

BEAUFORT SEA OIL AND GAS DEVELOPMENT/ NORTHSTAR PROJECT

FINAL ENVIRONMENTAL IMPACT STATEMENT

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LIST OF ACRONYMS AND ABBREVIATIONS

LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Program
ACS	Alaska Clean Seas
A.D.	Anno Domini
ADEC	Alaska Department of Environmental Conservation
ADL	Alaska Division of Lands
ADNR	Alaska Department of Natural Resources
AEWC	Alaska Eskimo Whaling Commission
ANCSA	Alaska Native Claims Settlement Act
ANWR	Arctic National Wildlife Refuge
ARCO	Atlantic Richfield Company (or ARCO Alaska, Inc., a subsidiary)
ARRC	Alaska Railroad Corporation
AS	Alaska Statute
BACT	Best Available Control Technology
barrels/day	barrels per day
BLM	Bureau of Land Management (USDOI)
B.P.	Before Present
BPXA	BP Exploration (Alaska) Inc.
Btu/hr	British thermal units per hour
°C	degrees Celsius
CAA	Clean Air Act
CAH	Central Arctic Herd (Caribou)
CCP	Central Compressor Plant
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIDS	Concrete Island Drilling Structure
cm	centimeter(s)
CMP	Coastal Management Plan
CO	carbon monoxide
COFR	Certificate of Financial Responsibility
Corps	U.S. Army Engineer District, Alaska
CRI	Caisson Retained Island
dB	decibel(s)
dBA	A-weighted sound level
DEIS	Draft Environmental Impact Statement
DEW	Distant Early Warning (Line)
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit

FEIS	Final Environmental Impact Statement
FR	Federal Register
ft	foot, feet
ft ³	cubic feet
ft/yr	feet per year
GCM	Global Climate Model
gpd	gallons per day
Hz	Hertz
INTEC	INTEC Engineering, Inc.
IWC	International Whaling Commission
kHz	kilohertz
km	kilometer(s)
km/hour	kilometers per hour
km ²	square kilometer(s)
liters/day	liters per day
LMRs	land management regulations
m	meter(s)
m ³	cubic meter(s)
m/yr	meters per year
m ³ /s	cubic meter(s) per second
mg/L	milligrams per liter
MLLW	mean lower low water
mm	millimeter(s)
MMS	Minerals Management Service (USDOJ)
mph	miles per hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service (USDOC)
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration (USDOC)
NPDES	National Pollutant Discharge Elimination System
NPRA	National Petroleum Reserve - Alaska (formerly Naval Petroleum Reserve Number 4)
NSB	North Slope Borough
NTU	nephelometric turbidity units
NWI	National Wetlands Inventory
OCS	Outer Continental Shelf
ODCE	Ocean Discharge Criteria Evaluation
ODPCP	Oil Discharge prevention and Contingency Plan
%	percent
pH	potential of Hydrogen (measures the acidity or alkalinity of a substance)
PM1	Point McIntyre No. 1
PM ₁₀	particulate matter less than 10 microns in diameter

PM2	Point McIntyre No. 2
PPA	Pressure Point Analysis
ppm	parts per million
ppt	parts per thousand
Put 23	Put 23 Oxbow
PSD	Prevention of Significant Deterioration
ROD	Record of Decision
s	second
SCADA	Supervisory Control and Data Acquisition
sec	second
SHPO	State Historic Preservation Officer (or Office)
SO ₂	sulfur dioxide
SPCC	Spill Prevention Containment, and Countermeasure (Plan)
SPL	sound pressure level
SPO	State Pipeline Office
SSDC	Single Steel Drilling Caisson
STP	seawater treatment plant
TAPS	Trans Alaska Pipeline System
TOC	total organic carbon
tpy	tons per year
µg-at/L	microgram atoms per liter
UIC	Underground Injection Control (Permit)
µPa	microPascal
USDOC	U.S. Department of Commerce
USDOI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service (USDOI)
VOCs	volatile organic compounds
VSMs	vertical support members
yd ³	cubic yard(s)

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CHAPTER 1.0

INTRODUCTION

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1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

BP Exploration (Alaska) Inc. (BPXA) submitted a permit application to the U.S. Army Engineer District, Alaska (Corps) to initiate the review process for BPXA's plans to develop and produce oil and gas from the Northstar Unit. A permit is required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act because BPXA proposes to discharge dredged or fill material into United States waters and to do work in navigable waters of the United States.

The Corps determined that issuance of a permit for BPXA's proposed project constituted a major federal action that may significantly affect the quality of the human environment pursuant to the National Environmental Policy Act (NEPA). In addition, the U.S. Environmental Protection Agency (EPA), upon review of BPXA's permit application, determined under provisions of the Clean Water Act and 40 CFR Part 6 Subpart F that permitting for BPXA's proposed project constituted a major federal action that may significantly affect the quality of the human environment. As a result, preparation of an Environmental Impact Statement (EIS) under NEPA was undertaken to identify and evaluate a range of reasonable alternatives and evaluate the potential effects the alternatives, including BPXA's proposed project, may have on the human environment. This information will be used in rendering permit approvals or other action decisions including the authorization of small takes of marine mammals under the Marine Mammal Protection Act by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS).

Assuming the role of lead federal agency, the Corps initiated a cooperative agreement with four other federal agencies (the Minerals Management Service [MMS], USFWS, NMFS, and the EPA) and the North Slope Borough (NSB). These agencies have regulatory responsibilities applicable to the proposed project. This Alaskan Beaufort Sea Oil and Gas Development/Northstar Project EIS has been prepared by the lead and cooperating agencies, with the assistance of a third-party contractor funded by BPXA.

Figure 1-1, Northstar Unit Location and Project Area, depicts the Northstar project area. This area generally corresponds to the area of consideration for this EIS. However, in some instances, the area of consideration varies due to the nature of the anticipated project effects (e.g. oil spill and cumulative impacts). The Northstar Unit is located between 2 and 8 miles (3.2 and 12.8 kilometers) offshore of Point Storkersen in the Alaskan Beaufort Sea. Oil and gas drilling, processing, and production is proposed to take place at Seal Island, a manmade gravel island originally built by Shell Oil Company to conduct exploratory activities within the Northstar Unit during the 1980s. BPXA's proposed project includes reconstructing and enlarging Seal Island and directionally drilling production, gas injection, and waste disposal wells from the island. Two pipelines would be constructed for the project. Crude oil produced from the Northstar reservoir would be transported by a buried subsea pipeline from Seal Island to the coastline and subsequently to the Trans Alaska Pipeline System and marine terminal at Valdez, Alaska. From Valdez, oil would be transported by tanker to U.S. west coast and international ports. A second pipeline would be constructed to transport gas from an existing onshore facility to the island to assist with

oil recovery. The offshore portion of the pipelines would be buried in a common trench on the seafloor. Crude oil production from the Northstar reservoir is estimated to be 158 million barrels over the anticipated 15-year life of the reservoir. Maximum daily production is estimated to peak at approximately 65,000 barrels of oil per day. A detailed description of BPXA's proposed project is included as Appendix A.

