz's murrelet (*B. brevirostris*) are Category 2 candidate species for listing, and may occur throughout the lease sale area. Category 2 candidates are species for which the best scientific and commercial information indicates that the species might qualify for listing under the Act, but the Service needs additional information before the need to list can be determined. Candidate species within the project area are identified for your information and environmental planning.

Aleutian Canada Goose

The Aleutian Canada goose currently nests on nine islands of the Aleutian Chain [Agattu, Alaid, Nizki, Buldir, Little Kiska, Amchitka, and Chagulak islands] and Semidi Islands (Kiliktagik and Anowik islands). The total population is estimated to be 20,000 birds (L. Harb, U.S. Fish and Wildlife Service, Portland, Oregon, pers. comm.). This subspecies nests primarily on vegetated maritime slopes and, unlike many other Canada goose subspecies, does not appear to require proximity to estuarine or fresh water sources. Aleutian Canada geese begin arriving on the breeding islands in late April and depart during September and October. The migration route to and from wintering grounds in California and Oregon is not fully known, but is presumed to be trans-oceanic.

Although the lease area is generally outside the current range of Aleutian Canada geese, migrating birds have recently been reported as close as the Kalsin Bay area on Kodiak Island. It is also likely that other areas of the Kodiak Archipelago are visited occasionally during migration. This subspecies is not known to rest on salt water during migration, and therefore would not be affected by an oil spill or industrial discharges.

Located approximately 225 miles (360 km) southwest of the southern lease sale boundary, the Semidi Islands are the location of an Aleutian Canada goose breeding population consisting of 132 birds with at least 28 nesting pairs (Anderson et al. 1993). It is possible, given appropriate wind and current conditions, that a large oil spill in the lease sale area could contact the Semidi Islands. Although Aleutian Canada geese normally use only upland habitats during the nesting season, molting geese have been observed to fly from an island and alight on the sea surface when alarmed. In the event an oil spill cleanup was necessary in the Semidi Islands, this type of escape response could be prevented by human avoidance of the nesting areas.

Given the lack of major oil spills associated with exploratory drilling on the U.S. Outer Continental Shelf, the Service concurs that the likelihood of substantial quantities of oil reaching the Semidi Islands or coastal habitats potentially used by geese is negligible.

Short-Tailed Albatross

The short-tailed albatross is a pelagic seabird that nests on two islands in Japan: Torishima and Minami-Kojima in the Senkaku Islands. After being reduced to fewer than 100 birds in the 1930s, the current population has increased to approximately 500 birds with a seven percent yearly growth rate (H. Hasegawa, Department of Biology, Toho University, Japan, pers. comm. 1992).

A combination of additional birds in the population, and a greater number of informed observers has resulted in more frequent and widespread short-tailed albatross sightings in recent years. While the majority of sightings are from fishing grounds of the western North Pacific Ocean and Bering Sea, several sightings have recently been reported from the northern Gulf of Alaska and Kodiak Island continental shelf. We have no records of short-tailed albatross from the lease sale area, however, it is reasonable to assume that low numbers of this wide-ranging seabird may occasionally be present in lower Cook Inlet.

Like other albatrosses, shearwaters, and petrels, the short-tailed albatross is a surface-feeder. Hasegawa and DeGange (1982) report that much surface-feeding occurs at night when squid are close to the surface. Individual birds could potentially be harmed if they come into contact with floating oil or fuel, either from a spill during exploration drilling or leaked from support vessels or rigs.

The Service concurs with your assessment that due to the low number of individuals that would be expected to be present in the lease sale area, and the industry's record of no major spills during exploration, the potential effects of drilling would be negligible. The Service also believes that albatrosses would avoid noise generating activities, such as seismic work and helicopter traffic.

Many reported sightings of short-tailed albatrosses are of birds that have been attracted to commercial fishing vessels. Like many seabirds, albatross can become habituated to following vessels because they represent a potential food source. As surface feeders, short-tailed albatrosses are also particularly vulnerable to the harmful effects of ingesting discarded waste, particularly plastics, which can resemble natural food items. Ingestion of plastic pollutants has been recorded in 50 species of marine birds, and albatrosses are among those species found to ingest plastics most frequently (Day et al. 1985).

The Biological Evaluation suggests that encounters between short-tailed albatrosses and plastic debris would not take place in the project area because of the expected scarcity of the species. However, floating plastic debris is extremely persistent, and may disperse widely outside the lease area. While there is no reliable method for predicting short-tailed albatross abundance in the lease area over the life of the project, it is reasonable to expect that the overall population will double in 10-12 years, and a greater proportion of its former range will be re-occupied.

Title 2 of Public Law 100-220, Marine Plastic Pollution Research and Control Act of 1987, prohibits the disposal of plastics anywhere at sea. Additionally, it is our understanding that your agency's Consolidated Offshore Operating Regulations (30 CFR 250) which discuss pollution prevention measures, prohibit the disposal of solid waste and other materials at sea. Although these measures directly address the problem, both the new law and the operating regulations may in reality be unenforceable on the high seas. Recently, Robards et al. (1991) reported increased levels of ingested plastic particles in seabirds they studied from 1988-1990.

Progress is being made by the MMS and the petroleum industry to curb the disposal of plastic debris during exploration activities. An example is the Exploration Plan - West Maktar Prospect, Beaufort Sea, Alaska, (Harding Lawson Associates 1990) which specifies that solid, non-combustible waste will be stored on board the drilling unit for land disposal. The MMS plans to adopt a similar plan for Lease Sale 149 should adequately ensure that there will be negligible risk to the short-tailed albatross from plastic pollution as a result of exploratory activities.

<u>Biological Opinion</u>

It is the biological opinion of the Service that the leasing and exploration phases (Incremental Steps 1 and 2) of Natural Gas and Oil Lease Sale 149 are not likely to jeopardize the continued existence of either the Aleutian Canada goose or the short-tailed albatross. No critical habitat for these species has been designated, therefore, none will be affected.

Incidental Take

Sections 4(d) and 9 of the Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement. The Service does not anticipate the proposed action will incidentally take any Aleutian Canada geese or short-tailed albatrosses; therefore no terms and conditions are provided.

DEVELOPMENT AND PRODUCTION

Description of the Proposed Action

Per your March 25, 1993, request for consultation, the Service has also considered the potential effects of the development and production phases of Lease Sale 149. A projected oil volume of 200 million barrels (base case of proposal) was used to project the number of tanker/barge trips and probabilities of a spill occurring. Interrelated, interdependent, and cumulative effects are the same as those identified in the previous section.

Your Biological Evaluation describes a base-case development and production scenario which is based on a composite of feasible options developed through discussions within your agency, other agencies, and industry. It was developed for the purpose of evaluating the potential effects of the entire action associated with Lease Sale 149.

Under the production and development scenario, 567 trackline miles (913 km) of seismic surveys covering 106.5 square miles (276 km^2) would be conducted for the production platforms, with an additional 500 miles (800 km) necessary for offshore pipelines. Over a 3-year period, 3 rigs would drill 48 production and service wells to a target depth of 7,500 feet (2250 m). In general, marine and air support would originate from the Kenai Peninsula.

Undersea pipelines would transport oil from production wells to storage facilities on the Kenai Peninsula. All products would be loaded onto tankers at Nikiski for trans-shipment to processing facilities in Alaska or the lower 48 states. No particular receiving ports along the west coast were specified; however, those currently in use are located in Puget Sound, San Francisco Bay, and Long Beach.

Environmental Baseline

In addition to the species discussed above, the Service evaluated nine listed species that may be affected by the development and production phases of Lease Sale 149, particularly through the transportation of oil. Those species are the southern sea otter (*Enhydra lutris nereis*), brown pelican (*Pelecanus occidentalis*), California clapper rail (*Rallus longirostris obsoletus*), light-footed clapper rail (*R. l. levipes*), western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), marbled murrelet, and bald eagle (*Haliaeetus leucocephalus*). The Service concentrated its evaluation on the southern sea otter and marbled murrelet, two species which would be most directly affected by a tanker-related oil spill. Measures taken to protect these species should also protect other listed species along the coasts of Washington, Oregon, and California. In depth analysis of the brown pelican, California clapper rail, western snowy plover, California least tern, and bald eagle may be necessary as the consultation progresses.

Southern Sea Otter

The southern sea otter was listed as threatened primarily due to its small population size, extreme vulnerability to hypothermia if its pelage is oiled, and the high probability that a tanker spill would contact its limited range. Minimizing the risk of oil spills, and the effects those spills would have on the southern sea otter are among the primary objectives of the Sea Otter Recovery Plan.

Based on tanker traffic within the southern sea otter's range during 1987, the U.S. Coast Guard predicts 3 to 4 tanker spills may occur over the next 30 years (U.S. Fish and Wildlife Service 1987). Along the coast of California, the probability of a spill on the scale of the Exxon Valdez (11 million gallons) is estimated at once every 69 years (S.L. Ross Environmental Research LTD 1990). Under current traffic patterns, it is estimated that there is a 13.4 percent chance that more than 5 percent of the current southern sea otter population would be lost in a tanker spill (Public Draft, San Miguel Project and Northern Santa Maria Basin Area Study EIS/EIR, Vol. 1, Table C2.4.3-6, 1985). There is a 1 in 67 chance (1.5 percent) that more than 40 percent of the population would be lost due to spills from tankers alone. If a spill occurred in the northern half of the southern sea otter range, at least 50 percent of the breeding females would be lost (U.S. Fish and Wildlife Service 1987).

Under current vessel traffic patterns, it is questionable if an emergency response vessel could arrive in time to aid a distressed vessel. Sea-going emergency response vessels currently in service are stationed in San Francisco Bay and at Port Hueneme, California. Under the best of conditions, response times to reach a disabled tanker along the southern sea otter range could approach 17 hours (Texaco 1989). About 14 percent of the time a disabled tanker would drift to shore in about 18 hours from 15 miles out, but this figure would drop to less than 1 percent if vessels were 40 miles or further from shore (Texaco 1989). The Service is currently attempting to model oil spill movement through the range of the southern sea otter as a function of spill time and distance from shore.

It is clear that depending on the size, location, and a variety of other factors, an accidental oil spill could have very serious adverse effects on the environment, and could result in injury or death to a significant proportion of the southern sea otter population as well as large numbers of other species (U.S. Fish and Wildlife Service 1993). It is therefore of great interest to the Service, where and how far offshore tanker traffic will occur.

Marbled Murrelet

The marbled murrelet is a small seabird of the family Alcidae that feeds in marine waters and nests onshore in old growth forests. The population segment that inhabits coastal Washington, Oregon, and California is listed as a threatened species (57 FR 45328). According to the "Ecology and Conservation of the Marbled Murrelet" (Ralph et al. 1995) marbled murrelet populations appear to be declining rapidly in California, Oregon, and Washington. They estimate the 3-state population to currently number between 18,500 and 31,950 birds, with 6,450 birds in California; 6,600 to 20,000 birds in Oregon; and 5,500 in Washington. Censuses of juvenile birds indicate that recruitment rates are extremely low throughout the range. Population models using the ratio of juveniles to adults to derive reproductive parameters indicate the populations are declining between 4 percent and 12 percent annually. These rates of decline suggest that in 20 years the marbled murrelet population in the three-state area could be reduced to less than one-half to one-twelfth of its current size (U.S. Fish and Wildlife Service 1995).

Marbled murrelets have a high susceptibility to mortality from oil spills because they tend to spend most of their time swimming on the sea surface and feeding in local concentrations close to shore. Depending on the location, extent, and season of an oil spill, significant adverse effects could occur to local or regional populations of marbled murrelets. Local populations were adversely affected by the Exxon Valdez oil spill of 1989, and marbled murrelets were subjected to proportionately higher mortality than other seabirds inhabiting Prince William Sound (Piatt et al. 1990).

Marbled murrelets are found both during the nesting season and during winter within areas affected by oil shipments. Of the three-state area inhabited by the threatened population segment, the Puget Sound area is of particular concern. Oiled marbled murrelets have been reported from previous oil spills in Washington (Leschner and Cummins 1990). Because the populations in Oregon, Washington, and California are small and locally concentrated, oil spills could result in local extirpations. Critical habitat has been proposed for marbled murrelets (59 FR 3811).

Reasonable Likelihood Determination

Under the regulations governing incremental step consultations, an agency action cannot proceed until the Service determines there is a reasonable likelihood that the entire action could proceed without violation to section 7(a)(2) of the Act (50 CFR 402.14(k)(5)). For the development and production phases, this determination is founded on assumption-based scenarios, and our current understanding of natural conditions, both of which are subject to change prior to initiation of development and production. A thorough evaluation of impacts from development and production is not possible because any analysis would be speculative without a more definitive development scenario.

The Service was initially concerned that the transportation of oil associated with Lease Sale 149 to ports along the Pacific Coast might result in a violation of section 7(a)(2) of the Act, in regard to southern sea otters and marbled murrelets. The MMS subsequently coordinated with the U.S. Coast Guard (USCG) to obtain the most recent information on that agency's progress toward reducing the threat of tanker-related oil spills. Much of the current momentum centers around provisions of the Oil Pollution Act of 1990 (OPA 90) which mandate adoption of new regulations for improved tanker safety, pollution prevention, and response preparedness. In response to the OPA 90, the USCG has taken or proposed the following actions (U.S. Coast Guard 1994):

1. Single hull tankers must be accompanied by two tow vessels when in Prince William and Puget sounds (a public comment period on the proposed regulation closed January 30, 1995).

2. Oil carrying vessels operating within the U.S. Exclusive Economic Zone must, according to a phase-in schedule based on age and size of vessels, be equipped with a double hull or double containment system between 1995 and 2015. The proposed regulation was included in a Federal Register notice which was published in December 1994.

3. Single-hulled tanker vessels must have equipment necessary to affix emergency lightering equipment for removing oil from ship storage tanks. A final rule containing this regulation was published in the Federal Register on August 5, 1994.

4. The qualifications of individuals applying for USCG licensing and certification to pilot oil-carrying vessels will be subject to a more rigorous review. The USCG anticipates publishing a Federal Register notice announcing the revised review requirements in 1995.

5. Tankers must have warning devices installed to detect overfills of tanks (which would likely result in leaks) by 1999. The USCG anticipates publishing a Federal Register notice announcing this proposed regulation in 1996.

6. Tankers must carry oil removal equipment on board in order to respond to spills. The USCG anticipates publishing a Federal Register notice announcing this proposed regulation in 1995.

7. Response plans will be required for tanker vessel and onshore facilities worst case discharge emergencies. The USCG anticipates publishing a Federal Register notice announcing this proposed regulation in 1996.

8. A tanker navigation safety study, and a report on the study, are due to be completed in 1995. The study will include analyses of appropriate crew size, extent of crew training, adequacy of navigation equipment, navigation procedures, potential tanker-free zones, inspection standards, effectiveness of simulator training, and a 20-year risk analysis.

The measures identified in the OPA 90 address the Service's concerns relating to the potential for spills during oil transport. Although some important measures will not be phased in entirely until as late as 2015, most of the measures will be in effect before the onset of oil production for Lease Sale 149 in 2002.

Because the OPA 90 requires regulatory agencies such as the USCG to adequately address tanker passage routes, navigation equipment and safety procedures, and other precautions, the potential for oil spills should decrease, and the ability for rapid containment of spills to limit their effect on coastal wildlife should increase. Additionally, the USCG and the National Oceanic and Atmospheric Administration are conducting a study to evaluate the need for vessel routing measures in the approaches to California ports and the regulation of vessel traffic in offshore marine sanctuaries (58 FR 44634). Therefore, the Service has determined that there is a reasonable likelihood that the entire action associated with Lease Sale 149 could proceed without violation to Section 7(a)(2) of the Act.

Thank you for your cooperation in the development of this biological opinion. If you have any comments or require additional information, please contact Ann Rappoport or Brian Anderson, Anchorage Ecological Services Field Office, at (907) 271-2888.

Attachment

cc: Regional Director, Region 1

Critical Habitat

On August 27, 1993, NMFS issued a final rule designating critical habitat for the Steller sea lion, as provided for under the ESA (58 FR 45269; August 27, 1993). Designated critical habitats occur in and near the planning area. These include five major rookery sites (Outer Island, Sugarloaf Island, Marmot Island, Chirikof Island, and Chowiet Island), several major haulouts, 20 NM aquatic zones and 3000 foot aerial zones radiating out from these rookery and haulout sites, and an aquatic foraging area (Shelikof Strait).

It is unlikely that support vessel traffic would adversely affect these designated habitats. Likewise, air support is estimated at one to two helicopter trips per day, and the flight paths should not approach designated rookeries and haulouts. Seismic operations are unlikely to disturb animals on land. Seismic surveys using airguns emit low frequency sound that is generally well below the sensitivity range of pinnipeds and unlikely to cause damage to them, although these devices may cause local, temporary disturbance of sea lions at sea.

The combined probability of an oil spill occurring and reaching critical habitats has been considered by MMS. It found that any spill within the sale area could contact one or more sites of sea lion concentration, and that the pelagic waters of Shelikof Strait had the highest probability (6-9 percent) of contact. Although the probability of a tanker spill was considered low (estimated no. equals 0.19), MMS found a 23 percent chance of such a spill contacting Marmot Island. A tanker spill in the Kennedy/Stevenson Entrance areas would have a high probability of contact with Sugarloaf Island. Spills in open water could contact adult animals, but sea lions would not be concentrated in these areas and mortalities are expected to be low. The combined probabilities of a spill occurring and contacting any of these critical habitats remain very low (0-3 percent for Sugarloaf and Marmot Islands, 0-9 percent for southern Shelikof Strait).

Shelikof Strait was designated as critical habitat based on its proximity to major rookeries and important haulouts, its use by foraging sea lions, and its value as an area of high forage fish production. Any impacts attributable to oil and gas development that adversely affect the forage fish resource within Shelikof Strait may also adversely modify this critical habitat.

Walleye pollock is a major component of the Steller sea lion's diet, and large concentrations of pollock spawn within Shelikof Strait. Pollock embryos exposed to Cook Inlet crude were found to have impaired development leading to abnormalities after hatching (Carls and Rice, 1989). Although oil spilled in the marine environment rarely reaches concentrations necessary to cause these effects (0.4-2.3 ppm), spilled oil concentrates in surface layers where pollock eggs and larvae are most abundant (Carls and Rice, 1989; Kendall and Picquelle, 1990). Pollock larvae may be more sensitive than embryos to brief exposure to oil. Concentrations of hydrocarbons in seawater can reach levels capable of impeding larval swimming or causing direct mortality (Carls and Rice, 1988).

Other areas near Shelikof Strait are also important for sea lion forage fish production. Kamishak Bay in particular is heavily used by spawning herring between April and May. Larval stages of herring are found within Kamishak Bay as they develop before migrating south into Shelikof Strait (ADF&G, 1992). Herring were found to be adversely affected by the 1989 Valdez oil spill, which produced higher egg mortality and induced higher levels of genetic damage and physical abnormalities within oiled areas when compared to non-oiled areas (Biggs and Baker, 1993).

The probability of an oil spill during exploration is low, and the forage resource base within Cook Inlet/Shelikof Strait is unlikely to be impacted to the point of adversely affecting this critical habitat. Because drilling muds are rapidly diluted and have low toxicity, they are not expected to be toxic to planktonic larvae (Rice et al., 1983). Due to low initial concentrations and a significant dilution factor, it is unlikely that drilling rig discharges would adversely impact pollock or other forage fish production.

Cumulative Impacts

Any significant impacts to the Steller sea lion resulting from exploration activity in the Lease Sale 149 area would add to the effect of state offshore oil and gas development, commercial fishing, and subsistence hunting on sea lions in the central Gulf of Alaska.

During the early 1980s, Loughlin and Nelson (1986) reported high incidental mortality of Steller sea lions in the Shelikof Strait pollock fishery. However, since the mid-1980s, there has been a declining trend in the number of sea lions annually taken incidental to North Pacific groundfish fisheries. NMFS observers reported no sea lion incidental captures in Gulf of Alaska groundfish fisheries in 1989 through 1992. Reduction in incidental take is likely related to reduced sea lions numbers and possibly to changes in fishing areas and methods.

Sea lions are still hunted by Alaska Natives for subsistence purposes. A 1992 Alaska subsistence survey estimated that 548 Steller sea lions were taken statewide by Alaskan Natives, with approximately 67 animals taken in the Kodiak Island/Cook Inlet region (ADFG, 1993).

Without a clear understanding of the causative factor(s) behind the declining population, it is difficult to speculate on the potential for oil and gas activity to add to the cumulative impact on sea lions. Nonetheless, any increase in disturbance to these animals could slow the recovery of the population. Further decline in the number of Steller sea lions would necessitate re-analysis of the effects of OCS activities to this population.

Conclusions

NMFS has responded to the alarming decline in the Steller sea lion by listing the species as threatened and implementing management measures to reduce human impacts on the population. Exploration activities present several aspects potentially harmful to sea lions. Paramount among these are the possible impacts to animals on rookeries and haulouts from aircraft operations and oil spills, and the cumulative effects of OCS activity, commercial fishing, and other human activity. Aircraft operations should be conducted in a manner that ensures no disturbance to sea lions on rookeries and haulouts. Air traffic should be restricted from direct overflights and minimum flight separations should be observed. Adherence to these restrictions, and enforcement of violations present special problems that MMS should consider.

The potential effects of a spill contacting a haulout or rookery are significant. However, the probability for oil spills during exploration is small, and the combined probability of an oil spill occurring and impacting these sites is remote. The potential for exploration activities to contribute to the cumulative adverse impact to these threatened species may be significant. Our present knowledge regarding the various factors which may be affecting sea lion populations is not sufficient to quantify potential cumulative impacts.

Based on the available information regarding the Steller sea lion and the anticipated impacts of the exploration phase of Lease Sale 149, we do not believe this action is likely to jeopardize the continued existence of the species. Also, we find the proposed exploration activities are not likely to destroy or adversely modify Steller sea lion critical habitat areas.

Conservation Recommendations

In furthering the purposes of the ESA to conserve and promote the recovery of Steller sea lions,

(1) All aircraft should maintain flight separation distances of 1,500 feet vertical and 0.5 mile horizontal over the following Steller sea lion haulouts and rookeries:

	Boundaries to	
Site/Rookeries	latitude/longitude	latitude/longitude
Chirikof I.	55°46.5N 155°39.5W	55°46.5N 155°43.0W
Chowiet I.	56°00.5N 156°41.5W	56°00.5N 156°42.0W
Marmot I.	58°14.5N 151°47.5W	58°10.0N 151°51.0W
Outer I.	59°20.5N 150°23.0W	59°21.0N 150°24.5W
Sugarloaf I.	58°53.0N 152°02.0W	
Site/Haulouts		
Cape Barnabas	57°10.0N 152°55.0W	57°07.5N 152°55.0W
Cape Chiniak	57°35.0N 152°09.0W	57°37.5N 152°09.0W
Cape Gull	58°13.5N 154°09.5W	58°12.5N 154°10.5W
Cape Ikolik	57°17.0N 154°47.5W	
Cape Kuliak	58°08.0N 154°12.5W	
Cape Sitkinak	56°32.0N 153°52.0W	
Cape Ugat	57°52.0N 153°51.0W	
Gore Point	59°12.0N 150°58.0W	
Gull Point	57°21.5N 152°36.5W	57°24.5N 152°39.0W
Latax Rocks	58°42.0N 152°28.5W	58°40.5N 152°30.0W
Long Island	57°45.5N 152°16.0W	
Nagahut Rocks	59°06.0N 151°46.0W	
Puale Bay	57°41.0N 155°23.0W	
Sea Lion Rocks	58°21.0N 151°48.5W	
Sea Otter I.	58°31.5N 152°13.0W	
Shakun Rock	58°33.0N 153°41.5W	
Sud I.	58°54.0N 152°12.5W	
Sutwik I.	56°32.0N 157°14.0W	56°32.0N 157°20.0W
Takli I.	58°03.0N 154°27.5W	58°03.0N 154°30.0W
Two-headed I.	56°54.5N 153°33.0W	56°53.5N 153°35.5W
Ugak I.	57°23.0N 152°15.5W	57°22.0N 152°19.0W
Ushagat I.	58°54.5N 152°18.5W	

OTHER LISTED SPECIES

Currently, four separate stocks of Pacific salmon are listed as threatened or endangered under the ESA. These are the Snake River sockeye, spring/summer chinook, fall chinook, and Sacramento River winter-run chinook. After smolting, these stocks move into the north Pacific and may occur within the Gulf of Alaska and the Sale 149 area. However, because these adult fish occur in such low densities in the area of the lease sale, it is unlikely that they would be adversely affected by any exploration activities.

Later Phases of OCS Activity

Development and production within the Sale 149 area is projected to involve approximately 1,200 miles of seismic survey, one production platform, 26 production and service wells, 30-60 supply vessel trips per month, and 60 helicopter trips per month (MMS, 1993). Drilling muds, cuttings, and formation waters would be discharged from the drill rig. Depending on the location, oil would be brought ashore via pipeline, possibly requiring barge shipment to Nikiski (est. 3 trips per week).

MMS currently estimates the probability of a substantial oil spill (i.e. >1,000 bbl) occurring (for the southern scenario; platform, tanker, and pipeline combined) is about 5 percent for two such spills, 27 percent for a single spill, and 68 percent for no spills. For spills less than 1,000 bbl but greater than one barrel, MMS estimates 17 events totaling 257 barrels. Conditional probabilities of oil spilled at various locations within the lease area contacting land or biological resource areas vary, but are generally extremely low (e.g. 3 percent for the Barren Islands; 1 percent for Marmot Island). However, a worst-case scenario could present the possibility of contact with important resource areas, including the Marmot and Sugarloaf Island rookeries. A significant spill event within the sale area during periods of pollock egg or larval concentrations could cause direct mortalities, impair development, and reduce survival. This may result in reductions within one or more year classes of forage fish within the Shelikof Strait critical habitat, and a subsequent impact on the corresponding group of juvenile Steller sea lions, the age group that appears to most strongly reflect the current decline in the abundance of the population.

The later phases of activities for Sale 149 present a higher probability of oil spills from platforms or vessels. However, the type of expected impacts due to disturbance or possible oiling of listed species and critical habitat would be similar to those associated with the exploration phase of this Lease Sale, as discussed earlier. While consultation will be reinitiated for any subsequent phases, NMFS does not believe the most-likely scenario for development and production presents a high probability of these activities jeopardizing listed species or adversely affecting critical habitats.

Opportunities for Additional Consultation

During the post-lease exploration phase, MMS should provide NMFS with all exploration plans and any subsequent revisions of these plans. MMS should review these plans to determine if further Section 7 consultation is necessary. Consultation must be re-initiated for the development and production phases. Consultation must also be re-initiated if new information reveals impacts from the proposed activities that were not previously considered, if there is a demonstrated decline in the Steller sea lion, the activities are modified in a manner that was not considered, or a new species is listed or critical habitat is designated that may be affected by the proposed activities.

Incidental Take Statement

This biological opinion does not permit the taking of any listed species. Taking of such species, unless properly permitted, is prohibited under Section 9 of ESA and under Section 102 of the Marine Mammal Protection Act (MMPA). Section 7 (b)(4)(C) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101 (a)(5) of the MMPA. Since no taking incidental to the proposed activity has been authorized under section 101(a)(5), no statement on incidental take of endangered of threatened marine mammals is provided and no take is authorized.

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Sale 149 Endangered Species Act Section 7 Consultation Update

As a result of comments received on the January draft EIS, the final EIS includes consideration of additional deferral alternatives and mitigating measures not included in the draft EIS.

Two new deferral alternatives have been added for analysis, the Northern Deferral Alternative (deleting 0.48 million acres north of Anchor Point) and the Kennedy Entrance Deferral Alternative (deleting 0.10 million acres in two areas adjacent to the Kennedy Entrance). These alternatives are intended to provide additional protection for commercial fisheries and subsistence-harvest resources.

In terms of mitigating measures, one Information to Lessees clause, the "Information on Minimizing Potential Conflicts between Oil and Gas and Fishing Activities," has been changed to a stipulation ("Protection of Commercial and Subsistence Fisheries") that is part of the proposal. Also, three new stipulations have been added for analysis as potential mitigating measures—the "Density Restriction Stipulation," the "Seasonal Drilling Restriction Stipulation," and the "No Surface Entry During Development and Production Stipulation"—all intended to provide further possible protection for commercial fisheries.

The proposed action (Alternative I) remains unchanged, and these additional alternatives and stipulations considered in the final EIS are changes intended to further protect environmental resources.

APPENDIX J

Fate and Effects of Exploratory Phase Oil and Gas Drilling Discharges in the Cook Inlet Planning Area, Lease Sale 149

(Prepared by the U.S. Environmental Protection Agency)

FINAL EIS APPENDIX

Fate and Effects of Exploratory Phase Oil and Gas Drilling Discharges in the Cook Inlet/Shelikof Strait Planning Area, Lease Sale 149

Prepared by:

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October 30, 1994

ERRATA

Corrections to the following figures should be noted for the EIS APPENDIX prepared by the US Environmental Protection Agency:

Page 39; Figure 3. No National Wildlife Refuge lands exist at the head of Izhut Bay on Afognak Island or at the head of Kaiugnak Bay on the east side of Kodiak Island. Also, many Alaska Maritime National Wildlife Refuge lands on the eastern coast of the Kodiak Archipelago are not identified.

