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Aggregate Effects of Oil Industry Operations on Iñupiaq Subsistence Activities, Nuiqsut, Alaska: A History and Analysis of Mitigation and Monitoring

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A History and Analysis of Mitigation and Monitoring

Authors

Stephen R. Braund & Associates

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Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510

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US Department of the Interior
Bureau of Ocean Energy Management
Alaska OCS Region
3801 Centerpoint Drive, Suite 500
Anchorage, AK 99503-5820
Phone: (907) 334-5200
Fax: (907) 334-5202

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LIST OF ACRONYMS AND ABBREVIATIONS

ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADGC	Alaska Division of Governmental Coordination
ADNR	Alaska Department of Natural Resources
ADOLWD	Alaska Department of Labor and Workforce Development
AEWC	Alaska Eskimo Whaling Commission
ANCSA	Alaska Native Claims Settlement Act
AOGCC	Alaska Oil and Gas Conservation Commission
AOMB	Alaska Office of Management and Budget
ASRC	Arctic Slope Regional Corporation
BIF	Best Interest Finding
BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BP	British Petroleum
BSEE	Bureau of Safety and Environmental Enforcement
CAA	Conflict Avoidance Agreement
CEQ	Council on Environmental Quality
CPAI	ConocoPhillips Alaska, Inc.
DCOM	Division of Coastal and Ocean Management
DO&G	Division of Oil and Gas
DOT&PF	Alaska Department of Transportation and Public Facilities
EA	Environmental Assessment

EED	Environmental Evaluation Document
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
KSOP	Kuukpik Subsistence Oversight Panel, Inc.
MMPA	Marine Mammal Protection Act
MMS	Mineral Management Service
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPRA	National Petroleum Reserve-Alaska
NSB	North Slope Borough
NSBMC	North Slope Borough Municipal Code
OCS	Outer Continental Shelf
PNRC	Pioneer Natural Resources Company
ROD	Record of Decision
SRB&A	Stephen R. Braund & Associates
UIC	Ukpeaġvik Iñupiat Corporation
USACE	U.S. Army Corps of Engineers
USDOI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service

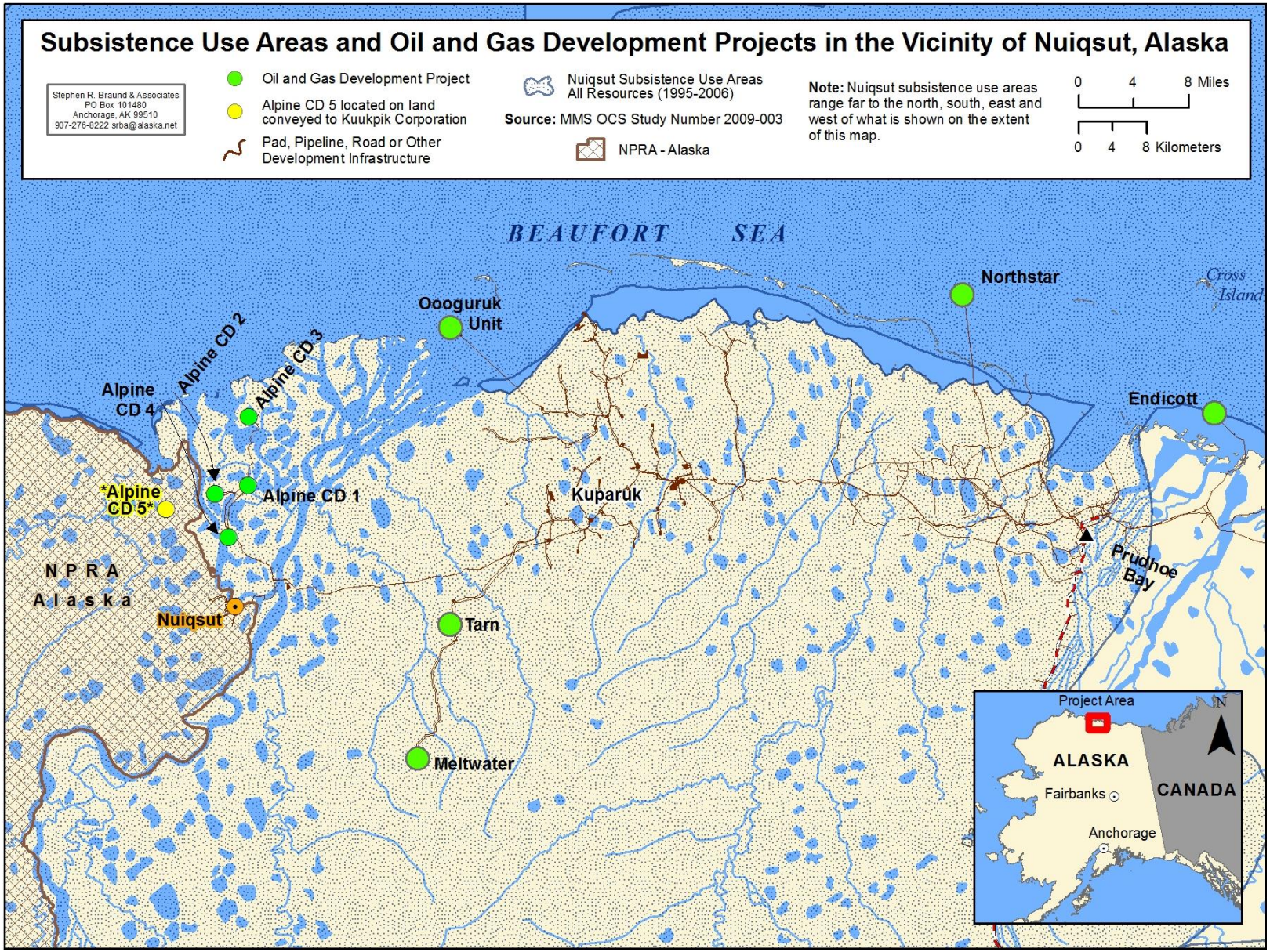
CHAPTER 1: INTRODUCTION

The Iñupiaq community of Nuiqsut is located on the North Slope of Alaska, on the Colville River approximately 35 miles upstream from the Beaufort Sea (Map 1). The current community site was established in 1973, after a group of Iñupiat traveled overland from Barrow and set up a tent city following passage of the Alaska Native Claims Settlement Act (ANCSA). Most of these individuals had grown up on the Colville River or in coastal locations near the Colville River, or had family connections to the area. Easy access to the main channel of the Colville River for fishing, hunting, and ease of movement between upriver hunting sites and downriver whaling and sealing sites was the primary reason for selection of the site (Brown 1979). The area was also traditionally a place where people from the coast and the interior gathered to trade and fish (Brown 1979).

Since its resettlement 40 years ago, Nuiqsut has grown to a population of over 400 residents (U.S. Census Bureau 2013). Residents participate in the cash economy, with primary sources of employment the village corporation (Kuukpik Corporation), the North Slope Borough (NSB), and the NSB School District. However, residents also rely heavily on subsistence harvests of fish, land mammals, marine mammals, and birds for a large portion of their food. Available harvest data from the Alaska Department of Fish & Game show Nuiqsut subsistence harvests of between 399 pounds per capita (in 1985) and 742 pounds per capita (in 1993) (ADF&G 2013). Key species harvested by Nuiqsut residents include bowhead whales, Arctic cisco, caribou and broad whitefish. Other important subsistence resources in Nuiqsut include seal, moose, geese, eiders and various species of non-salmon fish. Each of these species' contribution toward the total subsistence harvest varies from year to year based on resource availability, among other environmental and socioeconomic factors.

The combination of subsistence and commercial-wage activities provides the economic basis for the way of life so highly valued in rural communities (Wolfe and Walker, 1985). As one Iñupiaq hunter observed: "The best mix is half and half. If it was all subsistence, then we would have no money for snowmachines and ammunition. If it was all work, we would have no Native foods. Both work well together" (Alaska Consultants Inc., Courtnage, and Stephen R. Braund & Associates [SRB&A], 1984). In addition to their economic importance, subsistence foods and activities are also socially, culturally, and nutritionally important to the people of Nuiqsut. Participation in subsistence activities promotes transmission of traditional knowledge through generations and maintains people's connection to the physical and biological environment. The subsistence lifestyle encompasses cultural values such as sharing, respect for elders, respect for the environment, hard work, and humility. Subsistence is also a healthy source of nutrition in the community, where food prices are high.

Nuiqsut is the closest community to the major oil producing fields of the North Slope, which has resulted both in impacts on subsistence uses (Fuller and George 1999; Impact Assessment Inc.



Map 1: Oil and Gas Development Projects in the Vicinity of Nuiqsut, Alaska

1990; Pedersen, Wolfe, Scott, and Caulfield 2000) as well as economic benefits (e.g., jobs, dividends, and local revenue) for local residents (SRB&A 2009). In recent years, development activities have moved even closer to the community, increasing the potential for conflicts between industry activities and subsistence harvesting. The Alpine development, for example, is located in the Colville River delta eight miles north of the community. Further oil and gas exploration may result in additional developments west and south of the community. Starting as early as the 1970s, residents of Nuiqsut have reported negative impacts on their subsistence activities and on the availability of subsistence resources due to project infrastructure, traffic, noise, competition, and regulations (SRB&A 2009). In addition, a shifting of subsistence use areas away from areas of development has been documented for the community in a number of sources (Pedersen et al. 2000, IAI 1990, U.S. Department of the Interior [USDOI], Minerals Management Service [MMS] 2007, SRB&A 2013).

A number of studies have documented the impacts of oil and gas development on North Slope subsistence activities and recommended measures to reduce these impacts (Pedersen et al. 2000; National Research Council 2003; SRB&A 2009, 2010i, 2011, 2012, 2013). Over the years, agencies, industry, and local residents have adopted these measures or worked to develop new mitigation measures intended to lessen the impacts of oil industry activities on Nuiqsut's subsistence activities. However, few if any efforts have monitored effectiveness of these measures once they have been recommended or implemented. For this reason, the USDOI Bureau of Ocean Energy Management (BOEM) sought to gain a better understanding of the effectiveness of past and current mitigation efforts to reduce potential impacts on subsistence activities near Nuiqsut, Alaska.

Stephen R. Braund & Associates (SRB&A), under contract to BOEM, conducted research to identify and evaluate the effectiveness of specific subsistence mitigation strategies and stipulated actions guiding oil and gas industry operations in the vicinity of Nuiqsut. Specifically, the study team evaluated mitigation measures intended to lessen the potential negative impacts of oil and gas development on subsistence activities for seven onshore and offshore development projects in the vicinity of Nuiqsut: Alpine, Alpine Satellites, Endicott, Meltwater, Northstar, Oooguruk, and Tarn. This is a pilot project that could be expanded into a more comprehensive study in the future to monitor effects of multiple projects on local communities. Deliverables for this study include: (1) an inventory of planned mitigation (including an annotated bibliography) and annotated subsistence concerns; (2) a history of proposed and implemented mitigation; and (3) analysis of the effectiveness of the identified mitigation measures and monitoring plans. Task 1 (inventory of mitigation and subsistence concerns) was previously delivered to BOEM (SRB&A 2010a, 2010b, 2010c, 2010d, 2010e, 2010f, 2010g, and 2010h) and is briefly summarized below. Tasks 2 and 3 (history and analysis of mitigation) are the focus of this report.

In order to evaluate mitigation measures, the study team first conducted an inventory of mitigation measures for the seven development projects (Endicott, Northstar, Alpine, Alpine Satellites, Tarn, Meltwater, and Oooguruk). These projects are operated by three primary

developers: British Petroleum (BP), ConocoPhillips Alaska, Inc. (CPAI), and Pioneer Natural Resources Company (PNRC). As shown in Table 1, all seven development projects are on State land and require leases from the State of Alaska; however, because the Northstar development drills into the federal Outer Continental Shelf (OCS), it requires a Federal lease. The Alpine Satellites Development Plan originally included BLM lands; however, those lands were never developed while under BLM jurisdiction. The lands have since been conveyed to local Native corporations. Three of the projects (Endicott, Northstar, and Oooguruk) are offshore developments. BP is the primary developer for Endicott and Northstar; CPAI projects include Alpine, Alpine Satellites, Meltwater, and Tarn; and PNRC is the operator for Oooguruk.

Table 1: Development Projects and Land Status

Development Project	Primary Developer	Onshore/Offshore	State/Federal
Alpine	CPAI	Onshore	State
Alpine Satellites	CPAI	Onshore	Both
Endicott	BP	Offshore	State
Meltwater	CPAI	Onshore	State
Northstar	BP	Offshore	Both
Oooguruk	PNRC	Offshore	State
Tarn	CPAI	Onshore	State

Stephen R. Braund & Associates, 2013.

The inventory consisted of a review of local, state, and federal documents containing mitigation proposals (i.e., suggested mitigation from various local, state and federal stakeholders) and mitigation measures (i.e., mitigation stipulated for a developer). The scope of work for this study originally envisioned that the study team would review National Environmental Policy Act (NEPA) documents such as Environmental Impact Statements (EIS) and Records of Decision (ROD), in addition to state Best Interest Findings (BIF) to identify relevant mitigation proposals and measures. However, after initiating the review and discussions with agency informants, the study team found that a majority of stipulated mitigation measures (i.e., those that are binding to developers) were contained in permits and leases. Thus, the scope of work was expanded to include the identification and review of permitting and lease documents associated with the seven development projects. Tracking down and obtaining these documents, which are not always publically available, substantially increased the level of effort involved in the literature review. In addition to identifying mitigation proposals and measures, the study team reviewed official testimonials from available public hearings and scoping meetings in order to annotate Nuiqsut residents' subsistence concerns. Both the inventory of planned mitigation and annotated subsistence concerns have been delivered to BOEM (SRB&A 2010a, 2010b, 2010c, 2010d, 2010e, 2010f, 2010g, and 2010h).

One purpose of this document is to provide a concise history of proposed and implemented mitigation measures as they relate to the process of mitigating impacts to Nuiqsut subsistence activities. This narrative is based on a review of relevant documents (see above) and discussions

with knowledgeable informants from Nuiqsut; local, state, and federal agencies; and industry representatives from CPAI and BP. PNRC[1] declined to participate in the study[2]. It should be noted that the scope of this research project was to conduct directed conversations with knowledgeable informants that represented various perspectives of community, industry, and agencies and to collect information on mitigation effectiveness. This study was not designed to collect representative information through a broad survey, and therefore the history and analysis of effectiveness is based on a limited number of key informant discussions.

This document provides an analysis of the effectiveness of identified mitigation measures and monitoring plans and, based on the results of the analysis, it develops conclusions and findings related to mitigation measures as they pertain to Nuiqsut subsistence activities. The information gathered from knowledgeable informants is used to inform the analysis of the effectiveness of identified mitigation measures and monitoring plans. In addition, this report provides a summary of the study team's overall research process and discussion and findings for improving the method for evaluating and monitoring mitigation effectiveness for future studies. We believe the study methods and findings provide useful guidance for long-term mitigation monitoring and cumulative impact assessment throughout Alaska and the Arctic.

1.1 Report Organization

This report is organized into eight main chapters which include (1) Introduction, (2) Methods, (3) Overview of Relevant Agencies and Development Projects, (4) Overview of Mitigation Process, (5) History and Analysis of Spatial and Temporal Mitigation Measures, (6) History and Analysis of Social Mitigation Measures, (7) Conclusions and Findings, and (8) Summary. The introduction and methods sections of this report (Chapters 1 and 2) focuses on the study team's approach for creating an inventory of mitigation measures, selecting mitigation measures for analysis, conducting key informant discussions, and its analytic method for evaluating the effectiveness of mitigation measures.

Chapter 3 provides an overview of relevant agencies and development projects. This includes an examination of the various federal, state, and local government agencies that were involved in the process of mitigating impacts to Nuiqsut subsistence activities; with an examination of the role that Nuiqsut community members play in the mitigation process. Each of the seven development projects are also described in terms of the history of their development and involvement in the permitting process. Chapter 4 provides a discussion of the mitigation process of developing and implementing mitigation, monitoring mitigation, and measuring the effectiveness of mitigation as informed by the discussions with key informants.

[1] On October 25, 2013, PNRC announced that it was selling its Alaskan assets, including its Alaskan subsidiary, to Caelus Energy Alaska LLC (PNRC 2013).

[2] After PNRC initially declined participation in the project, BOEM asked the NSSI to request that PNRC share requested information with SRB&A; however, PNRC declined to do so.

The history and analysis by mitigation type examines 16 mitigation types selected for analysis by the study team for this project. This section is split into two chapters, one which addresses spatial and temporal mitigation measures (Chapter 5), and one which addresses social mitigation measures (Chapter 6). Each of the 16 mitigation types discussed in these chapters is relevant to mitigating distinctly different impacts to Nuiqsut subsistence activities and users. Each mitigation type includes (1) an overview/history section that provides context for how the mitigation measures were developed based on concerns, (2) mitigation proposals found in planning documents, and eventual stipulations in permitting and decision documents, (3) an analysis section that examines whether the mitigation type and specific mitigation measures associated with each type were implemented and monitored, and (4) an assessment of its effectiveness primarily based on key informant information in addition to the study findings.

Chapter 7 provides the study team's conclusions and findings based on the results of the study. This section includes findings related to each component process: compiling and tracking mitigation, developing mitigation, implementing mitigation, monitoring mitigation, measuring the effectiveness of mitigation, and a summary of the effectiveness of mitigation types. Chapter 7 concludes with an assessment by the study team of the methods employed in this study and recommendations about how to improve similar studies in the future. Chapter 8 provides a final summary of the report and a discussion of key findings.

CHAPTER 2: METHODS

2.1 Inventory of Mitigation and Concerns

The history and analysis of mitigation is based on subsistence concerns, mitigation proposals, and mitigation measures that were identified during SRB&A's inventory of mitigation (SRB&A 2010c-2010h) and annotated subsistence concerns (SRB&A 2010b). To provide context for how the study team later categorized and selected mitigation measures for the history and analysis, this section provides a summary of the study team's original inventory of mitigation proposals, mitigation measures, and subsistence concerns.

SRB&A conducted a review of available state, federal, and other documents to identify monitoring and mitigation plans affecting Nuiqsut associated with the seven oil and gas development projects. The study team did not include mitigation built into state and federal agencies policies that are not tied to a specific project. Examples of these include deferral areas that are removed from the leasing process or ordinances and regulations built into regional planning and zoning, all of which can be helpful in lessening impacts to subsistence activities. Industry often includes built-in features in their project designs that reduce negative impacts on subsistence activities (e.g., building setbacks, small pad footprints, increasing culvert size and quantities). These were also not included in the analysis unless they were specifically identified in planning documents as a mitigation measure the company was proposing. The study team did not review all planning and permitting documents associated with the seven development projects.

In a number of cases, the study team relied on agencies to provide relevant documents but not all documents were provided or readily available. In other cases, the study team learned of (or obtained) certain planning or permitting documents during key informant discussions after the inventory of mitigation measures was complete. These documents include the MMS's Letter of Authorization for the Northstar Development Project; ADNR's Lease Operations Approval for Northstar; the North Slope Borough (NSB) municipal code; the Draft NSB Coastal Management Plan (a program that is no longer in existence as legislation expired without renewal in 2011); National Marine Fisheries Service (NMFS) Incidental Take Statements and Incidental Harassment Authorizations; and Kuukpik Corporation surface land use agreements. While these documents are discussed in the history of mitigation measures (if they were obtained by the study team), the study team did not continue tracking down relevant documents and populating the mitigation database (discussed below) after the inventory of mitigation measures. The study team believes that the vast majority of mitigation types were captured during its initial review, although some individual mitigation measures for specific projects may be missing.

The study team reviewed 303 different documents during its inventory of subsistence concerns and mitigation. While the inventory originally focused on National Environmental Policy Act (NEPA) documents such as Environmental Impact Statements (EIS) and RODs, as well as state

BIFs, the study team later expanded its inventory to include available development permits once it became apparent that a majority of mitigation measures (i.e., those stipulated for developers) were included in permits. As noted above, the inventory of mitigation and subsistence concerns was not meant to be a census of all documents related to the seven development projects; a number of documents were not available to the study team, or the study team did not learn of their relevance until later in the study. However, the initial inventory provided a basis for the study team to explore and develop methods to monitor and evaluate mitigation effectiveness.

Because both the number and types of subsistence mitigation that existed for these seven projects were unclear prior to initiating the review, the team chose at the outset of the project to take a broad approach into identifying subsistence mitigation measures that was more inclusive rather than exclusive. This broad definition of subsistence-related mitigation included subsistence activities, wildlife and fish resources, wildlife and fish habitat, and culture. The study team entered each identified mitigation measure with key variables into a mitigation database designed for this project. In addition, the study team reviewed public testimony associated with the seven development projects in order to identify Nuiqsut subsistence concerns and entered each concern into the database. The study team used the Access database to create output resulting in two initial deliverables: 1) annotated subsistence concerns (SRB&A 2010b); and 2) inventory of mitigation measures (SRB&A 2010c-2010h). These were accompanied by an annotated bibliography of all of the documents reviewed for the project (SRB&A 2010a).

The purpose of the inventory of mitigation measures and annotated subsistence concerns was to attempt to identify concerns, proposed mitigation, and stipulated mitigation related to Nuiqsut subsistence (based on available data) in order to understand the types of mitigation that have been proposed or implemented over time for the seven development projects. The above deliverables did not attempt to identify interactive linkages between subsistence concerns, mitigation proposals, and mitigation requirements. Nor did they provide data in a format conducive to gathering information from key informants. However, the study team considered it necessary to take a broad approach to identifying mitigation measures in preparation for talking with knowledgeable agency, industry, and community informants regarding the historical narrative of industry initiatives and actions with regard to mitigation compliance and effectiveness.

2.1.1 Inventory Summary

As discussed above, the study team developed a database for its inventory of mitigation and annotated subsistence concerns. The primary purpose of the database was to assist the study team in organizing the various concerns, mitigation proposals, and mitigation measures identified during its literature review and to provide a tool by which the study team could inventory, categorize, and analyze these concerns and mitigation. The database provided the study team with a broad view of the magnitude and diversity of the types of concerns, mitigation proposals, and mitigation measures contained within the 303 documents reviewed in the

inventory. Ultimately, the study team used the database to identify the most relevant types of mitigation measures identified during the inventory and to filter the inventory to a manageable list of mitigation measures for further analysis.

The mitigation database contains a mitigation table and a concern table. Study team members populated the concern table with concerns from public testimony and from a study conducted by SRB&A on the impacts of oil and gas development on active harvesters in four North Slope communities, including Nuiqsut (SRB&A 2009). The mitigation table was populated with mitigation proposals and mitigation measures found in agency (federal, state, and local) and industry documents. In these tables, each mitigation proposal, mitigation measure, and individual concern was a separate record in the database that included a description of the mitigation or concern and associated variables. Table 2 shows the number of documents reviewed, by document type, for the seven projects for both concerns and mitigation.

Table 2: Documents Reviewed by Document Type

Document Type	Frequency	Percent
Scoping	6	2
Draft EIS	5	2
Final EIS	4	1
Record of Decision	5	2
Lease Sale	3	1
North Slope Borough Permit	230	76
State Permit	25	8
U.S. Army Corps of Engineers Permit[1]	16	5
Environmental Protection Agency Permit	1	<1
Plan of Operations	4	1
Industry Environmental Evaluation	2	1
Industry Mitigation and Monitoring	2	1
Total	303	100
[1]Included Environmental Assessments		

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As mentioned above, the study team reviewed a total of 303 documents during its inventory of mitigation and subsistence concerns. Although not originally included in the inventory, the study team added local, state, and federal agency permits to its inventory. North Slope Borough (NSB) permits accounted for a majority of the permits inventoried. As shown in Table 3, initial review and coding of the 303 documents resulted in 3,134 records in the mitigation database that were coded as mitigation or concerns. Forty-seven percent of these records were generated from NSB permit documents.

Table 3: Number of Records by Type of Document

Document Type	Number of Records	Percent of Records
Scoping	104	3
Draft EIS	214	7
Final EIS	517	16
Record of Decision	49	2
Lease Sale	210	7
North Slope Borough Permit	1490	47
State Permit	294	9
U.S. Army Corps of Engineers Permit[1]	109	4
Environmental Protection Agency Permit	1	<1
Plan of Operations	42	1
Industry Environmental Evaluation	92	3
Industry Mitigation and Monitoring	12	<1
Total	3134	100
[1]Included Environmental Assessments		

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The study team also documented mitigation proposals and mitigation measures from various other state, federal, regional and local entities. The mitigation table included mitigation proposals and measures from the following entities:

- Alaska Department of Environmental Conservation (ADEC)
- Alaska Department of Fish and Game (ADF&G)
- Alaska Division of Governmental Coordination (ADGC)
- Alaska Department of Natural Resources (ADNR)
- Alaska Department of Labor and Workforce Development (ADOLWD)
- Alaska Oil and Gas Conservation Commission (AOGCC)
- Alaska Office of Management and Budget (AOMB)
- Bureau of Land Management (BLM)
- Environmental Protection Agency (EPA)
- Kuukpik Corporation

- Minerals Management Service (MMS; now BOEM)
- North Slope Borough
- U.S. Army Corps of Engineers (USACE)
- U.S. Fish and Wildlife Service (USFWS)

These agencies are discussed in further detail in Section 3.1 (Agency and Stakeholder Overview).

The reason for the large number of NSB documents is that many NSB permits are issued on an annual basis or are issued for individual actions or alterations to an existing permit; thus, the NSB may issue numerous annual permits for a single development project and many of these permits may be identical. For this reason, SRB&A reviewed the NSB records in the database, flagging records that were duplicates in all respects except the year. At the same time, records were reviewed to ensure that each record explicitly contained either an individual or agency concern, or a specific mitigation measure; and if not, these records were flagged as irrelevant. The vast majority of "irrelevant" records contained a description of a potential impact without an associated mitigation. Based on the identification of duplicate and irrelevant records, the study team coded each record as one of the following four categories: (1) public or agency concern, (2) mitigation, (3) Not a Concern or Mitigation, or (4) NSB Duplicate Annual Permit (Table 4). All records coded as irrelevant (#3) or duplicate (#4) were subsequently removed from the database resulting in a database populated with 512 concern records and 1,108 mitigation records.

Table 4: Number of Records by Type of Record

Record Type	Frequency	Percent
Public or Agency Concern	512	16
Mitigation Proposal or Measure	1108	35
Not a Concern or Mitigation (Removed)	271	9
NSB Duplicate Annual Permit (Removed)	1243	40
Total	3134	100

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The study team assigned the following variables to each concern or mitigation record in the database: (1) type of development activity, (2) type of impact, (3) type of mitigation, and (4) resource and then analyzed the records by each of the variables. Table 5 shows the number of concern and mitigation records by development activity code (i.e., what type of development activity they were associated with).

Table 5: Development Activity by Type of Record

Development Activity	Public or Agency Concern	Mitigation Proposal or Measure	Total
Industry Development - All Aspects	105	294	399
Bridges/Culverts/Roads/Ice Roads/Causeways/Airstrips	74	124	198
Pipelines	25	111	136
EIS	128	1	129
Oil spills/Cleanup	39	55	94
Infrastructure/Facilities	8	71	79
Helicopters/Small Plane Activities	15	55	70
Water Withdrawals	8	47	55
Tractors/Trucks/Vehicles	0	54	54
Offshore Industry Development	8	43	51
Hiring/Employment, Including Support Services	17	29	46
Scientific Research[3]	18	14	32
Graywater/Produced Water/Mud Discharge	3	27	30
Seismic testing	4	22	26
Gravel Mining	2	14	16
Tanks/Storage Facilities	1	15	16
Flares/Fossil Fuel Emissions/Smoke	11	4	15
Solid Waste Disposals	2	13	15
Pads	5	9	14
Exploration	0	13	13
Industry vessels/barges	0	13	13
Drilling	2	10	12
Abandonment and Rehabilitation	7	5	12
Introduction of Human Foods[4]	3	8	11
Chemical/Water Injections	4	4	8
Contracts with Regional/Village Corporations	6	2	8
Contacts with Industry Personnel	0	8	8
Blasting/Dynamite	0	7	7
Hazardous Materials	0	7	7
Lights/Light Pollution	1	5	6
Development Plans	0	5	5

[3] Scientific Research may include activities associated with scientific studies including wildlife surveys (and associated air traffic), physical disturbances to animals (e.g., radio collars, tags), and research in communities and associated respondent burden.

[4] Refers to the introduction of human foods to wildlife; e.g., bears, foxes, and ravens attracted to food at garbage dumps.

Table 5 (Cont.): Development Activity by Type of Record

Development Activity	Public or Agency Concern	Mitigation Proposal or Measure	Total
Public Hearings	2	2	4
Local training/scholarships	2	2	4
Subsistence Support for Whaling	2	2	4
Coordination of Research Efforts	1	3	4
Landfills	2	1	3
Drill rigs	1	1	2
Pumping/Production	1	1	2
Power Lines	2	0	2
Waterflood Systems	1	1	2
Placement of Gravel for Roads/Pads/Airstrips	0	1	1
Surveying	1	0	1
Broadcasts of Public Meetings	0	1	1
Power Generators	1	0	1
Signage	0	1	1
Other	0	3	3
Total	512	1108	1620

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Some mitigation measures addressed general aspects of development. For example, the largest category under development activity, "Industry Development – All Aspects," most often involved a concern about a specific impact from development without mention of a specific development activity (Table 5). Transportation infrastructure (bridges, culverts, roads, ice roads (temporary frozen roads constructed in areas of the Arctic where there is no permanent road access), causeways, airstrips) constitutes another category of broad scope, followed by "Pipelines." The fourth largest development activity category is "EIS." These records primarily had to do with criticisms of the EIS process. It is notable that there is only one mitigation record coded with EIS as the development activity. This result may reflect the types of documents reviewed; suggestions about revisions to the EIS process likely do not appear in permits or industry planning documents, and the EIS itself is much more likely to provide mitigation suggestions specific to the relevant development project rather than suggestions about the EIS process. In general, however, concern and mitigation proposals are reflected in mitigation actions for each variable, indicating that concerns raised by the public and agencies tend to result in related mitigation proposals and/or requirements. The inventory indicates that industry is responsible for implementing large numbers of mitigation measures to address potential impacts from development projects. The inventory of mitigation measures did not provide information regarding whether mitigation measures were being implemented and/or were effective in reducing a potential impact or addressing a concern. These were topics that the study team

attempted to address in the History and Analysis of Mitigation phase of the project, and later in this report the content of mitigation proposals and requirements is examined in detail.

Table 6 shows the number of database records (both mitigation and concern records) by the type of impact related to that record. The largest impact category is "Movement Impediments" (Table 6). This category includes both impediments to terrestrial wildlife movements such as pipelines and impediments to marine and aquatic wildlife movements such as causeways. The second most frequent impact category, "Release of Contaminants," includes both concerns about oil spills as well as concerns about the release of a broad array of hazardous materials (including air emissions).

Table 6: Impact by Type of Record

Impact Type	Public or Agency Concern	Mitigation Proposal or Measure	Total
Movement Impediments	29	168	197
Release of Contaminants	23	117	140
Decrease in Habitat	22	117	139
EIS Deficiencies	124	0	124
Disruption of Wildlife	12	94	106
Effects of Development on Wildlife	14	66	80
Effects of Development on People	3	58	61
Diminished Access to Subsistence Sites	13	43	56
Impacts on Cultural Resources	1	52	53
Environmental Impacts [General]	18	35	53
Displacement of Wildlife	18	27	45
Nesting/Denning/Shelter Sites at Facilities	7	35	42
Lack of Employment Opportunities	10	28	38
Wildlife Mortality	6	26	32
Diminished Subsistence Harvests	8	23	31
Lack of Influence	29	0	29
Damage to ground surface/vegetation	2	27	29
Noise Disruptions	5	22	27
Contamination of Wildlife	17	8	25
Ability to Hunt	11	13	24
Disruption to Caribou Calving	1	20	21
Imbalances in Predator/Prey Populations	12	5	17
Disruption of Brood Rearing	1	15	16
Cumulative Effects	10	6	16
Human interaction with wildlife	0	16	16
Cultural Impacts	6	8	14

Table 6 (Cont.): Impact by Type of Record

Impact Type	Public or Agency Concern	Mitigation Proposal or Measure	Total
Conflicts between Oil Companies and Local Residents	4	10	14
Reduced Health of Wildlife	7	5	12
Insufficient Research on Subsistence Resources	8	4	12
Decline of Wildlife Populations	3	8	11
Effects of Development on Riparian Environments	9	2	11
Visual Disruptions	3	7	10
Bowhead Migration Impacts	2	7	9
Difficulty Hunting	7	2	9
Social Impacts	6	3	9
Health Impacts to Humans	9	0	9
Air/water quality	4	5	9
Decreased Access to Spawning Sites	1	7	8
Limited/No Benefits from Development	6	1	7
Additional Burdens on Local Infrastructure/Services	7	0	7
Damage to Industry Infrastructure	4	2	6
Insufficient Research on Social Impacts	5	0	5
Wildlife attraction to garbage	0	3	3
Hunting Competition	0	3	3
Discrimination	3	0	3
Economic Impacts	3	0	3
Limited/No Compensation for Destruction of Subsistence Resources	3	0	3
Lack of Access to Scientific Research	3	0	3
Increased Danger of Accidents	1	2	3
Decreased Foraging/Feeding Ability	0	2	2
Habituation of Wildlife to Human Foods	2	0	2
Education	2	0	2
Lack of communication between oil companies and local residents	0	2	2
Melting Permafrost	0	1	1
Spoiled Subsistence Resources	1	0	1
Uncomfortable Hunting Environment	0	1	1
Need to Travel Further	1	0	1
Hunting Safety	1	0	1
Harassment	1	0	1
Other	4	2	6
Total	512	1108	1620

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"Decrease in habitat," the third most frequent impact category, includes disturbance of the tundra by vehicles as well as the development footprint itself. Deficiencies in the EIS process comes up as an impact type commonly cited in concern records. Other large categories of impact concerns and mitigation measures include "Effects of Development on Wildlife," "Effects of Development on People," "Diminished Access to Subsistence Sites," and "Impacts on Cultural Resources."

The study team originally coded each mitigation and concern record under one of 104 mitigation categories, which were used in the original inventory of mitigation (SRB&A 2010c-2010h). However, the study team later condensed these categories into a more manageable list of 49 mitigation types, shown in Table 7. A majority of concerns did not suggest a mitigation measure or were criticisms of the EIS and therefore fell under the category of "No Proposed Mitigation" and are not shown in Table 7. The most common mitigation type was "Mitigation through Policy" (i.e., directives to follow regulations already in place), followed by "Pipeline Elevation and Placement," "Aquatic Habitat Protection," "Location of Facilities," and "Contamination Prevention." Other mitigation types common among mitigation proposals and measures were "Stream Crossings," "Vehicle Management," and "Helicopter and Airplane Management." In addition to the mitigation measures show in Table 7, the study team found that informal mitigation measures are relatively common, particularly between developers and local communities. These are not reflected in Table 7 but are instead discussed in further detail under "Overview of Mitigation Process" below.

Table 7: Mitigation Type by Record Type

Mitigation Type	Public or Agency Concern	Mitigation Proposal or Measure	Total
Mitigation Through Policy	1	167	168
Pipeline Elevation and Placement	12	84	96
Aquatic Habitat Protection	2	74	76
Location of Facilities	6	67	73
Contamination Prevention	0	64	64
Stream Crossings	10	43	53
Vehicle Management	1	44	45
Wildlife conflict avoidance	9	31	40
Helicopter and Airplane Management	4	36	40
Other Research	11	26	37
Spill Response Resources	2	33	35
Guarantee Access to Subsistence Resources	3	31	34
Community Consultation	4	27	31
Mitigation Through Operations	0	29	29
Terrestrial Habitat Protection	1	27	28
Impact Mitigation Funds	9	17	26
Oil Spill Prevention	0	25	25
Wildlife mortality avoidance	2	23	25
Research on Caribou Displacement	4	19	23

Table 7 (Cont.): Mitigation Type by Record Type

Mitigation Type	Public or Agency Concern	Mitigation Proposal or Measure	Total
Subsistence Protection	1	21	22
Employment Training Support	5	16	21
Bear Interaction Plan	0	17	17
Seasonal activity restrictions to Protect Wildfowl	0	16	16
Ice Roads and Ice Pads	0	15	15
Research on Fish	0	15	15
Size of Development Footprint	0	14	14
Subsistence Oversight Panel	2	11	13
Winter operations	0	11	11
Engagement of Local Communities	6	4	10
Spill Detection	0	10	10
Conflict Avoidance Agreement	0	9	9
Water Vessel Management	0	9	9
Research on Noise Levels	1	8	9
Subsistence Representatives	0	8	8
Wildfowl Habitat Protection	2	6	8
Drilling Management	2	6	8
Subsistence Monitoring Program	3	5	8
AEWC and Nuiqsut Whaling Captains Assoc	1	6	7
Employee Hunting Prohibition	0	7	7
Mitigation Through Design	0	5	5
Caribou Mitigation Program	0	4	4
Employee Cultural Awareness Training	0	4	4
Good Neighbor Policy	0	3	3
Documentation of Subsistence Areas, Timing	0	3	3
Air Emissions Reduction	0	3	3
Use of Gravel Island	0	2	2
Mitigation Through Research	1	1	2
Fish Management Plan	0	1	1
Light Pollution Reduction	1	0	1
Other	0	1	1
Total	106	1108	1214

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The final coding variable assigned to each mitigation/concern record was resource (i.e., wildlife or subsistence resource). "Fish" and "Caribou" were the most commonly mentioned resources both in concerns and in mitigation proposals and measures (Table 8). "Wildfowl" and "Bowhead" were the second and third most frequently mentioned resource concerns and mitigation proposals/measures, followed by "Spectacled Eider", "Polar Bear", "Whales", "Bear", and "Brown Bear." Not all records had a resource associated with the concern or mitigation proposal or measure.

Table 8: Resource by Record Type

Resource	Public or Agency Concern	Mitigation Proposal or Measure	Total
Fish	49	147	196
Caribou	57	128	185
Wildfowl	31	51	82
Bowhead	21	37	58
Spectacled eider	4	25	29
Polar bear	0	28	28
Whales	8	11	19
Bear	1	17	18
Brown bear	0	11	11
Lesser snow goose	2	7	9
Dolly Varden	0	9	9
Marine Mammals	6	2	8
Seals	7	1	8
Arctic cisco	3	4	7
Eiders	2	4	6
Broad whitefish	4	2	6
Land Mammals	1	4	5
Foxes	1	3	4
Bearded seal	0	3	3
Geese	0	3	3
Brant	2	1	3
Tundra swan	0	3	3
Ringed seal	2	0	2
Oldsquaw	1	1	2
King eider	1	1	2
Yellow-billed loon	1	1	2
Ptarmigan	1	1	2
Gull	2	0	2
Spotted seal	0	1	1
Arctic fox	1	0	1
Stellers eider	1	0	1
White-fronted goose	0	1	1
Canada goose	1	0	1
Loon	1	0	1
Arctic grayling	0	1	1
Arctic char	0	1	1
Burbot	1	0	1
Shellfish	0	1	1
Water	0	1	1
Total	212	511	723

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The inventory of mitigation and concerns allowed the study team to organize, categorize, and analyze all of the records identified during the literature review. While the original database contained 3,134 concern and mitigation records, the study team was able to filter the database to 512 concerns and 1,108 mitigation proposals or mitigation measures by removing duplicate and irrelevant records. The study team used the filtered set of 1,108 mitigation proposals and measures when reviewing and selecting records for further analysis. The methods and rationale for selecting records for additional analysis are described below.

2.2 Selecting Mitigation Measures for Key Informant Discussions and Analysis

Prior to initiation of the key informant field visits and subsequent analysis, the study team had identified 1,108 mitigation records that included both mitigation proposals and mitigation measures. For this study, the study team defined mitigation proposals as those proposed or suggested from various state and federal agencies and stakeholders that occur throughout the planning and analysis phases of a project prior to development. The study team defined mitigation measures as those stipulated for a developer that are issued during the latest phases of a project, directly prior to development.

The study team categorized each record as either a mitigation measure or mitigation proposal based on the type of document it was found in. Mitigation proposals were contained in Environmental Assessments (EA), EISs, and RODs. Mitigation measures were contained in lease sales (including state BIFs); federal, state, and local agency permits; plans of operations; and industry environmental evaluation documents (EED). Because industry EEDs are prepared by the developer, the study team coded these as mitigation measures rather than mitigation proposals. See "Overview of Mitigation Process" below for more information regarding each of these types of documents.

Of the 1,108 mitigation records, the study team identified 849 mitigation measures directly and indirectly associated with Nuiqsut subsistence activities, wildlife and fish resources, habitat, and culture in relation to the seven development projects (Northstar, Oooguruk, Endicott, Alpine, Alpine Satellites, Meltwater, and Tarn). The remaining 259 mitigation records were mitigation proposals (i.e., contained in planning documents and not binding to the developer). While mitigation proposals were included in the history of mitigation, only mitigation measures were addressed in the analysis of mitigation effectiveness and during the key informant field visits.

The 849 mitigation measures went through multiple rounds of filtering as the study team's methods for data collection and analysis evolved. Ultimately, the study team filtered these 849 records to a small subset of 38 mitigation measures selected for analysis. The history and analysis of mitigation focuses on the types of mitigation reflected in this subset of mitigation measures. The following discussion provides the methods and rationale the study team used to select its final 38 measures.

Because of the large number of mitigation measures that resulted from the study team's initial inventory of mitigation, the study team developed a method to filter the 849 mitigation measures in an attempt to focus the discussion for the agency, industry, and stakeholder field visits. This initial filter occurred prior to initiation of the field visits. The study team's inventory, which was broadly inclusive, had resulted in mitigation measures that were indirectly related to subsistence activities or uses or resources (e.g., wildlife habitat protection, cultural resource sites). The primary filter implemented by the study team was whether the mitigation measure was directly related to a subsistence activity, subsistence user, or key subsistence resource. Specifically, the study team coded each of the 849 mitigation measures as either "Direct" or "Indirect" based on the following criteria:

Direct Mitigation Measure

A direct mitigation measure addresses key subsistence resources (see definition below), subsistence uses, or subsistence activities. A mitigation measure was considered "Direct" mitigation if it met any of the following criteria:

- Mitigation addresses a subsistence activity (e.g., caribou hunting, fish harvesting)
- Mitigation addresses a subsistence user (e.g., hunter access, hunting regulations)
- Mitigation addresses key subsistence resource distribution/migration/passage, abundance, or health
    - Key subsistence resources include caribou, bowhead whales/marine mammals, fish, wildfowl (based on inventory of community concerns)
- Mitigation addresses activities (e.g., helicopter traffic, road traffic) that may disturb key subsistence resources or subsistence habitats while resources are present
- Mitigation addresses general wildlife passage when related to roads and pipeline (e.g., pipeline height requirements or traffic regulations designed to allow crossing of wildlife; the study team assumed that these mitigation measures addressed the key resource of caribou)
- Mitigation addresses cultural resources only if addressing traditional uses or use areas (e.g., traditional fish camps)
- Mitigation addresses employment in relation to subsistence (e.g., subsistence leave policies)
- Mitigation does not meet the above criteria but includes the word "subsistence," thereby linking the mitigation to subsistence uses, users, or activities

Indirect Mitigation Measure

A mitigation measure was considered indirect mitigation if it did not meet any of the "Direct" criteria listed above. An indirect mitigation measure may address general habitat degradation, air quality standards, water quality standards, oil spill prevention, and/or infrastructure design

features, but does not address key subsistence resources, subsistence uses, or subsistence activities. An indirect mitigation measure is characterized by one or more of the following:

- Mitigation does not directly address a subsistence activity or user
- Mitigation does not directly address the distribution/migration/passage, abundance, or health of key subsistence resources (see list of key resources above)
    - Non-key subsistence resources include grizzly bear, polar bear, spectacled and stellar eider, wolf and wolverine, gulls, ravens, raptors, foxes, vegetation
- Mitigation addresses specific wildlife habitats (e.g., do not construct infrastructure in waterfowl nesting area) but does not address disturbance of wildlife while present in these habitats (e.g., helicopter altitude requirements during the nesting season)
- Mitigation addresses cultural resource sites other than traditional use areas (e.g., graves, sod houses, Alaska Heritage Resources Survey sites)
- Mitigation addresses land ownership issues (e.g., Native allotments) without addressing subsistence uses
- Mitigation addresses employment other than subsistence related policies (e.g., local hire policies)

The study team applied this filter to the 849 mitigation measures and reduced the number of mitigation measures to be addressed in the key informant field visits to 407 direct mitigation measures. Table 9 and Table 10 summarize the list of direct and indirect mitigation measures by each proposing agency or developer. Only the direct mitigation measures were moved forward into the key informant field visits.

The study team initially sought to gather information about each of the 407 individual mitigation measures from agency and industry representatives. In order to do this, the study team developed agency and industry-specific databases that contained all of the mitigation measures relevant to the agency or industry. For example, the NSB database contained all of the direct mitigation measures (identified by the study team) that had been stipulated by the NSB in available project permits. The CPAI database included all of the direct mitigation measures (identified by the study team) that had been stipulated for their development projects (Alpine, Alpine Satellites, Tarn, and Meltwater), including those cited by CPAI in their planning documents (e.g., Plan of Operation). The database included the following four data entry fields for each mitigation measure record:

1. Mitigation Implementation – i.e., was the mitigation ever implemented?
2. Monitoring Implementation – i.e., was the mitigation ever monitored following implementation?
3. Measures of Effectiveness – i.e., if monitored, did the agency or developer have established measures of effectiveness?
4. Effectiveness Assessment – i.e., what is the agency's or developer's assessment of how effective the mitigation measure has been?

Table 9: Agency Direct and Indirect Mitigation Measures

Agency	Alpine	Alpine Satellites	Endicott	Meltwater	Northstar	Oooguruk	Tarn	Total Records	Indirect	Direct	Notes
ADEC - Department of Environmental Conservation	X					X		22	22		
ADFG - Department of Fish and Game	X				X	X	X	15	8	7	Direct: 1 Alpine, 3 Tarn, 3 Oooguruk
ADGC - Division of Governmental Coordination			X	X	X		X	59	26	33	Now Office of Project Management and Permitting. Direct: 5 Endicott, 15 Meltwater, 13 Northstar
ADNR - Department of Natural Resources	X			X		X	X	219	123	96	Direct: 1 Alpine, 23 Meltwater, 58 Oooguruk, 14 Tarn
ADOLWD - Department of Labor and Workforce Development						X		1	1		
AOGCC - Oil and Gas Conservation Commission						X		7	7		
AOMB - Office of Management and Budget	X							8	8		
BLM - Bureau of Land Management		X						21	9	12	Direct: 12 Alpine Satellites
EPA - Environmental Protection Agency					X	X		6	6		
KC - Kuukpik Corporation						X		2		2	Direct: 2 Oooguruk
MMS - Mineral Management Service (BOEM)					X			7	3	4	Direct: 4 Northstar
NSB - North Slope Borough	X	X	X	X	X	X	X	283	155	128	Direct: 29 Alpine, 10 Alpine Satellites, 2 Endicott, 31 Meltwater, 7 Northstar, 29 Oooguruk, 20 Tarn
USACE - U.S. Army Corps of Engineers	X	X	X	X	X	X	X	70	32	38	Direct: 3 Alpine, 16 Alpine Satellites, 7 Endicott, 12 Northstar
USFWS - U.S. Fish and Wildlife Service						X		5	2	3	Direct: 3 Oooguruk
Total								726	402	324	

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Table 10: Developer Direct and Indirect Mitigation Measures

Developer	Alpine	Alpine Satellites	Endicott	Meltwater	Northstar	Oooguruk	Tarn	Total Records	Indirect	Direct	Notes
BP - British Petroleum			X		X			106	56	50	Direct: 14 Endicott, 36 Northstar
CPAI - ConocoPhillips Alaska Inc.	X	X		X			X	499	238	261	Direct: 74 Alpine, 38 Alpine Satellites, 101 Meltwater, 48 Tarn
PNRC - Pioneer Natural Resources Company						X		244	148	96	Direct: 96 Oooguruk
Total								849	442	407	

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Fields 1 through 3 required only "Yes," "No," "Don't Know," or "Not Applicable" answers. Field 4 (effectiveness assessment), contained a summary rating using the following numeric categories: (1) mitigation highly effective; (2) mitigation effective but requires improvement to be effective; (3) mitigation ineffective; (4) mitigation never implemented; (5) don't know. A "Notes" field contained any notes, observations, or attached documents that provided additional context for the assessment of the mitigation measure.

Study team members began contacting all agencies and developers for which direct mitigation measures had been identified (see Table 9 and Table 10). Agencies with the highest numbers of direct mitigation measures included the NSB (128 measures) the Alaska Department of Natural Resources (ADNR) (96 measures); the U.S. Army Corps of Engineers (USACE) (38 measures); and the Alaska Division of Governmental Coordination (ADGC) (33 measures). CPAI had the highest number of direct mitigation measures (261 measures) among the three developers, followed by PNRC (96 measures) and BP (50 measures). For this study, CPAI also had a higher number of development projects (Alpine, Alpine Satellites, Meltwater, and Tarn) than the other developers.

The study team initially contacted each respective agency/developer and asked to speak with an individual who would be most knowledgeable regarding the mitigation measures. In a few instances, the study team met with the agency or developer prior to delivering the database. Once contact had been made with the appropriate individual, the study team asked that individual to review and complete the database for their agency/company. The database was accompanied by an introductory letter and a set of instructions for completing the database. In a few agency cases, where a small set of direct mitigation measures had been identified, the study team gathered the desired data from the informant over the phone and populated the database.

In a few instances, the study team's conversations with agency representatives led to the identification of other individuals within their agency or in other agencies that should be contacted for additional field visits. For example, during a conversation with a U.S. Fish and Wildlife Service (USFWS) representative, the study team was directed to two other individuals at the USFWS, as well as an individual at the National Marine Fisheries Service (NMFS), which had not originally been identified as a proposing agency, for additional information related to the mitigation measures identified for their agency. In addition, during agency contacts the study team was reminded that one agency, the ADGC, was no longer in existence and that the study team would likely not be able to obtain information related to those mitigation measures. The study team also learned that the mitigation measures stipulated by the Bureau of Land Management (BLM) related to the Alpine Satellites development had never been binding to CPAI because the BLM stipulations applied only to a portion of lands that had never been developed by CPAI while under BLM management. According to the BLM representative, these lands were later conveyed away from BLM under ANCSA to the Kuukpik Corporation and are no longer under their jurisdiction.

During those discussions with agency and industry informants, it became clear that more general discussions regarding the mitigation process would be necessary to better understand how agencies develop mitigation proposals, how these proposals become mitigation measures, and in what form mitigation measures are binding to a developer. A number of informants had noted that some of the mitigation measures contained in their respective databases were not, in fact, mitigation measures, but rather mitigation proposals. For example, the study team learned that RODs contain a summary of the various measures that were proposed or requested by different agencies and entities for a given project, which are then stipulated as mitigation measures in those agencies' respective permits or authorizations. The USACE indicated that the USACE mitigation measures that are binding to developers are those that are under their regulatory authority and are carried forward from the ROD into USACE permits. If a mitigation proposal in the ROD is outside the USACE's regulatory authority, regardless of whether it is the lead agency or not, then the USACE cannot stipulate that mitigation in its permit.

In addition, informants' responses when discussing individual mitigation measures frequently indicated that the options provided in the database fields did not always allow for the appropriate response without substantial context from the informant. Thus, the study team expanded the scope of their discussions with agency, industry, and community informants to further inform the historic narrative of the mitigation. In addition to asking informants to complete their respective databases, the study team also began asking if these individuals would explain their agency's or company's role and process in the mitigation process.

In most cases, and after multiple requests, key informants indicated that they could not prioritize the time or resources to complete the original database provided to them; these included informants for two of the developers (CPAI and BP) and for several of the agencies, and represented a large portion of the direct mitigation measures. PNRC, the third developer, chose to not participate from the outset of this project. In addition, in a number of cases agency representatives indicated that they could not provide an historical narrative of certain mitigation measures because the measures were relatively old, and the individuals who had worked on those permits and who would be able to comment on them were retired or no longer with the agency. As the study team's efforts to populate each of the agency and industry databases continued, it became clear that further reduction of the list of mitigation measures was necessary, so that relevant data could be collected from key informants who lacked the time or resources to complete the database. Therefore, the study team initiated a detailed review of the list of 407 direct mitigation measures. The study team reviewed the scope of work for the project, which states that the study will address mitigation effectiveness "in the limited context of potential impacts on subsistence hunting activities from recent oil and gas development projects near the NSB community of Nuiqsut." While the study team believes that all of the mitigation measures in the original database are relevant to reducing impacts on subsistence, many of them do so through reducing impacts on subsistence ***resources or habitats***, but are not all focused directly on subsistence hunting ***activities***. Thus, the study team filtered the list of 407 to focus only on

measures related to subsistence hunting ***activities*** and not subsistence ***resources or habitats***. In this process the study team noted a number of issues with the existing records. The following problems were identified:

1. Duplicate mitigation records

    - In a number of cases, multiple records existed for the same mitigation measure and for the same development project. Mitigation measures are frequently repeated in project permits, which are given throughout the life of the project for various activities. In addition, a single permit may state the same mitigation measure in various sections of the document. Because of the large number of mitigation measures initially identified, this issue did not become clear to the study team until closer review filtering for the subset of direct mitigation measures.

    - A number of the documents reviewed for the inventory of mitigation measures included references to mitigation measures required by agencies other than the agency authoring the document. In a number of cases, these mitigation measures were incorrectly attributed to the author of the document and had already been documented for the correct agency during a review of their own permitting documents.

2. Mitigation records for subcontractors rather than primary developers

    - Certain mitigation records provided mitigation measures relevant to one of the seven development projects, but were stipulations for subcontractors, rather than for the primary developer (CPAI, BP, or PNRC); these measures were coded as stipulations for the primary developer. The study team chose to only carry forward measures directly stipulated for the primary developer, rather than the subcontractor.

3. Mitigation records not providing an explicit mitigation measure

    - Certain mitigation records cited an agency regulation or policy that prohibited certain impacts on subsistence without providing a means (i.e., mitigation measure) for ensuring that those impacts do not occur. For example, a NSB mitigation record stated that, "The operations must not preclude subsistence user access to subsistence resources." The study team determined that records such as these did not provide adequate information for an agency or developer to assess their effectiveness. These records were not carried forward.

The study team did not go back to the database and recode the database records based on the above findings, but considered the database to be a tool in having moved the project forward toward the ultimate goal of analyzing the effectiveness of specific mitigation measures.

Based on the above described review and on the difficulties the study team had encountered in securing the participation of agency and industry informants due to the broad scope of the database, SRB&A eliminated miscoded mitigation measures, duplicate measures, and those measures associated with subsistence resources or habitats rather than subsistence activities. The remaining mitigation measures in the database met the following criteria:

- Explicitly related to subsistence ***users or activities***
- Unduplicated within a development project
- In a document considered by the proposing agency to include binding mitigation measures

This refinement of the database of mitigation measures resulted in 80 mitigation measures to potentially carry forward in the analysis of mitigation. These 80 mitigation measures all met the above criteria and are depicted in Table 11 by mitigation type ("Total Number of Measures"). In a number of cases, mitigation that did not meet the above criteria was similar in content to mitigation that did meet the criteria but did not specifically cite that the measure was designed to reduce impacts on subsistence ***users or activities***. For example, mitigation measures related to raising pipeline height to allow for caribou passage were not included in the final 80 measures, however, mitigation measures requiring pipelines to be elevated to allow for access by subsistence users on snowmachines were included in the final 80 measures. Appendix A provides a more detailed description (including the full reference and text) of the 80 mitigation measures.

To further focus the review of mitigation measures for the key informants (given their limited amount of time and resources), the study team selected a smaller subset of mitigation measures for agency, developer, and stakeholder review and analysis. The selection of the subset of mitigation measures followed two general criteria. First, the study team tried to select a subset of measures that would capture the various different types of mitigation measures represented in the 80 records that were directly related to subsistence users or activities (Table 11). To do this, the study team sorted the measures by "Mitigation Type" (see Table 11) with the goal of selecting at least one measure per mitigation type (e.g., community consultation, winter operations, pipeline elevation and placement). Second, if a mitigation measure was selected for one developer and that type of mitigation measure (e.g., Conflict Avoidance Agreement or CAA) was also available for the other developers, then the study team also selected that mitigation measure for the other developers to allow for a more robust data set for a given mitigation type. In some cases, the study team determined that none of the mitigation measures for a given mitigation type were appropriate to carry forward in the analysis, particularly when there was only one measure and the study had no other measures for comparison (Table 11). Of the 80 mitigation measures the study team selected 38 to carry forward in the analysis; these are also shown in Table 11, by mitigation type ("Number Selected for Analysis").

Table 11: Mitigation Records Selected for Analysis, by Mitigation Type

Mitigation Type	Total Number of Measures	Number Selected for Analysis
Air Emissions Reduction	1	0
Aquatic Habitat Protection	1	0
Community Consultation	10	6
Conflict Avoidance Agreement	8	4
Employee Cultural Awareness Training	2	1
Employee Hunting Prohibition	2	1
Good Neighbor Policy	2	2
Guarantee Access to Subsistence Resources	7	3
Helicopter and Airplane Management	5	2
Ice Roads and Ice Pads	3	0
Location of Facilities	2	1
Mitigation Fund	6	3
Mitigation Through Design	1	0
Pipeline Elevation and Placement	7	3
Prohibit Development Interfering with Subsistence	1	0
Research on Subsistence Impacts	5	5
Research on Fish	1	0
Size of Development Footprint	1	0
Subsistence Leave Policy	2	2
Subsistence Oversight Panel	5	1
Subsistence Representatives	3	2
Vehicle Management	2	0
Water Vessel Management	1	1
Winter Operations	2	1
Total	80	38
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Table 12 shows a summary of the 38 mitigation measures that the study team selected for further analysis. Figure 1provides a summary of the 1,108 mitigation records in the database and how they were ultimately categorized during the study team's filtering process, including definitions of terminology.