1.2 PURPOSE OF AND NEED FOR ACTION

The purpose of BPXA's proposed project is to recover oil from the Northstar Unit and to transport and sell sales quality crude oil to U.S. and world markets. The need for BPXA's proposed project is to help satisfy the demand for domestic oil resources at a time when domestic production, including Alaska's contribution, is in decline. This project also will prolong the economic viability of the Trans Alaska Pipeline System.

The NEPA requires the preparation of an EIS prior to any federal action that may significantly affect the quality of the human environment. The EIS is intended to provide federal agencies with information about the consequences of a proposed project and to disclose that information to the public, soliciting their comments, prior to making decisions on the project. Because this project represents the first development of Outer Continental Shelf (OCS) oil and gas resources in the Alaskan Beaufort Sea, this EIS addresses a range of potentially applicable technologies and development/production options to provide useful information applicable to evaluate future development proposals.

The proposed development of the Northstar Unit presents several issues which may have significant adverse impacts. The Corps has determined that an EIS is required because:

- The Northstar Project is the first offshore oil and gas development/production facility in the Alaskan Beaufort Sea without a causeway to shore, and the first to include a connection to onshore facilities by a buried subsea pipeline.
- The risks of oil spills from an offshore development/production island and a subsea pipeline system exposed to hazards have not been examined previously.
- Response limitations for oil spills under sea ice or in broken ice, and concerns regarding the effects of such a spill, require further examination.
- The effects of long-term, year-round offshore oil and gas development/production activities, particularly noise, on subsistence resources and the subsistence lifestyle of NSB residents should be addressed.

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1.3 AGENCY GOALS FOR THIS EIS

The Corps and the cooperating agencies developed specific goals for this EIS process, including:

- Develop this EIS, at the applicant's request, in parallel with the engineering and design of BPXA's proposed project to allow: a) the EIS process to begin sooner, potentially speeding up decisions and permitting; b) BPXA, the agencies, and the public to exchange ideas about project design as engineering progressed; and c) mitigation measures to be incorporated as part of the proposed project's overall design to minimize or avoid potentially significant impacts (Table 1-1).
- Incorporate Traditional Knowledge of the indigenous people of the North Slope in a way that allows agencies to use these data as part of their decision-making. Traditional Knowledge was collected early in the EIS process and was cited from existing sources and past testimony; this information is applied in evaluation of project impacts.
- Present the issues identified in EIS scoping, and address them in a way that allows readers to locate information of interest and track the issues. For example, the affected environment and environmental consequences for each topic are presented together to aid the reader in using this multi-volume EIS.
- Describe a broad view of oil and gas technologies applicable to the development/production activities in the Alaskan Beaufort Sea environment to set the stage for selection of alternatives for Northstar Unit development and also make this information applicable to future proposed oil and gas development/production projects.
- Include information necessary for cooperating agencies' approval processes to facilitate a more timely and streamlined approach. Specifically, a Biological Assessment, a draft National Pollutant Discharge Elimination System (NPDES) Permit and Fact Sheet, and an Ocean Discharge Criteria Evaluation (ODCE) in support of the NPDES permit and ocean dumping permit (Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972), and a draft Underground Injection Control (UIC) Permit and Fact Sheet are appended to this EIS, and rely on this EIS for information and NEPA documentation.
- It is a goal of the lead and cooperating agencies to develop a consistent, unified position regarding which alternatives will move forward with their decision-making processes. Agencies have identified to the extent possible preferred alternatives in Section 11.9. Final agency decisions will be made in the Records of Decisions after consideration of the FEIS and all comments received.

In addition, the cooperative agencies chose a format that accomplished several objectives:

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- Present Traditional Knowledge and western science in an objective manner, without drawing conclusions as to which information is better, allowing the reader and the decision-maker to draw their own conclusions.
- Organize the chapters to focus the reader's attention to the big issues (oil spills and noise).
- Rely on appendices (Project Description, Biological Assessment, Draft NPDES Permit) that were prepared for the Northstar Project to provide the reader with more information than would otherwise be included in an EIS.
- Incorporate considerably more information and analyses than is usual in an EIS, to reflect that the proposed project incorporates new ideas to oil development on the North Slope.
- Cross-reference chapters and appendices whenever possible to minimize redundancy.
- Organize the EIS in a manner to make it more responsive to local requests.

Permits for oil and gas development/production activities from the Northstar Unit will not be issued prior to records of decision being issued by the lead and cooperating agencies. Coordination of EIS preparation with the development of specific permit related information is intended to improve the consistency of multiple agency actions related to this proposal.

1.4 AGENCY RESPONSIBILITIES

In addition to the lead agency decision pursuant to NEPA, several specific federal, state, and local permits and approvals are required prior to development of the Northstar Unit. These approvals are summarized in Table 1-2 and discussed below.

1.4.1 U.S. Army Engineer District, Alaska

Section 404 Permit: To address the Clean Water Act Section 404 requirements, the EIS identifies waters and wetlands within the project area, and describes wetland types and functions. The EIS describes the project components, identifies the type and amount of wetlands and other waters affected by each alternative, describes anticipated impacts, and discusses mitigation measures that have been incorporated to minimize impacts to these resources.

Section 10 Permit: To address requirements of Section 10 of the Rivers and Harbors Act of 1899, the EIS describes navigable waters of the United States within the project area and how structures in, on, or over these waters (e.g., the proposed island and buried pipelines) would affect these waters during construction and operation. The EIS describes the alternatives and compares possible impacts to coastal integrity and navigation from each alternative. It also discusses mitigating measures to minimize these impacts.

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Section 103 Permit: The EIS provides information about dredged material and the substrate at the disposal sites, such as grain size and contaminants, to support agency decisions about disposal of waste material from pipeline trenching. The Corps issues permits for the transportation of dredged material for the purpose of ocean disposal. The EPA must concur with the proposed disposal site.

1.4.2 U.S. Environmental Protection Agency

NPDES Permit and Fact Sheet: The EIS summarizes the present marine water quality, marine life, and human activities in and near the Northstar Unit, including a summary of oceanographic data such as ocean currents and stratification, sea ice, and meteorological conditions. Possible marine discharges associated with either the construction or operation of an offshore development facility are included in the EIS. Descriptions of these discharges include discharge purpose, flow rates, frequency of discharge, and expected pollutants, including concentrations. The EIS also reviews the possible impacts from such discharges and provides both discharge limits and monitoring requirements. In particular, these requirements are stated in the NPDES Permit, while the associated Fact Sheet provides technical justification for these requirements. This justification includes a summary of risk to biota from these possible marine discharges.