Page 41; Figure 4. Two minor Steller's sea lion haulouts on the Cape Douglas reef and near Shaw Island are not identified. Each has 75-100 sea lions.

Page 57; Figure 5. Harbor seal haulouts in Viekoda, Uganik Pass, and Uganik Bay, accounting for several hundred animals, are not included in the figure.

Page 58; Figure 6. The legend in this figure has been changed to indicate Sea Otter Concentration Areas and Sea Otter Distribution.

Source: US Fish and Wildlife comments on Cook Inlet Planning Area Draft Environmental Impact Statement.

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INTRODUCTION

Purpose of Evaluation

The U.S. Environmental Protection Agency (EPA) intends to issue a National Pollutant Discharge Elimination System (NPDES) general permit for effluent discharges associated with oil and gas exploration in Outer Continental Shelf (OCS) Lease Sale 149, Cook Inlet/Shelikof Strait Planning Area, Alaska. Areas of Shelikof Strait were initially proposed for inclusion in Lease Sale 149, but they were subsequently withdrawn from the lease sale offering by the U.S. Department of the Interior/Minerals Management Service (U.S. DOI/MMS).

Sections 402 and 403 of the Clean Water Act (CWA) require that NPDES permits for effluent discharges to the ocean be issued in compliance with EPA's guidelines (Ocean Discharge Criteria authorized under Section 403 of the CWA) for preventing unreasonable degradation of ocean waters. Authorized discharges from oil and gas drilling operations include drilling muds and cuttings, sanitary and domestic wastewater, desalination unit discharges, boiler blowdown, uncontaminated ballast and bilge water, blowout-preventer fluid, excess cement slurry, deck drainage, noncontact cooling water, fire control system test water, and test fluids. Section 301(c) of the CWA provides that the discharge of pollutants to ocean water is unlawful except in the terms of an NPDES permit. Under EPA's regulations (40 CFR 122.28[a][2]), EPA may issue a single general NPDES permit to a category of point sources located within the same geographical area if the regulated point sources:

- involve the same or substantially similar types of operations;
- discharge the same types of wastes;
- require the same effluent limitations or operating conditions;
- have similar monitoring requirements; and
- in the opinion of the EPA Regional Administrator, are more appropriately controlled under a general permit than under individual permits.

EPA has decided that general permits are more appropriate for effluent discharges associated with oil and gas exploration than individual permits, and EPA expects to issue a general permit for exploratory drilling operations for Lease Sale 149. However, EPA may issue individual NPDES permits for areas requiring special consideration, such as areas of sensitivity or of biological concern, and may elect to issue individual NPDES permits for future development and production operations in the Lease Sale 149 area.

Ocean discharges must be evaluated with respect to the Ocean Discharge Criteria in accordance with Section 403(c) of the CWA. A memorandum of Understanding (MOU) dated May 31, 1984, exists between EPA and the U.S. Department of Interior. The MOU directs the two agencies to coordinate their respective activities, as related to the OCS oil and gas program administered by the MMS. EPA, Region 10, and the MMS Alaska OCS Region signed a cooperating agency agreement on November 3, 1992. The purpose of this agreement is to formalize EPA's National Environmental Policy Act cooperating agency status, to eliminate potential duplicative efforts between MMS and EPA, and to implement the procedures contained in the 1984 MOU.

The MMS requested that EPA provide an appendix to the environmental impact statement (EIS) for Lease Sale 149 that evaluates the fate of deliberate discharges from exploration phase drilling operations and the effects of these discharges on receiving water quality and biological populations.

Scope of Evaluation

The purpose of this appendix is to evaluate the effects of waste discharges covered by the general NPDES permit proposed for offshore oil and gas exploration in the Cook Inlet/Shelikof Strait Planning Area under Federal OCS Lease Sale 149. The appendix evaluates only deliberate wastewater discharges occurring during exploration. It does not evaluate impacts of exploration caused by noise, construction, spills, or other factors, and it does not include discharges that would occur during development and production. This appendix utilizes information contained in the Ocean Discharge Criteria Evaluation (ODCE) report prepared by EPA (1994) for Cook Inlet and Shelikof Strait.

Current Evaluation

Lease Sale 149 includes approximately 0.77 million ha (1.9 million ac) of the Cook Inlet/Shelikof Strait Planning Area (Figure 1). The area encompassed within this Lease Sale extends south of Cape Douglas on a line even with Shuyak Island at approximately 58°40' N, 153°30' W) northward along the west side of Cook Inlet to approximately 60°20' N latitude, 152°15' W longitude. The Lease Sale boundary then continues southward along the Kenai Peninsula southwest of the Barren Islands to the point of origin. The planning area encompasses the region of Shelikof Strait from approximately 57°15' N latitude, 153°30' W longitude north along the western coast of Shelikof Strait (bordered by the Alaska Peninsula) to the beginning of the Lease Sale area south of Cape Douglas. Shelikof Strait is bordered to the east by Kodiak Island.

Water depths in Lease Sale 149 range from approximately 13.5 m (44 ft) to 290 m (951 ft), with water depths tending to increase as one moves north to south within the Lease Sale area. In lower Cook Inlet, water depths generally range from 75 to 90 m (246 to 295 ft). In Shelikof Strait, most water depths range from 150 to 180 m (490 to 590 ft).

Coastal features in the waters adjacent to the Cook Inlet/Shelikof Strait Planning Area include rocky shores and seacliffs, lagoons, capes and points, and bays. The Cook Inlet is predominately surrounded by mountains except along its southerly and southeasterly boundary where waters flow into Shelikof Strait and the Gulf of Alaska, respectively. The Shelikof Strait is bordered on the northwest by the mountains and glaciers of the Alaska Peninsula and on the southwest by the rocky coast of Kodiak Island (Jackson and Kurz 1982).

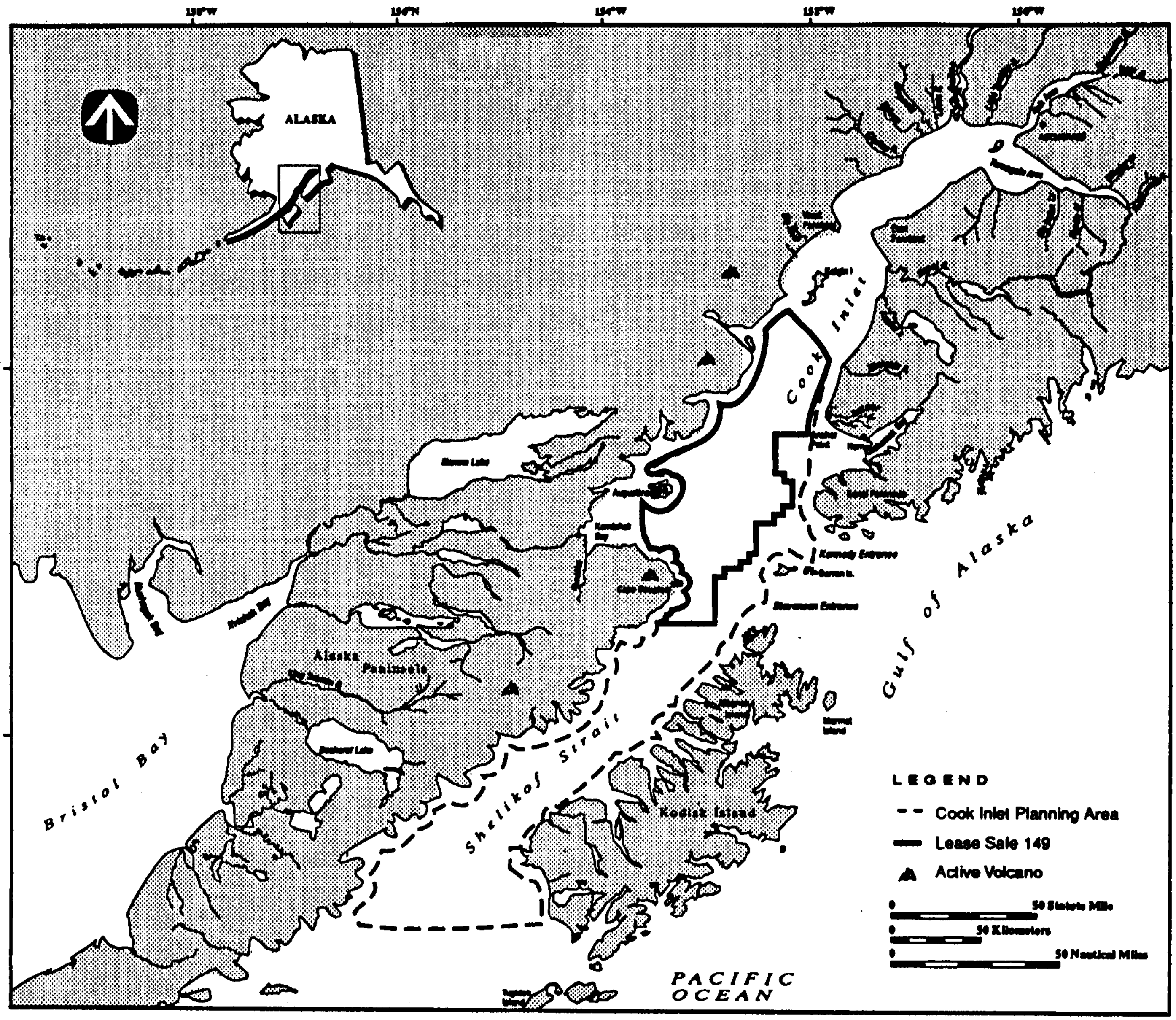


Figure 1. Proposed OCS Lease Sale 149 Area

Exploration Scenarios

Three development scenarios are presented by MMS (Table 1). Each scenario (i.e., alternative) requires a different number of exploration and delineation wells. Results presented in this appendix are based on the high case alternative. For the low, base, and high cases, exploration well drilling depths should average 1,828 m (6,000 ft) and delineation well depths should average 1,707 m (5,600 ft). The average exploration well requires the disposal of about 327 metric tons (mt) (360 tons [t]) of drilling mud and approximately 399 mt (440 t) of drill cuttings. The average delineation well requires the disposal of 309 mt (340 t) of drilling muds and approximately 363 mt (400 t) of drill cuttings. These are dry weight masses. The composition and quantities of other waste materials discharged during exploratory drilling are described in a following section.

The low case alternative assumes that exploration drilling only occurs within the Lease Sale area. One exploratory well would be drilled during 1997 and two exploratory wells would be drilled in 1998, resulting in estimated total discharges of 981 mt (1,080 t) of muds and 1,197 mt (1,320 t) of cuttings (Table 1).

The base case alternative assumes that the exploration phase will result in the discovery of approximately 200 million barrels of commercially recoverable hydrocarbons. A total of three exploration wells and five delineation wells are projected to be drilled between 1997 and 1998. Drilling of the exploratory wells will result in the discharge of a total of 981 mt (1,080 t) of drilling muds and 1,197 mt (1,320 t) of cuttings, and drilling the delineation wells will result in discharges of additional 1,545 mt (1,700 t) of muds and 1,815 mt (2,000 t) of cuttings (Table 1).

The high case scenario assumes that the exploration phase will result in the discovery of approximately 800 million barrels of commercially recoverable hydrocarbons. A total of 11 exploration wells are projected to be drilled between 1997 and 1999, resulting in discharges of a total of 3,597 mt (3,960 t) of muds and 4,389 mt (4,830 t) of cuttings. Additionally, drilling of 17 delineation wells will result in discharges of 5,253 mt (5,780t) of muds and 6,171 mt (6,790 t) of cuttings (Table 1).

DESCRIPTION OF ALTERNATIVES

Schedule

Lease Sale 149 (Figure 1) is currently scheduled to be held in June 1996. Exploratory drilling in the blocks leased as a result of this sale could begin in 1997. Drilling of exploration and delineation wells could continue through 1999. The average amount of time to drill and test exploration wells is estimated to be about 90 days (DOI 1989).

Table 1. Estimated Annual Production of Drilling Muds and Cuttings During Exploration and Delineation Activities in the Cook Inlet/Shelikof Strait, Lease Sale 149[a]

Case	Year	Exploration[b]				Delineation[c]		
		Number of Rigs	Number of Wells	Mud (metric tons)	Cuttings (metric tons)	Number of Wells	Mud (metric tons)	Cuttings (metric tons)
Low Case	1997	1	1	37	399	--	--	--
	1998	1	2	654	798	--	--	--
	Total	0	3	981	1,197	0	0	0
Base Case	1997	1	2	654	798	2	618	726
	1998	1	1	327	399	3	927	1,089
	Total	2	3	981	1,197	5	1,545	1,815
High Cases	1997	2	4	1,308	1,596	6	1,854	2,178
	1998	2	5	1,635	1,995	8	2,472	2,904
	1999	1	2	654	798	3	927	1,089
	Total	5	11	3,597	4,389	17	5,253	6,171

[a] Estimated number of wells and hypothetical drilling schedule.
[b] The average exploration well is assumed to use 327 metric tons of dry mud and produce 399 metric tons of cuttings.
[c] The average delineation well is assumed to use 309 metric tons of dry mud and produce 363 metric tons of cuttings.

Clean Water Act Permit Requirements

Sections 301(b), 304, 306, 308, 401, and 403(c) of the CWA provide the basis for NPDES permit conditions. Most of the general permit requirements fall into two categories: Ocean Discharge Criteria and technology-based effluent limitations. These sections are described below.

Ocean Discharge Criteria

EPA's Ocean Discharge Criteria (40 CFR Part 125, Subpart M) set forth specific determinations of unreasonable degradation that must be made prior to issuing permits. "Unreasonable degradation of the marine environment" is defined as:

(1) Significant adverse changes in ecosystem diversity, productivity and stability of the biological community within the area of discharge and surrounding biological communities,

(2) Threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms, or

(3) Loss of aesthetic, recreational, scientific or economic values, which is unreasonable in relation to the benefit derived from the discharge (40 CFR 125.121[e]).

The determination of unreasonable degradation must be based on the following factors:

- quantities, composition, and potential for bioaccumulation or persistence of the pollutants discharged;
- the potential transport of such pollutants;
- the composition and vulnerability of the biological communities exposed to such pollutants;
- the importance of the receiving-water area to the surrounding biological community;
- the existence of special aquatic sites;
- potential effects on human health;
- existing or potential effects on recreational and commercial fishing;
- applicable requirements of approved Coastal Zone Management Plans;

- marine water quality criteria developed pursuant to Section 304(a)(1) of the CWA; and

- other relevant factors.

If the EPA Regional Administrator determines that the discharge will not cause unreasonable degradation of the marine environment based upon the above criteria, an NPDES permit may be issued. If the Regional Administrator determines that the discharge will cause unreasonable degradation of the marine environment, an NPDES permit cannot be issued. If the Regional Administrator has insufficient information to determine, prior to permit issuance, that there will be no unreasonable degradation of the marine environment, an NPDES permit may not be issued unless the Regional Administrator, on the basis of the best available information, determines that:

(1) such discharge will not cause irreparable harm (as defined in 40 CFR 125.121[a]) to the marine environment,

(2) there are no reasonable alternatives to the onsite disposal of these materials, and

(3) the discharge will be in compliance with certain specified permit conditions (40 CFR 125.123[d]).

Technology-Based Effluent Limitations

The CWA requires particular classes of industrial discharges, including those associated with oil and gas exploratory drillings, to meet technology-based effluent limitations established by EPA. The CWA provides for implementation of these effluent limitations in three stages.

Implementation of best practicable control technology (BPT) was required no later than July 1977. BPT represents the average of the best existing performances of well-known technologies for controlling traditional pollutants. EPA set effluent limitation guidelines requiring BPT for the Offshore Subcategory of the Oil and Gas Extraction Point Source Category (40 CFR Part 435, Subpart A) on April 13, 1979 (44 FR 22069). BPT for this subcategory prohibits the discharge of deck drainage, drilling fluids, drill cuttings, and well-treatment fluids containing free oil that would cause a sheen on the water surface; requires a minimum residual chlorine content of 1 mg/l in sanitary discharges; and prohibits the discharge of floating solids in sanitary and domestic wastes.

Toxic pollutants (40 CFR 401.15) are controlled by the best available technology (BAT) economically achievable, while conventional pollutants, such as oil and grease, biochemical oxygen demand, pH, suspended solids, and fecal coliforms, are controlled by the best conventional pollutant control technology (BCT). Controls by BAT and BCT are to be achieved as expeditiously as practicable, but in no case later than 3 years after the date of final promulgation of technology-based guidelines. In no case is BAT or BCT to be less stringent than the already existing BPT. Permits must impose effluent limitations which control nonconventional (i.e., neither toxic nor conventional) pollutants by means of BAT.

Table 2. Effluent Limitation and Monitoring Requirements for That Portion of the Oil and Gas NPDES Permit Pertaining to Exploratory, Offshore Operations

Discharge and Permit Condition	Statutory Basis
Drilling Muds and Cuttings	
toxicity limit	BAT
no free oil	BAT/BCT
no oil-based muds and cuttings	BAT/BCT
no diesel	BAT
3 mg/kg cadmium, 1 mg/kg mercury in barite	BAT
chemical analysis	Section 308
inventory of added substances	Section 308
mud plan	Section 308
monitoring volume discharged	Section 308
flow rate limitations	Section 403(c)
depth related limitations	Section 403(c)
area and seasonal requirements	Section 403(c)
environmental monitoring requirements	Section 403(c), WQS
Deck Drainage	
no free oil	BAT/BCT/BPT
monitor flow rate	Section 308
Sanitary Wastes	
no floating solids	BCT
chlorine 1 mg/l (facilities > 10 people)	BCT
monitor flow rate	Section 308
Domestic Wastes	
no foam	BAT
no floating solids	BCT
all other domestic wash (garbage)	BCT
monitor flow rate	Section 308
Miscellaneous Discharges	
no free oil	BCT
monitor flow rate	Section 308
Test and Completion Fluids	
pH	BCT
no free oil	BCT

Table 2. Continued

Discharge and Permit Condition	Statutory Basis
oil and grease limits	BAT/BPJ
no discharge oil-based fluids	BAT
monitor volume	Section 308
All Discharges	
no floating solids, foam or oily waste	BCT
surfactants, dispersants, and detergents	BAT
rubbish, trash, and other refuse	BCT
other toxic and non-conventional pollutants	BAT/BCT
Best Management Practices Plan	402(a)(1)

Source: EPA 1993.

[a] 40 CFR Part 435, Subpart D.

BAT = best available control technology
BCT = best available conventional pollutant-control technology
BPJ = best professional judgement

BAT/BCT effluent limitation guidelines for the Offshore Subcategory were proposed by EPA in August 1985 (50 FR 34592). The final guidelines were promulgated in March 1993 (58 FR 12454). The guidelines address all applicable waste streams (drilling muds and cuttings, produced water, produced sand, deck drainage, well-treatment fluids, work overfluids, sanitary wastes, and domestic wastes) and are, in some instances, more stringent than BPT as discused above.

Land Disposal Alternatives

Land disposal must be considered as an alternative to ocean disposal of drilling muds if the NPDES permit conditions are not met or if there is insufficient information to determine that there will be no unreasonable degradation of the marine environment. In the event that EPA decides (on the basis of the ODCE) to prohibit discharges of drilling muds from exploratory operations, several alternatives and techniques for land disposal are available. These include:

- storage in pits or sumps;
- storage in abandoned gravel pits and quarries;
- direct disposal over land surfaces; and
- subsurface injection or burial.

All land disposal alternatives for offshore drilling will require transportation of drilling muds and fluids by barge to disposal sites.

COMPOSITION AND QUANTITY OF MATERIALS TO BE DISCHARGED

This section describes and quantifies the various discharges expected from oil and gas drilling rigs during exploration and delineation activities. Attention is given to the drilling muds and the specialty additives they contain.

Types of Discharges

Exploratory oil and gas well drilling can produce a wide range of waste materials related to the drilling process, maintenance of equipment, and personnel housing. The major discharges expected from exploratory drilling are drilling fluids (muds), drill cuttings, and washwater. Other discharges may include sanitary and domestic wastes, desalination-unit discharge, boiler blowdown, test fluids, deck drainage, noncontact cooling water, blowout-preventer fluid, uncontaminated ballast and bilge water, and excess cement slurry.

Miscellaneous Discharges

The existing NPDES general permit for the Cook Inlet/Shelikof Strait Planning Area authorizes the discharge of a total of 21 different waste streams, only 11-12 of which are authorized for discharge from exploratory drilling operations in this Lease Sale area. Monitoring requirements for the discharges generally include a monthly estimate of volumes discharged.

Average sanitary waste discharges were reported to average 21,700 liters (5,470 gallons) per day per rig (Menzie 1983). This discharge would consist of chlorinated, perhaps secondary treated, effluent. Upon discharge, an immediate dissolved oxygen demand would be exerted; this represents the oxygen potentially consumed by organic compounds in the waste as they are rapidly oxidized. Calculations described in EPA (1984b) indicate that the dissolved oxygen depression resulting from the discharge of treated sewage effluent during offshore exploratory drilling will not be significant when ambient dissolved oxygen concentrations are at least 1 mg/l above the dissolved oxygen standard for aquatic life. No standards exist for OCS waters; however, in Alaskan inshore waters the standards are 6 mg/l at the surface and 5 mg/l at depth. Assuming the ambient dissolved oxygen concentration in the receiving water exceeds 8 mg/l (Wright 1970, BLM 1981), sewage effluent discharge is not expected to significantly impact dissolved oxygen concentrations in the ocean.

Domestic waste (shower and sink drainage) is not expected to represent a significant discharge flow. These wastewaters are sometimes reused to make drilling mud rather than being discharged. The environmental effect of these discharges is difficult to determine given the absence of any analytical data.

The blowout preventer is a device designed to contain pressures in the well that cannot be contained by the drilling mud. The blowout preventer is located on the sea floor or on the drilling platform. Fluid may be discharged when the blowout preventer is actuated, generally during weekly testing. Expected discharges reported by EPA (1984b) are on the order of 757 L/day (200 gal/day). The primary constituents of blowout-preventer fluid are ethylene glycol and water. Ethylene glycol is not considered highly toxic; Price et al. (1974) reported the LC_{50} for brine shrimp to be 20,000 mg/l. Zajic and Himmelman (1978) considered the hazard of this compound to be "minor". Some proprietary formulations are also used. The mass loading of pollutants from these intermittent discharges are expected to be minimal. The volume of fluid discharged when the device is actuated must be monitored. Given the minimal expected mass loading of ethylene glycol, no adverse impacts are anticipated from blowout preventer fluid discharge.

Cement, along with spud mud and cuttings, will be discharged from the drilling rigs to the ocean floor in the early phases of drilling before the well casing is set, and during well abandonment and plugging. Excess cement slurry will result from equipment washdown after cementing operations. Although the exact composition of the cement is not documented it is not expected to represent a significant pollutant source. No adverse impacts from the discharge of cement on the ocean floor.

Desalination unit discharges may be twice as saline as ambient seawater. Boiler blowdown may be discharged once or twice a year per rig. Both of these discharges may contain biocides or chemicals used to combat corrosion and scaling. Discharge volumes for boiler blowdown are usually small, and will therefore not typically contribute substantially to pollutant loading. However, desalination-unit water could result in significant mass loadings of pollutants into the immediate marine environment if the chemicals are not consumed or detoxified prior to discharge.

Test fluids are discharged from the well upon completion of drilling. These fluids may contain formation water, oil, natural gas formation sands, any acids or chemicals added downhole, or any combination thereof (EPA 1985). Test fluids are generally stored and treated with acid for oil removal and neutralized before being discharged or flared. A typical 5-day well test may involve 47 barrels of test fluids. Approximately 1% of the total test fluids will have a pH of 2; the remaining 99% of the fluids will have a pH from 5.0 to 8.5. The addition of strongly acidic fluids downhole could cause significant leaching of heavy metals from the formation and residual drilling muds. The permit will require neutralization (pH 6.5 to 8.5) of all spent acidic fluids before discharge.

Some deck drainage and fire-control system test water may be produced and discharged during exploratory drilling operations. Deck drainage would consist of rain and washwater from the deck and drilling floor, as well as water used to test the fire-control system. Gutters normally carry the drainage to a sump tank where oil is separated and removed before the water is discharged. Oil is the primary pollutant in deck drainage, with a reported concentration range of 24 to 450 mg/l. These discharges may also contain small quantities of detergents used in cleaning spilled drilling mud or chemicals (Mors et al. 1982).

Generally, the composition of noncontact cooling water will not differ significantly from ambient seawater except for an elevated temperature (EPA 1984b). Oil-water separators are used to treat bilge waters for removal of petroleum hydrocarbons prior to discharge. While ballast waters are untreated, the permit prohibits discharges that will produce an oil sheen. The volume of noncontact cooling water can vary depending on the system used. Closed-system, air-cooled designs require no cooling water, whereas other systems may discharge up to 7 million liters (1.87 million gallons) per day. Reported temperatures range from 15 to 25°C (62 to 84°F), which are much higher than those of ambient seawater. Biocides may be used to control fouling in the heat exchange units (Zimmerman and de Nagy 1984). The volumes of cooling-water discharge could result in significant mass loadings of pollutants to the immediate marine environment if the chemicals are not consumed or significantly detoxified prior to discharge. Bilge waters are treated for removal of oil prior to discharge.

In summary, discharges from offshore exploratory drilling operations other than drilling mud and cuttings are expected to represent only small pollutant loadings when properly designed and functioning equipment is used. However, potential pollutant loadings could result from deck drainage, biocides, corrosion inhibitors, and scale preventers. Therefore, the following precautions appear warranted:

- Cooling-water and desalination-unit discharges (and any other high-volume discharge) should be monitored for the volume of discharge and the chemical composition and concentration of biocides, corrosion inhibitors, or other chemical additives.

- Oil separators or sump tanks should be used for deck drainage and the oil disposed of safely.

- No solid waste should be thrown into the sea.

Drilling Muds and Cuttings

General Composition

Drilling muds are complex mixtures of clays, barite, and specialty additives used primarily to remove rock particles from the hole created by the drill bit. Drilling muds serve several other functions besides removing solids. These include creating pressure to counteract pressure encountered in the formation at depth, and controlling the flow of fluids between the formation and the well hole. The composition of drilling mud can vary over a wide range from one well to the next and during drilling of a specific well. As the well hole becomes deeper and encounters different formations, the type of mud may need to be changed or the composition altered.

Previous general permits for oil and gas operations issued by EPA, Region 10 have utilized a case-by-case approach to limiting the toxicity of discharged mud/additive systems. A new approach will be employed in the proposed permit for the Cook Inlet and Gulf of Alaska. EPA Region 10 is proposing to incorporate an end-of-pipe toxicity limit of a minimum of 96-hr LC_{50} (lethal concentration for 50% of the test organisms for a 96-hour exposure) of 30,000 ppm suspended particulate phase (SPP) on discharged drilling muds. This technology-based limit controls not only toxicity (a nonconventional pollutant) but toxic pollutants as well. The 30,000 ppm SPP limit is based upon EPA's evaluation of what constitutes best available technology on a national basis and is part of the final effluent guidelines for the offshore subcategory of this industry (58 FR 12469, March 4, 1993). Before promulgation of the offshore effluent guidelines, EPA Region 10 used the toxicity criterion in its case-by-case evaluations of requests for authorization to discharge mud/additive systems.

The presence of toxic trace elements in drilling muds and cuttings is of primary concern. Metals including lead, zinc, mercury, arsenic, vanadium and cadmium can be present as impurities in barite; chromium is present in chrome lignosulfonates and chrome-treated lignite (U.S. EPA 1984a). According to Jones & Stokes (1990), drill pipe dope (which is known to contain 15 percent copper and 7 percent lead) and drill collar dope (which can contain 35 percent zinc, 20 percent lead, and 7 percent copper) may also contribute trace metals to the muds and cuttings discharge.

Trace metal concentrations expected in oil and gas exploratory drilling muds are presented in Table 3. The metal concentrations at the left of Table 3 were determined by CENTEC (1984). The laboratory-produced muds in this study were hot-rolled prior to analysis to simulate chemical changes induced by downhole conditions; however, the muds contained no additives. The concentrations at the right of Table 3 represent the median, minimum, and maximum values,

Table 3. Selected Trace Metal Concentrations Expected in Generic Drilling Muds and in Muds and Additives Discharged in Alaskan Waters

Metal	Generic[a] Muds (mg/kg dry)	Drilling Muds Discharged to Alaskan Waters[b] (mg/kg dry)		
		Median[c]	Minimum[c]	Maximum
Arsenic	17.2	2.8	1.2	7.9
Barium	1,240	62,300	7	495,000
Cadmium	0.7	0.38	0.001	12
Chromium	908	130	0.5	1,820
Copper	77.3	30	2.0	86.5
Lead	52.5	23.5	0.05	1,270
Mercury	0.7	0.103	0.001	1.46
Nickel	9.8	NA	NA	NA
Zinc	90.4	168.5	1.0	3,420

NA = Data not available.

[a] CENTEC Analytical Services (1984). The muds were hot-rolled prior to analysis to simulate chemical changes induced by downhole conditions.