Table 12: Final Selected Mitigation Measures

Mitigation No.	Mitigation Type	Project	Developer	Proposing Agency	Year	Reference Type	Mitigation Summary
ENDICOTT							
M1	Conflict Avoidance Agreement	Endicott	BP	NSB	2009	NSB Permit	Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission (AEWC) and the Whaling Captains of Nuiqsut
NORTHSTAR							
M2	Community Consultation	Northstar	BP	MMS (BOEM)	1999	Federal Permit	Provide plan to MMS and local organizations for long-term coordination with communities and subsistence users; conduct annual review of activities.
M3	Mitigation Fund	Northstar	BP	MMS (BOEM)	1999	Federal Permit	Provide MMS and local organizations with a description of the process for filing a claim for oil-spill removal costs and damages.
M4	Helicopter and Airplane Management	Northstar	BP	NSB	2008	NSB Permit	Helicopter altitude requirements near hunters.
M5	Water Vessel Management	Northstar	BP	NSB	2008	NSB Permit	Cease vessel traffic during bowhead whale hunt.
ALPINE							
M6	Employee Cultural Awareness Training	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Cultural awareness training for oil field workers (including subsistence access).

Table 12 (cont.): Final Selected Mitigation Measures

Mitigation No.	Mitigation Type	Project	Developer	Proposing Agency	Year	Reference Type	Mitigation Summary
ALPINE (cont.)							
M7	Employee Hunting Prohibition	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Prohibit employees from sport hunting and fishing activities.
M8	Guarantee Access to Subsistence Resources	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Coordinate with KSOP to provide signage at project facilities in English and Iñupiaq languages related to safety/awareness issues.
M9	Location of Facilities	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Re-locate and re-configure pads and other facilities farther north of Nanuq Lake to avoid key subsistence use areas and activities.
M10	Pipeline Elevation and Placement	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Re-route pipeline to avoid key subsistence use areas.
M11	Subsistence Oversight Panel	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Fund Subsistence Oversight Panel to provide guidance and establish policies related to subsistence mitigation.
M12	Winter Operations	Alpine	CPAI	ARCO Alaska, Inc.	1996	Industry Environmental Evaluation	Construct pipelines during winter to reduce disturbances to subsistence activities.
M13	Community Consultation	Alpine	CPAI	NSB	2009	NSB Permit	Communicate with Nuiqsut about flying activities.

Table 12 (cont.): Final Selected Mitigation Measures

Mitigation No.	Mitigation Type	Project	Developer	Proposing Agency	Year	Reference Type	Mitigation Summary
ALPINE (cont.)							
M14	Subsistence Representatives	Alpine	CPAI	NSB	2009	NSB Permit	Employ subsistence representatives from Nuiqsut.
M15	Conflict Avoidance Agreement	Alpine	CPAI	NSB	2004	NSB Permit	Work with the NSB and the Village of Nuiqsut to design and implement a Conflict Avoidance Agreement addressing subsistence.
M16	Good Neighbor Policy	Alpine	CPAI	NSB	2004	NSB Permit	Develop a Good Neighbor Policy with the Community of Nuiqsut and the NSB.
M17	Helicopter and Airplane Management	Alpine	CPAI	NSB	2009	NSB Permit	Helicopter altitude requirements near hunters.
M18	Mitigation Fund	Alpine Satellites	CPAI	NSB	2004	NSB Permit	Establish monetary fund to be used by the community to reduce impacts on subsistence uses.
M19	Research on Subsistence Impacts	Alpine Satellites	CPAI	NSB	2004	NSB Permit	Fund a subsistence study to monitor the impacts of CD-4 and other Alpine Satellite developments on subsistence.
MELTWATER							
M20	Pipeline Elevation and Placement	Meltwater	CPAI	ADNR	n.d.	State Permit	5-foot minimum pipeline height to ensure unrestricted human use of the area.

Table 12 (cont.): Final Selected Mitigation Measures

Mitigation No.	Mitigation Type	Project	Developer	Proposing Agency	Year	Reference Type	Mitigation Summary
MELTWATER (cont.)							
M21	Subsistence Leave Policy	Meltwater	CPAI	ADNR	2008	State Permit	Establish subsistence leave policies for NSB resident employees.
M22	Research on Subsistence Impacts	Meltwater	CPAI	NSB	2001	NSB Permit	Study alternative pipeline designs that would reduce impacts on subsistence users; forward findings annually to the NSB.
M23	Community Consultation	Meltwater	CPAI	NSB	2001	NSB Permit	Coordinate a series of meetings between local residents and other experts to develop a set of guidelines for mitigating impacts of development.
M24	Community Consultation	Meltwater	CPAI	ADNR	2001	NSB Permit	Consult with communities and the NSB to discuss potential impacts of development and methods for mitigating impacts on subsistence activities.
M25	Pipeline Elevation and Placement	Meltwater	CPAI	NSB	2000	NSB Permit	Minimum of 7-feet pipeline height to allow subsistence user access.
M26	Guarantee Access to Subsistence Resources	Meltwater	CPAI	Phillips Alaska, Inc.	2000	Plan of Operations	No restrictions on subsistence user access; coordinate with KSOP to establish procedures for accessing development facilities.

Table 12 (cont.): Final Selected Mitigation Measures

Mitigation No.	Mitigation Type	Project	Developer	Proposing Agency	Year	Reference Type	Mitigation Summary
TARN							
M27	Guarantee Access to Subsistence Resources	Tarn	CPAI	ADNR	1998	State Permit	Restrict lease-related use when necessary to prevent unreasonable conflicts with subsistence harvests.
OOOGURUK							
M28	Good Neighbor Policy	Oooguruk	PNRC	ADNR	2005	State Permit	Work with the NSB to develop a Good Neighbor Policy
M29	Conflict Avoidance Agreement	Oooguruk	PNRC	ADNR	2005	State Permit	Establish a Conflict Avoidance Agreement with the AEWC and Nuiqsut Whaling Captains Association.
M30	Mitigation Fund	Oooguruk	PNRC	Kuukpik Corporation	2007	Plan of Operations	Establish a Nuiqsut Mitigation Fund of $50,000 per year.
M31	Community Consultation	Oooguruk	PNRC	NSB	2006	NSB Permit	Consultation with the village of Nuiqsut to assure that planned activities will not result in unreasonable interference with subsistence uses.
M32	Subsistence Representatives	Oooguruk	PNRC	NSB	2006	NSB Permit	Employ Nuiqsut residents as subsistence representatives.
M33	Research on Subsistence Impacts	Oooguruk	PNRC	NSB	2006	NSB Permit	Establish a Cumulative Response Panel to address the cumulative effects associated with oil and gas development.

Table 12 (cont.): Final Selected Mitigation Measures

Mitigation No.	Mitigation Type	Project	Developer	Proposing Agency	Year	Reference Type	Mitigation Summary
OOOGURUK (cont.)							
M34	Subsistence Leave Policy	Oooguruk	PNRC	NSB	2008	NSB Permit	Establish subsistence leave policies for NSB resident employees.
M35	Conflict Avoidance Agreement	Oooguruk	PNRC	NSB Planning Department	2005	NSB Permit	Conflict Avoidance Agreement with the AEWC.
M36	Research on Subsistence Impacts	Oooguruk	PNRC	NSB Planning Department	2005	NSB Permit	Implement monitoring program that includes documentation of subsistence harvest activities in the area of development.
M37	Research on Subsistence Impacts	Oooguruk	PNRC	NSB Planning Department	2005	NSB Permit	Conduct a cumulative impact analysis that includes subsistence impacts.
M38	Community Consultation	Oooguruk	PNRC	ADNR	2005	State Permit	Consult with communities and the NSB to discuss potential impacts of development and methods for mitigating impacts on subsistence activities.

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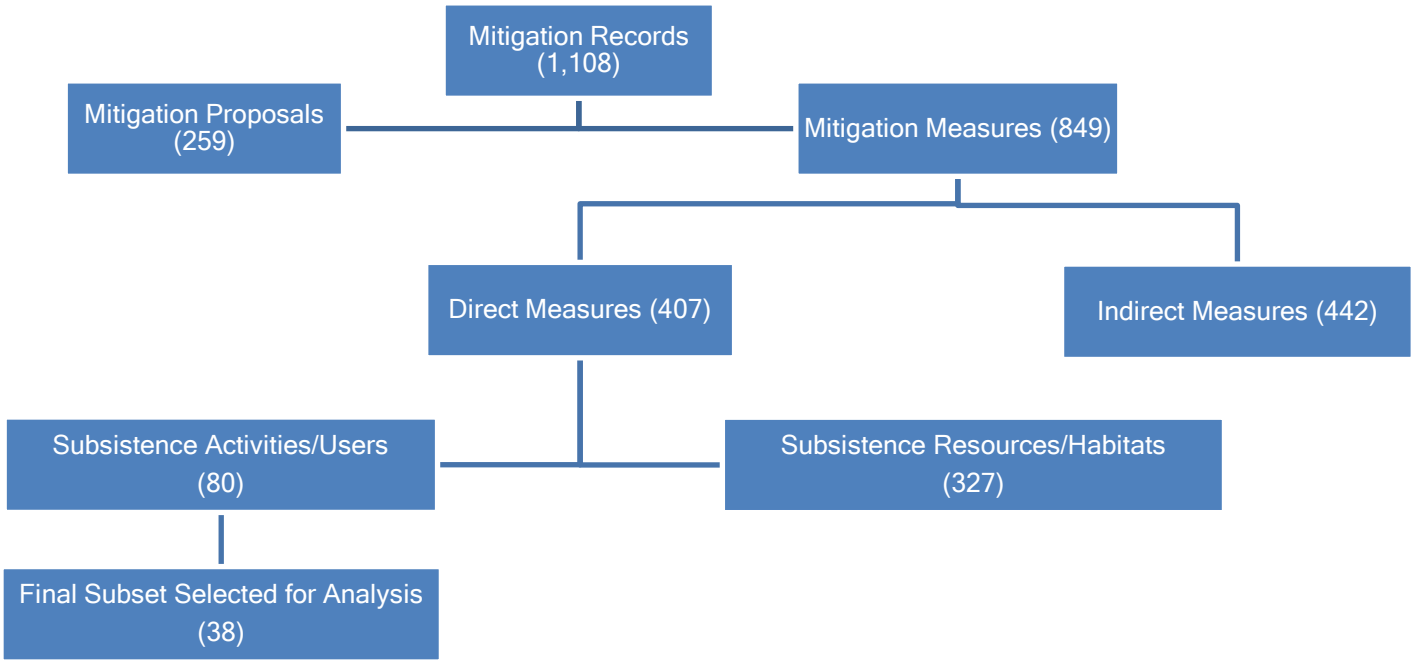

Definition of Terms

Mitigation Records: All mitigation ideas or measures documented during the study team's inventory of mitigation
Mitigation Proposals: Suggested or proposed mitigation from various local, state, and federal stakeholders; often found in planning documents
Mitigation Measures: Mitigation that is stipulated for a developer in a binding document such as a permit
Direct Measures: Mitigation measures that address subsistence activities, subsistence users, key subsistence resources, activities that may disturb key subsistence resources, wildlife passage related to roads and pipelines, traditional uses or use areas, employment in relation to subsistence, or include the word "subsistence"
Indirect Measures: Mitigation measures that do not meet any of the criteria for Direct Measures
Subsistence Activities/Users: Mitigation measures that directly address subsistence activities or users
Subsistence Resources/Habitats: Mitigation measures that address key subsistence resources and habitats but do not address subsistence activities or users
Final Subset Selected for Analysis: The final 38 measures selected by the study team to include in the key informant discussions and analysis of mitigation effectiveness

Figure 1: Process for Filtering Mitigation Records for Analysis

2.3 Key Informant Discussions

After selecting the subset of 38 mitigation measures, the study team followed up a second time with the appropriate agency and industry representatives. A number of the original agencies only had mitigation measures considered "indirect" (see Section 2.2, "Selecting Mitigation Measures") because those measures focused on mitigating impacts on wildlife, wildlife habitat, and the environment, rather than on subsistence users or activities. Therefore, because the study team only carried forward "direct" mitigation measures for inclusion in the analysis, these agencies were not included in the analysis of mitigation measures. As described later in this document, federal and state agencies are often limited to stipulating mitigation measures that affect resources under their legal jurisdiction and therefore had few mitigation measures that were directly related to mitigating subsistence users or activities. Table 9 shows which agencies had "direct" mitigation measures; any agencies with zero direct measures were not carried forward in the analysis of mitigation.

Table 13 presents the results of the study team's contacts with key informants for this study. All agencies with associated direct mitigation measures provided information on their agency's role in the mitigation process. Of the three agencies (NSB, Bureau of Safety and Environmental Enforcement [BSEE] [formerly Mineral Management Service or MMS], and ADNR) selected for the assessment of the effectiveness of the final mitigation measures (see Table 12), the NSB and BSEE completed the assessment. While the ADNR, Division of Oil and Gas (DO&G) participated in general discussions about their agency's mitigation process, they indicated they were too busy to complete the assessment of individual mitigation measures by the time of the draft final report production.

Both BP and CPAI met with the study team and participated in general discussions about their company's mitigation process. During general discussions, BP also provided information about the individual mitigation measures. CPAI submitted written responses to the study team's general questions, which were incorporated into this report where appropriate, and later provided SRB&A with a written assessment of individual mitigation measures. The study team also interviewed a former industry employee who had knowledge of several of the development projects and who participated in a general discussion of industry's role in the mitigation process. As previously described, PNRC declined to participate in the study.

The study team conducted a field visit to Nuiqsut and documented nine residents' information related to the mitigation process and/or effectiveness of mitigation measures. The study team contacted each of the main entities in Nuiqsut, including the Native Village of Nuiqsut, City of Nuiqsut, Kuukpik Subsistence Oversight Panel, Inc. (KSOP), and Kuukpik Corporation and asked for their recommendations regarding individuals who would be knowledgeable about mitigation measures affecting Nuiqsut subsistence activities. The nine individuals selected were all derived from these recommendations. The nine Nuiqsut residents included members of all of

the above entities in addition to the Nuiqsut Whaling Captains Association and the Alaska Eskimo Whaling Commission (AEWC). All of the Nuiqsut individuals were active and knowledgeable subsistence harvesters.

Table 13: Key Informant Contacts

Key Informant	Number of Individuals	Key Informant Summary
ADGC	1	Dropped from study because division no longer in existence
AEWC	1	Provided information regarding CAAs
BLM	1	Dropped from study because mitigation measures from BLM no longer relevant to Alpine Satellite project
BP	1	Provided information on BP role in mitigation process and evaluated effectiveness of BP mitigation measures.
BOEM	2	Provided information on BOEM role in mitigation process
BSEE	1	Evaluated effectiveness of BSEE related mitigation measures
CPAI	2	Provided information on CPAI role in mitigation process and evaluated effectiveness of CPAI mitigation measures.
ADNR, DO&G	5	Provided information on DO&G role in mitigation process. Indicated too busy to evaluate effectiveness of DO&G mitigation measures.
Kuukpik Corporation	1	Provided information on Kuukpik role in mitigation process and evaluated effectiveness of Kuukpik related mitigation measures.
NMFS	1	Provided information on NMFS role in mitigation process.
NSB	3	Provided information on NSB role in mitigation process and evaluated effectiveness of NSB related mitigation measures.
PNRC	NA	Several contact attempts. Sent introductory letter and list of relevant mitigation measures. PNRC reviewed information and indicated they did not wish to participate in project.
USACE	1	Provided information on USACE role in mitigation process.
USFWS	2	Provided information on USFWS role in mitigation process.
Former Industry Informant	1	Former industry employee who provided information on industry role in mitigation process.
Nuiqsut Residents	9	Provided information on Nuiqsut residents' role in mitigation process and evaluated effectiveness of mitigation measures.
BSEE and BOEM formerly known as MMS NA – Not Applicable		

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Because the study team focused on key informants who were knowledgeable about the mitigation process and, specifically, who were knowledgeable about the mitigation process related to the seven development projects addressed in this study, the number of key informants was relatively small. As noted in the introduction, this study was not designed to collect representative information through a broad survey, and therefore the history and analysis of effectiveness is based on a limited number of key informant discussions. These discussions provided knowledgeable agency, industry, and stakeholder perspectives on the mitigation

process and individual mitigation measures. In some cases, stakeholder, agency, and industry perspectives conflict with one another, and not all perspectives accurately reflect objective facts but are instead based on the experience of the key informant. Key informants were not given the opportunity to respond to criticisms or conflicting statements made by other key informants, and therefore the key informant quotes provided in this report should be considered observations that contribute to the understanding of the mitigation process.

2.4 Analytic Method

During the analysis phase of this study, the study team focused on three key components of the mitigation process as it relates to Nuiqsut subsistence activities: (1) how are subsistence mitigation measures developed and implemented; (2) how are mitigation measures monitored; and (3) are mitigation measures effective? In addition to seeking general information regarding the above three questions, the study team also conducted focused field discussions with agency and Nuiqsut individuals to assess the "track record" of the 38 specific mitigation types and measures that have been required for the seven development projects. The information presented in this section draws extensively on the key informant field visits and discussions with individuals from state, federal, and local agencies as well as Nuiqsut residents. To encourage individuals to express their thoughts and opinions freely, and because key informants were recommended by individuals within an agency or community and were not agency spokespersons, the names of individuals are not identified here.

To assess the effectiveness of specific mitigation types and measures the study team asked agency and Nuiqsut informants to provide their assessment of individual mitigation measures (e.g., cease vessel traffic during bowhead whale hunt) organized by type of mitigation measure (e.g., CAAs). The study team documented the following information about each mitigation measure:

- Was the mitigation implemented?
- Was the mitigation monitored following implementation?
- If monitored, did the agency/industry have established measures of effectiveness?
- What is the assessment of how effective the mitigation measure has been?

In order to capture the degree of variation that the study team anticipated encountering regarding the effectiveness of mitigation, the team developed a summary rating using the following categories:

- #1 - mitigation highly effective
- #2 - mitigation effective but requires improvement
- #3 - mitigation ineffective
- #4 - mitigation never implemented

The study team also gathered general information from key informants regarding the effectiveness of the mitigation type overall, particularly if the person did not have knowledge of

the specific mitigation measure but was familiar with other examples of that measure. For Nuiqsut residents, the study team focused more on questions related to implementation and effectiveness of mitigation measures and less on the questions related to monitoring and established measures of effectiveness, as these questions were directed more towards the relevant agencies or developers responsible for monitoring. See Table 13 for a summary of the key informants that the study team talked with for this analysis.

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CHAPTER 3: OVERVIEW OF RELEVANT AGENCIES AND DEVELOPMENT PROJECTS

Based on the study team's research, this section provides a brief overview of the process that industry and various federal, state, and local agencies undertake during the decision and permitting phase of a project and the ways in which mitigation measures are developed and monitored. Included in this process is the solicitation of public comments and concerns, state and agency reviews and mitigation proposals, and final mitigation measures that are stipulated in project permits and lease sales. This section includes an overview of the seven development projects addressed in this study. The information presented in this section is supplemented from the agency field visits and discussions that occurred as part of this study.

3.1 Agency, Industry, and Stakeholder Overview

3.1.1 Federal Agencies

The study team identified the following five U.S. federal agencies or divisions that were directly involved in the subsistence mitigation process for the seven development projects in the vicinity of Nuiqsut:

1. U.S. Army Corps of Engineers (USACE)
2. Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) (both previously Minerals Management Service [MMS])
3. Bureau of Land Management (BLM)
4. U.S. Fish and Wildlife Service (USFWS)
5. National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS)

The Environmental Protection Agency (EPA) was originally identified during the inventory of mitigation phase of this project (Table 2). Further review of mitigation measures associated with EPA showed that all of EPA mitigation measures were indirectly related to subsistence activities (Table 9) and thus the study team dropped EPA as one of the federal agencies addressed in this study. The NMFS, a division of NOAA, was added to the study based on discussions with the USFWS.

Mitigation measures that are binding to developers are those that are contained in lease sales, which permit the use of land or water for oil and gas exploration, and in agency permits or authorizations, which are generally issued once a development has been approved through the NEPA process. As described in a USDOI, BOEM (n.d.) publication, "Lease stipulations are legally binding, contractual provisions designed as mitigating measures to address specific concerns pertinent to the lease." For the seven development projects assessed during this study,

BLM (Alpine Satellites) and BOEM (Northstar) were the only federal agencies, for which the study team found documentation, that had lease sale stipulations associated with these projects. As described above, the BLM lease stipulations are no longer applicable to the Alpine Satellites development, because they applied only to a portion of lands that had never been developed by CPAI while under BLM management. These lands were later conveyed away from BLM to Kuukpik Corporation and are no longer under BLM's jurisdiction (see under "Selecting Mitigation Measures" above). The study team was unable to locate the 1979 lease sale document for Northstar. The remaining developments were subject only to state leases (Alpine Satellites and Northstar were also partially subject to state leases).

Each of these five federal agencies had various levels of involvement in the permitting process for the seven development projects. For each of the seven projects which involved federal permitting, these agencies followed the NEPA process, which is outlined in Figure 2. As shown in Figure 2, NEPA evaluations typically occur through the EA or EIS process. Lead agencies responsible for evaluating a project under NEPA are those with the primary responsibility in permitting. Other agencies will act as cooperating agencies and provide review and comments (often with mitigation measures) as part of the NEPA process. If a lead agency conducts an EA and their assessment results in finding no significant environmental consequences from the proposed action, then the decision (and the associated document) produced from the assessment is referred to as a 'Finding of No Significant Impact' (FONSI). If the lead agency conducts an EA and it is determined the environmental consequences of the proposed activity may be significant, then an EIS is prepared. If an EIS is conducted, then the resulting decision document is a ROD.

Public involvement and opportunity for input and comments are greatest in the EIS process versus the EA process, which may or may not include public input depending on the discretion of the responsible official (43 CFR 46.305). If the project is approved through a FONSI or ROD, or if the action qualifies as a Categorical Exclusion (which does not require an EIS or EA), then the agencies move forward and issue their permits with relevant stipulations and mitigation measures. The FONSIs or RODs are the measure documents which either approve or deny whether a project moves forward. While mitigation proposals are presented in the FONSI, ROD, and Final Environmental Impact Statement (FEIS), the documents themselves are provided to the permitting agencies for information purposes and are not legally binding to a developer. Only those stipulations included on agency permits or in documents such as a BOEM lease sale are legally binding to the developer. As one industry key informant observed, "The RODs are really recommendations that the agencies can decide whether to put into a permit or not" (BP Key Informant March 2013). Although not legally binding, federal law (40 CFR 1502.2(c)) requires that all RODs must identify the mitigation measures that the agency is adopting and committed

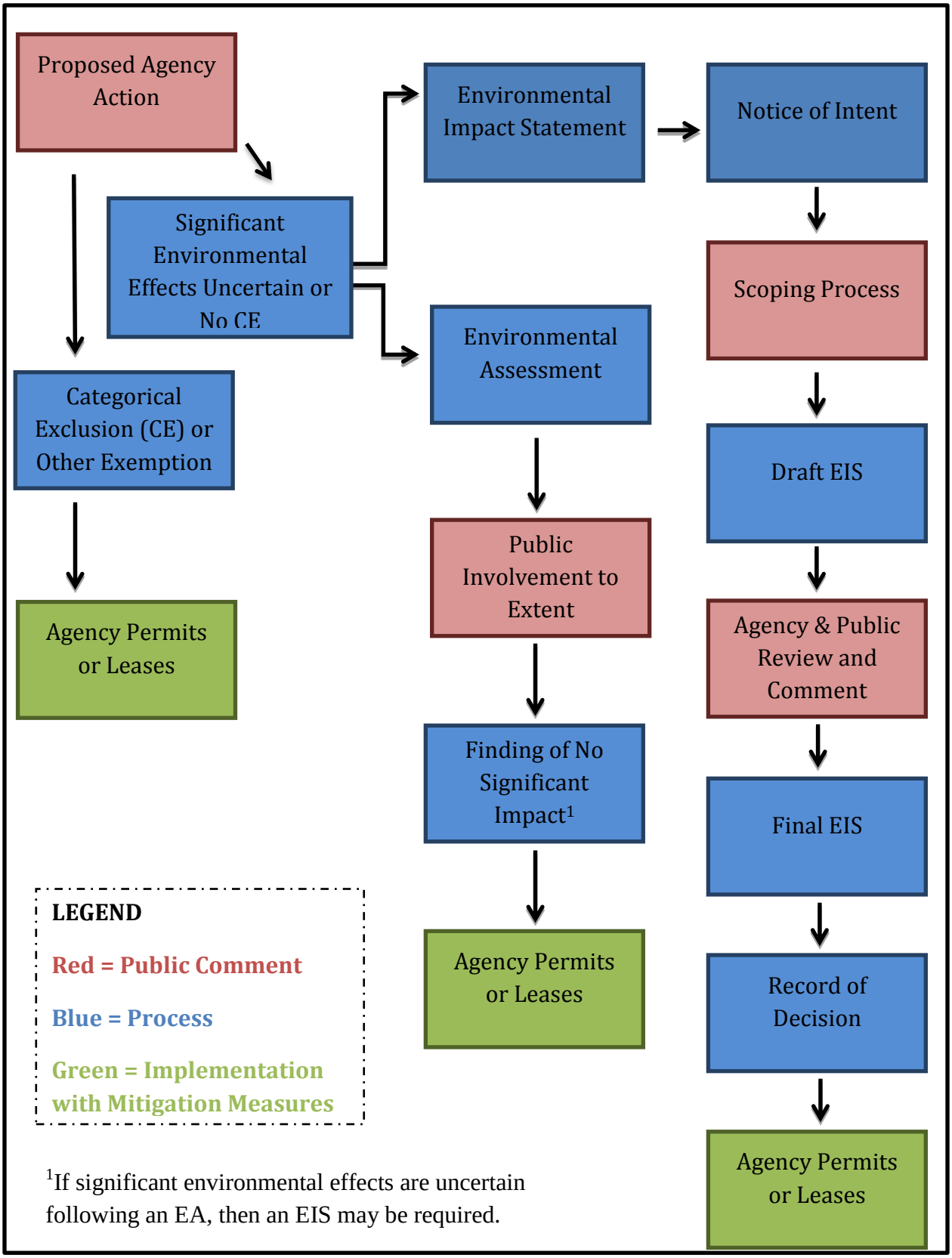

Figure 2: Basic NEPA Overview (adapted from Albright 2012 and Council of Environmental Quality 2007a)

to implementing. However, as discussed earlier, the agency issuing the ROD is often limited as to which stipulations it can legally carry forward into its own permit due to its regulatory framework; therefore, if there are any mitigation measures in the ROD that are outside the issuing agency's regulatory authority, then it is incumbent on the proposing agency to include those measures in their own permits or leasing documents. The issuing agency is not responsible for ensuring that all measures in the ROD have been carried forward into permits or leasing documents.

3.1.1.1 U.S. Army Corps of Engineers (USACE)

The USACE, which lies within the U.S. Department of Defense, issues permits for work, including construction and dredging, in navigable waters of the United States. These permits primarily include Section 404 and Section 10 permits although sometimes the USACE may issue permits under Section 103 of the Marine Sanctuaries Act. Section 10 permits refer to Section 10 of the Rivers and Harbors Act of 1899 under which the USACE issues permits to construct in and excavate or fill in the Nation's navigable waterways. Section 404 permits refer to Section 404 of the Clean Water Act and the permitting of dredge or fill material to be placed in navigable waters and wetlands. An in-depth description of the USACE's regulatory procedures is available on the USACE's Alaska District website (USACE 2012). The USACE was the lead federal agency responsible for evaluating all but one (Alpine Satellites, BLM) of the seven development projects near Nuiqsut under NEPA. The six development projects in which the USACE acted as lead agency were Endicott (EIS), Alpine (EA), Meltwater (EA), Tarn (EA), Northstar (EIS), and Oooguruk (EA).

Regarding the development of mitigation, the USACE coordinates with federal, state, and local entities in addition to reviewing public input during the NEPA process prior to issuing a Section 404 or Section 10 permit. For development projects on the North Slope, the most commonly consulted agencies include Alaska Department of Fish and Game (ADF&G), USFWS, EPA, NMFS, and NSB. While the USACE makes an effort to consult with these entities, the USACE can only include stipulations in its permit that fall under their jurisdiction (Section 10 and Section 404 regulations, thus excluding mitigation directly addressing subsistence activities). Each project is evaluated on a case by case basis and no standard list of mitigation measures exist. Once a permit has been issued the USACE can exercise its enforcement powers, outlined in 33 CFR Part 326, to ensure that developers are in compliance with permit stipulations including mitigation measures. Enforcement can include compliance inspections in the field as well as receipt and review of applicant's required monitoring and reporting documents.

As shown in Table 9, a total of 70 mitigation measures were identified by the study team associated with the USACE and the seven development projects. Further review of the 70 measures identified for USACE showed that none of the measures provided mitigation related to a subsistence activity and therefore the 70 measures were not included in the study team's final subset of mitigation measures (see Appendix A). Because the USACE issued mitigation

measures related to subsistence resources and/or habitat the study team included them in the study's field visits to better understand the mitigation process and effectiveness as a whole (see "Analysis of Mitigation" below). However, because the USACE did not have any mitigation measures related to a subsistence activity, they were not included in the analysis of the effectiveness of specific mitigation measures (Table 12).

3.1.1.2 Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE)

BOEM and BSEE were formerly part of the MMS but since 2010 the MMS was renamed the Bureau of Ocean Energy Management, Regulation and Enforcement and then subsequently reorganized into two separate entities known as BOEM and BSEE in 2011 (USDOI, BOEM 2011a). BOEM is a bureau of the USDOI responsible for managing the offshore energy resources of the OCS and oversees resource management including leasing, economic analysis, resource evaluation and environmental analysis, and permitting (USDOI, BOEM n.d.). BSEE, in turn, oversees the safety and enforcement responsibilities of operations, inspections, and environmental compliance. Under the OCS Lands Act, BOEM and the Secretary of Interior grant leases and prescribe regulations for oil and gas activities on the OCS. As previously described, mitigation measures that are binding to developers are those that are contained in lease sales and in agency permits, which are issued once an action has been approved through the NEPA process. BOEM fulfills both roles through issuing OCS lease sales with binding mitigation as well as approving Exploration Plans and Development and Production Plans or Development Operations Coordinations Documents. The OCS Lands Act requires an approved Exploration Plan (43 USC 1340) or Development and Production Plan (43 USC 1351) prior to any lease unit activities.

In developing mitigation measures, BOEM collects input both from public processes and consulting government agencies. As shown in Figure 3, BOEM provides multiple opportunities for public and agency commenting and input in their lease sale process. The BOEM leasing process includes several calls for information and scoping meetings as well as agency and public comment periods. Similar to other agencies, BOEM can only include mitigation measures into the OCS leases which are legally enforceable by BSEE and the OCS Lands Act and other implementing laws and regulations. During the leasing process, BOEM can implement deferral areas as mitigation, whereby specific lease tracts are removed from lease sales. Reasons for deferral may include presence of sensitive environmental resources, space-use conflicts (e.g., subsistence use areas), or other reasons (USDOI, BOEM 2011b).

Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents go through a similar process as the lease sales in that they are reviewed by BOEM, other federal agencies, and state agencies. If the plans include extraordinary circumstances, then they must go through a site-specific environmental assessment. These plans

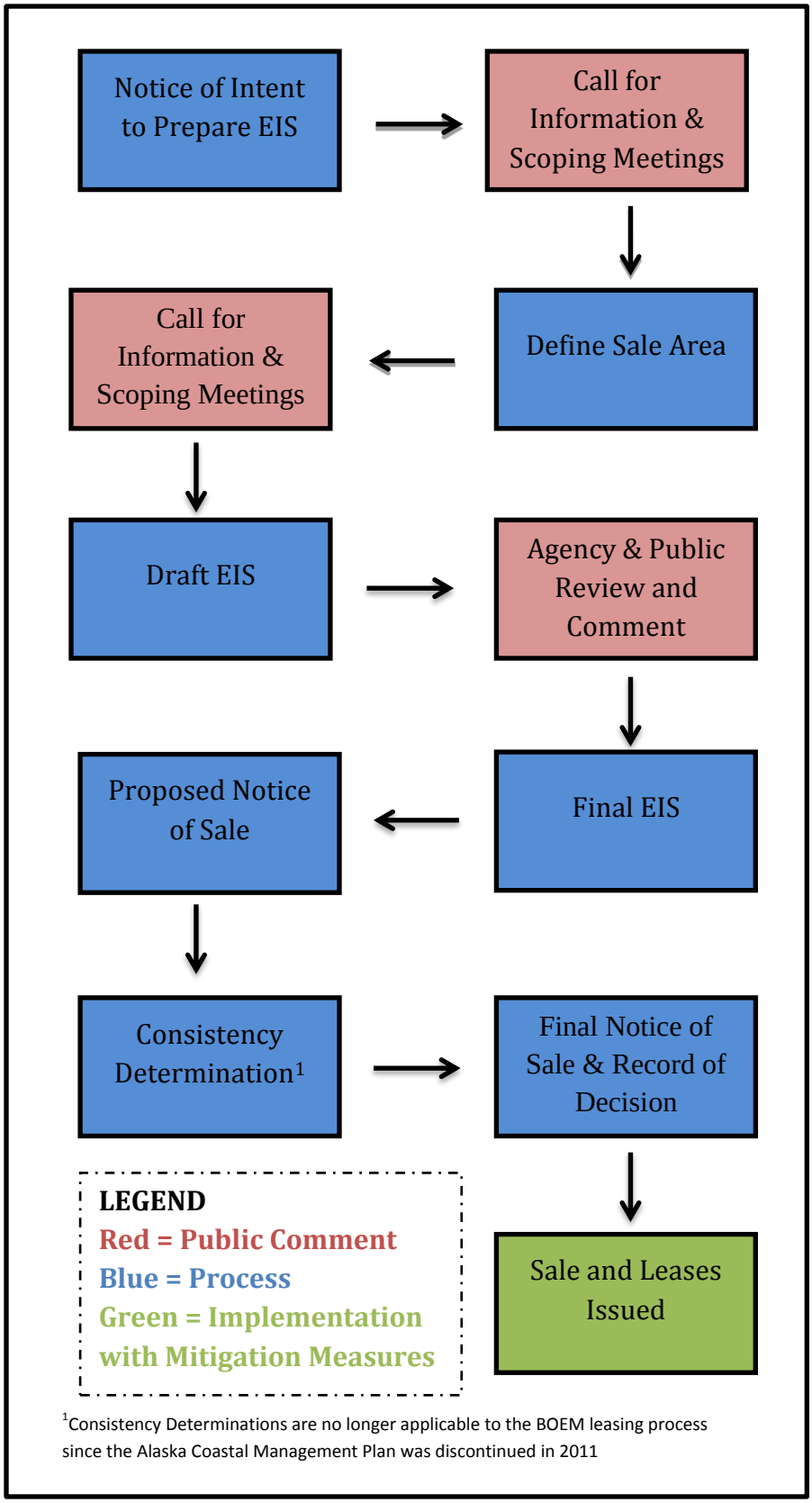

Figure 3: Overview of BOEM Leasing Process (adapted from USDOI, BOEM n.d.)

are also available for public comment. Once a lease or plan is approved then BSEE has inspectors who can monitor if the mitigation measures are being implemented. Inspectors have annual scheduled inspections as well as unannounced inspections. In some cases, BSEE may have full-time inspectors during certain phases such as exploration. The OCS Lands Act and regulations in 30 CFR 250 empower BSEE to impose suspension of operation, cancellation of leases, and other remedies and penalties for developers not in compliance with lease or plan stipulations.

As shown in Table 9, a total of seven mitigation measures were identified by the study team associated with the MMS and the Northstar project; further review by the study team showed that two of the measures provided mitigation related to a subsistence activity; both measures were included in the analysis of the effectiveness of specific mitigation measures (see Appendix A and Table 12).

3.1.1.3 Bureau of Land Management (BLM)

During discussions with the BLM for this project, the study team learned that the mitigation measures stipulated by the BLM related to the Alpine Satellites development had never been binding to CPAI because the BLM stipulations applied only to two pads located on BLM land. According to the BLM representative, CPAI never initiated development of the two pads on BLM lands and these lands have since been conveyed away from the BLM to Kuukpik Corporation under ANCSA and are no longer under their jurisdiction. The following excerpt from the ROD issued by BLM provides further information regarding BLM's involvement in the Alpine Satellites project:

> *The ASDP Environmental Impact Statement (EIS) analyzed CPAI's proposal to develop oil accumulations from five drill pads, two of which are on BLM-managed lands. The decisions in this ROD are limited to federal lands. Authorizations for development on non-federal lands will be issued by the U.S. Corps of Engineers (USACE), the U.S. Coast Guard (USCG), the U.S. Environmental Protection Agency (EPA), and the State of Alaska. The decision for BLM-managed land in this ROD is consistent with the ASDP EIS Preferred Alternative that will form the basis for decisions by the cooperating agencies, including decisions regarding development on non-federal lands.* (USDOI, BLM 2004a)

Because the BLM subsistence-related mitigation measures were never applicable to the Alpine Satellites development, the study team dropped the BLM from any additional research and analysis for this project.

3.1.1.4 U.S. Fish and Wildlife Service (USFWS)

The USFWS issues authorizations under a number of laws and treaties including the Endangered Species Act (ESA), Marine Mammals Protection Act (MMPA), Migratory Bird Treaty Act, and Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act "provides the basic authority for the Fish and Wildlife Service's involvement in evaluating impacts to fish and wildlife from proposed water resource development projects" and requires federal agencies to consult with the UFSWS (and, in some cases, NMFS) before permitting water resource development projects. Government-to-government formal consultation with tribes is also required under Section 7 of the ESA to identify if a listed species is located within the area of a proposed action and, if so, whether the action may affect that species. The USFWS may prepare a biological opinion, which provides an analysis of whether or not the proposed action is "likely to jeopardize the continued existence of the species or adversely modify designated critical habitat" (USFWS 2011). If the action is determined not to jeopardize the continued existence of a listed species, the USFWS will anticipate any incidental take that may result from the action and authorize that take in an incidental take statement. Similarly, under the MMPA, an incidental harassment authorization is granted for actions where the take will be limited to harassment. In Alaska, the USFWS is responsible for managing sea otters, walrus, and polar bear. Other marine mammal species are managed by NMFS.

The USFWS is generally brought into the mitigation process through consultation with a lead federal agency such as the USACE, BOEM, BLM, or EPA, when an EIS is required. For smaller undertakings, a developer may be referred directly to the USFWS to obtain the appropriate authorizations. The USFWS is not a permitting agency and therefore its primary role in the permitting process is to provide recommendations to federal agencies issuing permits. The lead federal agency will consider the recommendations provided by the USFWS during consultation and may incorporate those recommendations into the EIS for a project or, if the recommended stipulations fall under an agency's jurisdiction, into the final permits for the development project. In addition, the USFWS develops "reasonable and prudent measures" to mitigate potential impacts, which are often incorporated into biological opinions. These reasonable and prudent measures are developed based on professional judgment and through consultation with other agencies. Incidental take statements and incidental harassment authorizations issued by the USFWS include stipulations to achieve minimal impacts on wildlife species. The USFWS does not monitor compliance with the stipulations in incidental take statements or incidental harassment authorizations; however, if a permittee reports the take of a listed species or marine mammal and has *not* complied with the requested stipulations, then they are in violation of the ESA or MMPA. Any takes of listed or marine mammal species are reported to the USFWS by the permittee. While the USFWS is not responsible for monitoring compliance with their stipulations in other agencies' permits, it may conduct direct monitoring of activities in certain instances, as requested by other agencies.

As shown in Table 9, a total of five mitigation measures were identified by the study team associated with the USFWS and the seven development projects. Further review of these measures by the study team showed that none of the measures provided mitigation related to a subsistence activity and therefore they were not carried forward in the analysis (see Appendix A). Because the USFWS issued mitigation measures related to subsistence resources and/or habitat the study team included them in the study's field visits and discussions. However, because the USFWS did not have any mitigation measures related to a subsistence activity, they were not included in the analysis of the effectiveness of specific mitigation measures (Table 12).

3.1.1.5 National Marine Fisheries Service (NMFS)

The NMFS (a division of NOAA and the Department of Commerce) mitigation process is similar to that for the USFWS. With the USFWS, NMFS manages resources under the ESA and the MMPA. NMFS is also involved in Section 7 consultation under the ESA and issues incidental harassment authorizations and incidental take statements in accordance with the MMPA and ESA. Under the MMPA, NMFS is responsible for managing whales, dolphins, porpoises, seals, and sea lions.

As with the USFWS, the mitigation process for NMFS is either initiated when an EIS is required and NMFS is contacted by the lead agency, or when a developer contacts NMFS directly for smaller undertakings. During the NEPA process, NMFS provides recommendations through consultation or through biological opinions. Because NMFS manages whales under the MMPA, and because the MMPA does not allow incidental take of marine mammals that results in an impact on subsistence harvests, incidental harassment authorizations issued by NMFS in Alaska frequently include stipulations related to whale hunting activities. The ESA does not provide for protection of subsistence uses, and therefore incidental take statements do not include subsistence-related mitigation.

Incidental harassment authorizations and incidental take statements were not included in the study team's literature review to identify mitigation measures, and therefore the study team did not identify any mitigation proposals or measures for NMFS (Table 9). The study team learned of NMFS' role in the mitigation process during discussions with the USFWS and subsequently included NMFS in the study's field visits to better understand the mitigation process and effectiveness as a whole (see "Analysis of Mitigation" below). As noted above, NMFS does include subsistence activity-related mitigation measures in its incidental harassment authorizations under the MMPA. Of the seven development projects, NMFS issued authorizations only for the Northstar Project. Three examples of such mitigation measures in a NMFS Letter of Authorization for BP during oil and gas production at Northstar from 2009-2010 are as follows:

(c). All non-essential boats, barge, and air traffic will be scheduled to avoid periods when bowhead whales are migrating through the area where they may be affected by noise from these activities.

(f). All work must be performed in a manner consistent with any signed Conflict Avoidance Agreement with the affected Native Alaskan communities.

(i). In order to reduce the taking of ringed seals to the lowest level practicable, the Holder of this Authorization must begin winter construction activities, principally ice roads, as soon as possible once weather and ice conditions permit such activity. (NMFS 2009)

Because the study team did not fully recognize the NMFS' role until after the inventory of mitigation measures, NMFS related mitigation measures were not included in the analysis of the effectiveness of specific mitigation measures (Table 12). However, discussions of these measures are incorporated into the analysis where relevant.

3.1.2 State Agencies

The study team identified the following three state agencies that were directly involved in the subsistence mitigation process for the seven development projects in the vicinity of Nuiqsut:

1. Alaska Department of Natural Resources (ADNR), Division of Oil and Gas (DO&G)
2. Alaska Department of Fish and Game (ADF&G)
3. Alaska Division of Governmental Coordination (ADGC)

The study team had originally identified the Alaska Department of Environmental Conservation (ADEC), Alaska Department of Labor and Workforce Development (ADOLWD), Alaska Oil and Gas Conservation Commission (AOGCC), and Alaska Office of Management and Budget (AOMB) during the inventory of mitigation phase of this project. Further review of mitigation measures associated with ADEC, ADOLWD, AOGCC, and AOMB showed that all of the related measures were indirectly related to subsistence (Table 9) and thus the study team dropped these agencies from any additional research or analysis for this project.

3.1.2.1 Alaska Department of Natural Resources (ADNR), Division of Oil and Gas (DO&G)

The DO&G, a division of ADNR, is the state agency responsible for leasing state lands for oil and gas exploration and development as well as geothermal exploration and development. Title 38 of the Alaska Statutes meets the Alaska Constitution's mandate to provide for the utilization, development, and conservation of all natural resources belonging to the state and is the directing statute for ADNR (ADNR, DO&G 2009). This section examines the state process in which large scale oil and gas developments are permitted and mitigation measures are implemented through

the state's BIFs, Lease Sale Program, and DO&G's Lease/Unit Operations Approval (see Figure 4 for an overview of the DO&G process). DO&G also issues geophysical exploration permits, which commonly include permits for seismic surveys. Other divisions within ADNR, such as the Division of Mining, Land, and Water also issue permits needed for oil and gas development such as water use authorizations and land use permits.

Similar to federal agencies, binding mitigation measures for development on state land are contained in the leasing of the land and the permits for development. Within the state process, the leasing of lands for oil and gas development occurs under the BIF process and resulting oil and gas lease sales (Figure 4). BIFs are issued by director of the DO&G and state that "upon a written finding that the interests of the state will be best served, the director may, with the consent of the ADNR commissioner approve contracts for the sale, lease, or disposal of available land, resources, property, or interests in them" AS 38.05.035(e). BIFs are issued every 10 years and cover a large geographic area in which lease sales may occur. For this study the applicable geographic regions are the North Slope and Beaufort Sea regions. Prior to 1996, lease sales did not occur under the large areawide sales covered in the BIFs (ADNR, DO&G 2009). The most recent BIF for the North Slope was published in 2008 and for the Beaufort Sea in 2009. Any mitigation measures developed in the BIFs are binding for any developer applying for a lease during the 10 year period covered by the BIF. Each year the DO&G will issue a call for new information and determine if the BIF needs to be updated. DO&G will apply the most recent set of mitigation measures to a project regardless of an existing prior lease, although certain measures are allowed to be grandfathered in for an existing development, such as building setbacks. The lease sales contain the mitigation measures developed in the BIFs.

After acquiring a lease, a developer must submit a plan of operations and development for exploration, development, and production phases of a project (ADNR, DO&G 2009). The plan of operations undergoes a review by the DO&G, a request for public input and comments, and must include information on the schedule of operations, location and design of project components, plans for rehabilitation, and description of procedures to minimize adverse effects (see 11 AAC 83.158(d)). Prior to 2011, the plan of operations also underwent a separate review under the Alaska Coastal Management Plan (ACMP). If a project was not consistent with the standards developed in the ACMP, the permit could be denied. Since 2011, the ACMP (including the NSB's coastal management program, which operated under the ACMP) has been discontinued. If approved (through DO&G's Lease Operations Approval), the plan of operations may contain project-specific mitigation measures in addition to the stipulations in the BIFs and lease sales. Developers may also propose their own mitigation measures in their proposed plan of operations. The DO&G also requires applicants to submit a mitigation measure analysis in which the applicant provides a response to areawide (e.g., North Slope, Beaufort Sea) mitigation measures by stating one of the following: (1) mitigation measure satisfied, (2) waiver requested, or (3) mitigation measure not applicable (ADNR, DO&G 2012). Once a plan of operations has been approved and the developer has received all other federal, state, and local permits, then the

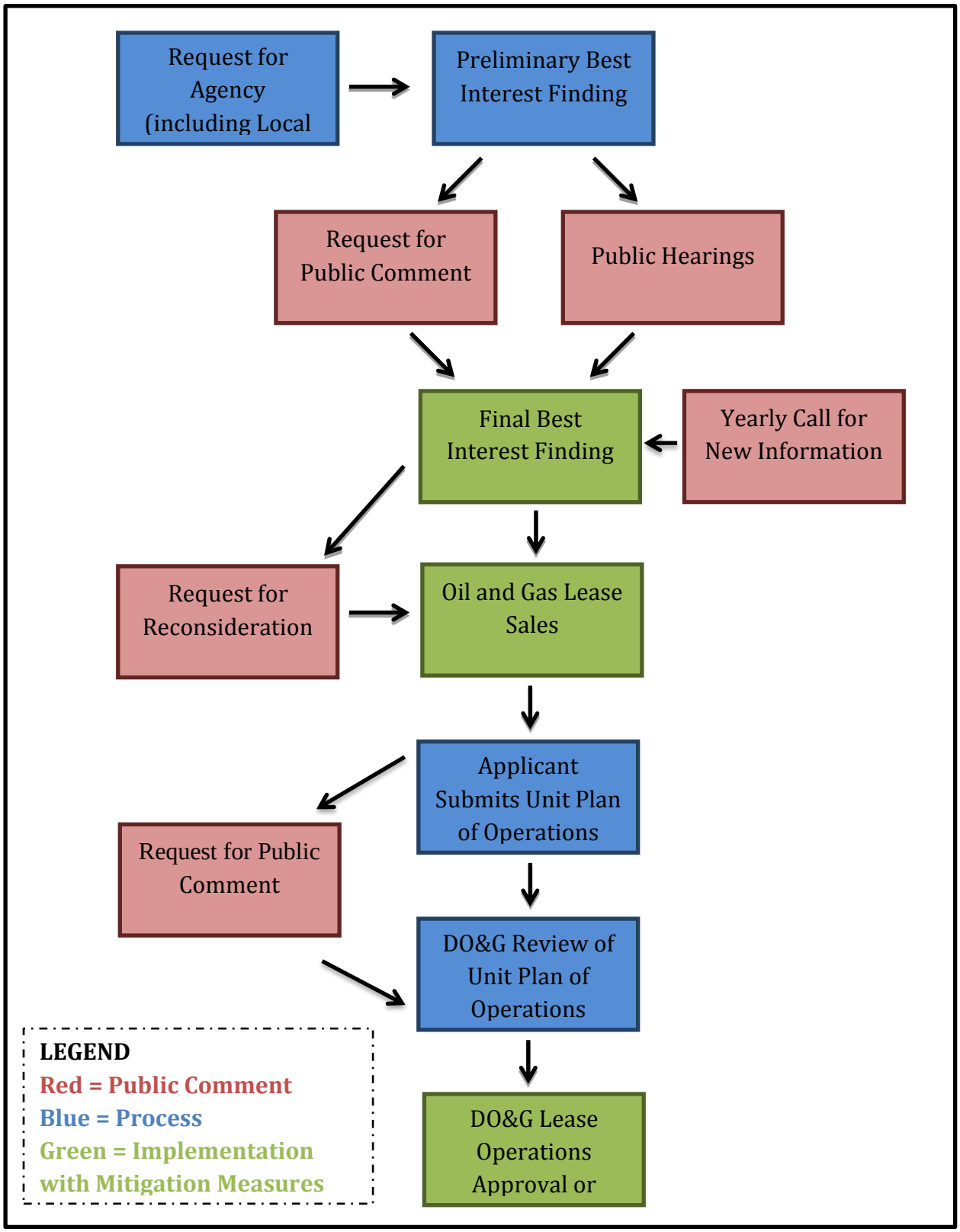

Figure 4: DO&G Oil and Gas Permitting and Mitigation Process Overview (adapted ADNR, DO&G 2009)

project may commence. DO&G also includes provisions that the developer must be open for inspection by DO&G inspectors and other state agency inspectors who inspect whether the terms of lease and plan of operations are being implemented.

As shown in Table 9, a total of 219 mitigation measures were identified by the study team associated with the ADNR and four of the seven development projects; further review by the study team showed that 10 of these measures provided mitigation related to a subsistence activity. Of these 10, the study team analyzed five specific mitigation measures (see Appendix A and Table 12).

3.1.2.2 Alaska Department of Fish and Game (ADF&G)

The ADF&G is the state agency responsible for protecting the state's fish, game, and aquatic plant resources and habitat and for managing their use and development. Title 16 of the Alaska Statutes includes provisions for protecting fish resources and habitat. Specifically, AS16.05.841 and AS16.05.871 assign ADF&G with responsibility for protecting anadromous fish habitat and ensuring adequate passage is provided for anadromous and other fish during the development and operation of a project. Prior to any development that could impact fish resources, habitat, or passage, an applicant must obtain a Fish Habitat Permit. While ADF&G has statutory authority to protect fish resources and can impose stipulations in their permit designed to mitigate impacts to fish resources, including subsistence fish, they can only make recommendations to land management agencies (e.g., ADNR, BLM) regarding wildlife mitigation measures.

The only legally binding mitigation measures from ADF&G are those that appear in their Fish Habitat permits. Certain ADF&G mitigation recommendations related to wildlife have been incorporated into ADNR's BIFs and lease conditions and are binding to a developer as well. ADF&G consults with the developers and state and federal agencies during the course of the leasing or permitting process to develop the mitigation measures for a project and in some cases will incorporate the developer's proposed mitigation measures into their Fish Habitat permits. All suggested mitigation measures are dependent on whether they fall under ADF&G's statutory authority. ADF&G monitors their permit stipulations through project site inspections.

As shown in Table 9, a total of 15 mitigation measures were identified by the study team associated with ADF&G and the seven development projects; the study team considered seven of these measures to be directly related to subsistence. Further review by the study team of the eight measures showed that none of the measures provided mitigation related to a subsistence activity (see Appendix A). Because ADF&G issued mitigation measures related to subsistence resources and/or habitat the study team included them in the study's field visits to better understand the mitigation process and effectiveness as a whole (see "Analysis of Mitigation" below). However, because ADF&G did not have any mitigation measures related to a subsistence activity, they were not included in the analysis of the effectiveness of specific mitigation measures (Table 12).

3.1.2.3 Alaska Division of Governmental Coordination (ADGC)

The ADGC, which had overseen the coordination for the ACMP for six of the seven projects (did not include Oooguruk), is no longer in existence. By the time PNRC initiated the permitting phase for the Oooguruk project in 2005, the ACMP had been moved to ADNR's Office of Project Management and Permitting and by 2011 was in the ADNR, Division of Coastal and Ocean Management (DCOM). The ACMP legislation was allowed to sunset when a special legislative session in May 14, 2011 ended without passing legislation required to extend the ACMP (ADNR, DCOM 2011). Discussion with a previous representative of DCOM, which was responsible for the ACMP in 2011, informed the study team that it would not be possible to conduct additional discussions and analysis of individual mitigation measures from the ACMP because the division responsible for its implementation was no longer in existence and there were no staff within the state agencies that could go back and assess the mitigation measures. Thus, the study team dropped the ADGC from any additional research or analysis for this project.

3.1.3 Local Government and Organizations

3.1.3.1 North Slope Borough (NSB)

The NSB issues permits and approvals for any action, including commercial or recreational, taken within the boundaries of the Borough. The boundaries do not extend offshore but stop at the federal boundary where the OCS begins (three miles seaward). All projects analyzed in this study fall within the NSB jurisdiction, The North Slope Borough Municipal Code (NSBMC) of Ordinances includes policies that are applicable to all economic development within the NSB. In addition to the NSBMC, the NSB also included enforceable policies in its coastal management plan, which was established under the purview of the ACMP. The ACMP expired in 2011 and was not extended by the state legislature; therefore, policies under the ACMP or the NSB coastal management program are no longer applicable to development on the North Slope. Although these policies are not currently applicable to development on the North Slope, they are still relevant to understanding the history of mitigation related to seven development projects and are therefore discussed in this report where relevant. The NSB's Department of Planning and Community Services is responsible for planning and land use regulations, which address environmental, health, social, and economic impacts to communities, and its duties include the development and issuance of permits. Developers must adhere to the policies contained with the code of ordinances, in addition to stipulations contained in the permits and administrative approvals for their specific actions, and in the Master Plan for the development district. The NSB issued permits for all of the seven development projects addressed in this study.

Mitigation measures are often developed as part of the NSB's Comprehensive Plan, which was most recently revised and adopted by the NSB Assembly in 2005. Development of the Comprehensive Plan includes public participation through workshops with community representatives and public meetings. The Comprehensive Plan is meant to assist with revising

and implementing NSB land management regulations, including measures related to permits. Developers often initiate the permitting process with the NSB by contacting and meeting with NSB representatives prior to submitting permit applications. Prior to issuing permits, the NSB holds public hearings in potentially affected communities and seeks approval from the NSB planning commission and assembly. Specific stipulations are developed through input from local residents and entities, as well as through consultation with operators. These stipulations are included in individual permits. The NSB may approve an activity through administrative approval without public notice, if the proposed activity meets certain criteria (such as minor alteration to an existing plan). Once a permit has been issued and development begins, the NSB conducts field inspections to monitor compliance with permit conditions and existing land management regulations. The NSB may order the discontinuance of a development activity or the removal of structures if a developer is found to be in violation of its permit, administrative approval, or Master Plan.

As shown in Table 9, a total of 283 mitigation measures were identified by the study team associated with the NSB, for all seven of the development projects. Further review by the study team showed that 36 of these measures provided mitigation related to a subsistence activity; of these 36, the study team analyzed 22 for the individual analysis of the effectiveness of specific mitigation measures (see Appendix A and Table 12).

3.1.3.2 Kuukpik Corporation

Kuukpik Village Corporation is Nuiqsut's village corporation, which was established pursuant to ANCSA. Kuukpik Corporation owns the surface rights to approximately 146,000 acres of land in and around Nuiqsut. The corporation leases the surface rights to its lands through a private agreement with the developer, which is called a surface use lease agreement. These agreements include various stipulations and conditions intended to benefit the community and/or reduce impacts on local residents and subsistence activities. Kuukpik Corporation coordinates with the Native Village of Nuiqsut and City of Nuiqsut, in addition to using feedback from KSOP, to monitor the impacts of development and negotiate lease conditions.

As shown in Table 9, a total of two mitigation measures were identified by the study team associated with the Kuukpik Corporation, for the Oooguruk Project. There are likely additional mitigation measures; however, because the study team did not have access to Kuukpik Corporation's surface use lease agreements for any of the seven development projects, these were not included in the literature review. The study team determined that both of the measures provided mitigation related to a subsistence activity; one measure was included in the individual analysis of the effectiveness of specific mitigation measures (see Appendix A and Table 12).

3.1.4 Industry

Industry is involved at the earliest stages of the planning and permitting process through the development of a project plan and in pre-application meetings. In most cases, a developer must

obtain permits or approval from both state and federal entities. Once a project has been defined, developers communicate with regulatory agencies to identify the permits that will be required, which vary depending on the type of project, the project design, the location of the project and landowners, and other factors (Rothwell 2002). A developer may be able to conduct certain construction activities, such as ice road construction, under permits they have already acquired for an existing development project.