Air Quality Permits: The EIS provides an analysis of meteorological factors and air quality baseline conditions and predicts potential impacts to air quality during construction and operations. Prevention of Significant Deterioration (PSD) regulations define major sources as those which have the potential to emit 250 tons (226,798 kilograms) per year or more of any pollutant regulated under the Clean Air Act (CAA). Sources subject to PSD permitting go through pre-construction review and may require collection of meteorological data and modeling of pollutant pathways. A permit under the EPA-approved State of Alaska Title V Operating Permits program will be required for development of the Northstar Unit.

Underground Injection Control: Information is provided in the EIS regarding the use of proposed Class I industrial waste disposal wells, which may be used for disposal of non-hazardous, non-exempt fluids. The EPA reviews applications for Class I industrial waste disposal wells under the Safe Drinking Water Act.

Spill Prevention, Containment, and Countermeasure (SPCC) Plan: The EPA requires an SPCC Plan to be developed by owners and operators of any facility storing in excess of 1,320 gallons (4,997 liters) of fuel in aboveground tanks. The SPCC Plan will describe the location of the fuel storage tank and methods of spill prevention to be implemented at the proposed facility. The SPCC Plan must be developed prior to commencement of oil production. The SPCC Plan is not a part of this EIS.

Council on Environmental Qualities (CEQ): The EPA reviews and evaluates the Draft EIS (DEIS) and Final EIS (FEIS) for compliance with CEQ guidelines, as specified in 40 CFR 1500-1508.

Section 309, Clean Air Act: The CAA (Title III, Section 309), as amended in August 1977, contains guidance that the EPA should review and comment, in writing, on the environmental impact of matters

relating to the CAA. This guidance would pertain to the EPA commenting on the DEIS and FEIS for the Northstar Project.

Section 103 Permit: The EPA reviews the ODCE prepared by the Corps for ocean dumping and must concur with the proposed disposal site.

1.4.3 Minerals Management Service

Plans of Operation for Federally Managed Leases: The EIS provides information utilized in developing Exploration Plans, Development and Production Plans, Applications for Permit to Drill, and other applications pertaining to proposed activities located on and under leases managed by the MMS, which must be submitted to and approved by the Regional Supervisor prior to commencement of operations (30 CFR Part 250). Within the Northstar Unit, two leases are federal and five are state. The regulations mandate that the Development and Production Plans meet public review and coastal zone consistency certification (30 CFR 250.34) requirements.

Oil Discharge Prevention and Contingency Plan (ODPCP) and Certificate of Financial Responsibility (COFR): The EIS describes storage and transportation of oil produced from the Northstar Project. This information is used in spill prevention planning and as baseline information for the COFR. In a Letter of Agreement (October 23, 1994), the Director of the MMS, Alaska OCS Region, and the Alaska Department of Environmental Conservation's (ADEC) Director of Air and Water Quality agreed that oil spill response plans approved by ADEC under 18 AAC 75 normally will satisfy federal requirements under the 30 CFR 254 interim regulations. The MMS has jurisdiction over OCS offshore production facilities and will coordinate with the ADEC to resolve or clarify any discrepancies or conflicts between federal and state regulations. Similar to the SPCC Plan, the Oil Discharge Prevention and Contingency Plan and the Certificate of Financial Responsibility must be produced and approved (by the MMS) prior to the commencement of oil production. These documents are not a part of this EIS.

1.4.4 U.S. Fish and Wildlife Service

Endangered Species Act Consultation: To ensure conformance with the requirements of Section 7(a)(2) of the Endangered Species Act of 1973 (ESA), as amended, information was requested from USFWS regarding threatened or endangered species in the area of the proposed project and oil transportation routes. As part of the Section 7 consultation process, a Biological Assessment was prepared by the Corps and submitted to the USFWS separately from the EIS, a copy of which was included in the DEIS as Appendix B. This Biological Assessment combines information on species under both USFWS' and NMFS' jurisdiction to evaluate project impacts.

Fish and Wildlife Coordination Act: The EIS provides baseline and impact information on fish and wildlife resources within the project area for use by the USFWS in its review of the proposed action.

Marine Mammal Protection Act: The EIS provides baseline and impact information on marine mammals within the project area for use by the USFWS in its review of the proposed action.

1.4.5 National Marine Fisheries Service

Endangered Species Act Consultation: The NMFS provided information to the Corps regarding threatened or endangered species in the area of the proposed project and oil transportation routes to ensure conformance with requirements of Section 7(a)(2) of the ESA, as amended. As part of the Section 7 consultation process, a Biological Assessment (Appendix B of the DEIS) was prepared by the Corps and submitted to the NMFS separately from the EIS. This Biological Assessment combines information on species under both NMFS' and USFWS' jurisdiction to evaluate project impacts.

Fish and Wildlife Coordination Act: The EIS provides baseline and impact information on fish and wildlife resources within the project area for use by NMFS in its review of the proposed action.

Marine Mammal Protection Act: The EIS provides baseline and impact information on marine mammals within the project area for use by NMFS in its review of the proposed action.

1.4.6 North Slope Borough

Rezoning and Master Plan Revision: A rezoning recommendation by the NSB Planning Commission and final determination by the NSB Assembly are necessary to convert Northstar Unit tracts presently within the NSB Conservation Zoning District to the Resource Development District. The rezoning must include an associated NSB Master Plan revision. The EIS contains a description of existing NSB zoning districts within the project area and potential impacts of the proposed rezoning to assist with the rezoning process.

Coastal Zone Management Act: The EIS provides a description of the location, type, and operation of the proposed project facilities. This description will assist the State of Alaska and the NSB in their review and determination of BPXA's project consistency with the Alaska Coastal Management Program and NSB Coastal Management Program.

1.4.7 All Federal Agencies

Floodplain Management: The EIS identifies existing flood plains within the project area, identifies the various project alternatives as being within or outside those flood plains, and describes potential impacts of facilities located within flood plains (Section 5.3). This information is used by all federal agencies for their floodplain management considerations, as required by Executive Order 11988.

Wetland Protection: The same information provided in the EIS for the Corps in its Section 404 permitting process is used by federal agencies for wetlands protection considerations as required by Executive Order 11990. This information is covered in Section 6.6.