[b] Source: EPA Region 10 database (Tetra Tech 1993a). Data are from generic mud types (n = 140), non-generic mud types (n = 9), and unspecified mud types (n = 19).

[c] One-half detection limit (when available) was used for those samples reported as not detected.

respectively, obtained from the used mud database maintained by EPA Region 10 (created primarily from end-of-well reports for entries through March 8, 1993) (U.S. EPA 1993a). The variation in metal concentrations has been attributed to the addition of authorized specialty additives, differences in base mud components (i.e., chrome-free lignosulfonate replacing chrome-containing lignosulfonate), incidental contamination from pipe dope, and possibly to differences in laboratory analyses and sample sources (Jones & Stokes 1989a).

The average trace metal concentrations in the earth's continental crust provide an estimate of metal concentrations to be expected in drilling cuttings. Comparison of these concentrations with the maximum values reported for muds and the maximum values reported during a recent permitting period of discharge in Alaskan waters provides an assessment of the enrichment above natural metal levels represented by drilling mud discharges. The enrichment values listed in Table 4 show that, with the exception of nickel and copper, drilling mud discharges contain concentrations of trace metals higher than that found in the continental crust. Barium shows the greatest enrichment, with mud discharge having levels as much as 1,165 times higher than the average value for the continental crust.

Chrome lignosulfonates may be present in drilling muds. According to Jones & Stokes (1989a), when chrome lignosulfonates are added to drilling muds, they adsorb to the clay component, and inhibit flocculation and loss of mud viscosity. However, chrome lignosulfonates are readily soluble in water [approximately 500 g/L (4.2 lb/gal)], and the extent to which they may be displaced from drilling muds during use, or by seawater ions after discharge, has not been determined. The discharge of chrome lignosulfonates is of concern because they apparently resist decomposition and persist in the marine environment for long periods of time. Marine sediments are the likely repository for discharged chrome lignosulfonates, although the precise fate of these compounds is unclear. Because they are water soluble, the potential exists for slow release into sedimentary pore-waters and reintroduction into bottom-waters by resuspension or bioturbation, which increases their availability to marine organisms.

Specialty Additives

Specialty additives include a wide range of substances, ranging from simple inorganic salts to complex organic polymers. Among the additives used in large enough quantities to result in substantial mass loadings to the environment are spotting materials, lubricants, zinc compounds, and materials added to prevent loss of circulation (Jones & Stokes 1989b, p. 16).

Spotting compounds are used to help free stuck drill strings. Some of these (e.g., vegetable oil or fatty acid glycerol) are easily broken down in the environment. The most effective spotting compounds are oil-based. The discharge of muds and cuttings contaminated by diesel oil or diesel-based spots is prohibited. Under the existing NPDES permit (as well as other general oil and gas permits), EPA Region 10 has authorized, with restrictions, the use of mineral oil as a spotting agent since 1984 (U.S. EPA 1986c). The discharge of residual amounts of mineral oil pills is authorized in recent permits provided that the mineral oil pill and at least a 50 barrel buffer of drilling fluid is removed from the system and not discharged. The residual mineral oil content should not exceed 2 percent (v/v).

Table 4. Comparison of the Range of Trace Metal Concentrations in Standard Drilling Muds and Average Earth's Continental Crust

Metal	Drilling Muds[a] (mg/kg dry weight of whole mud)	Continental Crust[b] (mg/kg)
Arsenic	7.9	1.8
Barium	495,000	425
Cadmium	12	0.15
Chromium	1,820	120
Copper	86.5	60
Lead	1,270	14
Mercury	1.46	0.08
Nickel	NA	84
Zinc	3,420	70

NA = Not available.

[a] From Table 5. Maximum metals concentration of muds and additives discharged to Alaskan waters. Based upon U.S. EPA Region 10 database for entries through March 8, 1993.

[b] Ronov and Yaroshevsky 1972, pp. 252-254.

Mineral oils can contribute potentially toxic organic pollutants to drilling muds to which they are added. Data indicate that the concentration of organic pollutants in the drilling muds is roughly proportional to the amount of mineral oil added.

Lubricants are added to the drilling mud when high torque conditions are encountered on the drillstring. These lubricants can be vegetable, paraffinic, or asphaltic-based compounds. When needed, these lubricants are used to treat the entire mud system [roughly 32,000 L (8,453 gal)], and they are discharged into receiving waters along with the muds (U.S. EPA 1984a). This can result in a 746-1,493 kg (1,650-3,300 lb) mass loading of the substances into the environment for each treatment of the system (U.S. EPA 1986a). Mineral oils, mentioned above, may also be used as lubricants and may, therefore, contribute to organic pollutant loading.

Zinc carbonate is used as a sulfide scavenger when formations containing hydrogen sulfide are expected to be encountered during drilling. Typically the entire mud system is treated with zinc carbonate to achieve mud concentrations of zinc between 1.5 and 5.5 kg/m^3 (0.01-0.05 lb/gal), resulting in 240-940 kg (520-2,080 lb) of zinc in the mud system (Jones & Stokes 1989a). The zinc sulfide and unreactive zinc compounds are discharged with the drilling mud into the environment, thus contributing to the overall loading of zinc.

In cases when circulation of the mud system is lost, combinations of cellophane, mica, and walnut hulls, or other inert substances such as vegetable and polymer fibers, flakes, granules, and glass or plastic spheres, may be added to the mud in one of two methods. The entire system can be treated with typically 0.2 to 2.0 kg (0.5-5.0 lb) per barrel (bbl) of mud, which results in 220 to 2,200 kg (1,000 to 10,000 lb) of additives to the system. Alternatively, a pill of 15,899-31,797 L (4,200-8,400 gal) containing 57-170 g/l of additive (0.5-1.4 lb/gal) can be sent downhole (U.S. EPA 1984b). When drilling resumes, the additives are separated from the drilling muds by screening and discharged into the environment along with the cuttings.

Composition of Cuttings

The trace metal concentrations listed for the earth's continental crust are an indicator of the concentrations to be expected in the cuttings. It should be noted, however, that the trace metal concentrations in mud and the natural rock could vary well beyond the range noted in Table 4. Most of the trace metals in the cuttings are likely to be located in the mineral structure of the rock formation. Cuttings occur in sizes ranging from coarse sand to cobble and gravels.

Quantity of Drilling Muds and Cuttings

Each exploratory well in the Cook Inlet/Shelikof Strait Planning Area is expected to produce about 327 mt (360 t) of drilling mud and 399 dry mt (440 t) of cuttings (Jones and Stokes 1993). Using these estimates for muds and cuttings production, annual mass loadings have been computed for each of the resource development scenarios (low, base, and high) and are presented in Table 1.

The discharge rate of muds and cuttings during drilling operations is quite variable. During actual drilling and circulation of the drilling mud, cuttings are brought up from the hole, removed by the solids control equipment (approximately 90 to 95 percent efficient), and discharged on a relatively continuous basis. However, muds are discharged less regularly (U.S. EPA 1984a). Drilling muds are discharged in bulk when the mud type is changed or altered during cementing operations, or at the end of drilling. Bulk discharge rates reportedly range from 4,769 to 190,779 l/h [30 to 1,200 bbl/h (1,260 to 50,400 gal/h)], with total volumes discharged ranging from 15,898 l [100 bbl (4,200 gal)] to more than 317,966 l [2,000 bbl (84,000 gal)] (U.S. EPA 1984a). The maximum discharge rate of muds and cuttings allowed in the existing Cook Inlet NPDES permit is 158,980 l/h [1,000 bbl/h (42,000 gal/h)], and this discharge rate is restricted to water depths greater than 40 m (U.S. EPA 1986c).

FATE AND TRANSPORT OF MUDS AND CUTTINGS

This assessment of the fate and transport of muds and cuttings relies extensively on the results of computer simulation modeling of dispersion and dilution of drilling muds. Oceanographic conditions are briefly described, the model and verification studies are presented, and the results of the modeling runs are discussed.

Factors influencing the transport and persistence of discharged drilling muds and cuttings include oceanographic characteristics of the receiving water, depth of discharge, discharge rate, and method of disposal. Oceanographic influences include tide, wind, freshwater overflow, ice movement, stratification, and current regime.

Environmental Conditions

The Lease Sale 149 area encompasses the semi-sheltered waters of lower Cook Inlet and parts of Shelikof Strait. The proposed Lease Sale 149 encompasses 0.77 million hectares (1.9 million acres) within the Cook Inlet/Shelikof Strait Planning Area (Figure 1). The water depths in the Lease Sale 149 area range between 13.5 m (44 ft) near Kalgin Island to more than 290 m (951 ft) near the southern entrance to Shelikof Strait. In general, water depths increase from north to south within the Lease Sale area. Water depths in Shelikof Strait range between 150 and 180 m (492 to 591 ft). In lower Cook Inlet, most depths within the sale area are between 75 and 90 m (246 to 295 ft).

Meteorology

Lower Cook Inlet lies in a transition zone between continental and marine meteorological conditions, whereas Shelikof Strait and the Alaskan Peninsula have meteorological conditions characteristic of a maritime climate (DOI 1981). The North Pacific high pressure system dominates the area during summer, bringing south to southwest winds and air temperatures ranging from 10 to 12°C (50 to 54°F). In winter, the weather is controlled by the Aleutian low atmospheric pressure system. Winds associated with this system are generally north to northwesterly, resulting in low temperatures (less than 0°C) over the inlet. Summer wind speeds tend to be slightly higher than in winter and are more consistent in direction (DOI 1979). Average wind speeds over open water in Cook Inlet range from 15 to 25 knots with extreme speeds from 75 to 100 knots (EPA 1983). Shelikof Strait is bounded by mountains on the north and south and can be subjected to high winds related to the orthographic channeling (funneling) of air between these mountain ranges (Lackmann and Overland 1989).

Circulation and Currents

The circulation patterns for the area are influenced by waters from the Gulf of Alaska (Alaska Coastal Current) and fresh water input from the rivers of the Kenai Peninsula. Waters from the Gulf of Alaska enter Kennedy and Stevenson Entrances and are then diverted northward before mixing with a strong surface outflow from upper Cook Inlet. Circulation in Cook Inlet is dominated by a counterclockwise gyre with significant north and westward transport. This flow roughly follows the 100 m (330 ft) isobath at minimum speeds of 10 centimeters per second (cm/sec) (4 inches per second) (Figure 2). Secondary gyres may be established in Kachemak and Kamishak Bays.

Two important features in the circulation pattern in Cook Inlet are upwelling along the southwest shore of the Kenai Peninsula and formation of frontal zones (zones of convergence or "rips") as the seawater from the Gulf of Alaska encounters the freshwater outflow from the upper inlet. One major rip extends down the southwest coast into Kamishak Bay, resulting in heavy debris accumulations along the shore.

Cook Inlet has a large tide range, which is greatest near the head of the Inlet. The water necessary to accommodate this sea level change moves through the lower Inlet, sometimes locally at speed in excess of 6 knots (MMS 1984). The tidal currents promote mixing and often completely mix the waters throughout the depth in lower Cook Inlet. Intrusions of Pacific Ocean waters can temporarily stratify (i.e., due to depth-related changes in water density) the Inlet. These intrusions depend on winds and seasonal runoff.

Using current observations, mean volume transport through the Shelikof Strait sea valley was computed to be 0.85 x 10^6 cubic meters per second (m^3/s). Approximately 75% of this flowed seaward through the Shelikof Strait sea valley, with the remainder flowing along the Alaska Peninsula. The data showed the expected increase of volume transport concomitant with maximum freshwater discharge in autumn. The greatest monthly mean transport, however, occurred in winter due to wind forcing. Over time intervals of days, fluctuations in transport were often large (up to 3.0 x 10^6 m^3/s) and generally geostrophic. Some of these fluctuations resulted from convergence of flow caused by the complex interaction of storms with orography (Schumacher et al. 1989).

Data from repeated conductivity, temperature, and density (CTD) profiles in central Shelikof Strait during 1985 to 1987 were used to derive a volume transport and the distribution of near-bottom physical properties. Mean transport was 0.6 x 10^6 m^3/s to the southwest, similar

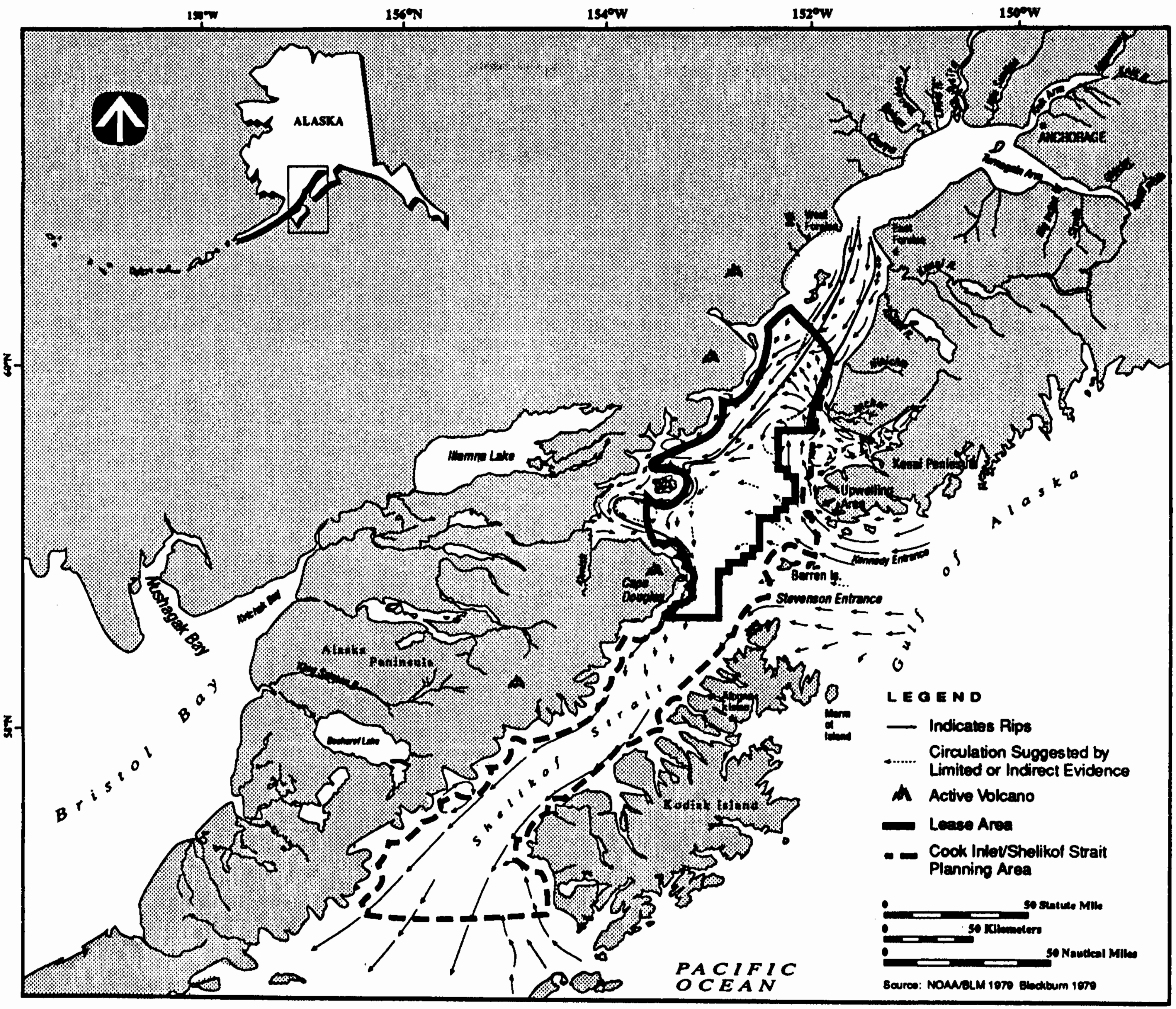


Figure 2. Surface Circulation in the Cook Inlet /Shelikof Strait Planning Area.

to that measured by a 5-month current meter array. Computed transport values varied from 0.2 x 10^6 to 1.2 x 10^6 m^3/s; differential Ekman pumping appears to be important in creating large changes in transport over short time intervals. Near-bottom temperature and salinity varied as a result of changes in source waters to the south. During 1986, cold, low-salinity conditions prevailed. The seasonal cycles of surface and near-bottom temperature and salinity are comparable to those found off of the Kenai Peninsula (Reed and Schumacher 1989).

Surface waves of long period (14 seconds and more) can enter Cook Inlet from the North Pacific. These waves can resuspend sediments to depths of 90 m (300 ft) and generate bottom currents of up to 100 cm/sec (40 inches per second) (Larsen et al. 1981).

Ice Formation and Movement

Ice formation is expected to be minimal or non-existent in the Lease Sale 149 area. However, ice formation is expected in adjacent regions. Ice begins to form in upper Cook Inlet (north of the Lease Sale area) in November to December and usually breaks up by late April (LaBelle and Wise 1983). Winter winds and currents move the ice southward through the Forelands (Figure 2) and down the west coast of lower Cook Inlet (DOI 1979). South of the Forelands, ice forms open pack with small flows. The pack ice can extend as far south as Cape Douglas along the western shore. In general, the ice concentration in the central and eastern parts of lower Cook Inlet is small (DOI 1979). Ice forms along the shore and in small bays in Shelikof Strait beginning in December, with breakup commonly occurring in late March. The central Strait, warmed by the Alaska Coastal Current, remains ice free (DOI, MMS 1984). Ice formation does not affect circulation and transport, except in smaller bays, coves, and nearshore waters. Therefore, ice is not expected to influence processes that determine effluent dilution and dispersion (EPA 1983).

Sediment Transport

Sediment transport in lower Cook Inlet and Shelikof Strait follows the general counterclockwise circulation pattern of the gyre. The principle sources of suspended particulate matter (SPM) in Cook Inlet are the Matanuska, Knik, Susitna, and Beluga Rivers, all of which discharge into upper Cook Inlet. These rivers supply about 70 to 80% of the freshwater input to Cook Inlet and between 75 and 90% of the suspended sediments (Feely and Massoth 1984). SPM from upper Cook Inlet passes through lower Cook Inlet with little deposition, except in coastal embayments (Feely and Massoth 1984). The major regions of SPM deposition, in order of decreasing importance, are Shelikof Strait, Kamishak Bay, and Kachemak Bay. The surficial sediments in the central part of Shelikof Strait are derived from Cook Inlet (Hampton et al. 1981). In the northeastern part of the Strait, the sedimentation rates are about 10 centimeters (cm) per 100 years. In the southwestern part, sediment is accumulating more rapidly, up to 120 cm per 100 years, in the depressions in the sea floor.

Sediment resuspension is dominated by strong tidal currents which generate bottom currents of 100 cm/sec (40 inches per second) (Dames and Moore 1978). Large sand waves with amplitudes up to 10 m [33 ft] in height caused by tidal currents have been observed in Cook Inlet

(Cacchione and Drake 1979). Wave-induced sediment resuspension could occur to depths of 200 m (660 ft) when no stratification is present. The potential for wave-induced sediment resuspension decreases in sheltered areas within Cook Inlet.

Summary

The lease sale oceanographic conditions can be summarized as follows:

- Water depths vary from 13.5 m (44 ft) to 290 m (951 ft).
- Current speeds are between 10 and 320 cm/sec (0.2 to 6.4 knots).
- The stratification of the water column varies throughout the year and is strongly influenced by winter winds and freshwater runoff.
- At water depths of 100 to 200 m (330 to 660 ft), sediment may be resuspended by surface waves and transported by bottom currents. Shelikof Strait is a depositional area for Cook Inlet suspended sediments.
- Flushing by currents of Kamishak and outer Kachemak Bays is weak, which could result in trapping of nutrients and pollutants in the bays.

THE OFFSHORE OPERATORS COMMITTEE MODEL

The fate of discharged muds and cuttings from exploratory drilling operations is evaluated using Version 1.0 of the Offshore Operators Committee (OOC) model (Brandsma et al. 1983). The OOC model simulates drilling discharges by dividing the discharge plume into an upper plume, which contains fine-grained solids, and a lower plume, which contains the majority of solids. Dilution of the effluent is simulated by considering three phases of plume behavior: convective descent, dynamic collapse, and a later passive diffusion phase. A Gaussian formulation is used to sum the three component phases and to track the distribution of solids to the bottom. The model predicts concentrations of solids and soluble components in the water column and the initial deposition of solids on the seafloor.

The OOC model has been field tested, and comparisons of model results with field observations indicate that the model is capable of predicting many important aspects of drilling mud discharge plume behavior. For example, a field verification study was conducted offshore of Huntington Beach, California, in waters with an average depth of approximately 18 m (O'Reilly et al. 1989). The model predicted water column solids concentrations were within the range of concentrations measured at 75 percent of the sampling locations. In the lower water layer, where the majority of the solids formed the lower plume, the model predicted the solids concentrations at 86 percent of the sampling locations. However, a comparison of the model predictions of bottom solids accumulation with field sediment trap data was less satisfactory, possibly due to errors associated with the field measurement technique.

The OOC model does not include cuttings. These are expected to be of coarser grain size than muds and will, therefore, settle rapidly to the seafloor. Jones & Stokes (1989b) indicate that the majority of cuttings will probably be deposited within 100-m (330-ft) from the point of discharge at all depths and current speeds. The total dry weight discharge of cuttings is generally about 1.3 times greater than the total discharge of drilling muds for exploratory drilling operations. Thus, nearfield estimates (within 100 m of the point of discharge) of bottom accumulations of drilling mud substantially underestimate the total deposition of material from drilling discharges.

The OOC model (Version 1.0) was used to examine discharge scenarios that were 1) likely to occur in the Lease Sale 149 area, and 2) representative of the maximum allowable discharges. Discharge scenarios were determined by examining relevant information sources describing exploratory oil and gas drilling practices. Maximum allowable discharges are those specified in Cook Inlet/Gulf of Alaska general NPDES (No. AK6285000). This permit is applicable to discharges from drilling rigs in the Cook Inlet/Shelikof Strait Planning Area. With reference to drilling mud discharges, the permit states that:

"the total drilling muds, drill cuttings, and washwater discharge rate shall not exceed:

(a) 1,000 bbl/hour in water depths exceeding 40 m
(b) 750 bbl/hour in water depths greater than 20 m to 40 m
(c) 500 bbl/hour in water depths 5 m to 20 m"

Discharge of muds and cuttings is prohibited between the shore and the 5 m isobath.

In addition to the depth-related discharge requirements, the general NPDES permit for oil and gas exploration also specifies the following areas where discharges are prohibited:

- Within the boundaries or within 1,000 m (3,280 ft) of a coastal marsh, river delta, river mouth, designated Area Meriting Special Attention, game refuge, game sanctuary, or critical habitat area.

- In Kamishak Bay west of a line from Cape Douglas to Chinitna Point.

- In Chinitna Bay inside the line between the points on the shoreline at latitude 59°52'45"N, longitude 152°48'18"W on the north and latitude 59°46'12"N, longitude 153°00'24"W on the south.

- In Tuxedni Bay inside the lines on either side of Chisik Island.

The estimate of the average amount of drilling muds and cuttings produced by each exploratory well is based on the predicted average depth necessary for each well. The average exploratory well depth for the Cook Inlet/Shelikof Strait Planning Area is predicted to be 1,828 m (6,000 ft)

(Jones and Stokes 1993). Based on this average drilling depth, it is estimated that the average exploratory well will produce 327 mt (360 t) of dry drilling muds and 399 mt (440 t) of cuttings (Jones and Stokes 1993).

Since each actual exploratory well drilled will be unique, it can be assumed that the actual quantity of drilling muds produced will vary for each individual well. Since the dilution of the discharged mud is primarily a function of the discharge rate, and not of the total mass discharged, variation in the total amount of drilling muds discharged will not affect the predicted dilutions of dissolved and solid components in the water column. However, variation in the total amount of drilling mud discharged will affect the model-predicted depth of sediments deposited on the bottom. Therefore, the model-predicted maximum sediment depths for a range of total drilling muds discharged (25 to 500 percent of the average value) will also be explored. This will assist in the evaluation of the potential smothering effect of these various discharge scenarios on benthic organisms that occur within Lease Sale 149.

OOC model test cases that reflect the permit stipulations discussed above were run for open-water discharges; results of the model runs are discussed below.

Open-Water Discharges. During a typical year, ice is minimal or non-existent in the Lease Sale 149 area; therefore, discharge to open water is likely.

A total of 23 open-water discharge modeling test cases are evaluated below. The modeling test cases were chosen in consultation with the U.S. EPA. Model parameters held constant for all test cases are given in Table 5. Further information on the model parameters, equations, and assumptions is contained in the ODCE. The modeling test cases can be placed into three groups:

- Evaluation of drilling mud discharges to waters that are 40 to 300 m (131-984 ft) deep (Table 6). These modeling test cases include evaluation of dilution and mud deposition for different combinations of 1) water depths (40 to 300 m), 2) discharge rates [from the maximum permissible rate of 1,000 bbl/h (159,091 l/h) to 500 bbl/h (119,318 l/h)], and 3) current speeds [from 2 to 150 cm/sec (0.07-4.9 ft/sec)].

- Evaluation of drilling mud discharges to waters that are 20 to 40 m (66-131 ft) deep (Table 7). These modeling test cases include evaluation of dilution and mud deposition for different combinations of 1) water depths (20 and 40 m), 2) discharge rates [for the maximum permissible rates of 750 bbl/h (119,318 l/h) and 500 bbl/h (79,546 l/h)], and 3) current speeds [from 10 to 150 cm/sec (0.3-4.9 ft/sec)].

- Evaluation of drilling mud discharges to waters that are 10 to 20 m (33-66 ft) deep (Table 8). These modeling test cases include evaluation of dilution and mud deposition for different combinations of 1) water depths (10 and 20 m), 2) discharge rates [for the maximum permissible rates of 500 bbl/h (79,546 l/h) and 250 bbl/h (39,773 l/h)], and 3) current speeds [from 2 to 30 cm/sec (0.07-1.0 ft/sec)].

Discharge of drilling muds to water less than 5 m (16 ft) deep is prohibited by the general NPDES permit for oil and gas exploration; however, water depths less than 10 m (33 ft) do not generally occur in the Lease Sale 149 area. Therefore, drilling mud discharges to waters less than 10 m deep were not modeled.

TABLE 5. OOC MODEL INPUT PARAMETERS HELD CONSTANT

Discharge Conditions	
Duration (hr)	1.0
Angle of Pipe (Degrees Downward From Horizontal)	90.0
Depth Of Pipe Mouth (m)	0.3
Pipe Radius (m)	0.1
Rig Type	Jackup
Rig Length (m)	70.1
Rig Width (m)	61.0
Rig Wake Effect	Included

Drilling Mud Characteristics	
Bulk Density (g/cm^3)	2.085
Initial Solids Concentration in Whole Mud (mg/l)	1,441,140

Mud Particle Distribution

Class No.	Density (g/cm^3)	Volume Fraction In Whole Mud (cm^3/cm^3)	Settling Velocity	
			(cm/sec)	(ft/sec)
1	3.959	0.0364	0.658	0.021600
2	3.959	0.0364	0.208	0.006820
3	3.959	0.0437	0.085	0.002780
4	3.959	0.0728	0.044	0.001430
5	3.959	0.1383	0.023	0.000758
6	3.959	0.0364	0.013	0.000427

Receiving Water Characteristics	
Significant Wave Height (m)	0.6
Significant Wave Period (sec)	12.0
Surface Water Density (σ_t)	21.6
Density Gradient ($\Delta\sigma_t$/m)	a

Source: Tetra Tech (1993).

[a] The density gradient used in the model was based on an actual salinity-temperature profile measured in Lower Cook Inlet (Dames & Moore 1978, Table 8.1-38).

TABLE 6. SUMMARY OF OOC MODEL RESULTS FOR OPEN-WATER DISCHARGES TO WATER DEPTHS GREATER THAN OR EQUAL TO 40 M												
Modeling Test Case #	9	10	11	12	13	17	18	21	22	19	20	23
Discharge Rate	1,000 bbl/h (159,091 L/h)									750 bbl/h (119,318 L/h)		500 bbl/h (79,546 L/h)
Water Depth	40 m					100 m		150 m	300 m	100 m		300 m
Unidirectional Current Speed (cm/sec)	2	10	30	100	150	10	30	10	100	10	30	100
Minimum Solids Dilution at 100 m	2,156	1,039	3,957	3,995	4,025	2,216	4,824	1,967	4,318	3,552	3,507	6,233
Minimum Dissolved Dilution at 100 m	1,660	1,012	886	6,024	6,061	2,607	7,299	10,592	6,494	2,717	5,307	27,219
Maximum Depth of Deposited Mud (cm)	99	41	9.7	1.1	0.7	25	6.0	1.0	0.0	19.2	0.2	0.0
Estimated Distance (m) from Discharge for Maximum Mud Depth	20	10	50	50	1,440	130	30	110	NA	170	30	NA
Estimated Mud Deposition Depth (cm) at Edge of Mixing Zone[a]	0.2	3.7	2.2	Trace	Trace	2.0	Trace	0.9	0.0	1.0	Trace	0.0
Estimated Percentage of Discharged Solids Deposited Within Mixing Zone[a]	74	67	22	1.0	<1.0	7.9	5.4	2.5	0.0	5.4	0.1	0.0

[a] The mixing zone is defined by a circle with a radius of 100 m about the point of discharge.