Once the required permits have been identified, the developer gathers and/or documents information needed to complete the permit applications. Depending on the location and nature of the proposed activity, the developer may be able to use existing data to complete the applications, or they may hire contractors to perform additional research (Rothwell 2002). Collection of baseline data was listed by CPAI in their responses to the study team as one of their primary roles in the mitigation process:

> *Our role in the mitigation process associated with permits is, generally, to:*
>
> *1) collect environmental baseline information that can be used to develop appropriate and practicable mitigation meuasers as the project team moves from conceptual design to detailed design;*
>
> *2) use these data to develop self-imposed mitigation measures as appropriate to address the potential for impact of our operations (e.g., extending pipeline height to a minimum 7 foot above tundra surface to allow for caribou passage and free passage by snowmachines).* (CPAI Written Response October 2013)

CPAI went on to note their role in pre-application meetings "with regulatory agencies throughout the process to understand their key concerns and work solutions in to the design process" (CPAI Written Response October 2013). Pre-application meetings generally involve the developer and relevant regulatory agencies, including the NSB. During these meetings, the developer presents their proposed project, fields questions from agencies, and discusses agency concerns. A key informant from BP described these initial stages of planning for a development project as follows:

> *The first [step] is defining the project and explaining it to the agencies and having an open mind, because the agencies will have questions about what we've defined. [Then] we make sure we get feedback, modify [the project plan], go through a negotiation process with the agencies and typically if [the project] is something that would be of interest to Nuiqsut or to Barrow, then we would talk to parties in those communities.* (BP Key Informant March 2013)

In addition to meetings with agencies, CPAI also noted the early involvement of local stakeholders in providing input into the design process. In their responses to the study team, CPAI listed one of their roles as "hold meetings with the closest community(ies) to inform them

about the scientific knowledge being collected and solicit their input on study design" (CPAI Written Response October 2013). CPAI also reported working with scientists at the NSB Department of Wildlife to "consider their concerns and suggestions for study design" (CPAI Written Response October 2013).

Once permit applications have been submitted, agencies review the applications and request additional information as needed. Activities requiring a federal permit may trigger NEPA and require an EIS (Section 3.1.1). Some agencies or entities, such as the NSB, issue draft permits for review by the public and the applicant. If the developer objects to any of the stipulations within a permit, then they may try to negotiate the permit conditions with the permitting agency. If the permit stipulations are changed, then the agency will issue a revised permit (Rothwell 2002). In addition to permits, there are certain laws and regulations that developers must abide by, regardless of the content of their permits. The BP individual noted, "There are laws that include very significant requirements that aren't part of a permit. [For example], under the Migratory Bird Treaty Act, you're not allowed to kill a bird" (BP Key Informant March 2013). Once permits have been issued, CPAI noted that their responsibility is to "develop studies and procedures to comply with mitigation requirements in regulatory permits and approvals" (CPAI Written Response October 2013).

3.1.5 Nuiqsut

Nuiqsut residents do not have any regulatory authority through which they can develop binding mitigation measures for a project. However, residents are involved in scoping meetings for projects during which they can voice their concerns through public testimony and provide mitigation proposals to federal, state, and local government agencies. Providing written comments during public comment periods is another method in which residents can state their concerns and provide mitigation proposals. Local entities in Nuiqsut that review project activities and provide comments and recommendations include the City of Nuiqsut, Native Village of Nuiqsut, Kuukpik Corporation, and for CPAI projects, KSOP (Rothwell n.d.). In addition, local entities may meet with and make recommendations to the Kuukpik Corporation related to stipulations in the corporation's surface land use agreements. The NSB ordinances have a provision that the NSB Zoning Commission will provide parties such as the city and private individuals or groups with relevant materials concerning proposed actions on the North Slope on which they may submit comments and recommendations (§ 19.30.080)

3.2 Overview of Development Projects

3.2.1 Endicott

The Endicott Development project is located eight miles east of Prudhoe Bay approximately four miles offshore in the Beaufort Sea (Map 1). Endicott was discovered in 1978 by the Sohio Alaska Petroleum Company (AOGCC 2011a). In September of 1982, Sohio Alaska Petroleum Company submitted an application to the USACE to secure a permit allowing for the placement

of 2,700,000 cubic yards of gravel into approximately 197 acres of the seabed and the construction of 4.9 miles of causeway, containing two breaches. The project was proposed by eight companies, including Amoco Production Company, ARCO Alaska, Inc., Cook Inlet Region Incorporated, Doyon Limited, Exxon Corporation, NANA Development Corporation, Sohio Alaska Petroleum Company, and Union Oil Company of California. The USACE was the lead federal agency that oversaw the federal permitting process under the NEPA including the issuance of an EIS, ROD, and permits. Other agencies that were directly involved in permitting and providing subsistence related mitigation for Endicott included the NSB and various state agencies including ADNR's Lease Operations Approval (84-99) and the ADGC's consistency review for the ACMP. Endicott began production in 1987 (BP Exploration [Alaska] Inc. 2010). Development incorporated the construction of onshore facilities including two man-made 14 acre gravel islands and a causeway 2.5 miles off the coast from the mouth of the Sagavanirktok River, approximately 15 miles east of Prudhoe Bay (BP Exploration [Alaska] Inc. 2010).

In October, 1988 the ADF&G, Division of Habitat, in accordance with recommendations from the Endicott Mitigation Advisory Group, prepared and submitted a technical paper to the USACE regarding necessary mitigation to prevent impacts to anadromous fish, fish habitat, and subsistence uses of the proposed project area. Subsequently, in response to unacceptable adverse impacts to fish in the nearshore environment, a negotiated settlement agreement was signed on January 17, 1991 between the USACE and ARCO Alaska, Inc., BP Exploration Inc., and Exxon Corporation to provide for additional breaching of the Endicott and West Dock Causeways. Today, BP Alaska is the primary operator of Endicott.

3.2.2 Alpine and Alpine Satellites

The Alpine oil field is located eight miles north of Nuiqsut and 40 miles west of the Kuparuk oil field in the Colville River Delta (Map 1). When discovered by ARCO Alaska, Inc. in 1994, Alpine was the largest oil field discovered in the United States in over a decade (AOGCC 2011b). ARCO Alaska, Inc. (Operator), Anadarko Petroleum Corporation (Co-Owner), and Union Texas Petroleum Alaska Corporation (former Co-Owner) proposed the initial development of the Alpine oil field located on State of Alaska land. In addition to applying for Lease Operations Approval and other state permits, ARCO prepared and submitted an EED to the USACE in September 1997 in order to obtain two USACE permits authorizing long term oil and gas production and transportation. The USACE reviewed ARCO's proposed action, in accordance with NEPA, in order to determine its effects on the natural and human environment (ARCO Alaska, Inc. 1996). Because the USACE issued a FONSI in their EA, no federal EIS was required for the Alpine project. Agencies beside USACE that were directly involved in permitting and providing subsistence related mitigation for Alpine included the NSB and various state agencies including the ADNR's Lease Operations Approval (LO/NS 97-07) and ADGC's consistency review for the ACMP. Alpine began production in November 2000 and during that same year ARCO Alaska, Inc. was purchased by Phillips Petroleum Company who later merged with Conoco Inc. to become ConocoPhillips.

In 2003, CPAI and Anadarko filed an application with the BLM to further develop the Alpine oil field and an EIS was prepared. In their application, CPAI and Anadarko proposed the development of five satellite drilling pads (two of which were located on National Petroleum reserve Alaska (NPRA) lands managed by BLM, one located on state land, and two located on Kuukpik Corporation land) and provided six alternate development plans for the BLM to consider. The BLM selected the Preferred Alternative, also known as Alternative F, in the ROD. Alternative F was identical to Alternative A (CPAI's original proposal) with the exception that it modified components of the applicant's proposed action (Alternative A) to minimize, mitigate, or avoid certain potential environmental impacts identified by the BLM, the cooperating agencies, and the public through the NEPA process (USDOI, BLM 2004a). In addition to BLM, both the USACE and NSB were directly involved in the permitting process for the Alpine expansion and provided subsistence related mitigation for the project. The study team was unable to determine whether the state prepared a plan of operations approval or a final consistency determination for this project.

CPAI originally designated their production pads as CD-1 through CD-7; CD-6 and CD-7 are now known as Greater Mooses Tooth 1 and 2. CD-1 and CD-2 are part of the original Alpine field. In 2006, CD-3 (Fiord; state land) and CD-4 (Nanuq; Kuukpik Corporation land) began producing oil; CD-5 (Alpine West; land conveyed to Kuukpik Corporation) is anticipated to begin production in 2015 after receiving a USACE permit in December 2011 to construct a gravel road, bridge, and pipeline crossing over the Nigliq channel of the Colville River (ConocoPhillips 2012), a permit that had previously been denied by the USACE due to concerns about impacts on aquatic resources. Greater Mooses Tooth 1 and 2 have not yet been developed and are now located on Kuukpik Corporation and Arctic Slope Regional Corporation land selections in northeast NPRA (USDOI, BLM 2012). A recent lawsuit filed by seven Nuiqsut residents against the USACE challenges the USACE's decision to issue a permit for the CD-5 project, citing potential impacts on subsistence hunting and fishing activities (Loy 2013). Today, CPAI, operator of the production facilities at Alpine, owns a 78 percent share in the Alpine and Alpine Satellites fields; Anadarko owns a 22 percent share (ConocoPhillips 2012).

3.2.3 Tarn

The Tarn field is located in the southwestern corner of the Greater Kuparuk area (Map 1). ARCO Alaska, Inc. discovered the Tarn prospect in 1991 (AOGCC 2011c). Effective July 1998, the DO&G approved the sixth expansion of the Kuparuk River Unit and Formation of the Tarn Participating Area. Because the USACE issued a FONSI in their EA for the project, no federal EIS was required for the Tarn project. Agencies beside USACE that were directly involved in permitting and providing subsistence related mitigation for Tarn included the NSB and various state agencies including the ADNR's Lease Operations Approval (LO/NS 97-10) and ADGC's consistency review for the ACMP. Tarn began producing oil in August 1998. CPAI operates Tarn and has a 55.4 percent share in the field; BP, Chevron, and ExxonMobil are co-venturers (ConocoPhillips 2012).

3.2.4 Meltwater

The Meltwater field is a southern satellite of the Kuparuk unit located 25 miles southwest of the Kuparuk production facilities and west of Prudhoe Bay (Map 1). Discovered in 2000, Meltwater was initially put into production by Phillips Alaska Inc. (today CPAI), and BP Exploration Inc. Because the USACE issued a FONSI in their EA for the project, no federal EIS was required for the Meltwater project. In August of 2000, Phillips, Alaska Inc. prepared and submitted its plan of operations to the DO&G. The DO&G granted authorization in January, 2001 (LO/NS P00-09 Lease Operations Approval) to conduct activities on state lands as proposed in the plan of operations. USACE also approved permit applications in January, 2001 for the placement of 772,650 cubic yards of fill material into 103 acres of wetlands, as well as a 10.1 mile gravel road, a new drill pad, a 25 acre mine site, and the construction of new above ground power and pipelines. Other agencies that were directly involved in permitting and providing subsistence related mitigation for Meltwater included the NSB and various state agencies including the ADGC's consistency review for the ACMP.

In order to comply with special conditions within the USACE permitting document, CPAI developed and submitted a Caribou Mitigation Plan for the Meltwater Development Project on April 25, 2001. The expressed goal of this plan was to minimize disturbances of caribou with a focus on maternal females, including displacement from preferred habitats, and movement impediments during calving and insect seasons, as well as during seasonal migrations. The USACE approved the Caribou Mitigation Plan on April 27, 2001, and considered the plan to be in compliance with stipulations set forth in the original permit. CPAI constructed the site over the 2000-2001 winter season, and regular production began in November of 2001 (AOGCC 2011d).

3.2.5 Northstar

The Northstar Unit is a five acre man-made island located in the Beaufort Sea approximately six miles offshore and 12 miles northwest of Prudhoe Bay (Map 1). The Northstar Oil Pool was initially discovered by Shell Western E&P Inc. in 1984 (AOGCC 2011e). BP Exploration Inc. originally proposed the creation of the self-contained offshore development/production facility, expanding on the remains of Seal Island, which Shell Oil Company had built during exploratory activities in the 1980s. The Northstar Project as proposed by BP required joint federal and state management because the Northstar unit production facilities and pipeline were located on submerged state lands while the development wells were drilled into the federal OCS which required MMS' approval of an OCS Development and Production Plan (USDOI, MMS 1999a)

The USACE, which acted as the lead federal agency for the project, held public scoping meetings in 1996 and issued a Final EIS in February of 1999 in accordance with NEPA. In May of 1999, the USACE issued a permit authorizing work associated with the Northstar Project that included special conditions for endangered species, the creation of bear interaction plans, vessel traffic restrictions during bowhead whale migrations, and further mitigation to lessen the impact

on subsistence resources. Other agencies that were directly involved in permitting and providing subsistence related mitigation for Northstar included the MMS, NMFS, NSB, and various state agencies including the ADNR's Lease Operations Approval (the study team was unable to obtain a copy of this document) and ADGC's consistency review for the ACMP.

On November 1, 2001, the first oil was produced from the Northstar Unit, making it the first OCS development project since federal offshore leasing began off of Alaska in 1976 (Nelson 2001). Oil is processed on the island and transported by an undersea pipeline from Northstar to the Trans-Alaska Pipeline (BP Exploration [Alaska] Inc. 2007). Northstar does not have a permanent road and transportation to the site depends on the season and weather conditions with access by ice road in the winter and helicopter or hovercraft during the open water seasons.

3.2.6 Oooguruk

Oooguruk is a 10.85 acre artificial offshore gravel island in the Beaufort Sea located approximately 2.5 miles offshore in approximately five feet of water northeast of the Colville River Delta (PNRC 2012; AOGCC 2011f). ARCO Alaska discovered the Oooguruk Oil Pool in 1992 (AOGCC 2011f). Texas-based company PNRC owns a 70 percent share of Oooguruk, and Italian-based Eni Petroleum owns the remaining 30 percent (Lidji 2008). PNRC's Oooguruk offshore development is the result of a State of Alaska, Beaufort Sea Areawide lease sale. The USACE, which acted as the lead federal agency for the Oooguruk Project, issued a FONSI in their EA; thus no federal EIS was required for the project. The USACE issued their permit for the Oooguruk Project in 2006 under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344). Other agencies that were directly involved in permitting and providing subsistence related mitigation for Oooguruk included the NSB and various state agencies including the ADNR's Lease Operations Approval (LO/NS 05-009) and ADGC's consistency review for the ACMP.

Oooguruk began producing oil in 2008 and was the first independent (i.e., production only) oil producer on the North Slope. Oil produced at the Oooguruk facility is piped to the mainland where CPAI processes the oil at its Kuparuk facilities (Lidji 2008). The unit is expected to produce as much as 90 million barrels of oil.

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CHAPTER 4: OVERVIEW OF MITIGATION PROCESS

Prior to initiating their review and analysis of the effectiveness of specific mitigation types and measures associated with each type, the study team conducted a general overview and assessment of the ways in which the relevant state, federal, and local government agencies, in addition to industry, develop and implement mitigation measures, monitor mitigation, and measure the effectiveness of mitigation. The information presented in this section is primarily from the agency field visits and discussions that occurred as part of this study.

4.1 Developing Mitigation Measures

Mitigation measures are developed by agencies in a number of ways, with each agency having slightly different processes and methods for developing mitigation measures. While each agency follows a slightly different process, several common characteristics include the use of public involvement through scoping meetings and written comment periods, scientific research, and best professional judgment. Several key informants from agencies described their agency's process for incorporating public input into the mitigation process as follows:

> *A lot of the above [mentioned sources inform mitigation]. By the time we get to our ROD we take all the input and 75 to 80 [percent] is from agencies and sometimes from [the] general public or Sierra Club. I have been taking that larger list and [assessing] what works and what doesn't and what is enforceable, and we [develop] this list, and at the end of the ROD, we will probably carry [the stipulations forward] onto our permit also.* (USACE Key Informant July 2012)

> *A number of public processes [are involved]. We have a request for information from the public and comments.… We also go out with scoping and here is what the public and communities tell us to look at. And we go out with the EIS and summarize the scoping report, and here is an evaluation, and here is something we looked at before and [determined it is] not useful or not legal, and here is something new we can carry forward in deferral mitigation measures. The NEPA document goes out, and we receive comments on the draft and we respond to comments. We also issue a Final EIS and people can comment. [At the] same time we put out the final notice or proposed notice of sale and final EIS and this is the document that says, 'Right now we are thinking of this mitigation and terms and conditions.' We get comments from the public, and also under Section 19 of the OCS Lands Act the governor can respond to what we propose, and we have to adopt conditions stated by governor or get back and state why we are not adopting [the conditions]…. The public has all of those processes.* (BOEM Key Informant October 2012)

> *Mitigation measures are established in best interest plans [and] informed by a wealth of sources. We send out notices asking entities to provide information*

> *[and conduct] literary reviews and interviews. 38.05.035 Section G identifies various subjects that must be considered in best interest plans. Using all of that research plus [the] call for information - that is what is contained in best interest findings. Then mitigation measures are developed towards the end.* (DO&G Key Informant August 2012)

Often the public involvement with Nuiqsut residents includes holding meetings with the local Kuukpik Corporation, Native Village of Nuiqsut, and City of Nuiqsut. One NSB representative explained their process for involving the community of Nuiqsut in the mitigation process saying,

> *[Public consultation] is meeting with the village and that includes the Native Village, the City, and the local corporation. That includes the community as a whole. That also depends on the location of the project. It also depends on the size of the project. [For] a development [there] would be a public hearing. If it's on an existing pad—they want to place a pole, if they want to place another – those can be done with administrative approval [without requiring public involvement]*. (NSB Key Informant August 2012)

The NSB has a process in which local involvement is incorporated into their planning documents which in turn inform their municipal ordinances. The NSB comprehensive plan, for example, relies on public participation including public meetings and workshops with residents from each community. The comprehensive plan is adopted by the NSB assembly by ordinance (most recently in 2005) and many of the mitigation measures stipulated in the comprehensive plan become policies within the code of ordinances. Ordinances are also often the foundation for mitigation measures because they prohibit industry from certain actions that may be harmful to subsistence activities. In order to comply with these ordinances and prevent or lessen impacts, the developers and the NSB must develop specific mitigation measures. These measures are incorporated into individual permits. The NSB recognizes that Iñupiaq traditional knowledge is a valuable component when developing mitigation measures. The NSB's most recent comprehensive plan includes a section on traditional and contemporary local knowledge and states:

> *Traditional and contemporary local knowledge means knowledge imparted by elders, hunters, gatherers, whaling captains, and others amongst the Iñupiat people about the culture and history of the Iñupiat people and the natural environment including, but not limited to, knowledge of subsistence habits, uses, and traditions, wildlife, flora, fauna, land, sea, water, air and ecosystem conservation. Residents have detailed knowledge of local conditions, including routine and historic events, which can affect the location and design of facilities and utilities.* (URS Corporation 2005)

The document goes on to outline a number of ways in which traditional knowledge should be incorporated into the planning and permitting process.

Public processes are often the only way for Nuiqsut residents to provide proposals for mitigation. Several residents indicated that this forum of public involvement is the primary way that community members can use their traditional knowledge to inform agency and developer decision-making processes. One Nuiqsut resident indicated to the study team that those individuals who have had an opportunity to work in the oil and gas industry on the North Slope can often provide the best suggestions, because they have first-hand knowledge of developer activities in addition to traditional knowledge that has been passed down through the generations. This resident explained,

> *Traditional knowledge has always been around, and it is something industry is learning. First-hand experience fits right in. Most people living here it is first-hand experience and for those who work in the fields that applies to that. That falls in line for those that work out there and see hands on and hopefully learn the differences between companies, and contracts, and projects. And I think that it is all one basket, and those who do go to work and come back and bring back knowledge and share what they learned, and they can better make comments.* (Nuiqsut Key Informant November 2012)

In addition to input from public involvement, agencies also rely on experiences from past projects and from ongoing scientific research to refine and improve their mitigation measures. Several agencies specifically discussed the role of ongoing scientific research to inform and revise mitigation measures as follows:

> *It's a combination of all of those [mentioned sources]. Ongoing research that may be going on in the project area whether it be wildlife related, fish related. We look at a variety of things and a variety of situations or occurrences that we've worked through in the past, too, that are applicable to the new location.* (ADF&G Key Informant October 2012)

> *It is definitely both [stakeholder input and research that inform mitigation measures]. Other times with ice roads and on ice vibrators we have conditions for monitoring that are time sensitive and have to do with the onset of pupping and it used to be March 30th and now that date is moved back to March 15th [due to changes in the timing of seal pupping]. Research does inform us as well.* (NMFS Key Informant July 2012)

> *There's a lot of work prior to these documents [being] drafted and I stated earlier, we've had a real close relationship with Wildlife Department and the Mayor's Office. The assistant Borough attorney attached to land management and certain biologists in wildlife, we know the whole area covers the caribou*

> *herds, and as I said one of the fish biologists could be involved, because in no way are we experts in wildlife. We're permitters, you know.* (NSB Key Informant August 2012)

Some agency respondents explained that not all mitigation measures are set in stone and that their agency tries to be adaptive to each project and use their best professional judgment when applying mitigation measures to a project. One USFWS key informant explained their agency's approach to applying their best professional judgment when developing mitigation measures for eiders. He said,

> *Excellent question. They [mitigation measures] come from best professional judgment of the people that work for me. We discuss mechanisms or how impacts may occur and try to develop those reasonable and prudent measures, and they certainly do evolve over time. They vary from project to project and [depend on] how great a risk of impact [there is]. For example, most eiders migrate offshore, so we would view in a general sense the collision risk which is one mechanism of impact, and we view collision risk to be greater for offshore development like Northstar than something 10 miles inland. We are much more likely to have reasonable and prudent measures for offshore and coastal [developments] than for inland developments. Also [helps] other birds that may collide and are not protected by ESA. And [other USFWS representative's] shop has prerogative to put that in for other species that are not endangered [through] the Fish and Wildlife Coordination Act.* (USFWS Key Informant July 2012)

Other agencies have standardized lists of mitigation measures, such as the "reasonable and prudent measures" mentioned above, which the agencies draw on when permitting a development. These measures may evolve or change over time. A NMFS respondent observed,

> *As far as mitigation goes, we have a more or less standardized set of mitigation measures that we apply to most activities that we address up north. They are not codified or written in stone. They are known to us who have adopted them and those have evolved over the last two decades. They are pretty much SOP [standard operating procedures]. [It is] unusual not to see these [in a permit or authorization]. A lot of times they are included in an applicant's plans [already]. We may echo them or not list them because [they are] already part of the plan.* (NMFS Key Informant July 2012)

Developers also may provide input into the process of developing mitigation measures, often before agencies have seen a project design. Many of these mitigation measures are built into the project design, while others may be standard measures included by the developer in all of their projects. CPAI noted the existence of these "standard" mitigation measures "that CPAI commonly implements on development projects, many of them self-imposed" and indicated that

these measures are developed "throughout the project development with stakeholders" (CPAI Written Response October 2013). A BP key informant described the early stages of developing mitigation measures for incorporation into their project plan:

> *I would say [we begin developing mitigation measures] at the very beginning, when we're talking about projects within the company. Within the company there's engineers talking to biologists. We've already got our eye on the types of mitigation we think are practical. First, it would be internal verbal discussions [that] might be documented by the meeting minutes. Most often it would become formal or informal discussion with agency representatives, or informal checking in with Nuiqsut residents or representatives.* (BP Key Informant March 2013)

Developers may also propose mitigation measures for inclusion in permits or authorizations. The BP key informant noted that his company prefers to be engaged on a regular basis with agencies in order to avoid "surprises" later in the permitting process. He observed,

> *We have a whole department of environmental people and we have collectively 100 years of experience, and we all have ideas about what works best. We consult with agencies on a regular basis, as concerns come up. Occasionally we're still surprised. That certainly may happen, because the agencies also have collective experience and the communities do. Nobody should be too surprised when somebody comes into the project design …we're talking to everybody ahead of time, removed by one or two steps. We'd rather not have surprises. Sometimes it works against us – if you're sitting in a chair as a regulator or you're in the village and someone is going to develop in your backyard, you're not going to feel like you have done your job if you say "yeah, looks like you've done a good job"; you're going to want to make some recommendations [for how it could be improved]*. (BP Key Informant March 2013)

CPAI also noted that, despite early consultation with agencies and communities, new mitigation suggestions often arise later in the permitting process, which often results in the need for increased consultation and collaboration:

> *Even though we have ongoing discussions with communities and regulatory agnecies throughout the permitting process, there are often additional mitigation measures suggested at the draft permit stage. Often times these measures are not feasible or practicable to implement or not appropriately designed to mitigate the concern and we spend time with the agency trying to come to agreement on the mitigation measure that is not only appropriate for the action but of value to the project and community. This can often be a difficult process to resolve in a timely manner.* (CPAI Written Response October 2013).

An industry key informant noted that developers try to anticipate potential concerns or questions related to a proposed project so that they are prepared to address these concerns as early as pre-application meetings with the NSB:

> *Any [NSB] planning commission member can request an elevation of any permit that comes through the door. You want to make sure you have your ducks lined up before you walk in the door…. At that time, during that pre-application meeting, that's when, if you were smart, you would flag anything that you think's going to come up and say, "Here's what we're going to do to address this concern" – if you're smart, you've already met with the community and identified their concerns.* (Industry Key Informant February 2013)

The BP individual noted that they also look at other development projects for ideas on "what we should do, but also for what we don't think we should have to do" (BP Key Informant March 2013). The BP key informant stressed the importance of engaging with local residents when developing mitigation measures and explained,

> *I think the biggest thing with any small community is getting out and talking to people so they understand what you're going to do and [you understand] what their concerns are. We could sit in our office and say, "Six feet is enough for caribou passage," and it wouldn't occur to us "What about guys on their snowmachines [the hunters]?" So I think talking to the communities is the most effective method for addressing subsistence concerns [through mitigation].* (BP Key Informant March 2013)

CPAI also noted the importance of consulting with stakeholders to develop measures that are not only economically feasible but useful to the community. Regarding how they develop mitigation measures, CPAI wrote,

> *We prefer to work through proposed mitigation measures during project design and permitting with the agencies and other stakeholders to ensure that the measures can be incorporated to the project design in a sustainable and economic way; it is important that any measures agreed to with stakeholders are practicable, economic, and address the concern at hand and allow the project to move forward.* (CPAI Written Response October 2013)

Another industry key informant noted that oil companies often weigh both the cost and usefulness of mitigation during the initial stages of developing mitigation measures. He observed,

> *The truth is that [development companies] obviously [want] to minimize the expense of whatever the mitigation measure is. They're looking after dollars; that's what everyone does. The politically correct answer is to come up with a*

measure that is doable and is something that will truly offer something to the community, other than generate dollars for consultants. And to give something to the community so that they feel like you're responding to their needs. (Industry Key Informant February 2013)

4.2 Implementing Mitigation Measures

In addition to asking key informants how mitigation measures are developed, the study team sought to learn how agencies specifically carry forward the information they receive and in turn implement mitigation measures on a permit or lease. One important point that agencies frequently stressed was that they can only include mitigation measures on their permits or leases that address resources under their regulatory authority. Thus, suggestions from Nuiqsut residents do not always fall within an agency's regulatory framework. Three agency respondents discussed their regulatory boundaries in the following manner:

> *We include those that make sense and what we have authority to include. Some are like, 'add more garbage cans,' but we can't do that [because it is not under our jurisdiction]. The Borough could do that. We get comments from everybody on just about everything. We have to boil down to what can we legally put on a permit. I have seen five conditions go out and 45 conditions go out. It is case-by-case and every project is unique.* (USACE Key Informant July 2012)

> *[Mitigation measures are based] primarily on internal discussions and the need to satisfy our statutory authority. It would be consultations with other agencies, state and or federal, depending on what the situations are.* (ADF&G Key Informant October 2012)

> *There are other things we do in lease packages, and when we put out a Notice of Sale we also provide in there information to lessees. And this is information about other requirements such as ESA and [other regulations] and other Corps regulations that could affect something they have to do, but they are not under our purview. We let the company know you can have these requirements [but they are not BOEM stipulations], local zoning for example.* (BOEM Key Informant October 2012)

According to agency key informants, most agencies rarely implement informal mitigation measures (e.g., measures developed outside a permit or lease) because of the strict regulatory framework in which they operate. For example, one BOEM individual said that informal measures are not helpful because they are not enforceable and would leave too much room for interpretation. He said,

> *We aren't prohibited from looking at something [to develop a new measure], but they can't be informal. We would have to look at the process and do a*

> *conditional permit, and we can't send someone out there and say use your best judgment. It is not predictable for the company and not enforceable.* (BOEM Key Informant October 2012)

In contrast, several agencies and Nuiqsut residents expressed that "informal" measures developed through consultation between stakeholders and industry that are subsequently formalized and implemented by developers are often useful and effective. Often these informal measures are developed through coordination between the developer and the agency or potentially affected community and go beyond what is required by the agencies. Several agencies noted that if a measure is already in a developer's plan of operations, then they do not include the measure as a stipulation in their permit. Three agency individuals provided the following responses regarding industry use of informal mitigation measures:

> *There are a lot of BMPs [Best Management Practices] that we don't carry as special conditions, if we can see in the plan by the applicant that they are incorporating the best management practice…. We see that in the plan [of operations], and we don't put it into the stipulations. We could possible carry [the stipulation] if we don't see it [in the plan]*. (USACE Key Informant July 2012)

> *Often if we have discussions with an operator we may say 'It might be a good idea to do this,' and they'll say 'Yeah, we can do that.' And they'll put that in their revised Plan of Operations, and we issue approval based on that. So we don't have a stipulation because it's in their plan, and they say we'll go through these steps, and we don't have to put it in our stipulations*. (ADF&G Key Informant October 2012)

> *No, not really [have informal mitigation measures]. There are mitigation measures that industry has adopted that didn't come from us and came from Natives and those might be [measures like] putting observers on a crew boat.* (ADF&G Key Informant October 2012)

> *I assume there are a lot [of measures] that the companies go through with the communities. I know that the companies meet routinely [in the communities] to discuss issues. I heard that they have made changes as a result.* (DO&G Key Informant August 2012)

One Nuiqsut resident stated that informal measures from the industry are helpful and effective because they show that the company is engaged with the community and willing to learn from what did not work rather than sticking solely to permit stipulations. He explained,

> *Yeah. It still happens too. I think that [an informal measure] is just as effective as something written down and especially for operators, and I have noticed they*

> *have actually asked that and bring that up at the meetings. What could we do better and what are we not doing?* (Nuiqsut Key Informant November 2012)

In general, industry is responsible for implementing a large number of mitigation measures from various agencies and entities addressing multiple resources. These mitigation measures are intended to address a wide range of concerns. The involvement of multiple entities and agencies in developing mitigation measures and issuing permits sometimes results in conflicting or confusing stipulations, according to the BP key informant. The sheer quantity of mitigation measures, some of which are redundant or conflicting, also makes it difficult to track and implement certain measures:

> *The CAA is a nightmare; it is so convoluted. On page 3 it says we have to do something and on page 7 it says that it's something we can't do…. [A single database for tracking mitigation measures] would make sense to the extent that the original requirement made sense! Some of these requirements that don't make any sense – it should be documented that they were abandoned. I think we're already doing that within the company. I think there's over 10,000 entries in our database.* (BP Key Informant Interview March 2013)

In addition to those measures required in permits and leases, industry has developed and implemented mitigation measures either through their own plans of operations or informally through coordination with local communities. Examples include design changes incorporated into plans of operation meant to avoid key subsistence use areas (see ARCO Alaska, Inc. 1996), and the development of processes and procedures jointly with Nuiqsut to address impacts to subsistence activities as they arise (CPAI 2012). In recent years, CPAI worked with the community of Nuiqsut to develop a communications plan related to air traffic after increasing complaints from local residents about air traffic during the summer caribou hunting season. This plan was later formalized as part of CPAI's 2012-2013 Subsistence Plan (CPAI 2012). In CPAI's response to the study team, the company noted the development of this communication protocol as an example of informal mitigation measures:

> *To address concerns and impacts related to helicopter activity, CPAI has implemented a communication protocol with Nuiqsut. This protocol continues to be refined to implement effective communication methods so that helicopters avoid interference with subsistence hunters. This protocol is effective with respect to CPAI operations; however, due to the number of other operators in the area utilizing helicopters the effectiveness is impacted by other operators not following similar communication measures.* (CPAI Response Letter October 2013)

The BP key informant noted that any agreement with an organization is usually "formalized" in some way through documentation of the agreement or discussion. As one industry key informant observed,

> *[Industry] pretty much keeps things formal. There's little informal [mitigation]. If it's informal, it's going to be something that's real minor. You want a paper trail [documenting all mitigation measures], unless it's something like 'I'll bring you a copy of this report'…. Sometimes, [a mitigation measure] might be [developed] through your discussions with KSOP; you'll document it in the minutes. 'You had a concern about* qaaktaqs*? We'll provide you with the results of the study.' Sometimes it's not formal, but it's written down somewhere – 'This is what we talked about, this is what we agreed to, and this is what we said we would do.' [Binding measures are in] permits, leases, surface land use agreements, and agreements with entities like KSOP.* (Industry Key Informant Interview February 2013)

As indicated by the key informants, these less formal measures sometimes go above and beyond the minimum requirements and are considered to be an example of successful adaptive management practices. Industry input into the mitigation process has improved the development of measures over time and in some cases has resulted in agencies adopting industry initiated measures as standard stipulations.

4.3 Responsiveness to Community Concerns

Another topic addressed during key informant discussions was industry's responsiveness to community concerns, specifically whether community concerns were being addressed through implemented mitigation measures. On the topic of industry responsiveness to Nuiqsut resident concerns, the thoughts expressed by the various agencies were mixed, although several expressed the view that industry was more responsive to local concerns than they were in the past. Regarding the mixed performance of industry in addressing community concerns, several agency individuals provided the following comments:

> *Depends on the company. Some [companies] are really investing and some are new and [there are] some as big as CPAI that haven't signed the CAA, whereas Shell has signed [the CAA] even if they're not doing anything.* (NMFS Key Informant July 2012)

> *We don't see a project on the North Slope that doesn't have pipelines seven feet in height and roads and pipelines that are less than 500 feet apart. It's a standard now, and it's taken 30 years. Anymore it's not even really the seven foot height; if you want to talk about responsiveness to communities, that [seven foot height] came about due to concerns from the villages. There's really no evidence that a seven foot height is better than a five foot height for caribou crossing, but if you*

get wind blowing snow, and the land goes up and down a lot [then five feet may not be enough]. The villages really did think the seven foot height was necessary. That has come about because of their voice. The other thing is the non-shiny pipe. That's definitely something that has come about as a concern from subsistence. Industry has definitely stepped up and said 'Yeah.' Those are some of the things that we [agencies] don't even have to ask for. For the most part, overhead powerlines are getting that way too. (USFWS Key Informant July 2012)

More so [responsive] in recent years. There was pushback like 20 years ago. We more or less forced them and now industry has embraced it by saying look how green we are and a lot of times they will come in with a dozen or so BMPs and with other permits and a lot of those are talking to communities, and they go above and beyond anything we would require and a lot of it has to do with funding and oil industry pays for it and it is a form of mitigation. (USACE Key Informant July 2012)

Among Nuiqsut residents, one theme that became apparent to the study team focused on the industry response to social concerns. Several Nuiqsut residents acknowledged that over time industry and agencies have become more effective at addressing environmental concerns including concerns for subsistence resources. However, they went on to express the belief that Nuiqsut concerns regarding social impacts were not being adequately addressed. Three individuals provided the following comments regarding industry responsiveness to social concerns:

Probably the social aspects [are not being addressed] and locally for people. Industry and agencies do such a good job addressing impacts to wildlife and ecology and caribou and fish and all that, and they have concentrated a lot of effort to land and water, but what about the people? In part a lot of that was spurred on by us. To insure industry and state and decision makers to do the studies and do the work and mitigate the impacts and make sure it is minimal. I think some are coming to realize that – 'What about us?' When we can speak and do all we want for caribou and fish and hunt up here of course they [animals] cannot speak for themselves, and we do it [for animals]. And we do a good job and are still trying and we keep thinking 'What about ourselves?' Somebody expressed that to DNR last month, finally at one of the meetings. They come up and they talk about current issues and impacts and projects and plans and history of projects and the environment and wildlife, and I think it finally clicked – 'Yeah, keep it up, but what about us? We are impacted too.' (Nuiqsut Key Informant November 2012)

Social impacts. Yep, they can study all the animals and all the lakes and all the fish and how about study the people that are impacted? They are finally starting the health [impact] assessment. That is something that is ignored, and we don't have programs and it costs too much. I have expressed that over and over again. Health and social impacts. It is the North Slope Borough doing health impact assessments. (Nuiqsut Key Informant November 2012)

One of the peak issues that we've been asking [developers and agencies] about was a sociocultural impact study. We acknowledge that the current operator is working with us to move forward to do an actual documentation of the sociocultural impact study. We finally got them to agree to fund the study. (Nuiqsut Key Informant December 2012)

Other Nuiqsut individuals expressed dissatisfaction over certain environmental issues that they believe are still not being addressed and are a continued source of concern for local residents. These concerns included pipeline glare and health of residents and resources related to air quality measures (see Table 6).

During the key informant discussions, several Nuiqsut individuals also commented on the responsiveness of agencies to local community concerns during the permitting process. Several individuals expressed the belief that some agencies were more responsive than others and their responsiveness varied even across projects. As noted above, the responsiveness of certain agencies to community concerns may be limited by their regulatory authority. This appears to be a source of misunderstanding for local residents related to the responsiveness of agencies to their concerns. Several Nuiqsut respondents discussed their engagement in the permitting process as follows:

We're very much involved on the federal level – we comment and make recommendations during the permitting process to identify issues and [we follow] protocols that are required by the permitting process under their policies. We do [comment on EISs]. We're working with DOI [BLM] right now on their [NPR-A IAP] ROD. We do [have direct communication] with the federal agencies to make sure that the stipulations are in place, and we work [with them]. (Nuiqsut Key Informant December 2012)

[The responsiveness to community concerns] depends on what projects are going up. Pioneer got their [permits] easy. But as far as NPRA and taking away our 29 stipulations we put to BLM…. The [required] setbacks were off the river at three miles and those were our stipulations and now they say 'No, we won't do that'. Only 500 feet from watermark [was the final stipulation]. Those were in the BLM meeting. Right when Alpine was just about developed. We had [requested] 29 stipulations, and they stripped all of them, BLM did. It all depends on what and

where they are developing, even with exploration. You either go with this alternative, [or] you don't have any say so. Unless you stop them with the bridge. Conoco had to move that because [it was] in the heart of Arctic cisco [habitat] in that [area]. Kuukpik played a big role in that. They knew it was the area where we always set our nets. (Nuiqsut Key Informant November 2012)

One individual expressed that agency responsiveness has continued to improve, particularly since the development of Alpine and the community's efforts to be more involved in the process. However, another individual stated that agency responsiveness and communication was still lacking, particularly when it came to interacting with the local Native Village of Nuiqsut, saying,

I started [working with the Native Village] since January, and we haven't had very many agencies contact us even though they are required to. I think the way NSB, State of Alaska, it is how they run the system, the government, and the offices, and the departments. [Communication] - that is a problem we are having with agencies. Right now we get out letters saying you need to consult with the tribe and [instead] they go to the corporation and they [corporation] are for development and they leave us out and there isn't good communication. I have been voicing and new council members and the president [are voicing their concern]. Not very good [communication]. (Nuiqsut Key Informant November 2012)

When asked whether they believed their company was responsive to community concerns, the BP key informant provided several examples of how BP has responded to local residents' concerns related to the Northstar development project:

Absolutely - it's something I've been really impressed by with BP. The bowhead work at Northstar would be an example [of responsiveness]. We did a multi-year study that is ongoing that involved frequent conversations working with local residents. It involved changing the color of some of the modules because some of the Natives did not like the color of the modules. I told some guys they couldn't take a module up there unless they changed the color. It's always a big topic at the open water meetings. The first four years [of Northstar] were very controversial. When we talked to locals they were concerned that the noise would deflect the whales, but when we talked to the whale scientists, their reaction was "No way, that's not gonna happen," but then when we said "How much noise is it going to make?" no one knew, because no one had made an island like this. No one could definitely say how much noise a bowhead whale would respond to. We did show a subtle deflection of the migration. The whales are in the southernmost corridor when they migrated past. We spent years showing residents the marine mammal data and explaining how to interpret the data. There certainly were people from Nuiqsut engaged in that story. (BP Key Informant March 2013)

CPAI provided the following examples of how they believed they had been responsive to community feedback in the past, indicating that these actions were in direct response to community requests:

> *1). Supplying natural gas to the community of Nuiqsut…*
> *2). Prohibiting CPAI and contract personnel from sport hunting and fishing the Western North Slope operations area i.e. (Alpine and satellites) to minimize impacts to subsistence resources.*
> *3). Posting signs in Inupiat at Alpine facilities to make residents aware of safety considerations that are protective of their safety, if English is not their first language.*
> *4). Adjusting plans for helicopter activity to avoid hunters and caribou herds.*
> *5). Changing the location of the CD5 bridge over the Nigliq Channel in response to concerns expressed by the community of Nuiqsut and the NSB.*
> *6). Implementing a number of long term workforce development programs including high school Career Quest program, internships, scholarships to address the community feedback over jobs and training.*
> *7). Providing Nuiqsut residents with access to ice roads and gravel roads as long as they comply with the field safety requirements. Access to facilities and airstrips is limited to ensure safety.* (CPAI Written Response October 2013)

Another industry key informant expressed the view that federal agencies have generally been more responsive to Nuiqsut subsistence concerns than the state, saying,

> *The feds are a lot more sensitive to the local concerns and local issues than the state is. The state, because of the location of the state lands, doesn't have to deal with a lot of the local issues, because the state land is Canning to Colville [rivers]. Nuiqsut's on the very border of that.* (Industry Key Informant February 2013)

4.4 Monitoring Mitigation

While the first component of the study team's mitigation analysis was related to how agencies and industry develop and implement mitigation measures, the second component focused on how agencies monitor industry implementation of mitigation. The study team found that information about agencies' processes for developing and implementing mitigation measures is more readily available than information about their monitoring methods and practices; therefore, less information regarding monitoring was found during background research for this project. During field visits and discussions with agencies, the study team learned that agencies have varying forms of monitoring and inspections, with some agencies also requiring industry self-reporting as a form of monitoring. The enforcement power also varies between agencies. Certain agencies have the power to prosecute and assign regulatory penalties, and others only have the ability to notify industry of their non-compliance and if necessary revoke the lease if

proper actions are not taken to rectify the non-compliance. Several agencies described their monitoring process as follows:

> *We do follow up with site inspections to determine if our permit stipulations have been complied with, if the culverts have been installed correctly, if they're using appropriate methods for water removal from fishbearing streams. [We monitor] as best we can. If it's fairly simple, it's a matter of talking with the field environmental folks or the onsite folks and it can be taken care of rapidly. They just do it. If it's more involved, then it may require additional engineering from the operator, and we go through a series of letters or revised plans for review and we go from there.* (ADF&G Key Informant October 2012)

> *Yes, during the exploration and right now during developing process we have [an] inspector full time, and after that we have periodic inspections and most of the time they are unannounced and [the inspectors] are not there full time, but they will land there and see this and this and this. And one requirement [is] they have to have training for all employees, and we need to see the training. And that includes subsistence, and we want to see that it is current. Whenever our inspectors go out they look for that and safety and operations concerns. They look for stipulations and term and conditions on permits. Those are inspected all the time. We don't have that many productions in place [in Alaska] but in the Gulf it is quarterly.* (BOEM Key Informant October 2012)

> *So we take the commission out to the nearest affected village. There's times we just about move to Nuiqsut. Planning has offices out there. We've had offices in Nuiqsut. We've had two inspectors out there. We're in the process of opening offices in Deadhorse, and we'll start rotating employees in and out [to inspect that stipulations are being complied with].* (NSB Key Informant August 2012)

The NSB respondent described the Borough's process of conducting regulatory audits of their ordinances to make sure mitigation measures are being implemented and to make changes to the ordinance as necessary. These audits are usually associated with large scale development projects and include a review of all the applicable stipulations that should be in place for a specific project. As part of the monitoring process, the NSB has created a mitigation advisory committee which advises the NSB mayor on the use of mitigation funds. This informant described the process as follows:

> *We did two or three audits with our ordinances. The ordinance is the final approval to move forward with a development plan, and that [the CAA ordinance] is in the law and they need to follow it…. But we do review for the large scale development. We're probably going to be mounting another audit of these things. We're starting one for Oooguruk. They have study programs and*

mitigation agreements to look at what will have an impact on subsistence harvesting and habitats…. We can do all of that [monitoring], going to the minute details; more recently we've tried to gauge how recent the ordinance is, and work with the industry [to make sure everything is in place]. There are a lot of components in the ordinance authorizing the master plans in terms of how mitigation is going. The Borough created a panel through one of these agreements that would advise the mayor, that the mayor is the responsible party. The North Slope Borough mitigation advisory committee (developed through the CAA) goes directly to advise the mayor on the way to use these funds. (NSB Key Informant October 2012)

This individual went on to describe the ongoing process of developing and monitoring mitigation measures, through feedback from the mitigation advisory committee, reviewing policies, and funding research:

I have asked the corporations and village leadership how well the mitigation committee is working, how effective it is, how well they are deliberating, and how they are approaching it. NSB has their own mitigation committee and there is another one. I don't think we can delegate responsibility to other entities…. I've asked the mitigation committee of Nuiqsut to invite me, because I feel I have a responsibility to see how well these entities are working privately….We are still in the process of [asking] what are the big issues of impact if serious impacts have occurred? We've hired third party contractors to audit our policies as to how far off we are in our master plan. I think we need to do more of that. It should always require all of the reporting requirements, intervals, sit down as the studies mature and how we are going to be able to evaluate the studies. Evaluate studies at the end of their cycle. There will be a time where we sit down and say 'I think the studies are complete' and [determine] what mitigation measures are needed and where they are appropriate. (NSB Key Informant October 2012)

As mentioned above, each agency has its own process for monitoring mitigation measures. Certain agencies, such as ADF&G or ADEC, have legal authority to prosecute for infractions or non-compliance and other agencies (e.g., DO&G) have less enforcement power. One DO&G individual described this difference as well as the DO&G monitoring process saying,

We do have an inspection process but it is largely informal on behalf of the state. ADEC has police powers and they have a stringent inspections policy. They have stringent regulation where you have to report spills and [there are] penalties. The Department of Natural Resources does not have police powers. We don't have subpoenas and regulatory penalties. We do have an inspection program that is largely oriented around mitigation measures or additional project stipulations. Our inspectors go out to the North Slope three weeks out of every

> *month. And basically what we look for is, are their violations of mitigation measures, such as secondary containment are available under gas hoses? When they are proposing, for example, a 500ft setback from waterbody is determined with the plans. We don't go with a ruler [to check the setback]. We look at day to day operational measures. It is very different for agencies that have police powers, they have a checklist.* (DO&G Key Informant December 2009)

Several agencies also indicated that they require self-reporting from industry as part of their monitoring efforts. For example, the USACE indicated that they try to conduct monitoring and compliance field visits on a yearly basis but sometimes cannot inspect each project on a yearly basis. As such, the USACE requires developers to submit yearly monitoring reports:

> *We do [monitor] to some extent, but we actually require the applicant to do a lot of self-monitoring and self-reporting. We do compliance inspections. We try to get up every year but not always to each project every year, sometimes every other [year]. If obviously not in compliance, we have someone that pulls out what is due this year and this month and we need to check on this and that.* (USACE Key Informant July 2012)

A USFWS individual described a similar process of on the ground monitoring combined with industry self-reporting. This person said,

> *Yes [we do monitor]. The Deadhorse airstrip, when they expanded it, there are eiders nesting in the area, they put some cameras up in the area. FAA does like to put gravel down in the summer; we worked with them to monitor those nearby nests…. As far as monitoring, we do monitor. The company usually does the monitoring with any pads that have been picked up and rehabbed. We've been very successful; there are several hundred sites that have been rehabbed, from 25 years ago to last year. Conoco and BP looks at those [rehabilitated] sites every five years and send us a report, update reports on how things are going and if they've had to do anything else [to ensure compliance].* (USFWS Key Informant July 2012)

One agency employee discussed the difference in monitoring for compliance and monitoring for effectiveness. This individual said that agencies can more easily monitor for compliance but indicated that effectiveness should also be considered during the monitoring process. This individual said, "One is compliance and one is effectiveness. Compliance is easier to monitor and if they put collision devices on wire it is easy to see that. [It is] tougher to monitor to see if birds are still whacking the wires" (USFWS Key Informant July 2012). The BP key informant confirmed that agencies do contact development companies to ensure compliance with permit stipulations, saying, "Sure, there's compliance monitoring and enforcement. I'd say all the agencies [do], although I don't know if I can prove that. Agencies call and say, 'Hey, did you do

such and such?'" (BP Key Informant March 2013). CPAI noted in its response to the study team that "Permit stipulations may require follow-up reporting and agencies often inspect and audit our operations to ensure mitigation measures are being implemented" (CPAI Written Response October 2013). Another key informant noted that various agencies follow up to ensure that certain mitigation measures were implemented and to conduct monitoring. He observed,

> *The NSB, sometimes BLM, sometimes the Corps, whoever's taking the lead on a project [will monitor for implementation]. DEC [for] all your air permit stuff, Division of Oil and Gas…. Yes, they have field inspectors that come out. The borough particularly.* (Industry Key Informant February 2013)

The study team also asked local Nuiqsut residents to express their thoughts and knowledge of the process for monitoring mitigation. Two individuals discussed their community's role in making sure that the developers are complying with mitigation measures. They explained that community monitoring occurs through the subsistence advisors that the companies employ, in addition to working with the NSB to ensure compliance with NSB permit stipulations:

> *When Alpine started up we made ARCO put in the air quality monitoring station in the village. That was the start. We know. Season to season and project by project, we have a subsistence advisor that the companies are obligated to employ. The advisors are there and to monitor and to advise the company to follow procedures and follow rules. If there are any violations, the advisors will report [them].* (Nuiqsut Key Informant November 2012)

> *As far as I know, the conditions and stipulations that are amended under the Borough…. Kuukpik and the locals don't have the permitting authority; we work with our local home-rule government to make sure these mitigating measures are being implemented and are being complied by the operator. We work closely with the Borough and the industry operators, when it comes to [making sure] they are doing their actual studies, to make sure the environment is protected.* (Nuiqsut Key Informant December 2012)

Developers may also have their own system for monitoring their own compliance with permit stipulations. Both BP and CPAI noted that they track all permits under a lease (including permits issued to contractors or subcontractors):

> *Generally speaking, BP will police any permit stipulation that was occurring on our leases. As soon as there was a permit for an activity occurring under one of our leases, then we would have our eyes wide open.* (BP Key Informant March 2013)

> *The final responsibility for permit compliance for work conducted by or for CPAI falls with CPAI regardless of whether contractors are involved or not. If a*

> *specific stipulation is conducted by a contractor, the stipulation is managed by the Operations team at either Kuparuk or Alpine and tracked by the Environmental Coordinators or other responsible parties within Operations at each field; if the stipulation consists of environmental monitoring studies, the work is managed by the Permits & Sciences Department's environmental scientists. During the contracting process, contractors' compliance programs are critically reviewed prior to awarding the work. We set out requirements for required training modules for our contractors and maintain the right to audit (ad do) the contractor to assure compliance with our contracts, which do include language specific to taking training on environmental awareness, permit compliance, cultural awareness, wildlife avoidance, etc.* (CPAI Written Response October 2013).

Another industry key informant made a similar statement indicating that while a development company may not be legally responsible for their contractors' permit stipulations, it is wise to ensure that all contractors are in compliance with any permits related to a given development project:

> *If there's an overarching permit, then yeah, they [the contractors] have to [comply with the stipulations]. If they're working for you, doing something associated with your future development, if you're smart, [you monitor it]…. In my book, you're always on the hook. Because you're the one that has to live there after the subcontractor goes.* (Industry Key Informant February 2013)

BP has its own compliance monitoring database, which undergoes internal audits regularly and ensures accountability within the company. The BP key informant described the system as follows:

> *If you mean compliance monitoring - did you do things you were supposed to? Yes. We were just in a compliance task management meeting. We have a complex database that every time we have a requirement that comes up, we would stick it into the database. First it identifies the complier and then it identifies the party [responsible] and my boss, and the date it needs to be done. And if I don't get it done, then I get a reminder, and my boss will get a notification…. The CTM [database] is a systematic method to make sure we're in compliance. It's auditable. They're not us [who run the system]; they're working on BP's behalf and they're working to make sure we don't screw up. I've never seen a person get a big fat bonus if they got a bunch of audits. It's a multi-part process with responsible parties, their bosses, and their boss's bosses.* (BP Key Informant March 2013)

CPAI also reported a detailed internal tracking system for permit stipulations, saying,

> *Mitigation measures or monitoring requirements set out in a permit from any agency are captured and tracked through an internal tracking program. A Standard Operating Procedure (SOP) is in place that describes how the stipulation contained within a permit (or a Record of Decision) is to be managed and assigns a Responsible Party to carry that forward. This is 'handed off' by the permit staff responsible for obtaining the permit to the company compliance representative responsible for implementation over the life of the permit.* (CPAI Written Response October 2013)

Another industry key informant indicated that the company they worked for did not have standard procedures for monitoring every mitigation measure:

> *That's probably an area that's a little grey, I would say, depending on what the [mitigation measure] was. There's no standard procedures that say 'Here are the 15 mitigation measures we've agreed to,' and 'Joe, you have to report back to the community [about those measures].'* (Industry Key Informant February 2013)

CPAI noted that they provide the community of Nuiqsut with the results of monitoring studies and also share monitoring reports with various agencies and local organizations. Monitoring reports are generally made available to those who request them:

> *Results of monitoring studies are shared annually with the Kuukpik Subsistence Oversight Panel (KSOP), the KSOP Board of Directors, and community residents. In some cases, the science is shared via a Science Fair in the village (of Nuiqsut) where children learn about science through 'hands on' techniques. CPAI attempts to visit with the community to talk about the scientific learnings of our program and to solicit input from the elders on their knowledge in the same disciplinary areas (e.g., hydrology, caribou, birds). All reports generalted from the Environmental Studies program are widely shared with representatives of State, Federal, and Local regulatory agencies as well as tribal governments, village corporations, ICAS, environmental NGOs and other academics reqesting the information. CPAI has set up an external sharepoint site where anyone can request permission for a userid to access the sharepoint site and download any report on monitoring activities sponsored by CPAI. In addition, reports can be found on file at the Alaska Resources Library and Information Services (ARLIS).*

4.5 Measures of Effectiveness

The study team began their initial assessment by asking agencies and industry if they had established measures of effectiveness that they use to evaluate and improve mitigation measures that they propose. The study team found that mitigation measures affecting the physical or biological environment had more defined approaches to assessing effectiveness than those

mitigation measures focusing on social impacts, including impacts on subsistence users and activities. Describing their respective agencies' approach to assessing the effectiveness of mitigation measures related to the biological environment, two individuals provided the following comments:

> *In some cases we have gone into a stream once the culverts have been installed and put fish nets upstream and downstream to see if they are moving past the structure. We use that process to get the operators to repair or fix culverts if they are a barrier to fish passage. In some cases it's installed incorrectly or there's a failure of the structure for some reason and sometimes they're not aware of it. So that's one of the points of our going in the field to make sure they're aware there may be a problem.* (ADF&G Key Informant October 2012)

> *When Northstar was built, the [waterfowl] migration in August generally took place roughly at the barrier islands and on the inside edge of ice, and the next few years the ice just sort of disappeared and the effect that ice had on funneling migration into narrow corridor evaporated. We did studies with ABR and one of the collision avoidance measures was strobe lights that flashed on western side and that would warn birds that a structure was posing a collision risk, and we used radar to evaluate bird trajectories or flight path and we turned the lights off and gathered data and turned [them] on and compared flight trajectories and got good data that was compelling, and the second year the ice disappeared and the birds no longer migrating [through the usual area]*. (USACE Key Informant July 2012)

An industry key informant also provided examples related to the physical and biological environment when discussing methods for measuring the effectiveness of mitigation measures, saying, "You are required to report any exceedence of your air quality [emissions], report spills in water, you've got to clean up [any spills], and so on and so forth" (Industry Key Informant February 2013). This individual noted that some measures are easier to assess than others, in terms of their effectiveness. He observed,

> *Some of the mitigation measures [are effective]; raising pipelines to seven feet, that addressed a big concern that people couldn't get under the pipelines on their snowmachines. Other ones are harder to pin down. We said we would do a study, and we did the study. So what are the results? Did that take care of the issue? No matter how carefully you construct a study, it's not always going to address or answer all your questions.* (Industry Key Informant February 2013)

Several agencies explained that they do not always assess the effectiveness of mitigation measures that are on their permit if the measures originated from another state or federal agency. For example, the USACE indicated that measures that are recommended from USFWS and

ADF&G and are later incorporated into USACE permits are often referred back to the respective agencies for monitoring and assessment:

> *We do [follow-up on mitigation], but we don't know how effective [they are]. We afford that to Fish and Wildlife Service or Fish and Game who requested it. I think what most conclusions are that is at certain times of year certain loud or big aircraft or lots of flights do make a difference….If [a mitigation measure is] on our permit, we are responsible for follow-up. But if another agency suggests [the measure] and they are experts on those, we would turn it over to them and say, does this meet what you were expecting? When they say yes we will go back to applicant and say they are in compliance.* (USACE Key Informant July 2012)

A DO&G informant echoed a similar response to that of the USACE when describing their own agency's assessment of effectiveness, saying,

> *No, [we] rely on other agencies who have invested interest in seeing measures being followed. The measures are preventative [and] generally overly restrictive. The agencies that do have enforcement agencies are not reporting problems with what has been established; [however], if there were a problem [reported], we could adjust [the mitigation measures] as necessary.* (DO&G Key Informant August 2012)

Several agency individuals discussed the difficulty in assessing the effectiveness of mitigation measures aimed at alleviating social concerns and impacts surrounding subsistence activities. BOEM, DO&G, and NSB, three of the agencies that often provide for mitigation measures related to social impacts and concerns, expressed that part of their measure of effectiveness is based on community feedback and whether or not they are still hearing concerns. In addition, the NSB indicated that subsistence monitoring studies are funded by industry and also provide an indicator of whether existing mitigation measures are working to reduce impacts on subsistence. These agency key informants explained,

> *In terms of monitoring effectiveness, it is an interesting discussion. Effectiveness is measured by non-occurrence of event as well as violation of measures. Do we have methodology of determining effectiveness? No. Do we have instances of violations to mitigation measures? Sure. Do we track them in any documented way? No. It might be captured in an inspection report. He might call up and remind them to follow up. We don't have definitive records of monitoring compliance or non-compliance or follow up on items we think needed clean up. As general rule, we have people going nearly every week, and follow up is good and consistent. If [it is] not cleaned up we have a meeting. [There are] no real comprehensive records in that regards.* (DO&G Key Informant December 2009)

> *We try to do that [measure effectiveness] in our analysis of our NEPA documents. Part of that is feedback from communities. If you look, our mitigation has changed over time and part of that is in response to the public. For subsistence, it is a lot harder to track and things like our social indicator program are things that we go back and look [at]. And subsistence is a lot of perception [of] what is there, and it is a lot harder to deal with [in terms of monitoring and assessment].* (BOEM Key Informant October 2012)

> *[We measure effectiveness by] talking to community and the operator. Nuiqsut operator has a responsibility to do a yearly monitoring of subsistence activities.* (NSB Key Informant August 2012)

Another NSB individual added that establishing measures of effectiveness is a goal of the Borough. However, he noted that establishing such measures requires long-term data sets to identify trends that can be used to help measure mitigation effectiveness:

> *There are certain aspects and issues that can be addressed through the [Borough's] Mitigation Advisory Committee. The committee includes one member of the village corporation, one member from the city, representatives from a couple other entities, and one North Slope Borough representative. We need to assess if we are at a stage where we can sit down and talk about the effectiveness of this, and [I think] we're moving towards it. We need to sit down with the industry and stakeholders and gauge how effective the project was and what should be the outcome. A lot of these projects you just don't have two years of study and decide there's no impact. You have to have a trend developed to determine what is the real impact. Creating trends takes a number of years of observation; scientists will tell you that.* (NSB Key Informant October 2012)

The BP key informant noted that studies are sometimes required to monitor the effectiveness of certain measures. However, he indicated that the effectiveness of certain measures is unclear and indicated that in these cases the developer simply implements them because they are required on a permit. This individual observed,

> *[For] some of the requirements, built into the requirement is a research stipulation to determine if [the mitigation measure] is working. A good example of that is our Northstar bowhead studies on deflection which we developed some methods that are applied to other projects by other developers. Pipeline caribou crossings – this started to become part of the cause of the pipeline degradation. We occasionally see them on top of the ramps but they're up there to escape the insects. I've never seen a time when the caribou funnel over these ramps. That's one that we still do that we just throw our hands up and say, "Well, they're making us do it."* (BP Key Informant March 2013)

CPAI also provided a similar response about the difficulties of measuring the effectiveness of individual mitigation measures.