Environmental Justice: Executive Order 12898 requires that federal agencies make achieving Environmental Justice part of their mission by identifying and addressing disproportionately high and

adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. The North Slope is defined as an area bounded by the northern foothills of the Brooks Range to the Alaskan Beaufort Sea coastline and from the Chukchi Sea coast to the Canadian border. This development will take place in an area where there exists an indigenous population with a subsistence culture closely tied to the environment. It has been the intent of the lead and cooperating agencies to comply with Executive Order 12898. There is a strong link between Environmental Justice requirements and the use of Traditional Knowledge in the EIS. The cooperating agencies committed to collecting and incorporating Traditional Knowledge, in part, to meet requirements outlined in Executive Order 12898 regarding Environmental Justice.

Preparation of the Beaufort Sea Oil and Gas Development/Northstar Project EIS has taken the following steps to comply with Executive Order 12898 in addressing Environmental Justice and enhancing participation by affected communities.

- Preparation of this EIS has provided many opportunities for community input.
 - Project scoping meetings were held in three NSB communities (Barrow, Nuiqsut, and Kaktovik) that have the potential to be affected by the proposed project.
 - Translators were used to assist with presentations on the nature of the proposed project and to assist residents expressing their comments regarding the proposed project.
 - Additional meetings were held in each of the communities to collect Traditional Knowledge on characteristics of the affected environment and potential environmental consequences.
 - Workshops were held in each of the three NSB communities to help residents better understand the EIS content and public review and comment process.
 - Formal public hearings were also held to obtain comments on the DEIS and in each of the three NSB communities. Translators were used to assist with public testimony in Kaktovik and Nuiqsut.
- Traditional Knowledge has been used extensively in preparation of the EIS.
 - The cooperating agencies, BPXA, the third-party contractors, and residents of affected communities on the North Slope committed to collecting Traditional Knowledge and incorporating it into the EIS.
 - Traditional Knowledge was obtained from comments made during scoping meetings, review of past testimony on projects related to oil and gas development on the North Slope, and meetings with whaling captains and other knowledgeable individuals.
 - Use of Traditional Knowledge has helped describe the affected environment, assess environmental consequences, enhance public participation, and help develop appropriate mitigation

measures to avoid or minimize potential impacts.

- Accumulation, compilation and integration of Traditional Knowledge is described in Chapter 2 (Traditional Knowledge) and used in the description of the affected environment and assessment of environmental consequences presented in Chapters 5 through 9 and the Biological Assessment (Appendix B of the DEIS).

- Topics specified in Executive Order 12898 have been addressed in the Affected Environment sections of Chapters 5 through 9 of the EIS.

- These topics include a description of the socioeconomic characteristics of affected communities, such as ethnic composition of the population and employment and income levels. A description of specific subsistence resources (game and fish utilized by local residents), activities, and harvest and consumption levels of affected communities has been provided.

- Potential adverse and beneficial effects on local residents in the project area have been evaluated (Chapter 7). The analysis of environmental consequences of each of the project alternatives has addressed potential adverse impacts on: fish and wildlife used by local residents for subsistence, subsistence activities and harvest levels, and potential effects on human health. Potential beneficial effects stemming from local employment opportunities and from state and local revenues that are used to provide public facilities and services to communities in the project area also have been addressed.

The EIS addresses federal agencies compliance with Executive Order 12898 regarding Environmental Justice in the issuance of permits and approvals. Compliance with the Executive Order also applies to the Record of Decisions issued by federal agencies. Traditional Knowledge has been a factor in the EIS and decision-making process in three ways. It has been a factor in reaching conclusions of significant impact (e.g., significant impacts of noise on subsistence whaling harvests). Traditional Knowledge has been incorporated into development of mitigation measures. Finally, Traditional Knowledge has been a factor in project design changes (e.g., the applicant has changed the color of project facilities to avoid disturbance to subsistence whaling harvests). A general summary of where information related to Environmental Justice and Traditional Knowledge can be found in the EIS is presented in Table 1-3. In addition, an index of the location of Traditional Knowledge on specific topics can be found in the EIS.

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As a result of the NSB community meetings and evaluation of Traditional Knowledge, substantive concerns with regard to the Northstar Project were identified. These concerns were focused primarily on potential impacts to subsistence whaling associated with project noise. Oil spill risk and potential widespread environmental damage (including direct impacts to subsistence resources) were additional concerns of the local population. To provide decision-makers and the public with an adequate treatment of these topics, specific EIS chapters are included which address these concerns.

Cultural Resources: The EIS provides information on cultural and archaeological resources in the project area and analysis of the impacts from construction and operation of the project alternatives (Section 7.4). Federal agencies coordinated with the State Historic Preservation Officer for a “no adverse impact” determination or to develop mitigation for adverse impacts during the public review of the DEIS.

1.4.8 Government to Government Coordination

The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. In treaties, our Nation has guaranteed the right of Indian tribes to self-government. As domestic dependent nations, Indian tribes exercise inherent sovereign powers over their members and territory. The United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, trust resources, and Indian tribal treaty and other rights.

Executive Order 13084 was in part intended to establish regular and meaningful consultation and collaboration with federally recognized tribal governments in the development of regulatory practices on Federal matters that significantly or uniquely affect their communities. Section 3(a) of the executive order states that each agency shall have an effective process to permit elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.

Four federally recognized tribal governments (Native Village of Barrow, Native Village of Kaktovik, Native Village of Nuiqsut, Inupiat Community of the Arctic Slope) from the North Slope of Alaska were contacted and extended an opportunity to participate in the development of the EIS. During the public comment period each of the federally recognized tribal governments had the opportunity to comment on the DEIS. Representatives of each federally recognized tribal government received, either directly in their capacity as a tribal official, or in some other capacity, notices and newsletters concerning the status and the availability of the DEIS. Likewise, in their capacity as tribal officials, or in some other capacity (e.g. municipal or corporate official, whaling captain, concerned individual), these tribal representatives received copies of the DEIS or its Executive Summary, and attended the public workshop and/or public hearing in their community on the document.

Among the federally recognized tribal governments, the Inupiat Community of the Arctic Slope submitted written comments on the DEIS (see letter F420 in Appendix K), and these were responded to in this FEIS

(see response to comments, F420-77 to F420-84 in Appendix L). The Inupiat Community of the Arctic Slope also responded to an offer made to all four federally recognized tribal governments to meet with the lead and cooperating federal agencies to discuss the status of the EIS development process. The meeting was held in Anchorage on October 16, 1998.

Copies of the FEIS will be sent to each of the federally recognized tribal governments and each will have the opportunity to comment during the 30-day public comment period. The federal cooperating agencies will address all comments received and will consult with each federally recognized tribal government regarding their comments.

1.4.9 State of Alaska

Although no state agencies participated in the EIS development or relied directly on the EIS for permit decisions, there was a large overlap between information needs for federal and state regulatory programs. The state and the lead and cooperating agencies coordinated information requests and reviews when possible. The state indirectly relies on the EIS process through certification of federal agency permits that rely on information contained in the EIS. State permits and approvals anticipated for Northstar Unit development are listed in Table 1-2.