NA = Not applicable. No appreciable mud accumulation was predicted by the OOC model.

TABLE 7. SUMMARY OF OOC MODEL RESULTS FOR OPEN-WATER DISCHARGES TO WATER DEPTHS FROM 20 TO 40 M						
Modeling Test Case #	4	5	6	14	15	16
Discharge Rate	750 bbl/h (119,318 L/h)					500 bbl/h (79,546 L/h)
Water Depth	20 m			40 m		40 m
Unidirectional Current Speed (cm/sec)	10	30	150	10	100	150
Minimum Solids Dilution at 100 m	1,329	1,252	4,810	1,279	4,736	5,728
Minimum Dissolved Dilution at 100 m	747	700	7,143	1,276	7,092	8,621
Maximum Depth of Deposited Mud (cm)	57.8	25.8	2.3	37.4	1.7	0.9
Estimated Distance (m) from Discharge for Maximum Mud Depth	30	20	30	20	50	590
Estimated Mud Deposition (cm) Depth at Edge of Mixing Zone[a]	3.9	7.7	0.8	2.5	Trace	Trace
Estimated Percentage of Discharged Solids Deposited Within Mixing Zone[a]	85	43	3.6	63	0.2	0.01

[a] The mixing zone is defined by a circle with a radius of 100 m about the point of discharge.

TABLE 8. SUMMARY OF OOC MODEL RESULTS FOR OPEN-WATER DISCHARGES TO WATER DEPTHS FROM 10 TO 20 M					
Modeling Test Case #	1	2	7	8	3
Discharge Rate	500 bbl/h (79,546 L/h)				250 bbl/h (39,773 L/h)
Water Depth	10 m		20 m		10 m
Unidirectional Current Speed (cm/sec)	10	30	10	30	2
Minimum Solids Dilution at 100 m	3,323	2,126	1,683	1,852	9,391
Minimum Dissolved Dilution at 100 m	420	269	1,022	1,079	1,867
Maximum Depth of Deposited Mud (cm)	151	76	62	17	159
Estimated Distance (m) from Discharge for Maximum Mud Depth	10	10	30	20	10
Estimated Mud Deposition Depth (cm) at Edge of Mixing Zone[a]	1.1	1.8	3.7	1.9	0.05
Estimated Percentage of Discharged Solids Deposited Within Mixing Zone[a]	91	84	82	34	90

[a] The mixing zone is defined by a circle with a radius of 100 m about the point of discharge.

The OOC model test cases assume a discharge duration of 1 hour. Although the estimates of minimum solid- and dissolved-fraction dilutions will not be affected by the differences between modeled and actual discharge amounts, solids deposition will be underestimated. An estimate of solids deposition resulting from discharges of the quantity of mud necessary to drill an average exploratory well was obtained by multiplying the OOC model predictions by a factor (e.g., 1.4) that represents the ratio of the total amount of mud discharged to the amount discharged in one hour. This method of estimating mud accumulation assumes that areal deposition patterns will be unchanged for discharges of different quantities of mud. This is reasonable provided that the rate of mud discharge does not vary from that used in the model. Mud deposition depths shown in Tables 6 through 8 are the depths expected to occur after completion of an average exploratory well in the Lease Sale area. For example, 327 mt (360 tons) of drilling mud are expected to be produced by a single exploratory well drilled in the Lease Sale area; this amount is equivalent to 326,600 kg (720,000 lb). A discharge of 1,000 bbl/h is equivalent to the discharge of 229,119 kg (505,116 lb) of drilling mud. Therefore, the mud depth predicted by the model for a discharge of 1,000 bbl/h for one hour must be multiplied by 1.4 (326,600 kg/ 229,119 kg) to estimate the mud depth following completion of an average exploratory well.

40-m Water Depth. Modeling results for 12 test cases of discharges to open-waters 40 to 300 m deep resulted in a minimum solids dilution of 1,039:1 for a discharge at the maximum allowable rate of 1,000 bbl/h (159,091 L/h), a water depth of 40 m (131 ft), and a current speed of 10 cm/sec (0.33 ft/sec) (Table 6). The minimum dissolved constituent dilution of 886:1 was determined for a discharge at the maximum allowable discharge rate, a water depth of 40 m (131 ft), and a current speed of 30 cm/sec (1.0 ft/sec) (Table 6).

Mud deposition greater than 1.0 cm (0.4 in) at the edge of or beyond the mixing zone boundary was predicted for discharges at the maximum allowable discharge rate in water 40 m (131 ft) deep for current speeds of 10 and 30 cm/sec (0.3 1.0 ft/sec) (Table 6). Model test cases with higher current speeds did not result in the prediction of greater than 1.0 cm (0.4 in) of mud deposited beyond the mixing zone boundary. However, for a discharge to 100 m (328-492 ft) of water and a current speed of 10 cm/sec (0.3 ft/sec), a discharge rate of 1000 bbl/h is predicted to create an initial mud deposit greater than 1.0 cm deep outside of the mixing zone boundary (Table 6). For a discharge rate of 1,000 bbl/h in 100 m of water and a current speed of 10 cm/sec, the maximum mud depth of 25 cm (0.8 ft) is predicted to occur 130 m (427 ft) from the discharge point.

20 to 40-m Water Depth. Modeling results for 6 test cases of discharges to open-waters 20 to 40 m (66-131 ft) deep resulted in a minimum solids dilution of 1,252:1 for a discharge at the maximum allowable discharge rate of 750 bbl/h (119,318 l/h), a water depth of 20 m (66 ft), and a current speed of 30 cm/sec (1.0 ft/sec) (Table 7). The minimum dissolved constituent dilution of 700:1 was determined for the same discharge rate, water depth, and current speed (Table 7).

Mud deposition greater than 1.0 cm (0.4 in) deep at the edge of or beyond the mixing zone boundary was predicted for discharges at the maximum allowable discharge rate in water 40 m (131 ft) deep for a current speed of 10 cm/sec (0.3 ft/sec), and for discharges at the maximum allowable discharge rate in 20-m (66-ft) water depth and current speeds of 10 and 30 cm/sec (0.3-1.0 cm/sec) (Table 7). Model test cases with higher current speeds did not result in the prediction of greater than 1.0 cm (0.4 in) of mud deposited beyond the mixing zone boundary. However, one model test case for a discharge rate of 500 bbl/h in 40 m of water and a current speed of 150 cm/sec resulted in the prediction of a maximum depth of drilling mud of 0.9 cm deposited 590 m (1,936 ft) downcurrent of the discharge point.

10 to 20-m Water Depth. Modeling results for 5 test cases of discharges to open-waters 10 to 20 m (33-66 ft) deep resulted in a minimum solids dilution of 1,683:1 for a discharge at the maximum allowable discharge rate of 500 bbl/h (79,546 L/h), a water depth of 20 m (66 ft), and a current speed of 10 cm/sec (0.3 ft/sec) (Table 8). The minimum dissolved constituent dilution of 269:1 was determined for the maximum allowable discharge rate, a water depth of 10 m, and a current speed of 30 cm/sec (1.0 ft/sec) (Table 8).

Mud deposition greater than 1.0 cm (0.4 in) deep at the edge of or beyond the mixing zone boundary was predicted for discharges at the maximum allowable discharge rate in water 10 and 20 m deep and for current speeds of 10 and 30 cm/sec (0.3-1.0 ft/sec) (Table 8). One model test case for a discharge rate of 250 bbl/h in 10 m of water and a current speed of 2 cm/sec (0.07 ft/sec) resulted in the prediction that 90 percent of the mud would be deposited within the mixing zone and that the mud depth at the edge of the mixing zone would be 0.05 cm (0.002 in).

Effect of varying total discharge on predicted maximum sediment depth. The drilling mud deposited on the sediment surface may physically impact benthic communities in the vicinity of drilling discharges. The potential impact will depend on the mud characteristics and the depth of the deposited solids. Since the total amount of drilling mud produced by each exploratory well will be site specific, the model-predicted mud depth at the edge of the mixing zone was calculated for each of the 23 modeling runs for a range of total discharge scenarios. These scenarios ranged from 10 to 500 percent of the average total drilling mud discharge for a typical well in the Cook Inlet Lease Sale area (Tables 9–11).

For discharges to water depths of 40 m or greater, mud deposition depths less than 1.0 cm (0.4 in) at or beyond the mixing zone are predicted to occur for discharge of as much as 500 percent of the average amount of total drilling mud produced by an exploratory well for seven model test cases involving:

- High rate discharge (1000 bbl/h) to waters 40 m (131 ft) deep with current speeds of 100 and 150 cm/sec (3.28-4.92 ft/sec) (Modeling Test Cases 12 and 13, Table 6).
- High rate discharge to waters 100 m deep with a current speed of 30 cm/sec (1.0 ft/sec) (Modeling Test Case 18, Table 6).
- High rate discharge to waters 40 m deep with a current speed of 2 cm/sec (0.07 ft/sec) (Modeling Test Case 9, Tables 6 and 9).
- High rate discharge to waters 300 m deep with a current speed of 100 cm/sec (3.28 ft/sec) (Modeling Test Case 22, Table 6).
- A discharge rate of 750 bbl/h to waters 100 m deep with a current speed of 30 cm/sec (1.0 ft/sec) (Modeling Test Case 20, Table 6).
- A discharge rate of 500 bbl/h to waters 300 m deep with a current speed of 100 cm/sec (3.28 ft/sec) (Modeling Test Case 23, Table 6).

For the remaining five modeling test cases, mud deposition depths less than 1.0 cm (0.4 in) at or beyond the mixing zone are predicted to occur for some, but not all, of the mud discharge scenarios (Table 9). Modeling test cases for which the depth of drilling mud at or beyond the mixing zone boundary was predicted to be 1.0 cm or less were generally for discharges less than the average total drilling mud discharge to 40-m water depth at current speeds of 10 and 30 cm/sec (0.3-1.0 ft/sec) (Table 9).

TABLE 9. ESTIMATED DEPTH OF DRILLING MUDS AT THE EDGE OF THE MIXING ZONE FOR OPEN-WATER DISCHARGE TO WATER DEPTHS EQUAL TO OR GREATER THAN 40 M

Water Depth and Discharge Rate	Percent of Average Total Discharge							
	10%	25%	50%	100%	200%	300%	400%	500%
	Total Drilling Mud Discharged in Kilograms (pounds)							
	32,700 (72,091)	81,750 (180,228)	163,500 (360,456)	327,000 (720,911)	654,000 (1,441,823)	981,000 (2,162,734)	1,308,000 (2,883,646)	1,635,000 (3,604,558)
	Mud Depth at Edge of Mixing Zone (cm)							
40 m 1,000 bbl/h (159,091 L/h) 2 cm/sec	0.02	0.05	0.1	0.2	0.4	0.6	0.8	1.0
40 m 1,000 bbl/h (159,091 L/h) 10 cm/sec	0.37	0.93	1.85	3.7	7.4	11.1	14.8	18.5
40 m 1,000 bbl/h (159,091 L/h) 30 cm/sec	0.22	0.55	1.1	2.2	4.4	6.6	8.8	11.0
100 m 1,000 bbl/h (159,091 L/h) 10 cm/sec	0.20 (2.5)[a]	0.5 (6.3)[a]	1.0 (12.5)[a]	2.0 (25)[a]	4.0 (50)[a]	6.0 (75)[a]	8.0 (100)[a]	10.0 (125)[a]
150 m 1,000 bbl/h (159,091 L/h) 10 cm/sec	0.09 (0.10)[a]	0.23 (0.25)[a]	0.45 (0.5)[a]	0.9 (1.0)[a]	1.8 (2.0)[a]	2.7 (3.0)[a]	3.6 (4.0)[a]	4.5 (5.0)[a]
100 m 750 bbl/h (119,318 L/h) 10 cm/sec	0.13 (1.9)[a]	0.25 (4.8)[a]	0.5 (9.6)[a]	1.0 (19.2)[a]	2.0 (38.4)[a]	3.0 (57.6)[a]	4.0 (76.8)[a]	5.0 (96)[a]

[a] The number in parentheses is the maximum mud depth predicted beyond the 100-m mixing zone boundary.

Note: Shaded areas indicate model scenarios that predict a drilling mud depth of 1 cm or less in areas at or beyond the 100-m mixing zone boundary.

TABLE 10. ESTIMATED DEPTH OF DRILLING MUDS AT THE EDGE OF THE MIXING ZONE FOR OPEN-WATER DISCHARGE TO WATER DEPTHS FROM 20 TO 40 M

Water Depth and Discharge Rate	Percent of Average Total Discharge							
	10%	25%	50%	100%	200%	300%	400%	500%
	Total Drilling Mud Discharged in Kilograms (pounds)							
	32,700 (72,091)	81,750 (180,228)	163,500 (360,456)	327,000 (720,911)	654,000 (1,441,823)	981,000 (2,162,734)	1,308,000 (2,883,646)	1,635,000 (3,604,558)
	Mud Depth at Edge of Mixing Zone (cm)							
20 m 750 bbl/h (119,318 L/h) 10 cm/sec	0.39	0.98	1.95	3.9	7.8	11.7	15.6	19.5
20 m 750 bbl/h (119,318 L/h) 30 cm/sec	0.8	1.9	3.9	7.7	15.4	23.1	30.8	38.5
20 m 750 bbl/h (119,318 L/h) 150 cm/sec	0.08	0.2	0.4	0.8	1.6	2.4	3.2	4.0
40 m 750 bbl/h (119,318 L/h) 10 cm/sec	0.3	0.6	1.3	2.5	5.0	7.5	10.0	12.5
40 m 500 bbl/h (79,546 L/h) 150 cm/sec	0.002 (0.009)[a]	0.003 (0.225)[a]	0.005 (0.45)[a]	0.01 (0.9)[a]	0.02 (1.8)[a]	0.03 (2.7)[a]	0.04 (3.6)[a]	0.05 (4.5)[a]

[a] The number in parentheses is the maximum mud depth predicted beyond the 100-m mixing zone.

Note: Shaded areas indicate model scenarios that predict a drilling mud depth of 1 cm or less in areas at or beyond the 100-m mixing zone boundary.

TABLE 11. ESTIMATED DEPTH OF DRILLING MUDS AT THE EDGE OF THE MIXING ZONE FOR OPEN-WATER DISCHARGE TO WATER DEPTHS FROM 10 TO 20 M

Water Depth and Discharge Rate	Percent of Average Total Discharge							
	10%	25%	50%	100%	200%	300%	400%	500%
	Total Drilling Mud Discharged in Kilograms (pounds)							
	32,700 (72,091)	81,750 (180,228)	163,500 (360,456)	327,000 (720,911)	654,000 (1,441,823)	981,000 (2,162,734)	1,308,000 (2,883,646)	1,635,000 (3,604,558)
	Mud Depth at Edge of Mixing Zone (cm)							
10 m 500 bbl/h (79,546 L/h) 10 cm/sec	0.1	0.3	0.6	1.1	2.2	3.3	4.4	5.5
10 m 500 bbl/h (79,546 L/h) 30 cm/sec	0.18	0.45	0.9	1.8	3.6	5.4	7.2	9.0
20 m 500 bbl/h (79,546 L/h) 10 cm/sec	0.4	0.9	1.9	3.7	7.4	11.1	14.8	18.5
20 m 500 bbl/h (79,546 L/h) 30 cm/sec	0.19	0.48	0.95	1.9	3.8	5.7	7.6	9.5
10 m 250 bbl/h (39,773 L/h) 2 cm/sec	0.006	0.015	0.03	0.05	0.1	0.15	0.20	0.25

Note: Shaded areas indicate model scenarios that predict a drilling mud depth of 1 cm or less in areas at or beyond the 100-m mixing zone boundary.

Accumulations of drilling mud greater than 1.0 cm deep were predicted beyond the mixing zone boundary for several scenarios for discharges to waters 100 and 150 m (328-492 ft) deep with current speeds of 10 cm/sec (0.3 ft/sec) (Table 9). This was due to the lower lateral dispersion of the discharge plume at low current speeds resulting in the accumulation of drilling mud in an area beyond the mixing zone boundary.

For discharges to water depths of 20 to 40 m (66-131 ft), mud deposition depths of 1.0 cm (0.4 in) or less at or beyond the mixing zone are predicted to occur for discharge of as much as 500 percent of the average amount of total drilling mud produced by an exploratory well for one of the model test cases: a discharge at the maximum allowable rate of 750 bbl/h to waters 40 m deep with a current speed of 100 cm/sec (3.3 ft/sec) (Modeling Test Case 15, Table 7).

For the remaining five modeling test cases, mud deposition depths less than 1.0 cm (0.4 in) at or beyond the mixing zone are predicted to occur for some, but not all, of the mud discharge scenarios (Table 10). Modeling test cases for which the depth of drilling mud at or beyond the mixing zone boundary was predicted to be 1.0 cm or less were generally for discharges less than the average total drilling mud discharge to 20- and 40-m water depth and current speeds of 10 and 30 cm/sec (0.3-1.0 ft/sec), although mud discharges of 100 percent or less of the average total mud discharge to water depths of 20 and 40 m at a current speed of 150 cm/sec (4.9 ft/sec) were not predicted to exceed the 1.0-cm depth (Table 10).

For discharges to water depths of 10 to 20 m (33-66 ft), mud deposition depths of 1.0 cm (0.4 in) or less at or beyond the mixing zone are predicted to occur for discharge of as much as 500 percent of the average amount of total drilling mud produced by an exploratory well for one of the model test cases: a discharge at the rate of 250 bbl/h to waters 10 m deep with a current speed of 2 cm/sec (0.07 ft/sec) (Modeling Test Case 3, Tables 8 and 11).

For the remaining five modeling test cases, mud deposition depths less than 1.0 cm (0.4 in) at or beyond the mixing zone are predicted to occur for some, but not all, of the mud discharge scenarios (Table 11). Modeling test cases for which the depth of drilling mud at or beyond the mixing zone boundary was predicted to be 1.0 cm or less were generally for discharges less than the average total drilling mud discharge to water depths of 10 and 20 m and current speeds of 10 and 30 cm/sec (0.3-1.0 ft/sec).

SUMMARY

Computer modeling of drilling discharges and results obtained in other OCS areas support the following conclusions for drilling mud discharges in the Lease Sale 149 area:

- Drilling muds tend to be diluted rapidly following discharge. For a given discharge rate and mud density, the dilution is dependent on the density structure of the water column, the water depth, and the current speed.

- During open-water discharge in water depths ranging from 40 to 300 m (131-984 ft), the model-predicted minimum solids and dissolved component dilutions at the edge of the mixing zone are 1,039:1 and 886:1, respectively. In general, the modeling test cases evaluated indicate that discharge of drilling muds in 40-m (131 ft) water depth at current speeds less than 100 cm/sec (3.28 ft/sec) will likely result in the accumulation of drilling mud beyond the mixing zone boundary to depths greater than 1.0 cm (0.4 in). Drilling mud discharges to waters 100 to 300 m (328-984 ft) deep at current speeds less than 30 cm/sec (1.0 ft/sec) will likely result in the initial deposition of drilling mud beyond the mixing zone boundary to depths greater than 1.0 cm.

- During open-water discharge in water depths ranging from 20 to 40 m (66-131 ft), the model-predicted minimum solids and dissolved component dilutions at the edge of the mixing zone are 1,252:1 and 700:1, respectively. The test cases used to evaluate discharge of drilling muds to waters 20 to 40 m (66-131 ft) deep indicate that discharge of drilling muds to receiving waters with current speeds less than 150 cm/sec (4.9 ft/sec) will likely result in the accumulation of drilling mud beyond the mixing zone boundary to depths greater than 1.0 cm (0.4 in), except for a discharge at the maximum allowable rate of 750 bbl/h to waters 40 m deep with a current speed of 100 cm/sec (3.3 ft/sec). Drilling mud discharges to these waters with current speeds below 100 cm/sec will likely result in the initial deposition of drilling mud beyond the mixing zone boundary to depths greater than 1.0 cm.

- During open-water discharge in water depths ranging from 10 to 20 m (33-66 ft), the model-predicted minimum solids and dissolved component dilutions at the edge of the mixing zone are 1,683:1 and 269:1, respectively. Test cases used to evaluate discharge of drilling muds to waters 10 to 20 m (33-66 ft) deep indicate that discharge of drilling muds to receiving waters at current speeds greater than 2 cm/sec (0.07 ft/sec) will likely result in the accumulation of drilling mud beyond the mixing zone boundary to depths greater than 1.0 cm (0.4 in).

WATER QUALITY

Marine Water-Quality Criteria

The 403(c) regulations allow a 100 m (330 ft) radius mixing zone for initial dilution of drilling wastes. At the edge of the mixing zone, marine water-quality criteria must be met. Compliance with water-quality criteria is assessed in this section.

Marine water-quality criteria for the protection of aquatic life (45 FR 79318, 50 FR 30784, 51 FR 43665, and 52 FR 6213) are stated as acute values (1-hour average concentration) and chronic values (4-day average concentration). The chronic criteria apply to a relatively constant flux of pollutants. Acute criteria values apply to instantaneous releases or short-term discharges of pollutants. Because drilling mud discharges are episodic with durations of only a few hours, the acute criteria apply to drilling mud discharges (Petrazzuolo 1981).

Federal water quality criteria for metals in marine waters were stated in terms of acid-soluble concentrations of trace metals, which until recently was believed by EPA to be the "scientifically correct" basis upon which to establish water quality criteria for trace metals (U.S. EPA 1986b). Recently, however, EPA has re-evaluated the use of metals criteria in water quality standards extended to protect aquatic life (U.S. EPA 1992b). This guidance supersedes past criteria document statements expressing criteria in terms of an acid-soluble analytical method.

The EPA guidance (Interim Guidance on Interpretation and Implementation of Aquatic Life Criteria for Metals) on metals recommends that compliance with water quality standards be evaluated using measurements of total recoverable metals because this extraction procedure more accurately reflects the bioavailable fraction, and hence the potential toxicity, of a metal (U.S. EPA 1992b). The four methods of sample preparation for metals analysis that have been recognized by EPA include 1) total metals, 2) total recoverable metals, 3) acid-soluble metals, and 4) dissolved metals. The first three of these methods measure metals that are dissolved in water, along with metals that become dissolved when samples are refluxed in acid. The severity of the extraction procedures decreases in the order: total metals > total recoverable metals > acid soluble metals method. Dissolved metals are operationally defined as those that pass through a 0.45 m pore-size filter at the time of collection (i.e., no acid is used).

The Toxics Rule (57 FR 60865) also states that the total recoverable metals criteria unadjusted for site chemistry should be applied. EPA has determined that this is a reasonable, albeit environmentally conservative, strategy for applying EPA's aquatic life criteria. (The only exception would be if a state adjusts the criteria based upon a water-effect ratio, and this has not been done by Alaska.) Under the Toxics Rule, effluent monitoring should measure the total recoverable metals, which allows for a direct comparison with the corresponding total recoverable metal criteria.

Evaluation of water quality compliance for the discharge of drilling muds during exploratory oil and gas drilling is based on measurements of total metals concentrations. Metal concentrations have been reported as "whole mud concentrations" which are assumed to be equivalent to values obtained using the total metals method. Determination of compliance with EPA's aquatic life criteria for metals requires that these data be used to compare with the total recoverable metals. While evaluation of compliance using total recoverable metals is preferred because this method would provide a direct comparison, no conversion factors are available for converting from the values obtained using the total metals method to total recoverable metals. For this general permit, EPA has decided to compare the total metal concentration with the total recoverable metal criterion. This is a conservative approach since total metal extraction is more vigorous than total recoverable metal extraction.

Table 12 shows the maximum predicted total metal concentrations for arsenic, barium, cadmium, chromium, copper, lead, mercury, and zinc at the edge of the mixing zone due to the discharge of Alaskan drilling muds for 8 of the 23 model cases described above [i.e., for water depths of 10 m (33 ft), 20 m (66 ft), 40 m (131 ft), and 100 m (330 ft) in open water at two different current speeds]. The eight model cases shown in Table 12 include the lowest predicted dilution factors (i.e., the most conservative evaluation of compliance with water quality criteria) of the 23 model cases evaluated. The predicted total metal concentration is based on the 90th percentile of the reported drilling mud total metal concentration, and the dilution factors predicted by the OOC model for selected open-water discharge scenarios available in Tables 6-8. The equation used to calculate these concentrations is described in the ODCE.

The predicted total metal concentration at the edge of the mixing zone may be compared directly to the marine acute water quality criterion presented in Table 12. However, the ratio of the marine acute metal criterion to the predicted total metal concentration is also presented in this table to facilitate comparison with the metals water quality criteria.

The hazard quotient (HQ) values shown in Table 12 should be interpreted in the following way:

- Compliance with acute water quality criteria: HQ <<< 1.0. HQ values substantially lower than 1.0 are indicative of unlikely, or minimal effects.

TABLE 12. COMPARISON OF MIXING ZONE BOUNDARY - PREDICTED TOTAL METAL CONCENTRATIONS TO ACUTE MARINE WATER QUALITY CRITERIA FOR DISCHARGE OF DRILLING MUDS IN ALASKAN WATERS

Metal	90th Percentile Mud Metal Concentration[a] (mg/kg)	Total Concentration[b] (mg/L)	Acute Marine Water Quality Criterion[c] (mg/L)	Open-Water Discharge, Current Speed of 10 cm/sec				Open-Water Discharge, Current Speed of 30 cm/sec			
				Case 17	Case 10	Case 4	Case 1	Case 18	Case 11	Case 5	Case 2
				Water Depth							
				100 m	40 m	20 m	10 m	100 m	40 m	20 m	10 m
				Predicted Concentration at the Mixing Zone Boundary[d] (mg/L)							
Arsenic	6.48	6.64	0.069	0.0025	0.0066	0.0089	0.0158	0.0009	0.0075	0.0095	0.0247
Barium	272,800	279,347	NA	107	276	374	665	38.3	315	399	1038
Cadmium	2.84	2.908	0.043	0.0011	0.0029	0.0039	0.0069	0.0004	0.0033	0.0042	0.0108
Chromium	653	669	1.1	0.257	0.61	0.895	1.592	0.092	0.755	0.955	2.486
Copper	76	77.8	0.0029	0.030	0.077	0.104	0.185	0.011	0.0878	0.111	0.289
Lead	70.58	72.3	0.22	0.028	0.071	0.0968	0.172	0.0099	0.0816	0.103	0.269
Mercury	0.361	0.370	0.0021	0.0001	0.0004	0.0005	0.0009	0.0001	0.0004	0.0005	0.0014
Zinc	541	554	0.095	0.212	0.547	0.742	1.319	0.076	0.625	0.791	2.059
				Ratio of Predicted Metal Concentration to Acute Water Quality Criterion (HQ)							
			Arsenic	0.0362	0.0956	0.1290	0.2290	0.0130	0.1087	0.1377	0.3580
			Barium	--	--	--	--	--	--	--	--
			Cadmium	0.0256	0.0674	0.0907	0.1605	0.0093	0.0767	0.0977	0.2511
			Chromium	0.2336	0.6009	0.8136	1.447	0.0836	0.686	0.868	2.260
			Copper	10.34	26.55	35.86	63.79	3.793	30.28	38.28	99.65
			Lead	0.1272	0.3227	0.4400	0.7818	0.0450	0.3709	0.468	1.223
			Mercury	0.0476	0.1905	0.238	0.428	0.0476	0.1905	0.2381	0.6666
			Zinc	2.231	5.758	7.810	13.88	0.800	6.578	8.326	21.67

a 90th Percentile metal concentrations are from U.S. EPA, Region X database entries made through 3/8/93 (1993b). Measurements have been made using total metals analysis techniques. Water quality criteria are in terms of total recoverable metals.

b Total concentration was calculated by multiplying the metal concentration by the density of seawater (1.024 kg/L).

c U.S. EPA Water Quality Criteria (1992a).

d The predicted total-metal concentrations calculated by dividing the estimated dissolved-metal concentration by the appropriate OOC model-predicted dilution factor in Tables 6 through 8.

NA = No data available.
Shaded values violate acute water quality criteria.

- Potential exceedence of acute water quality criteria: HQ ≥ 1.0. HQ values approximating 1.0 are usually considered to indicate the need for further analysis in order to better define the potential for risk (U.S. EPA 1991b).

For metals other than copper and zinc, and, in certain cases, chromium and lead, total concentrations are estimated to be less than acute water quality criteria (see Table 12). In light of the conservative (or protective) nature of the comparison between total metals analyses and total recoverable standards, EPA does not believe that the discharges of drilling muds will cause exceedences of the marine water quality criterion at the edge of the mixing zone. However, because of the uncertainties in the analysis outlined above, EPA will be including a requirement for total and total recoverable metals analyses in the proposed general permit. It is anticipated that the compliance of metals with water quality standards will be a subject of review during permit reissuance and possibly during the term of the general permit.