CHAPTER 5: HISTORY AND ANALYSIS OF SPATIAL AND TEMPORAL MITIGATION MEASURES

Chapters 5 and 6 provide the results of the key informant field visits and discussions as well as the study team's literature review, which informs the history and analysis of mitigation measures for the seven development projects as they pertain to Nuiqsut subsistence activities. During its literature review, the study team identified 849 mitigation measures; 80 of which were directly related to subsistence activities and users. The study team selected 38 of these measures to carry forward in the analysis of mitigation (see Section 2.2). These chapters provide a history and overview of each of the 16 mitigation types represented in the final subset of 38 mitigation measures (Table 11), followed by an analysis and summary of agency and community responses related to the implementation, monitoring, and effectiveness of each of the 38 measures selected for analysis (see Table 12). For organizational purposes, the 16 mitigation types are discussed under one of two broader headings: spatial and temporal mitigation measures (Chapter 5) and social measures (Chapter 6).

In many cases, mitigation proposals and measures include spatial and/or temporal restrictions on oil and gas activities, wherein development activities must avoid certain activities at times and/or places that conflict with wildlife and subsistence uses. This is the case not only in Alaska, but in other oil-producing regions; in Norway, their Comprehensive Management Plan for the Barents Sea bans oil and gas development in certain areas until further review and limits oil and gas development activities to certain time periods so as not to conflict with fisheries or increase the risk of oil spills (Baffrey and Huntington 2010). Many of the mitigation measures identified for this study do not ban activities altogether but instead restrict certain activities at certain times in key areas. The mitigation type, "Helicopter and Airplane Management," for example, includes measures that restrict aircraft activity in key nesting areas during peak nesting seasons, and measures requiring aircraft to fly at certain altitudes when caribou herds or hunters in pursuit of caribou are spotted. Both of these measures include spatial and temporal restrictions. This chapter focuses on the following mitigation types that are spatial and/or temporal in nature:

1. Conflict Avoidance Agreement
2. Guarantee Access to Subsistence Resources
3. Helicopter and Airplane Management
4. Location of Facilities
5. Pipeline Elevation and Placement
6. Water Vessel Management
7. Winter Operations

Not all mitigation measures include spatial and temporal restrictions. Others can be generally classified as social or economic measures that address impacts on local residents through consultation or through compensatory benefits, and those measures are discussed in Chapter 6.

Due to the various agencies, entities, and processes involved with the development of mitigation measures, tracking individual mitigation measures for specific projects is difficult. Thus, the history of each mitigation measure is based on a review of available scoping documents, EISs, EAs, RODs, and permits, as well as interviews with agency and stakeholder respondents. Each history is a general summary based solely on available data and is not meant to be a comprehensive description of how mitigation measures were developed, proposed, and stipulated for the seven development projects addressed in this study. One goal of the history of mitigation is to describe the history of mitigation measures by identifying how concerns and mitigation proposals are reflected in the final mitigation measures proposed for a specific project. The analysis component of each section assesses the effectiveness of mitigation measures only as they pertain to mitigating impacts to Nuiqsut subsistence users and activities. The analysis focuses on whether mitigation measures were implemented, whether agencies have monitored the mitigation, and summarizes the agencies' and Nuiqsut residents' assessment of the effectiveness of the individual mitigation measures analyzed by the study team (see Table 12). Each mitigation type discussion includes an overview/history and an analysis. The analysis includes the following three subheadings: (1) Implementation, (2) Mitigation Monitoring, and (3) Assessment of Effectiveness.

5.1 Conflict Avoidance Agreement

5.1.1 Overview/History

CAAs have developed over time as tools that are commonly proposed or stipulated by agencies to prevent or lessen impacts of industry activities on local subsistence uses. In general, CAAs are agreements between industry and local subsistence groups or communities that are designed to address anticipated impacts of development. While CAAs are most commonly associated with bowhead whaling activities, they have also been implemented more generally between industry and subsistence communities. For example, the NSB included general CAAs between the developer and the community of Nuiqsut as stipulations in permits for the Oooguruk and Alpine development projects. These CAAs were intended to address subsistence use areas, security, and access.

Galginaitis (2009) provides a history and description of CAAs as they relate to Nuiqsut whaling activities. Related to whaling, CAAs are agreements between the oil industry and the AEWC in addition to community whaling captains' associations. As Galginaitis notes, CAAs evolved out of the Oil-Whaler Agreements of the 1980s. The first Oil-Whaler Agreement was implemented in 1986 and subsequently in 1987 and 1988. After a gap in Oil-Whaler Agreements during a lull in Beaufort Sea oil and gas activities, CAAs were resumed, although it is unclear what year this occurred. Galginaitis (2009) states, "At the most basic level, the CAA provides for the constant

communication between industry and the whalers about all of their respective ongoing activities, so that each can avoid interfering with the other. The mechanism for this mutual communication is the Whaling Communication Center…in Deadhorse." In addition to providing a mechanism for communication, the CAAs have also included agreements related to logistical support for Nuiqsut such as providing conex units (which serve as seasonal cabins on Cross Island), a generator system to supply electricity during the whaling season, cell phones, a front end loader, emergency services, use of West Dock, barge and other transportation, and assistance with transporting butchered whales to the community of Nuiqsut. Galginaitis notes that BP, Shell, and ConocoPhillips have provided most of the funding related to CAAs; however, the financial terms of the CAAs are not disclosed to the public. These private arrangements include informal mitigation measures that occur beyond the purview of regulatory agencies.

A Nuiqsut respondent noted that the CAAs were once individual agreements between a single developer and the AEWC and local whaling captains associations. However, the CAA is a now a single agreement between the AEWC, whaling captains associations, and various developers. The individual observed, "It's very time consuming to do individual [CAAs] with the numerous operators, which is why we turned it into one Conflict Avoidance Agreement" (Nuiqsut Key Informant December 2012). This individual went on to note that the CAAs have evolved over time to address the needs and concerns of bowhead whale hunters. He noted that the CAAs are "working documents" and "negotiable agreements, in principle" (Nuiqsut Key Informant December 2012).

A recent draft of the CAA between seven industry companies and the AEWC and North Slope community whaling captains' associations for the 2012 open water season included an agreement that industry would employ marine mammal observers on certain vessels, fund communication centers ("Com-Centers") that are staffed by Iñupiaq operators, and cease geophysical (e.g., seismic) activity in certain areas during the bowhead whale hunting season (AEWC 2012).

During discussions with a representative from the AEWC, the CAA was described as "a gentleman's agreement." The AEWC respondent noted that the CAA has "no teeth to it" in terms of being enforceable and described the process as follows:

> *We administer the Conflict Avoidance Agreement. We develop it each year, and we have a Conflict Avoidance Agreement with the oil industry every year and try to work with the oil companies so that they are able to sign it. It's mostly with the oil company. That meeting occurs every year in Barrow. There are some federal agencies present, but they have very little participation. But the CAA is something that we've been trying to convince the federal government [should be] part of their permitting. We've been unsuccessful thus far, although the federal government may be talking to the oil companies about the CAA and it may be the best thing for the oil companies to sign it. It would be ideal if the federal*

> *government were able to require the oil companies to sign the CAA. That would be very nice.* (AEWC Key Informant August 2012)

This individual went on to note that, during most years, at least one operator has chosen not to sign the CAA:

> *Last year is the first time I think that all the operators agreed to sign [the CAA]. Even if they weren't operating last year, they said that if they were going to operate they were going to sign it, but before, last couple of years, there were oil companies like Conoco [who] just said, 'We cannot sign the CAA; it's too stringent.' As long as they've got their permits, they can do what they want, which is why it's so important why [federal agency] take the CAA and make it a requirement.* (AEWC Key Informant August 2012)

While the CAAs themselves are not "enforceable," some agencies, such as NMFS, do stipulate coordination with the AEWC and community whaling captains' associations, in addition to stipulating, in their permits or authorizations (e.g., Incidental Harassment Authorizations), measures that are frequently incorporated into CAAs (e.g., suspend drilling activities during the fall bowhead whale hunt). The NSB also frequently requires the establishment of a CAA, but cannot enforce the contents of the CAA once in place. As a NSB respondent noted, "We're not going to enforce a Conflict Avoidance Agreement signed by two private parties. But we're going to look at our policy [which requires developers] to coordinate their activities with the AEWC" (NSB Key Informant October 2012).

The development of whaling-related CAAs has been in response to community concerns about the impacts of offshore oil and gas activities on bowhead whale subsistence harvests. During SRB&A's inventory of subsistence concerns (SRB&A 2010b), which reviewed Nuiqsut public testimony for three of the seven development projects under consideration for this study (Alpine Satellites, Endicott, and Northstar), the study team documented over 200 individual subsistence related concerns voiced by Nuiqsut residents. Twenty-one of these concerns were specifically related to bowhead whales, while an additional 11 concerns were related more generally to "whales" or "marine mammals." In addition, "difficulty hunting" and "displacement of wildlife" were the second and third most commonly reported concerns. SRB&A's study on the impacts and benefits of oil and gas development to North Slope harvesters included interviews with 33 Nuiqsut harvesters (SRB&A 2009). During these interviews, 73 percent of Nuiqsut respondents reported having personal experiences with impacts related to displacement of wildlife and 79 percent reported experiences related to difficulty hunting. In 13 cases, Nuiqsut respondents specifically volunteered (i.e., reported without cueing) concerns related to displacement of bowhead whales. Over time, bowhead whale hunters have consistently cited concerns that noise related to oil and gas development such as seismic activities and vessel traffic deflects whales or causes them to act more skittish and aggressive, making them less available to subsistence users.

Nuiqsut resident concerns related to effects of development on bowhead whale hunting have included the following:

> *And then, with all the noise and activities going down there in the ocean, our bowhead whale that migrate… you know, not far from that area, migrating all the way to Canada, probably will be hurt also.* (USACE 1984a)

> *There are many concerns across the North Slope. We, as Iñupiat, have lived for thousands of years here. We have knowledge of arctic waters. I come from a family of whalers. Kaktovik to Pt. Hope. I've been in Barrow. When there was a rig there, it affected our whales. It pushed them out to deeper seas. This affects our whales. In the fall time this really endangers our whalers. Here in Nuiqsut my family has experienced impacts for 20 years out by Cross Island.* (SRB&A 2009)

> *I lost a whale because of [development activities]. I had to go 30 miles out and it got windy. One boat got swamped. [They] deflected bowhead 30 miles out from Cross Island. That was the time I first got a whale and lost it. They were doing drilling and activities in Camden Bay. One year they didn't catch a whale because of oil companies doing seismic [seismic work often involves the use of airguns, and the loud sound may result in sea mammals deflecting from the noise or skittish behavior, both of which can impact hunters].* (SRB&A 2009)

> *The biggest concern is once they start leasing on the Beaufort Sea it will have an impact on the whaling during fall time. AEWC opposes it. Not to mention the whales get aggressive and dangerous. Some might not come back. The whale was so dangerous back in '93 or '94 that it pulled the boat under water. When whales are disturbed they get dangerous and aggressive, not to mention they go way out there and we endanger our lives. That happened in 2005. We only got one whale. We had a chance for two more, but there were so many vessels back and forth from West Dock that interfered.* (SRB&A 2009)

Nuiqsut residents have also expressed concerns about impacts on bowhead whale hunting activities through comments on draft EISs. One Nuiqsut resident provided the following comment on the draft EIS for the Endicott Development Project:

> *The DEIS appears to assume that drilling will proceed all year at Endicott. This is inappropriate. The ban on drilling during seasons when bowhead whales could encounter oil spills has been a critical protection for the bowhead throughout the history of the Beaufort Sea oil development. Lease sales have proceeded on the assumption that the seasonal drilling restriction will be in place to protect this endangered species. The Corps of Engineers should not blithely assume that this important protection is to be cast aside.* (USACE 1984b)

Addressing these concerns, planning documents (e.g., EISs, EAs, RODs) often suggest coordination with local communities to reduce impacts of development on subsistence activities; however, few of these planning documents for the study projects have specifically suggested CAAs. The only cases where the study team identified CAAs in pre-permitting documents was in the Alpine Satellites ROD, which mentions a conflict avoidance provision in the NSB's permit, and in the USACE's EA for Oooguruk, which states,

> *To mitigate impacts to subsistence, cultural (lifestyle), and marine mammals including the Federally listed Bowhead whale the applicant is coordinating development of a Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission. The agreement is expected to include shipping timing restrictions, seasonal pile driving restrictions, and possibly seasonal drilling restrictions. With these mitigating factors noise and disturbance impacts to marine mammals can be reduced but not eliminated.* (USACE 2005)

While most do not suggest CAAs specifically, pre-permitting documents (e.g., EISs, EAs, and RODs) for the seven development projects periodically suggested measures that are commonly included or addressed in CAAs. For example, the Northstar FEIS proposes a number of mitigation measures meant to reduce impacts of development on bowhead whaling activities, including seasonal restrictions on seismic and vessel activity. These are discussed below under Section 8 (Helicopter and Airplane Management).

The Northstar ROD also included recommendations from NMFS related to reducing impacts on bowhead whales. One recommendation was to minimize vessel and helicopter traffic during the fall bowhead whale migration, a measure often suggested for inclusion in CAAs.

During its literature review, the study team identified eight CAA mitigation measures (Table 11). The study team found NSB CAA stipulations for the Alpine, Endicott, Northstar, and Oooguruk development projects including the following examples:

> *This permit is contingent upon the approval of a Conflict Avoidance Agreement between BP Exploration and the Alaska Eskimo Whaling Commission (AEWC). The terms and conditions of this agreement may be enforceable under this permit. NSBCMP 2.4.3.(b)* (NSB 2002)

> *Permittee shall design and work with the NSB, Village of Nuiqsut on a Conflict Avoidance Agreement, which addresses subsistence use areas, security, and access, to be implemented for the life of the development. NSBCMP 2.4.3(e).* (NSB 2006b)

> *Pioneer Natural Resources shall work within a Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission, which will remain enforced throughout the life of the project.* (NSB 2005)

> *BPXA shall have signed Conflict Avoidance Agreement (CAA) with Alaska Eskimo Whaling Commission (AEWC), the Whaling Captains of Nuiqsut prior to commencement of dredging activities. (NSBMC 19.70.040 (E))* (NSB 2009c)

The establishment of a CAA is also listed as one of the conditions that Pioneer had agreed to abide by in ADNR's final consistency determination for the Oooguruk project:

> *Project activities necessary after September 1, must be coordinated with the AEWC and the Nuiqsut Whaling Captains Association to avoid and minimize potential impacts to whaling operations. Such coordination will be documented in the Conflict Avoidance Agreement with the AEWC.* (ADNR 2005)

In addition to stipulations contained within project-specific permits, the NSBMC includes policies that are "applicable to the approval of all development and uses within the Borough" (NSB 2012). A number of these policies are related to reducing impacts on whaling activities. Relevant policies include the following:

> *All nonessential boat, barge, and air traffic associated with drilling activity shall occur prior to or after the period of whale migration through the area. Essential traffic (that could not reasonably occur prior to or after the period of whale migration through the area) shall avoid disrupting the whale migration, subsistence activities and be coordinated with the Alaska Eskimo Whaling Commission.* (NSBMC 19.70.040 (E))

> *Offshore drilling and other development within the area of bowhead whale migration during the migration seasons shall not significantly interfere with subsistence activities nor jeopardize the continued availability of whales for subsistence purposes*. (NSBMC 19.70.050 (B) (1))

In addition to the NSB project-specific stipulations and NSBMC, the NSB also included enforceable policies in its coastal management plan, which was established under the purview of the ACMP. As described in Glenn Gray and Associates (2007), the NSB was a participant in the ACMP as a coastal district. The NSB coastal management plan was most recently revised in 2007 and included policies specifically related to subsistence and, more specifically, subsistence whaling and marine mammal harvests. The NSB draft coastal management plan (Glenn Gray and Associates 2007) included the following policy specifically relevant CAAs:

- *The following project activities that would adversely affect bowhead whale migration, feeding, mating, and calving areas are not allowed:*
    - *Shipping activities within 10 miles of bowhead whales without a Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission (Policy C-1 (a)(2))*

The coastal management plan also noted that "Voluntary agreements between subsistence users and oil companies have been successful in reducing impacts…. Other techniques to reduce subsistence effects include CAAs with the Alaska Eskimo Whaling Commission and village whaling captains associations" (Glenn Gray and Associates 2007). The previous coastal management plan, published in 1988 (NSB 1988), did not include mentions of CAAs or of coordination with the AEWC. The only specific mention of bowhead whale hunting in the 1988 coastal management plan was as follows:

> *Offshore drilling and other development within the area of bowhead whale migration during the migration seasons shall not significantly interfere with subsistence activities nor jeopardize the continued availability of whales for subsistence purposes.* (NSB 1988)

The ACMP program expired in 2011 and was not extended by the state legislature; therefore, policies under the ACMP and the NSB coastal management program are no longer applicable to development on the North Slope.

While not included in the literature review for this study, in its Letter of Authorization (LOA) for the Northstar Project (which was not included in the literature review and therefore not represented in the database), NMFS required that BP's actions be consistent with their CAA:

> *6(f). All work must be performed in a manner consistent with any signed Conflict Avoidance Agreement with the affected Native Alaskan communities.* (NMFS 2009)

In summary, CAAs are mitigation measures that were first implemented in the 1980s under the term "Oil-Whaler Agreements" and constitute private agreements between local whaling groups and industry. These agreements arose out of the concerns expressed by bowhead whale hunters related to the impacts of offshore oil and gas development on their whaling activities, and they have evolved over time through coordination between the AEWC, community whaling associations, and developers. While the CAAs themselves are not enforceable, federal, state, and local agencies often require the establishment of CAAs, coordination with the AEWC, or measures that are common CAA stipulations. A discussion of the implementation and effectiveness of individual mitigation measures, including CAAs, is provided in the following section.

5.1.2 Analysis

The study team assessed the effectiveness of the CAA mitigation type as well as four specific CAA measures (**M1**, **M15**, **M29**, and **M35**) associated with the Endicott, Alpine, and Oooguruk projects (Table 14 and Appendix A). This assessment included information from an NSB individual, AEWC member, five Nuiqsut residents, one BP individual, and a written response from CPAI. Other agencies and industry associated with these measures included the ADNR

and PNRC. However, the study team was unable to collect information from these entities regarding these specific measures.

Table 14: Conflict Avoidance Agreement – Mitigation Measure for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M1	Endicott	BP	NSB	Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission (AEWC) and the Whaling Captains of Nuiqsut
M15	Alpine	CPAI	NSB	Work with the NSB and the Village of Nuiqsut to design and implement a Conflict Avoidance Agreement addressing subsistence.
M29	Oooguruk	PNRC	ADNR	Establish a Conflict Avoidance Agreement with the AEWC and Nuiqsut Whaling Captains Association.
M35	Oooguruk	PNRC	NSB	Conflict Avoidance Agreement with the AEWC.

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5.1.2.1 Implementation

Three of the four measures (**M1**, **M15**, and **M35**) are CAAs related to offshore activities during community whaling activities. A majority of respondents believed that these CAAs had been implemented. Measure **M15** was the only CAA addressing onshore oil and gas activities, and respondents were less certain about its implementation (see discussion below).

Four individuals reported that the **M1** mitigation measure (requiring a CAA for the Endicott project) had been implemented and that similar mitigation measures had been implemented for other BP projects (e.g., Northstar). One Nuiqsut resident did not know if this mitigation was ever implemented. The BP key informant confirmed that the company had signed the CAA and said, "We've signed the CAA every year since I don't know how long" (BP Key Informant March 2013). A NSB key informant described the implementation process for CAAs, including those associated with Endicott and Northstar, saying,

> *We require it so they can act in accordance with active whaling. BP has always signed a Conflict Avoidance Agreement through Northstar. They've always had a Conflict Avoidance Agreement in place. Yeah for minor dredging activities, barging and things like that. We've gone to a more… there's been some pushback about the Borough requiring a Conflict Avoidance regulation and the policy with offshore activities be coordinated with whaling activities. It's required as a proof and assurance that our policy will be adhered to and that you will continue to have an agreement with AEWC. One measure of complying with NSB policy is that you have a Conflict Avoidance Agreement.* (NSB Key Informant October 2012)

As discussed in the previous section, for offshore activities, a single CAA exists yearly between the AEWC and industry and most, but not all, operators sign the CAA on a yearly basis. Several individuals noted that BP has consistently signed the CAA with the AEWC.

Nuiqsut key informants were in agreement that PNRC had implemented the **M29** and **M35** mitigation measures associated with the Oooguruk Project. Both of these measures required the establishment of a CAA but were stipulated by different agencies (the NSB and ADNR).

Measure **M15** is a requirement by the NSB that CPAI implement a CAA with the Village of Nuiqsut to address potential impacts to subsistence related to the Alpine development project. Of the four CAA measures, this was the only measure to address onshore subsistence uses. Regarding Alpine's **M15** mitigation measure, however, three of the four Nuiqsut residents who provided comments on the measure were unaware of the measure and whether it had been implemented. Part of this uncertainty may be due to residents attributing CPAI's CAA for Alpine to CPAI's Good Neighbor Policy and the fact that the term CAA is often used to refer to offshore activities. As one resident explained,

> *Is that onshore or is that Alpine going to [offshore]? It can be called a Good Neighbor Policy. That might be one that I think that is. Kuukpik and Conoco has a really tight partnership. I haven't heard about that, but I am sure it is in place.* (Nuiqsut Key Informant November 2012)

The NSB reported, however, that the **M15** measure had been implemented and also provided a detailed explanation for the difference between a CAA and a Good Neighbor Policy. This individual explained that the CAAs focus on mitigating everyday effects whereas the Good Neighbor Policy is geared more toward preventing catastrophic effects. The informant described this difference as follows:

> *Here's how it goes. The Conflict Avoidance Agreement is geared to make sure that the differences between the community and industry are adequately being addressed while the development is going on. The Conflict Avoidance Agreement is not going to determine the pipeline height. Through analysis and staff recommendation, the planning staff with coordination with the North Slope Borough Wildlife Department, and sometimes with a third party, will define what needs to be addressed and what needs to be implemented in order to go forward. The Good Neighbor Policy is different than the Conflict Avoidance Agreement. The Conflict Avoidance Agreement addresses everyday effects. The Good Neighbor Policy addresses catastrophic events….Other aspects of Conflict Avoidance Agreement is how [industry employees] perceive the hunters and saying they can't be there; there are things that don't require firearms like camping and fishing and you have to balance these things.* (NSB Key Informant October 2012)

Describing the implementation of Alpine's **M15** mitigation measure the NSB respondent added,

> *The Conflict Avoidance Agreement is there for the life of the project. It's put in there for the ability of the residents to coexist with development and industry activity. When the applications first came in, the Planning Department was heavily involved with the topic, and we thought boy we got to go to the village and ask for their input. The ordinance [for the Nuiqsut village district] is placed in the middle of the village and permeates a radius around it, and even then you're only seven miles from the village. The culture permeates out[side] of the village [district] boundaries to harvest. And the aesthetics, the changes to the landscape with infrastructure; a lot of camps and cabins, fishnets are where CD4 is, and the village of Nuiqsut is a major trading area for the trading of Arctic cisco. I get my resources from them for trading. These were all things that were taken into consideration [when creating the Conflict Avoidance Agreement]*. (NSB Key Informant October 2012)

Regarding implementation of measure **M15**, CPAI stated that a formal CAA had not been finalized; however they noted that many of the elements of a CAA had already been implemented to reduce impacts on subsistence activities. In their written response, CPAI stated,

> *A written Conflict Avoidance Agreement has not been finalized, however CPAI works with various stakeholders to ensure work is carried out in a manner that minimizes conflicts with subsistence hunting. Actions taken by CPAI to achieve this objective includes: 1)development of a helicopter protocols as stated above; 2) providing weekly summaries to the community on locations of summer activities, including a forecast for the following week; 3) a daily phone call with a Subsistence Representative in the community (initiated in 2013) during the summer to obtain information on hunting locations for avoidance purposes; and 4) holding meetings with the community multiple times to inform residents of the timing and extent of various CPAI project activities. The inclusion of subsistence advisors on projects has been instrumental in reducing the extent of disturbance to the community.* (CPAI Written Response December 2013)

5.1.2.2 Monitoring

Responses regarding monitoring of CAAs were more general, rather than addressing specific measures. When asked if the NSB monitored their CAA stipulations for implementation, the informant responded that the NSB does not monitor for implementation beyond receiving confirmation that the CAA has been put in place. This individual explained that the CAA is a private agreement between industry and the AEWC, and any further follow-up regarding implementation must come from the AEWC. This person explained, "I think we may have copies of one [CAA], but it's usually an acknowledgement [that it is in place]" (NSB Key

Informant October 2012). The NSB employee added that the NSB auditing of Borough ordinances includes CAAs and is one form of monitoring for implementation. One Nuiqsut individual added that multiple organizations are aware of the CAA stipulations and ensure they are in place. This person identified the AEWC, Nuiqsut Whaling Captains association, the NSB, and the Native Village of Nuiqsut as being organizations that help monitor the implementation of CAAs. An AEWC respondent described implementation of the CAA and follow-up on the measures contained within the CAA as a "trust thing" and observed,

> *The agreement by the oil industry is really important. If they don't sign the agreement, we don't have anything to stand on. There's not really any monitoring per se [by agencies] to make sure the oil company is [following] the agreement.* (AEWC Key Informant August 2012)

For the Endicott CAA measure (**M1**), the BP key informant noted that the AEWC monitors the CAA for implementation. This individual noted that a company is only legally bound to sign the annual CAA if it is a requirement in an agency permit. He explained,

> *Yeah, the AEWC does [monitor for implementation]. There have been cases with other companies that didn't agree [to the CAA] and refused to sign it. There is no legal requirement that you sign a CAA unless there are requirements like this [**M1**] in a permit. If we had this permit and we'd looked at the CAA and said we can't possibly sign this, then we would have to cancel the project [because of noncompliance with a permit].* (BP Key Informant March 2013)

5.1.2.3 Assessment of Effectiveness

Both Nuiqsut and NSB informants assessed the Endicott CAA measure (**M1**) as highly effective. Similarly, most Nuiqsut and NSB informants assessed the Oooguruk CAA measures (**M29** and **M35**) as highly effective. One Nuiqsut individual said the Oooguruk CAA measure was effective but required improvement; however, this individual did not provide a specific suggestion for how it should be improved. Responses were more mixed regarding Alpine's CAA measure (**M15**) with the NSB and one Nuiqsut individual assessing it as effective but requiring improvement and another Nuiqsut individual assessing it as not effective.

In general, most of the key informants seemed to regard CAAs as highly effective in reducing anticipated impacts. Two individuals provided the following comments regarding the effectiveness of the CAAs:

> *I think it's a very effective tool. It allows for the free consultation [between industry and local residents], and a lot of times it is initiated by AEWC, when a project that has not been permitted and an applicant comes through saying they will have several ships coming ashore and asks us about subsistence activities. We tell them they have a responsibility to coordinate their jobs with the AEWC.*

Many times there has not been a Conflict Avoidance Agreement. Cease and desists have been ordered. There have been issues related to drilling offshore and seismic impacting Barrow, 1989 being particular [with] whalers being way out of the way to harvest resulting in spoiling of the meat. Spoiling of the meat of the bowhead that can feed thousands of people is a very, very big issue. Additional danger that is put in front of the whalers is another issue. If there is a storm and they are fifteen hours out, it is very [risky]. (NSB Key Informant October 2012)

That [development of the CAA] was the beginning of no vessel traffic and putting a com center [in] and communicating with whalers and developers, and that has been really effective for our whalers and developers. (Nuiqsut Key Informant November 2012)

One individual who indicated that CAAs are effective but require improvement pointed to the lack of CAAs for companies not directly associated with the large development projects. Specifically this individual noted that fuel barging and other supply companies do not sign CAAs and thus pose a potential impact to whaling activities. This individual indicated they would like to see CAA stipulations extended to these smaller companies and operators, saying,

I would say, people that were hauling fuel and federal government hauling fuel to Barter Island and also Barrow. They don't have to sign [the CAA]. Bowhead Transportation is UIC [Ukpeaġvik Iñupiat Corporation] owned, and they do fuel barging to Barter Island and Wainwright. Not Crowley. They don't have to sign; they don't want to sign anything. They [transportation companies] are still out there causing an impact. They are out there 12 hours of the day when [we are] scouting for whales, and they stay out till eight in the evening. But they run and go through Narwhal and go to Northstar and other places. They run into these barges. (Nuiqsut Key Informant November 2012)

The BP individual did not provide an effectiveness rating for the Endicott CAA measure (**M1**), but did provide his observations about the strengths and weaknesses of the CAA in general. This individual indicated that there are both effective and ineffective components within a CAA, but that overall it is an effective measure that reduces the concerns of subsistence harvesters. He observed,

I would say that first of all it's not a simple answer [how effective the CAA is]. There are components of the CAA that I think are a waste of time. Some of those [components], people wouldn't be surprised, because I've told them year after year [that I think they're not useful], and other [components] they've backed off [requiring] them. Quantifying vessel noise in shallow water is useless. So, things like that were a total failure of the CAA process. But they were minor, and the bigger picture is that the CAA works. We are doing something in these people's

back yards and it makes them nervous. And the CAA helps make people feel less nervous. I think the CAA is a really nice mechanism. They [subsistence harvesters] carry a psychological burden [due to development], but we've decreased that psychological burden through the CAA. (BP Key Informant March 2013)

During general discussions with the agencies and Nuiqsut residents, several key informants provided responses on what they considered to be particularly effective mitigation measures for subsistence. Three individuals identified CAAs as highly effective measures, particularly for offshore impacts. They discussed,

We also issue seismic permits related to oil and gas, and we have to have things on board then and they have to shut down if they see whales or hunters and communication with the communities. We think those things are effective. We see things shut down, and we see things in response to animals or people, and we think that is positive. (BOEM Key Informant October 2012)

I am going to speak about whaling and CAAs; that has really helped our whalers. And when they [oil companies] stop the traffic from a certain time when we are hunting, that has really sped up our whaling time as to back then when they did seismic, we would stay at Cross Island at least a month. After that they stopped that and stopped all traffic, and [it takes] one week tops [at] Cross Island [to get] four whales. (Nuiqsut Key Informant November 2012)

A lot of mitigation, we have deals with subsistence and to protect subsistence and how that evolved is, it was never realistic or appropriate [for NMFS] to determine when Natives' subsistence is interfered with, and we have allowed them [to work with] industry [to] agree they are not screwing with subsistence. That has evolved into Conflict Avoidance Agreements. We assume that if a company has signed that document, that there isn't any unreasonable interference with subsistence. (NMFS Key Informant July 2012)

One Nuiqsut individual recommended an improvement to the CAA process related to the term of the CAAs. This person stated that CAAs should be extended for the life of the project without needing an annual renewal, in order to reduce conflicts each year with the operators. He said,

My biggest concern on that is some of these industries use the CAA as leverage to get their way with Nuiqsut Whaling Captains Association. It is a year to year thing, everything, and my suggestion would be [that] all the industry commit to a lifetime [CAA] without having to go through the process [each year], and so it doesn't go through all [the negotiating]. It should be mandatory that it is [for the] lifetime of exploration and development, and that would take away and not

use things as leverage so that industry can get their way. (Nuiqsut Key Informant November 2012)

5.1.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, industry, and agencies, the study team assessed the CAA mitigation type as an effective mitigation measure, although some respondents indicated there is room for additional improvement. Based on community suggestions, potential improvements could include a requirement that all companies conducting offshore activities that have the potential to disrupt subsistence activities sign a CAA with the AEWC, and extending the term of the CAA so that annual renewals are not necessary. Key informants also suggested making the terms of the CAA enforceable between agencies that require the establishment of the CAA and industry, rather than being solely private agreements. Based on the comments by the BP respondent, review of the individual stipulations within the CAA and removing stipulations that prove unnecessary may also help streamline the CAA process and increase the efficacy of the CAAs.

5.2 Guarantee Access to Subsistence Resources

5.2.1 Overview/History

Guarantee Access to Subsistence Resources includes mitigation measures that provide access to areas of development for purposes of subsistence harvesting or in times of emergency. These measures generally ensure access of local residents to oil fields for subsistence and travel purposes; in addition, the measures may indicate coordination with local residents to establish procedures for road use, entrance to facilities, and discharge of firearms.

Residents of Nuiqsut have expressed concerns over increased regulations around development areas and denial of access to areas of development that were traditionally used for subsistence hunting. During SRB&A's 2007 interview with active harvesters, 53 percent volunteered that their ability to hunt is a primary concern, while 73 percent of active harvesters responded in the affirmative that they are concerned about their ability to hunt (SRB&A 2009). Among the 33 Nuiqsut respondents interviewed, 15 were concerned about the loss of traditional hunting due to pipelines, roads, and other structures. Concerns over regulations on hunting was also noted, as six respondents indicated their concerns of restrictions on hunting in NPRA areas, and three noted concerns related to restrictions on hunting in buffer zones along pipelines (SRB&A 2009). One Nuiqsut harvester voiced his concern over losing their traditional hunting area to development:

When they start to build a pipeline across the whole NPRA our entire area will be covered with pipeline, and we won't even be able to hunt caribou. That already happened with Kuparuk, our traditional hunting ground. It's covered with pipelines. (SRB&A 2009)

Other comments made in scoping meetings related to concerns of regulations restricting access in development areas were cited in SRB&A's 2007 interview with active harvesters (SRB&A 2009):

> *Another question I had is, are you going to restrict us from boating near the project? Are we going to be still allowed access to that area? There are some questions on assistance. If local residents were out there in need, would BP assist those as well as whalers that are in need? Emergency aid is what I'm talking about.* (USACE 1996)

> *Knowing that whenever a structure is put up by the industry, the prohibitions, then, become effective where nobody can hunt in the area.* (USDOI, BLM 1982)

During interviews with Nuiqsut caribou harvesters in 2009, one hunter reported personally experiencing the impacts of restricted access to oilfields. This individual observed,

> *We were waiting for caribou by Nanuq that one time and they walked by there, and one guy says you can't be around here, you're in a restricted area, you have to move on. By CD4. Last year. During the summer, [the caribou] are just hanging around, right around CD4. They said 'You can't stay here and hunt around here.' Somewhere in July. Whether they like it or not, if the caribou are by the pipeline, you're going to get the caribou. You have no choice but to try to get them when they're right by the edge*. (SRB&A 2010i)

The study team identified mitigation proposals for guaranteed access in the planning documents for Alpine, Endicott, Meltwater, and Oooguruk. General recommendations for access to development areas were noted in Meltwater and Oooguruk. The Endicott FEIS notes that no hunting closures have been requested, but recommends research on the impact of closures on subsistence activities (USACE 1984c). It is noted in the Oooguruk EA that permitted industry activity "must not interfere with public's right to free navigation on all navigable waters of the U.S." (USACE 2006). While this statement does not specify subsistence activities, it does correspond with areas in which subsistence activities take place. More specific recommendations for guaranteed access are noted in the Alpine EA, which notes access to traditional hunting grounds as the number one primary subsistence concern of the Kuukpikmiut (USACE 1998a). As such, the proposed mitigation reads as follows:

> *Nuiqsut hunters have been guaranteed free access to all areas of the ADP [Alpine Development Project] subject only to reasonable firearms safety protocols which would be established and overseen by a Subsistence Oversight Panel composed of hunter representatives and coordinated with ADP personnel.* (USACE 1998a)

The Meltwater EA also included specific mitigation proposals related to guaranteed access:

> *Subsistence issues are always of concern with increased development on the North Slope. However, the applicant has taken many steps to insure there is no impact to subsistence within the area (i.e. raised the overall height of the pipeline from 5 to 7 feet, restricted hunting within the area to [Alaska] Natives only, and restricted fishing to catch and release only except for [Alaska] Natives.* (USACE 2001)

During its literature review, the study team identified seven mitigation measures categorized as "Guaranteed Access to Subsistence" (Table 11). Three of the stipulations were included in the developer's plan of operations for CPAI's projects, three were stipulated by state agencies in permits and leases, and one measure was stipulated by the NSB. The measures were included in decision documents for the Alpine, Meltwater, Oooguruk, and Tarn development projects.

In its 2000 Plan of Operations for the Meltwater project, CPAI stated that they would implement the following measure:

> *Design Feature: No access restrictions in oilfield to subsistence users. Establish procedures for entrance to facilities, use of permanent gravel roads, and firearm discharge. These procedures will be coordinated with the KSOP.*
>
> *Expected Benefit: Maximizes safety precautions. Safeguards PAI and its contractors from harm while providing oilfield access to subsistence hunters.* (Phillips Alaska, Inc. 2000)

The same measure is included in CPAI's 1996 EED for Alpine.

A variation of this stipulation was included in the DO&G's 2009 Lease Sale document for Oooguruk, stating:

> *Traditional and customary access to subsistence areas shall be maintained unless reasonable alternative access is provided to subsistence users. "Reasonable access" is access using means generally available to subsistence users. Lessees will consult the NSB, nearby communities, and native organizations for assistance in identifying and contacting local subsistence users.* (ADNR, DO&G 2009)

The NSB's 2005 permit for the Oooguruk project also included stipulations about subsistence user access, noting that "due diligence" must be exercised to mitigate adverse impacts on subsistence use, and that "Pioneer shall not preclude subsistence user access to the proposed gravel island to provide safe harbor in an emergency" (NSB 2006c). This stipulation is also a NSB policy as cited under Title 19.70.050 "Coastal Management and Area-Wide Policies."

In addition to measures directly related to subsistence user access, other measures under this category provide for the potential to restrict development activities when they affect residents'

access to subsistence resources. DNR's stipulation in its lease for the 1998 Tarn Project stipulates restricted development activities when the "Director determines it is necessary to prevent unreasonable conflicts with subsistence harvests." (ADNR, DO&G 1998)

One measure contained in the Alpine EED reduces potential access conflicts by providing signage in the Iñupiaq language that explains access policies. The measure reads as follows:

> *Action: Provide signage at facility and pipeline locations in English and Iñupiaq languages warning non-ARCO visitors of safety and awareness issues. Coordinate signage through Subsistence Oversight Panel.*
>
> *Benefit: Minimizes impact to subsistence or cultural use patterns. Maximizes human safety and facilities integrity.* (ARCO Alaska, Inc. 1996)

As noted above, the NSB's code of ordinances includes policies that prohibit activities that "preclude reasonable subsistence user access to a subsistence resource" (§19.70.050 (D)). The policy goes on to clarify that precluding access "addresses not only means of access, but access to areas where resources are present and can be used by subsistence users." A similar policy was also contained in the NSB coastal management plan (Glenn Gray and Associates 2007).

In summary, restricted access to subsistence resource areas due to development activities is a concern expressed by Nuiqsut residents, which agencies have attempted to address through permit stipulations. These mitigation measures gives subsistence users continued access to traditional hunting areas where development activities may occur. Mechanisms include unrestricted access to areas used for traditional subsistence hunting where development activities occur, as well as providing appropriate signage and director appointed restrictions on development activities when necessary.

5.2.2 Analysis

The study team assessed the effectiveness of guaranteed access to subsistence resources mitigation type as well as three specific research related measures (**M8**, **M26**, and **M27**) associated with the Alpine, Meltwater, and Tarn projects (Table 15 and Appendix A). This assessment included information from four Nuiqsut residents in addition to CPAI. Other agencies and industry associated with these measures included ADNR and CPAI. CPAI confirmed that measures **M8** and **M26** had been implemented; however, the study team was unable to collect information from these entities regarding measure **M27**.

Table 15: Guarantee Access to Subsistence Resources – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M8	Alpine	CPAI	ARCO Alaska, Inc.	Coordinate with KSOP to provide signage at project facilities in English and Iñupiaq languages related to safety/awareness issues.
M26	Meltwater	CPAI	Phillips Alaska, Inc.	No restrictions on subsistence user access; coordinate with KSOP to establish procedures for accessing development facilities.
M27	Tarn	CPAI	ADNR	Restrict lease-related use when necessary to prevent unreasonable conflicts with subsistence harvests.

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5.2.2.1 Implementation

Each of the three mitigation measures focused on access to subsistence resources although the specific measures varied in their scope. For the **M27** measure, the ADNR stipulated that lease related use for Tarn would be restricted to prevent unreasonable conflicts with subsistence harvests when the Director determines it necessary. Three Nuiqsut residents either reported that the **M27** mitigation measure had never been implemented or did not know if it had been implemented. One person indicated that both the ADNR and the NSB were failing to monitor adequately to implement these types of mitigation measures, saying,

> *Nobody and not even the NSB and their badge thingy with their compliance officer; I don't think they keep track of this stuff. That should be where they go in and observe these things. They're in their little office waiting for a phone call and they should be inspecting. And [they are] in Barrow, hired by NSB. They are compliance officers. They do some [inspections] but they should do more. Almost 100 miles or 150 mile radius of infrastructure. But that is something that kind of put on paper to make it look nice and good to get their permits. A lot I see to see if they are really reading fine print. I think so [this measure should have been implemented]. We talk about a lot of our people say we don't see herd coming this way anymore and Tarn is not that old and Meltwater.* (Nuiqsut Key Informant November 2012)

One individual could not recall if this measure had been implemented but did remember an instance where ice road construction was stopped during a caribou crossing event and indicated to the study team that it was an effective mitigation measure. CPAI responded that they "modify operations in areas of known subsistence activities," but indicated that this was done internally (CPAI Written Response December 2013).

For the **M26** measure, CPAI proposed a design feature of their project that no access restriction would occur within the oil field to subsistence users and that procedures for entrance and use of the area would be developed and coordinated with KSOP. CPAI noted in their response to the study team that one of their measures was "providing Nuiqsut residents with access to ice roads and gravel roads as long as they comply with the field safety requirements" (CPAI Written Response October 2013). Three individuals reported this mitigation measure was in place and one person provided an example of CPAI providing use of facilities and fuel when hunting near Meltwater. This person described his experience saying, "I was low on gas, and I went to the facilities out there and they gave me some gas so I could make it home. I was hunting wolves." (Nuiqsut Key Informant November 2012). Another individual, however, reported that this policy is not being implemented as intended and described instances of denied access:

> *We get escorted away from the facilities if we have firearm, but we only have firearms when we [are] coming home, and I got a new AK47 and shotgun and I got escorted all the way to ice road. We had no plans to hunt around those areas because of fear of shooting infrastructure. If you had a snowmachine – and my brother hunts Kuparuk River, but he has access and he goes but he is away from infrastructure. If we hunt even to Alpine I think the security would be right there. We will see people by Miluveach and [they] go on their vehicles and shoot a caribou if there. That is farthest on the ice road. Some people do [hunt on the ice road]*. (Nuiqsut Key Informant November 2012)

The last measure under this category ("Guarantee Access to Subsistence Resources") that the study team evaluated was related to CPAI's proposal to provide signage in English and Iñupiaq for safety and awareness issues (measure **M8**). CPAI confirmed that the signage had been implemented and described the measure as "Posting signs in Inupiat at Alpine facilities to make residents aware of safety considerations that are protective of their safety, if English is not their first language" (CPAI Written Response October 2013). Two Nuiqsut residents said CPAI had never implemented the bilingual signage, one did not know, and the other reported that CPAI had implemented the measure. Regarding their knowledge of this mitigation measure, residents provided the following responses:

> *I don't see them. Not in Iñupiaq. Otherwise you would see them all over the place… I think that would be useful [signage]. People travel ice road all the time and they don't know what is highly toxic and those [signs] should be in place.* (Nuiqsut Key Informant November 2012)

> *No. But they put in policies in land [that] our ancestors had alternates with English name and Nigliq and Oliktok, and Judy Creek area there is a [Iñupiaq] name on those places, and [instead] they [developers] put their own [non-Iñupiaq] name and [development not reflecting native names]….* (Nuiqsut Key Informant November 2012)

They did. When we drive ice road we see the signs. (Nuiqsut Key Informant November 2012)

5.2.2.2 Monitoring

Regarding monitoring of measure **M8** (posting signs in Iñupiaq), CPAI noted that once the signs were posted, there was no need for monitoring. However, they also stated that "Signs would be replaced if they got damaged or removed" (CPAI Written Response December 2013).

5.2.2.3 Assessment of Effectiveness

As discussed above, Nuiqsut residents reported that two of the three "Guarantee Access to Subsistence Resources" measures (**M27** and **M8**) either had not been implemented or respondents were unsure if they had been implemented. Without knowledge of the implementation of these measures, it was not possible for respondents to provide an assessment of their effectiveness. Regarding CPAI's mitigation to not restrict subsistence user access to oil fields (**M26**), one individual assessed the measure as highly effective, and another assessed this measure as effective but needing improvement. This person suggested lessening the travel restrictions that are already in place and discussed proposed development near Umiat as future projects that should implement fewer restrictions on subsistence users:

> *After 9/11 everything changed with industry. Because now, if you go through riding a snowmachine and stop at Kuparuk, when you stop, security will be there and take your firearms away and then give it back when you go. Even if you want to go on the ice road. When [they build] road to Umiat, the security will follow you and escort you…. Yeah now that they want a road to Umiat[5] we want to make sure we participate and hunt the way our ancestors have hunted, where the animals are, with less restrictions.* (Nuiqsut Key Informant November 2012)

While not commenting specifically on measure **M26**, CPAI listed "ensuring access to gravel and ice roads for subsistence hunting" as one of the measures most commonly requested by Nuiqsut and therefore effective at addressing Nuiqsut concerns (CPAI Written Response October 2013).

One Nuiqsut resident characterized **M8** (providing signage in Iñupiaq) as highly effective.

5.2.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, the study team assessed the guarantee access to subsistence resources mitigation type as an effective mitigation measure as it relates to physical and regulatory access. Providing continued access to traditional use areas is important in

[5] In recent years, the State of Alaska has explored the possibility of building a road between the Dalton Highway and the Colville River, at Umiat. The purpose of the road would be to facilitate access to oil and gas reserves west of the Dalton Highway.

preserving the subsistence lifestyle and culture, and industry and agencies appear to make an effort to allow for physical (e.g., elevated pipelines) and regulatory (e.g., permission to use ice roads) access to subsistence use areas. In some cases, residents believe the access restrictions are too prohibitive and need to be lessened. The overall effectiveness of this mitigation type is dependent on whether the individual measures are implemented or monitored.

One aspect of subsistence user access that the study team found was not adequately addressed through mitigation is the impact of user avoidance, in which subsistence users may have physical and/or regulatory access to an area but the proximity of industry to their use areas presents a social barrier (e.g., employees watching them, fear of contamination) and results in user avoidance of an area. Stronger efforts in cultural awareness training, communication to local residents of company policies and efforts to protect the environment from contamination, community outreach to improve relationships with development companies, and reducing activities in key subsistence use areas during peak harvesting seasons are ways in which social barriers and impacts on user avoidance may be lessened.

Regarding the specific measures addressed in this section, the ADNR mitigation measure to restrict lease use to prevent unreasonable conflicts with subsistence harvests (**M27**) could be improved by greater specificity of the process in which local residents can identify and report conflict with lease use and further detail regarding what information the Director uses when making a determination to restrict lease uses.

5.3 Helicopter and Airplane Management

5.3.1 Overview/History

Helicopter and airplane management mitigation measures are stipulated to reduce the impacts of air traffic on subsistence activities and resources. Mitigation measures related to helicopter and airplane management include altitude requirements, seasonal restrictions, and adherence to prescribed air routes.

Air traffic related to development activities may result in reduced subsistence access and resource availability. Noise from air traffic such as low flying airplanes and helicopters may cause the displacement of species such as caribou, waterfowl, and marine mammals from traditional hunting areas. Mitigation measures related to helicopter and air traffic management have developed over time to lessen noise disturbances that could lead to the displacement of wildlife, making it difficult for harvesters to hunt.

The development of helicopter and airplane management mitigation measures has been in response to community concerns about the impacts of air traffic noise on onshore and offshore subsistence harvests. During SRB&A's interviews with active harvesters in 2007, 73 percent of Nuiqsut respondents reported having personal experiences with impacts related to displacement of wildlife and 79 percent reported experiences related to difficulty hunting. In 19 cases,

Nuiqsut residents specifically volunteered concerns related to displacement of caribou from migration routes, while four respondents specifically volunteered concerns about small aircraft and helicopters disturbing caribou migration (SRB&A 2009). One Nuiqsut respondent also volunteered concerns related to helicopters deliberately chasing/herding caribou. The Nuiqsut Caribou Subsistence Monitoring Project has also documented the impacts of helicopter and air traffic on Nuiqsut caribou hunting activities (SRB&A 2010i, 2011, and 2012). During the first three study years, helicopter traffic was the most commonly cited impact by Nuiqsut caribou hunters. SRB&A's inventory of Nuiqsut subsistence concerns (SRB&A 2010b) shows 39 percent of the records related to concerns specific to caribou. Seventeen records related specifically to Nuiqsut concerns of difficulty hunting, while 15 records related specifically to concerns about displacement of wildlife. Nuiqsut resident concerns related to effects of air traffic noise on caribou migration included the following:

> *When I went camping last year, I waited three days for the herd, [just] to have a helicopter divert them away from us. When they were diverted, we went without. We have had to deal with harassment. We had over-flights three times while trying to cut the harvest. It is disturbing. The next year we had a helicopter do the same thing, but it was worse. They were carrying a sling going from Alpine to Meltwater, another oilfield. It went right over us three times. The herd was right there and it put us at risk. I had my two young sons with me and it made me very angry.* (SRB&A 2009)

> *Like aircraft. In summer when I go out boating, I go for catching food, like caribou, when my mother and I go hunting, my mother always says, and I say, I think we need more meat because prices in our store are getting higher and higher. Hardly any jobs and gas is getting expensive. We decide to go get meat. And we go by boat for caribou and there is Alpine aircraft and helicopters flying over and it seems like they are disturbing our hunting. All of a sudden a helicopter flies over us and scares our caribou away. My mother gets so mad. It used to not be like this before Alpine came around. Alaska Airlines too. Alpine helicopters and Frontier Airlines.* (SRB&A 2009)

> *I took quite a few [trips], but like the first two weeks when I went out this way I would come over like this and didn't see anything. I went out almost every day too, but there was a lot of helicopters flying low and stopping down there. I didn't see nothing. Not like last year where you would see little groups all over. This year I didn't' see any at all out there with all those helicopters. Right over here by this other one, right around here it was all over in this area right here. I would see them over this way too flying around. Everywhere I went I would see them flying around.* (SRB&A 2012)

Nuiqsut residents also expressed concerns about impacts of air traffic on bowhead whale hunting activities. One Nuiqsut resident offered this comment:

> *And, Tom, you guys said earlier, too, that what we want to see in the EIS. Eliminate air traffic is a good example. During the time that the Nuiqsut whales are out there, to eliminate air traffic for any type of vessel traffic until the quota has been met by Kaktovik and Nuiqsut.* (USDOI, BLM 2003)

The SRB&A study team identified proposed mitigation actions related to helicopter and airplane traffic management in planning documents for the Alpine, Alpine Satellites, and Northstar development projects. For each of these projects, proposed actions included limiting helicopter and airplane traffic during peak subsistence harvest months and where high concentrations of wildlife are present:

> *Potential mitigation measures to reduce impacts to bowhead whales could include aircraft altitude restrictions over the nearshore Beaufort Sea during periods when whales could be present (spring, summer, fall).* (USDOI, BLM 2004c)

> *A secondary effect of placement of the proposed fill material, is the noise disturbance on waterfowl and waterbirds which select nesting locations and use those sites within 1/2 mile of the proposed ADP airstrip. In order to mitigate this potential bird disturbance during a critical phase of their late spring/early summer life cycle stages, use of the airstrip from June I-July 15 would be restricted to aircraft weighing less than 105,000 lbs take off weight (Le., Boeing 737 prohibited) unless excepted by FAR PART 36-Stage 3 (noise level category), safety emergency, or by the Subsistence Oversight Panel. All aircraft use would be minimized during June I-July 15, and would maintain minimum altitude except for take-off and landing patterns, and pipeline surveillance. Aircraft use would be maximized during winter.* (USACE 1998a)

> *As the whales experience increasing numbers of disturbances, it has been hypothesized that they may adopt a migration route located further offshore, rather than a meandering route based on multiple disturbance responses. If such an effect was to occur, this could significantly affect whaling communities beyond the cumulative impact area, including Barrow, Nuiqsut, and Kaktovik. The combined effect described has not been documented by scientific studies, and is only a hypothesis at present. Measures that could be implemented to reduce the potential for such a cumulative effect include: prohibition of seismic survey activities during bowhead whale migration periods; coordination of helicopter activities to establish minimum transit altitudes and to minimize the length of overwater transit routes to offshore sites during the fall whale migration; prohibition of fall icebreaking barge activities prior to October 15; and*

> *coordination of vessel activity during the whale migration period to minimize the length of offshore transit routes. These requirements could be relaxed during other portions of the year.* (USACE 1999)

Other proposed mitigation actions include maintaining a minimum altitude level when in common wildlife areas:

> *Some disturbance and displacement of ringed seals and bearded seals during the operation period could occur from aircraft noise. Ringed seals follow the edge of the retreating pack ice north during summer, so few ringed seals are expected to be in the Plan Area during summer. Those ringed seals that remain may be displaced for a short time by aircraft noise, but any effects are expected to be uncommon and of less than 1 hour duration. Flights that go over the ice edge could affect seals there. Breathing holes, lairs, and haul outs of ringed seals are often found away from lead edge habitat. The anticipated flight path for the airstrip at CD-3 would be over land areas in the Colville River Delta. Maintaining a 1,000-foot minimum altitude would minimize effects on ringed seals at these sites.* (USDOI, BLM 2004d)

The study team identified five mitigation measures categorized as helicopter and airplane management, which were stipulated for the Alpine and Northstar development projects. Stipulations have been included in permits to decrease the impact helicopter and airplane noise has on both wildlife and harvester. For example, Northstar and Alpine permits (NSB 2009b and 2008b) stipulate that helicopters must maintain a minimum altitude of 1500 feet over concentrations of 25 caribou or more, and in the area of harvesters in pursuit of subsistence animals:

> *Helicopter use in support of study activities shall maintain an altitude of 1500 feet over concentrations of 25 or more caribou, and over hunters in the area in of pursuit of subsistence animals. NSBMC 19.70.050 (L) 4, NSBCMP 2.4.6 (d), NSBMC 19.70.050 (J) 3.* (NSB 2008b)

> *Helicopter use in support of exploration activities shall maintain an altitude of 1500 feet over concentrations of 25 or more caribou, and with hunter in the area of pursuit of subsistence animals. NSBMC 19.70.050 (L) 4, NSBMC 19.70.050 (J) 3.* (NSB 2009b)

A second helicopter stipulation in the Alpine permit requires established helicopter routes from development site locations, unless deviation from the established route is necessary for avoidance of large concentration of animals or human safety (NSB 2009b). Of the five mitigation measures identified, two measures restrict air traffic during times when wildlife populations are high, and during peak subsistence harvest seasons. Restrictions include limiting airstrip use of aircraft weighing less than 105,000 pounds from June 1-July 15, and "designing a

logistics plan that transports and stockpiles a majority of materials and supplies during the winter (i.e., December 1-April 19)" (ARCO Alaska, Inc. 1996). While helicopter and airplane management mitigation measures relating specifically to the impact of air traffic on marine mammals were cited in the various EISs and RODs, stipulations in the permits reviewed for this project did not include measures directly citing impacts from aircraft on marine mammal subsistence activities.