1.5 SUMMARY OF THE SCOPING PROCESS AND KEY ISSUES IDENTIFIED

Scoping is the process of identifying both the range of issues to be addressed in the EIS and the significant issues potentially resulting from a proposed action. Scoping includes written comments, statements at public meetings, and consultation with federal, state, and local agency officials, interested groups, and individuals. Scoping occurs early in the EIS process and is designed to be an open, public activity. Comments about the proposed project are communicated to resolve potential conflicts and assist with efficient preparation of an accurate and comprehensive EIS.

A *Notice of Intent* was published in the Federal Register on November 24, 1995, announcing the anticipated preparation of an EIS for the proposed Northstar Unit development and the opportunity for public input. Public scoping meetings were held in March, April, and May of 1996. A mailing list was compiled and is included as Appendix C to the DEIS. Newsletters were mailed to approximately 5,000 interested parties at various stages during EIS development. Advertisements about scoping meetings were placed in four newspapers throughout the state: the Anchorage Daily News, the Fairbanks Daily News-Miner, the Valdez Vanguard, and the Arctic Sounder. Public announcements were scheduled on KSKA (Anchorage Radio), KBRW (Barrow Radio), Barrow Cable Television, and Kaktovik Television. In addition, poster-sized notices were displayed in communities where public meetings were held.

Written comments on the proposed project have been solicited and received, and seven public scoping meetings were held for communities and agencies on the dates listed below.

- Barrow Public Scoping Meeting - March 25, 1996 (with Inupiaq translator)
- Kaktovik Public Scoping Meeting - March 26, 1996 (with Inupiaq translator)

- Nuiqsut Public Scoping Meeting - March 27, 1996 (postponed¹)
- Fairbanks Public Scoping Meeting - March 28, 1996
- Anchorage Agency Scoping Meeting - April 1, 1996
- Valdez Public Scoping Meeting - April 2, 1996
- Anchorage Public Scoping Meeting - April 3, 1996
- Nuiqsut Public Scoping Meeting - May 7, 1996 (with Inupiaq translator)

(1) Postponed due to weather on March 27 and postponed per community request on March 28. Rescheduled to May 7, 1996.

In addition to the public scoping meetings, smaller, informal public involvement meetings were held. These meetings served the dual purpose of receiving scoping comments and collecting Traditional Knowledge in the region (Chapter 2). Additionally, BPXA held meetings with interested individuals in and around the project area to provide information specific to the proposed project. The public and agencies identified issues of concern with the proposed development, including numerous specific questions regarding the effects of the project.

Details on scoping meetings, issues identified at meetings, and the full text of oral and written comments are included in the *“Scoping Report - Beaufort Sea Oil and Gas Development/Northstar Project”* dated July 15, 1996. This document is located in city offices at Barrow, Kaktovik, and Nuiqsut; at the NSB office in Barrow; at the Office of the Alaska Eskimo Whaling Commission in Barrow; and in city libraries at Anchorage, Fairbanks, and Valdez. It is available from the Corps’ Anchorage office (see contact address on cover sheet). Oral and written comments received from the public and agencies during the scoping period are summarized below.

General Comments: Most of the general comments involved concerns regarding cumulative impacts of additional Alaskan Beaufort Sea development, and permitting issues.

- There is the general concern that approval of this development will increase the likelihood of further offshore oil and gas development in the Alaskan Beaufort Sea and the cumulative effects of these potential future developments need to be addressed (Chapter 10).
- Prevention and avoidance of negative whaler/industry interaction needs to be anticipated. Guidelines should be established early in the project to prevent potential conflicts. In addition, there may need to be temporary work stoppages to allow for whale hunting and to minimize disruption during offshore subsistence hunts (Section 7.3).
- Identify steps that can be taken to avoid or mitigate potential impacts to subsistence resources and access, and monitoring programs may need to be established to assess the effectiveness of mitigation measures. The affected communities should have a role in establishing effective mitigation measures based on their experience in dealing with oil and gas activities (Chapter 11).
- The Coastal Standard of the Alaska Coastal Management Program needs to be integrated into the EIS, and all pertinent issues addressed (Section 7.5).

Project Design: Concerns/issues were raised on the design of the production platform/island, subsea pipelines, and resupply. These are summarized below.

- Concerns were raised about the type of armor planned for the proposed island and which type would work best considering ice forces, wave impacts, and storm tide height at the site (Section 4.4).
- The rehabilitation of the island and the reinstatement of the near-shore ecosystem after production ends should be considered and elements incorporated into the project design (Section 4.4).
- Questions were raised about the integrity of the pipeline, its ability to withstand shifting ice, the potential effects of corrosion, permafrost/pipeline interactions, and the need for emergency plans for repairing the pipeline during each season if damage occurs (Sections 3.4.2.7, 4.2.5, 4.3, 5.3, 5.6, and 8.5.3).
- Offshore waste injection needs to be evaluated and how it may differ from onshore injection described (Section 5.3).
- The EIS needs to present a discussion of the alternatives for resupply of the island during periods of the year when surface transportation offshore will not be possible and how they might affect seasonal subsistence activities. Alternate modes of access need to be analyzed, and the EIS should discuss transportation during freeze-up and break-up (Section 4.2).

Physical Environment: Concerns/issues raised on the physical environment centered on sea ice dynamics and oil spill prevention/response as summarized below.

- The EIS needs to analyze and consider ice dynamics, both for heavy, multi-year and “young” ice, particularly in combination with winds and currents (Section 5.6).
- Numerous questions were raised about the oil industry's ability to prevent oil spills and to clean up spilled oil in the Arctic, particularly in broken ice. Cleanup technology must be adequate for response during the Beaufort Sea ice season. The response time for repairing a break in the subsea pipelines needs to be included in spill scenario discussions (Chapter 8).
- Spill planning for a pipeline break is necessary prior to development, and spill cleanup equipment needs to be in place prior to the start of drilling. Lessons learned from the *Exxon Valdez* spill related to oil spill impacts to marine mammals need to be addressed in the EIS. Local people need to be included in oil spill response planning activities (Chapter 8).

Biological Environment: Biological issues/concerns centered mainly around the impacts of offshore development on marine mammals and pipeline impacts to terrestrial ecology, wetlands, and wildlife. These concerns/issues are summarized below.