Organic compounds found in drilling muds also have the potential to cause marine water quality criteria exceedances. None of the individual compounds detected in drilling mud samples have established acute marine water quality criteria, and only one, naphthalene, has a reported lowest observed effects level (LOEL). Naphthalene concentrations are not expected to exceed the LOEL unless dilutions are less than 2:1. All of the dilutions predicted for model cases exceed this value. More organic chemical data are needed to fully assess the potential for organic compounds in discharged drilling muds to violate water quality criteria.

EFFECTS ON MARINE BIOTA

For the purposes of this appendix, important marine habitats are defined as areas used by a disproportionate number of individuals and/or species, or those areas that have been designated under federal or state authority. The following section identifies areas of special significance, briefly describes biologic communities, and addresses the potential impacts of drilling muds and cuttings from exploratory drilling on components of the biota and on the biotic community as a whole. The effects of exploratory drilling discharges on marine biota in lower Cook Inlet and Shelikof Strait were discussed in detail in EPA 1984b. The following sections summarize discussions from EPA (1984b) and include new information. Particular attention is given to the benthic community and to the potential for toxicity to all components of the ecosystem.

State and Federally Designated Special Aquatic Sites

The State of Alaska has set aside several areas for fish and wildlife which include tidal habitat around Cook Inlet and Shelikof Strait (ADFG 1991). Kachemak Bay, Redoubt Bay, Clam Gulch, and Kalgin Island have been designated critical habitat areas (Figure 3). Trading Bay, Susitna Flats, Potter Point, Goose Bay, McNeil River, and Palmer Hay Flats are designated state game refuges. McNeil River (adjacent to the McNeil River state game refuge) has been designated as a state game sanctuary. In addition to state-designated lands within or adjacent to the Lease Sale 149 area, there are several federally designated National Wildlife Refuges (Alaska Maritime, Kodiak, Becharof, Alaska Peninsula) and National Parks and Preserves (Katmi and Lake Clark) bordering the Lease Sale area.

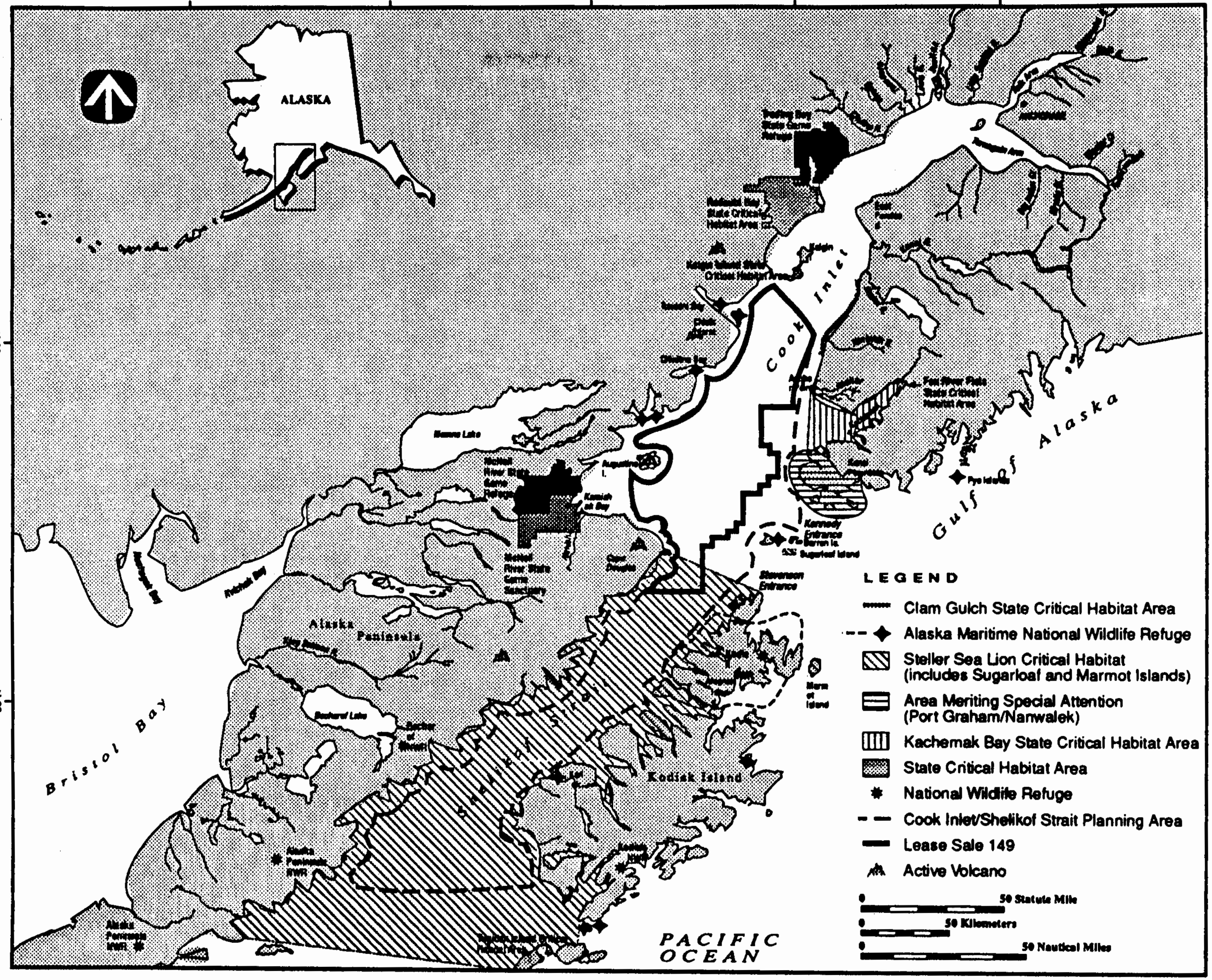


Figure 3. Special Aquatic Sites and Wildlife Refuges.

Pursuant to the Endangered Species Act, the National Marine Fisheries Service (NMFS) has recently designated (effective September 27, 1993) areas within and adjacent to Shelikof Strait, and other areas outside of the proposed Lease Sale 149 area, as a critical habitat for Steller sea lions (50 CFR Part 226). The NMFS designated major Steller sea lion rookeries, haul-out sites, and associated areas, as well as three special foraging areas (Shelikof Strait, Seguam Pass, and the Bogoslof Island region in the Aleutian Islands), as critical habitat (50 CFR Part 226). In Alaska (including the Lease Sale area), major Steller sea lion rookeries, haul-outs, and associated aquatic, terrestrial, and air zones are designated as critical habitat. Critical habitat includes an aquatic zone extending 37 kilometers (20 nautical miles) seaward (west of 144°W longitude), a terrestrial zone extending 0.9 kilometer (3,000 ft) landward, and air zones extending 0.9 kilometer (3,000 ft) above the terrestrial and aquatic zones, from each major rookery and haul-out. Major haul-outs were defined as sites where more than 200 Steller sea lions have been counted at least once since 1970. Locations of major Steller sea lion haul-outs and rookeries in the vicinity of Lease Sale 149 are presented in Figure 4.

Benthic Invertebrate Communities

Distribution

The benthic community plays a vital role in the ecosystem, both as important prey for higher trophic levels and as mediators for nutrient recycling. Several benthic species, such as Tanner crab, Dungeness crab, weathervane scallop, and shrimp, are harvested commercially.

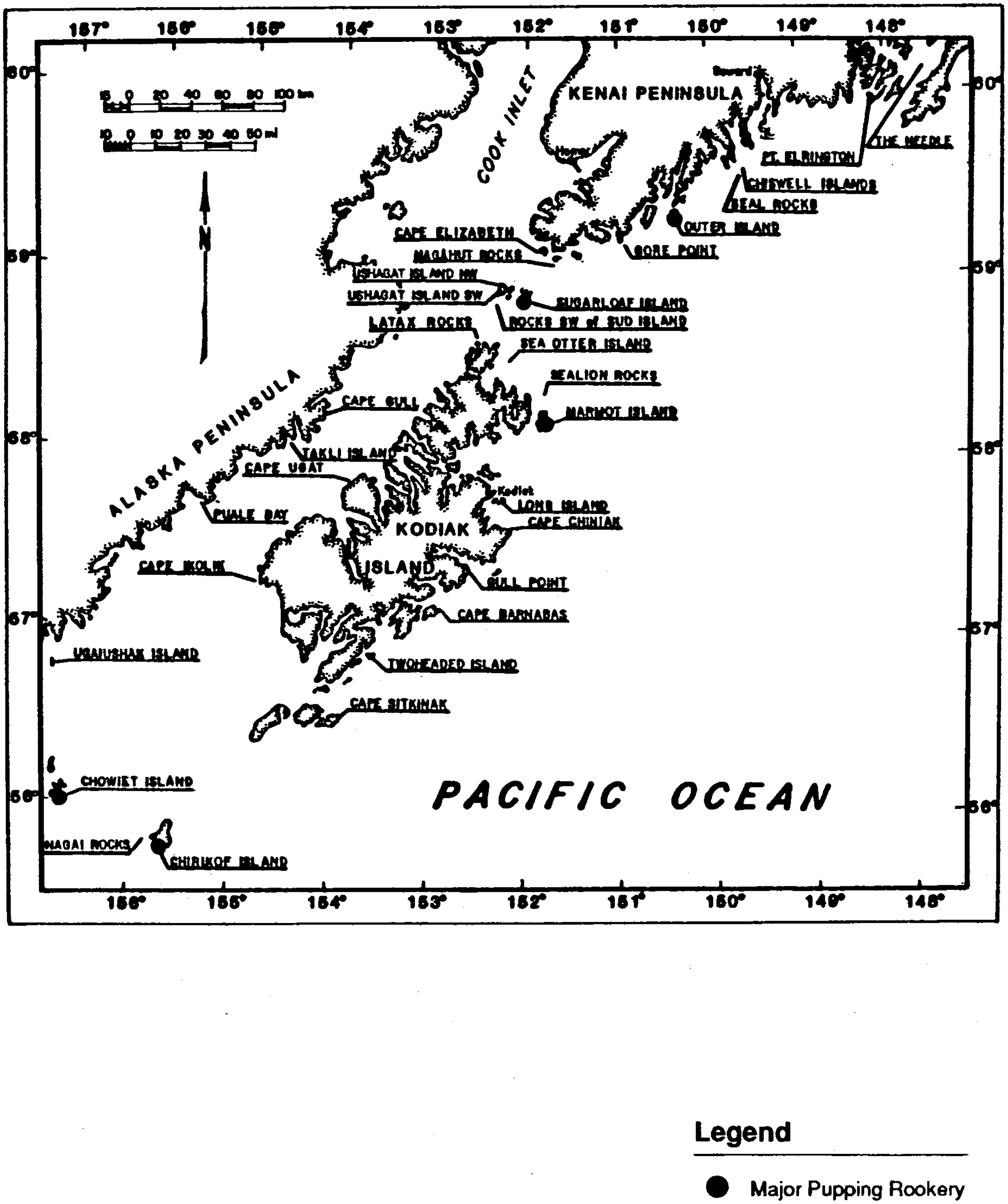
The distribution of benthic species in lower Cook Inlet was surveyed during 1976 to 1978 by Feder (1978, 1979, 1981). Some 165 epifaunal species (species living on the surface of the substrate) were collected. Arthropods, mollusks, and echinoderms accounted for 60, 59, and 23 of the species and for 91, 4, and 3% of the total numbers of organisms, respectively (Feder 1981). The average biomass was 2.4 grams per square meter, with the highest biomass recorded in outer Kachemak Bay (9.1 grams per square meter) (Feder 1981). Species contributing the greatest biomass were the sea cucumber, the green sea urchin, and the commercially important Tanner and king crabs and humpy shrimp. (Scientific names for these species are given in Table 13).

Several areas are particularly important habitats for commercially harvested species. The outer Kamishak Bay, Kachemak Bay, the area between Cape Douglas and the Barren Islands, and part of Shelikof Strait are nurseries for Tanner crab (Feder 1979, DOI 1981). Kachemak Bay, Kamishak Bay, and areas of Shelikof Strait are important habitats for king crab, Dungeness crab, and pandalid shrimp (Feder 1981, DOI 1981). Populations of pink and humpback shrimp are declining and current harvests are allowed over limited areas in Cook Inlet and Shelikof Strait (DOI/MMS 1992). Razor clams are harvested primarily from the Kenai Peninsula beaches between Anchor Point as well as Clam Gulch.

Infauna (species living within the sediment) sampled by Feder comprised 264 species, with mollusks, arthropods, and echinoderms accounting for 128, 54, and 26 species, respectively (Feder 1978). Polychaetes were also well represented. Regions within the Lease Sale 149 area supported high infaunal biomass and species diversity.

Effects of Waste Discharges

The National Research Council (NRC) (1983) and EPA (1984b) have identified the potential detrimental benthic impacts of discharged drilling fluids and cuttings in low-energy environments as:



Source: Calkins and Pitcher 1982 Modified based on 50 CFR Part 226

Figure 4. Steller Sea Lion Major Haulouts and Rookeries from Prince William Sound to Chirikof Island, as Designated Under 50 CFR Part 226

Table 13. Common and Latin Names of Species Described in the Text

Common Name	Latin Name
Invertebrates	
Blue king crab	Paralithodes platypus
Dock shrimp	Pandalus danae
Dungeness crab	Cancer magister
Green sea urchin	Strongylocentrotus droebachiensis
Humpy shrimp	Pandalus goniurus
Octopus	Octopeda
Red king crab	Paralithodes camtschatica
Sea cucumber	Holothuroidea
Squid	Teuthoidea
Tanner crab	Chionoecetes bairdi
	Chionoecetes opilio
Fishes	
Arrowtooth flounder	Atheresthes stomias
Atka mackerel	Pleurogrammus monopterygius
Capelin	Mallotus villosus
Dolly Varden	Salvelinus malma
Eulachon	Thaleichthys pacificus
Flatfish	Pleuronectidae
Flathead sole	Hippoglossoides elassodon
Lanternfish	Myctophidae
Ocean perch	Sebastes alutus
Pacific cod	Gadus macrocephalus
Pacific hake	Merluccius productus
Pacific herring	Clupea harengus
Pacific halibut	Hippoglossus stenolepis
Rock sole	Lepidopsetta bilineata
Rockfish	Sebastyes spp.
Sablefish	Anoplopoma fimbria
Sand lance	Ammodytes hexapterus
Salmon, sockeye	Oncorhynchus nerka
Salmon, pink	Oncorhynchus gorbuscha
Steelhead	Salmo gairdneri
Yellow Irish Lord	Hemilepidotus jordani
Yellowfin sole	Limanda aspara
Walleye pollock	Theragra chalacogramma

Table 13. Continued

Common Name	Latin Name
Mammals	
Pinnipeds	
California sea lion	Eumetopias jubatus
Harp seal	Phoca groenlandica
Harbor seal	Phoca vitulina richardsi
Northern elephant seal	Mirounga angustirostris
Northern fur seal	Callorhinus ursinus
Steller sea lion	Eumetopias jubatus
Baleen Whales	
Blue whale	Balaenoptera musculus
Fin whale	Balaenoptera physalus
Gray whale	Eschrichtius robustus
Humpback whale	Megaptera novaeangliae
Minke whale	Balaenoptera acutorostrata
Sei whale	Balaenoptera borealis
Sperm whale	Physeter macrocephalus
Right whale	Balaena glacialis
Toothed Whales	
Beluga whale	Delphinapterus leucas
Killer whale	Orcinus orca
Pilot whale	Globicephala macrorhynchus
Other	
Dall's porpoise	Phocoenoides dalli
Harbor porpoise	Phocoena phocoena
White-sided dolphin	Lagenorhynchus ololiquidens
Sea otter	Enhydra lutris
Birds	
Pelagic	
Black-legged kittiwake	Rissa tridactyla
Brandt's cormorant	Phalacrocorax penicillatus
Common murre	Uria lomvia
Crested auklet	Aethia cristatella
Fork-tailed storm petrel	Oceanodroma furcata
Glaucous-winged gull	Larus glaucescens

Table 13. Continued

Common Name	Latin Name
Shearwater	Puffinus spp.
Thick-billed murre	Uria aalgae
Tufted puffin	Lunda cirrhata
Waterfowl and Land Birds	
Aleutian Canada goose	Branta canadensis leucopareia
American peregrine falcon	Falco peregrinus anatum
Arctic peregrine falcon	Falco peregrinus tundrius
Black Brant goose	Branta bernicla nigricans
Canada goose	Branta canadensis
Dunlin	Calidris alpina pacifica
Dusty Canada goose	Branta canadensis occidentalis
Short-tailed albatross	Diomeda albatrus
Snow goose	Chen caerulescens
Spectacled eider	Somateria fischeri
Steller's eider	Polysticta stelleri
Trumpeter swan	Olor buccinator
Tule white-fronted goose	Anser albifrons elgdsi
Western sandpiper	Calidris mauri

- physical smothering of benthic fauna;
- alteration of sediment chemistry and texture; and
- introduction of substances to the fauna which may have direct toxic effects or which may bioaccumulate.

Smothering. Many benthic invertebrtes are relatively sedentary and sensitive to environmental disturbance and pollutants. Short-term effects of drilling muds and cuttings on benthic invertebrates are expected to include smothering of biota and, consequently, reduce the abundances of benthic organisms such as polycheates, molluscs, and crustaceans. The response of benthic organisms to smothering is a function of several interacting factors, including the depth of covering material, the burial time, the temperature, and the difference in grain size of the material relative to the natural sediment (Maurer et al. 1980).

Deposition of muds and cuttings (area and thickness of accumulations) on the sea floor depends on their composition, discharge velocity, and depth of the discharge in relation to the bottom, as well as hydrodynamic processes such as currents and turbulence in the receiving waters. The deposition patterns of discharged muds and cuttings vary because of differences in the particle size composition. Cuttings, with some adhered mud, will settle very close to the discharge point. Accumulations of cuttings are greatest at shallow watersites with little current. Within months after cessation of discharges, cutting accumulations will decrease in size and height due to settling and redistribution of cuttings by currents.

Accumulations of cuttings on the sea floor can have a short-term impact on benthic species with low mobility, such as clams and polychaetes. However, in areas with swift bottom currents, such as deeper portions of lower Cook Inlet and Shelikof Strait, any accumulation of cuttings would be expected to disperse rather rapidly. Previous studies on deep water drilling sites in Cook Inlet (Dames and Moore 1978) indicated that bottom currents prevented the formation of a visible cuttings pile.

Little information is presently available concerning the effects of various deposition depths on benthic communities. Most of the studies that have investigated impacts on benthos have examined depostion of dredged material. Of the species examined, burial depths from which organisms have been able to migrate to the surface ranged from 1 to 32 cm (0.4 to 12.6 in). Studies of the burrowing limitations of 10 bivalves show that the clam Protothaca staminea and Transennella tantilla are most sensitive to burial, with critical depths being 5 cm (2.0 inches) (Armstrong 1965) and 2.5 cm (1 inch) (Maurer et al. 1980), respectively. Arthropods are more mobile than bivalves; the Dungeness crab was the most sensitive to burial of three species studied (Chang and Levings 1978; Maurer et al. 1981). The Dungeness crab was unable to emerge through 20 cm (8 inches) of deposit. If it is assumed that most benthic organisms are not adversely affected by deposition of drilling muds less than 1 cm (0.4 in), benthos in the vicinity of the discharge receiving deposition in excess of this amount may be impacted by drilling activities.

It is not possible to accurately predict the area within the Cook Inlet Sale Area receiving deposition exceeding 1 cm (0.4 in) due to the uncertainty of drilling rig location and site-specific oceanographic conditions. However, water depths greater than 40 m (131 ft) are not expected to receive drilling mud deposition exceeding 1 cm (0.4 in). A "worst case" scenario can be developed by determining the area that would be affected if the total volume of discharge were evenly spread to a depth of 1 cm (0.4 in). An estimated 4,223 m^3 of drilling muds, using a mud density of 2.09 g/l (17.4 lb/gal) is expected to be produced from the 11 exploratory and 17 delineation wells estimated from the High Case Scenario.

Evenly distributed to a depth of 1 cm (0.4 in), this would cover a maximum of 41 ha (102 ac). Since the Cook Inlet/Shelikof Strait Planning Area encompasses approximately 0.8 million ha (1.9 million ac), approximately 0.005 percent of the lease area would potentially receive greater than 1 cm (0.4 in) deposition of drilling mud for this "worst case" scenario. The values given above do not include cuttings, and thus, can be considered underestimates, although cuttings are expected to be deposited within the mixing zone and would not be expected to contribute substantially to the total solids deposition outside the mixing zone (Jones & Stokes 1990). Given the extremely small percentage of the planning area expected to be covered by greater than 1 cm (0.4 in) of deposited solids, the inclusion of cuttings in the calculations would not alter the conclusion that the impacted area is extremely small relative to the entire planning area.

Alteration of Sediment Chemistry and Texture. Alteration of sediment characteristics is expected to affect the benthos more subtly than smothering, but over larger areas. Menzie et al. (1980) noted reduced abundances of polychaetes, echinoderms, mollusks, and crustaceans up to 370 m (1,213 ft) from a well in a low-energy, mid-Atlantic OCS site in 120 m (393 ft) of water. The discharge from this well was 3 times greater (2,160 mt [2,380 t]) than the anticipated cutting and mud discharges from exploratory wells in Lease Sale 149. The authors could not attribute the population depressions to any one factor, but they suggested four possible mechanisms: (1) fish and large epibenthic invertebrates attracted to the drilling area reduced benthic populations through predation; (2) mobile crustaceans emigrated from the discharge area; (3) altered sediment composition adversely affected the feeding and survival of some benthic species; and (4) altered sediment composition inhibited larval recruitment. The initial impact zone was recolonized and commenced recovery within a year of cessation of drilling mud discharge.

An 8-week recolonization study conducted by Tagatz et al. (1985) consisted of boxes containing clean sand (control); 1:10 or 1:3 barite:sand mix; and 1:10 or 1:3 drilling mud:sand mix placed in 3 m (10 ft) of water in Santa Rosa Sound, Florida. A total of 1,081 individuals representing 63 species recolonized the boxes. There were 43 species in the control substrate compared with 38 species in the barite:sand mixes, 32 species in the 1:10 mud:sand mix, and 24 species in the 1:3 mud:sand mix. The apparent toxicity of the lime drilling mud was attributed to diesel oil, a component prohibited from use in EPA Region 10. Although there were significantly fewer individuals in the 1:3 barite:sand mix compared with the control (220 compared to 296), species diversity, species dominance, and dissimilarity indices were not markedly affected.

Toxicity. Houghton et al. (1980) identified lignosulfonates and caustic soda (sodium hydroxide), through an effect on pH, as the most acutely toxic components of water-based drilling fluids. The NRC (1983) identified diesel fuel (No. 2 fuel oil) and biocides as two of the most toxic constituents which may be present in some drilling muds. In light of this, EPA Region 10 permits for offshore drilling operations have prohibited the discharge of diesel oil and limited the toxicity of drilling muds.

Generally, the animals tested in laboratory bioassay studies have a high tolerance to whole drilling muds (EPA 1984b). Dock shrimp larvae had the lowest suspended particle phase LC_{50} of any Alaskan organisms tested in an unmixed whole mud (LC_{50} of 600 parts per million) (Carls and Rice 1984). However, it is possible the mud used was formulated with a component containing hexavalent chromium, which is highly toxic to marine life and is not permitted by EPA Region 10. Other low EC_{50}s are 10,000 parts per million for Mya arenaria (weighted polymer) and 14,000 parts per million for the amphipod Orchestia traskiana (KCL-XC-polymer) (EPA 1984b). The EC_{50} is the concentration at which a designated effect is displayed by 50% of the test organisms.

The toxicity of drilling muds and barite to lancets (Branchiostoma carbaeum) was tested in flow-through aquaria (Clark and Patrick 1987). Lancets were kept in 1:1 clean sand:test sediment, with additional daily treatments of barite or lime to a depth of 0.15 to 0.23 cm (0.06 to 0.09 inch). Although burrowing was reduced, making the animals more susceptible to predation, neither barite sediment nor barite additions were toxic to lancets. Seawater/lignosulfonate mud and lime mud were toxic to buried animals after 7 days, and to animals on the surface within 24 hours. Lightly treated lignosulfonate was toxic to both buried and surface lancets within 24 hours. Drilling muds are one to two orders of magnitude more toxic to mysids (Mysidopsis bahia) than they are to lancets (Gaetz et al. 1986).

Although few studies have been conducted, it is possible that other benthic organisms emerge from drilling mud deposits. This would not only make the animals more susceptible to predation, but would attract predators to selectively feed in the area of drilling mud deposits, increasing the chance of heavy metal accumulation through the food web.

Bioaccumulation. Heavy metals can be highly persistent in the environment and some metals have the potential to bioaccumulate in marine organisms and to biomagnify through food webs, possibly leading to humans. Pelagic species are subjected to drilling muds intermittently for short periods and would not be exposed to a high bioaccumulation potential. Benthic organisms are particularly susceptible to bioaccumulation since they live on and in drilling mud deposits. Mercury, cadmium, and barium are of most concern due either to toxicity and propensity to bioaccumulate, or to the possibility of exposure to high concentrations. Anderson et al. (1987) reported that marine species have demonstrated little bioaccumulation from exposure to sediments contaminated with heavy metals, with the exception of mercury, cadmium, and copper.

Mercury, one of the few metals to biomagnify (increase in concentration up trophic levels), may be in excess of 10 parts per million in some drilling muds. Concentrations of mercury in ocean sediments range from less than 10 to 2,000 parts per billion, with a mean of 100 parts per billion (D'Itri 1972). Although mercury discharged in drilling muds is largely inorganic and not bioavailable, virtually any mercury compound may become a bioaccumulation hazard for organisms since bacteria common to most natural waters are capable of biomethylating the metal (Callahan et al. 1979). Several studies have reported sediment and organism mercury concentrations to be correlated; however, some organisms, such as polychaetes, probably absorb mercury from the water through their epidermis (Jensen and Baatrup 1988). The polychaete Nereis virens exposed to 9 parts per billion mercury as mercuric chloride in aquaria water had a bioconcentration factor of 930 with a constant rate of uptake. Constant rates of mercury uptake in marine polychaetes have been observed for over 72 days (Kendall 1978).

Cadmium can accumulate to high levels in marine organisms without causing apparent ill effects, due perhaps to proteins such as metallothionein that detoxify non-essential metals (Hamer 1986, Langston and Zhou 1987). Several studies have reported sediment and organism cadmium concentrations to be correlated, with cadmium bioconcentration factors for oysters ranging from 0.008 to 40 times that of sediment (Neff et al. 1978, Atwood et al. 1979). However, it is apparent that Macoma accumulates cadmium primarily from water (Langston and Zhou 1987). Macoma exposed to 100 micrograms of cadmium per liter of seawater had a linear uptake of cadmium (0.354 microgram cadmium per gram dry tissue per day) for the 29-day period of exposure. The elimination rate from the soft tissue was very slow (1% of the accumulated cadmium was eliminated daily), although the rate of loss from the shell was faster (46% in 7 days).

Barium is considered a chemical of concern due to its high concentration in drilling muds and propensity to settle on the substrate, although it has low toxicity. Barium concentrations in the drilling muds are reported to range from 7 to 495,000 milligrams per kilogram (dry weight) (Table 3).

Bioaccumulation has been described in non-Alaskan species. Mariani et al. (1980) found barium in benthic organisms to be about 10 times that of sediment concentrations.

Benthic Community Recovery

After cessation of drilling activity, benthic communities will recolonize the area, although pioneer species may not be the same as those present prior to drilling. Menzie et al. (1980) suggested that benthic communities within the initial impact zone are recolonized and commence recovery within a year following cessation of discharge. The potential for bioaccumulation of metals remains (Crippen et al. 1980); however, the discharge of toxic pollutants can be regulated through the NPDES permit.

Crippen et al. (1980) analyzed sediment and benthos for mercury, arsenic, cadmium, lead, and zinc near a drilling site in the Beaufort Sea one year after discharge had ceased. There were suggestions of elevated mercury levels in benthic organisms very near the original discharge site, but no indications of significant bioaccumulation for any of the other metals. The mud discharged from the Beaufort Sea wells studied by Crippen et al. (1980) had mercury levels of 13.0 micrograms per gram, far in excess of those reported in the Region 10 database (Table 3).

A field survey was conducted at the Murchison oil field in the North Sea 16 months after the major cuttings discharges had ceased (Mair et al. 1987). The benthic community was sampled to 2,000 m (6,562 ft) from the discharge point. Species abundance, diversity, and evenness were significantly lower at the 100 m (328 ft) station as compared to the reference station; however, these community parameters were not significantly different from the reference point 1,000 m (3,280 ft) from the discharge point. The community recovery was strongly affected by the oil residues from the oil-based drilling muds. Oil-based drilling muds are not permitted under EPA Region 10 permits.

Summary

Exploratory drilling activities affect the benthic community by smothering, potential for bioaccumulation of selected metals, toxic effects of additives, and changing trophic relationships and larval recruitment. The impact of exploratory drilling to the Cook Inlet/Shelikof Strait community is reduced because:

- The maximum accumulation thickness of muds at the mixing zone boundary is predicted to be 7.7 cm (3.0 inch).
- The control of toxic pollutants and metals is effected by BAT and effluent guidelines.
- Recolonization of the disturbed bottom is expected within a year of cessation of drilling activities.