The NSB code of ordinances also includes built-in measures related to air traffic within the Borough and Beaufort Sea boundary. "Section 19.70.040-Offshore Development Policies" described as policies "intended to guide the approval of development," states:

> *All nonessential boat, barge and air traffic associated with drilling activity shall occur prior to or after the period of whale migration through the area. Essential traffic (traffic that could not reasonably occur prior to or after the period of whale migration through the area) shall avoid disrupting the whale migration, subsistence activities and be coordinated with the Alaska Eskimo Whaling Commission.* (NSBMC 19.70.040 (E))

Other built-in policies related to air traffic are included in the NSB code of ordinances; however, they are specific to avoidance of wildlife rather than subsistence activities. Similar enforceable policies that relate to airplane and helicopter avoidance and altitude minimums near concentrated groups of wildlife were found in the NSB coastal management plans for years 1988 and 2007, but do not address subsistence activities.

In summary, air traffic and noise related to development activities causing the disruption of wildlife and subsistence harvests are concerns that have been voiced frequently by residents of Nuiqsut. Agency stipulations in planning documents and built-in enforcements in policies by the Borough have attempted to address the impacts air traffic has on subsistence harvesters and wildlife through actions such as altitude requirements, seasonal restrictions, designated routes, and communication between the village and developers.

5.3.2 Analysis

The study team assessed the effectiveness of the helicopter and airplane management mitigation type as well as two specific aircraft related measures (**M4** and **M17**) associated with the Alpine and Northstar projects (Table 16 and Appendix A). This assessment included information from four Nuiqsut residents, a NSB informant, and industry informants from BP and CPAI. Both BP and CPAI provided either general observations about the mitigation type, or specific information about their measures.

Table 16: Helicopter and Airplane Management – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M4	Northstar	BP	NSB	Helicopter altitude requirements near hunters.
M17	Alpine	CPAI	NSB	Helicopter altitude requirements near hunters.

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5.3.2.1 Implementation

Both mitigation measures regarding helicopter and airplane management (**M4** and **M17**) stated that helicopters shall maintain an altitude of 1500 feet over concentrations of 25 or more caribou, and over hunters in the area in pursuit of subsistence animals. While not providing specific details on the individual mitigation measures, a NSB informant discussed that to the Planning Department's knowledge, these stipulations were being implemented unless overriding safety concerns require the helicopters to fly lower than 1500 feet. The NSB person went on to provide a personal experience of impacts from helicopter traffic near Barrow during a caribou hunt:

> *I'll tell you something; I was at my cabin a couple weeks ago, and I wasn't getting caribou for a long time. I was blaming a whole bunch of different things. Suddenly a group of about 400 caribou showed up. My cabin is 60 to 70 miles south of Barrow and NPRA. Out of the blue we had been waiting for the caribou to come by and they weren't coming. The minute they showed up we watched an aircraft harass them. Circling, flying low and suddenly they were out of our reach. I experienced that firsthand. I called the office and said somebody call the FAA. The helicopter was disrupting at least 3 different camps. I sympathize with those that say there are issues with aircraft, especially helicopters that can get low. I don't know if it is pure negligence or they don't know anything about people [subsistence users] doing anything. Making sure there are vertical buffers that are appropriate because the probability of these cowboys with wings [flying low is high], it was rutting season and they were maybe watching, taking pictures.* (NSB Key Informant October 2012)

CPAI also confirmed that they had implemented helicopter management measures, stating that one of their measures was "adjusting plans for helicopter activity to avoid hunters and caribou herds" (CPAI Written Response October 2013). In their subsequent response addressing measure **M17**, CPAI described their policy and indicated that recent measures had been taken to improve upon the measure:

> *Pilots are directed to maintain an altitude of 1500 feet over concentrations of 25 or more caribou, and hunters in the area. CPAI's Helicopter Program Manual clearly identifies helicopter pilot expectations. CPAI has a formalized procedure for Aircraft Operations Communication to Local Residents. In 2013 CPAI began*

> *recording daily flight plans so that villagers could call in on the telephone. Daily discussions with a subsistence advisor are also very useful for instructing helicopters to avoid subsistence activities.* (CPAI Written Response December 2013)

All four Nuiqsut residents agreed that CPAI had implemented the 1500 foot height (measure **M17**); however, several of these residents indicated that CPAI only implemented this mitigation after a number of complaints were raised or only when subsistence representatives were present on the helicopters. These individuals provided the following comments regarding CPAI's implementation of the measure:

> *They don't abide by it. Sometimes when [they are] doing studies they fly low. And now they fly high that communication has been set.* (Nuiqsut Key Informant November 2012)

> *Sometimes and sometimes no. It depends on what they are studying*[6] *and what they are doing, but you know when they have a subsistence rep on the choppers they comply.* (Nuiqsut Key Informant November 2012)

> *The policy is implemented. I don't know that it is followed all the time, that 1500 foot height. I know for their avian bird studies they will fly around lakes and look for nest and sometimes they get low and see by eye. Every time they land they will shut down and it has to. All the bird people are counting eggs or whatever. I know because I have been out there some with them.* (Nuiqsut Key Informant November 2012)

All of the Nuiqsut residents that provided information on BP's implementation of the helicopter and airplane management stipulation reported that they did not know if BP had implemented the measure (measure **M4**). They indicated that Nuiqsut does not generally hunt in the area of BP's Northstar operation except during fall whaling and thus were not as familiar with BP's aircraft activities. In addition, the BP key informant noted that the measure **M4** was in a permit for a survey that primarily occurred in the ocean, and therefore it is likely that the surveyors never encountered caribou herds or hunters in pursuit.

During key informant discussions, several individuals noted that scientific studies are a common source of helicopter and other air traffic on the North Slope; some of these studies are industry-funded and therefore comply with stipulations related to minimum altitude requirements. However, other scientific studies on the North Slope are implemented by state and federal agencies. A NSB key informant noted that federal and state agencies often do not obtain permits for activities on NSB lands and therefore do not comply with the same stipulations that an

[6] This individual is referring to scientific studies requiring aircraft overflights. These studies may be industry-funded, or funded by federal or state agencies. It is unclear to which entity the commenter is referring.

industry operator may be required to comply with. Thus, these agency studies are an additional source of impacts on North Slope subsistence uses.

5.3.2.2 Monitoring

Two Nuiqsut residents reported that although community organizations such as the City or KSOP are not responsible for monitoring the implementation of the helicopter and airplane management stipulation, they will report violations to the NSB or ICAS if communication directly with CPAI is not effective. One individual described the process saying,

> *Yes. We have VHF and we tell them right away. If not right away we tell NSB and ICAS. We can't get a hold of Conoco. We have to go through other process. They don't listen to us. We have to go to NSB permitting planning department or regional tribal council…. Yes... at first [early in the season] we have a hard time [communicating] and then they fix it right and by time they fix it right the majority of work has already been done.* (Nuiqsut Key Informant November 2012)

5.3.2.3 Assessment of Effectiveness

Overall, Nuiqsut residents and NSB informants assessed the helicopter and airplane management as effective but needing improvement or not effective. Residents did not provide an assessment of BP's **M4** measure because they did not know if it had been implemented. A NSB informant assessed the 1500 feet elevation as adequate to reduce impacts but said the mitigation measure needed improvement regarding which entities are required to abide by the regulation (e.g., federal agencies not complying with NSB policies related to aircraft management) and also suggested localizing or condensing traffic routes to minimize overall impacts:

> *I think it [1500 feet buffer] is generally high enough to reduce the concern. What I hear is the amount of flights and increased use of the airport at Alpine has substantially increased. If the developments were more connected to the community, to use the existing runway and try to localize the impacts coming from every which way [it may reduce impacts], but I don't even know if that would suffice. Maybe have direct routes identified? Those kinds of things are more useful and helpful because we know where their routes are established. But that's one entity and there are so many others where the complaints come in. BLM? USFWS? If they came in for a permit we would have stipulated well enough that there would be the same ordinances put in place.* (NSB Key Informant October 2012)

All four Nuiqsut key informants that provided information on the effectiveness of the 1500 feet helicopter mitigation measures reported that the height was not adequate enough to prevent

disturbance to subsistence users. One person also expressed that the 1500 feet stipulation should apply to CPAI's airplane activities. They explained,

> *No, you can still hear chopper, and they need to be more than 1500 feet and when low cloud ceiling they go below the clouds and that might be 1000 feet.* (Nuiqsut Key Informant November 2012)

> *We see choppers, when we [are] waiting on caribou; [they] go fly around and hover around the caribous. Then they go the other way. They might have been doing caribou studies and getting a count. Yep. Who is going to always stay at 1500 feet? And the weather might not permit you to do that. The fog and low clouds….I use to love it when they fly around me when I was geese hunting [because they scare the birds up]. But yeah that maybe needs improvement and [I'm] not sure in what way. You still hear the chopper when [it's] at 1500 feet. How do we know it is 1500 feet? And you could be sitting on a high bluff and they are 1500 feet up [from the ground, but not from the bluff].* (Nuiqsut Key Informant November 2012)

> *To the animals themselves [it is effective], yeah. Not the hunters. Number 2 [effective but needs improvement].* (Nuiqsut Key Informant November 2012)

> *Even at 1500 feet, you can still hear them. That stipulation should apply to planes, too; planes flew right over us this summer. I'll tell you guys about this over here. They flew right over us at 200 feet. That CASA plane from Prudhoe Bay. It's an Alpine plane. The second time they went around us, the third time they flew right over us again. They disturbed our hunting. I did make a complaint to KSOP [about that] over here....* (Nuiqsut Key Informant November 2012)

The BP key informant made general comments about the effectiveness of helicopter altitude requirements. First, similar to the comment made by the NSB individual, he noted that these measures are less effective when they are only required of certain helicopter operators on the North Slope. He said,

> *The worst case where the hunters got frustrated – these were hunters that were working and one of the helicopters came down and got fairly within a few hundred feet of them and they [the hunters] got really [angry]. It was a Department of Justice helicopter, and so we were complying with our permit, but they didn't have a permit.* (BP Key Informant March 2013)

The BP individual also noted that the effectiveness of helicopter altitude requirements may vary depending on the type of helicopter, saying,

> *The one thing that jumps out to me is that it doesn't say what kind of helicopter. You could have a bigger helicopter [or one] that's quieter. I think it's an effective mitigation measure. You can imagine in the old days, it was so fun for the pilots to chase the wildlife, but they don't do that anymore.* (BP Key Informant March 2013)

CPAI indicated that, in general, "Pilots avoid disturbance to wildlife" (CPAI Written Response December 2013). Another industry key informant provided a general statement about the effectiveness of limiting certain types of activities, such as helicopter traffic, during peaking hunting times:

> *Trying to limit activities to certain times, that's another thing that's effective. The worst thing in the world is that you're hunting waterfowl, and a helicopter buzzes over and the birds fly off. The caribou is the main concern there. Industry has to do their studies so they can see the ground, do their bird counts and do their caribou counts when the caribou are there.* (Industry Key Informant February 2013)

5.3.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents and a NSB informant, the study team assessed the helicopter and airplane management mitigation type as mitigation that requires more improvement in order to be effective. The general consensus among residents was that the 1500 feet elevation is not adequate due to the noise but also that this measure is not always implemented as intended (e.g., companies flying lower than 1500 feet) and should be required of airplane traffic rather than limited to helicopters. Improved communication between industry and local community organizations (such as KSOP) regarding upcoming flying activities and local residents' hunting activities could alleviate impacts from helicopter activities if industry can first avoid the areas of hunting during peak harvesting times. Increasing the minimum flight altitude may also help reduce impacts although the study team has no information and received no information regarding what the adequate height would be in order to reduce impacts from noise. Applying minimum altitude requirements to airplanes, as suggested by one individual, may also be a potential improvement with appropriate consideration for aircraft safety. The NSB and BP recommendation that agencies also abide by the minimum aircraft elevation when in the presence of concentrations of caribou and subsistence users also warrants further consideration.

5.4 Location of Facilities

5.4.1 Overview/History

The mitigation type "Location of Facilities" refers to mitigation that alters project design to avoid sensitive areas such as high use subsistence harvesting locations or key wildlife habitat areas. The placement of facilities can have positive or negative implications for subsistence users. If located in key habitat areas or in the path of migratory routes, a project may affect the

availability of subsistence resources to local harvesters by displacing them or disrupting their movement. If located near or within key subsistence harvest locations, a project may affect subsistence uses by causing hunters to avoid previously used hunting grounds near facilities over concerns for the safety of facility workers or discomfort with hunting near development. These potential impacts are often addressed during the NEPA process through the consideration of multiple project alternatives and selection of an environmentally preferred alternative. Industry may also respond to concerns about project locations by reflecting changes to the project design (including changes in facility locations) in their plan of operations.

North Slope active harvesters voiced concern over the location of facilities during interviews with SRB&A in 2007. In Nuiqsut, 30 percent of personal experiences with the impacts of oil and gas activities were related to infrastructure, facilities, or vehicles (SRB&A 2009). In addition, during SRB&A's inventory of subsistence concerns for this study, pipelines were the most commonly mentioned development activity, followed by other infrastructure including bridges and ice roads (SRB&A 2010b). Residents' specific concerns include the placement of infrastructure within traditional hunting areas as well as the impacts of infrastructure on resource habitat and distribution. When asked to suggest mitigation measures to address the impacts of oil and gas development, "design changes" was the most frequently recommended type of mitigation. The following community responses represent some of the concerns that have been voiced by Nuiqsut residents related to the placement of facilities:

> *I think the oil industry is trying to move too fast, spreading out too fast, and it's not giving the wildlife time to get used to it. You know where that Nanuq pad is? Right around the bend up here, I used to always get caribou there, now I don't even bother. That ice road goes right across my grandma's land. I went there always when I was a kid, now I just don't bother.* (SRB&A 2009)

> *You know, when I first come up, you know I had a free will to hunt anywhere I want to hunt, especially towards the east. With so much infrastructure in place, for safety matters you know, that's kind of – that depletes our hunting resources and we had to look for another area …even though we have an access under our agreement to hunt, you know, we're looking at the safety of the people that we don't want to, you know, use any type of firearms. The only reason we're doing that [not hunting there] is because of the safety of the people… even though we have access to hunt.* (USDOI, BLM 2003)

> *[I harvested] less. There's less caribou out there than there used to be before the facilities were built. They have offset the caribou a little bit. Me and [hunting partner] were just talking about that this morning. Before those facilities were there, we would watch the big caribous, the bulls, running along the coast.* (SRB&A 2012)

> *Reduced quality of hunting areas due to development. Going out into areas where formerly there wasn't anything but game, and now we see infrastructure.* (SRB&A 2009)

> *The pipeline, the pads I would say [have been an impact]. The caribou see it as safety. The coastal ones will come as close to CD3 as they can, and the roadways they will hang around, and the pipeline, year-round. Caribou are smart; they know they are not going to be shot on these sites. The company tells us we can hunt in the area, but for safety you don't want to risk it. [It results in] displacement to hunters.* (SRB&A 2012)

The FEIS for Alpine Satellites suggests that ice roads and airstrips may prove lethal to wintering fish and recommend that their construction occur where the ice in a watercourse naturally blocks fish travel to prevent the addition of another blockage (USDOI, BLM 2004d). None of the planning documents for the seven developments recommends relocating facilities specifically to avoid subsistence use areas.

During its literature review, SRB&A identified two mitigation measures related to altering the location of facilities. The following excerpts originate from the EED for developments at Alpine:

> *Re-locate all pads further north of Nanuk Lake to respond to Nuiqsut comments regarding high subsistence use in and around lake and integrate 1996 well results. Re-configure location of airstrip and processing facility to consolidate sources of noise, activities, and potential oil spill at a maximum distance away from the Nechelik (Nigliq) Channel, an identified high-subsistence-use area, and away from sensitive waterfowl nesting areas* (ARCO Alaska, Inc. 1996)

> *Optimize siting by mapping wildlife habitat and use, subsistence areas, and important terrain features.* (ARCO Alaska, Inc. 1996*)*

In summary, mitigation measures related to location of facilities are generally those that alter project design to avoid high use subsistence areas and resource habitat. These measures are intended to reduce disruptions to subsistence activities and to reduce hunter avoidance of facilities in key hunting and harvesting locations. During the literature review, the study team identified mitigation proposals and measures related to facility locations in documents for the Alpine and Alpine Satellites development projects. In addition to altering the location of facilities as mitigation measures to address subsistence impacts, the EIS process considers the locations of facilities in its evaluation of multiple project alternatives, resulting in the selection of an environmentally preferred alternative.

5.4.2 Analysis

The study team assessed the effectiveness of the location of facilities mitigation type as well as one specific facilities related measures (**M9**) associated with the Alpine project (Table 17 and Appendix A). This assessment included information from four Nuiqsut residents and CPAI. CPAI also provided general observations about the location of facilities mitigation type.

Table 17: Location of Facilities – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M9	Alpine	CPAI	ARCO Alaska, Inc.	Re-locate and re-configure pads and other facilities farther north of Nanuq Lake to avoid key subsistence use areas and activities.

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5.4.2.1 Implementation

Nuiqsut residents provided mixed responses as to whether measure **M9**, which states that ARCO would re-locate all pads farther north of Nanuq Lake to avoid key subsistence use areas and activities, was implemented. One person recalled ARCO Alaska, Inc. changing the design of their project and one individual did not know. A third resident explained that CPAI did not consider similar mitigation for the subsequent CD4 and CD2 developments. This person said,

> *Our original hunting grounds, before Alpine started, are now gone. They change and put CD4 and CD2 right by Nigliq Channel and [there is] still an impact to our people even though they say [they would not impact] and after they get permit and ran through on that, they changed [the design] and forgot what they said.* (Nuiqsut Key Informant November 2012)

CPAI confirmed that measure **M9** had been implemented, stating that the site was "moved prior to construction based on village input" (CPAI Written Response December 2013).

5.4.2.2 Monitoring

The study team was unable to obtain any information regarding whether or not this measure was monitored for implementation. CPAI responded that ongoing monitoring was not needed. One local resident indicated that state and federal agencies as well as local organizations were involved in overseeing the mitigation.

5.4.2.3 Assessment of Effectiveness

Each of the four Nuiqsut residents that provided information on the effectiveness of CPAI's measure to locate all pads more north of Nanuq Lake (measure **M9**) reported that the mitigation measure was ineffective. Two residents discussed that even though the intentions of the mitigation measure were to avoid key subsistence use areas, the impact still occurred and residents no longer used the traditional camp at Nanuq Lake. They said,

> *Well, now that Nanuq was high use area, we don't use that no more. The places we utilized like Putu, we don't use that any more. …Our original hunting grounds, before Alpine started, are now gone.* (Nuiqsut Key Informant November 2012)

> *I would think nothing is ever too far away. But in relation to waterways and river, yeah [effective], but still people and families that used to camp out there and spend summers out there don't do that anymore more, save for [elder's] place. They have a cabin there.* (Nuiqsut Key Informant November 2012)

Another resident indicated that the addition of the CD4 development associated with Alpine Satellites compounded the impact to residents' subsistence uses of the Nanuq area and caused further avoidance , in addition to reportedly interrupting the caribou migration route:

> *CD4, no. It is really close to the river. There is a camp over there that is abandoned. So I can't say that they did. It still affected [us]. 2,000 to 3,000 feet is not [an adequate setback], and if BLM says they don't have to, they don't have to…. [There were] two families and they don't hunt there anymore. They don't even fish there anymore. You don't see caribou at the hill right there…. [There was a] major caribou crossing [there]; that goes across the traditional migration route. [They were] offset from the original migration route. At first they told us only one Alpine and then boom 2, 3, 4, and [it became] bigger and bigger and more pipeline and connections to Alpine.* (Nuiqsut Key Informant November 2012)

A fourth resident explained to the study team that this type of mitigation needs to consider not only the impacts on high use areas but the impacts on subsistence resources, particularly those that migrate through the area. Although the mitigation measure may be aimed at protecting the use area, if the subsistence resources are disturbed to the point that they are no longer available in traditional harvesting areas, then the mitigation is also ineffective. This person commented,

> *That's a catch 22 question right there, because they talk about the subsistence use areas [in their document], and the locations of the facilities are directly where the heart of the migration route used to be. Before we answer that question, we need to understand the traditional knowledge [about animal habitat] and put it in there [in order] to determine whether the strategic locations of those facilities were effective in reducing impacts on subsistence hunters. Those facilities changed the route of the caribou migration. And the surveys on the birds displace the subsistence users. It's not just the subsistence user but the subsistence resources that need to be considered.* (Nuiqsut Key Informant November 2012)

Although they did not comment on the specific **M9** measure, CPAI indicated that "project specific location of roads, pads, and river crossings" was one of the measures most commonly

requested by Nuiqsut and therefore effective in addressing Nuiqsut concerns (CPAI Written Response October 2013).

5.4.2.4 Effectiveness Summary/Conclusions

While Nuiqsut residents assessed the specific mitigation measure (**M9**) to move pads north of Nanuq Lake as ineffective, their comments indicate that the measure could have been effective if implemented differently. The location of facilities mitigation type is a measure that is frequently considered during the planning process for development projects and one that can be effective to a certain degree (e.g., facilities relocated from areas of higher use to areas of lower use). However, based upon the responses from Nuiqsut residents, it appears that the specific measure to move pads farther north of Nanuq Lake was ineffective in reducing impacts to subsistence uses in the Nanuq Lake area. The success of this mitigation type depends upon consultation with local community members and project specific research regarding subsistence use areas, wildlife habitat, travel routes, and to what extent facilities can or should be moved to avoid impacts as intended. In the case of Nanuq Lake, the facilities were not relocated at an adequate distance from high use areas such that the impact of user avoidance could be prevented. As discussed under "Guarantee Access to Subsistence Resources" additional mitigation measures focused on user avoidance are necessary, especially when facilities cannot be relocated out of traditional use areas.

5.5 Pipeline Elevation and Placement

5.5.1 Overview/History

Pipeline elevation and placement mitigation measures account for a substantial portion of the mitigation measures related to the potential impacts of oil and gas development on subsistence hunting in Nuiqsut. Subsistence users rely on the regularity of annual caribou migrations to ensure a sufficient harvest. However, research and local observations indicate that pipeline glare, pipeline proximity to roads and other pipelines, low-lying pipelines, and the proximity of pipeline entry and exit locations near river banks and coastlines can affect caribou distribution, migration, and behavior (SRB&A 2009, 2010b, and 2012; National Research Council 2003). In addition, pipelines have the potential to affect user access for local hunters traveling by snowmachine. Mitigation measures related to pipeline elevation and placement may include implementing a minimum pipeline height to allow for unimpeded travel of wildlife and humans, rerouting pipelines to avoid sensitive habitats or subsistence use areas, and designing pipelines to include crossing areas for caribou and subsistence users.

The development of pipeline-related mitigation measures primarily have been in response to community concerns about the impacts of pipelines on subsistence uses and wildlife, particularly caribou. Nuiqsut residents have cited pipelines as a common obstacle for both subsistence hunters and migrating caribou. Community concerns range from general concerns about the presence of pipelines to specific concerns about the ability to maintain subsistence activity and

avoid disruption of caribou migrations. As noted in SRB&A (2010a), difficulty hunting, displacement of wildlife, and movement impediments were among the top five concerns identified in SRB&A's literature review, and caribou was the most frequently mentioned resource in all documented concerns. In addition, according to SRB&A (2009), which documented North Slope harvester experiences with the impacts of oil and gas development, 30 percent of Nuiqsut respondents' experiences were related to pipelines. Residents' most common experiences with the impacts of pipelines were the displacement of caribou from migration routes, caribou travel disrupted by pipelines elevated less than seven feet, and loss of traditional hunting areas due to pipelines (SRB&A 2009).

General concern about the presence of pipelines is summarized by one resident's comment below:

> *When they start to build a pipeline across the whole NPRA our entire area will be covered with pipeline and we won't even be able to hunt caribou. That already happened with Kuparuk, our traditional hunting ground. It's covered with pipelines.* (SRB&A 2009)

In addition to concerns about pipeline glare deflecting caribou, residents also expressed concerns about the height of existing pipelines and about the originally proposed minimum pipeline height of five feet. Low-lying pipelines can hinder subsistence hunters on snow machines during winter months. In addition, residents have witnessed large bull caribou that were unable to pass underneath low-lying pipelines. Residents provided the following remarks:

> *I think what caused the caribou from diverting from the Prudhoe Bay, Kuparuk area is the height of the pipeline due to the fact, the requirement, is a minimum of five feet, and especially when there's winter months, where snow starts building up, I mean there's absolutely no way that caribou can go underneath the pipeline, I think that's what's causing some of the caribou to come towards the west, especially the part of the Central herd* (USDOI, BLM 1997).

> *So to comment again about the pipeline, it is very much too low, like what Isaac was saying. When you drive to Prudhoe Bay it's so low they're not going to cross and the crossings are so many miles. How can you herd caribous to the crossings? So I'd like for that to be higher; minimum of 10 feet is what the city and Native village is proposing so the caribou can have access. Because caribou sustains our life: we eat it, it's free, and everyone here eats caribou* (USDOI, BLM 2003).

EIS mitigation proposals for the seven development projects considered many of the community concerns related to pipeline placement and elevation. Mitigation records indicate that CPAI originally proposed a five feet minimum pipeline height for Meltwater and Alpine Satellites, but later increased this to seven feet (measured at the vertical support members) and also proposed to

increase the minimum distance of pipelines from roads and other pipelines from 300 feet to 500 feet (USDOI, BLM 2004c, USACE 2001). These recommendations were also carried forward into the ROD for Alpine Satellites. In contrast, planning documents for the Endicott and Northstar projects (published before the Meltwater and Alpine Satellites documents) proposed a minimum pipeline height of five feet with no recommendations for raising the minimum height requirement. Recommendations to increase the pipeline height to a minimum of seven feet were most prevalent in EIS documents for the Alpine Satellites project. The following comment from the Alpine Satellites Final EIS documents the original community concerns, which led to the seven feet height requirement:

> *Subsistence users do not believe that a minimum pipeline height of 5 feet is adequate for caribou passage, unless something, such as insects or predators, is motivating the caribou. Several Nuiqsut hunters related the following scenario as evidence that pipelines deflect caribou:*
>
> *Some caribou have a hard time crossing the Meltwater pipeline. Some of pipeline is too low—four to five feet; it needs to be 7 to 8 feet for caribou to get to calving grounds and the ocean where it is cooler.* (USDOI, BLM 2004d)

Pipelines may impact subsistence user access in two ways: (1) subsistence users traveling by snowmachine or ATV cannot cross under pipelines when snow conditions result in reduced pipeline clearance, forcing subsistence users to follow pipelines looking for an area where they can cross (USDOI, BLM 1997) and (2) subsistence users are reluctant to shoot around pipelines. A Nuiqsut hunter expressed the difficulty of crossing pipelines:

> *Well the recommendation from the community for outside development was either bury a good portion of the pipeline or elevate it high enough. I mean 5 feet is not adequate in the wintertime. There's no way that you can cross, even with a snowmobile. You have to follow the pipeline in order to get to an area where you can you can finally cross it. It could take you an additional 10 miles of the quickest route that you might be able to come home on, but because of the height of the pipeline and the snowdrifts, that makes it that much harder, and I do think that the caribou have that same problem as like we do." (Isaac Nukapigak 1997 National Petroleum Reserve-Alaska Scoping, Nuiqsut).* (USDOI, BLM 2004d).

Proposed mitigation in the Alpine Satellites DEIS and FEIS also included burying sections of pipeline, as suggested by some local residents. The FEIS notes that the North Slope Buried Pipeline Study Team found buried pipeline especially effective for undisturbed caribou migration along sections where the pipeline was near roads or other pipelines or known caribou river crossings but also brought other limitations associated with high cost, identifying and repairing corrosion and leaks, and melting surrounding permafrost (USDOI, BLM 2004d).

Buried pipeline also reduced the barriers to caribou and hunter passage caused by excessive snowdrift.

SRB&A identified six mitigation measures relevant to both subsistence use and the elevation and placement of pipelines. Two broader categories encompass these six mitigation measures: interference to sites important for cultural or subsistence use and barriers to the movement of wildlife and hunters. Early mitigation measures related to pipeline height and placement, such as the measures proposed by ARCO, Alaska in their EED for the Alpine project (ARCO Alaska, Inc. 1996) indicated that pipeline entry and exit locations would maintain a minimum of only 300 feet from river banks and that pipelines be elevated to a minimum of just five feet:

> *X14 HDD pipeline entry and exit locations to be at least 300 ft from each river bank.*
>
> *Action: Elevate pipelines to heights greater than 5 ft at river/ stream crossings (as dictated by local topography) and a special use area between lakes located two miles east of the Colville River. Benefit: Avoids impacts to fish, wildlife, habitat, and water quality. Enhances free passage for migrating caribou.*
>
> *Action: Elevate pipeline to nominal 5 ft above ground on VSMs across tundra (exceptions noted above). Benefit: Avoids caribou passage obstruction and minimizes impact on fish, wildlife, habitat, and subsistence use.* (ARCO Alaska, Inc. 1996)

ARCO Alaska, Inc. also indicated that pipelines would be re-routed to avoid impacts to fish, wildlife, habitat, and subsistence use areas:

> *Action: Re-route pipeline (using ARCO's habitat and use mapping and interested parties' comments) to minimize contact with sensitive habitats and use areas* (ARCO Alaska, Inc. 1996).

Both a seven foot minimum pipeline height and 500 feet distance from roads and existing pipelines were adopted as mitigation for the developments at Meltwater and Alpine Satellites. These increased heights and distances were largely the result of public concern over earlier developments by CPAI at Alpine. The following from the NSB Planning Department specifically addresses the Meltwater development:

> *Development is required to be located, designed and maintained in a manner that does not interfere with the use of a site that is important for significant cultural uses or essential for transportation to subsistence use areas.*
>
> *The proposal as submitted by Phillips Alaska, Inc. shows accommodation for both terrestrial travels for cultural and essential travel. Phillips has proposed a minimum of 7-feet for the pipeline height for the subsistence user transportation*

needs. Additionally, the KSOP has taken the opportunity to listen and suggest concerns that may be conflicting. The general feeling is that the 7-foot minimum is certainly directed to address the concern. (NSB 2000b)

In summary, concerns cited by Nuiqsut residents about potential hindrances to wildlife migration and subsistence access have led to mitigation actions relating to pipeline elevation and placement. Pipeline elevation and placement may cause impacts to subsistence users in two ways: placement of pipelines in areas important for cultural or subsistence use can cause user avoidance, and pipelines may act as barriers to the movement of wildlife or hunters. The measures addressed under this mitigation type include elevated minimum pipeline heights, buried pipelines, increased minimum distances for pipeline facilities from river banks, and increased pipeline distances from roads and other pipelines.

5.5.2 Analysis

The study team assessed the effectiveness of the pipeline elevation and placement mitigation type as well as three specific pipeline related measures (**M10**, **M20**, and **M25**) associated with the Meltwater and Alpine projects (Table 18 and Appendix A). This assessment included information from an NSB individual, four Nuiqsut residents, and CPAI. Other agencies associated with these measures included ADNR; the study team was unable to collect information from ADNR regarding these specific measures. CPAI and BP provided general observations about this mitigation type.

Table 18: Pipeline Elevation and Placement – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M10	Alpine	CPAI	ARCO Alaska, Inc.	Re-route pipeline to avoid key subsistence use areas.
M20	Meltwater	CPAI	ADNR	5-foot minimum pipeline height to ensure unrestricted human use of the area.
M25	Meltwater	CPAI	NSB	Minimum of 7-feet pipeline height to allow subsistence user access.
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5.5.2.1 Implementation

The pipeline elevation and placement measures assessed in this study include two conflicting pipeline height measures for the Meltwater project (**M20** and **M25**), and a plan to re-route pipelines to avoid key subsistence use areas for the Alpine project **(M10**). Two of three Nuiqsut residents who provided information about the Meltwater measures, which required both a 5-foot and 7-foot minimum height, indicated that the pipeline elevation for the Meltwater pipelines was implemented at seven feet, as required in measure **M25**. A NSB informant also confirmed that the Meltwater pipelines were installed at seven feet. Furthermore, in their written response,

CPAI reported "Pipelines are elevated at least seven feet above tundra" (CPAI Written Response December 2013).

One Nuiqsut individual stated, however, that the pipelines were not at the specified height required in the **M25** measure, and another resident said they did not know if the pipelines had been installed at the specified height. Describing the need for a seven foot pipeline clearance to allow animal and subsistence user movements, a NSB respondent said,

> *That was another issue that was raised, not just the free movement of caribou but the free movement of users to be unduly corralled to travel 15 miles away. They should be able to go under the pipeline. Five feet is not enough space to get a snowmachine to get underneath when the snow piles up. We try to balance free movement of caribou and not corral the subsistence users themselves.* (NSB Key Informant October 2012)

Several individuals noted that drifting snow can dramatically affect distance between the pipeline and the ground. One individual believed that the pipeline height for the Meltwater project was not consistently seven feet across the length of the pipeline, and noted that changes in terrain may affect pipeline height in some places. This person observed, "It is five feet because in winter time it goes down to three feet. A lot is five feet but some of it is seven feet and some of it is 12 feet. [There are] places where it was seven feet but because of sediment it went down a little" (Nuiqsut Key Informant November 2012). A second Nuiqsut resident maintained that the Meltwater pipeline was never elevated to the required height, saying, "Never happened. If you go to Meltwater and back out away, it is less than five feet in most places" (Nuiqsut Key Informant November 2012).

For the Alpine related measure (**M10**) that CPAI re-route the pipeline to minimize contact with sensitive habitats and use areas, Nuiqsut residents all indicated that they did not know if the measure was ever implemented. One person said,

> *I don't remember if they did. I know they worked with Kuukpik a lot. So it might have been that they did. I worked with the soil surveyors, and we did a lot of probing and soil sampling on the route. But we never had to go back and check another spot. I think they stuck with what Conoco said was best. I don't know.* (Nuiqsut Key Informant November 2012)

However, CPAI stated that this measure had been implemented and noted, "Pipelines were planned using input from various stakeholders, including the community" (CPAI Written Response December 2013).

5.5.2.2 Monitoring

During discussions with the NSB individual, the study team learned that the NSB Department of Wildlife Management is responsible for monitoring the pipeline-related measures and receives

reports related to pipeline height. These reports are primarily focused on monitoring wildlife resources including their interaction around infrastructure such as pipelines. One local resident remembered a meeting with the NSB regarding their compliance officers monitoring for the seven foot pipeline height (measure **M25**). This individual said, "NSB was doing that. I remember a big meeting on height of Meltwater [with the] compliance officers. I don't remember if they fined [them] or fixed it. In some places [it] was less than seven feet" (Nuiqsut Key Informant November 2012). Another individual added that the community and Borough had monitored this mitigation measure.

Although not specifically assessed for the USACE, the study team learned during general discussions with the USACE respondent that the USACE requires the seven foot stipulation on all their permits and will send out compliance inspectors to monitor the height of the pipeline. This person described the USACE procedures saying,

> *The seven foot height of pipeline wasn't required [before], but now is a standard condition on all Corps permits. It seems to help and caribou can easily go under it when [there is] no snow. It is mostly for subsistence hunters to not hit their head….Yes, we actually do [monitor]. It is the lowest cross member of the pipeline [from which they measure].* (USACE Key Informant July 2012).

5.5.2.3 Assessment of Effectiveness

Nuiqsut residents provided varied responses as to the effectiveness of the pipeline elevation mitigation measures implemented for Meltwater (**M20** and **M25**). Two individuals described the mitigation as ineffective or not implemented and the resulting difficulties the pipeline has created on user travel. They explained,

> *Some of them [you] have to go all the way around and find where they could cross and in some places you can't cross at all.* (Nuiqsut Key Informant November 2012)

> *When I was at Meltwater, I had to find a place to cross; I had to follow the pipeline to find a place to cross because the snow banks were so high. Even when you drive in the summer, they're low and there's no place for the caribou to cross….* (Nuiqsut Key Informant November 2012)

One Nuiqsut resident described the mitigation as effective but needing improvement in areas where the snow tends to drift. This person said,

> *It is not high enough in some places. I have driven there and it looks low, maybe because the road is high. It is different height in some places. Maybe [due to] hydrology…. I think so. [There are] places where [the snow] is more likely to drift. I know the Alpine pipeline is up to 12 feet. [There are] pretty high drifts. The state says [it should be] five feet but you will see [snow] drifts and pipelin*e

> *height is about three feet in dead of winter.* (Nuiqsut Key Informant November 2012)

Another Nuiqsut informant considered the mitigation to be highly effective, especially in comparison to older pipeline projects near Kuparuk and Prudhoe Bay, which severely limited user access:

> *Highly effective I say, compared to some sites at Kuparuk and Prudhoe Bay. I know that because I have taken some of those trips between here and Prudhoe Bay and getting past pipeline from here to Kuparuk is no problem but Kuparuk to Prudhoe Bay you have to go around.* (Nuiqsut Key Informant November 2012)

During interviews with active caribou hunters in 2010 (SRB&A 2011), 15 percent identified pipelines at seven feet as a helpful mitigation measure; 46 percent indicated this measure needed improvement. While some believed that seven feet was adequate to allow passage of caribou and hunters, others believed that seven feet was not high enough, especially during the winter with drifting snow:

> *There's some parts where they are pretty low actually like three, three and a half feet. I've seen like only three crossings and they are like two miles apart.* (SRB&A 2011)

> *I wish they could bury that pipeline. Gosh you don't know how the pipeline height is measured. A bull caribou with a big rack, or is it measured during winter? No one knows how it is measured.* (SRB&A 2011)

> *Usually you see them just walk underneath them. But in the low spot they'll just walk up and turn around. Some parts are high enough but most parts are kind of low. With the snow machines we have to go all the way around with the snow drifts and everything.* (SRB&A 2011)

Regarding the pipeline elevation measures, CPAI indicated that "There are no documented cases of access restrictions [for subsistence hunters]" (CPAI Written Response December 2013). However, as indicated above, some hunters have reported difficulties crossing under the Meltwater pipeline due to snow drifts.

Because residents were unsure if CPAI had implemented their mitigation measure to re-route the Alpine pipeline to avoid sensitive habitat and use areas (measure M10), they did not provide an assessment of effectiveness.

Although not commenting on the effectiveness of the specific pipeline elevation measures selected for this analysis, the BP key informant provided some general observations about these measures, indicating that the push for higher pipeline elevations beyond the current seven feet is not supported by research. He observed,

> *There are places where [mitigation measures] are clearly working, and there are places where it's ambiguous, and there are a few examples. Pipeline height keeps changing. I'm just not convinced that a caribou cares that the pipeline is seven feet or six feet. It doesn't matter if it's 10 feet or seven feet. To do the studies, you're never going to figure out that piece of biology [the exact height needed]. I think raising them higher than three feet [is reasonable], and maybe higher than five feet [is reasonable], but when you start getting to six, and seven, and 10 feet, the next thing you know someone's going to want to raise it to 20 feet.* (BP Key Informant March 2013)

CPAI also provided a general observation about the effectiveness of pipeline elevation measures, indicating that scientific research had not provided evidence of the benefit of a 7 foot pipeline elevation over a five foot elevation:

> *If effectiveness means that elevation of pipelines to a minimum of 7 feet above tundra level has been effective, this would be difficult to tease out specifically as caribou have been able to negotiate movement under 5 foot pipelines in the Kuparuk fields. In general, increasing pipeline height from the original Prudhoe Bay pipelines of 2-3 feet has improved caribou movement; however, monitoring data does not indicate 7 feet is better than 5 feet.* (CPAI Written Response October 2013)

CPAI listed increased pipeline height as one of the measures most often requested by Nuiqsut and therefore effective in addressing Nuiqsut concerns (CPAI Written Response October 2013). CPAI also noted that they fund yearly studies on caribou movement around pipelines during the insect relief season[7].

5.5.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, the study team assessed the pipeline elevation and placement mitigation type as a generally effective mitigation measure when pipelines are elevated to seven feet. Pipelines lower than seven feet appear to pose a barrier to subsistence users' access. One potential measure to address Nuiqsut residents' concerns about winter travel under pipelines would be to conduct monitoring studies prior to pipeline placement to determine areas most likely to drift during the winter and elevate the pipeline higher in those specific locations to allow for better access. Some residents continue to suggest buried pipelines as an alternative mitigation to elevated pipelines because buried pipelines reduce barriers to caribou and hunter passage and remove concern over pipeline glare.

[7] Such studies could be useful in determining whether pipelines are at an adequate height for caribou passage during the snow-free season, but do not address hunters on snowmachine during the winter.

5.6 Water Vessel Management

5.6.1 Overview/History

Water vessel management measures generally restrict development-related water vessel activity, including seismic testing, during certain periods of time to avoid conflicts with subsistence activities related to whale hunting. These measures are often incorporated into CAAs (discussed above).

The potential impacts of water vessel activity on subsistence activities and species is a concern that has been voiced by North Slope residents. Barges and seismic vessels have the potential to deflect subsistence species away from their normal routes and may cause conflicts with subsistence users during peak times of harvest. Of the 33 Nuiqsut respondents during SRB&A's 2007 interviews with active harvesters (SRB&A 2009), 79 percent volunteered concerns related to displacement of wildlife, while 85 percent responded in the affirmative when cued about these concerns. Fourteen of the 33 respondents volunteered concerns about displacement of marine mammals due to development activities, while five respondents reported concerns over deflection of bowheads from their normal migration paths. SRB&A's inventory of subsistence concerns also identified displacement of wildlife as the third most commonly reported concerns in scoping testimony; in addition, bowhead whales were the second most commonly mentioned resource in scoping related to seven development projects (SRB&A 2010b). Nuiqsut respondents have recalled their personal experiences related to the effects of offshore development activities and marine mammals as follows:

> *When all the activity was happening on the west side, there must have been 20 boats. That whale didn't even go south. It went straight west. It must have been listening to all the noise. I was involved with tagging the whales.* (SRB&A 2009)

> *I lost a whale because of [development activities]. I had to go 30 miles out and it got windy. One boat got swamped. [They] deflected bowhead 30 miles out from Cross Island. That was the time I first got a whale and lost it. They were doing drilling and activities in Camden Bay. One year they didn't catch a whale because of oil companies doing seismic.* (SRB&A 2009)

> *Lots of activities. Especially when the barges start. Our experience is the number of barges drive the whales out to deeper seas.* (SRB&A 2009)

Additional concerns related to displacement of bowhead whales are provided in the discussion under "Conflict Avoidance Agreement."

Suggested measures related to water vessel management are contained in planning documents for Northstar. While EIS documents for Endicott include comments on the potential impacts of noise on bowhead whales and whale hunters, these documents do not include suggestions for

limiting vessel traffic during the subsistence hunt; instead, the FEIS states that the project would not be subject to seasonal drilling restrictions (meant to avoid impacts on migrating whales). The study team identified recommendations for water vessel management in the FEIS and ROD for the Northstar project. The Northstar FEIS suggested both the restriction of vessel and helicopter activities during certain times to avoid impacts on subsistence hunters and bowhead whales, and included the following recommendations:

> *Measures that could be implemented to reduce the potential for such a cumulative effect include: prohibition of seismic survey activities during bowhead whale migration periods; coordination of helicopter activities to establish minimum transit altitudes and to minimize the length of overwater transit routes to offshore sites during the fall whale migration; prohibition of fall icebreaking barge activities prior to October 15; and coordination of vessel activity during the whale migration period to minimize the length of offshore transit routes. These requirements could be relaxed during other portions of the year.* (USACE 1999)

> *It must also be recognized that periodic and predictable offshore seismic operations have the potential alone to disrupt the whale migration and subsistence harvest, if not restricted in time and location (Section 9.5.1.1). Conducting a seismic operation during the fall bowhead migration near subsistence harvest areas in proximity to the Northstar production island could compound the minor impact of the island. Timing and location restrictions of any seismic operations proposed during Northstar construction and operations could eliminate or minimize these potential adverse cumulative effects.* (USACE 1999)

In addition, the Northstar ROD lists "The five conservation recommendations in the NMFS' biological opinion," which included the following two items:

> *1. Minimize vessel and helicopter activities after August 31 to reduce potential harassment of migrating bowhead whales.*

> *5. Restrict oil-spill vessel ice-maintenance activity until after October 15 of each year.* (USDOI, MMS 1999b)

NMFS carried forward the following mitigation measure related to water vessel management in its 2009 LOA for the Northstar Project:

> *(c). All non-essential boats, barge, and air traffic will be scheduled to avoid periods when bowhead whales are migrating through the area where they may be affected by noise from these activities.* (NMFS 2009)

During its literature review, the study team identified one water vessel management stipulation, which was cited in a 2008 NSB Administrative Approval for Northstar project related activities. The stipulation is as follows:

> *All vessel activity associated with this permit must be completed prior to September 1st of each year to avoid conflict with the subsistence whale hunt.* (NSB 2008b)

The study team also identified relevant policies written into the NSB's municipal code and in their coastal management plan related to water vessel management (these were not included in the study team's inventory of mitigation measures). One policy in the NSB municipal code relates to the restriction of offshore "nonessential boat, barge, and air traffic associated with drilling activity," before and after whale migration through the area, and directs the developer to coordinate such activities with the AEWC (NSBMC 19.70.040). In addition, Policy A-6 in the NSB coastal management plan had outlined restrictions on various offshore development activities that may impede subsistence harvest activities or defer the migration of marine mammals from their traditional routes (Glenn Gray and Associates 2007).

In summary, water vessel management measures address potential impacts to offshore hunting activities through restrictions on the timing and location of industry vessel operations. These measures are frequently included in CAAs with the AEWC; however, agencies also include water vessel management strategies in their permitting documents for projects. Water vessel management measures have also been incorporated in the NSB's municipal code and were once also incorporated into the coastal management plan when it was in effect.

5.6.2 Analysis

The study team assessed the effectiveness of the water vessel management mitigation type as well as one specific water vessel management measure (**M5**) associated with the Northstar project (Table 19 and Appendix A). This assessment included information from two Nuiqsut residents, one NSB individual, and the BP key informant.

Table 19: Water Vessel Management – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M5	Northstar	BP	NSB	Cease vessel traffic during bowhead whale hunt.

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5.6.2.1 Implementation

Two Nuiqsut residents and one NSB respondent reported that BP had implemented this measure **M5,** which requires that BP cease vessel traffic associated with the Northstar project during the bowhead whale hunt. The NSB individuals indicated that their knowledge of implementation went as far as knowing that BP coordinated with the AEWC regarding the water vessel

management and timing of activities, but that the NSB did not know the specific details of implementation saying,

> *That is a stipulation directly related to coordinating efforts with AEWC, if we don't have Conflict Avoidance measures in place, they would have stop gap measures in places. We can define the window of opportunity for subsistence users to be in that area. We will directly stipulate and tie it to a policy. They have done that.* (NSB Key Informant October 2012)

The BP key informant also noted that this requirement was likely included in the CAA, saying, "I did not run that study, but I feel pretty confident saying that we did this. If this was on a NSB permit, then it also would have been part of a CAA" (BP Key Informant March 2013).

5.6.2.2 Monitoring

Stipulations related to water vessel management are generally captured within the CAA implemented between the AEWC and industry. Therefore, for monitoring these types of stipulations, the study team learned that as long as there is confirmation by the AEWC that NSB policies within the CAA have been met, then the NSB considers the stipulation to be implemented. A NSB informant explained the Borough's method for monitoring this stipulation as follows:

> *I think they work with close coordination with AEWC under the guise of a Conflict Avoidance Agreement, but it is a private agreement between them. Once a Conflict Avoidance Agreement is confirmed, and we see that our policy has been met [then monitoring is complete]. We will hear that consultation with AEWC was not fruitful and there remains this concern out there in terms of activities that are going to go on without a Conflict Avoidance Agreement in place, and our own recourse would be to stipulate in that fashion [an individual water vessel management stipulation].* (NSB Key Informant October 2012)

The BP key informant indicated that any monitoring of this measure would likely occur in the form of monitoring complaints from hunters during the bowhead whaling season. He observed,

> *For this, [monitoring] would be a combination of whether they got any complaints from hunters and the com centers, but on top of that the Borough may have called someone at BP [to ensure it was implemented]. But I don't know for sure.* (BP Key Informant March 2013)

5.6.2.3 Assessment of Effectiveness

Two Nuiqsut informants and the BP key informant commented on the effectiveness of BP's water vessel management (measure **M5**) as well as on the mitigation type in general. One

individual indicated that the measure was highly effective and expressed concern that future non-development related boat traffic that would not be subject to this type of mitigation, saying,

> *I would give that a #1 in effectiveness specific to that one….Yeah [it has been implemented] across the board. But of course there is one company operator that may have slipped. Rating of #1 in general. Although I wonder if that will change now with the [Northwest] passage opening up? So it may not be just the industry vessels that we will contend with. It will be cruise liners, the public.* (Nuiqsut Key Informant November 2012)

The other Nuiqsut informant assessed this mitigation as being effective but needing improvement because the measure does not cover all types of water vessel traffic utilized by a company. This person explained,

> *Um. No, they continue to use airport and hovercraft. Some small ships they used to go back and forth from there, Northstar. Sometime we have to go west side and when you get close to Northstar you can hear them real loud…. They [are] going to need improvement and plan ahead to get everything out to Northstar so [that] we have less traffic. They need improve to get it [traffic] all into Northstar before whaling.* (Nuiqsut Key Informant November 2012)

The BP key informant rated the individual measure (measure **M5**) as effective, saying,

> *I would say I would look at the effectiveness of this individual measure. This would be effective, because the point is not to have ships out there when they're whaling from Cross Island.* (BP Key Informant March 2013)

5.6.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, the study team assessed the water vessel management mitigation type as a generally effective mitigation measure and sees it as closely related to the CAA mitigation type. Further exploration of the types of vessels that are covered under water vessel management mitigation may be warranted, given the concern raised regarding small vessel traffic and potential impacts on bowhead whaling.

5.7 Winter Operations

5.7.1 Overview/History

Subsistence harvesting in rural Alaska generally peaks during the spring, summer, and fall, with fewer activities occurring during the winter. Subsequently, disturbances to many (but not all) subsistence activities can be prevented by constraining development activities to winter months. Limiting development activities to winter months reduces noise, vibration, traffic, and human presence disturbances to most subsistence activities. In Nuiqsut, the winter exceptions are winter ice fishing, periodic caribou hunting, and furbearer (e.g., wolf and wolverine) harvesting.

Reducing disturbances to wildlife resulting from noise and the presence of humans is one of the primary goals of limiting certain development activities to the winter months. During the study team's inventory of Nuiqsut subsistence concerns, "displacement of wildlife" was the third most commonly mentioned concern. During SRB&A's 2007 study on the impacts and benefits of oil and gas development to North Slope harvesters, "displacement of wildlife" was the most frequently expressed concern, followed by "disruption of wildlife." In Nuiqsut, 79 percent of respondents volunteered concerns related to displacement of wildlife, and 73 percent reported having personal experiences with displacement of wildlife. In addition, "timing" of development activities was the second most suggested mitigation to address the impacts of oil and gas development. Residents frequently mentioned the impact of noise from traffic and seismic activities on subsistence resource availability. One individual noted the impact of air boats along the Nigliq Channel on their harvests of game:

> *The concern I have is with [my aunt]'s fish camp there. It's right by Alpine. And it upsets us because they run those airboats, on land and water and the noise scares off our game. They run wherever they want to with those choppers too. My aunt calls 'em noise makers. We can't pick eggs no more because they disrupt the birds and other game too.* (SRB&A 2009)

North Slope caribou harvesters expressed concern over the timing of development during interviews conducted by SRB&A, and a number of individuals suggested that industry schedule development activities for winter:

> *If they do give them permits, we just want to make sure they come at the right time. Like the winter. . . . Timing is a good thing for the oil company to know…* (SRB&A 2009)

> *If they did their drilling from November 1 until March 31, that would be a good time for them to be operating. It wouldn't hurt a lot of the activities going on in Barrow.* (SRB&A 2009)

Despite comments that support limiting development activities to the winter, a number of North Slope active harvester respondents specifically noted the impacts that winter construction and other development activities have had on their subsistence activities. In particular, these concerns were noted by furbearer hunters and others concerned about impacts on overwintering fish. SRB&A's (2009) report includes several representative comments from active harvesters, such as the comments from the Barrow and Wainwright residents below, which include concerns about the impacts of winter operations on subsistence resources:

> *In the early 1980s, rollagons, seismic crews, and ice roads started. I hunt wolverines and wolves in winter, occasionally. But there are so few wolverines now, maybe because of the noise.... (SRB&A 2009)*

> *I'm worried about our cabin area. The caribou and fish. If they do seismic in the winter, it will affect the fish. The wolf and caribou migration route. (SRB&A 2009)*

The study team found mitigation proposals pertaining to winter operations in planning documents for the Alpine Satellites and Northstar development projects including the FEIS for the Alpine Satellite development. These proposed mitigations addressed indirect impacts to fish and to water quality. Limiting construction to winter months was suggested as potential mitigation. Specifically, the FEIS states:

> *CPAI has proposed to install bridges at seven sites where roads would cross water bodies. These bridges would be constructed in winter when most of the water bodies that would be crossed are frozen, and fish would therefore not be present when construction occurs. Furthermore, for all road bridges except the Nigliq Channel and Ublutuoch River crossings, in-channel piers are not required. Because of this, at those locations, no fish habitat losses or alterations are expected from bridge construction at these sites.*

The FEIS also recommends winter construction to address potential indirect impacts on water quality, subsistence resources, and subsistence harvests. Specifically, the FEIS suggests the following mitigation to address these impacts:

> *Proper disposal of wastes. Facility design to minimize erosion. Construction during winter. BMPs during construction and operation.* (USDOI, BLM 2004d)

The DEIS for the Northstar project recommends limiting construction to winter to "minimize potential impacts to tundra, subsistence hunting, and migratory species" (USACE 1998b). Similar recommendations were carried forward into the FEIS and ROD for the Northstar project.

NMFS also included a mitigation measure related to the timing of winter construction activities in its LOA for the Northstar Project:

> *(i). In order to reduce the taking of ringed seals to the lowest level practicable, the Holder of this Authorization must begin winter construction activities, principally ice roads, as soon as possible once weather and ice conditions permit such activity.* (NMFS 2009)

During SRB&A's literature review, the study team identified two mitigation measures related to winter operations, for the Alpine and Meltwater projects. SRB&A did not find any agency stipulations in the permits it reviewed, mandating industry to limit development to winter months. However, the research team found that Phillips Alaska, Inc. (now CPAI) adopted mitigation concerning winter construction for Meltwater and that Arco Alaska, Inc. (now CPAI) adopted similar mitigation for the Alpine development into their project plans. Phillips Alaska,

Inc. indicated that they would conduct all major activities at Meltwater during the winter, when the ground is solid, primarily to lessen the damage to wildlife and wildlife habitat. The following excerpt originates from the Plan of Operations for Meltwater developments explaining the benefits of winter construction:

> *Design Feature: Conduct all major activities (e.g., pipeline construction, bridge construction, gravel mining, road construction) during winter. Expected Benefit: Eliminate impacts of construction on wildlife, minimize impacts to tundra and wetlands during construction and eliminate impacts from an access road.* (Phillips Alaska, Inc. 2000)

Arco Alaska, Inc. split construction for Alpine into two separate winters to avoid the greater impacts to subsistence, wildlife, and wildlife habitat brought by summer construction:

> *Avoids summer construction surface impact, wildlife and subsistence disturbance. Minimizes winter construction, wildlife and subsistence disturbance, and seasonal water demand for ice roads/pads.* (ARCO Alaska, Inc. 1996)

In summary, subsistence harvesting in rural Alaska generally peaks during spring, summer, and fall months and construction during this time increases disturbances to subsistence activities and resources. Disturbance of wildlife is a common concern cited by subsistence harvesters on the North Slope, and residents have suggested timing certain activities outside of peak subsistence seasons. Limiting development activities to winter months reduces noise, vibration, traffic, and human presence disturbances to subsistence hunting and fishing activities during the spring, summer, and fall. However, this mitigation does not address potential impacts to winter harvesting activities, particularly furbearer hunting.

5.7.2 Analysis

The study team assessed the effectiveness of the winter operations mitigation type as well as one specific winter operations measure (**M12**) associated with the Alpine project (Table 20 and Appendix A). This assessment included information from three Nuiqsut residents and written response from CPAI.

Table 20: Winter Operations – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M12	Alpine	CPAI	ARCO Alaska, Inc.	Construct pipelines during winter to reduce disturbances to subsistence activities.

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5.7.2.1 Implementation

The three Nuiqsut residents who provided information on measure **M12**, which limits CPAI's pipeline construction to the winter (Table 20), indicated that the measure had been implemented. One of the individuals provided their first-hand experience with this mitigation measure recounting their work as a dump truck operator during winter operations.

> *Yeah I think they did that in that regard. I remember those days because we had a meeting almost every day for a good half a year and infrastructure and, you remember [Nuiqsut resident], and they really didn't miss a thing. And they stayed on top and they were ensured that our community and life would not be impacted in any way, regardless of what industry was trying to do. But I think that impacted ARCO. Quite heavily. So I think I know that first time because I was working as a dump truck operator building ice road to Alpine the year before and at the meetings before it was drilled in us that if you spilled one drop on the ground and write it down and let me know and report it. They made doggone sure we followed rules.* (Nuiqsut Key Informant November 2012)

CPAI confirmed that this measure had been implemented.

5.7.2.2 Monitoring

One Nuiqsut informant provided a comment on the monitoring of CPAI's winter operations mitigation (**M12**). This individual identified the NSB and the Arctic Slope Regional Corporation (ASRC) as being involved in monitoring. This person discussed, "Borough was involved [in monitoring]. And ASRC I would say. Because they have a lot of contracts out here and subsidiaries" (Nuiqsut Key Informant November 2012). CPAI responded that ongoing monitoring was not required for measure **M12.**

5.7.2.3 Assessment of Effectiveness

Three residents assessed the effectiveness of the winter operations mitigation measure (**M12**). Two assessed the mitigation as effective but requiring improvements and the other assessed the mitigation as highly effective. Residents expressed that this type of mitigation was effective because it avoided the peak of residents' subsistence activities which occur during the spring, summer, and fall:

> *It is effective. Cause we do all our harvest in the summer. They continue to drill just in the winter months. It should stay that way.* (Nuiqsut Key Informant November 2012)

> *Yeah I would think so. For industry and company it was an easier time to do that, for their purposes. Of course you all know the caribou and wildlife migration is spring, summer, and fall and people didn't want any of that impact. The*

companies did the construction work during those times and I think it worked well for companies and us. Spring, summer, and fall we get around by boat and foot. We are limited to river and waterways and ocean. Anchor our boat and walk. Winter time we have snowmobiles and [it's] frozen and we can cover wider areas….I would say #2 [effective but needs improvement]. I say that because there is always room for improvement. (Nuiqsut Key Informant November 2012)

Another local informant added that winter construction is effective but noted that the monitoring of infrastructure that occurs during the summer months is still an impact.