- Information on the long-term (continuous) versus short-term disturbance of bowhead whales should be evaluated. Impacts on whale migration and possible deflection from the proposed island should be evaluated. Advance planning may be necessary for reducing noise during the fall whale migration. The EIS should describe how noise reduction will be achieved (Chapter 9).
- Impacts to seals should be assessed since there is the potential to create a habitat which could result in increased use of the area by seals (Section 6.5).
- Human/polar bear interactions should be addressed, particularly related to attraction to human activity resulting in bears being killed in defense of life and human injury, as well as construction effects on denning bears. Creation of an artificial lead may attract bears and increase the potential for bears to gain access to the island (Section 6.5).
- Onshore pipeline routing should avoid lakes and high value wetland areas when possible (Section 6.6).
- Concerns related to caribou post-calving and insect relief need to be evaluated (Section 6.8).
- Birds fly through the North Slope area from all over the world. Impacts of an oil spill and impacts to bird populations due to strikes on aboveground pipelines and offshore island structures through the nearshore areas need to be evaluated in the EIS (Chapter 8 and Section 6.7, respectively).

Human Environment: Concerns/issues raised in this category dealt with subsistence, traditional lifestyle and knowledge, cultural resources, and cumulative impacts as summarized below.

- The Inupiat people need to be consulted regarding subsistence resources, and their information needs to be integrated into the EIS. This should include conversations with whaling captains and other community members from Barrow, Kaktovik, and Nuiqsut as a source of information (Section 7.3).
- The importance of subsistence harvests, particularly marine mammals, to the communities of Kaktovik, Nuiqsut, and Barrow needs to be discussed. The EIS should describe fish, wildlife, and marine resources used by affected North Slope communities for subsistence and how the use of these resources might be affected by the project (Section 7.3).
- There are concerns about maintaining long-term access to hunting areas and risks related to food supply following an oil spill (Chapter 8).
- Known archaeological sites within the area affected by the proposed project need to be protected (Section 7.4).
- Traditional Knowledge from elders and whaling captains will be an important source of information in the EIS and should be incorporated. Traditional Knowledge should be an integral part of the EIS decision-making process (Chapters 5 through 9).

A specific listing of issues was developed for each of the physical, biological, and human environments, along with issues specific to effects of oil and effects of noise. Text boxes within each subsection of this document are used to identify information that addresses issues.

Issues Raised That Are Not Addressed in the EIS: Some issues raised during the public scoping process are not addressed in the EIS, as they are deemed to be outside the parameters of relevant issues considered as part of this project. The following is a list of these issues:

- Issues surrounding the purpose and need for revisions of state royalty payments received as a result of oil and gas production from the Northstar Unit.
- Development of oil and gas in the Arctic National Wildlife Refuge as an alternative to offshore development in the Alaskan Beaufort Sea.
- Issues related to Alaska statehood rights and U.S. or Alaska constitutional rights.

1.6 DEIS PUBLIC REVIEW AND COMMENT PERIOD

A Notice of Availability was published in the Federal Register (62 FR 28375) for the DEIS on May 22, 1998, and the DEIS was released for public review and comment on June 1, 1998. Notices of Availability also were announced through newspapers and mailing lists. The DEIS comment period was extended from an original 60-day period to continue through August 31, 1998, following requests for an extension to the comment period.

The DEIS was available to any member of the public requesting a copy. Over 260 complete sets of the DEIS and an additional 548 copies of the Executive Summary (Volume 1) were mailed to interested parties for review. The Executive Summary also was available for viewing on the Internet, and complete sets of the seven volume document were available for reference at libraries and city offices in Anchorage, Barrow, Fairbanks, Juneau, Kaktovik, Nuiqsut, and Valdez and the Corps' office in Anchorage. The Corps and cooperating agencies held informal workshops to familiarize interested parties with the document during June and July 1998, and formal public hearings were held during July at Nuiqsut, Kaktovik, Barrow, Fairbanks, and Anchorage (refer to Appendix K for workshop and hearing dates).

A total of 435 letters were received from federal, state, municipal, and federally recognized tribal governments, businesses, organizations, and individuals. Public testimony was received from approximately 105 individuals at public hearings. All comments (letters and testimony) were reviewed and, in accordance with NEPA, substantive comments were addressed. Copies of comments received (letters and testimony) are provided in Appendix K; responses to comments are provided in Appendix L. Substantive comments that affected elements of the EIS were incorporated into the document.

1.7 ORGANIZATION OF THE EIS

This EIS addresses issues raised in scoping and issues related to decision making. It tracks these issues

through the analysis of project impacts. Key issues are presented as questions at the beginning of each chapter and show the section where each topic has been addressed in this EIS. Issue questions appear again in boxes within the technical chapters alongside text that addresses each of them. Issue boxes look like this:

There are also questions to assist in understanding why topics are covered in the EIS. They do not respond directly to a particular issue, but support issues, and are put into boxes that look like this:

The document was constructed to be user-friendly, respond to scoping concerns, and support several approval processes (e.g., ESA, NPDES, Ocean Dumping), as well as support decisions on future offshore projects. The chapter on Traditional Knowledge responds to North Slope residents' concern about their input not being taken seriously in the past. Traditional Knowledge sections at the beginning of chapters, as well as Traditional Knowledge used alongside western science, allow the reader to quickly find Traditional Knowledge information in the document. The Affected Environment sections are placed next to Environmental Consequences for each of the topic subsections to make the EIS easier to use. For example, if a reader is interested in fish, all the information about fish is found together. While this format may result in some redundancies, we have adopted this approach in respect to the diverse group of reviewers who are often very issue-specific in their interests.

The analysis of offshore development/production options in the Alaskan Beaufort Sea is presented in Chapter 3. The purpose is to present a broad, initial view of development options for this first Alaskan Beaufort Sea offshore project with a subsea pipeline. It is intended that much of this EIS be useable for future oil and gas development by substituting project-specific information in Chapter 4 and reassessing impacts as needed for project-specific alternatives. Oil and noise information and impacts were placed into separate Chapters (8 and 9, respectively) for two reasons: 1) to accommodate the volume of background information needed to understand the assessment of oil and noise impacts, and 2) to focus on spilled oil and increased noise in the marine environment as primary issues for the Northstar Unit development.

Readers may notice repetition of information in this EIS. This was avoided as much as possible; however, in some places it is deliberate. An example is the Traditional Knowledge information which is incorporated within each chapter, but is also repeated in a separate section at the beginning of Chapters 5 through 9. Information on effects of oil and noise on the physical, biological, and human environments may also appear to be repeated. Generally, more detailed discussions on these topics are found in Chapter 8 (Oil) and 9 (Noise), with summary points brought to specific sections of Chapters 5, 6, and 7.

A description of the contents and purpose of EIS chapters is set forth below.

The **Executive Summary** provides an overview of BPXA's proposed project. It summarizes the EIS contents, presents a description of the EIS development process, and explains the EIS structure and supporting rationale. The Executive Summary presents information on the development of project alternatives, impacts assessment, and comparison of project alternatives based on analyses contained in the document.

A list of **Acronyms and Abbreviations** used in this EIS is provided.