However, there are indications that drilling mud deposits induce behavioral changes in benthic organisms, possibly leading predators to selectively feed in deposition areas and increasing the chance of metal transfer through the food web. Too few studies have been conducted to assess the scale of these behavioral modifications.

Planktonic Communities

The Gulf of Alaska is one of the most productive areas of the Pacific Ocean (Koblentz-Mishke et al. 1970). Phytoplankton and zooplankton form a major portion of the food base for pelagic and benthic food webs, and they affect nutrient dynamics. Larvae of commercially important epibenthic species (e.g., crab and shrimp) are also members of the zooplankton community.

The seasonal cycle of phytoplankton productivity and standing stock in Cook Inlet/Shelikof Strait is typical of northern temperate waters. Phytoplankton productivity and standing stock increase from April to early July, with peaks in May and early July, respectively. Phytoplankton communities consist of pennate and centric diatoms, dinoflagellates, microflagellates, and other less common groups. Diatoms are usually the most important group at high latitudes (Raymont 1980). In lower Cook Inlet, microflagellates and diatoms dominate the phytoplankton community during spring and summer (Larrance et al. 1977). Thalassiosira spp., Melosira sulcata, and Chaetoceros spp. were most abundant during the Outer Continental Shelf Environmental Assessment Program (OCSEAP) studies, conducted from April to August 1976 (Larrance et al. 1977).

In open waters, phytoplankton are the main food for zooplankton, which in turn are fed upon by many other species. In shallow coastal waters, phytoplankton serve directly as food for benthic filter-feeders such as bivalves, amphipods, and polychaete worms.

Zooplankton communities are composed of a wide variety of organisms which spend either part (meroplankton) or all of their lives as plankton (holoplankton). Meroplankton include larvae and eggs of several commercially important benthic and pelagic species (e.g., shrimp, crab, and finfish). As consumers primarily of phytoplankton, zooplankton growth and reproduction probably follow the seasonal increases in phytoplankton production. Substantial grazing pressure by fishes, birds, and baleen whales also controls the abundance of zooplankton.

Little direct information is available on zooplankton of lower Cook Inlet and Shelikof Strait. The most detailed information comes from Kachemak Bay (Damkaer 1977). However, these data are not necessarily representative of the lower Cook Inlet/Shelikof Strait Planning Area. Copepods are the most abundant zooplankton in Kachemak Bay, lower Cook Inlet, and the Gulf of Alaska. Damkaer (1977) found that the three most abundant copepod species (Pseudocalanus spp., Acartia longiremis, and Oithona similis) in Kachemak Bay increased in abundance from spring to summer. In July and August, populations of the arrowworm (Sagitta elegans) increased markedly. Euphausiid populations paralleled the arrowworm cycle, but at a lesser magnitude and duration. Decapod larvae are present primarily in spring and summer and are more prevalent in bays and nearshore waters (Kendall et al. 1980).

Zooplankton such as mysids, euphausiids, and copepods are important prey of the birds, mammals, and fishes. Microplankton (0.5 to 1.5 millimeters) such as the small copepods (Pseudocalanus spp. and Oithona spp.) are an important food resource for larval fishes. Euphausiids are key items in the diets of adult yellow Irish lord and yellowfin sole; mysids are principal prey of walleye pollock and Pacific halibut (SAIC 1979). Shearwaters, kittiwakes, puffins, and auklets congregate in convergence zones around shallow banks to feed on dense populations of plankton, fish, or both. Copepods and euphausiids are principal foods of minke whales, which occur regularly in lower Cook Inlet.

Effects of Waste Discharges

The possible impacts of drilling mud and waste discharges on marine phytoplankton include:

- decreased primary productivity due to increased turbidity and light reduction or stimulation of primary production by trace nutrients in the discharge;

- decreased primary production or increased mortality due to acute or sublethal toxic effects of trace metals and/or biocides; and

- altered nutritional content of the cells.

Few bioassay data are available on the effects of drilling mud on phytoplankton (EPA 1984b). Of the possible impacts of drilling mud discharges on phytoplankton, the toxic effects of metals such as copper or zinc are of greatest potential concern.

Several factors suggest that discharge of drilling mud from exploratory wells in Lease Sale 149 will have little (if any) immediate impact on phytoplankton. First, most chemicals present in drilling wastes are rapidly diluted to background levels. Background concentrations of suspended solids and metals in dissolved or particulate form are usually reached within 100 to 1,000 m (300 to 3,300 ft) downcurrent of the drilling mud discharges. Second, the residence time of suspended solids and toxicants in the water column is expected to be short. It is unlikely that any pelagic organisms in the vicinity of the mud discharge would be exposed continuously to high concentrations of mud for 96 hours (the time period of most acute bioassays). Drilling muds are discharged intermittently at highly variable rates. Third, most of the toxic metals and trace metals contained in the discharge will be unavailable (i.e., bound to particles in the mud or to ligands present naturally in nearshore waters). Fourth, even if mud discharges affected phytoplankton populations coming in contact with a plume, the mixing of impacted phytoplankton with adjacent unaffected populations and the natural recovery of impacted populations would take place rapidly.

The possible impacts of drilling mud discharges upon marine zooplankton include:

- decreased growth, altered behavior, or increased mortality due to acute or chronic effects of toxic materials in the muds;

- interference with feeding or respiratory activity due to increased suspended solids concentration; and

- indirect enhancement or inhibition of zooplankton populations resulting from changes to phytoplankton.

Some dissolved components of the wastes, such as cupric ion or other metals, could be directly toxic to zooplankton or ichthyoplankton (fish larvae or eggs) (Sunda et al. 1978, Engel and Sunda 1979). Fine inorganic particles contained in the discharge could clog the zooplankton filtering apparatus or be ingested by the animals, reducing the efficiency of feeding and growth.

Although bioassay data concerning the effects of drilling muds on zooplankton are limited (see EPA 1984b), mysids and copepods appear to be sensitive relative to other species tested to water/mud mixtures (Neff 1981). Most authors attribute the sensitivity of certain species to their inability to tolerate high concentrations of suspended particles (Neff 1981). However, little or no impact is expected under field conditions. The period of zooplankton exposure to discharge plumes is intermittent and short relative to bioassay test exposures. Additional considerations presented above in relation to phytoplankton also suggest that impacts of drilling mud discharges on zooplankton will be minimal.

Toxicity. Both cadmium and mercury affect plankton. Exposure to 100 micrograms cadmium per liter seawater for 10 days reduced dinoflagellate population growth by 20% (Prevot and Soyer-Gobillard 1986). Five micrograms cadmium per liter seawater for 10 days reduced diatom spore formation by 35%, and 15 micrograms cadmium per liter reduced spore formation by 81% (Sanders and Cibik 1985). However, concentrations of metals in the water column are not expected to be within the toxicity ranges cited above (Table 12).

The effects of drilling muds on the marine alga Skeletonema costatum were investigated (EG&G Bionomics 1976a, 1976b). The EC_{50} with barite was 385 parts per million; with freshwater lignosulfonate it was 430 parts per million without agitation. With agitation, the EC_{50}s increased to 1,650 and 16,000 parts per million, respectively. Various lignosulfonate formulations were tested in agitated mixes (EG&G Marine Research Laboratory 1976); the lowest EC_{50} was 1,325 parts per million.

The effects of two drilling muds and eight mud additives on the primary production of natural assemblages of Californian marine phytoplankton were assessed by Alldredgel et al. (1986). Short-term (4-hour) exposure to barium sulfate, lignosulfonate, and a reference drilling mud at concentrations over seven orders of magnitude did not affect primary production in the study. The used drilling mud significantly enhanced primary production. Long-term exposure (120 hours) to 10 micrograms per liter of X-Pel-G or Soltex, or to 100 milligrams iron lignosulfonate per liter, significantly reduced production. In no case was the species composition altered. Plankton are unlikely to be exposed to drilling mud discharges for this length of time.

The suspended particulate phase of a reference drilling mud and a used production mud significantly increased hydranth shedding in the coelenterate Tubularia crocea after 48 hours of exposure to concentrations of 100,000 parts per million (Michel et al. 1986). The liquid phase was more toxic, with concentrations of 10,000 parts per million increasing coelenterate shedding.

Summary

Dilution of solids and dissolved materials is predicted for discharges at 40 m (120 ft) and 100 m (330 ft) of water with currents of 10 cm/sec. A minimum particulate dilution of at least 2,216:1 is expected in the water column at 100 m (330 ft) from the discharge for discharges of 1,000 bbl/hr in 100 m (330 ft) of water. (It should be noted that this minimum dilution applies to the area of greatest solids concentration within the plume. Other areas within the plume will experience greater dilutions). At this dilution, estimated suspended solids concentrations are approximately 1,000 mg/l.

Several factors suggest that the discharge of drilling muds will have a limited effect on plankton:

- Most metals will be bound to muds and ligands and will not be available in the water column.
- Expected concentrations of most metals in the drilling mud discharges at the edge of the mixing zone are within the EPA water-quality criteria, which were established to protect marine life.
- The dilution of muds is rapid. At the edge of the mixing zone, dilutions of 1,039 to 1,967-fold are expected for particulates (Table 6). Concentrations of over 1,000 parts per million will probably be present for only 100 m (330 ft) downcurrent of the discharge.

- The residence time of the drilling muds will be much shorter than the 96-hour period of bioassay tests.

- The area affected by detectable discharge plumes is very small relative to the total lease sale area.

Fish Communities

The fish assemblages of Cook Inlet and Shelikof Strait are dominated by demersal species, with the walleye pollock, yellowfin sole, and Pacific halibut being the most abundant species. The nearshore areas of Cook Inlet, particularly Kachemak and Kamishak Bays, and other small inlets and bays, are important habitat for juveniles of herring, capelin, and sand lance (Blackburn 1979). Five species of Pacific salmon migrate seasonally through the Lease Sale 149 area. Pacific herring are abundant throughout the coastal waters of Cook Inlet and Shelikof Strait. Herring utilize the intertidal and subtidal zones in coastal areas to spawn (McGurk 1989). Anadromous fish including chinook, coho, sockeye, chum, and pink salmon are the most important commercial fish in Cook Inlet in terms of harvest volume and value.

Effects of Waste Discharge

Fish are relatively mobile and would be able to avoid the discharge plume. Demersal species are most likely to contact deposited materials, being generally less mobile than pelagic species and feeding on benthic organisms. Lease Sale 149 contains a large number of demersal fish, including walleye pollock, Pacific halibut, yellowfin and rock sole, yellow Irish lord, sculpins, arrowtooth flounder, and Pacific cod. Some demersal fish species are concentrated in the Lease Sale 149 area and could be directly exposed to the discharge plume.

Smothering of Demersal Eggs. Several species, including sand lance, rock sole, flathead sole, and Pacific cod, have demersal eggs could be smothered or otherwise affected if discharge coincides with spawning. Little is presently known about smothering or toxic effects of drilling mud deposition on demersal fish eggs, although, in general, eggs are a particularly sensitive life-history stage. In general, a 1-millimeter (0.04-inch) depth of deposition is the threshold for damage to fish eggs (EPA 1984b). The OOC model suggests that each well will contribute muds and cuttings deeper than 1 millimeter over an area of between 10 and 19 hectares (25 to 46 acres). The total area influenced by eight wells will be less than 152 hectares (368 acres).

Toxicity. The toxicity of whole mud to fish species has been tested. Of the eight Alaskan fish species tested with a total of 24 whole mud samples, all of the 96-hour LC_{50} values exceeded 1,000 parts per million; 95% exceeded 10,000 parts per million; and 43% exceeded 100,000 parts per million (EPA 1984b). Of the Alaskan species tested with approved drilling mud, pink salmon fry (an important commercial species) had the lowest LC_{50} value (3,000 parts per million) based on a volume:volume dilution of continuously suspended drilling mud. The pink salmon fry leave their natal streams and enter the ocean immediately upon hatching, although they remain near shore to feed and grow. Drilling mud discharges could adversely affect the fry if they were within 200 m (660 ft) of the discharge point, and if they remained in the plume for the entire duration of discharge. However, since the Lease Sale boundary is located 3 miles from shore, pink salmon fry should not encounter discharge plumes. All other species of Alaskan fish that have been tested with drilling muds have much higher LC_{50}s (EPA 1984b).

Fish populations are not considered to be at risk from toxicity effects of metals in discharged drilling muds and cuttings.

Bioaccumulation. Heavy metals are the primary constituents of mud and cuttings having potential for bioaccumulation. Most heavy metals in the discharge (over 99%) are likely to be associated with solids rather than occurring as dissolved materials in the water column. Chemically reducing conditions that could release some metals from particulates to sediment interstitial water, or to the overlying water column, are not likely with thin deposition and highly buffered ocean waters.

Fish can bioaccumulate metals either through the water via direct adsorption (Fair and Sick 1984) or by ingestion of contaminated food. Because of the small area of water column affected, the intermittent and short duration of the discharge, and the mobility of fish, it is likely that any metals accumulated by fish would be obtained through diet. Once certain metals are ingested, elimination may be slow (Ballatori and Boyer 1986). It is not possible to predict the degree to which an individual fish will accumulate metals from its prey, although it is thought that this is a relatively minor concern given the wide foraging range of fish. However, incrementally small additions of some metals from diverse sources can increase the potential for bioaccumulation through the food chain.

Effects on Food Supply. Disposal of muds and cuttings could indirectly affect fish by temporarily reducing or increasing their food supplies in the vicinity of drilling rigs. Fieldwork indicates little change in benthic species composition and only a slight reduction in population levels (Tagatz et al. 1985, Gray 1988). Benthic species emerge from drilling muds, making them more susceptible to predation (Clark and Patrick 1987) and possibly attracting predators to selectively feed on drilling mud deposits.

Marine Mammals

Twenty-six species of marine mammals are found either as seasonal migrants or year-long residents in the Gulf of Alaska (Calkins 1987). Of these, 13 species are fairly common in lower Cook Inlet/Shelikof Strait area. These species include cetaceans (gray, humpback, fin, sei, beluga, killer, and minke whales, and harbor and Dall's porpoises), pinnipeds (Steller sea lions, harbor and northern fur seals), and mustelids (sea otters). Four whale species common to the Lease Sale 149 area (gray, fin, sei, and humpback whales) and the Steller sea lion are designated as endangered species. Other endangered whale species (blue, sperm, and right whales) occur in the Gulf of Alaska, but they tend to be present farther offshore and would not be expected in Cook Inlet or Shelikof Strait (DOI 1981). Both the Steller sea lion and the harbor seal have experienced recent declines in abundance.

The gray whale occurs in the north Pacific and Arctic Oceans, ranging from the western Beaufort Sea southward to Mexico (Calkins 1987). Gray whales pass through the Kodiak area during April to June, on their northward migration to summer feeding grounds in the Beaufort Sea, and again in November and December during their southward migration (Fiscus et al. 1976). There is some evidence that subpopulations may have shorter migrations and feed at scattered subarctic locations, although the extent to which they feed in Cook Inlet/Shelikof Strait is unknown. Gray whales normally travel within a few kilometers of shore. The general migratory route is along the eastern and southern shores of Kodiak Island (outside the Lease Sale 149 area); however, some gray whales migrate through Shelikof Strait (Calkins 1987). Gray whale feed on the bottom, primarily on amphipods, polychaetes, molluscs, and fish, in their summer foraging grounds. However, little feeding activity during migration has been documented.

The humpback whale occurs in the Gulf of Alaska in the summer months, arriving from southern wintering grounds in April and departing in November (Calkins 1987). During the summer there are three main concentration areas within the Gulf of Alaska: the area to the south and east of Kodiak Island, including Portlock and Albatross Banks; Montague Strait; and Prince William Sound. The humpback is considered a coastal species and a surface feeder (Fiscus et al. 1976). Sightings have been made southeast of the Barren Islands, and the area of most probable occurrence within the Lease Sale is Shelikof Strait. Prey species include euphausiids and small fishes such as herring and cod (Calkins 1987).

Fin whales are present in the Gulf of Alaska in the summer months, generally between April and September (Calkins 1987). Migratory routes are not well defined, but the species is generally considered to range well offshore (along or inshore of the continental shelf). The Gulf of Alaska is a significant part of the fin whale summer feeding range. From June to August, the largest concentrations of fin whales in the Gulf occur in the Portlock Bank area (Fiscus et al. 1976). Fin whales are also known to occur offshore from Kodiak Island, including Shelikof Strait, and in Prince William Sound (Hall and Tillman 1977). Important prey species include copepods, euphausiids, and small fishes such as capelin and herring (Calkins 1987).

Sei whales are seasonal residents of the Gulf of Alaska, generally arriving in the spring and departing in late summer. The largest known Alaskan concentration occurs just east of Portlock Bank (Fiscus et al. 1976). Sei whales are surface feeders and prey primarily on copepods and lesser amounts of euphausiids and fish (Kawamura 1980).

Minke whales move into the Gulf of Alaska in April and leave the coastal Gulf waters by October (Calkins 1987). In the summer, minke whales are commonly observed in nearshore waters of Kodiak Island, Prince William Sound, and Yakutat Bay. These whales prey primarily on euphausiids and small fish.

Beluga whales are found in Alaskan waters from Yakutat Bay to the Yukon-Alaskan border in the Beaufort Sea. However, their distribution is not continuous, and at least two discrete populations are recognized (Sergeant and Brodie 1969, Gurevich 1980). The Cook Inlet population is currently being evaluated to determine its population status. Sightings reported by Calkins (1984) indicate that the Cook Inlet population inhabits the Inlet during all seasons. The seasonal distribution of belugas is related to prey availability and ice movement. The Cook Inlet population of belugas concentrates at the mouths of rivers in upper Cook Inlet in the spring, coinciding with the arrival of eulachon and juvenile and adult salmon which approach or descend the rivers. During the summer, these whales are distributed in other areas of Cook Inlet, particularly Turnagain Arm. As ice builds in the upper Inlet, the belugas move to the lower Inlet. Calkins (1984) postulated that belugas may leave the Inlet during severe ice winters. The range of the Cook Inlet population may extend from Yakutat Bay to Shelikof Strait. There is little direct information on the diet of the Cook Inlet population. Their diet is thought to include eulachon, salmon, herring, cod, halibut, sole, shrimp, crab, and other invertebrates (Calkins 1984).

Killer whales are thought to be one of the most widely distributed marine mammal in Alaska and are found throughout lower Cook Inlet, Shelikof Strait, and the Gulf of Alaska in the summer. Although this species does shift its distribution southward in the summer, it is best considered a resident species. Killer whales prefer shallow waters of the continental shelf, and they are considered surface feeders (Fiscus et al. 1976). Prey species include squid, fish, marine mammals (dolphins, seals, porpoises) and seabirds (Nishiwaki 1966).

Harbor porpoises frequent sheltered bays, river mouths, and other inshore areas and are found primarily in shallower waters (less than 18 m [60 ft]) (Leatherwood and Reeves 1978). Little information on the diet of this species in the Gulf is available. It is thought that this porpoise feeds primarily on fish (pollock, herring, capelin, and eulachon).

The Dall's porpoise is probably the most common cetacean in the Gulf of Alaska, both in nearshore and offshore waters. They are year-round residents of much of the Gulf of Alaska and their range extends from the Bering Sea in the summer and south to Southern California. They are considered to be abundant in all areas of the Lease Sale except for areas north of Kachemak Bay (Morris et al. 1983). This species feeds nocturnally on squid, as well as pelagic and deep-water hake and lanternfish.

The northern fur seal is a seasonal migrant to the Gulf of Alaska. Its' range extends from the Bering Sea south to San Diego, California. The bulk (75%) of the population concentrates in the Pribilof Islands from May to November for pupping and breeding (Fiscus 1978). Females and young males migrate south for the winter, but the Gulf of Alaska is an important wintering area for older adult males (Kajimura et al. 1980). Large numbers of fur seals have been noted in the Gulf from March to mid-June during their northward migration to the Pribilof Islands. Some young males and nonpregnant females remain in the Gulf during summer, using haul-outs on Sugarloaf Island in the Barren Island group. Southward migrations begin in October. Fur seals are generally found offshore. The coast of Kodiak Island and the Portlock and Northern Albatross Banks are considered important feeding areas for fur seals. Primary prey in Alaskan waters include pollock, capelin, sand lance, herring, squid, and Atka mackerel (Fiscus 1978).

Steller sea lion populations range from the Bering Strait to Southern California; however, the major concentrations are found in the Gulf of Alaska and the Aleutian and Pribilof Islands. The Steller sea lion occurs throughout the Lease Sale 149 area, and several major rookeries and haul-out areas are located adjacent to the area (see Figure 4) with the largest rookeries located on Sugarloaf and Marmot Islands (Calkins and Pitcher 1982). No Steller sea lion haul-outs or rookeries were identified within Cook Inlet. Critical habitat for this species exists in Shelikof Strait and around major rookeries.

Limited data indicate that walleye pollock are the primary prey of Steller sea lions (Pitcher 1981, Calkins and Pitcher 1982, Calkins and Goodwin 1988). Other prey include cod, octopus, squid, herring, salmon, capelin, and flatfishes. Information on the foraging range of Steller sea lions is limited, but it indicates that foraging strategies and range change regionally and seasonally (Fiscus and Baines 1966, Calkins and Pitcher 1982, Lowry et al. 1982) and by age and sex of animal (Merrick et al. in press). Satellite tracking studies indicate that waters in the vicinity of the rookeries and haul-outs are important foraging habitats, particularly for females and young sea lions (Merrick et al. in press). These areas appear to be restricted to relatively shallow waters within 37 kilometers (20 nautical miles) of the rookeries.

The final rule listing the Steller sea lion as threatened was promulgated in December 1990. Steller sea lion abundance in the eastern Aleutians has been declining since at least the early 1970s (Braham et al. 1980, Loughlin et al. 1984, Sease et al. 1993). Recent counts indicate that Stellar sea lion populations have declined by 82% since 1960 (DOI/MMS 1992). Studies of rookeries have indicated that pup numbers decreased by a total of 45% between 1979 and 1986 in the Gulf of Alaska and Southeastern Alaska (Calkins and Goodwin 1988). Although there is some increase in pup numbers in other areas, pup numbers continue to decline in the central Gulf. On Sugarloaf and Marmot Islands, the two major rookeries closest to the Lease Sale 149 area, pup numbers decreased 40% and 36%, respectively, between 1979 and 1986. Sease et al. (1993) reported that pup numbers on Sugarloaf Island (a trend site) continued to decrease (46% decline) between 1989 and 1992.

The harbor seal ranges from the Bering Sea southward to Baja California. Although observed offshore, the harbor seal tends to frequent nearshore waters and haul-out on sandy beaches or on offshore islands, rocks, or ice flows. Harbor seal haul-outs and rookeries are scattered along lower Cook Inlet and Shelikof Strait, as well as on the seaward shores of Kodiak Island (Figure 5). Two major haul-out and breeding sites near the Lease Sale area are located on Shaw Island in Shelikof Strait and Augustine Island near Kamishak Bay (Pitcher and Calkins 1979). Tugidak Island, historically the largest concentration of harbor seals in the Gulf, is located approximately 50 kilometers (27 nautical miles) south of the Lease Sale area. However, counts of Tugidak Island harbor seals decreased 75% over the past six years and continue to decline dramatically (Loughlin 1993). Loughlin (1993) also reported dramatic declines of harbor seal numbers at other sites in the Kodiak Archipelago and Bristol Bay. The cause or causes of the declines are unknown. Harbor seal diets vary with location, but octopus, capelin, and pollock are the most common prey (Pitcher and Calkins 1979).

Sea otters are found in nearshore habitats throughout the Gulf of Alaska. Sea otters currently occupy much of Prince William Sound, the Kenai Peninsula, lower Cook Inlet, the Barren Islands, most of Kodiak Island, and much of the south side of the Aleutian Peninsula (Figure 6). An estimated 3,500 sea otters are found in the Kenai Peninsula and Cook Inlet area. Sea otters prefer shallow waters having rocky reefs and shoals, offshore rocks, and kelp beds. Most animals are noted in less than 37 m (120 ft) of water (Kenyon 1978). Otters consume a wide variety of benthic prey including clams, octopus, crabs, and sea stars (Calkins 1978). Since they feed primarily on benthic organisms, they cannot migrate or travel great distances over deep water.

Effects of the Proposed Action

Activity. Noise associated with the exploration phase of the proposed lease sale may disturb marine mammals near the drilling rigs, but drilling activities are not expected to disturb rookery or haul-out sites. The NMFS currently prohibits vessels within 3 miles of established sea lion rookeries. All exploration activities would be located at least 3 miles from shore.

Exposure to Discharges. Marine mammals are large and mobile, and, in some cases, only migrate through the Lease Sale 149 area. Drilling noise and human activity are expected to keep most mammal species at a distance and away from direct contact with the discharge plume. Discharges are expected to be made into open water, and the plume will be diluted and removed from the water column relatively quickly. Exposure of mammals to the plume, particularly to the most concentrated portions, is unlikely. Exposure of benthic feeding mammals to settled mud on the bottom would be possible in shallow waters.

Toxicity. Acute and chronic toxicity levels for drilling muds and cuttings have not been determined for marine mammals. The toxicity of drilling mud to other species is generally low, however, and it is unlikely that marine mammals will remain in contact with the discharge long enough to receive exposure to acutely or chronically toxic concentrations in either the water column or the bottom sediments. Since materials will be discharged intermittently and dispersion and dilution are rapid within a short distance of discharge, any direct acute or chronic toxic effects on marine mammals are judged to be unlikely.

Bioaccumulation. Little is known concerning metal concentrations in Alaskan marine mammals, although mercury concentrations in beluga whales and other species have been observed to exceed the criteria for human consumption in some areas (EPA 1984b). Any bioaccumulation of metals is most likely

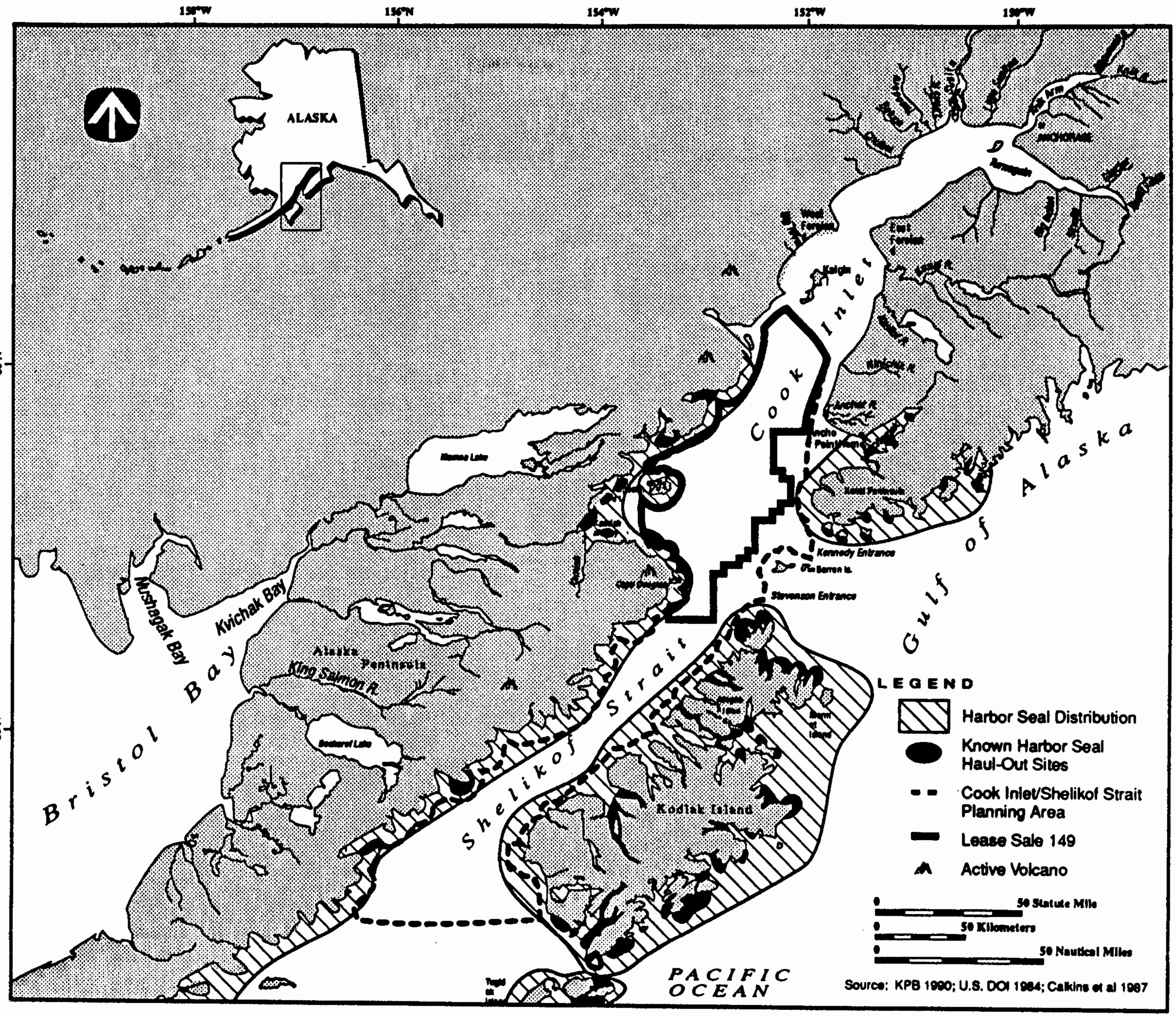


Figure 5. Harbor Seal Distribution.