Regarding the effectiveness of measure **M12**, CPAI stated, "Pipelines were constructed in winter when low subsistence activity was occurring and minimal wildlife species in the project area" (CPAI Written Response December 2013).

5.7.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, the study team assessed the winter operations mitigation type as a generally effective mitigation measure because it does avoid periods of high subsistence activity. However, not all impacts on subsistence can be avoided by moving development activities to the winter, as winter activities such as seismic testing have been cited as sources of disturbance by active harvesters during winter harvesting activities such as furbearer hunting.

CHAPTER 6: HISTORY AND ANALYSIS OF SOCIAL MITIGATION MEASURES

Similar to Chapter 5, this chapter provides the results of the key informant field visits and discussions as well as the study team's literature review, which informs the history and analysis of mitigation measures for the seven development projects as they pertain to Nuiqsut subsistence activities. This chapter focuses on those mitigation types that are not spatial or temporal in nature, but instead address impacts through social or economic measures. Community consultation is one example of a mitigation type that generally does not restrict development activities spatially or temporally. Mitigation funds are another. Social mitigation measures generally do not address a specific impact, but instead serve to increase communication, lessen concerns through consultation, and minimize impacts that cannot be avoided. The following nine mitigation types are addressed in this chapter:

1. Community Consultation
2. Employee Cultural Awareness Training
3. Employee Hunting Prohibition
4. Good Neighbor Policy
5. Mitigation Fund
6. Research on Subsistence Impacts
7. Subsistence Leave Policy
8. Subsistence Oversight Panel
9. Subsistence Representatives

6.1 Community Consultation

6.1.1 Overview/History

Community consultation mitigation measures are frequently stipulated in permits for development on the North Slope and may include both informal and formal mechanisms for communicating with local communities. Community consultation may include public meetings prior to or throughout a development project, meetings with community representatives, workshops or interviews with elders and other traditional knowledge holders, or direct communication (e.g., communications links) with community organizations or representatives related to activities in or near their communities. Community consultation often begins prior to the permitting phase through public scoping meetings and formal tribal government-to-government consultation. However, this consultation does not necessarily involve direct

communication between the developer and local residents. Thus, direct consultation with potential affected communities is a relatively common stipulation included in development permits.

The goals of community consultation are to provide information to local stakeholders regarding project purpose, design, and operations; facilitate communication with local residents regarding the potential impacts of a development project; to document traditional knowledge and incorporate this knowledge into project planning; to identify potential mitigation measures; and to communicate directly with community residents during project activities to avoid and minimize impacts. Consultation may also be achieved through coordinating with local subsistence panels or through the use of subsistence representatives, both of which are described under their own sections below.

Residents of Nuiqsut have expressed concerns about the outcome of consultation with local communities related to the impacts of oil and gas development. During SRB&A's review of scoping testimony from the three development projects (Alpine Satellites, Northstar, and Endicott) that held scoping meetings, "lack of influence" was the most commonly identified concern. As noted in SRB&A's inventory of subsistence concerns for this study (2010b), "Nuiqsut residents have voiced concerns about their inability to stop unwanted development; the sense that their concerns are not being heard; the loss of control over their subsistence use areas; the lack of involvement of stakeholders in decision-making processes; no avenues to report concerns about oil and gas activities (e.g., unauthorized use of private lands); lack of time and local expertise to comment on EIS documents; and lack of traditional knowledge, including residents' concerns, in EIS documents."

"Lack of Influence" was also a commonly reported concern during SRB&A's interviews with active harvesters in 2007 (SRB&A 2009). During the 2007 interviews, 24 percent of Nuiqsut respondents volunteered "lack of influence" as a primary concern related to oil and gas development. For all study communities (Barrow, Nuiqsut, Atqasuk, and Wainwright), 67 percent of respondents responded in the affirmative when asked if lack of influence was a concern. In particular, residents expressed concerns about the lack of influence over development, federal land managers favoring industry over Iñupiat interests, not enough weight placed on traditional knowledge of elders and active harvesters, and that development will occur despite Iñupiat concerns.

Residents' comments have included the observation that their frustrations lie not with the frequency of consultation in their community but with the manner in which consultation is conducted and residents' lack of influence over the outcome of development projects. In other words, despite voicing their opinions and providing suggestions at numerous public testimonies and consultation meetings over the years, residents believe their concerns and desires are not being heard. This is particularly true when permit decisions run contrary to local requests.

Nuiqsut concerns related to the need for more productive consultation include comments made during public scoping meetings for the Alpine Satellites, Northstar, and Endicott development projects, as well as more general comments related to oil and gas development:

> *The oil companies and the government officials keep coming to discuss the developments, but they do nothing to help us. They belittle our comments during the meetings. Our elders have been commenting for decades now and not one development has been stopped by anything we have said. The impacts are continuing, and we are commenting at these meetings about what they are. They are planning on the permanent developments to the west of us now. Why are we not heard?* (USDOI, BLM 2004b)

> *[Translator]: His concern right now is he feels that the people that are here right now have already done all the work and now, after you have completed all this work that you are doing, you come to us? His concern is that are you coming to us when you are done with your work and now it's too late for them to give you their comments? That's his concern.* (USACE 1996)

> *Regardless of how many comments or remarks we make toward a certain project, whether it be inland or out in the Beaufort or the Chukchi, there is always a way around that you guys go ahead and permit a certain company to do exploration or development. Will our comments have any effect toward the regards of this Northstar project?* (USACE 1996)

> *The oil and gas industry has opposed Nuiqsut concerns. ARCO used to work with us. Since Conoco took over, they are resistant. Before Alpine, all natural resources were abundant. That was the natural migration route for caribou--four to five thousand at a time. CD-2 is right on the migration route. There is a difference between ARCO and Conoco. Regardless of what the community says, ARCO was a good company to work with. They assisted the community from time to time. They'd make donations for students. It was a true partnership. It's different now. Conoco has a different business philosophy.* (SRB&A 2009)

Under Executive Order 13175 ("Consultation and Coordination with Indian Tribal Governments") (signed in November 2000), all federal agencies are required to have a process that ensures "meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications." Tribal involvement and consultation is also required during the NEPA process.

Planning documents for the seven development projects include suggestions to coordinate with the community of Nuiqsut. The DEIS for Alpine Satellites provided the most proactive suggestion for implementing consultation, recommending the development of a committee of subsistence users and agency and industry representatives, who would meet quarterly or

semiannually and whose purpose would be to provide information about development activities to local residents; identify community concerns; identify potential topics for research; and identify and resolve conflicts. This concept was also brought forward into the FEIS for the project, in addition to suggestions related to community outreach programs and general consultation.

EIS documents for the Endicott and Northstar projects did not include direct recommendations for community consultation related to subsistence impacts; however, these documents did include comments from agencies making these recommendations. The Endicott FEIS, for example, included a comment from the NSB recommending that a workshop involving local residents be implemented for the purposes of developing a method for monitoring impacts of the project. Their comment and the USACE's response are as follows:

> *NSB Comment: We suggest that a workshop be convened (including scientists, subsistence fishermen and hunters, and representatives of appropriate industrial and governmental groups) to consider the design of the monitoring effort. In this regard we would be pleased to offer the cooperation of the Borough's Science Advisory Committee. Such a "workshop approach" should result in the design of a reasonable monitoring effort that will provide the data needed to assess the presence or absence of adverse impacts.*
>
> *USACE Response: The offer to use the North Slope Borough's Science Advisory Committee to help design the monitoring effort is appreciated. If the project is approved, it may be advisable to have an agency workshop to finalize design of monitoring plans before actual monitoring is implemented.* (USACE 1984c)

The Northstar FEIS included a comment from the EPA stressing the need for consultation with Iñupiaq residents when identifying potential impacts and mitigation measures (USACE 1999). The Northstar ROD included several recommendations by MMS to coordinate with local communities (including local government), such as submitting a plan for "long-term coordination with local communities and subsistence users" (USDOI, MMS 1999b).

During its literature review, the study team identified 10 community consultation mitigation measures (including one categorized as "Engagement of Local Communities") (Table 11). Seven of the 10 mitigation measures were proposed by the NSB, one by the MMS, and two by ADNR.

In its approval letter for the Northstar development project, the MMS carried forward a recommendation from its ROD (mentioned above) as a condition of its approval:

> *Before production begins, BPXA must provide this office, the NSB, the AEWC, and the Native villages and tribal governments of Nuiqsut, Kaktovik, Barrow, and*

> *the ICAS [Iñupiat Community of the Arctic Slope] with a plan for long-term coordination with local communities and subsistence users. At a minimum, BPXA must conduct an annual review of Northstar activities with these interests. BPXA must notify this office of changes to plans and of any unresolved issues identified during coordination efforts.* (USDOI, MMS 1999c)

The DNR included a stipulation related to community consultation in its oil and gas leases both for Tarn and Oooguruk. The stipulation requires consultation with the affected communities and the NSB prior to submitting a plan of operations to "discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards of mitigating measures which could be implemented by the operator to prevent unreasonable conflicts" (ADNR, DO&G 1998; ADNR 2005).

The NSB included community consultation mitigation measures (not including those related to subsistence representatives or subsistence oversight panels, which are described later in this report) in its permits for the Alpine, Oooguruk, and Meltwater projects. These include requirements that the operator communicate with the village of Nuiqsut when they will be flying or conducting seismic surveys near the community; consultation with the community prior to initiation of development activities and a report of that consultation; a series of meetings with traditional knowledge holders to address impacts and develop mitigation measures; and incorporation of traditional knowledge into wildlife monitoring studies. These permit stipulations include the following:

> *CPAI shall avoid impacting subsistence activities by communicating with the village of Nuiqsut to let them know they will be flying in the area. NSBMC 19.70.050 (L), NSBMC 19.70.050 (J) 3.* (NSB 2009a)

> *Permitee shall avoid impacting subsistence activities by communicating with the village of Nuiqsut by setting up a communications link. NSBMC 19.70.050 (L), NSBMC 19.70.050 (J) 3.* (NSB 2009b)

> *Due to subsistence activities, (caribou and fishing hunting season) surrounding the State/Corporation Lands, these geotechnical activities shall inform the community and KSOP [Kuukpik Subsistence Oversight Panel, Inc.] of the use these Lands.* (NSB 2000a)

> *Develop a schedule and timetable for a series of meetings, prior to oil and gas development in the Meltwater Prospect, between the traditional knowledge and other experts to develop a fair and just agreement regarding the socio-economic and socio-cultural impacts of development on residents of the North Slope Borough. The discussions shall include the impact of development on caribou, caribou migration, fur bearing animals, fish, and waterfowl and access versus availability of these resources. The results of these meetings and conferences*

> *shall be the development of mitigation measures that will serve as guidelines for exploration and development in the Meltwater Prospect. These guidelines shall be updated at the request of any party participating in the documentation of subsistence needs every 3 years. NSBMC 19.70.050.* (NSB 2001)

While community consultation was not identified as a measure required in the NSB's code of ordinances, the draft NSB coastal management plan included the following forms of consultation in its enforceable policies:

> *For activities with a potential to significantly affect subsistence uses, applicants shall include measures in the project description to coordinate activities with communities to avoid disturbance to subsistence uses to the maximum extent practicable.* (Glenn Gray and Associates 2007)

> *For major projects with reasonably foreseeable adverse impacts to the availability of subsistence resources for taking for subsistence use, the subsistence effects analysis required by 11 AAC 112.270(b) shall not be deemed complete until the applicant:*

> *…Demonstrates that traditional knowledge about subsistence uses and effects has been incorporated into the analysis from available literature and from village or tribal entities closest to the project site.* (Glenn Gray and Associates 2007)

In summary, the need for improved consultation with communities related to oil and gas development is a concern that has frequently been voiced by local residents and which agencies have attempted to address through permit stipulations. Community consultation measures have been designed to anticipate the impacts of development, identify existing impacts, and develop measures to reduce those impacts. Mechanisms include meetings and workshops with subsistence users, direct communications links between operators and subsistence users, and incorporation of traditional knowledge into project designs and monitoring.

6.1.2 Analysis

The study team assessed the effectiveness of the community consultation mitigation type as well as six specific community consultation measures (M2, M13, M23, M24, M31, and M38) associated with the Northstar, Alpine, Meltwater, and Oooguruk projects (Table 21and Appendix A). This assessment included information from a NSB individual, a BSEE individual, four Nuiqsut residents, and written responses from CPAI. Other agencies and industry associated with these measures included the ADNR, BP, and PNRC; the study team was unable to collect information from these entities regarding these specific measures. BP and CPAI both provided general observations about the community consultation mitigation type.

Table 21: Community Consultation – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M2	Northstar	BP	MMS	Provide plan to MMS and local organizations for long-term coordination with communities and subsistence users; conduct annual review of activities
M13	Alpine	CPAI	NSB	Communicate with Nuiqsut about flying activities.
M23	Meltwater	CPAI	NSB	Coordinate a series of meetings between local residents and other experts to develop a set of guidelines for mitigating impacts of development.
M24	Meltwater	CPAI	ADNR	Consult with communities and the NSB to discuss potential impacts of development and methods for mitigating impacts on subsistence activities.
M31	Oooguruk	PNRC	NSB	Consultation with the village of Nuiqsut to assure that planned activities will not result in unreasonable interference with subsistence uses.
M38	Oooguruk	PNRC	ADNR	Consult with communities and the NSB to discuss potential impacts of development and methods for mitigating impacts on subsistence activities.

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6.1.2.1 Implementation

The six community consultation measures assessed for this project included mitigation focused on (1) developing long term plans for coordination, (2) notification of flying activities, and (3) consultation for operational activities and development of appropriate mitigation measures to reduce/prevent impacts. For four of the six mitigation measures shown in Table 21 (**M13**, **M24**, **M31**, and **M38**), all informants agreed that the measures had been implemented. For the **M2** and **M23** measures, one Nuiqsut resident said the measures had not been implemented and one replied they did not know if they were ever implemented. The remaining individuals believed the **M2** and **M23** measures had been implemented.

BSEE, BP, Nuiqsut informants discussed the implementation of measure **M2**, a MMS requirement that BP provide for a long term plan for coordination with local communities and subsistence users regarding the Northstar project. The BSEE individual reported that BP is continuing to implement this measure through periodic newsletter publications and described this newsletter as follows:

> *BP developed and continues to issue a periodic newsletter publication that is distributed to the communities, tribes and governments. [The mitigation*

measure] is ongoing and MMS [BSEE] continues to receive copies of newsletters. (BSEE Key Informant July 2012)

The BP key informant believed that this measure had been implemented, but was unsure what form the plan took, saying,

[The measure] is pretty broadly worded…. I'm almost certain someone's submitted a plan, and it's been expected. If you printed out a plan I could tell you whether [the things within it] were implemented. (BP Key Informant March 2013)

While one resident stated they were unsure of **M2's** implementation, another resident stated that it had not been implemented beyond the initial meetings and that the measure has not been continued as intended. This person explained,

No. Never been done. Only time they did that [was] when the first Northstar [was built]; they had lot of stipulations, but after it was built and whatnot, they have no consultation or communication with BP and don't come tell us [anything]. Nothing has been done. (Nuiqsut Key Informant November 2012)

In contrast with the above individual who indicated that the community receives no communication from BP, the BP key informant indicated that BP has a regular presence in Nuiqsut and said, "I don't know what people in Nuiqsut are saying [about our consultation], but they know how to reach us. They know we're reachable, and we have someone from BP up there regularly" (BP Key Informant March 2013).

Regarding measure **M13**, which requires CPAI to notify Nuiqsut residents of flying activities, all individuals that provided information on the measure agreed that the measure had been implemented to some degree. A NSB individual noted that this mitigation measure was developed in the early 2000s alongside the subsistence representative measure, indicating that the subsistence representatives are meant to be the primary mode of communication between the community and the developer. He noted that the subsistence representatives were developed in response to a better need to monitor industry activities, after an industry fuel tanker's track came off and damaged the tundra. Both Nuiqsut and NSB individuals agreed that subsistence representatives were supposed to be a key part of CPAI's communication with the community regarding flying activities. While informants agreed the measure had been implemented, two residents added that CPAI was not proactively implementing this measure and that the community had to continue to remind CPAI of the need to inform residents of the company's flying activities. They observed,

We had to tell them on and on every year and make sure caribou migration was not interfered. But this year they interfered, but every year they say [they will communicate with us], and we always tell them, we need to talk. They started

doing that after the communication was, the year before or last year when they were told to…. Yeah, every year we start over and remind them again and tell them to avoid the migration of caribou. (Nuiqsut Key Informant November 2012)

The communication was they were supposed to hire a subsistence rep or someone to fly with them. During hydrology studies because of the geese hunters….their summer studies…and that was a key person. That was with VHF…. [They stopped having the advisors fly with them]…Yes. I think they need a subsistence advisor. (Nuiqsut Key Informant November 2012)

CPAI described measure **M13** as an ongoing communication protocol which is continuously evolving based on the needs of the community. CPAI included subsistence representatives on helicopters as an example of another measure for reducing conflicts between subsistence users and helicopters:

To address concerns and impacts related to helicopter activity, CPAI has implemented a communication protocol with Nuiqsut. This protocol continues to be refined to implement effective communication methods so that helicopters avoid interference with subsistence hunters. Additional examples of mitigating impacts from helicopter activity include placing a representative of the community on the helicopter during periods of potential subsistence activity to guide the helicopter crew on areas to avoid due to subsistence fishing or hunting activities. (CPAI Written Response December 2013)

The study team asked Nuiqsut and NSB informants to describe their knowledge of the NSB's **M23** stipulation, that CPAI coordinate a series of meetings between local residents and other experts to develop a set of guidelines for mitigating impacts of development from Meltwater. A NSB informant reported that the mitigation had been implemented stating, "I was a lead on that project" (NSB Key Informant October 2012). Responses from Nuiqsut residents varied among all three individuals with answers of mitigation implemented, don't know, or not implemented. Both residents who said the mitigation was not implemented or were unsure of its implementation pointed toward the fast nature of the Meltwater permitting process and believed that the series of meetings never occurred. They said,

With Meltwater, no that didn't happen. Just the one time when they first met to implement the permit, for one purpose. It was one time. [They] came and talked about Meltwater and that was it. Then they would tell us that Meltwater was going to be right by the ground [pipeline]. And at that time we told them it had to be seven feet up from ground. Without saying nothing, they just put it in anyway [and ignored the suggestion]. (Nuiqsut Key Informant November 2012)

Not sure how many times they have met. My sister worked one year in observing Meltwater during calving season and [the stipulation requiring] no traffic during

that time, and she only observed one summer, and the pipeline route [went] from Two Well to Meltwater. And she said that they said totally no traffic [during calving], and that didn't happen. They just like did it only one year. But the series of meetings, it might have been not so many of them. That was a quick project that went up. One year of observation. (Nuiqsut Key Informant November 2012)

CPAI reported that they had consulted with the community and experts multiple times to address the potential impacts of the Meltwater project. They indicated that this consultation had resulted in the development of various mitigation measures to reduce impacts on local residents:

CPAI consulted with local residents and experts on multiple occasions to understand the potential socioeconomic and sociocultural impacts of the Meltwater development project on residents of Nuiqsut. Out of these meetings arose a number of mitigation measures including pipeline height and other measures identified in this [list of mitigation measures]. (CPAI Written Response December 2013)

Two ADNR mitigation measures (**M24** and **M38**) required that CPAI and PNRC consult with communities and the NSB to discuss potential impacts of development and methods for mitigating impacts on subsistence activities. All Nuiqsut individuals who provided information regarding these two measures reported that the mitigation had been implemented. A NSB informant stated that the process of consultation with the ADNR regarding the Meltwater project was an effective one, particularly because of the DGC's involvement and the coastal management program:

At the time we had a very robust and broad coastal management program. And we always sided for those that we had to make the determination whether it was in or out for projects that were within 25 miles of the coast. We may have commented to the DNR that in fact there could be adverse impacts to the availability of resources from these projects, and we wanted to make sure the state heard loud and clear [therefore it is a state stipulation in response to a comment from the NSB]….You know, the state had a very thorough Division of Governmental Coordination at the time, inclusive of coastal management, [NSB was] invited to pre-application meetings - DNR, DEC, NSB, everybody came together and talked about this project and what it meant to people. There was a coordinated response and effort. Once the coordination was done, the permits flew off and everybody knew what to do. I thought it always worked well. It provided a seat at the table for NSB to be heard. (NSB Key Informant October 2012)

Although Nuiqsut residents agreed the measures had been implemented, they commented that there was limited interaction and indicated that more consultation with local residents and organizations would have been appreciated saying,

> *I would say the majority of it [consultation] was with the NSB. Because that was a fast deal and really, we might have had the proposed project meeting and then the winter activities and then after that it was done [permits were issued]*. (Nuiqsut Key Informant November 2012)

> *They never consulted with Native Village but they talked with KSOP and the community. They needed to consult with Native Village because Native Village had jurisdiction over 25 mile radius [from the community]. Tribal needs more involvement.* (Nuiqsut Key Informant November 2012)

Similar to measure **M23**, CPAI reported that they had consulted with local residents and experts to address the potential impacts of the Meltwater project, saying, "CPAI consulted with local residents, biologist, engineers, and other experts to evaluate development plans and their potential impacts on subsistence activities" (CPAI Written Responses December 2013).

The final community consultation measure (**M31**) was a NSB requirement that PNRC consult with the village of Nuiqsut to assure that planned activities will not result in unreasonable interference with subsistence uses. In all cases, residents and the NSB individual agreed that PNRC had implemented the measure and several gave overall high marks to the company's community consultation procedures. Two provided the following responses regarding PNRC's implementation of mitigation measure **M31**:

> *They did a consultation. I can say so much more about the industry that come in and have a gung-ho want to get [things] done attitude and want to work with you. Pioneer is one of those that wants to be a good neighbor to their neighbors and use of the lands that they are entrusted to develop, and [they] work very well and closely with Nuiqsut. We have had minimal (issues)….The subsistence reps have been our primary contact. A liaison's job is to mediate how well you communicate and work with a village in terms of hiring and recruiting.* (NSB Key Informant October 2012)

> *Before anything happens they communicate with Nuiqsut and have a very good flight plan and work well with community [better] than any other [company]. They get subsistence reps from the village and get help with the project. Because they are offshore and going near shore and the project there had to work with our community to get studies that needed to be done.* (Nuiqsut Key Informant November 2012)

6.1.2.2 Monitoring

The study team was only able to gather mitigation monitoring information from agencies on four of the six measures shown in Table 21, as two of the measures were associated with the ADNR and were not evaluated by the ADNR staff. Regarding mitigation measure **M2**, the BSEE indicated that they are monitoring the stipulation through ongoing newsletters provided by BP. The NSB responded that the **M13** and **M31** measures were continuing to be monitored by the Borough staff and that the **M23** measure did not require monitoring as the meetings stipulated in the measure had already occurred.

Regarding the NSB's monitoring of CPAI's mitigation measure (**M13**) to notify Nuiqsut residents of flying activities, a NSB informant described an ongoing monitoring effort that focused on communications between industry, the Borough, and subsistence representatives. This person described the monitoring of this measure as follows:

> *There's monitoring because we had to mediate one [issue about lack of communication regarding aircraft overflights]. There was misunderstanding and after deliberation, it became a big event connecting village to development. First [we identify] what the issue is and who's doing it. How are you [as the industry] utilizing the mechanisms that are designed to mitigate circumstances to ensure they are in place, like neglecting to utilize the subsistence reps effectively? Leave them on the pad. Being able to effectively utilize subsistence reps was not panning out and there was communication between industry and the Borough as to what we expect the reps to be doing as well as the KSOP folks. Sometimes I think KSOP is being underused to be a store house of that and be able to help with the monitoring activities.* (NSB Key Informant October 2012)

CPAI indicated that there is ongoing monitoring of their communication protocol to ensure that it is adequately addressing residents' concerns. In their written response, they stated, "Village concerns about helicopter activity are important to CPAI and practices are modified as needed" (CPAI Written Response December 2013).

An NSB person indicated that monitoring for PNRC's **M31** measure, which requires that the company consult with the village of Nuiqsut to assure that planned activities will not result in unreasonable interference with subsistence uses, was ongoing and working well. One Nuiqsut resident provided several comments that community organizations such as the Native Village, City, Kuukpik Corporation and local subsistence representatives also all play a role in monitoring the implementation of mitigation measures.

6.1.2.3 Assessment of Effectiveness

In general, Nuiqsut residents and the NSB informants provided a mixed assessment of the effectiveness of community consultation mitigation measures, ranging from ineffective to highly

effective. The study team was able to gather little evidence regarding the effectiveness of the BSEE **M2** mitigation measure (provide a plan for long-term coordination and conduct an annual review of activities) (Table 21). The BSEE expressed that their agency did not establish measures of effectiveness as the mitigation measures were "informational and were not designed or intended to provide a quantitative or measureable mitigation" (BSEE Key Informant July 2012). One Nuiqsut resident did think the measure was highly effective, and the others were either unaware that the measure had been implemented or stated it never had been and thus could not provide an effectiveness assessment. The BP individual did not provide an effectiveness assessment rating, but did state that in general the measure is "effective, because you're formalizing a plan for coordination" (BP Key Informant March 2013).

Three of the four individuals who provided information on the effectiveness of CPAI's **M13** measure (notifying Nuiqsut residents of flying activities) indicated that the measure was effective but could be improved; the fourth individual described the measure as highly effective. Recommended improvements included conducting flying activities during the night and improving communication with the liaison/subsistence representatives. Two individuals described their recommendations as follows:

> *At first it was not effective until the people of village told them to start doing something different. [They should] start flying at night during the 24 hours of daylight. We suggested that and told them to work at night and all that 24 hour daylight [because] during the day the caribou migrate and at night they rest.* (Nuiqsut Key Informant November 2012)

> *[They distribute] emails or flyers saying this [the flight plan]. Not everyone reads them. Word of mouth would improve from a liaison [getting daily reports].* (Nuiqsut Key Informant November 2012)

CPAI stated that while measure **M13** was effective in reducing impacts from CPAI helicopter activity, there are multiple operators on the North Slope, and not all of them follow communication protocols such as CPAI's. The presence of other helicopter operators in the vicinity of Nuiqsut lessens the overall effectiveness of the measure. In their written response, CPAI stated, "This protocol is effective for CPAI; however, due to the number of other operators in the area utilizing helicopters the effectiveness is impacted by other operators not following similar communication measures" (CPAI Written Response December 2013). A similar statement was made by an NSB individual regarding subsistence representative mitigation measures. CPAI listed the implementation of a communication protocol for helicopter traffic as one of the measures most often requested by Nuiqsut and therefore effective in addressing Nuiqsut concerns (CPAI Written Response October 2013).

The study team asked Nuiqsut and NSB informants to provide their assessment of measure **M23**, which required CPAI to coordinate a series of meetings to develop a set of guidelines for

mitigating impacts from Meltwater. One Nuiqsut resident assessed the mitigation as highly effective and a NSB informant identified that the measure was effective but in need of improvement in that new guidelines for mitigating impacts can always be improved. This individual explained,

> *I think they [meetings] were highly effective, and there is always grounds for improvement. I think [at] the next stage of development we will see pipelines inside of the roads as the best mitigation…. Pipeline spacing and road research. There has to be ways to try and balance [industry and subsistence]. Northeast NPRA defined large areas as high subsistence use areas. Part of the record of decision is defining what was the priority of use areas and trying to mitigate those impacts and design with nature, [such as, make the] pad aesthetically pleasing like a pingo. I've seen some big [pingos], 500 feet high.* (NSB Key Informant October 2012)

Measures **M24 and M38** required the developer to consult with the communities and the NSB to discuss the potential impacts of their development and methods for mitigating impacts on subsistence. The assessment of effectiveness for the two identical ADNR mitigation measures (one for Meltwater and one for Oooguruk) indicated that PNRC's implementation was more effective than CPAI's, although in both cases respondents believed the measures could be improved. Two Nuiqsut residents commented on the effectiveness of CPAI's implementation of Measure **M24**. Each one reported that CPAI was ineffective in its implementation of this measure, with one noting a lack of ongoing consultation and another indicating that CPAI had not responded to community suggestions related to pipeline placement:

> *It was very ineffective in some ways because how they put in the pipeline, it was so low from Meltwater to CD2. They met with the village [which wanted to] make the pipeline seven feet high and that pipeline is low and the caribou came across that pipeline and divert one way to east or west. That is what happened to caribou this summer.* (Nuiqsut Key Informant November 2012)

> *#2 to #3 [rating of effectiveness]. It started good, but tapered off. They [CPAI] need to revive it. They got what they wanted [after permits] and there you go.* (Nuiqsut Key Informant November 2012)

Residents' evaluations of the same mitigation measure for PNRC's Oooguruk project (Measure **M38**) included all three effectiveness ratings (highly effective, effective but needs improvement, and ineffective). Criticisms of PNRC's implementation of this measure included a lack of communication or providing misleading information to the community. The Nuiqsut residents' comments, in order from highly effective, to effective but needs improvement, to ineffective, are presented below:

Highly [effective], #1. [Pioneer is the] top company we hear from. (Nuiqsut Key Informant November 2012)

There was a mishap that happened when [they] first developed Oooguruk, and they never let us know of the mishap, and [we] found out a week or two later. And they had oil when a tractor went through the ice and got stuck down there and another was a vehicle that got stuck and [there was] no communication until after the fact and then it was already too late and the impact was done. We need improvement with them, too. (Nuiqsut Key Informant November 2012)

I felt we were misled by Pioneer saying [the Oooguruk development] will be remote controlled. They said there will be nobody there, but they have to maintain that all the time. There is traffic all the time. They said 'unmanned camp.' And yep, okay, we like the idea but there are choppers flying there every day and people still working there. There is no camp there but they fly them every day. I would rather they make their camp right there and do shifts. But because [it is unmanned] over there, they fly them every day from Oliktok. (Nuiqsut Key Informant November 2012)

Nuiqsut informants also assessed Measure **M31**, a PNRC mitigation measure that required the company to consult with the village of Nuiqsut to assure that planned activities will not result in unreasonable interference with subsistence uses. For this measure, two of the four Nuiqsut individuals assessed this specific mitigation measure as highly effective saying,

They are usually good about consulting with Kuukpik. I don't hear anything really about Pioneer, because they are complying with their permits and everyone should learn from them. They are the most [responsive] and their people are really nice, and I was part of the group that went to Corvallis [to watch] the wave tank demonstration at OSU and they had a model. Our concerns were sandbags ripping and getting into props during whaling and they had a new mesh sandbag that are not supposed to wear and tear. The purpose of that was we told them about the cross-waves and whatever, and they showed us a model and the waves. It is highly effective. (Nuiqsut Key Informant November 2012)

Number 1 [rating of highly effective]. [Pioneer does an] outstanding job compared to other operators. Persistence and consistency and efforts in maintaining contacts. Other [companies] pursue [consultation] for a time and then forget about it. (Nuiqsut Key Informant November 2012)

A NSB informant complemented PNRC's efforts at community consultation, saying, "I think they've gone far and above what any other industry has done" (NSB Key Informant October 2012). Two other Nuiqsut residents assessed the mitigation as effective but needing

improvement, with one individual explaining that PNRC needs to improve their communication because of the increasing presence of cumulative effects in the area.

6.1.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, industry, and agencies, the study team assessed the community consultation mitigation type as an effective mitigation measure in need of improvements. The study team noted that the effectiveness of this mitigation type depends heavily on the commitment of the company that is responsible for implementing the measures. When implemented successfully, community consultation measures appear to be one of the most effective types of mitigation. Lack of communication was one of the most frequently cited criticisms of the mitigation process that the study team encountered.

6.2 Employee Cultural Awareness Training

6.2.1 Overview/History

The purpose of the Employee Cultural Awareness Training mitigation measure is to educate non-resident oil field workers regarding the culture and lifestyle of local residents of Nuiqsut. The goal of this measure is to increase cultural sensitivity among non-resident employees, and to avoid or minimize cultural misunderstandings between residents of Nuiqsut and non-resident oil field workers. Specific characteristics of the culture and lifestyle of Nuiqsut residents addressed in the training include Iñupiaq values of land and natural resources used for subsistence, importance of access to traditional hunting areas, protection of grave and other sacred sites, and maintenance of community social cohesion.

Measures related to cultural awareness have arisen from community concerns related to insensitivity of oil companies and oil company workers toward Nuiqsut residents and their culture and lifestyle as a whole. The SRB&A study team did not identify concerns that specifically indicated the need for employee cultural awareness training, however it did identify community concerns that could be minimized or avoided with cultural awareness training. In SRB&A's 2007 interviews with active harvesters, 18 percent of Nuiqsut respondents volunteered concerns regarding cultural impacts, while 73 percent of respondents responded in the affirmative when cued about cultural impacts (SRB&A 2009). Specifically, one third of Nuiqsut respondents voiced concerns about the "view of development as source of economic stability without understanding its effects on subsistence and culture," and another third of respondents had concerns about the "effects of development on cultural sites (e.g., cabin sites, cemeteries, burial grounds along coast, campsite, Native allotments" (SRB&A 2009). Social impacts and discrimination were also among the types of concerns identified in SRB&A's inventory of subsistence concerns for this study (SRB&A 2010b). Specific instances of misunderstanding regarding cultural practices were described during a discussion with a NSB key informant:

> *There are complaints of USGS [U.S. Geological Survey] moving land markers and saying it is trash. We use things that we can recognize like oil drums, antlers*

as landmarks and we look at that as removing cultural resources that were put there in place for a reason. Trappers use natural resources like antlers to tie to their traps; they use them as natural attractant of animals. We have complaints that come in saying that Shell is disturbing [the area] when they said they were not disturbing. (NSB Key Informant October 2012)

A Nuiqsut resident interviewed in 2007 voiced their concern of development activity disrupting traditional grave sites:

The oil companies travel doing seismic and surveys outside right now with snow vehicles. They should watch what they are doing. They don't know what they are stepping on. There are some graves out there they are running over. I see a lot like that. There is a graveyard southwest, maybe 20 miles from here, and some survey people don't care what they are doing. Do they have a [local] monitor? Do they hear what Native people say, not to step on or run over [a grave] – a dead person might be under it. Don't just ignore the stakeholders. Watch what you are doing. There is a graveyard out there. It was there before you were there. They did not dig down far in permafrost. Not just one graveyard out there, there are more. (SRB&A 2009)

General concerns of discrimination and insensitivity when interacting with non-resident employees has also been a concern reported by Nuiqsut residents:

One more thing. I am a United States citizen, just like you are, and last – two weeks ago, I really felt discriminated in my own backyard, in the oil industry. My colleagues are Caucasian and they, you know, go to the industry just like I do and they go through with no problem. And for me, maybe my hair is too black and my skin is too brown. I may be treated differently. So I want to point that out. I may be Native, but I'm not dumb and I'm not stupid and we aren't, and we just need that opportunity to rise to that level where they want us to be in order to get those jobs at Alpine or wherever. Our children need that opportunity. That's all. (USDOI, BLM 2003)

We've heard a few testimonies about what could happen, what we should do, and how we should do it. I don't think anything can be done if we don't work together as an equal opportunity. We are – we have been discriminated by the industry. Employment-wise, we have been discriminated by our own corporation, employment-wise, and the only people that benefit is the president, the treasurer and the CEO. Nobody else benefits. Nobody gets a job. And the only people that are working at Alpine now are non-shareholders, young kids that just got out of school last year and there's only two of them. Out of all four hundred and some odd community members here, we only have two people employed in the industry.

> *Once you get out of here, you go up to your airplane. On your way there, you'll be laughing at us. As soon as you close the door when we're done with this meeting, you'll be laughing at us because we are laughingstock of this whole exploratory thing that's going on up here.* (USDOI, BLM 2003)

The SRB&A study team did not identify any proposed employee cultural awareness measures in the planning documents. The study team identified employee cultural awareness training stipulations in two CPAI planning proposals for Meltwater and Alpine Satellites projects. The 1996 Alpine EED states:

> *Action: Provide non-resident oil field workers with cultural awareness training. Possible use of existing ASRC Iñupiat cultural awareness program.*
>
> *Benefit: Avoids/minimizes cultural misunderstandings by increasing sensitivity of oil field workers to Nuiqsut's culture and lifestyle including values of land and natural resources used for subsistence, importance of access to traditional hunting areas, protection of grave and other sites, and maintenance of community social cohesion."*(ARCO Alaska, Inc. 1996)

During its literature review, the SRB&A study team did not identify any government agency stipulations requiring employee cultural awareness training. However, according to MMS's (now BOEM) letter of approval for the Northstar DPP (MMS 2009), the Northstar DPP does include an environmental training and orientation program as one of the planned mitigation measures.

In summary, employee cultural awareness training is meant to improve the cultural sensitivity and understanding of non-resident oil field workers to reduce impacts on subsistence users. Employee cultural awareness training has been included in CPAI's planning documents for Meltwater, Alpine, and Alpine Satellites; it is unclear whether this training has been implemented among other developers on the North Slope.

6.2.2 Analysis

The study team assessed the effectiveness of the employee cultural awareness training mitigation type as well as one specific cultural awareness measure (**M6**) associated with the Alpine project (Table 22 and Appendix A). This assessment included information from four Nuiqsut residents and in written form from CPAI.

Table 22: Employee Cultural Awareness Training – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M6	Alpine	CPAI	ARCO Alaska, Inc.	Cultural awareness training for oil field works (including subsistence access).

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6.2.2.1 Implementation

Three of the four Nuiqsut residents agreed that the employee cultural awareness training mitigation measure **M6** had been implemented by CPAI for the Alpine project; the other individual did not know if the measure had been implemented. Those residents with knowledge of CPAI's cultural awareness training provided the following descriptions of its implementation:

> *Yes. Sure it is [ongoing]. Whether [it occurs at] Alpine or Anchorage, I am not sure. [There is an] orientation pamphlet.* (Nuiqsut Key Informant November 2012)

> *Every year they have orientation during the ice road project, and they have to have orientation. But I don't know if they implemented [with] their workers how to improve and work closely with Natives in the field…. The seismic crew did some of that. But I know Repsol doesn't do it. The seismic that Conoco hired, the seismic crew used to be Kuukpik Veritas, and now it is a different company.* (Nuiqsut Key Informant November 2012)

> *That [training] is required. They have the North Slope Training Cooperative (NSTC), the NSTC class [about how] to be an oil field worker. Conoco [implements it]. They do that and they have trainers now. Nanuq is coming and doing that training. They train their contractors and the contractors have that NSTC and HAZWOPER course. [It's a] video. We have our dancers come from here and do our dancing, and they know we are people too. It used to be it was hard for developers to do it our way and develop the way we wanted and people from VECO and other contractors come here and are different. A lot of people got fired because they were not in compliance with what we wanted to see. So Conoco set some policies in place. [At the] beginning of Alpine, our people were quitting and that was because they were getting mouthed off [to], and Conoco said we are going to make a policy that if there are any racist slur you are gone. And that goes both ways….Everybody does it [now]. We are the guinea pigs [for mitigation] and we started Conflict Avoidance Agreements and now it is slope wide and [now cultural awareness] training is slope wide.* (Nuiqsut Key Informant November 2012)

CPAI confirmed that measure **M6** had been implemented, stating, "All CPAI employees and contractors receive cultural awareness training prior to working on the Colville River Delta or NPRA" (CPAI Written Response December 2013).

6.2.2.2 Monitoring

One local resident indicated that the NSB as well as local organizations such as the Kuukpik Corporation were involved in overseeing measure **M6**. The research conducted for this study indicated that these measures are not typically required by agencies and thus little agency monitoring for cultural awareness training occurs. However, CPAI noted that there is internal monitoring of this mitigation measure to ensure that it is being implemented, stating, "CPAI and their contractors keep training records as common practice to ensure that their crews are properly trained. By adding cultural awareness as a requirement compliance is self-monitored" (CPAI Written Response December 2013).

6.2.2.3 Assessment of Effectiveness

Two Nuiqsut residents discussed the effectiveness of the cultural awareness training program implemented by CPAI (measure **M6**). One individual indicated the training is highly effective, and the other individual stated that the program, while effective, could use improvement in the area of consistency saying, "At the time it was highly effective. I take that back. Give it a #2 [rating of effectiveness]. It could always be improved. Consistency I would say [to ensure that training happens regularly]" (Nuiqsut Key Informant November 2012).

During general discussions with the agencies, several key informants volunteered responses regarding what they considered to be effective mitigation measures for subsistence. One BOEM individual stated, "They have to train employees about subsistence and what is there [culturally], and I would say that is effective" (BOEM Key Informant October 2012). One NSB respondent believed that cultural awareness training should extend beyond industry and be required for federal agencies as well. This individual provided the following recommendation related to better training for federal employees and improving the relationship between the NSB and the federal government, saying,

> *We've built a real close working relationship with the majority of the operators up here. When the federal government is doing their own work without coming to us for permits, we're able to –they [industry] let us know. Therefore they're giving us a surprise visit. They claim they're federal government [and therefore don't need to obtain permits]. It would be nice if they could build a working relationship with us. That way we could provide [them with] cultural orientation with us. They were moving drums and antlers. Drums up here are still used for navigation purposes. They were removing those and caribou antlers. [Subsistence users] use those for setting traps because we don't use trees and willows. If they were aware of the orientation program that's provided to industry, they would have known. We kindly asked them to put them back.* (NSB Key Informant August 2012)

In assessing the effectiveness of the culture awareness training program, CPAI indicated that the training was successful in educating workers about the cultural importance of the area, stating, "The folks working at CPAI camps understand the cultural significance of the area and know to leave any artifacts in place and avoid any hunting/fishing activities they see" (CPAI Written Response December 2013).

6.2.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents and agencies, the study team assessed the employee cultural awareness training mitigation type as an effective mitigation measure. Effective monitoring by agencies to ensure the training is ongoing would address the one Nuiqsut resident's concern over the lack of consistency. The NSB recommendation that similar training should be extended beyond industry operators to other organizations including federal agencies working on the North Slope may also help improve the effectiveness of this mitigation.

6.3 Employee Hunting Prohibition

6.3.1 Overview/History

Employee hunting prohibitions are a relatively common condition of large development projects in rural Alaska. The purpose of employee hunting prohibitions is to minimize the potential for increased hunting and fishing competition for local subsistence users resulting from an influx of employees to the region. Company policies generally prohibit hunting and fishing by non-resident employees while in the region conducting company business. However, an employee may choose to return to a region when off-duty to engage in hunting and fishing activities as allowed by state and federal hunting regulations. During discussions with Nuiqsut residents, several individuals reported that a "no hunting policy" was in place for all oil development on the North Slope. One respondent noted that this policy even applies to Nanuq, Inc., a subsidiary of their own village corporation. This individual noted that non-resident employees of Nanuq, Inc. may only engage in subsistence activities if invited by a local resident.

The potential impact of increased competition on subsistence uses is a concern that has been voiced by North Slope residents. Residents have primarily voiced these concerns as they relate to sport hunting and fishing activities by outside hunters. The opening of the Dalton Highway to the public is one source of these concerns, as residents perceive hunting along the highway to deflect caribou from their usual migration routes. During a meeting with the KSOP board in November 2012, one topic of discussion was the impact of bow hunters on the availability of caribou to local hunters. During SRB&A's 2007 interviews with North Slope active harvesters, 192 individuals responded in the affirmative when asked if competition was a concern to them. These more general concerns about competition were likely the impetus for the establishment of employee hunting prohibitions by development companies.

SRB&A identified proposed employee hunting prohibitions in planning documents for the Alpine Satellites and Meltwater projects. The Environmental Assessment for the Meltwater project included the following statement:

> *Subsistence, recreational or commercial fisheries: Subsistence issues are always of concern with increased development on the North Slope. However, the applicant has taken many steps to insure there is no impact to subsistence hunting within the area (i.e. raised the overall height of the pipeline from 5 to 7 feet, restricted hunting within the area to natives only, and restricted fishing to catch and release only except for natives.* (USACE 2001)

Employee hunting and fishing prohibitions were also included as recommended mitigation measures in the DEIS and FEIS for the Alpine Satellites Project:

> *Potential Mitigation Measure: Enforce a company policy of "No Hunting and Fishing" in industrial areas by industry personnel (included in current Northeast National Petroleum Reserve-Alaska stipulations) Decrease competition between industry personnel and local users.*
>
> *Anticipated Results: Decrease competition between industry personnel and local users.* (USDOI, BLM 2004d)

The study team did not identify any agency stipulations requiring the establishment of employee hunting prohibitions. Instead, developers for Tarn, Meltwater, and Alpine included employee hunting prohibitions in their own evaluation documents or plans of operation:

> *Action: Sport fishing and hunting by ARCO employees while conducting company business will be prohibited. Benefit: Avoids additional pressure on Colville subsistence resources.* (ARCO Alaska, Inc. 1996)
>
> *Design Feature: Prohibit hunting by oilfield personnel and allow traditional subsistence hunting. Expected Benefit: Reduce potential for harassment of wildlife, reduces noise in area, reduces impacts to subsistence hunters.* (Phillips Alaska, Inc. 2000)

In summary, employee hunting prohibitions have been implemented to address concerns about increased subsistence competition from non-resident oil field workers. These policies generally prohibit hunting and fishing by non-resident employees while conducting company business. Employee hunting prohibitions have been proposed in EIS documents and were included in developer plans for the Tarn, Meltwater, and Alpine developments.

6.3.2 Analysis

The study team assessed the effectiveness of the employee hunting prohibition mitigation type as well as one specific hunting prohibition measure (**M7**) associated with the Alpine project (Table 23 and Appendix A). This assessment included information from three Nuiqsut residents and in written form from CPAI.

Table 23: Employee Hunting Prohibition – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M7	Alpine	CPAI	ARCO Alaska, Inc.	Prohibit employees from sport hunting and fishing activities.

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6.3.2.1 Implementation

All three Nuiqsut residents that provided information on the employee hunting prohibition **M7** measure agreed that CPAI had implemented it for their Alpine development project. In addition CPAI indicated in its responses that this measure had been implemented, listing the measure as one example of CPAI responsiveness to Nuiqsut residents:

> *There are many examples of our responsiveness to community feedback, including:*
>
> *…2). Prohibiting CPAI and contract personnel from sport hunting and fishing in the Western North Slope operations area i.e. (Alpine and satellites) to minimize impacts to subsistence resources….* (CPAI Written Response October 2013)

Two informants discussed the implementation of this measure and explained that the only hunting allowed by non-resident employees of CPAI is when an employee is invited by a local resident to hunt. They discussed,

> *Yeah [it is] still in place. Sometimes we see employees when [they] work there they would come to the village area and hunt if invited [during time off]. Now we probably start seeing more of those things in future. [It is] going to happen more and more [with the] NPRA development, more and more.* (Nuiqsut Key Informant November 2012)
>
> *Yes. Not even Nanuq [employees can hunt], our own subsidiary - unless you invite them.* (Nuiqsut Key Informant November 2012)

CPAI confirmed that the employee hunting prohibition was in place, stating, "CPAI employees and contractors are not permitted to engage in sport hunting or fishing activities while working on the Colville River Delta or NE NPRA" (CPAI Written Response December 2013).

6.3.2.2 Monitoring

Two Nuiqsut residents observed that the community plays a strong role in monitoring whether or not employee hunting prohibition mitigation measure is being implemented correctly because they are the ones who are out on the land and would be aware if company employees were engaged in hunting activities. Specifically KSOP, in addition to the ADF&G, were mentioned by local residents as organizations that assist in monitoring of this mitigation. CPAI indicated that they did not monitor measure **M7**, noting that there was "nothing to monitor." They added that the lack of complaints related to employees hunting or fishing in the area was evidence that the measure had been properly implemented, saying, "No concerns have been brought to CPAI's attention about employees or contractors hunting or fishing in the Colville River Delta or NE NPRA" (CPAI Written Response December 2013).

6.3.2.3 Assessment of Effectiveness

Two Nuiqsut residents assessed the specific Alpine employee hunting prohibition (**M7**) and the overall mitigation type as highly effective in reducing anticipated impacts of increased competition that would result if employees were allowed to hunt while working on the North Slope. One person added that an improvement to the measure would be if employees were prohibited from hunting in the area even when they had returned home and had come back to the North Slope on their own time saying, "Somewhat effective but needs improvement. All those working from field, they need to come from where they come and go back [and not come to the area on their off-time]" (Nuiqsut Key Informant November 2012). CPAI responded that the measure "appears to be effective" (CPAI Written Response December 2013).

6.3.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents and CPAI, the study team assessed the employee hunting prohibition mitigation type as an effective mitigation measure because it prevents an added competition for subsistence resources that could result if non-local employees were allowed to harvest resources while working in the field. This measure appears to be working as intended, and the study team did not identify any improvements through its discussions with key informants.

6.4 Good Neighbor Policy

6.4.1 Overview/History

Good Neighbor policies are agreements between the oil industry and local communities that are intended to reduce impacts of development on subsistence resources and activities. Good Neighbor policies were primarily developed as a means to establish mitigation funds in the event

of an oil spill or other catastrophic event (NSB Key Informant October 2012; Ahmaogak n.d.). When explaining the difference between a Good Neighbor Policy and a CAA, one NSB respondent described the difference as CAAs address everyday effects whereas Good Neighbor policies are meant to address catastrophic events. The Final Information to Lessees for Oil and Gas Lease Sale 193 in the Chukchi Sea (MMS 2008) describes the Good Neighbor Policy as follows:

> *The NSB and the AEWC have estimated the monetary impact of a major oil spill over a given time. They considered direct and indirect impacts, such as relocation of whaling crews and equipment, hauling of harvested meat, and socio-cultural counseling. While the long term reimbursement of the monetary impacts of a spill are covered under OPA-90 [Oil Pollution Act], the NSB and AEWC believe that a prudent operator should provide some type of compensation commitment that could be accessed immediately.*
>
> *To provide such an "insurance policy," several oil and gas companies operating in the Beaufort Sea have elected to enter into a Good Neighbor Policy [GNP] with the NSB and AEWC; lessees are encouraged to negotiate a similar GNP for the Chukchi Sea. The GNP serves the purpose of demonstrating an operator's commitment to a more immediate compensation system to minimize disruption to subsistence activities and provides resources to relocate subsistence hunters to alternate hunting areas or to provide temporary food supplies if a spill affects the taking of marine subsistence resources. The GNP demonstrates that the participating operators have made these commitments prior to conducting the proposed exploration or development operations.* (MMS 2008)

The first Good Neighbor Policy on the North Slope was initiated in 2000, when the NSB and BP set up a policy that included an "oil spill mitigation fund in the event of a small or large spill to provide insurance against dangers to whaling and the subsistence harvest of other marine mammals" (Ahmaogak n.d.). Good Neighbor policies have been implemented by other developers on the North Slope since that time and have been expanded to include mitigation funds (beyond oil spill mitigation) and to fund monitoring studies.

Concerns about the impacts of oil and gas development on the health and availability of subsistence resources, including the potential for oil spills and reduced wildlife populations, are the reason for broad mitigation measures such as Good Neighbor policies. "Displacement of Wildlife," "Reduced Health of Wildlife," "Release of Contaminants," and "Contamination of Wildlife" were among the types of concerns identified in SRB&A's inventory of subsistence concerns for this project. Similar concerns were cited during SRB&A's study on the impacts and benefits of oil and gas development North Slope harvesters (SRB&A 2009). Concerns about contamination and extraction of materials were cited by 79 percent of Nuiqsut respondents; in particular, residents cited concerns about oil spills, release of toxic materials, and contamination

of subsistence resources. During a public scoping meeting in Nuiqsut for the Northstar development, one Nuiqsut resident stated,

> *We are very concerned about the Northstar development because, first of all, it's being an offshore well or a near-shore well, and that still needs to be found, whether it's offshore or near-shore. We are very skeptic about the oil spill response. Some of us are on a village response team and we have been on drills on exploratory offshore wells. And we have seen where the oil spill response team kind of puts their hands in the air because of ice conditions, so we are very skeptic about oil cleanup if there is a spill. As a member, I am.* (USACE 1996)

The study team identified recommendations for a Good Neighbor Policy in two of the planning documents for the seven development projects. The USACE's ROD for the Alpine Satellites Development Project noted the following recommendation by the NSB:

> *The North Slope Borough (NSB) issued a Development Permit for CD-4 on October 11, 2004. The NSB Planning Commission found this portion of the project consistent with NSB Title 19 and the NSB Coastal Management Program provided that CPAI complies with a series of recommendations and stipulations. Recommendations included the development of a Good Neighbor Program which recognizes the importance of the subsistence lifestyle to the Iñupiat and stipulates contributions and commitments from CPAI to fund caribou, fish, and subsistence studies, and to make payments to a mitigation fund.* (USACE 2004)

In addition, planning documents include recommendations for measures that are sometimes included within Good Neighbor policies. These include recommendations to fund monitoring studies and provide mitigation funds.

During its literature review, the study team identified two Good Neighbor Policy mitigation measures (Table 11). One stipulation that was carried forward from the USACE's ROD was in a NSB permit for the Alpine Satellites development and provided specifics as to what the policy should address:

> *CPAI shall develop a "Good Neighbor Policy" with the Community of Nuiqsut and the North Slope Borough that addresses the critical importance of subsistence hunting and fishing defined as "Net Public Benefit"….The purpose of the Good Neighbor Policy is to mitigate the effects and impacts of oil and gas development, its infrastructure, and from potential oil spills. While CPAI recognizes state and federal applicable laws and regulations, as matter of company policy CPAI shall also mitigate subsistence related impacts from oil and gas development, infrastructure, and potential spills and cooperation with the village of Nuiqsut and the North Slope Borough. At minimum, CPAI shall develop its policies to address:*

1. *Historical and Contemporary Status of the Community of Nuiqsut as outlined in NSB Comprehensive Plan and Nuiqsut Paisanich;*
2. *Importance of fish and wildlife, especially caribou habitats and the community's sharing and bartering characteristics;*
3. *Develop criteria to be used to define a cause and effect relationship between the impacts of development to the loss of opportunity, access, and adequate populations of fish and game to the communities of the North Slope Borough. The intent of this criterion is to define the threshold at which the communities of the North Slope Borough will be compensated for adverse impacts due to oil and gas development and infrastructure.*
4. *Acknowledge the potential threat to fish and wildlife habitats, the adverse impacts to their populations that could result in state and federal quota system and in turn could prevent communities of the North Slope Borough from harvesting adequate amount of resources for their sustenance. Present a list of options for alternative resources and or financial subsidies in the event of an oils spill or if development infrastructures reduces the availability or access to those resources.*
5. *Define the cumulative impact of the infrastructures to the fish and wildlife habitat and nutrient and ecosystems in relation to the availability for subsistence use due to changes in migratory behavior, reduced numbers, or contamination of the subsistence resources, forcing hunters to travel further to find subsistence resources or forces subsistence hunters to find alternative subsistence foods.*
6. *Create "Trustees" or a "Commission" responsible for implementation of the financial assurance instrument in the event of oil spills and/or diminished subsistence resources occurs.*
7. *Develop a Plan to execute the disbursement of funds, interim transportation to alternate hunting areas in the event of oil spill or displacement of wildlife resources, provision for alternative food supplies due to occurrence of events, provision for counseling and cultural assistance, restoration assistance of depleted subsistence resources, and dispute resolution should there be disagreement to issues that may be hard to resolve by Trustees or Commission.* (NSB 2004)

The ADNR included the establishment of a Good Neighbor Policy in the final consistency determination for the Oooguruk development. The recommendation was that this policy should be developed with the NSB and should address subsistence impacts in general:

> *Pioneer will also work with the North Slope Borough (NSB) to develop and implement a mutually acceptable Good Neighbor Policy designed to address and mitigate subsistence impacts, if any.* (ADNR 2005)

Although not identified in the literature review, the NSB's ordinance to rezone the Oooguruk project area to a resource development district included a stipulation requiring a Good Neighbor Policy to provide for oil spill mitigation:

> *Pioneer must enter into a Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission (AEWC) including an agreement under the Good Neighbor Policy for oil spill mitigation. This agreement will include procedures to be followed in the event of an oil spill as well as restrictions on barging and vessel traffic during whaling activities.* (NSB 2006c)

Although not mentioned in the NSB's municipal code, the NSB's 2007 coastal management plan noted Good Neighbor policies as one of the "voluntary agreements between subsistence users and oil companies" that have been "successful in reducing impacts" (Glenn Gray & Associates 2007).

6.4.2 Analysis

The study team assessed the effectiveness of the Good Neighbor Policy mitigation type as well as two specific research related measures (**M16** and **M28**) associated with the Alpine and Oooguruk projects (Table 24 and Appendix A). This assessment included information from a NSB individual, three Nuiqsut residents, and written responses from CPAI. Other agencies and industry associated with these measures included ADNR and PNRC; however, the study team was unable to collect information from these entities regarding these specific measures.

Table 24: Good Neighbor Policy – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M16	Alpine	CPAI	NSB	Develop a Good Neighbor Policy with the Community of Nuiqsut and the NSB.
M28	Oooguruk	PNRC	ADNR	Work with the NSB to develop a Good Neighbor Policy

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6.4.2.1 Implementation

Good Neighbor policies were developed in 2001 primarily to establish mitigation funds in the event of a catastrophic oil spill and have since evolved to be more inclusive policies that address concerns about impacts on subsistence. The policies have been recommended and stipulated for the Alpine and Oooguruk development projects.