Chapter 1.0 - Introduction introduces BPXA's proposed project and describes the purpose and need for the project and the EIS. This chapter presents the goals of this EIS and explains how the document is organized. It also includes a brief discussion of decisions to be made and a summary of the scoping process and key issues identified.

Chapter 2.0 - Traditional Knowledge explains what Traditional Knowledge and subsistence mean and their cultural importance. It describes the process for gathering Traditional Knowledge and using it in this document. This information is placed at the beginning of the EIS to provide the context for use of Traditional Knowledge in the remainder of the document.

Chapter 3.0 - Oil and Gas Development/Production Options for the Alaskan Beaufort Sea presents a summary of the range of oil and gas development/production technologies applicable to the Alaskan Beaufort Sea. This chapter then analyzes these technologies to identify a short list of development/production options to be evaluated further in the EIS. This analysis continues in Chapter 4, using information applicable to the Northstar Unit, and its results provide the basis for identification of the action alternatives evaluated in more detail throughout this EIS. This approach allows an initial, broad consideration of options for the Northstar Project, which may be applicable to the evaluation of future oil and gas development/production proposals at other locations in the Alaskan Beaufort Sea.

Chapter 4.0 - Northstar Unit Development/Production Alternatives provides information about the Northstar Unit and reservoir needed to analyze technical options for offshore development/production at the Northstar Unit. Development/production options for the Northstar Unit are identified and linked to form reasonable project alternatives for this development. As required by NEPA, a No Action Alternative is also analyzed as the basis for assessing impacts.

Chapter 5.0 (Affected Physical Environment and Impacts), Chapter 6.0 (Affected Biological Environment and Impacts), and Chapter 7.0 (Affected Human Environment and Impacts) present information regarding the existing physical, biological, and human environments that would be affected by the project alternatives. The second part of each section, "Environmental Consequences," discusses potential impacts from construction, operation, maintenance, and abandonment of alternatives identified in Chapter 4. Summaries in these chapters identify unavoidable adverse effects, short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and irreversible and irretrievable effects. Information in these chapters also supports associated approval processes (e.g., NPDES Permit, ESA - Biological Assessment, Ocean Dumping), which allows cross-referencing among EIS sections and appendices and avoids repetition of information.

Chapter 8.0 - Effects of Oil on the Physical, Biological, and Human Environments presents the likelihood of spills at different sites, background information, identification of resources of particular concern, and realistic assessment of impacts from spilled oil. The probability of an oil spill for each of the project alternatives is estimated. This chapter describes the impacts of oil on the physical, biological, and human environments (at the large-scale or population level) to address concerns raised in scoping and to enable readers to find information on potential oil spills and their impacts in one place in the document.

General effects of oil on resources (on a small scale or individual level) are described in Chapters 5, 6, and 7. Information is presented (when available) for the species within the project area. When such species-specific information is not available, information may be presented from related species or from a different area. Because the effect of oil on resources was a key issue identified in scoping, a separate chapter has been dedicated to address this concern.

Chapter 9.0 - Effects of Noise on the Biological Environments describes and explains noise, noise studies, and animal reactions to noise to predict/assess impacts of project alternatives. Noise impact was a concern raised repeatedly during scoping. This chapter provides information addressing that concern. An analysis of potential impacts from construction, operation, maintenance, and abandonment of each of the alternatives identified in Chapter 4 is included.

Chapter 10.0 - Cumulative Effects presents an analysis of past, current, and reasonably foreseeable future actions that, in combination with development/production of the Northstar Unit, may cause cumulative effects on the physical, biological, and human environments. Exploration, construction, operation, and production activities associated with foreseeable future projects are described. This chapter provides an understanding of what impact the Northstar Unit development, in conjunction with other existing and/or future North Slope developments, would have on the environment.

Chapter 11.0 - Comparison of Project Alternatives and their Impacts presents a summary of the magnitude and significance of environmental impacts associated with each alternative identified in this EIS. The information is presented in a comparative format to highlight environmental issues and principal differences among alternatives.

Chapter 12.0 - List of Preparers presents a list of individuals contributing to the preparation of this EIS, including agencies who provided assistance in the overall development and coordination.

Chapter 13.0 - Consultation and Coordination identifies federal and state agencies consulted during preparation of this EIS, along with NSB personnel, special interest groups, and other individuals who provided information and assistance.

A **Glossary** is included to define technical terms and other potentially unfamiliar words and phrases.

An **Index** of keywords, as required by NEPA, is included to assist the reader in locating information in this EIS. In addition, an index of keywords pertaining specifically to Traditional Knowledge topics is included.

Descriptions of the appendices to the EIS which were developed to provide supplemental technical information and supporting data are provided below.

Appendix A - BP Exploration (Alaska) Inc.'s Final Project Description is BPXA's description of its proposed Northstar Development Project (Final Project Description, Revision 1, dated March 27, 1997, with subsequent modifications). It is provided to ensure that all reviewers (state, federal, local, and

public) have the same information and level of detail to assess the proposed project. This project description also serves as the Development and Production Plan for the MMS's approval.

Appendix B - Biological Assessment was prepared to conform with the requirements of Section 7 (a)(2) of the ESA, as amended, regarding threatened or endangered species potentially affected by BPXA's proposed project. As part of the Section 7 consultation process, the Biological Assessment was submitted to the NMFS and USFWS separately from the EIS. The Biological Assessment addresses potential effects to threatened and endangered species as a result of development/production of the Northstar Unit. It also addresses potential effects of the subsequent transport of crude oil along the U.S. west coast and routes to refinery destinations. The Biological Assessment references some analyses which can be found in the biological, noise, and oil chapters of this EIS. Refer to the DEIS for this document.

Appendix C - Updated Mailing List shows agencies, groups, and interested individuals receiving newsletters and announcements regarding the development of the EIS.

Appendix D - Northstar Unit Lease Stipulation Summaries and Applicable Alaska Regulations includes summaries of lease stipulations issued by the U.S. Department of the Interior, Bureau of Land Management. These OCS functions were transferred by Executive Order to the MMS on October 1, 1982, for the two federal leases that comprise portions of the Northstar Unit. Summaries of stipulations issued by the Alaska Department of Natural Resources and the State of Alaska Division of Minerals and Energy Management, which govern oil and gas exploration and development activities from the five individual state leases that comprise the remainder of the Northstar Unit, are also included. Select Alaska statutes specific to the proposed project are included.

Appendix E - Technical Appendices is a listing of technical documents prepared by BPXA and used in preparation of the EIS.

Appendix F - Draft National Pollutant Discharge Elimination System Permit provides limitations and monitoring requirements for discharges from BPXA's proposed project into local marine waters. Refer to the DEIS for this document.