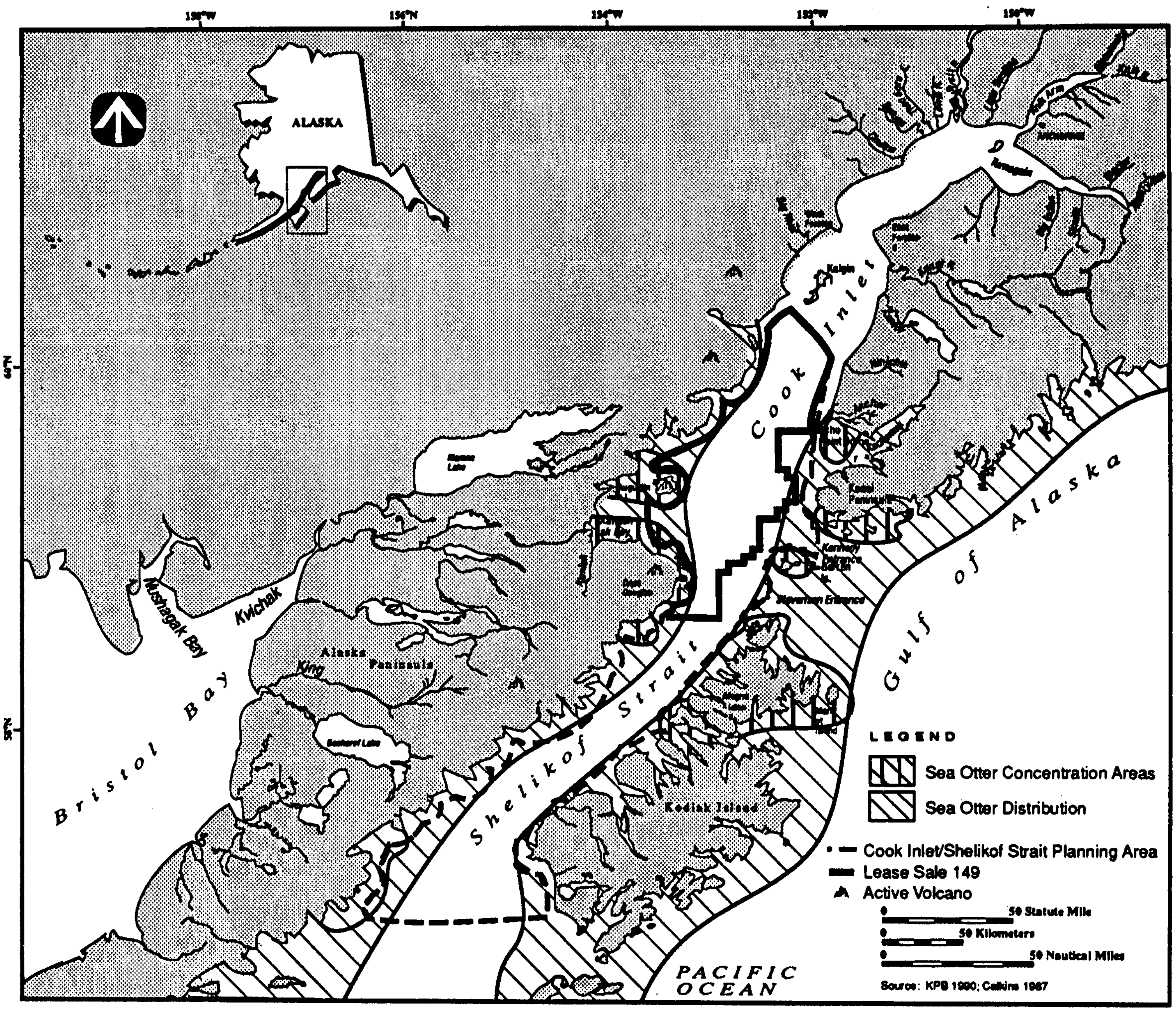


Figure 6. Sea Otter Distribution.

to occur through ingestion of contaminated food sources rather than through absorption of metals from the water column.

Detectable levels of mercury and cadmium have been found in many mammals, including gray and fur seals from Canada (Olafson and Thompson 1974), Dall's porpoises from the North Pacific (Fujise et al. 1988), harp seals off of Newfoundland (Botta et al. 1983), and seals from the Antarctic (Steinhagen-Schneider 1986). It is not possible to attribute metal body burdens in marine mammals to any one source, such as exploratory oil and gas drilling, because increasing emissions of pollutants are occurring worldwide, and animals in remote areas have detectable levels of metals. However, incremental additions of heavy metals from diverse sources do increase the potential for bioaccumulation through the food chain.

Mammals feeding on pelagic species are less likely to accumulate metals than those feeding on benthic species because animals in the water column are less likely to be exposed to elevated metal concentrations. However, mammals feeding higher in the food chain are at risk to bioaccumulate mercury and cadmium, particularly since fish prey only slowly eliminate mercury.

Some benthic feeders, including the gray whale, selectively feed on species that may colonize recently disturbed muds, and thus are most susceptible to heavy metal bioaccumulation. However, bioaccumulation of heavy metals in mammals specifically from drilling mud and cuttings discharges during exploratory drilling is judged not to be a significant concern based on:

- the relatively limited volume of the wastes discharged;
- the limited number of exploratory wells;
- the limited areal extent of elevated heavy metal concentrations in the water column and sediments; and
- the mobility of mammals which allows selection of food from a variety of uncontaminated as well as contaminated locations.

Effects on Food Supply. Disposal of muds and cuttings could indirectly affect marine mammals by reducing benthic populations serving as food, although fieldwork indicates little change in benthic species composition and only a slight reduction in population levels (Tagatz et al. 1985, Gray 1988). Benthic species emerge from drilling muds, making them more susceptible to fish and invertebrate predation (Clark and Patrick 1987) and possibly attracting predators to selectively feed on drilling mud deposits.

Marine Birds

Over 100 species of marine and coastal birds have been identified in the Cook Inlet/Shelikof Strait region (EPA 1984b). More than 60 marine bird colonies are located in the Cook Inlet region, and approximately 120 have been identified near Shelikof Strait (Figure 7). Two major colony areas are located on Chisik Island (in Tuxedni Bay National Wildlife Refuge) and in the Barren Islands; over 500,000 seabirds breed on these islands alone. The most abundant species include murres, tufted puffins, fork-tailed storm petrels, black-legged kittiwakes, and glaucous-winged gulls. Most colonies and about 87% of the total breeding population are located on the west coast of Cook Inlet from southern Kamishak Bay to Tuxedni Bay (SAIC 1979).

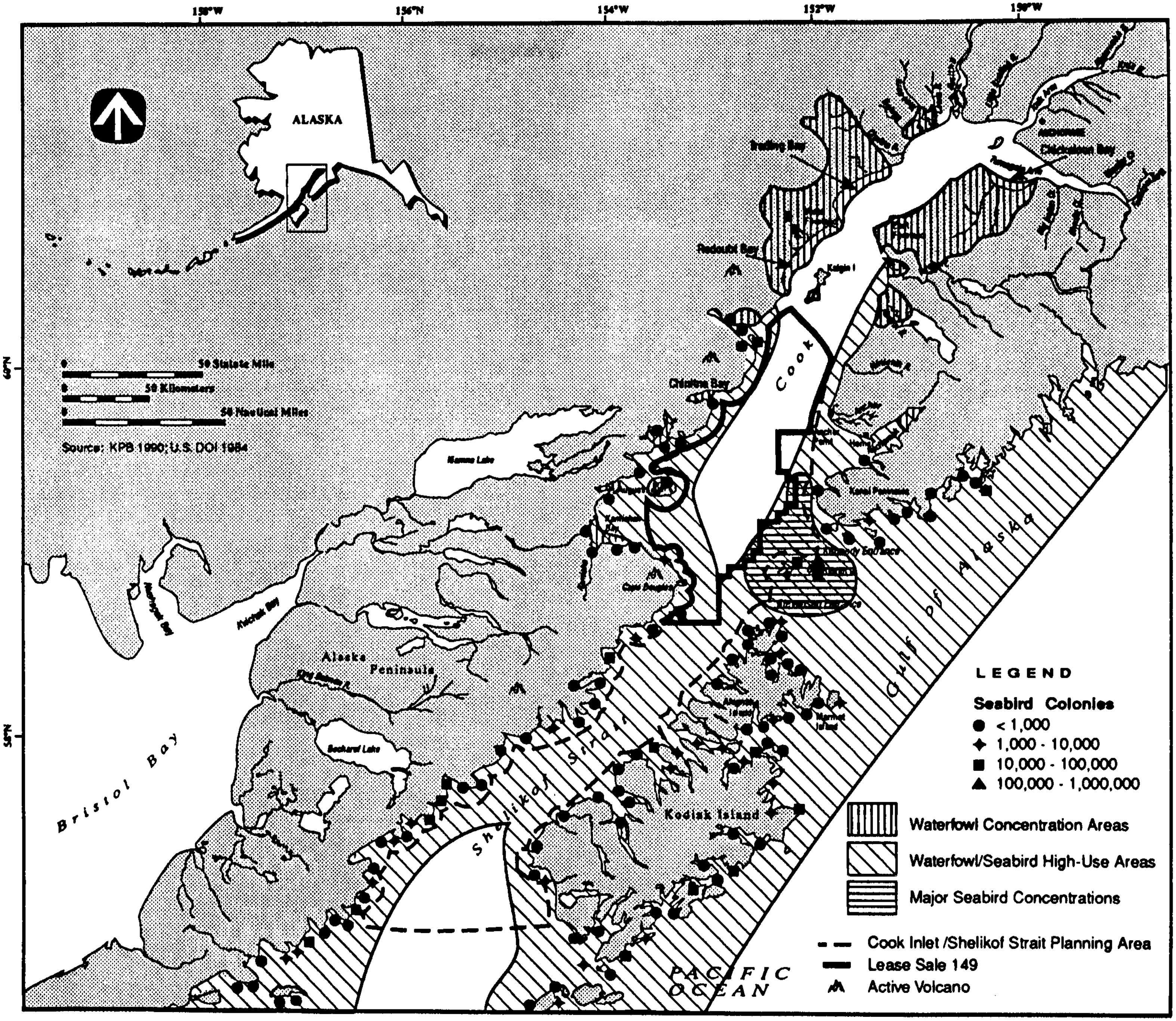


Figure 7. Sea Bird and Waterfowl Distribution.

Coastal salt marshes, mudflats, tideflats, and spits are extremely important areas for nesting, breeding, resting, and feeding. During spring, several million waterfowl and shorebirds migrate through the area, with major stopover and staging areas in the numerous bays, mudflats, and river deltas. Staging areas in the Kenai River and Kasilof River tidal marshes are used for resting and feeding. These areas receive concentrated use only a few days each year but are extremely important habitat for migrating waterfowl. Critical habitat for migrating shorebirds in the vicinity of the Lease Sale 149 area include the Fox River Flats, Mud Bay, and Kamishak Bay. The Fox River tidal marsh is also an important staging area because food is available there earlier than at most other places. A breeding colony of the rare Aleutian terns and more common Arctic terns nest along the mud flats in the Homer area.

Endangered Species

Two endangered raptor species that may occur in the lease sale area are the American and Arctic peregrine falcons. These subspecies breed in interior and northern Alaska. Both races are highly migratory and winter from the southern United States to South America. Peregrines can be found throughout North America during migration. The status of these species is being reviewed and may lead to a reclassification proposal for peregrines.

Effects of Waste Discharges

Exposure to Discharge. Discharges are expected to be intermittent and relatively brief. Since discharge activity will be distant from land, nesting sites are not expected to be affected. It is not expected that marine birds will be directly affected by exposure to the discharges since, due to their mobility, they will be able to avoid the plume.

Toxicity. No data exist concerning the acute toxicity of drilling mud to birds. Toxicity could result only if birds are exposed directly to discharges or indirectly through contaminated food. Because discharge is intermittent, dilution occurs rapidly, and much of the material settles quickly, direct contact between marine birds and the concentrated plume is not expected to be extensive. In areas such as Cook Inlet where highly turbid waters occur naturally, little seabird foraging occurs, apparently due to the inability of birds to visually locate prey (EPA 1984b). Feeding that has been recorded in highly turbid water is limited to situations in which prey organisms are concentrated at the surface and does not include diving birds (EPA 1984b). Drilling mud discharges are not expected to concentrate prey organisms near the surface. Toxic effects from direct contact with discharged material are, therefore, expected to be minimal.

Ingestion of contaminated food organisms is possible; however, due to the limited areal coverage of a discharge plume, the intermittent nature of the discharge, and the mobility of birds, it is highly unlikely that a significant portion of a bird's diet would be contaminated. Toxicity from ingestion of contaminated food organisms is, therefore, also highly unlikely.

Bioaccumulation. No data exist concerning heavy metal bioaccumulation in marine birds from drilling mud and cuttings discharges. Pelagic birds foraging offshore (e.g., nonbreeding gulls, murres) may obtain some heavy metals through contaminated prey, particularly since fish eliminate some accumulated metals very slowly. Birds are likely to forage in uncontaminated areas as well as contaminated areas, but it is not possible to predict the extent to which a given individual or species will forage in either location. Metal accumulation is judged to be a minor concern because of the limited number of wells to be drilled, the limited extent of contamination in benthic or pelagic prey species, and the mobility of birds and most prey species. Measurable impacts would be likely only if the drilling was to affect large portions of major feeding areas for extended periods. However, small additions of heavy metals from diverse sources do increase the potential for bioaccumulation through the food chain.

Effects on Food Supply. A number of bird species feed on fish and invertebrates. Bird populations could be reduced if their prey were significantly reduced in quantity. Field studies show no change in planktonic species composition and little reduction in population numbers (Tagatz et al. 1985, Gray 1988). An insignificant proportion of the food supply may have a reduced nutritional quality, and some prey may be unavailable to seabirds due to increased turbidity from drilling mud discharges. Because discharges are intermittent and of short duration, and dilution and dispersion occur rapidly, these effects are not expected to be significant. Significant effects on bird populations are, therefore, highly unlikely.

Summary

Overall, larvae and planktonic organisms are most sensitive to constituents in the water column, and effects on the biota will primarily be a function of dilution and dispersion of the discharge plume and duration of discharge. Since dilution is rapid and metal concentrations are within EPA water-quality criteria (set to protect marine life) within 100 m (330 ft), effects on the plankton biomass are expected to be transient and localized.

The benthic community is the most likely to be affected physically and toxicologically because of potential exposure to drilling mud solids. Effects on the benthos will be primarily a function of the depth and areal extent of solids deposition. Since the area affected will be small, population depressions in the benthic community are not expected to have serious impacts on higher trophic level marine species.

Benthic community structure changes in the immediate vicinity of the discharges due to smothering, in particular by cutting piles which may be a few meters high and 100 to 200 m (300 to 600 ft) in diameter in a nondispersive environment (Battelle Ocean Sciences 1987). However, the habitat is rapidly recolonized, and field studies show little change in benthic communities one year following cessation of drilling activity, providing oil-based drilling muds are not used.

Mercury and cadmium bioaccumulation via trophic transfer is of some concern. Plankton in the discharge plume are exposed to some dissolved metals. The benthic polychaete, Capitella capitella, feeding on metal-contaminated phytoplankton/zooplankton debris, showed a significant metal accumulation (Windom et al. 1982). It is also possible that pioneer species of muds are selected prey for fish and mammals.

Based on an assessment of the sensitivities and susceptibilities of Alaskan marine organisms to drilling mud and drilling mud components, the biological communities in Lease Sale 149 do not appear to be at unreasonable risk from toxicity caused by limited offshore exploration-phase discharges of drilling mud. However, the potential for significant effects on all communities increases when large-scale production is considered.

Commercial, Subsistence, and Recreational Harvests

Major fishing grounds in the lease sale area are on the continental slope and the upper region of the continental shelf (10 to 500 m [30 to 1,640 ft]). The area is dominated by domestic fishermen; foreign fleets are restricted to bottomfish harvests. Most of the Alaskan harvests of flatfish, rockfish, and sablefish are taken from this area. The tonnage of walleye pollock is considerable, although it represents only a small percentage of the Alaskan pollock harvest. There has been a strong, renewed growth of the salmon harvest (DOI 1984), predominately for pink and sockeye. Most of the fish are caught in Prince William Sound (DOI 1984), although the oil spill in the Sound (March 24, 1989) could affect future salmon harvests. Five species of salmon are harvested in Cook Inlet and Shelikof Strait. In 1986, 9.6 million salmon were harvested in the upper and lower Cook Inlet management areas.

Other fisheries include the herring roe fishery, which centers on Prince William Sound, Kodiak, and the southeastern Gulf of Alaska, and the crab fishery, particularly for red king crab (although these harvests have been declining since 1961) and for Tanner crab. The greatest number of Tanner crabs are harvested from Kachemak Bay, the western portion of lower Cook Inlet, the northern portion of Shelikof Strait, and the eastern side of Shelikof Strait. There has not been a commercial opening in the Cook Inlet area and Shelikof Strait since 1983.

Subsistence harvests are important throughout the Lease Sale 149 area, and can represent up to 24% of the native diet (EPA 1984b). Birds, marine mammals, fish, and marine invertebrates are harvested for subsistence.

Recreational fishing is a major industry in the vicinity of Lease Sale 149; over 1.2 million people-days of effort were reported in 1982 (EPA 1984b). Cook Inlet and in particular the Kenai Peninsula are the major sportfishing centers. The major species taken are salmonids (salmon, steelhead, and Dolly Varden), halibut, and rockfish. Most recreational fishing occurs near shore.

Bioaccumulation of heavy metals in fish or shellfish captured for human consumption is of most concern in the assessment of harvest quality. Insufficient data are available to accurately assess the accumulation of metals in marine organisms from drilling mud discharges. However, harmful effects from barium, the most abundant heavy metal in drilling muds, would likely require ingestion of unreasonably large amounts of seafood within a short period. Also, bioaccumulation of metals in fish and shellfish is not likely to decrease overall harvest quality because of the relatively limited volume of waste discharge and the limited areal extent of dissolved metal concentrations in the water column. Bioaccumulation may occur to a small extent in sedentary species; however, low-level bioaccumulation is not expected to adversely affect humans. Exploratory drilling activity in Lease Sale 149 is not likely to cause a significant problem because of the limited area of impact and low level of oil exploration activity.

Human Health Impacts

Adverse human health effects from drilling muds are unlikely to result from the limited exploration-phase discharges since direct human exposure will be low. Human health effects are most likely to result from chronic ingestion of marine organisms that have accumulated high levels of metals. Three metals are of concern: mercury and cadmium because they biomagnify in food webs, and barium, which is present in large concentrations in drilling muds. Barium could accumulate in marine organisms, but human ingestion of contaminated seafood in a short enough period of time to pose a human health threat is unlikely. Petrazzuolo (1981) assessed human health risk based on reported barium concentrations in biota and concluded that a human would have to eat 5 to 15 kg (11 to 13 lbs) of contaminated seafood in a short period of time (biological half-life of barium is less than 24 hours) in order to be at risk. This event is highly unlikely.

Organic mercury is readily taken up by marine biota and accumulates in the liver and kidney (Hamer 1986). Mercury accumulation by pilot whales can be high enough to pose a health risk to human inhabitants of the Faroe Islands (Andersen et al. 1987), and seal meat has been found to contain high levels of mercury (Botta et al. 1983). The potential for chromosome mutagenicity was high in Greenlandic Eskimos with a high proportion of seal meat in their diets, and seal meat consumption was positively correlated with human blood concentrations of mercury and cadmium (Wulf et al. 1986).

The body burden of metals in birds and animals from areas remote from major human activity (the Antarctic and the Canadian Arctic) is relatively high (Steinhagen-Schneider 1986, Eaton and Farant 1982). The increases in metal body burdens of animals consumed by humans that are attributable to drilling mud discharges are expected to be minor, since drilling mud discharges are periodic and of small volume. However, incrementally small additions of heavy metals from diverse sources do increase the potential for bioaccumulation of metals through the food chain. Metal content of drilling muds should, therefore, be minimized.

COASTAL ZONE MANAGEMENT ACT

The Coastal Zone Management Act requires that states make consistency determinations for any federally licensed or permitted activity affecting the coastal zone of a state with an approved Coastal Zone Management Program (CZMP) (16 USC §1456[c] [A] Subpart D). Under the act, applicants for federal licenses and permits must submit a certification that the proposed activity both complies with and will be conducted in a manner consistent with the state's approved CZMP. For NPDES General Permits for OCS exploration, EPA is considered an applicant submitting the general permit to the state for a consistency determination.

Waste discharges associated with oil and gas exploration in Lease Sale 149 will be consistent with relevant Alaska Coastal Zone Management policies. The consistency assessment is based on state and district policies approved by local, state, and federal governments. Relevant policies with which the waste discharges will be consistent are related to subsistence uses of the coastal zone, management of all coastal habitats, management of specific habitat types (offshore areas, estuaries, wetlands, tideflats, and high energy coasts), and state water-quality regulations. The consistency certification made by EPA will be submitted to the State of Alaska for formal state review pursuant to 15 CFR 930.60 through 15 CFR 930.64.

EFFECTS OF LAND DISPOSAL

Land disposal of drilling muds and cuttings is generally unattractive because sites fill and new disposal locations must be found. Land disposal has been considered for operations off of the Canadian coast (Lamm 1982) and in the Beaufort Sea (Drajnich 1983, Cooper Consultants and Envirosphere Company 1986a) and Chukchi Sea (Cooper Consultants and Envirosphere Company 1986b). However, if the drilling mud composition is such that ocean disposal would violate the conditions of the NPDES permit, or if there is insufficient information to determine that there will be no unreasonable environmental degradation to the discharge site, on-land disposal is the only option.

Onshore disposal options include placing the mud in existing quarries, building pits or sumps, or direct land disposal. For each of these options, shipping traffic, docking facilities, and haul roads are required.

The construction of pits or sumps removes land from other uses. The magnitude of land loss depends on the volume of waste to be disposed and the amount of time that would be required to reclaim the lands with vegetative cover. Snow can accumulate in the pits over winter, and flooding is a danger during spring breakup. Furthermore, drilling muds and fluids that could not be safely disposed at sea probably contain toxic materials such as oil and grease, heavy metals, synthetic and natural organic compounds, or high concentrations of salt, and have a high biochemical oxygen demand.

Accumulated pit water must be disposed to avoid forming a lagoon, which may attract waterfowl and other wildlife and pose potential hazards to them. Land disposal of pit water can stress the vegetation; for example, willows are particularly sensitive to salt concentrations over 4,000 mg/l (Cooper Consultants and Envirosphere Company 1986a).

There are no known studies addressing the effects of direct application of drilling muds to vegetation and soils (Cooper Consultants and Envirosphere Company 1986a). However, it is expected that fresh muds are more saline than pit water and might, therefore, cause greater physiological damage to plants. There is a potential for physical or mechanical damage due to the weight of the muds and to smothering and burial of the vegetation. Heavy metals may be taken up by plants and transmitted through the food chain, and oils and grease can be directly toxic to vegetation (Cooper Consultants and Envirosphere Company 1986a). Land disposal is considered to be potentially more environmentally hazardous than direct discharge into the ocean.

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APPENDIX K

Environmental Impact Statement Cooperating Agency Agreement between Minerals Management Service and the Environmental Protection Agency, Region 10 and Memorandum of Agreement between the U.S. Environmental Protection Agency (EPA), Region 10, and the Minerals Management Service (MMS), Alaska Outer Continental Shelf Region Coordinating the EPA National Pollutant Discharge Elimination System (NPDES) Permit Compliance Program with the MMS Offshore Inspection Program

ENVIRONMENTAL IMPACT STATEMENT
COOPERATING AGENCY AGREEMENT
BETWEEN
MINERALS MANAGEMENT SERVICE
ALASKA OUTER CONTINENTAL SHELF REGION
AND THE
ENVIRONMENTAL PROTECTION AGENCY, REGION 10

A Memorandum of Understanding (MOU) dated May 31, 1984, exists between the U.S. Environmental Protection Agency (EPA) and the Department of the Interior. The MOU was developed to improve cooperation between the two Agencies and directs them to coordinate their respective activities, as related to the Outer Continental Shelf (OCS) oil and gas program administered by the Minerals Management Service (MMS), and to assist EPA in the issuance of new source discharge permits under the National Pollutant Discharge Elimination System. This agreement implements procedures subject to that MOU. In this Agreement, the MMS Alaska OCS Region is designated the lead Agency and the EPA, Region 10, Seattle is the designated cooperating Agency. This agreement does not alter EPA's independent responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act to conduct an official review of the draft Environmental Impact Statement (EIS) and the final EIS during the public comment periods for these documents.

Responsibilities of MMS

(1) The MMS invites the EPA to participate in all Alaska OCS Region sale-specific EIS's as long as this agreement remains in effect.

(2) The MMS will keep EPA informed of each EIS schedule and any changes in the schedule, allowing as much time as possible for EPA's planned participation. All schedule decisions are the responsibility of MMS.

(3) The MMS will identify EPA as a cooperating agency on the title page and include a statement describing the extent of EPA's role in the introduction section of all pertinent EIS's.

(4) The MMS has the sole responsibility for the determination of the following parameters of the sale and will provide these to EPA as early as they become available and any changes if they occur:

(a) an outline of the proposal and included mitigating measures;

(b) alternatives and additional mitigation measures to be analyzed in the EIS;

(c) scenarios and exploration and development reports.

(5) The MMS will prepare the draft and final sale-specific EIS's with the written discussion for both the "affected environment" and the "environmental consequences" of the proposed action.

(6) The MMS will retain final responsibility for the content of the EIS's (except for the EPA contributed appendices), and for the determination of which alternatives and mitigation measures are selected for inclusion in the project. EPA recommendations will be considered in making balanced decisions on the EIS and the lease sale process.

(7) The MMS will prepare the water and air quality sections of the sale-specific EIS's and provide these sections to EPA for comment prior to inclusion in the document. Every effort will be made to resolve any conflict over content, but these and all EIS sections remain the responsibility of MMS.

(8) The MMS will invite and encourage EPA to participate in the scoping and public hearing process for each EIS. Meeting schedules, arrangements and scoping reports are the responsibility of MMS.

(9) The MMS will forward to EPA for review copies of all comments concerned with water and air quality that are received during the preparation of both the draft and final EIS's. In addition, MMS will forward to EPA for review the proposed responses to comments concerning water and air quality that are received during the public hearing process. The MMS will consider EPA's comments when preparing the final responses to public comments. Any comments received concerning the EPA provided appendices will be responded to by EPA.

RESPONSIBILITIES OF EPA

(1) To address the fate and effects of discharges associated with oil and gas exploratory drilling activities, the EPA will prepare the water quality appendix to fulfill their NEPA obligations for the issuance of NPDES permits. A decision on the preparation of air quality appendix will be made on an individual sale basis. These appendices will be prepared for each Alaska OCS Region sale-specific EIS within the timeframes established by MMS for the EIS schedule.

(2) The EPA acknowledges that the MMS maintains EIS review and publication schedules, and the EPA agrees to meet these dates.

(3) The EPA agrees that the costs associated with preparation of the appendices is the sole responsibility of EPA.

(4) The EPA will provide MMS an opportunity to review the drafts of these appendices to assure consistency of resource numbers, scenario information, etc. The EPA has final

responsibility for the content of these appendices.

(5) The EPA will deliver the contributed appendices to MMS in accordance with the agreed-to timetable in the form of "camera-ready" copy or other agreeable format.

(6) The EPA will review the water and air quality sections of each sale-specific EIS and consult with MMS on any recommended additions or changes. Every effort will be made to resolve differences, but the content of these and all EIS sections is the responsibility of MMS.

(7) The EPA is invited to participate in the scoping and/or public hearing process; however, all EPA travel and associated personnel expenses are the responsibility of EPA.

(8) EPA will review MMS proposed responses to comments that are received during the public hearing process and that concern water and air quality. Any suggested changes will be provided to MMS on a timely basis. As lead agency, MMS retains the final responsibility for the content of the responses.

(9) If EPA is not able to meet its NEPA compliance responsibilities with the MMS EIS, EPA may supplement or produce a separate NEPA document.

This Agreement may be modified by mutual agreement or terminated by either party by written notice at any time.

Dana A Rasmussen
Regional Administrator
Region 10
Environmental Protection Agency

Alan D. Powers
Regional Director
Alaska OCS Region
Minerals Management Service

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN THE
U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), REGION 10
AND THE
MINERALS MANAGEMENT SERVICE (MMS), ALASKA OUTER CONTINENTAL SHELF (OCS) REGION
COORDINATING THE EPA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COMPLIANCE PROGRAM WITH THE MMS OFFSHORE INSPECTION PROGRAM

SECTION I. INTRODUCTION

On May 31, 1984, a Memorandum of Understanding (MOU) between the U.S. EPA and the Department of the Interior (DOI) was approved. The purpose of this MOU was to improve cooperation and coordination between the EPA and DOI in oil and gas lease activities on the OCS in determining the terms and conditions of the NPDES permits and to ensure NPDES permit compliance. The MOU establishes that each Agency will coordinate studies and related regulatory responsibilities and cooperate to ensure that the EPA can issue NPDES permits no later than the Final Notice of Sale for the lease offering as projected by the DOI.