The Good Neighbor Policy mitigation measures assessed for this project required the establishment of policies for the Alpine (**M16**) and Oooguruk (**M28**) development projects. Nuiqsut residents and NSB informants generally agreed that CPAI's and PNRC's Good Neighbor policies had been implemented; one Nuiqsut key informant did not know if the policies had been implemented. For the NSB stipulation that CPAI implement a Good Neighbor Policy for the Alpine project (measure **M16**), the NSB individual indicated that the policy was put in place in case of a catastrophic event and that while the policy has been developed, the mitigation measures within the policy have not been implemented because a catastrophic event has not occurred. However, local residents generally appeared to view the Good Neighbor Policy differently, indicating that it had been implemented and included measures to provide funding and programs associated with the local school. Two Nuiqsut residents also commented on CPAI's implementation of their Good Neighbor Policy saying,

> *I think so [implemented] and it wasn't overnight. It was one of those deals that was a work in process and still is. [CPAI worked with] the community directly, City, and Native Village, and Whaling Associations and Corporation. All the leadership [was involved], [and] elders of course…. The funds [were part of the policy and were put into place]….I think that Conoco was the model [for Good Neighbor policies]*. (Nuiqsut Key Informant November 2012)

> *They did and it has been good. But I know with Conoco we are going to train our people as far as having our kids' summer programs. They have career days and Conoco brings employees to the school and these are young people that have an internship program through Kuukpik and Conoco and talk with highschoolers and opportunities they have. They work with the school a lot.* (Nuiqsut Key Informant November 2012)

CPAI stated that no formal written Good Neighbor Policy had been finalized; however, they indicated that many of their actions in the community are conducted with the intent of being a Good Neighbor. These include efforts to reduce impacts to the community and providing educational presentations:

> *A written Good Neighbor Policy has not been finalized, however CPAI works with the Community of Nuiqsut and the NSB ensure that work is carried out in a manner that minimizes impacts to the community. Educational events and presentations are held by CPAI, in the village, to share past, present, and future projects.* (CPAI Written Response December 2013)

CPAI also stated that "CPAI strives to be a Good Neighbor and appreciates the questions and input provided by all stakeholders" (CPAI Written Response December 2013).

Three Nuiqsut residents also agreed that PNRC had implemented their own Good Neighbor Policy (measure **M28**). Two individuals indicated that several companies, including PNRC,

modeled their Good Neighbor policies after CPAI's. One person added that each policy is tailored to each specific project saying,

> *Yeah. I think all the operators followed suit [after CPAI implemented one]. Each one is specific to each operator. There may have been examples taken from another. Formed and designed specific for project and site and operations.* (Nuiqsut Key Informant November 2012)

The study team did not have access to the Good Neighbor policies mandated by NSB and ADNR and therefore it is unclear exactly what these policies address and whether the policies address all the requirements identified in the mitigation measure. According to responses from stakeholders, agencies, and industry, it appears that there is a lack of agreement regarding what a Good Neighbor Policy is, whether a Good Neighbor Policy is a formalized document, and whether these policies had been implemented as intended.

6.4.2.2 Monitoring

An NSB individual indicated that monitoring for implementation of the Good Neighbor policies was not applicable, explaining that the mitigation measures within the policy have not been implemented because a catastrophic event triggering their implementation had not occurred. One Nuiqsut resident believed that Kuukpik Corporation oversees the Good Neighbor policies.

6.4.2.3 Assessment of Effectiveness

The three Nuiqsut residents who provided an assessment of the Good Neighbor policies varied in their assessment. One individual reported that both PNRC and CPAI's Good Neighbor policies were highly effective and provided an example of the companies local funding of youth sports as an example, saying,

> *Highly effective with both Pioneer and Conoco. I can't think of anything with Pioneer but I coach little dribblers and now they fight over sponsorship. They never hesitate when our people seek donation for an event or fund our dancers.* (Nuiqsut Key Informant November 2012)

Another individual added that CPAI's policy (**M16**) was effective but required improvement. Finally, one Nuiqsut resident assessed PNRC's Good Neighbor Policy (**M28**) as ineffective. This individual indicated that the lack of involvement with the local residents was one reason for the policy's ineffectiveness as well as the varying degrees of Good Neighbor policies in the area. This person stated,

> *What is a Good Neighbor Policy if they are not working with the people? They are trying to get their policies on what they try to do to prevent [impacts]. Other policies need to be equal with all the entities in the Colville Delta. Every stakeholder that have leases in Colville Delta, that Good Neighbor Policy should*

be in place. One policy for all developments. (Nuiqsut Key Informant November 2012)

6.4.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents, the study team assessed the Good Neighbor Policy mitigation type as an effective mitigation measure in which success of the policy is highly dependent on the degree of involvement with the local community. Because the study team was unable to review the actual policies to understand more clearly what is contained with them (they are private agreements between the community and developer), it is difficult to provide a detailed assessment of the measure. It appeared during key informant discussions that there was a lack of certainty among local residents regarding the purpose and content of the Good Neighbor policies. Those who did have knowledge of these policies had different understandings of their purpose, indicating that the Good Neighbor policies address either capacity building efforts (e.g., sponsoring local sports teams) or catastrophic response efforts (e.g., mitigation funds to be implemented in the event of an oil spill). As discussed above the NSB individual indicated that the mitigation policies under CPAI's Good Neighbor Policy had yet to be implemented, yet several local residents indicated that the policy had been implemented and with mixed effectiveness. Further clarification and work among residents, agencies, and companies responsible for implementing Good Neighbor policies could be beneficial in improving local residents' understanding and expectations regarding these policies. Procedures to make such agreements more transparent seem advisable.

6.5 Mitigation Fund

6.5.1 Overview/History

Mitigation funds have been established in Nuiqsut to assist in lessening the impacts of development activities on subsistence activities, particularly related to the reduced availability of subsistence resources. A representative from the NSB noted,

> *Alpine was the first [mitigation fund] through CD4, [and] we've done it for Oooguruk Island. [Mitigation funds] reflect the ongoing displacement and impact on transportation routes and Native allotments and activities, and pipelines that come ashore 700 feet from Native allotments. In a lot of these areas, it's an outright displacement.* (NSB Key Informant October 2012)

The project-specific mitigation funds addressed in this study are most commonly used to provide monetary assistance or fuel to hunters who may have to travel farther to harvest subsistence resources (NSB Key Informant October 2012). Other mitigation funds have been implemented on the North Slope, but were not included in the literature review for this study because they are not specific to a development project. For example, the NPR-A Impact Mitigation Program was enacted in 1984 and provides grants to communities impacted by oil and gas development (State

of Alaska 2012). This discussion focuses on mitigation funds stipulated specifically for the community of Nuiqsut.

Decisions about how Nuiqsut mitigation funds are disbursed are generally left to the NSB and/or entities in Nuiqsut. There are two advisory committees that make decisions about how Nuiqsut mitigation funds should be utilized and disbursed. One of these (the Mitigation Fund Advisory Committee) includes Nuiqsut residents in addition to a representative from the NSB (for mitigation funds stipulated by the NSB), and the other committee includes only Nuiqsut residents (for mitigation funds stipulated by Kuukpik Corporation).

Residents of Nuiqsut have expressed a number of concerns that may have led to the development of mitigation fund programs. Many of these concerns are related to the increased costs and time required to harvest subsistence resources due to disturbances from oil and gas development. "Difficulty Hunting" was the second most common concern category identified during SRB&A's inventory of subsistence concerns (SRB&A 2010b). During SRB&A's 2007 interviews with Nuiqsut harvesters, 85 percent of respondents volunteered concerns about difficulty hunting (SRB&A 2009). These respondents most frequently cited concerns such as having to travel farther to find subsistence resources (25 observations) and increased need for cash to purchase fuel and equipment due to scarce resources (13 observations). Nuiqsut concerns related to increased difficulty hunting include the following:

> *The caribou herds used to migrate through our village and now they migrate away from us. Last summer only three houses hung caribou. There are over 100 houses and most houses went hunting last summer. The offshore developments have caused problems with our fish. They are not coming. It's been eight years now. I know one family that hunted all summer, 80 days, and not one caribou. Where is the help for us when we go without?* (USDOI, BLM 2003)

> *Yes, Cross Island, our fall whaling, it [seismic work] deflected the whales further north and we had to go further out north. It's not safe. We lost a boat and a whale, from seismic work. The whales get spooky and it's hard to catch a good whale that is spooky.* (SRB&A 2009)

> *That is the new pipeline, Meltwater and Alpine has to do with caribou rerouting to the south. It is a health and safety hazard to have to go further and further. Young hunters need to carry more gas than they need.* (SRB&A 2009)

> *[My hunting trips were] longer than normal because I was going farther. [They were] mostly day trips, except for the four to five day trips. I tried to make it all the way to Umiat, but gas was too expensive.* (SRB&A 2011)

Impact funds were recommended in several planning documents (e.g., EISs and RODs) for the seven development projects. The DEIS for Alpine Satellites included the following two

comments from Nuiqsut residents regarding the need for funding to offset the impacts of development:

> *Someone told me that Alpine is making how many millions a day out there. Well, those monies should have been earmarked back then because now they're not earmarked and we have to fight for them. We're put under public scrutiny, not only in the state, but also in the Lower 48 because they wonder why this little village of 500 people should get these impact funds. Well, we should get these impact funds because we, day to day, go without when we're out there trying to live as our elders have taught us in the areas they taught as being able to sustain us with the lifestyle we have learned to live, and we want to be able to continue that. We don't want to give that up to allow this development to occur. Thank you.* (USDOI, BLM 2004c)

> *We have people from these other facilities and uses out there coming into our community, utilizing our resources, but we're not given the flexibility to increase our public service staffing that are necessary to meet these demands. Instead, our health aide that has been carrying the load through September, in December was told to wait till the middle of February to get some help. That's not meeting our demands. We've known that the ice road has caused some increase to our public services for the last how many years that we've had the ice road come into our community. If we don't get the support to build the fluctuation into our demands, either giving increased salaries during these times to help in retention, either giving the flexibility to hire support staff when we need them, or looking at alternatives that decrease our stress load on our public service providers, we're going to continue to lose our educated people into other fields because they don't have the demands placed on our public service providers.* (USDOI, BLM 2004c)

While a recommendation for impact funds was not included in the FEIS for Alpine Satellites, the Alpine Satellites ROD noted the presence of this mitigation in the NSB's development permit for CD-4:

> *The North Slope Borough (NSB) issued a Development Permit for CD-4 on October 11, 2004. The NSB Planning Commission found this portion of the project consistent with NSB Title 19 and the NSB Coastal Management Program provided that CPAI complies with a series of recommendations and stipulations. Recommendations included the development of a Good Neighbor Program which recognizes the importance of the subsistence lifestyle to the Iñupiat and stipulates contributions and commitments from CPAI to fund caribou, fish, and subsistence studies, and to make payments to a mitigation fund.* (USACE 2004)

Planning documents for the Northstar and Oooguruk projects also included recommendations related to impact funds. The EA for the Oooguruk Project states:

> *The proposed project will exacerbate and additively contribute to reductions in subsistence harvest success by increasing disturbance to bowheads, caribou, hunters, by reducing the hunt-able acreage (e.g., hunters unwillingness to fire on game with oil and gas infrastructure in the background even when it is out of range), and increasing the time required to harvest subsistence resources. The applicant is mitigating the impact to an incremental level via subsistence fund agreements with various elements of the Iñupiat community and the various studies previously noted related to the NSB's rezone.* (USACE 2006)

The Northstar ROD (USDOI, MMS 1999b) included a recommendation that BP formalize the process by which local subsistence harvesters may file claims for "oil-spill removal costs and damages" and to provide a description of the process to local organizations.

During its literature review, the study team identified six mitigation fund stipulations (Table 11). Two of the mitigation fund stipulations were from Kuukpik Corporation, one from the MMS, and three from the NSB. Both of the Kuukpik Corporation stipulations were for the Oooguruk Project and are found in PNRC's document entitled "Nuiqsut Mitigation Fund." This document describes the agreements between PNRC and the Kuukpik Corporation as follows:

> *WHEREAS, as a result of those negotiations and its desire to be a good neighbor, Pioneer agreed to pay $50,000 per year for the life of the Oooguruk field for a Pioneer/Oooguruk Nuiqsut Mitigation Fund to help mitigate the impacts of the Oooguruk oil field and its facilities on the subsistence resources and lifestyle of all of the subsistence users of the community of Nuiqsut.* (PNRC 2007)

> *$35,000 shall be allocated to lump sum payments to all households in Nuiqsut of Nuiqsut residents that are Substantially Dependent (as defined below) on subsistence and meet all of the eligibility requirements as provided in Paragraph 2.* (PNRC 2007)

A key informant from the Kuukpik Corporation further described the mitigation fund as follows:

> *We worked with the operator and worked with them to mitigate the actual impacts of oil and gas. So we managed to get Pioneer to secure mitigation funds for the community [to] utilize for different impacts. What we did was we initiated a mitigation fund which the community can utilize for the subsistence hunt. To lessen the residents' costs. We established an amount per year. And a portion of that goes to fuel vouchers and a fund for residents to utilize.* (Kuukpik Corporation Key Informant December 2012)

The MMS carried forward a recommendation from its Northstar ROD (mentioned above) into its approval letter for the project. The stipulation relates to the establishment of a process for oil-spill removal claims and reads as follows:

> *Before production begins, BPXA must provide this office with the contact (title or position) and description of the process through which claimants (particularly Native subsistence users) would file a claim for oil-spill removal costs and damages, pursuant to 30 CFR 253 Subpart F. This information must also be provided to the NSB, the Alaska Eskimo Whaling Commission (AEWC), and the Native villages and tribal governments of Kaktovik, Nuiqsut, Barrow, and the Iñupiat Community of the Arctic Slope (ICAS).* (USDOI, MMS 1999b)

The NSB included mitigation fund stipulations in permits for the Alpine, Alpine Satellites, and Oooguruk development projects. For Alpine, the fund was specifically to provide fuel for area hunters and trappers. The NSB permit reads:

> *Permittee shall provide impact mitigation for area hunters and trappers, by providing fuel. This is needed for displacement of hunting activities, or extended hunting and trapping opportunities caused by seismic operations. Hunters may need to access alternative hunting and trapping locations. Notice of this provision shall be forwarded to Native allotment owners and camp owners in the impact zone. (NSBCMP 2.4.3.(d)).* (NSB 2009d)

The NSB permit for Oooguruk also includes specific stipulations related to the use of impact funds, requiring that the funds be used to address displacement of Native Allotment owners:

> *Pioneer Natural Resources shall work with the impacted native allotment owners of the area in addressing direct impacts of development on the use-ability of those native allotments. Communication shall at a minimum include impact funds for displacement, direct leasing and continued use by the owners, including limitations if any, "fire-arms" and so on.* (NSB 2005)

For the Alpine Satellites project, the NSB's mitigation fund stipulation did not direct the use of the funds but instead required that the Mitigation Fund Advisory Committee make decisions about disbursement of funds. It states that the fund should be used for the following general purposes:

> *Use of the Fund is intended to offset costs related to mitigation of impacts on subsistence harvests associated with the construction and operation of CD-4 and other satellite developments within 30 miles of CD-4, including, but not limited to, impacts resulting from the displacement or reduction of subsistence resources or disruption of access to traditionally used subsistence harvest areas. The Fund may be used to offset the costs of (1) transportation of subsistence*

hunters/fishermen and their equipment from their villages to alternate hunting/fishing areas and safely returning them, their equipment and subsistence catches to their villages in order that they may acquire alternate subsistence resources in the event that subsistence resources are found by the MFAC to have fallen below minimum levels of community needs as a result of infrastructure or activities associated within CD-4 or other satellite development within 30 miles of CD-4, or access to subsistence resources is restricted; or (2) other mitigation measures deemed appropriate by the Mitigation Fund Advisory Committee. (NSB 2004)

In summary, several recent development projects on the North Slope, including the Alpine, Alpine Satellites, and Oooguruk developments, have provided mitigation funds to the community of Nuiqsut. A primary purpose of these funds is to address concerns about increased costs, time, and effort required to harvest subsistence resources due to the impacts of oil and gas development. Specifically, these funds have been used to address displacement from traditional use areas (including Native allotments) and to provide fuel and other assistance to local harvesters.

6.5.2 Analysis

The study team assessed the effectiveness of the mitigation fund mitigation type as well as three specific mitigation fund related measures (**M3**, **M18**, and **M30**) associated with the Alpine Satellites, Northstar, and Oooguruk projects (Table 25 and Appendix A). This assessment included information from a Kuukpik Corporation and BSEE individual, two NSB informants, and five Nuiqsut residents. Industry associated with these measures included BP, PNRC, and CPAI. BP provided information about measure **M3**, and CPAI provided both general observations about mitigation funds and specific information about measure **M18**.

Table 25: Mitigation Fund – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M3	Northstar	BP	MMS	Provide MMS and local organizations with a description of the process for filing a claim for oil-spill removal costs and damages.
M18	Alpine Satellites	CPAI	NSB	Establish mitigation fund to reduce impacts on subsistence uses.
M30	Oooguruk	PNRC	Kuukpik Corporation	Establish a Nuiqsut Mitigation Fund of $50,000 per year.

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6.5.2.1 Implementation

For BP's mitigation fund measure (**M3**), the MMS stipulated that BP provide MMS and local organizations with a description of the process for filing a claim for oil-spill removal costs and damages. According to the BSEE informant, BP implemented this mitigation measure and provided MMS with a description of the claims process in their oil spill response plan. The BP

key informant believed the measure had been implemented, but was less sure about which organizations received a copy of the claims process description. He noted that BP's database for monitoring compliance was implemented after the **M3** stipulation (in 1999), and therefore it would be difficult to retrieve information about that stipulation. Nuiqsut residents were less certain whether this mitigation had been implemented by BP with two persons providing a response of "don't know," one indicating that the measure was implemented, and a fourth saying the measure was not implemented. Two residents discussed the uncertainty over how this mitigation measure is intended to work, particularly regarding the definition of a spill and who has rights to the mitigation fund:

> *No. The only Good Neighbor Policy for oil spill was they had [money] if [there was an] oil spill, and that has not been done, and we know they had a spill in our ocean and no federal or state [agencies] monitor that stuff. The mitigation commissioner is not effective. Any spill at that place, we had a right to that mitigation fund.* (Nuiqsut Key Informant November 2012)

> *They haven't determined what a spill is. We know there has been a pin drop leak. When do they determine it is a spill? I have never seen anybody or know of any funds. I know there was a suit back then with [local resident] and coalition, and they each got $30,000 from what I heard… As far as Northstar that is what I remember. That little lawsuit. There was a leak.* (Nuiqsut Key Informant November 2012)

The BP individual also stressed that the stipulation was not for the establishment of a fund itself, but was for the establishment of a plan for how oil spill claims would be addressed. He noted that the plan has not been triggered, because BP has not had a spill of a magnitude that would trigger it:

> *This isn't really a fund. It would be misleading to indicate that there's a bank account sitting out there. We haven't had any spills. We've had droplets on the ice, we've had spills on the gravel [pads], but we pick them up before they leave the gravel.* (BP Key Informant March 2013)

In contrast, residents were more certain of CPAI's and PNRC's implementation of their mitigation fund measures (**M18** and **M30**) to establish a mitigation fund to reduce impacts on subsistence uses, with each resident indicating the measure had been implemented. Nuiqsut key informants identified common uses of the fund including fuel vouchers for subsistence hunters, household impact funds, and funding for food and fuel during whaling activities. Two informants provided the following descriptions of CPAI's and PNRC's mitigation funds saying,

> *Some of it is issued for whalers to provide fuel and food for when they first go out. Some has been used for that.* (Nuiqsut Key Informant November 2012)

> *We got the fuel for hunters for subsistence practices. And [the] household impact check. Kind of like a mini-dividend. We have the subsistence fuel voucher and gas voucher program….Yes. [There are mitigation funds for] Conoco and ENI and Repsol. And years past [it] was BP.* (Nuiqsut Key Informant November 2012)

One Kuukpik Corporation informant described the implementation of PNRC's Nuiqsut Mitigation Fund (**M30**), which provides $50,000 per year to mitigate impacts on subsistence resources and users of Nuiqsut. He said,

> *It's part of a three-way agreement where we [Kuukpik] establish a committee to administer the funds and [determine] how they should be utilized. [The committee] have policies in place of how these funds should be distributed annually and they meet prior to the distribution of the fund. [The fund also] goes to help utilize some of these non-profits, like the whaling captains and the search and rescue operations. The city administers the funds and there are guidelines [from the committee] of how they should be initiated and dispersed.* (Kuukpik Corporation Key Informant December 2012)

In addition to Nuiqsut respondents, a NSB informant also confirmed that CPAI was implementing the mitigation fund measure (**M18**). CPAI confirmed that these funds had been provided. In their response, CPAI noted that while historically, the funds had been provided to NSB for distribution, responsibility for distribution of the funds was recently transferred to Kuukpik Corporation (CPAI Written Response December 2013). They also added that a separate mitigation fund exists to support KSOP.

6.5.2.2 Monitoring

A NSB key informant described the process through which the Borough monitors the mitigation fund associated with CPAI's development (measure **M18**) and commented that a mitigation advisory committee and the NSB mayor are responsible for the use of these funds. This person said,

> *The Borough created a panel through one of these agreements that would advise the mayor, and the mayor is the responsible party. The North Slope Borough Mitigation Advisory Committee goes directly to advise the mayor on the way to use these funds [thus mitigation funds are monitored in this way].* (NSB Key Informant October 2012)

A local mitigation advisory committee, which is comprised only of local Nuiqsut residents, oversees mitigation funds stipulated by the Kuukpik Corporation. Several local residents identified a number of organizations that are involved in the monitoring of mitigation funds. These organizations included the Native Village, City of Nuiqsut, ICAS, and NSB.

6.5.2.3 Assessment of Effectiveness

Because residents had little knowledge of BP's associated mitigation fund measure (**M3**) they could not provide an assessment of effectiveness. The BP key informant believed the mitigation is successful and explained, "You're alleviating a psychological burden. So I would say it's been a successful mitigation, because the communities know it's there" (BP Key Informant March 2013). For PNRC's and CPAI's mitigation funds (**M18** and **M30**) residents either indicated the funds were effective but needing improvement or not effective. Describing the lack of effectiveness of mitigation funds in general, three residents commented on the small amount provided by the fund not being able to offset the impacts being created by nearby developments. They said,

> *It is too little. The mitigation is too little. It helps out but you weigh it out, and it is like $1200 a year for each household and divided into two or three checks a year and it is wrong in my opinion. A lot of people are struggling over here and people think we're rich, but in reality things cost so much over here and we pointed that out to EPA and Department of Interior and Borough.* (Nuiqsut Key Informant November 2012)

> *The mitigation, we depend on that sometimes and it is so little. [It] gives you food for one more week for kids, and we are so impacted by what is going on out there. Our kids will feel it. We want to look after them. With more industry coming around, where are they going to hunt and catch their food? We don't always have money to go to the store especially when kids are hungry and we not benefiting.* (Nuiqsut Key Informant November 2012)

> *No, [mitigation fund is not effective] with more increased activity and growth and not just from Alpine. The whole impact with mitigation fund is so small we can barely get by to go hunt. They only give us a [couple gallon] a month to go farther away. Sometimes we get nothing. Nothing but frustration. Need to increase it more. [The amount is] the same every year; if [they] increase activity, [they should] increase mitigation fund. More basis to go out hunting. Not very effective at this time. Industry had continued to grow and more impact and where can we go now. Are they going to provide us something? What can we do now? We are boxed in [by development and have to travel farther]. We can't go no place but further away and yet mitigation funds are so small to go further away. Twenty gallons a month for one household. Majority of real subsistence hunters never benefit because multiple families in one household.* (Nuiqsut Key Informant November 2012)

For both PNRC's and CPAI's mitigation funds, two residents assessed the funds as effective but needing improvement. Similar to residents' opinions regarding mitigation funds in general,

residents who assessed the mitigation as needing improvement expressed that the amounts distributed by PNRC's and CPAI's funds were too small and did not make up for residents increased costs as a result of development. They also expressed the desire for better guidelines over the distribution of the funds by the City. One individual indicated that the lack of guidelines and limited funding has created its own social impact as it has brought conflict between the NSB and the community. This person explained,

> *[The mitigation fund measures] need to be improved. Pennies for us to fight over. We fight over this, especially with the NSB [involved]. That was another social impact, to fight over this fund. It was so small. Not everyone is a Kuukpik shareholder or tribal member. We have a lot of residents from another place, and they have access to that fund and it is not enough to cover [the hunters'] costs. And better guidelines need to be set by the entities of how it should be funneled and shipped around [disbursed] by city council members. Set guidelines for how [the fund is] dispersed.* (Nuiqsut Key Informant November 2012)

During SRB&A's hunter interviews for the Nuiqsut Caribou Subsistence Monitoring Program, 78 percent of Year 3 study respondents identified CPAI's fuel voucher funding as a helpful mitigation measure, with 27 percent indicating that the program needed improvement. Concerns about the fuel voucher program included misuse of fuel vouchers and an inadequate supply of fuel vouchers:

> *[Vouchers should be for] subsistence hunters only. I thought it was supposed to be for subsistence hunters but people just go in and fill up there trucks there.* (SRB&A 2011)

> *No, I kept trying to go in but everybody would snag them up before I got there. There's people out there that don't need it that go get it and people that don't get it that really need it.* (SRB&A 2011)

> *And a lot of them go to hunters who go get them. It should only go to hunters. Like social impact over there. You only get 20 vouchers a month with 50 or 60 hunters. We're missing at least another 50 vouchers a month.* (SRB&A 2011)

> *Only once. It's not really improving; they need more [fuel vouchers] instead of just a limited number that the city can give out per month. It's not enough for people that hunt and people that fish. And the voucher is not enough to harvest what you need to harvest.* (SRB&A 2011)

Regarding CPAI's mitigation fund that the NSB is partly responsible for overseeing, a NSB informant discussed that the mitigation fund is generally effective and recognizes that impacts do occur to subsistence users that are situated close to industry. This person explained,

> *I think it's been effective to what we have envisioned. There's going to be a change of harvest locations and harvest patterns that existed [prior to development] that show they [harvesters] want to get away from industry. Fifteen years ago you were able to hunt and do what you wanted in these areas, where now there's derricks, there's pipelines and roads…. Common sense will tell you not to subsist in these areas, so I think mitigation measures like these are effective for the common person who subsists, who has resources at their fingertips to go elsewhere. We are taking a more comprehensive measure to mitigation to account for the people who are going further for subsistence like allocating funds to search and rescue, gas for harvesters, etc. It goes a ways to assist whaling captains. We do think about whaling captains and what they do in providing whales for the community and the best ways to approach to mitigate for their needs, and we think about the regular person. When is [the] peak harvest [time]? And we tailor mitigation to their needs and peak harvest times.* (NSB Key Informant October 2012)

Another NSB informant expressed to the study team that mitigation funds in general are some of the most effective mitigation measures to lessen impacts to subsistence uses. This person cited personal experiences with mitigation funds in Barrow and provided the following description of the mitigation fund:

> *But based on my experience we had one here in Barrow. We had a mitigation program here in Barrow. [I was] one of the coordinators for Arctic mitigation fund for subsistence hunters…. It was very effective. There were a lot of folks that were reluctant to [unintelligible] the program. You go to their house and talk to them, gas vouchers to travel farther for the activities, displacement of caribou. When that finally caught on it was very effective for Barrow.* (NSB Key Informant August 2012)

When asked to identify some of the more effective mitigation measures that had been implemented to lessen impacts on Nuiqsut subsistence activities, an industry key informant answered,

> *Money, that's one thing – money. There's been some talk about some different programs. The subsistence hunter has to go out farther. So, in order to address that, they had a program going on for a while, where they were going to provide gasoline. That's a way to help.* (Industry Key Informant February 2013)

CPAI listed mitigation funding as one of the measures most often requested by Nuiqsut and therefore effective in addressing Nuiqsut concerns (CPAI Written Response October 2013).

6.5.2.4 Effectiveness Summary/Conclusions

Based on the various responses from BSEE, NSB, BP, Kuukpik Corporation, and Nuiqsut residents, the study team assessed the mitigation fund measures as an effective mitigation type because it recognizes that not all impacts can be avoided during development and the need to help compensate for those impacts. Residents likewise indicated to the study team that the mitigation funds are helpful in reducing the costs of having to travel further and expend more time pursuing subsistence resources that may have been disrupted due to development activities. In a separate study conducted by SRB&A related to CPAI's caribou monitoring program (SRB&A 2011), Nuiqsut residents were asked to assess the effectiveness of specific mitigation measures related to CPAI's development. One of the mitigation measures assessed during this study focused on the fuel vouchers that residents receive as part of the mitigation fund. Of the 39 total respondents in 2009, 24 residents assessed the fuel voucher program as helpful while the remainder indicated the program needed improvement. Those who reported the need for improvement suggested changes in the methods of distribution which are controlled by a local community organization and increasing the voucher amounts. Appropriate agencies and industry companies should continue to dialogue and work with local community organizations to address residents' concern that the current mitigation funds are not adequate to meet the added costs that residents are incurring due to the increase in development in the Nuiqsut area.

6.6 Research on Subsistence Impacts

6.6.1 Overview/History

Research is important for understanding the sociocultural and biological impacts of development, for identifying the cumulative effects of development, and for improving project design (including location and placement of facilities) and operations. Research and monitoring contributes to an understanding of development related impacts on subsistence activities and assists with the development of mitigation measures to address identified impacts. In particular, research related to alternative design, timing, and placement of development projects support efforts to minimize disturbances to subsistence users and resources. In addition, regular monitoring of subsistence resources and subsistence activities during project operations allows for the identification of changes in those resources or activities over time. This discussion focuses on research and monitoring related to subsistence impacts.

During its inventory of subsistence concerns, the study team identified a number of Nuiqsut concerns specifically related to a need for or lack of research activity for the Alpine Satellites, Northstar, and Endicott developments (SRB&A 2010b). The two quotes below are Nuiqsut resident comments during a scoping meeting for the Alpine Satellite Development Plan:

> *Last year when ConocoPhillips came, they did a science fair, and they provided us with some information on tracking caribou. … They didn't have enough collars to study the caribou that are affected with this pipeline. So I didn't see*

very much information with the caribou study... They had lots of studies this way where there's no pipeline yet. But I didn't see no end result of the studies with the caribou this way, where the pipeline is. (USDOI, BLM 2003)

Not enough funding for observation and commenting on studies of subsistence resources [exists]. There's obviously not enough funding in the Kuukpik Subsistence Oversight Panel to do … observation and proper commenting on resources that are being depleted… There is no proper funding for that. (USDOI, BLM 2003)

During the same meeting, residents expressed concerns about research transparency and a lack of dissemination of research to affected communities:

They say they have a whole bunch of data of studies with fish, birds, and caribou. But where are the studies? Are they made available to us? Where? I haven't seen one myself. I see people nodding their heads, yes, but I haven't seen them. I know that MJM comes and does the fish studies at fall when we do our Arctic cisco runs and for maybe four years we had a very bad, bad fishing. If we could declare disaster is should have been last year because we got no Arctic cisco last year on this river and on the main channel. This year we finally got a little bit, but it's not like how we used to catch them when we first moved here. I don't know what the studies show about that STP plan and how it affects the food the fish eat and if it affects the route that they take. All these things I question. (USDOI, BLM 2003).

And I think that's very important that studies be done on this side and that it be made available to us. I know the oil industry does their own studies and they give them to BLM, to you, to satisfy your part of your job, but that information I don't think is readily available to us, the people that live here. (USDOI, BLM 2003)

During interviews with SRB&A in 2007, a number of respondents cited a lack of research related to oil and gas impacts, in addition to inadequate incorporation of local traditional knowledge into research studies and EISs. When asked to suggest mitigation to address the impacts of oil and gas development, active harvesters mentioned maintenance and monitoring 248 times (20 percent of harvesters) and research 80 times (seven percent of harvesters). Residents frequently discuss a lack of research in the context of specific concerns about the impacts of a development project on subsistence activities or resources. One active harvester from Barrow made the following statement:

If they could do it [oil and gas development] safely; but they haven't done enough scientific research. They need more studies on noise, ice, weather, current. If they would do more studies they could prove they can solve the problems like oil

> *spills. They need to study polar bear and ring seal habitat. The seals will den all over the place and you can't see them.* (SRB&A 2009)

During SRB&A's 2007 research, residents also voiced concern about the lack of EIS analysis of the effects of development on subsistence (answered prompts in the affirmative 115 times), an insufficient analysis of cumulative effects from development (answered in the affirmative 107 times), and inadequate dissemination of research results to residents (answered in the affirmative 99 times) (SRB&A 2009).

The study team identified mitigation proposals related to research in planning documents for the Alpine, Alpine Satellites, Endicott, and Northstar development projects. However, the majority of the recommended studies are associated with monitoring of subsistence resources rather than impacts on subsistence activities. For example, mitigation proposals included in the Alpine Satellites DEIS addressed long term and cumulative impacts on fish from potential leaks into the surrounding tundra and water bodies, and from water withdrawal during construction phases of the project. These mitigation suggestions were carried forward into the FEIS for Alpine Satellites, which concerned monitoring the long term impacts to and recovery of tundra and water bodies from any potential spills. The ROD for the Alpine Satellites development contains one mitigation suggestion related to monitoring, which addresses the potential long term impacts on locally important fish stocks. The following is from the ROD for Alpine Satellites:

> *CPAI will continue fish monitoring studies in the Plan Area to ensure that the health of regional and locally important fish stocks is maintained.* (USDOI, BLM 2004a)

The ROD for the Endicott project indicated that the USACE would develop an "extensive monitoring program" (funded by the applicant) that would address, among other things, "effects on subsistence or commercial fisheries (USACE 1984d). The FEIS and ROD for Northstar included recommendations for monitoring studies primarily related to the impacts of noise on bowhead whales, in addition to monitoring of water quality and other wildlife resources. None of the planning documents for the seven development projects contained mitigation suggestions that specifically addressed research on subsistence impacts.

During its literature review, the study team identified five mitigation measures related to research on subsistence impacts (Table 11). The five measures were stipulated by the NSB in permits or administrative approvals for the Alpine Satellites, Meltwater, and Oooguruk development projects. For the Oooguruk development project, the NSB stipulated a caribou monitoring study, a study on cumulative effects, and the establishment of a cumulative response panel. The required caribou monitoring study included documentation of subsistence harvesting locations in that area:

At a minimum, the program must:

1) Study caribou distribution along the Oooguruk pipeline shore crossing;
2) Document caribou calving within 5-miles on either side of the Oooguruk pipeline corridor;
3) Document subsistence harvest activities within the area;
4) Document insect relief activities, including what percent of the general animal population is utilizing the area;
5) Document the distribution of caribou within 20-miles of the Oooguruk onland corridor and impacts they sustain by the cumulative effect of the Oooguruk pipeline in addition to the pipelines already existing in the area;
6) Study, or supplement a study, that includes the impacts to caribou from elevated pipelines. The study must include, but is not limited to: a. data that is gathered with radio-collared caribou during migration, insect relief, and calving, and b. funding for a period sufficient to collect scientific data that is statistically significant, will withstand peer review, and will result in a high quality scientific and technical report;
7) Issue a report at the conclusion of the study that contains: a. a map of all pipelines within 20 miles of the Oooguruk pipeline and within any caribou migratory routes within the area of the project, b. the identification of different herds so as to fully understand the herds' specific movements, and c. information on motivated and non-motivated caribou, habituation, and visual aspects of all pipelines
8) Include in the study group the NSB, Alaska Department Fish and Game, KSOP, and SB School District to allow for possible participation by different schools within the borough, based on herds that may be affecting the village; Include a design basis report, annual report and final report. These reports will take into account existing data from all sources;
9)Continue until the Administrator approves discontinuation; and
Reports must be submitted to the NSB Planning Department in Barrow. (NSB 2006c)

The same permit issued by the NSB for the Oooguruk development stipulates that industry provide research to explore the cumulative effects of development.

Pioneer shall conduct a comprehensive cumulative impact analysis of subsistence, terrestrial animals, marine mammals, fish, waterfowl, and water circulation in relation to other offshore and near shore development and its impacts to the socio-cultural and socio-economic structure of the area. The analysis shall be completed within 12 months of approval of the rezoning. (NSB 2006c)

A third measure for the Oooguruk Project requires the establishment of a Cumulative Response Panel, which is charged with identifying the cumulative impacts of development and for implementing programs to address these impacts.

For the Alpine Satellites development project, the NSB required that a subsistence study be implemented to monitor impacts of the CD-4 and other Alpine Satellite developments on subsistence activities. The development permit further describes the study as follows:

> *The purpose of the study will be to evaluate the short and long term impacts of CD-4 and other CPAI satellite developments on the people of Nuiqsut. The scope of the study shall include but is not limited to (a) harvest success by area and species, (b) changes in harvest levels by area and species composition over time, (c) changes in use of subsistence areas and identification of the causes for any changes…. The study shall commence no later than November 1 of the winter CPAI begins construction and will continue annually for 10 years…. It is intended that the study design will address the possible impacts of CD-4 development as well as the additional anticipated CPAI satellite developments proposed for construction prior to 2010 within the 30-mile radius of the CD-4 development.* (NSB 2004)

In its administrative approval for the Meltwater Master Plan, the NSB included a stipulation that CPAI would research alternative pipeline designs "that would be safe around human use activities…, i.e., hunting, cross country snow machine use; would provide for the unimpeded movement of migratory caribou and other animals;…and could be used in areas critical for village use" (NSB 2001). The stipulation also requires that CPAI incorporate traditional knowledge into its research.

In addition to requiring specific research and monitoring programs in development permits, the NSB also encourages or requires such programs in its municipal code of ordinances and had required it in its coastal management plan. For example, Borough policies note that NSB and NMFS monitoring programs will determine the area of bowhead whale migration on a yearly basis, which will inform annual restrictions on the location and timing of seismic activities (NSBMC 19.70.050). In addition, in its coastal management plan, the NSB listed "Analysis of Subsistence Impacts" as one of its once enforceable policies (Glenn Gray & Associates 2007). This policy noted that for major projects with "reasonably foreseeable" impacts to the availability of subsistence resources, the analysis will include traditional knowledge, measures for monitoring subsistence impacts and an analysis of cumulative effects. The coastal management plan described the importance of baseline information and monitoring research as follows:

> *Development of baseline information is extremely important to develop an understanding of natural processes, ecological conditions and the potential of development activities to affect them. In addition to baseline studies, long-term monitoring and research is necessary to determine the effects of development projects. Some effects take many years to manifest, and cumulative impacts may*

not be evident until a certain threshold of disturbance had been reached. (Glenn Gray & Associates 2007)

In summary, research on subsistence impacts provides data that allows for the identification of impacts and development of mitigation measures. Required research may include the establishment of baseline subsistence information, ongoing monitoring programs, and cumulative effects studies. Studies on subsistence impacts contribute to an understanding of development related impacts to subsistence activities, which help industry and agencies in the development of project alternatives and mitigation measures. Research is important for understanding the sociocultural and biological impacts of development and also for improving the design, timing, and placement of development projects.

6.6.2 Analysis

The study team assessed the effectiveness of the research on subsistence impacts mitigation type as well as five specific research related measures (**M19**, **M22**, **M33**, **M36**, and **M37**) associated with the Alpine Satellites, Meltwater, and Oooguruk projects (Table 26 and Appendix A). This assessment included information from an NSB individual and four Nuiqsut residents. Other industry associated with these measures included PNRC and CPAI; the study team was unable to collect information from PNRC regarding these specific measures. CPAI provided information on measure **M19**.

Table 26: Research on Subsistence Impacts – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M19	Alpine Satellites	CPAI	NSB	Fund a subsistence study to monitor the impacts of CD-4 and other Alpine Satellite developments on subsistence.
M22	Meltwater	CPAI	NSB	Study alternative pipeline designs that would reduce impacts on subsistence users; forward findings annually to the NSB.
M33	Oooguruk	PNRC	NSB	Establish a Cumulative Response Panel to address the cumulative effects associated with oil and gas development.
M36	Oooguruk	PNRC	NSB	Implement monitoring program that includes documentation of subsistence harvest activities in the area of development.
M37	Oooguruk	PNRC	NSB	Conduct a cumulative impact analysis that includes subsistence impacts.

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6.6.2.1 Implementation

For measure **M22**, CPAI was to study alternative pipeline designs utilizing NSB's Wildlife Department and traditional knowledge information. The NSB individual and one Nuiqsut resident agreed that CPAI had implemented the study; although a NSB informant indicated that

CPAI's implementation was more aimed at funding agency studies and less on implementing research on alternative designs:

> *To some degree [it has been implemented]. I think it's very, very hard to crack the shell of the status quo. The least cost is to put it on stilts and to develop it as usual. Alternative pipeline construction is very hard. We had a third party come in with a white paper saying we've seen it [alternative designs] work in other countries - mainly Canada. I think it's going to have to catch on some time or another…. There were always studies by ADF&G and I think Conoco helped supplement for additional resources so we can look at more of the data that better justifies the population that they were studying. If you have 50,000 caribou, are five collars able to be a representative to what the herd is doing? Those things help because I think the government has limited resources to do this type of work.* (NSB Key Informant October 2012)

Three other Nuiqsut residents reported that they were unaware of whether CPAI had implemented this mitigation measure and two provided the following statements:

> *They just did it and built the way they wanted. That is it. Nothing.* (Nuiqsut Key Informant November 2012)

> *I don't know if they will listen to anyone local who has no knowledge of a pipeline and how it should be. I am sure design could be altered someway, maybe camouflaged, but [it is] not for us to say. I don't know if they are researching that. I would assume they are.* (Nuiqsut Key Informant November 2012)

Regarding implementation of measure **M22**, CPAI indicated that they had funded a study related to buried pipelines and that yearly caribou monitoring studies are forwarded on to local organizations and the NSB:

> *CPAI participated in a study of buried pipeline design and provided this information to the NSB. On the basis of discussions with the community and some regulatory agencies, CPAI agreed to set an average pipeline height of 7 feet above tundra. CPAI conducts caribou studies annually; copies of the final report are sent to KSOP, Kuukpik Corporation, Native Village of Nuiqsut and the NSB Dept of Wildlife Management.* (CPAI Written Response December 2013)

PNRC's stipulation for a caribou monitoring program (**M36**) required the company to implement a monitoring program that includes documentation of subsistence harvest activities in the area of development. The NSB and Nuiqsut informants reported PNRC had implemented this mitigation measure. The NSB individual related that this measure was put in place in response to the number of changes that were occurring to subsistence uses and resources and the need to better monitor potential impacts. This person described the basis for this measure as follows:

> *So we had to put in place the history as to why studies needed to take place. What are the impacts to Native lands? Is it [development] something that disenfranchises the subsistence resource/use area? We work with the Wildlife Department, to figure out what are the appropriate measures to take. You can see it here [map] Oooguruk comes across here to 3H and allotments are here in between in Kuparuk River unit. We used to hunt all this area because the Central Arctic herd was all around there. You can see where Meltwater is attached to the far south. The availability and harvest resource patterns have drastically shifted. And there are studies that corroborated these events.* (NSB Key Informant October 2012)

In addition to studies specific to caribou, CPAI and PNRC were also required to implement subsistence monitoring programs. Nuiqsut and NSB informants agreed that CPAI was funding a subsistence study to monitor the impacts of CD-4 and other Alpine Satellite developments on subsistence (**M19**) and that this study was being fully implemented as the Nuiqsut Subsistence Caribou Monitoring Program. CPAI confirmed that they had implemented this study in Nuiqsut. The NSB respondent stated that these studies are important because they show the community that the Borough is committed to studying and identifying mitigation measures. This person stated, "We want to assure the village that appropriate studies and mitigation measures are going to be in place to mitigate your [village's] subsistence activities while development is going on" (NSB Key Informant October 2012).

PNRC's **M37** measure was a requirement to conduct a cumulative impact analysis that included subsistence impacts. Nuiqsut residents were less certain whether PNRC had implemented this measure. One individual said the mitigation had been implemented; however, two reported that they did not know if it had been implemented saying,

> *They are doing the studies. They do the lakes and the fish. I haven't seen anything like that [cumulative impact study]. Air quality is a big thing. When you combine all the whatevers [separate development emissions], the numbers get high [higher than legally allowed]. DNR gives them the permits for individuals [actions] and we never see any [cumulative analysis].* (Nuiqsut Key Informant November 2012)

> *When they first start they did some fish studies and some seals that go feed in mouth of Colville River but after Oooguruk Project is done, we hardly see any ugruk or seals in mouth. We need more monitors on. We never see reports [about cumulative impacts]. We need to see a report of what they put on. To develop stipulations you need to work more with communities that are affected by project.* (Nuiqsut Key Informant November 2012)

The NSB reported that although PNRC had implemented this mitigation measure (**M37**), the end product was not what the Borough was expecting and the task of conducting a cumulative analysis has since been delegated to the NSB's Wildlife Department. Furthermore, the NSB had decided that in order for a cumulative impact analysis to be effective, it would need to include all impacts across the North Slope and not just that of PNRC's. Describing the status of the cumulative analysis project the NSB individual said,

> *They [Pioneer] provided a canned one [cumulative impact analysis]. I don't think you can provide a comprehensive impact analysis in 12 months. But we at the Planning Department in coordination with the Wildlife Department and the Wildlife Initiative, they would like to take on the task of taking on a comprehensive oil impact analysis study. They are using their own seed money to begin from some grant.* (NSB Key Informant October 2012)

In addition to the cumulative impact analysis, the NSB stipulated that PNRC implement a "Cumulative Response Panel" consisting of state, local and federal agencies (**M33**). The panel would address the cumulative impacts of development on subsistence and would seek funds to offset these impacts. Two Nuiqsut residents believed that the panel had been implemented, while another two individuals were unsure whether it had been implemented. One resident observed, "I haven't heard of that. If they have a panel, they need to make sure the village is involved." Another Nuiqsut respondent indicated they had never heard about such a panel, saying,

> *I think they're going straight to the Borough on these things over here. That's why we have no idea if they have implemented these things. That's the first thing I've heard of a panel on cumulative effects.* (Nuiqsut Key Informant November 2012)

The NSB respondent explained that the Cumulative Response Panel mentioned in the stipulation was not necessarily the responsibility of PNRC but was more of a statement by the NSB that such a panel should be formed to help guide cumulative research on the North Slope:

> *I'd have to look at that one because that was part of cumulative effects [study] on what we thought would be the best approach, to create a panel that would review, participate [in the study] and because we felt at the Borough level that the cumulative effects were not adequately being addressed. And it was not just based on just tasking Pioneer [with creating it], but a panel shall be created. Just like if you look at Northstar, I think there's an advisory [panel mitigation], they don't exist but [we] recognize that this is something they need to do. An offshore oversight committee should be started for all these offshore areas. I think it's tasked to the mayor and everybody else that should be involved. Don't task the industry to develop it. Recommend to the powers that be to recommend that there*

are expanding cumulative effects as we go and that there should be a panel as we go forward. (NSB Key Informant October 2012)

One Nuiqsut respondent believed that the panel had possibly been implemented under the title of "Subsistence Advisory Council."

6.6.2.2 Monitoring

A NSB informant explained to the study team that the Borough relies on the NSB's Wildlife Department to monitor certain research studies, particularly those related to specific wildlife resources, because they are knowledgeable about the North Slope environment and can help identify whether the changes that are occurring are part of a trend from development or part of a natural change. Describing the Wildlife Department's role, the NSB informant said,

Sometimes, you know, we put these [studies] on the shelf because their shelf life is so long, we trust the Wildlife Department to work with these guys to peer review the study program to be effective. There is a shelf life in order to ensure adequate time to definitively show a trend is not arbitrary. The Wildlife Department-they are scientists, as well as the NSB Science Advisory Committee that is made up by prestigious folks on the Arctic. We expect that it takes time to create trends. It takes time to make a decision [about] when is the appropriate time to sit down and see [what the impacts are], in probably some sort of forum with the stakeholders. (NSB Key Informant October 2012)

As mentioned in the previous quote, the NSB has also formed the Science Advisory Committee, an assemblage of academics with specialized knowledge, to review studies completed by government agencies or consultants (Glenn Gray & Associates 2007).

One Nuiqsut resident added that PNRC has also allowed the community to be involved in the monitoring by distributing the reports to the organizations stipulated in the mitigation measures as well as inviting local leaders to tour the project area.

A NSB respondent reported to the study team that the Borough had yet to complete an audit or monitoring of CPAI's subsistence monitoring program (measure **M19**) because it had been delayed in its start and the study has continued to evolve. The NSB has yet to conduct any monitoring of the cumulative impact analysis as well because the project has been delegated to the Wildlife Department and has yet to be initiated. The NSB informant provided the following statements regarding the monitoring of the two projects:

I think we have yet to provide a complete audit of this [CPAI] study because the project was stalled for a number of years. There were specific requirements because the development was so close to the village, and these are also corporation lands, surface lands that belong to Nuiqsut corporation, sub-surface that belong to state and federal, and regional corporations, so there was a lot of

compromise and at time concerning because there was a lot of different interests to go forward, to say "go ahead," since there were no conclusive impacts. We have to look at this with the view of what is the culture? How do they hunt in these lands?.... Conoco has approached the Wildlife Department and has to work with them to peer review some of these programs…. The Borough has departments that have been assigned to work with industry to develop meaningful studies that will answer questions that we have. Eventually they will answer mitigation needs on into the future. (NSB Key Informant October 2012)

We've had about three other rezones since then and every time [there is a rezone] the comprehensive cumulative effects analysis is talked about. It is now mounting on the Wildlife Department, and I think they're waiting for the right moment [to implement it]. (NSB Key Informant October 2012)

6.6.2.3 Assessment of Effectiveness

The three Nuiqsut informants who did not know if CPAI's research alternative pipeline designs (**M22**) had been implemented could not provide an effectiveness assessment. However, two individuals (one Nuiqsut resident, and one NSB key informant) discussed the effectiveness of this measure. One Nuiqsut respondent who stated the measure was implemented ranked it as highly effective. The NSB key informant did not provide an effectiveness assessment but did indicate that these studies were valuable because they show that alternative designs can be implemented and are feasible depending on the size and scale of the project:

The biggest change out of all of this is the spacing between road and pipeline and the height of the pipeline. The rest has been relegated to mitigating impacts. Some of these were almost challenging in permitting these projects because, in the same way that the Corps of Engineers challenged the status quo of CD5 that delayed the project for five years to get off the ground. For a minimal size field that they were after, the cost wouldn't justify the development. [They said] it was cost prohibitive…. [Now, because of research] we can say to the industry what we couldn't before; we can say there are feasible alternatives to develop. It gives the Borough some power and weight to say alternative designs need to be incorporated to pilot projects so development and subsistence can be actively successful. They do it all over the world; somewhere in California they built a derrick that looks just like a building. That's what I've heard anyway. Design with nature. (NSB Key Informant October 2012)

A NSB key informant explained that independent, third-party research is crucial in the assessment of effectiveness. The study team learned that while there are no set "scales" of effectiveness, the Borough considers their measures of effectiveness to be "discussion-based" and stressed that these discussions should be based on studies from objective scientists.

Regarding the importance of scientific information in assessing the effectiveness of mitigation measures, this NSB respondent said,

> *It should be an ongoing discussion, and I don't think the industry should be tasked to study indefinitely, but they should be tasked to create real information. If you're going put info out there that a scientist can't really use or make a judgment on, that's a useless effort.* (NSB Key Informant October 2012)

The NSB key informant also noted that, in some cases, developers will request to drop a study from their stipulations or to end a particular monitoring study if they believe that the study is not applicable to their project or that no impact is occurring. Such a request will prompt a public hearing and review by the NSB. The NSB individual stressed the importance of third party objective research in determining whether studies are needed as well as in assessing impacts and effectiveness of mitigation measures. Describing the need for impartial studies, the NSB added,

> *When we started reading and getting information that a general shift in harvest locations was being recognized as this is actually happening, you put infrastructure in and the normal pattern is they shift to the west. You put it here, they shift to the south and it [research] has been critical [to showing the change]. The science and information provided on how we mitigate and where and how the infrastructure should accommodate this continuing shift…. It really provides information. I think there needs to be objective, reasonable studies; that's why we put third parties and [have] peer review because some of these studies were coming back with biased views due to development direction. The question starts coming up to debunk statements made by subsistence users [about] caribou by insect harassment and they were virtually insane! We had a couple [caribou] that were nearly decapitated that were running from bugs. They hit the pipeline and were killed. I think studies are very important. But you have to make sure they are not industry led. Third party. Objectively done.* (NSB Key Informant October 2012)

Only one Nuiqsut informant provided an effectiveness assessment of PNRC's caribou monitoring program (**M36**). This individual assessed the mitigation as effective but requiring improvement but did not provide any further suggestions.

Regarding the subsistence monitoring mitigation measure (**M19**), the NSB explained to the study team that they could not provide an assessment of the effectiveness of these specific measures because the NSB has yet to conduct an audit of CPAI's subsistence monitoring program. However, three Nuiqsut residents provided information regarding the effectiveness of CPAI's monitoring program with each individual reporting that the measure was effective but could be improved. Recommended improvements included better communication, add more local

residents to the subsistence panel that has been implemented for the study, and expanding the scope of the subsistence monitoring studies:

> *Collectively I would give it a #2 [effective but needs improvement]. Communication. Actually, communication [could be improved].* (Nuiqsut Key Informant November 2012)

> *Yes. [The subsistence researchers] are doing an effective job and just coming back and getting all the village information. What I want to see improved is that I know [they] are only required 10 for the panel and….There needs to be a mix [of the types of panel members].* (Nuiqsut Key Informant November 2012)

> *[Improvements include] what [the researchers] heard yesterday [during the panel meeting], of some [additional] stuff that needs to be done. Food that is contaminated, we don't know [about] yet. Some of elders are saying they are contaminated. They are getting sick from it. [We] need to know more from that.* (Nuiqsut Key Informant November 2012)

CPAI also provided their observations about the effectiveness of the Nuiqsut caribou subsistence monitoring study. The company indicated that monitoring studies such as this one and an ongoing fisheries monitoring study funded by CPAI are useful in documenting up to date harvest information, but less useful for identifying the cause of changes in subsistence harvests and activities:

> *We implemented an annual subsistence study five years ago to gather harvest data; the study established panels of local experts with knowledge of historical and current hunting practices (timing, location) to help guide the scientists conducting the study. Some harvest data have been collected through the NSB's program, as well as the ADFG's subsistence division however those data are sparse and not kept up to date. With spotty data on baseline (prior to development) harvest data the variability in hunting success has so many other variables to consider such as hunt effort, location, time of year, etc. drawing conclusions about impacts to subsistence activity is anecdotal at best. Even with a long-term annual study conducted by CPAI consultants to document the fisheries catch (arctic cisco or qaaktaq) during the fall under-ice fishery by Nuiqsut residents, the data have been unable to tease out effects of CPAI activities on the fishery. In a report prepared by ABR Inc. – Environmental Research and Services, Inc. (ABR) for MMS (now BOEM) on the under-ice fishery for arctic cisco (qaaktaq) the data analysis did not discern one way or another whether construction of CD4 had an adverse effect on fishing that year. In fact, we observed that the year of construction was actually a high yield year for arctic*

cisco in the community – information we had because of our support of data collection on that fishery since 1986. (CPAI Written Response October 2013)

CPAI also noted that the subsistence monitoring program has support and participation from the community, indicating that it is successful (CPAI Written Response December 2013).

One Nuiqsut individual provided a comment on the effectiveness of PNRC's cumulative impact analysis (**M37**) and said it was effective but required improvement. Regarding the effectiveness of PNRC's cumulative response panel mitigation measure (**M33**), the two individuals who believed the panel had been created believed that the panel was effective but needed improvement. Neither individual provided suggestions for how the measure should be improved.

6.6.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents and NSB informants, the study team assessed the research on subsistence impacts mitigation type as an effective mitigation measure when fully implemented. The study team received little information from Nuiqsut informants related to the cumulative impact study and the caribou-specific studies, because many were unaware of the implementation of these studies. This lack of knowledge regarding implementation indicated to the study team that there was room for improvement in the dissemination of the results of these studies to local community members. The NSB's comments regarding PNRC's cumulative impact analysis measure indicates to the study team that requiring cumulative impact analyses of individual companies may result in incomplete or inadequate analyses. In contrast, delegating the cumulative impact analysis to the Wildlife Department or a third party researcher may result in a more comprehensive analysis that considers the impacts of all development activities on the North Slope. A Cumulative Response Panel would also be most effective if implemented by state, federal, and local organizations rather than by individual developers. CPAI's subsistence monitoring program appears to be effective, in part because of the project adapting and changing to better address community concerns and because of the inclusion of a community-led panel that guides the research design. Further analysis of its effectiveness could occur after the NSB conducts its own audit of the program.

6.7 Subsistence Leave Policy

6.7.1 Overview/History

Subsistence leave policies are sometimes implemented by developers for projects in rural Alaska, where a high proportion of local residents participate in subsistence activities. While local employment is often viewed as a benefit of oil and gas development on the North Slope, it also may result in reduced time for local residents to participate in subsistence activities, particularly during peak subsistence harvesting seasons. Subsistence leave policies may simply include flexible (e.g., rotational) or seasonal work schedules, or they may provide for paid or unpaid subsistence leave. A NSB respondent provided the following description of the need for subsistence leave policies on the North Slope:

> *There have been so many characterizations of the general [Native] population that they quit all the time, that they don't want to work, where[as] we know there is a peak period of time where the need to harvest for your family arises and catching 15 to 20 caribou [for] meat [is more cost effective than buying it] at A/C for 45 bucks. That's one tenth of a caribou you can harvest on your own. The need to harvest and being able to provide for the traditional use patterns of the community and adapt to those [priorities is important]…. Seasonal jobs and flexible employment will allow you to maximize the potential an employee has in both worlds.* (NSB Key Informant October 2012)

The NSB's draft Coastal Management Plan also addresses the potential impacts of employment on subsistence, noting that "The work schedules [in oil fields] require employees to be away from home during extended periods, and they may not accommodate leave for subsistence activities" (Glenn Gray & Associates, 2007). During public testimony and during studies related to the impacts of oil and gas development, residents of Nuiqsut have discussed the potential social impacts of employment on their community, with some noting that the most employable residents are often those that are also key subsistence harvesters in the community**.** Several individuals described the indirect effects of increased employment on the community's subsistence uses as follows:

> *Our workers are the most able-bodied people of the village. Who does that leave behind? The children and the elders. The elderly and the young are left and who will help them with their survival, pump diesel, or get ice? Who will supervise the children when the workers leave for weeks at a time? Who will educate them in our lifestyle?* (USDOI, BLM 2003)

> *[Before development] we fed our families from what was there because there was no one else to give it to us. We had no money to go buy it from the stores. Now some people have jobs and they can buy a lot of different things. But we're also tied to that stupid clock. We need that 40 hours so we can go buy that motor gas, because we can't take the time when the caribou are in our back yard to go get it. We're tied to our stupid clock.* (USDOI, MMS 1997)

> *You see, I grew up on caribou, whale, fish - hamburger was not available, but now I can't do that as much. I have less time and need more money to hunt and now my kids aren't learning the subsistence ways. It's not a priority to them. And that takes a toll on me. It makes me disappointed but not surprised that this next generation doesn't depend on subsistence.* (SRB&A 2009)

Subsistence leave policies are intended to address the impacts of local hire on the community's ability to continue participating in subsistence activities and harvesting adequate subsistence resources. In addition, these policies may promote local hire if local residents believe they are

able to continue their subsistence way of life and participate in the cash economy. The study team identified recommended subsistence leave policies in only one planning document for the seven development projects. The FEIS for the Alpine Satellites Development Project states,

> *Employment of Alaska Natives in oil-related jobs on the North Slope has been low. In spite of this limited participation, community and NSB leaders continue to seek implementation of programs that would result in increased hiring of local residents, especially Alaska Natives. The NSB has attempted to facilitate Native employment in the oil industry at Prudhoe Bay and has expressed concern that industry has not done enough to accommodate training of unskilled laborers or to accommodate their cultural need to participate in subsistence hunting. The NSB also is concerned that even though recruitment efforts are made and training programs are available, industry recruits workers using methods more common to Western industry practices.* (USDOI, BLM 2004d)

During its literature review, the study team identified two subsistence leave policy stipulations (Table 11). The two subsistence leave policy stipulations were found in NSB permits for the Meltwater and Oooguruk development projects. In both cases, the stipulations read,

> *Developers are encouraged to conduct operations to the extent practical and feasible: Utilizing flexible employment procedures, which allow the pursuit of subsistence opportunities by Borough resident employees.* (NSB 2008a)

This mitigation measure is included in the NSB's code of ordinances and is therefore applicable to all development on the North Slope. As a NSB representative noted, the measure in the ordinance does not specify the procedures that developers should implement, but rather encourages flexible hiring practices to allow for local participation in subsistence.