Appendix G - National Pollutant Discharge Elimination System Fact Sheet provides technical information supporting the limits and monitoring requirements in the NPDES Permit. A significant portion of this information is derived from the EIS, including the project description (Appendix A) and oceanographic data (Section 5.5). Appendix G includes the nature of the marine discharges, the local environment into which these discharges may be made, the need for mixing zones, and the rationale for monitoring requirements. In addition, biological data from the EIS (Chapter 6) are used in this Fact Sheet to support its risk assessment. Refer to the DEIS for this document.

Appendix H - Ocean Discharge Criteria Evaluation provides an evaluation of the possibility of unreasonable degradation due to marine discharges from the Seal Island facilities. This evaluation is based on the ten criteria requirements set forth in 40 CFR 125.121. In addition, this ODCE summarizes recommended monitoring requirements detailed in Appendix F. Discharges, physical oceanography, sea

ice, and biological communities data for this ODCE were taken from the EIS. Refer to the DEIS for this document.

Appendix I - Section 103 Evaluation is a document required by the Marine Protection, Research and Sanctuaries Act of 1972 for evaluating the transport and ocean disposal of dredged waste material. This appendix provides information about dredged material and the substrate at the disposal sites, such as grain size and potential contaminants, to support agency decisions about disposal of waste materials from pipeline trenching. The Corps issues permits for the transportation of dredged material for the purpose of ocean disposal, and the EPA must concur with the proposed disposal site. Refer to the DEIS for this document.

Appendix J - Draft Underground Injection Control Permit defines both the general permit conditions and well-specific conditions for the proposed Northstar non-hazardous material injection well. This injection well will receive numerous waste streams, ranging from process related material to treated domestic wastewater and surface run-off. Appendix J includes the UIC well permit conditions as well as monitoring and reporting requirements and plugging and abandonment requirements. Refer to the DEIS for this document.

Appendix K - Public Comments Received on the Draft Environmental Impact Statement provides comments, both written letters and oral testimony, received during the public comment period for the Northstar Development Project EIS from June 1, 1998, through August 31, 1998, in accordance with 40 CFR 1506.9. To comply with NEPA, all comments received must be acknowledged, and substantive comments addressed. These comments have been bracketed in this appendix and corresponding responses can be found in Appendix L.

Appendix L - Response to Public Comments provides responses to comments received during the official public comment period, identified by the comment number, and prepared by technical authors specializing in each field. Responses were drafted to meet NEPA, CEQ, and Corps guidelines.

Appendix M - Biological Opinions contains the Biological Opinions of the USFWS and NMFS on the Northstar Development Project, based on the Biological Assessment (presented in Appendix B of the DEIS).

Appendix N - Final Underground Injection Control Permit contains the final version of the UIC Permit. The draft version was previously published in the DEIS as Appendix J.

Appendix O - Preliminary Final National Pollutant Discharge Elimination System Permit contains the preliminary final version of the NPDES Permit. The draft version was previously published in the DEIS as Appendix F.

Appendix P - Reports of the Cold Regions Research and Engineering Laboratory contains reports concerning shoreline erosion, permafrost at the sea/land transition zone, and loads placed on ice near a slot in a thickened ice sheet. The first two topics are important for assessing the integrity of the subsea

pipeline from Seal Island as it transitions to an onshore pipeline. The third topic is relevant to subsea pipeline construction activities.

Reference Citations are presented within the EIS text in a format that provides information to locate a cited document or communication. Reference citations are provided after or within the first sentence in a paragraph when information in that paragraph is summarized from the same reference. If subsequent sentences in the same paragraph present information from different sources, or different page numbers within the same source, a reference is provided after the first sentence containing information from each new source page(s). If a statement or discussion is supported by more than one reference, all references are listed.

At the end of each chapter a reference listing is provided. References have been arranged in the Modern Language Association format. The reference listing is organized in alphabetical order by the author's last name, then alphabetically by title. Documents authored by companies, government agencies, or other non-person entities are listed alphabetically by their full title the first time they appear in the references. Names are followed by an acronym or abbreviation in parentheses, when necessary, to shorten the reference. (This abbreviated or acronym version is used in the text citation.) For example, a citation from Kinnetic Laboratories, Inc. appears in the text as (KLI, 1992:4). If the author is unknown, the reference is listed alphabetically according to title. This type of reference appears in the text as follows: (Petroleum News Alaska, 1997:1).

Personal communications appear alphabetically and then chronologically in each chapter reference listing. These citations are listed in the document by the person with whom the communication took place, followed by "Pers. Comm.," and the date.

Since Traditional Knowledge has been cited frequently in this EIS, these citations are listed separately in a reference section entitled "Traditional Knowledge" and appear at the end of each chapter, as relevant. Traditional Knowledge references are formatted similarly to those appearing in the regular reference section. There are two forms of Traditional Knowledge citations. Where Traditional Knowledge is contained in previous testimony on oil and gas lease sales or similar documents, each reference lists the person who presented the information, followed by the document in which comments appeared, publication information, and the date. Citations within the text pertaining to Traditional Knowledge list the name of the person presenting the information first, followed by "in" and the author of the document, the date, and page number(s). Where Traditional Knowledge was provided in meetings with whaling captains and other community members, citations list the name of the person presenting the information followed by "Pers. Comm.," the meeting name, location, and date.

1.8 IMPACT EVALUATION CRITERIA

To communicate clearly the results of the environmental impact analysis presented in this document, standard terminology is used consistent with CEQ NEPA regulations (40 CFR 1508.27). In this document, impacts are defined as those changes to the existing environment that have either a beneficial

or adverse consequence as a result of project construction, operation, maintenance, or abandonment activities. Impacts are described in terms of frequency, duration, general scope and/or size, and intensity. The combinations of frequency, duration, scope/size, and intensity of identified adverse impacts are described as follows:

- None - (no change) No impacts are anticipated when subject resources are not present or activities are not expected to affect those resources that are present.
- Negligible - Impacts on subject resources may occur as a result of project activities, but are not measurable.
- Minor - Impacts that have a measurable effect, and individually may or may not require avoidance or minimization to mitigate that effect, as determined by the responsible agency.
- Significant - As described in the CEQ regulations, significant impacts are to be considered both in context and intensity. These impacts have a measurable effect and, individually or cumulatively, require avoidance or minimization to mitigate the effect.

Significant adverse impacts are addressed in the following manner: 1) demonstrating that the impact can be reduced to a minor level by changing the project design, 2) demonstrating that the alternative is acceptable because the risk of the impact is small, or 3) demonstrating that the impact cannot be reduced by changes in design and/or the risk is not small.

The determination of impacts with regard to specific resources and project activities is based upon specific environmental features and significance thresholds related to the resource in question. The impact analysis text presented in Chapters 5 through 10 of this document specifically identifies the significance criteria along with the presentation of each individual analysis.