This document represents an MOA between the EPA Region 10 and the MMS Alaska OCS Region to implement Part VI, "Postlease Monitoring, Inspection, and Enforcement," of the MOU between the EPA and DOI. It finalizes a cooperative procedure which has been underway as a pilot inspection program since 1989.

SECTION II. DEFINITIONS

For the purposes of this MOA the following definitions apply:

General NPDES Permit - A permit which regulates a category of point sources located within the same geographic area whose discharges warrant similar pollution control measures. A general permit does not require an application from a named party, merely a notification to the EPA Regional Administrator of the party's intent to be covered by the general permit.

Individual NPDES Permit - A permit which regulates the discharge of pollutants from point sources under Section 402(a) of the Clean Water Act. This permit identifies a named party through an application requirement.

Inspection List - The inspection list will contain the following: a heading section that provides general information about each specific inspection (e.g., lease block, date of inspection, operator, etc.), the inspection items, and any comments.

NPDES Permit - See definitions for General and Individual NPDES permits.

OCS Facility - Any artificial island, installation, or other device permanently or temporarily attached to the seabed or subsoil of the OCS and used for oil and gas activity. This term includes either fixed or floating structures and mobile offshore drilling units attached to the seabed, including self-positioning drill ships, but does not include a deep-water port or vessel engaged in transportation.

OCS Oil and Gas Activity - Any offshore activity on the OCS pursuant to a Federal lease or permit resulting in effluent discharges associated with the exploration, development, or production of oil and gas mineral resources.

Outer Continental Shelf (OCS) - All submerged lands that comprise the continental shelf lying seaward and outside of the area of lands beneath navigable waters as defined in the Submerged Lands Act of 1953, 43 U.S.C. 1301, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control.

Potential Incidence of Noncompliance (PINC) Lists - This form is the baseline for inspecting lease operations and facilities by MMS personnel.

SECTION III. ARTICLES OF AGREEMENT

ARTICLE I

INSPECTIONS

(A) According to procedures for inspection developed under the implementation section of the MOU, the MMS hereby agrees to conduct inspections for compliance with NPDES permit provisions during MMS-scheduled inspections of OCS facilities.

(B) The EPA, in coordination with MMS, will develop an NPDES inspection and regional guidance, as necessary, for MMS inspectors conducting NPDES inspections. The list will be provided in a format consistent with the PINC List, currently used by MMS inspectors. The guidance will include NPDES inspection procedures, explanations of specific NPDES permit compliance requirements, and region-specific guidance on determining NPDES compliance.

(C) Sampling may be conducted by the MMS at the request of the EPA Region 10 Water Management Division Director. Compliance sampling conducted by the MMS will be in accordance with the EPA's NPDES Compliance Sampling Inspection Manual. The MMS will forward all samples to the EPA.

1. The EPA will prepare a Quality Assurance/Quality Control Plan for the sampling program and send to MMS for concurrence prior to initiating any sampling.

2. The EPA will provide MMS with a ready-to-use sampling collection kit.

3. The MMS will collect up to two (2) samples per well as directed by the EPA.

(D) The EPA will provide training for MMS inspectors conducting NPDES inspections and sampling.

(E) Special inspection or sampling requests (e.g., emergencies, responses to citizen's complaints, etc.) will be at the discretion of the MMS Regional Director and EPA Water Management Division Director.

(F) The EPA will provide the MMS information regarding well-specific discharge authorizations (limitations, approved mud types and additives, changes to general permit authorizations, etc.). Such information will be provided to the MMS when authorization has been given to a lessee/operator.

(G) The MMS will follow the reporting requirements as detailed in Article III of this document.

ARTICLE II

TRANSPORTATION

(A) The EPA Region 10 does not anticipate routine situations where EPA personnel will require transportation to an offshore facility.

(B) The EPA will arrange for transportation of their representative(s) to and from the facility. The EPA may request MMS assistance in scheduling travel to an OCS facility.

ARTICLE III

REPORTS

(A) The MMS will complete the inspection list for each NPDES inspection conducted on an OCS facility.

(B) The MMS will provide the EPA with copies of completed NPDES inspection lists and other pertinent information on a monthly basis unless otherwise agreed to by the MMS and EPA.

(C) The MMS will notify the EPA immediately of any violations or discrepancies between permitted conditions and actual discharges.

(D) The EPA Region 10 will provide MMS with a ten (10) work day comment period on any proposed administrative action to be taken as a result of an MMS inspection.

(E) The EPA Region 10 may ask MMS to provide EPA with other pertinent available data (e.g., list of active rigs and platforms and present location, block number, lease tract, etc.) or information of special interest specific to upcoming inspections. Such data will be consistent, to the maximum extent possible, with existing internal MMS reports.

ARTICLE IV

DISPOSITION

(A) The MMS will send NPDES inspection reports and samples to the following address:

Alaska Operations Office
U.S. Environmental Protection Agency
Region 10
Room 537, Federal Building
222 West 7th Avenue, #19
Anchorage, Alaska 99513-7588

ARTICLE V

TESTIMONY

The MMS personnel may be required to appear as witnesses to testify, or provide documented testimony, on matters relating to MMS NPDES compliance monitoring activities in any subsequent administrative or judicial actions.

ARTICLE VI

ENFORCEMENT

The EPA will be responsible for the enforcement of all NPDES permit conditions. The MMS is responsible for reporting evidence of NPDES permit noncompliance to EPA. In the case of overlapping statutory authorities, MMS inspectors will exercise MMS enforcement actions authorized under the OCS Lands Act and amendments, or its implementing regulations, but will also notify EPA of the NPDES noncompliance incident.

ARTICLE VII

AUTHORITY

(A) Nothing in this MOA shall be deemed to alter, amend, or affect in any way the statutory authorities of the EPA or the DOI.

(B) This MOA is effective upon the signature of the EPA Regional Administrator and the MMS Regional Director. The provisions of this MOA shall be re-evaluated as necessary. Either party can modify the provisions of this MOA by giving appropriate notice and approval at that time.

(C) Representatives from EPA and MMS shall meet at least annually at a mutually agreed upon location and time to conduct business related to this MOA (e.g., develop or update inspection lists, update or revise the MOA, training seminars, etc.).

SECTION IV. IMPLEMENTATION

As soon as practicable, but not later than 6 months from the effective date of this MOA, the regional agencies will hold their first annual meeting as referenced in Section III, Article VII, Part C. All future annual meetings will be held prior to the beginning of each fiscal year.

SECTION V. AGENCY CONTACTS

Inquiries regarding the provisions of this MOA, its implementation, or disagreements over any of the provisions should be directed to:

Regional Supervisor, Field Operations
Minerals Management Service
949 East 36th Avenue, MR 603
Anchorage, Alaska 99508-4302
Phone: FTS 907-271-6188 Commercial (907) 271-6188

Alaska Operations Office
U.S. Environmental Protection Agency Region 10
Room 537, Federal Building
222 West 7th Avenue #19
Anchorage, Alaska 99513-7588
Phone: FTS 907-271-5083 Commercial (907) 271-5083

Dana A. Rasmussen
Regional Administrator
Environmental Protection Agency

Irven F. Palmer
Acting Irven F. Palmer, Jr.
Regional Director
Minerals Management Service

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INDEX

ACRONYM GLOSSARY

Acronym Glossary (includes common abbreviations and symbols)

ACC	Alaska Coastal Current
ACMP	Alaska Coastal Management Plan
ACS	Alaska Clean Seas
ADCRA	Alaska Department of Community and Regional Affairs
ADF&G	Alaska Department of Fish and Game
ADOL	Alaska Department of Labor
AEDP	Area Evaluation and Decision Process
AMSA	areas that merit special attention
ANCSA	Alaska Native Claims Settlement Act
AOGA	Alaska Oil and Gas Association
AOGCC	Alaska Oil and Gas Conservation Commission
APD	Application for Permit to Drill
API	American Petroleum Institute
ARRT	Alaska Regional Response Team
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
bbl	barrel/s
Bbbl	billion barrels
BOD	biochemical oxygen demand
BOP	Blow Out Prevention (equipment)
B.P.	Before Present
BTEX	benzene, toluene, ethylbenzene, and xylene
C	Carbon (atoms)
Call	Call for Nominations
CDP	Census Designated Place
CI/SS	Cook Inlet/Shelikof Strait
CIRCAC	Cook Inlet Regional Citizen's Advisory Board
CIRO	Cook Inlet Resource Organization
CISPRI	Cook Inlet Spill Prevention and Response, Inc.
cm	centimeter/s
cm/s	centimeters per second
C/m^2	grams of Carbon per square meter
CMP	Coastal Management Program
CO	carbon monoxide
COE	Corps of Engineers (U.S. Army)
COST	Continental Offshore Stratigraphic Test (well)
CP	Comprehensive Program
CPC	Coastal Policy Council (State of Alaska)
CRSA	Coastal Resource Service Area
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibel/s
DEC	Department of Environmental Conservation (State of Alaska)
DEIS	Draft Environmental Impact Statement
DGGS	Division of Geological and Geophysical Surveys (State of Alaska)
DNR	Department of Natural Resources (State of Alaska)
DOTPF	Department of Transportation, Public Facilities (State of Alaska)
DPP	Development and Production Plan
DWT	deadweight ton/s
EIS	Environmental Impact Statement
ENRI	Environmental and Natural Resources Institute
EP	Exploration Plan
ERA	Environmental Resource Area
ESA	Endangered Species Act
ESD	Emergency Shutdown System
ESI	Environmental Sensitivity Index
ESP	Environmental Studies Program
ESS	Emergency Support System
EVOS	*Exxon Valdez* oil spill
FAC	fluorescent aromatic compounds
FEIS	Final Environmental Impact Statement
FOSC	Federal On-Scene Coordinator
FR	*Federal Register*
ft	foot/feet
ft^2	square foot/feet
ft^3	cubic foot/feet
FWS	Fish and Wildlife Service (U.S.)
g/l	grams per liter
gal	gallon/s
GBOS	Glacier Bay oil spill
GMT	Greenwich Mean Time
gpd	gallons per day
ha	hectare
HMW	high-molecular weight (hydrocarbons)
Hz	Herz
in	inch/es
IBR	Information-Base Review
ICS	Incident Command System
IFQ	individual fishing quota
ISER	Institute of Social and Economic Research
ITL	Information to Lessee
ITM	Information Transfer Meeting
IWC	International Whaling Commission
kg	kilogram/s
kHz	kiloherz

km	kilometer/s
km^2	square kilometer/s
kn	knot/s
KIB	Kodiak Island Borough
KPB	Kenai Peninsula Borough
KPFA	Kenai Peninsula Fishermens Assoc.
l	liter/s
lb	pound/s
LC_{50}	lethal concentrations at which 50 percent of the test animals die
LMW	low-molecular weight (hydrocarbons)
LNG	liquified natural gas
LS	Land Segment
LTF	log-transfer facility
m	meter/s
m/s	meters per second
m^3/s	cubic meters per second
mg/l	milligrams per liter
mi	mile/s
mi^2	square mile/s
ml/l	milliliters per liter
mm	millimeter/s
MMbbl	million barrels
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NCP	National Contingency Plan
NEPA	National Environmental Protection Act
ng/g	nanograms per gram
nl/l	nanoliters per liter
nmi	nautical miles
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO_x	nitrogen oxide
NO_2	nitrogen dioxide
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent (to publish an EIS)
NPDES	National Pollution Discharge Elimination System
NPFMC	North Pacific Fisheries Management Council
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRC	National Research Council
NTL	Notice to Lessee
O_3	ozone
OCD	Offshore and Coastal Dispersion (model)
OCS	Outer Continental Shelf
OCSEAP	Outer Continental Shelf Environmental Assessment Program
OCSLA	Outer Continental Shelf Lands Act
OPA 90	Oil Pollution Act of 1990
OSCP	Oil Spill Contingency Plan
OSRA	Oil-Spill-Risk Analysis (model)
PAAM	Proposed Action and Alternatives Memorandum
PAH	polycyclic (polynuclear) aromatic hydrocarbons
PCB	polychlorinated biphenols
pH	measure of acidity or alkalinity
PHC	petroleum hydrocarbons
PINC	Potential Incident of Non-Compliance
PM	particulate matter
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PWS	Prince William Sound
RD	Regional Director
RFIC	Request for Information and Comments
RS/FO	Regional Supervisor/Field Operations
SDR	Seasonal Drilling Restriction
SF	sale-specific mortality factor
SHPO	State Historical Preservation Office
SO_2	sulfur dioxide
SPM	suspended particulate matter
SS	Sea Segment
TAH	total aromatic hydrocarbons
TOC	total organic compounds
TSS	total suspended solids
U_{oil}	oil-drift vector
UAA	University of Alaska, Anchorage
USCG	U.S. Coast Guard
USDOC	U.S. Department of Commerce
USDOI	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VHS	viral hemmhorrhagic septicema
VOC	volatile organic compounds
$<$	less than
$\leq$	less than or equal to
$>$	greater than
$\geq$	greater than or equal to
$10^6\ m^3/s$	million cubic meters
$^\circ/_{\circ\circ}$	salinity
°C	degrees Centigrade/Celsius
$\mu g/g$	micrograms per gram
$\mu g/kg$	micrograms per kilogram
$\mu g/l$	micrograms per liter
$\mu l/l$	microliters per liter
μPa	micropascal
$\pm$(SE)	plus/minus standard error

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The Department of the Interior Mission

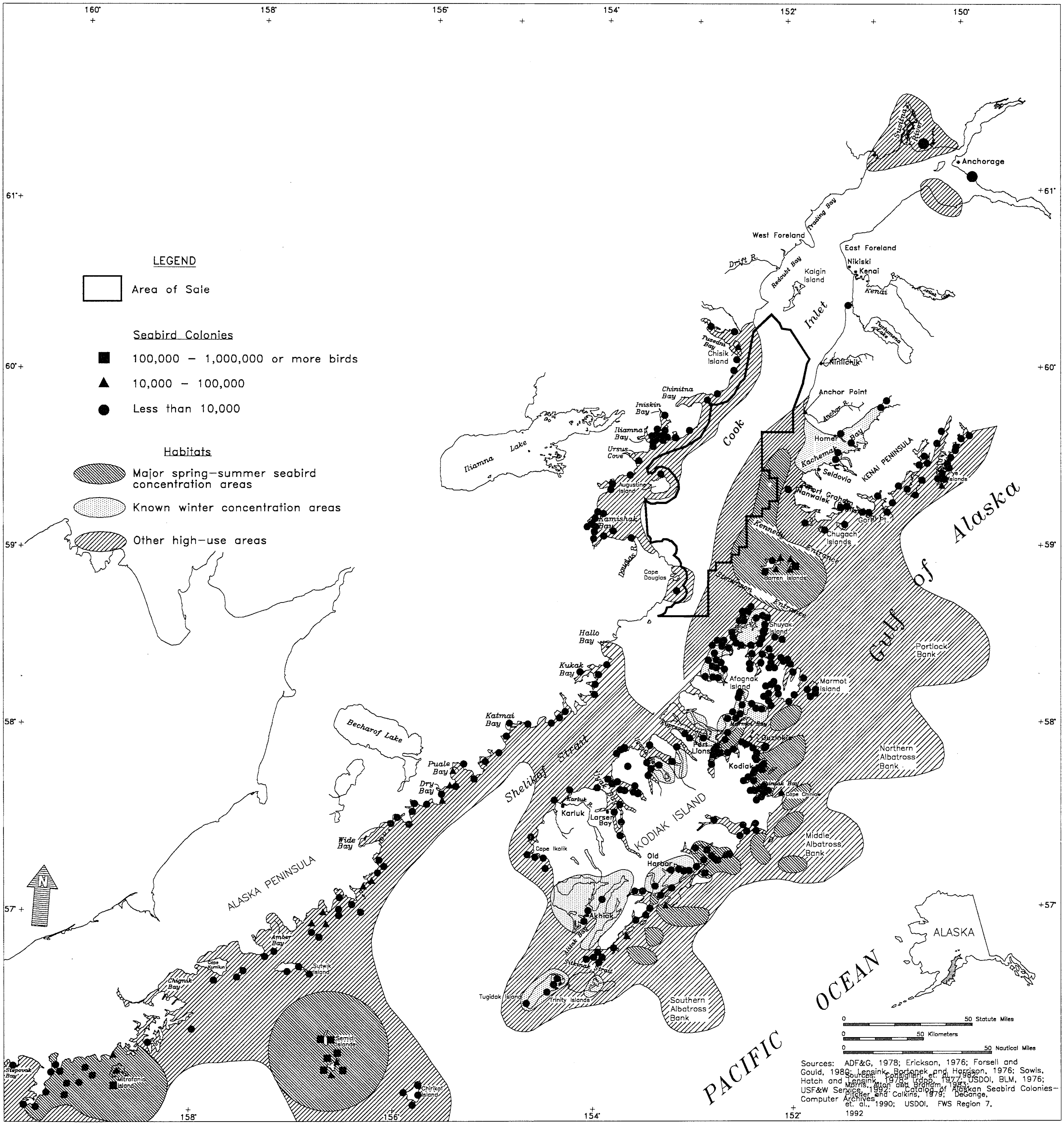
As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

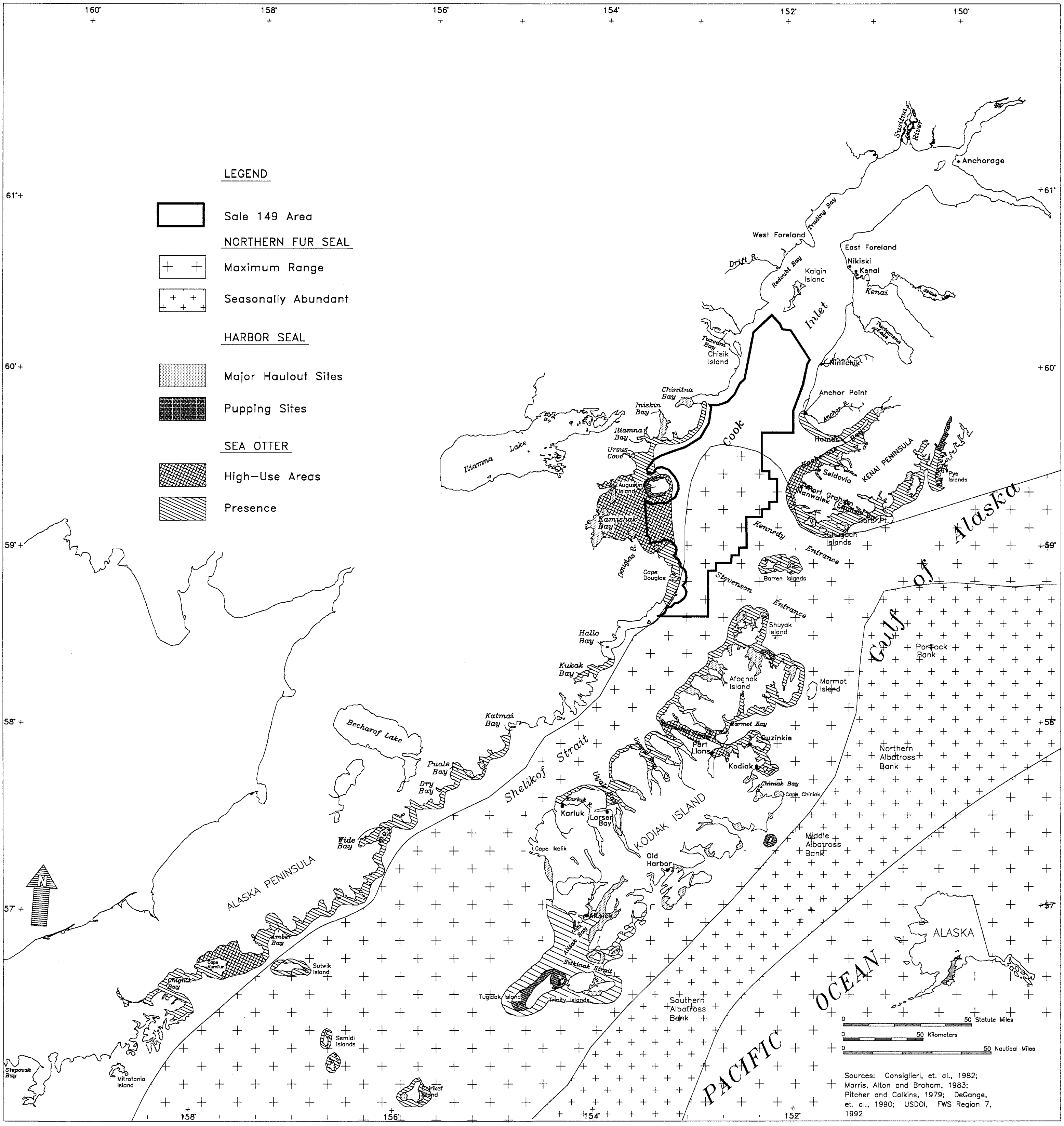
As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Royalty Management Program** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

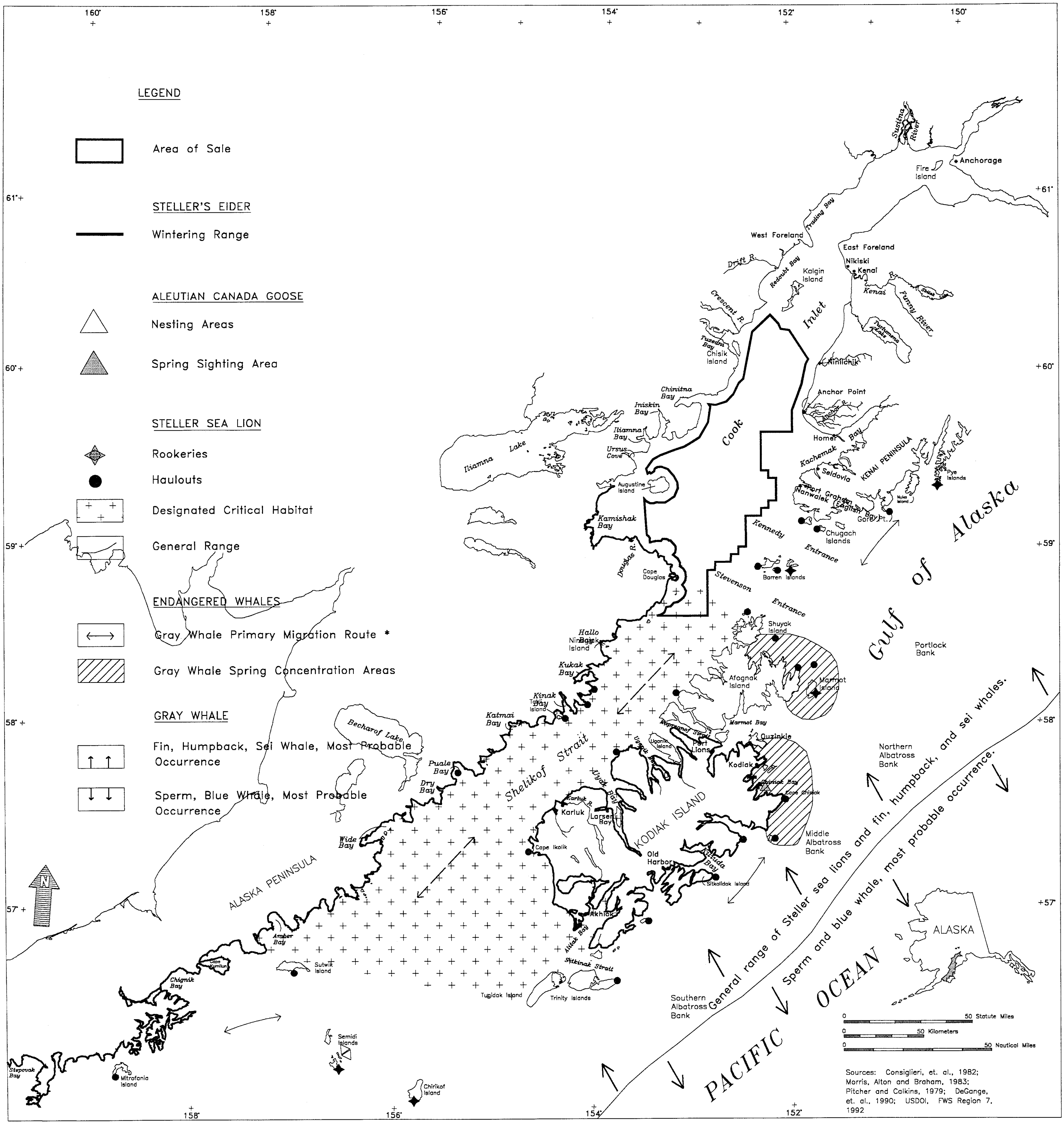
The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.



Graphic 1. Marine and Coastal Bird Resources.

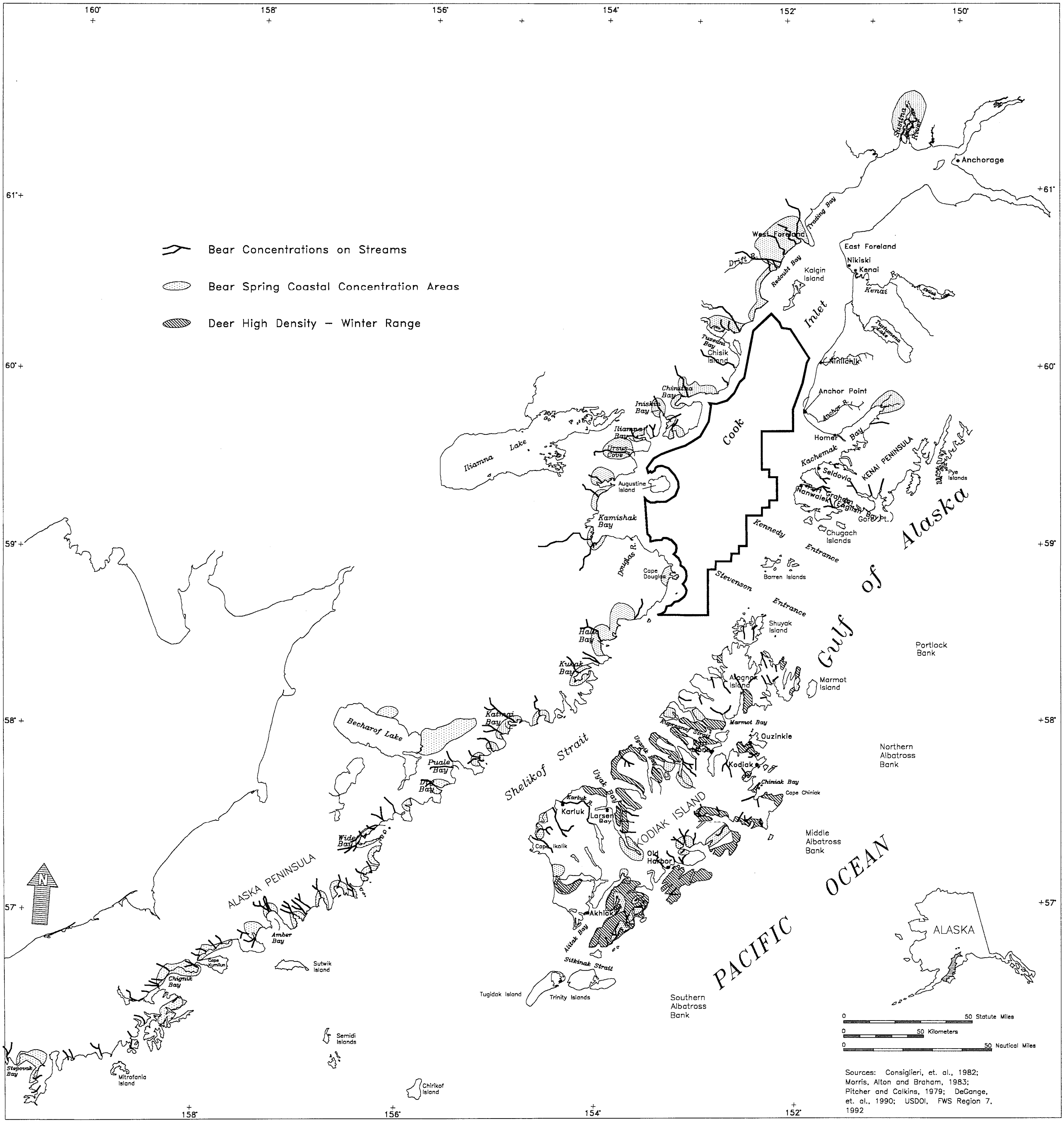


Graphic 2. Marine Mammals.



* The Gray whale was removed from the Endangered Species List.

Graphic 3. Endangered and Threatened Species of the Lower Cook Inlet and Shelikof Strait Region.



Graphic 4. Brown Bear and Sitka Black–Tailed Deer Major Coastal Habitats.