In general, subsistence leave policy mitigation measures have been implemented due to the potential impacts of local employment in the oil and gas industry on community subsistence uses. Concerns about these impacts have been stated by local residents and the NSB has addressed these concerns by establishing subsistence leave for NSB employees as well as encouraging similar policies for developers on the North Slope.

6.7.2 Analysis

The study team assessed the effectiveness of the subsistence leave policy mitigation type as well as two specific subsistence leave related measures (**M21** and **M34**) associated with the Meltwater and Oooguruk projects (Table 27 and Appendix A). This assessment included information from four Nuiqsut residents and a NSB informant. Industry associated with these measures included PNRC and CPAI; the study team was unable to collect information from PNRC regarding their specific measures. CPAI provided a response for measure **M21.**

Table 27: Subsistence Leave Policy – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M21	Meltwater	CPAI	NSB	Establish subsistence leave policies for NSB resident employees.
M34	Oooguruk	PNRC	NSB	Establish subsistence leave policies for NSB resident employees.

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6.7.2.1 Implementation

A NSB informant reported to the study team that the requirement to utilize flexible employment procedures in the form of subsistence leave policies is a Borough-wide policy that also may appear on industry permits. In general, these policies are often implemented between the community and industry with less involvement from the NSB. Describing the ongoing implementation of this policy, the NSB informant said,

> *I think they have [been implemented]. We've dealt with it in public hearings, the want of the community to have employment and training exists, and I think between private agreements between village and Conoco and use like that. We don't engage in that, but through those kinds of mechanisms in citing a policy by the NSB has been effective.* (NSB Key Informant October 2012)

When asked about the implementation of the two subsistence leave policy measures assessed in this project (**M21** and **M34**), two Nuiqsut residents provided responses focused on the issue of local hire, rather than on subsistence leave policies. These residents commented on the need for more local hire, saying,

> *Well, at first there was hardly anybody from Nuiqsut working at Pioneer. They need to hire us. They do Good Neighbor, and they need to hire our people. Work with them. It is not working right now. Let them hire the locals.* (Nuiqsut Key Informant November 2012)

> *No local hire. They need to improve local hire. We still have 80 percent unemployment. They need to implement service plan use agreement. And they need to implement that and Tony Knowles had said to people it will be jobs for our people and where are the jobs? There is nothing. They need to make sure they implement that. Jobs for our people.* (Nuiqsut Key Informant November 2012)

Another two residents stated that CPAI and PNRC had implemented the subsistence leave policies. Describing CPAI's implementation of the subsistence leave policy for local employees, one resident said,

I am sure they did. Because, you know, I mentioned the cultural classes their employees had to go through. It was one of the topics [in the class] that local residents were employed at the projects, the classes that we did for the on-site supervisors. [They] learn a great deal from the class [and] understand why this person had to go [back to the village for subsistence] when they were right in the middle of the project. (Nuiqsut Key Informant November 2012)

CPAI indicated that they could not identify the permit where subsistence leave policies had been stipulated; however, they stated, "CPAI employees are granted annual leave that provides opportunities for participating in subsistence activities" (CPAI Written Response December 2013).

6.7.2.2 Monitoring for Implementation

A NSB informant explained to the study team that subsistence leave policies are generally monitored by the community because of the nature of the policy and the fact that specific agreements regarding local hire and subsistence leave are developed with the community and not the Borough. A Nuiqsut resident also confirmed that local organizations play a role in monitoring; however, this individual also believed that the NSB played a role in monitoring these measures.

6.7.2.3 Assessment of Effectiveness

Only one Nuiqsut key informant provided an effectiveness assessment of CPAI's and PNRC's subsistence leave policies (**M21** and **M34**) and reported that both were highly effective citing lack of complaints from any local people as the basis for the assessment. A few other individuals could not provide an effectiveness assessment because they were not sure if the policies had been implemented. A NSB informant discussed the general effectiveness of subsistence leave policies and assessed them as effective mitigation measures. This person said,

I think so [effective] because it's engrained in our master plan ordinance to promote hiring practices, contracting opportunities with local villagers that they recognize this. We can't force them to; I don't think we can. We can only emphasize that there is this need out there and some of this could be tied to surface use, Good Neighbor Policy all of them work together to ensure opportunities are there and they remain open. (NSB Key Informant October 2012)

6.7.2.4 Effectiveness Summary/Conclusions

Based on the responses from key informants, the study team assessed the subsistence leave policy mitigation type as an effective mitigation measure because it allows local residents to work in a wage job while also conducting key subsistence activities. This promotes participation in a mixed subsistence economy in which income from employment is used to purchase the

materials and technologies needed to conduct subsistence activities. How and to what extent each developer implements subsistence leave policies is unclear. CPAI indicated that they provide annual leave to all employees; however, they do not have a specific subsistence leave policy for North Slope residents. Informing local residents of each company's subsistence leave policy could help encourage local interest in employment, if it lessens concerns about reduced opportunities for participation in subsistence activities. Cultural awareness training is a key component in making this mitigation type effective because it provides the opportunity for hiring managers to understand the subsistence needs of local residents. In addition, because of the variability of subsistence activities from year to year, it is important that any subsistence leave policy be flexible in terms of the timing and length of residents' leave. Several residents expressed to the study team that the number of local hire in industry-related jobs were less than desired by the community. Their responses indicated that the lack of local hire was a greater problem in the community than the existence of subsistence leave policies. Because the study team was not systematically asking about local hire mitigation measures, the study team was not able to fully ascertain whether these measures have been effective or ineffective. However, based on the brief responses the study team received, further examination of this topic is warranted in future studies.

6.8 Subsistence Oversight Panel

6.8.1 Overview/History

Oversight panel mitigation measures have been developed to bring together various stakeholders to address the effects of oil and gas development on local residents and to provide recommendations for how these impacts could be lessened. This section focuses specifically on subsistence oversight panels, which consist of community members, allow for direct dialogue between the developer and local community, and provide local knowledge and direction for the establishment of policies and procedures related to development and the community. These advisory panels provide guidance to the developer on issues related to the conflicts with subsistence activities and other local concerns.

Community concerns regarding lack of influence over development and oilfield activities is an issue that has been voiced by North Slope residents. As noted in SRB&A 2010b, issues related to lack of local influence include "their inability to stop unwanted development; the sense that their concerns are not being heard; the loss of control over their subsistence use areas; the lack of involvement of stakeholders in decision making processes…and lack of traditional knowledge, including residents' concerns, in EIS documents." During SRB&A's 2009 survey of Nuiqsut active harvesters, 67 percent of respondents reported concerns about a lack of influence, while 24 percent of respondents reported having had personal experiences with lack of influence. Specific concerns reported by Nuiqsut respondents during the SRB&A study (2009) include a lack of local influence over development, federal land managers favoring industry over Iñupiaq interests, and not enough weight placed on traditional knowledge of elders and active hunters.

Comments related to concerns over lack of local influence have been voiced during public scoping meetings, as well as during interviews with SRB&A:

> *Sociocultural impacts to our community caused by the impacts of oil exploration and development to our subsistence resources in our community are complex and ongoing. We have had many years of constant public meetings and hearings and continual oil development. The feeling of loss of control over our subsistence land and our community is the most damaging to us.* (USDOI, BLM 2003)

> *They need to listen to elders a lot more. They need to take action with what the elders say instead of just looking at the all-mighty dollar. Our elders say these are our traditional hunting grounds. Not just elders, but all people who live here. How would they feel if we went to their backyard and polluted it? When I worked at APC, I was behind a few guys listening to them talk about how 'We take their land and give 'em a few bucks.' Then when I showed up they stopped.* (SRB&A 2009)

KSOP was the first subsistence oversight panel on the North Slope created in 1996 through mitigation stipulations outlined in the Alpine EED. A Kuukpik Corporation key informant noted that KSOP was originally stipulated by the corporation through a surface land use agreement. This is the sole oversight panel currently operating in Nuiqsut. As explained in Haley (2004), KSOP is a panel of local residents which "meets regularly to hear testimony from the company and contractor representatives and community residents concerning environmental and social impacts of industry facilities and activities. They negotiate with Phillips [CPAI] those changes in operations to mitigate problems that are identified". Arco Alaska, Inc. initially funded KSOP through the Kuukpik Corporation, and CPAI is now the primary funding source for KSOP. CPAI coordinates with KSOP to ensure that development related impacts on subsistence activities are kept to a minimum. KSOP has also been involved in the establishment of resource-specific panels of experts, such as the Nuiqsut Caribou Panel (SRB&A 2012) and the *Qaaktaq* (Arctic Cisco) Panel (Seigle and Parrett 2009).

Coordination of development activities with KSOP is mentioned in planning documents for Alpine and Alpine Satellites. Both of these documents suggest development coordination with the panel regarding policies that may have an impact on subsistence resources and activities. The Alpine EA suggests "guaranteed free access and firearms safety protocols to be established and overseen by a Subsistence Oversight Panel composed of hunters coordinated with ADP personnel" (USACE 1998a). Planning documents for Alpine Satellites provide the most specific description regarding KSOP's role to oversee impacts of development on the community. This comment was found in both the DEIS and FEIS for the Alpine Satellites project:

> *No direct and immediate impacts are expected to community social organization, community services, or community health and welfare as a result of direct project*

> *impacts. If impacts in these sectors of community life occur as an indirect result of project development, such impacts are likely to occur incrementally and over a long period of time. A number of indicators of overall community welfare have been identified in previous studies prepared for the Kuukpikmuit Subsistence Oversight Panel (CRA 2002). CPAI would assist in continued monitoring of the indicator on a periodic basis to provide additional information to community leaders and appropriate social, health, and law enforcement organizations on overall community welfare. Such information could then be used to prioritize budgeting of community and NSB resources to address selected community welfare issues.* (USDOI, BLM 2004c and 2004d)

The SRB&A study team did not identify specific suggestions for subsistence oversight panels in planning documents for the remaining five projects. However, suggestions for community coordination occur.

During its literature review, the study team identified five subsistence oversight panel mitigation measures (Table 11). Two of the measures were stipulated by the NSB, two were included by ARCO Alaska, Inc. in their project design documents, and one was stipulated by ADNR. The measures were included in decision documents for the Alpine, Alpine Satellites, Oooguruk, and Tarn development projects.

In its 1996 EED for the Alpine Development Project, ARCO Alaska, Inc. stated its intent to assist in the creation of the KSOP and coordinate with KSOP to develop policies and procedures relevant to subsistence:

> *Primary mitigation for subsistence would be achieved through planning and policies developed between the Subsistence Oversight Panel and the operator. Open access would be maintained to traditional subsistence areas. Habitat restoration is addressed in the wildlife and fishery sections of this chapter. The Subsistence Oversight Panel would be funded by ARCO up to a certain dollar amount. It would meet on a scheduled basis and provide guidance to ARCO for establishing policy and procedures for the management of the development relative to concerns of local interest. The Panel would provide the mitigative mechanism to ensure conservation of the subsistence resource base, guarantees of free access to subsistence resource areas, and maintenance of a close working relationship between the operator and local residents. The applicant recognizes that maintenance of these socio-cultural components of the subsistence lifestyle are central to its practice.* (ARCO Alaska, Inc. 1996)

The NSB also stipulated continued consultation between CPAI and KSOP in its permit for the Alpine Satellites development project, noting that CPAI "shall halt or otherwise restrict or modify planned activities…as deemed necessary by the KSOP" (NSB 2006d). ADNR stipulated

coordination between PNRC and KSOP in its final consistency determination for the Oooguruk development (ADNR 2005); however it is unclear whether PNRC was involved in funding the panel and whether it was within the panel's scope to coordinate with development companies other than CPAI.

In summary, Nuiqsut residents' concerns over lack of influence in development decisions is one that has been frequently voiced and one which agencies have attempted to address with the formation of a subsistence oversight panel. Subsistence oversight panels serve as a mitigating agent between the local community and the developers and provide guidance and insight on local issues regarding development and subsistence activities.

6.8.2 Analysis

The study team assessed the effectiveness of the subsistence oversight panel mitigation type as well as one specific subsistence oversight panel mitigation (**M11**) associated with the Alpine project (Table 28 and Appendix A). This assessment included information from three Nuiqsut residents and written responses from CPAI.

Table 28: Subsistence Oversight Panel – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M11	Alpine	CPAI	ARCO Alaska, Inc.	Fund Subsistence Oversight Panel to provide guidance and establish policies related to subsistence mitigation.

Stephen R. Braund & Associates 2013

6.8.2.1 Implementation

All three Nuiqsut residents who provided information on CPAI's funding of a subsistence oversight panel to provide guidance and establish policies related to subsistence mitigation reported that the measure (**M11**) had been implemented. This oversight panel, otherwise known as KSOP, is based in Nuiqsut and thus residents all could easily report that this mitigation had been implemented. A Kuukpik Corporation respondent noted that KSOP was originally initiated through one of their surface land use agreements and included representatives from the corporation, Native Village, and City of Nuiqsut. Regarding the implementation of measure **M11**, CPAI stated,

> *To maintain a complete and thorough knowledge of the cultural resources of the area without compromising the confidentiality of the information, the operator proposed to work closely with a Subsistence Oversight Panel in the planning, siting, construction, and operation of its development project.* (CPAI Written Response December 2013)

6.8.2.2 Monitoring for Implementation

One resident reported that the monitoring to make sure that the subsistence oversight panel (**M11**) was put in to place occurred by local residents. This individual explained, "It was the people. The leadership back then. It wasn't just one office. It was elders and leadership. People and individuals that were elected and appointed to office" (Nuiqsut Key Informant November 2012). Because of the involvement of local organizations including the Kuukpik Corporation, Native Village, and City of Nuiqsut in the implementation of KSOP, it is likely that these entities are also involved at some level in monitoring the panel. CPAI stated that monitoring also occurs through annual meetings, saying, "Through annual meetings, KSOP is involved in consultation for projects" (CPAI Written Response December 2013).

6.8.2.3 Assessment of Effectiveness

Three Nuiqsut residents assessed the effectiveness of the subsistence oversight panel (measure **M11**). Two assessed the mitigation as effective but requiring improvements and the other assessed the mitigation as highly effective. Those who suggested changes to the panel proposed improvements in communication between CPAI and the panel as well as a stronger effort on part of the KSOP board to track studies and fulfill their role as an oversight panel. Discussing the need for better communication between CPAI and the panel, one resident who was a KSOP board member said,

> *Communication needs [to be] improved. Working with them with subsistence monitors is working good, but they need more students to implement summer studies. They need more improvement in their flight plan and how [it is] implemented. At first when they developed, they said they [would] fly two to three flights a day. We have seen 10 or more flights a day. It is very different from what they said. Because what they say they forget and they increase their activity and flight planning…. Yeah they [CPAI] listen somewhat, but sometimes they always forget what we say and we have to repeat every year and they need to work on [that]. And we have to remind them.* (Nuiqsut Key Informant November 2012)

One Nuiqsut individual believed that the roles and responsibilities of KSOP needed to be more clearly defined. Describing the need for the panel to improve their role as an oversight organization, this individual stated,

> *There needs to be improvement. They are a subsistence oversight panel and they should be tracking studies that are happening. I know they meet with the companies that come up and propose activities, but it stops right there. And no documentation on their part of what their findings are. Right now the board is [not effective] because of their lack of knowledge [about] what they should do and what they should be…. They [previous board members] were really effective.*

> *These were the people that put it together. They you know, they made sure everything was in place and reported [impacts]. It was a strong entity. And they knew their purpose of the panel.* (Nuiqsut Key Informant November 2012).

CPAI believed that the implementation of KSOP has been successful in providing guidance during project planning, stating, "KSOP input is a valuable part of project planning" (CPAI Written Response December 2013).

6.8.2.4 Effectiveness Summary/Conclusions

The study team assessed the subsistence oversight panel mitigation type as a generally effective mitigation measure. Similar to other mitigation measures, key informants' comments indicate that a lack of communication may hamper the effectiveness of the panel. Greater clarification of KSOP's role, particularly in relation to other projects that are in the area, may help alleviate concerns over the effectiveness of the panel. Potential improvements to the subsistence oversight panel mitigation measure include expanding funding of the panel to include all companies working in the area (rather than a single developer); establishing a protocol in which the panel receives regular updates and communication from the companies funding the panel; including representatives from each community entity on the panel; and expanding the panel's role to include oversight of all interactions between subsistence activities and industry operations in the Nuiqsut area.

6.9 Subsistence Representatives

6.9.1 Overview/History

Subsistence representatives (often referred to as "sub reps," "subsistence reps," or "subsistence advisors") serve as liaison between industry and subsistence harvesters. They need a working knowledge of both local subsistence practices and development projects. Subsistence representatives may serve to improve communication between developers and subsistence users, inform hunters about impending development activities that may conflict with subsistence uses, and inform developers about subsistence activities. Subsistence representatives may include monitors during ice road construction and/or seismic work, may accompany surveyors during aircraft overflights, or may act as a community point of contact for the development company. CPAI's 2008-2009 Subsistence Plan (CPAI 2008) describes the subsistence representative role as "the North Slope residents' representative in the field," and lists their primary duties as observing CPAI and CPAI contractor activities, providing recommendations for improvements related to project operations, and alerting personnel on sensitive areas or cultural materials (e.g., grave sites) of which CPAI or its contractors may be unaware. Subsistence representatives are generally hired and paid by development companies although in some cases local entities (e.g., Kuukpik Corporation, KSOP) are responsible for hiring and managing employees such as ice road monitors.

NSB concerns over a specific incident with a developer and issues raised by North Slope residents about communication between residents and industry led to the formation of subsistence representatives as a mitigation type. According to the NSB Planning Department, subsistence representatives originated from an incident in 2001, which prompted the NSB to cite a developer for an unnecessary disturbance to the tundra. The NSB identified the need for adequate monitoring of development activities to prevent such disturbances in the future, and subsequently designed the subsistence representative mitigation measure as a form of monitoring. Below are specific comments pertaining to the incident itself and the formation of the subsistence representative role:

> *Out of that [developer incident], the planning commission, through the planning department [issued a] citation [and decided it] was a major thing that there needs to be better monitoring of tundra, and subsistence reps to monitor large impact projects.* (NSB Key Informant October 2012).

As discussed above, a primary purpose of the subsistence representative mitigation measure is to reduce conflicts between development and subsistence activities. In SRB&A's inventory of subsistence concerns for this study, "difficulty hunting" was the second most commonly mentioned type of concern. Nuiqsut residents have cited concerns related to a lack of communication with developers particularly related to specific activities (e.g., air traffic, seismic activities) that may interfere with residents' subsistence hunting or harvesting. During SRB&A's 2007 interviews, two active harvesters in Nuiqsut remarked on the importance of clear communication by developers to forewarn residents about impending development activity:

> *Like when they do seismic in the areas or survey, when they do that, they come to talk about it with villages. They explain it and then go to work. Some companies do work before meetings. They need to do meetings before work. Like the guy from Alpine came to a meeting but he had already started work. That goes for all oil companies, why do you work before coming to meetings.* (SRB&A 2009)

> *My concern is that four years ago, an oil company was eight to 12 miles south of here. They say they gave information to our village about dynamite blasting. When they blasted this dynamite the blast shook the buildings. More than half of the people hadn't gotten the information, so they were very concerned about the shaking buildings. I heard the explosion. I thought it was my propane tank or my neighbor's. I said, "We better find the kid." Everyone was out looking south. Then we found out. Everyone was concerned. We were told the community had been informed, but that's all the further it went. They didn't check up. Then they said they were sorry. But they have to make sure the information gets out.* (SRB&A 2009)

None of the planning documents for the seven development projects mention subsistence representatives as a specific mitigation type; however, planning documents for the Alpine Satellites project include suggestions related to communication of development activities to reduce subsistence conflicts as well as monitoring of development activities (through oversight panels or advisory committees). The FEIS for Alpine Satellites suggests mitigation to improve communication with local residents. The following excerpts are from the FEIS for the developments at Alpine Satellites:

> *Communications among CPAI, local residents, the NSB, the State of Alaska, and federal agencies can minimize conflicts and accidents related to activities in the Plan Area, including hunting by local residents.*
>
> *Potential Mitigation Measure: Empower a committee of local subsistence users, agency personnel, and CPAI that would meet on a regular basis to exchange information, identify concerns and issues, develop research and monitoring plans, oversee research and monitoring implementation, review data, identify options to resolve issues, establish and implement plans to resolve issues, and resolve issues in a mutually satisfactory manner for all parties. Anticipated Results: Provides a forum for CPAI, local subsistence users and agency personnel to identify and work together to resolve conflicts/issues, suggest areas of research and monitoring, and disseminate project development information to communities.* (USDOI, BLM 2004d)

A suggestion for consultation with subsistence users was carried forward into the ROD for the Alpine Satellites, which noted that BLM had included such measures as stipulations in their leases for the project (as noted above, the BLM stipulations no longer apply to the Alpine Satellites project as those lands were never developed and later conveyed away from BLM).

During its literature review, the study team identified three subsistence representative mitigation measures for the seven development projects (Table 11). All three of these mitigation measures were NSB stipulations and were found in NSB permits for the Alpine, Oooguruk, and Meltwater developments. The following are the three NSB stipulations requiring subsistence representatives:

> *Permitee shall employ subsistence representatives from the village of Nuiqsut that will serve to minimize impacts to wildlife and local subsistence activities.* (NSB 2009b)
>
> *Permitee shall employ subsistence representatives to assure that conflicts are minimized and that proper notification of areas that may be dangerous to local subsistence users are identified and properly notified to residence.* (NSB 2006a)

CPAI shall employ Subsistence Representatives to minimize conflicts during activities. (NSB 2008a)

In summary, subsistence representatives have developed as a mitigation measure to facilitate communication between developers and subsistence users, to monitor development activities, and to advise developers on issues related to subsistence. Subsistence representatives may act as monitors during ice road construction and/or seismic work, may accompany surveyors during aircraft overflights, or may act as a community point of contact for the development company. The NSB required that industry hire subsistence representatives for the Alpine, Oooguruk, and Meltwater developments.

6.9.2 Analysis

The study team assessed the effectiveness of the subsistence representative mitigation type as well as two specific community representative mitigation measures (**M14** and **M32**) associated with the Alpine and Oooguruk projects (Table 29 and Appendix A). This assessment included information from an NSB individual, four Nuiqsut residents, and written response from CPAI. Other industry associated with these measures included PNRC; however, the study team was unable to collect information from PNRC regarding these specific measures.

Table 29: Subsistence Representatives (Advisors) – Mitigation Measures for Analysis

Mitigation No.	Project	Developer	Proposing Agency	Mitigation Summary
M14	Alpine	CPAI	NSB	Employ subsistence representatives from Nuiqsut.
M32	Oooguruk	PNRC	NSB	Employ subsistence representatives from Nuiqsut.

Stephen R. Braund & Associates, 2013.

6.9.2.1 Implementation

The subsistence representative measures assessed for this project required the employment of subsistence representatives for the Alpine (**M14**) and Oooguruk (**M32**) development projects. The majority of key informants who provided information on the implementation of the subsistence representative measure indicated that both CPAI and PNRC had implemented the measure. One individual indicated that PNRC had not implemented measure **M32** as intended because the company was not hiring local subsistence representatives from Nuiqsut saying, "No they don't. They get someone else from out of town and get other companies and don't go through the village. There is no subsistence rep [from Nuiqsut]. And they need to do that" (Nuiqsut Key Informant November 2012). Another individual reported that they were not aware that PNRC had subsistence representatives.

Several individuals discussed that CPAI's implementation of measures **M14** was not being fully implemented or that CPAI had implemented the measure for a time and then stopped. Three of

the four Nuiqsut residents said that Conoco had either stopped using subsistence representatives in the summer, were not using them on their helicopters, or had stopped employing subsistence representatives altogether. Residents noted that CPAI was still employing ice road monitors during the winter. One person said,

> *They're not doing it anymore [subsistence representatives on helicopters]. They need to implement what [was] done in the past, work with them and students to know the land, young students [who] want to make a career out of being a biologist. This kind of stuff. We still do ice monitors every winter and we implement that under the surface use agreement.* (Nuiqsut Key Informant November 2012)

CPAI's response regarding implementation of **M14** indicated that they include subsistence representatives when required in an individual permit. They reported that they had used subsistence representatives during the ice road season and during seismic activities, among other activities, saying,

> *CPAI contracts with Kuukpik for KSOP Subsistence Reps and Ice Road Monitors during ice road season and for seismic operations. Subsistence representatives have also been employed by the Environmental Studies, Tundra Rehabilitation, and Remediation programs.* (CPAI Written Response December 2013)

6.9.2.2 Mitigation Monitoring

The NSB respondent reported that the Borough was monitoring both CPAI's and PNRC's subsistence representative measures. Several individuals also noted the role that local residents and organizations, such as KSOP and the ASRC's Arctic Energy Services, have in monitoring the subsistence representative programs. A NSB informant noted that the NSB's monitoring of the subsistence representative program occurs on a case by case basis and described two recent examples of NSB monitoring with Shell and the Alaska Department of Transportation and Public Facilities (DOT&PF), saying,

> *I think it's on a case-by-case basis. As the concerns rise, we certainly engage in dialogue with Shell, [to determine] if it was their aircraft. We needed to make sure that the representatives that were working with Shell were in place, and [we were] having the village hearings as to what the [subsistence] rep is supposed to be doing. A very effective tool that the State of Alaska DOT has implemented is taking subsistence reps for the "Roads to Resources studies" to help [company] and be their guide and work as a liaison with the community. There's some language that says if there are unresolved issues [with the program] it shall be brought to the attention of the administrator to figure out further mitigation issues. If there are unresolved conflicts there are stipulations in place that say*

you need to take it to the administration to adequately address the concerns. (NSB Key Informant October 2012)

CPAI stated that project managers monitor for implementation of subsistence representatives during activities where they are required in permits, stating, "When this mitigation measure is included in permit stipulations the project managers work together to ensure compliance" (CPAI Written Response December 2013).

6.9.2.3 Assessment of Effectiveness

The study team received a number of detailed responses from the NSB and Nuiqsut informants regarding the role and effectiveness of subsistence representatives. Many of their observations were related to subsistence representatives in general, rather than the individual measures included in the analysis (Table 29). When implemented correctly, the study team learned that many considered this to be an effective measure in reducing anticipated impacts. A NSB informant discussed the positive aspects of industry implementation of the subsistence representatives as well as the areas in need of improvement. This person identified the use of traditional and contemporary knowledge of the landscape as the primary benefit of the subsistence representatives' role but also believed that the role of the subsistence representatives needs to be better defined. He noted that some developers have used subsistence representatives for jobs that are outside of their intended scope:

We've used that stipulation [subsistence reps] for many years and with a lot of praise. The oil industry solicits individuals that are knowledgeable of the land, hunting practices, how river systems work, etc. Sometimes we used subsistence representatives that saved the industry millions of dollars because of their knowledge of the land and where to place development. It's valuable to use traditional knowledge and modern knowledge to help facilitate the best management practices…. I would have to say that this measure is a very effective tool. A couple of years ago there was a misunderstanding as to the use of subsistence representatives. Nuiqsut was up in arms. I had to go there and mediate about best management practices and questions like what is the role of a subsistence representative? We learned by trial and error. There were representatives that were being used as available labor for anything like washing dishes, and getting out of the scope of what they should be doing. I had subsistence representatives personally call me and ask me what their role is, that they are not giving the industry any direction other than they are washing dishes. Is that their role? We gave a more specific definition as to what a subsistence representative is. They are a liaison between the hunting world and industry. The representative should be the go to person for incidents, knowledge of trails…and other types of issues….Knowledge of the land is useful to know how and where to travel around here. This is traditional and contemporary

> *knowledge of people who have used this land for subsistence and we try to emphasis that they are a critical way of balancing that [subsistence and development]*. (NSB Key Informant October 2012)

During the study teams' field visit to NMFS, the NMFS informant stated that the subsistence representative mitigation measure was one of the most effective measures for addressing local concerns saying,

> *I think local participation with observers is effective. Iñupiat speaking observers and staff on the industry vessels, and having communication centers that notify the company as to what types of subsistence is going on and where and giving same info [from the developers] to hunters is important, and that will be more important once industry is out there and that will be effective [in production phases]*. (NMFS Key Informant July 2012)

A NSB informant also discussed the need for agencies to include subsistence representatives in their activities on the North Slope. He noted that federal agencies sometimes conduct research and other activities on the North Slope, particularly helicopter and other surveys, without obtaining permits from the NSB or abiding by NSB policies. This includes a lack of subsistence representatives during agency fieldwork activities, which are another source of impacts to North Slope subsistence users. In order to reduce impacts to subsistence activities, the NSB respondent argued that all major operators on the North Slope, including state and federal agencies, should be required to obtain permits and include subsistence representatives in their field operations:

> *Not everybody is bound by these permits. Fish and Wildlife Service, USGS [United States Geological Survey] are the greatest violators in not communicating with the villages and not seeking permits [for their activities in the NSB]. They get their permits from BLM and say they are done with everybody else….A lot of impacts come from other organizations [outside of the oil industry]. During the fall and summer, people [who harvest] were going to the camps asking about helicopters and land management inspection; turned out to be USFWS planting themselves in a major harvesting corridor deflecting away from harvesters. They are not bound to listen to people saying "you need to move your camp." …. Having traditional knowledge available to all operators is key to having a balanced approach to balance impacts as to what is going to occur.* (NSB Key Informant October 2012)

CPAI listed the use of subsistence representatives as one of the measures most often requested by Nuiqsut and therefore effective in addressing Nuiqsut concerns (CPAI Written Response October 2013). They also commented specifically on the effectiveness of measure M14, stating, "Subsistence Advisors and Representatives have provided valuable information allowing CPAI to minimize impacts on subsistence activities" (CPAI Written Response December 2013).

Nuiqsut residents discussed the effectiveness of both CPAI's (**M14**) and PNRC's (**M32**) subsistence representative measures. All three Nuiqsut residents that provided information on PNRC's subsistence representative program said it was highly effective. Four residents also said that CPAI's subsistence representative program was effective; two of the four indicated, however, that there was room for improvement. Criticisms of CPAI's implementation included not using subsistence representatives in the monitoring of field activities (i.e., only consulting with them in the village) and a lack of overall commitment to and communication with the representatives. Two residents pointed to Shell's current implementation of the subsistence representatives as examples of effective implementation of this measure. One individual suggested that the subsistence representatives be contacted daily by the developer and informed of the developer's activities, so that they can disseminate the information to the rest of the community. Two Nuiqsut informants described their assessment of CPAI's use of subsistence representatives as follows:

> *They [CPAI] stopped doing that [subsistence representatives]. That was very effective when they had that and when it is exploration they do it consistently and when they are developing and pumping oil today it is like, 'Screw the village' and they start going away from that. Then they start giving us laws and regulations and say we're not trained for helicopter rides and we say train us! And that is what Shell does with MMO [marine mammal observer] and they get training. It is okay [subsistence reps are in place] during the exploration phase and when it comes to development they start saying, 'Oh we can't do it. It is against the law.' The day that CD4 was getting close to water, they didn't pick me up. They didn't want me to see something. After that they stopped picking up people and [made] all these little excuses, thinking it will go away.* (Nuiqsut Key Informant November 2012)

> *There needs to be some things done with that because Conoco Phillips needs subsistence advisors over here to have teleconference every morning and afternoon so people can know and avoid those areas. Daily! Shell has a good thing going with subsistence advisors. They have a conference every morning at 8:30, and they ask subsistence advisors where they are going and they don't go around that area until everything is gone. Do not disturb the subsistence hunters and that is what Conoco needs to do. But during the summer time for surveying they need to get subsistence advisors in place with Nuiqsut so there can be daily conference…. They should use Shell as an example over here for what they're doing. Shell has daily conference call and let them know where they going and if caribou sighted they let them know and not disturb area. Conoco needs to do it. I am a subsistence advisor for Shell, and I call them every morning and afternoon.* (Nuiqsut Key Informant November 2012)

During SRB&A's interviews with caribou hunters for the Nuiqsut Subsistence Caribou Monitoring Program, respondents were asked to provide feedback related to CPAI's existing mitigation measures. Forty-four percent of Year 3 study respondents identified subsistence representatives as a helpful mitigation action, with 12 percent indicating that the measure needed improvement. Residents' observations regarding the subsistence representative program included the following:

> *It's been good, we provide those services, having sub reps [subsistence representatives] and monitors out there. We are keeping them on track and making sure that they are complying with what the permit stipulations say.* (SRB&A 2011)

> *Yeah, it's working well. They are making sure that things get done [properly]. Now it's just pretty much monitoring. It works though; it's there for a purpose. It keeps some people on track; they get pretty lazy. Some, very few not all people, come up here and don't have respect for it.* (SRB&A 2011)

Respondents also provided recommendations for potential improvements related to the subsistence representative program:

> *They can do more. They can put them out there when the project starts and keep them out there till the end of the season. There can clean up when it kind of gets shut down. They can get on their snowmachines and clean up more on the road. They have a good, end of April and May when we have spring weather, and they can get out there and pick some things up. The sub reps really help out because you get somebody from Anchorage never been up here before, and they have no idea what things are. It's good to have somebody there reminding them all the time.* (SRB&A 2011)

> *It seems to be when they get people from here to do it. Communication between the community could be better. I suggested to one of the companies [that] it would be a good idea for the sub rep to carry a radio [in order to communicate with nearby hunters]. But they said we couldn't because of aerial laws.* (SRB&A 2011)

A NSB informant provided a similar discussion regarding CPAI's flying activities and use of subsistence representatives, saying,

> *Both mitigation measures [subsistence representatives and community consultation] are related; to search and rescue, to folks on the ground to communicate with the manager on sight, to pioneering trails. There are a lot of aspects when you talk about monitoring as to how representatives help us to achieve communication between the village and industry. I know of another issue*

> *in which the industry told the subsistence rep 'We're going over here and flying this way,' but the rep was not allowed to participate in the flights and was just getting direction on the ground. In that way, industry is underutilizing the representative and knowledge that is provided….* (NSB Key Informant October 2012)

Two local residents also discussed the need for local representatives to come from Nuiqsut and to be knowledgeable about the environment. Clear communication and training protocols for subsistence representatives were also identified as needed improvements, with one resident identifying CPAI as a positive example of adequate training. Two individuals observed,

> *They are highly effective. Some parts, they need improvements. Repsol for instance, they didn't train their sub reps, and they were thinking we put them out there and Conoco gives us state permits and guidelines and they say this is how we do it and we work with HRC out of Kuparuk out of environmental office and Alpine environmental office and it works great…. These young people are not really trained and have knowledge of area. [Need people with knowledge of area]. We always say our employees get younger and younger and they really don't have knowledge and KSOP should teach them and have a booklet or workshop with the elders, and that is something we don't really do.* (Nuiqsut Key Informant November 2012)

> *We stressed to the operators that they need to go through KSOP so that we hire people that live around our area rather than people from down south, people who don't even know about the area.* (Nuiqsut Key Informant November 2012)

The NSB respondent also identified clear communication as one of the primary improvements needed regarding subsistence representatives. Several residents also expressed frustration over local organizations including the Native Village, Kuukpik Corporation, and KSOP not having clearly defined roles in the oversight and hiring of subsistence representatives. Two individuals explained,

> *Conoco funds the administration of KSOP, but they have another set of funds that they give to Kuukpik to hire the subsistence reps…It used to be KSOP, but now it's Kuukpik. Kuukpik is now doing the hiring for the subsistence ice road monitors.* (Nuiqsut Key Informant November 2012)

> *It gets confusing because they overrode the Kuukpik Board. The agencies are going to the corporation and not to the village. The corporation somehow took that responsibility. I don't know how they did that. We don't have anything on file [about] how they did that.* (Nuiqsut Key Informant November 2012)

6.9.2.4 Effectiveness Summary/Conclusions

Based on the responses from Nuiqsut residents and the NSB, the study team assessed the subsistence representative mitigation as an effective measure. The study team sees this mitigation as being particularly successful because of its real-time implementation and the ability to utilize the traditional knowledge of local residents. However, the NSB and Nuiqsut individuals identified a number of areas where improvements could be made to this mitigation measure to make it more effective. These areas of improvement included addressing the need for clearer communication protocols, better training, hiring local and knowledgeable residents, and including subsistence representatives in field activities, particularly aircraft overflights. Key informants also noted the lack of subsistence representatives during agency operations.

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CHAPTER 7: CONCLUSIONS AND FINDINGS

This final section presents the conclusions drawn from the study team's findings related to the mitigation process. The mitigation process is complex, involving multiple interested parties as well as policies and regulations at various levels of government, and addressing a broad spectrum of physical, biological, and social concerns. This project represents an initial investigation into a field of research that has increasing relevance as oil and gas development on the North Slope continues to expand. The study team views this report as a foundation for further research related to how the mitigation process can be more systematically monitored and improved. This section presents lessons learned and socio-cultural insights in the hopes of fostering dialogue and forward progress among agencies, industry, and local communities.

The study team assessed the analytic methods used for evaluating the effectiveness of mitigation measures in order to identify the strengths and weaknesses of the research design. The study team focused their findings on the following components of the mitigation process:

- Compiling and tracking mitigation measures,
- Process of developing mitigation,
- Process of implementing mitigation,
- Process of monitoring mitigation, and
- Suggested scientific parameters for measuring the effectiveness of mitigation

Insight from agencies, industry, and Nuiqsut residents related to key improvements in the mitigation process are also included. The study team acknowledges that the lack of input from all relevant development companies regarding the mitigation process represents a gap in the study team's ability to assess the mitigation process. Therefore, the following findings and conclusions have been drawn with partial industry input. The study team hopes that following discussion will be useful in furthering additional research and improvements into the mitigation process.

7.1 Compiling and Tracking Mitigation Measures

The study team experienced a number of difficulties in identifying the mitigation measures that were to be implemented for the seven development projects addressed in this study. The primary data sets that contain binding mitigation measures are found in policy planning documents (e.g., BIFs and NSB ordinances), leasing approval documents, and permits. However, these documents are not all readily available and in some cases have multiple iterations due to changes in project design or need for annual renewal. The fact that a discrete list of mitigation measures is not readily available for each development project presents an initial difficulty for any future mitigation assessment. The study team found the DO&G website to be one of the most

straightforward in identifying mitigation measures that apply to a given project and also found it useful that DO&G requires applicants to submit a mitigation measure analysis in which the applicant provides a response regarding how they plan to comply with areawide (e.g., North Slope, Beaufort Sea) mitigation measures (ADNR, DO&G 2012). One NMFS individual provided a suggestion to the study team during their discussions that called for a list of known and approved mitigation measures that are specific to a certain geographic area, activity, and technology so that mitigation measures could be applied consistently across projects. This person said,

> *I think it would be good to have a memorialized list or recognized list that is area and activity specific and technology specific. [For] each of those it would be nice to have an agreed understanding of what the required mitigation should be. That is more or less known and exists in past permits but [there is] not a prescriptive list and those guys like ENI would [benefit] and [it would] streamline bureaucracy.* (NMFS Key Informant July 2012)

The same individual explained that the loss of the ADGC negatively affected the mitigation process. This individual explained that the ADGC served as a point of coordination between the various agencies and industry and noted that the lack of this coordination has made the mitigation process less effective:

> *DGC was useful because they would coordinate. MMS has information [they provide] to the lessee that clarifies the things that are… [it] direct applicants on how to comply with various acts.* (NMFS Key Informant July 2012)

Throughout the key informant discussions, the study team heard multiple Nuiqsut residents express frustration over their lack of knowledge about proposed and implemented mitigation measures. In a number of cases these individuals, many of whom worked for local organizations, were unaware that a given mitigation measure had ever been stipulated or even suggested. The study team also heard multiple agencies express frustrations that their agency has no regulatory authority to address many concerns expressed by Nuiqsut and no protocol or method for forwarding those concerns to the appropriate agency or entity. These residents' and agencies' concerns could be alleviated by consolidating a list of known mitigation measures and policies that apply to a project into one transparent and readily available repository. The study team considers industry to be the organization best suited for this task because, (1) they are not bound by the regulatory frameworks that limit the scope of many agencies' activities, and (2) they are generally the ones responsible for implementing each mitigation measure and thus are most aware of the suite of mitigation measures required of each development project. In addition, industry key informants indicated that they already have an internal tracking system in place for permit stipulations. These tracking systems could be modified and used as a basis for a publically available repository of mitigation measures.

An alternative to having industry provide consolidated lists of mitigation measures applicable to each development project would be to have an intergovernmental agency or group implement or monitor such a tracking system. On the North Slope, the North Slope Science Initiative (NSSI) is an intergovernmental group that includes representatives from various state and federal agencies in addition to regional or local organizations such as the ASRC and NSB. The primary purpose of the NSSI is to increase collaboration on the North Slope for research and monitoring efforts related to oil and gas development.

One suggestion for tasking industry with the development of a consolidated list of mitigation measures would be that the leasing agency includes a stipulation that each company must provide a publicly available document/website, similar to that used by the DO&G that contains the following components:

1. List all the applicable mitigation measures that a company is following,
2. Agency that stipulated the mitigation, relevant policy/regulation, and source document
3. Expected duration of mitigation measures (e.g., construction, life of project, one year), and
4. How the company is implementing the mitigation or complying with the policy/regulation

An example of the types of information that could be provided for each mitigation measure is shown on Figure 5. Agencies could assist industry by listing their agency's mitigation measures, expected performance standards, and expected duration of mitigation measures in their decision documents (Council on Environmental Quality [CEQ] 2011). Any list of stipulated mitigation measures should clearly state who is expected to implement the mitigation measure, and who is expected to monitor the mitigation measure. A pilot project for this suggestion could focus solely on social mitigation measures, which appear to be the least monitored and have more potential for uncertainty over their implementation. If successful, the mitigation tracking document could expand to include physical and biological mitigation as well.

Ideally, each developer's list of consolidated measures would be provided to an agency or intergovernmental group to be compiled into a single tracking system published online and available to the public. However, this would be dependent on the availability or willingness of such an agency or group to maintain and manage the website. If a single website managed by a single entity is not feasible, each development company could maintain and manage the tracking system on their own website.

7.2 Developing Mitigation Measures

Based on the responses received from the agencies, industry, and community informants and the study team's analysis of mitigation measures across the seven projects evaluated for this study,

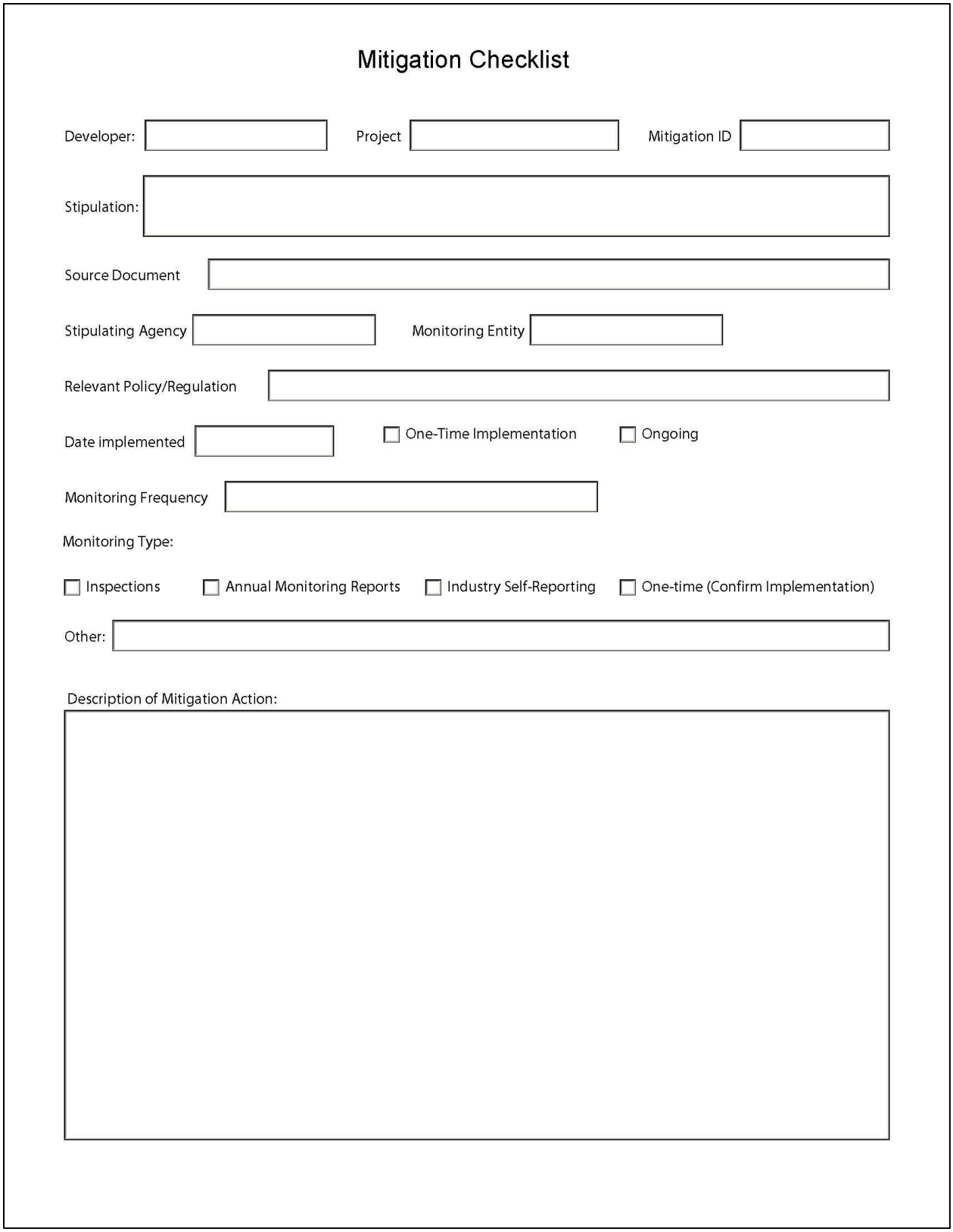

Figure 5: Example Mitigation Checklist Form

the process of developing mitigation measures is effective in many ways because it provides for and draws on a number of information sources (e.g., public involvement, scientific research, professional judgment) in the development of mitigation measures. To ensure that all concerns and proposed mitigation have been considered in the development of mitigation measures, it is important that there be a system for inventorying concerns and mitigation proposals for a given project prior to developing final mitigation measures. Therefore one finding of this study is the need for a coordinating agency or entity to inventory scoping concerns (found primarily in scoping documents) and mitigation proposals (found primarily in NEPA planning documents) prior to the issuing of final permits or leases for a project. While the study team found that this inventory had been done for development projects to varying degrees, especially with the documentation of concerns during the NEPA process, it is less clear whether this had been done for mitigation proposals to ensure that all mitigation proposals had been considered in the final decision. The recent ROD for the NPR-A Integrated Activity Plan provides an example of how mitigation proposals that were considered but not carried forward can be documented. The ROD included a section entitled "Potential Mitigation Measures not Adopted." The inclusion of this section was based on 40 CFR 1505.2(c), which states that the ROD should "state whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not." The study team believes this could be an appropriate avenue for inventorying mitigation proposals prior to the issuing of final permits or leases.

Key informants from the DO&G and USFWS identified the process of drawing on a number of agency sources when developing mitigation measures as a strength of the mitigation development process saying,

> *We include other agencies and actively solicit their input when developing a BIF. There is a time period within which they should comment. Information- they provide us sources of information, like reports. [It] provides fodder for developing and updating BIFs.* (DO&G Key Informant August 2012)

> *[There is the] Section 7 consultation process, and various parties are familiar with it and oil and gas and the major agencies are familiar with the process and getting oil industry to [consult with] us.* (USFWS Key Informant July 2012)

An ADF&G individual added that an effective part of the mitigation process for their agency was the dialogue they have with the applicant during the early phases of the planning process. This person said,

> *Working with the applicant, talking with them early in the process, listening to their concerns and having them listen to our concerns and try to reach a middle ground. And [we] realize that they need to get things done and we need to protect our concerns. It's usually indirect, depending on what may or may not be going*

on, sometimes the Subsistence Division may have a project going on in Nuiqsut, a harvest survey, and we get feedback from those staff [that helps develop measures]. But as far as a permit to drill a well someplace …it's mainly indirect [to subsistence]. (ADF&G Key Informant October 2012)

In keeping with the thoughts expressed by other agencies, one NSB individual expressed that the agency and industry coordination in the forming of mitigation measures was an effective part of the Borough's process. This individual described the process as follows:

It's working pretty well, and we're continuing making minor revisions to the municipal code. They [developers] understand really quick [what they need to do] without constantly calling. And then as revisions are proposed, industry is informed of the proposed revisions and they're given opportunities to comment. The last revisions, the two last revisions that are going to the assembly next week, we've had them out for a while for comments for industry and we've received comments from one operator. We've made minor revisions to the draft. We work quickly with other agencies like the Army Corps. In the interim we put [the agencies and industry] on the cc list for our permits. And that's how we always manage to give public notice for applicants. (NSB Key Informant August 2012)

The BP key informant also noted difficulties with poorly worded stipulations, or stipulations that conflict with stipulations in other permits or even within the same permit. This individual noted that increased communication to ensure that all parties understand the expectations of a given stipulation could help reduce some of these issues:

I think people should be more careful about how they word requirements. Everyone should pass them around and say, "What does this mean to you?" That would probably be the best change they could make. (BP Key Informant March 2013).

In addition, CPAI noted the importance of being notified early in the permitting process about proposed mitigation measures so that they can determine how to work these measures into their project design and also determine whether these measures are appropriate for the project. CPAI also noted that some measures are implemented due to pressure from outside groups that are not effective or are not in the best interest of industry and stakeholders. The most effective part of the mitigation process, according to CPAI, includes "early discussions with stakeholders," which "are helpful and guide the project team toward a design with minimal impacts to the environment, wildlife and subsistence hunters" (CPAI Written Response October 2013). CPAI provided the following comments regarding how the mitigation process could be improved:

Knowledge of proposed mitigation measures required by agencies early in the permit process; this would allow for the company to work with the project engineering staff to ensure that the proposed measure can be engineered and

adds benefit to the project (i.e., actually assists with impact reduction or minimization). Evolving agency issues and requests through individual permit reviews is difficult for applicants to plan and adjust for, and adds time and cost to the overall permit process. Adding additional requirements through the permit process circumvents the regulatory rulemaking process and creates uncertainty for all operators (e.g., an operator may agree to something outside the regulatory requirements due to the urgency to implement a project versus the value of the mitigation measure which creates an expectation for all operators).

Late comments and litigation by eNGO [environmental non-governmental organization] groups threaten to modify or eliminate mitigation measures that have been carefully negotiated between industry and local stakeholders. In addition, the threat of eNGO litigation appears to be driving the mitigation process followed by regulatory agencies and as a result industry may be required to implement ineffective measures which increase cost with little added benefit to the environment and/or community. In some instances, these measures create unnecessary and unacceptable increases in safety risk associated with operations, thus increasing the potential for significant safety incidents. (CPAI Written Response October 2013)

The inclusion of traditional knowledge in informing the development of mitigation measures is one area that could improve if agencies and developers placed more emphasis on this source of information. While the public scoping meetings and written comment periods are one way for traditional knowledge to be transmitted, they may not be the best forum for local residents to express their accumulated wealth of knowledge. Specific traditional knowledge workshops and directed conversations with local leaders regarding mitigation proposals during the early stages of the permitting process would be one enhancement to the process of developing mitigation. Such a dialogue could include presentation of mitigation proposals in consideration by an agency with direct feedback from local residents regarding ways in which the measure may be enhanced or removed if not effective.

An example of the effectiveness of incorporating the knowledge of local residents is the now-standard minimum pipeline height of seven feet. As a number of key informants observed, this measure was put in place in response to comments and observations from the community of Nuiqsut and is now generally accepted as a measure effective in reducing impacts on caribou and subsistence users. By placing more emphasis on the traditional knowledge as it relates to project mitigation measures, the agencies and developers have a better chance of gaining community support for the permitting process while at the same time enhancing the effectiveness of mitigation measures.

Local oversight panels such as KSOP may be one avenue for gathering and documenting traditional knowledge relevant to mitigation measures. Several studies have established

oversight panels consisting of knowledgeable harvesters to help guide research and review study findings. These include a panel of experts developed for a study on variations in the abundance of Arctic cisco (ABR, Inc. et al. 2007), which continued in a formal capacity as the *Qaaktaq* Panel for a fisheries monitoring study (Seigle and Parrett 2009), and a Nuiqsut Caribou Panel which oversees a caribou subsistence monitoring study funded by CPAI (SRB&A 2012). In each of these studies, the panel of local experts has been invaluable in providing their own observations and knowledge, which led to the development of additional research questions, alterations to study design, and contributed to researchers' understandings of the local environment. These existing panels, or a new panel consisting of knowledgeable subsistence hunters and harvesters with an interest in contributing to mitigation and monitoring efforts, could review proposed and implemented mitigation measures and provide input regarding their design and/or effectiveness.

One Nuiqsut resident expressed that local involvement with the community is helpful in informing mitigation measures and regarded it as the most effective part of the mitigation process. The individual went on to recommend that agencies take the next step and allow Nuiqsut residents to actually have a voice in the decision process so that the community believes their voice is being heard. This person suggested,

> *I know that the companies and state and federal agencies say in the last they could come up with a panel and committee and subsistence panel and subsistence advisory committee, and the board has done it and we have done it. That is all good. And it has been effective, and if needs improvement it would be nice to see on the local level a representative or two in the board rooms of the decision makers where they are discussing policies and procedures and regulations and listening in and being there and directly involved in decision making process where it becomes law. It is great and nice the state agencies come in and gain input and then ok so you go back to your office and why not bring someone along from here to stay with it and see it through.* (Nuiqsut Key Informant November 2012)

Another concern heard frequently during discussions with Nuiqsut key informants was that certain local entities were left out of the planning and implementation process, while others were given a greater role. In particular, several individuals expressed the concern that the Native Village of Nuiqsut was not being adequately consulted by agencies or industry regarding development activities in the area. If local entities are given a greater role during the decision-making process, they should each have equal opportunities for participation.

7.3 Implementing Mitigation Measures

During the course of field visits and discussions with the agencies, it became apparent to the study team that certain agencies had greater flexibility in terms of what they could include as

mitigation measures on their permits or leases. Agencies that are under the framework of one or two specific regulatory statutes such as the USACE and their Section 404 and Section 10 permits, or ADF&G and the AS16.05.841 and AS16.05.871 regulations, are more restricted in the scope of the mitigation measures they can legally stipulate. Often these regulations are aimed at protecting the natural environment, and thus these agencies cannot address all concerns, particularly when they relate to social aspects such as protecting subsistence activities and other cultural components. Separate analyses of the NEPA process have identified continued concern and lack of guidance regarding social, cultural, and economic effects (NEPA Task Force 2003). The study team also concluded that mitigation regarding these effects is lacking in many permitting documents. A number of mitigation measures identified by the study team were vague or broad in their requirements (e.g., restricting lease-related use when necessary to prevent unreasonable conflicts with subsistence harvests). Key informants were generally unaware of these measures and further unable to assess the effectiveness of these measures because of the lack of specificity. It is likely that this lack of specificity also results in difficulty for developers in implementing the measures. More specific measures are generally more effective because developers know what is expected of them, agencies can more easily monitor their implementation and effectiveness, and communities can more easily provide feedback on these measures.

Agencies that are responsible for leasing lands or waters for oil and gas exploration and development (e.g., DO&G, BOEM, BLM) or issuing local land management regulations (e.g., NSB) appear to have the greatest flexibility in the scope of mitigation measures that they can apply to permits and leases. Thus, these entities are the best suited for addressing broader social concerns including those related to subsistence activities. Even more so than the leasing or land management agencies, the developers have the greatest flexibility to address concerns that are not addressed within an agency's regulatory framework. However, because the decision to implement mitigation outside those required in permits and leasing documents is voluntary, the degree to which these mitigation measures are addressed, particularly social ones, is based on the company's policies and mandates and level of commitment to local residents and sustainable development. The study team received a number of key informant comments that the developers addressed in this study were proactive in implementing and improving mitigation measures outside of the regulatory framework. This indicated to the study team that industry can play a valuable role in developing and implementing mitigation measures.

A BOEM informant suggested that one method for improving the implementation of mitigation would be to give agencies greater flexibility to work towards adaptive management (i.e., flexible seasonal restrictions on industry activities). This individual pointed to the example of the CAAs and how BOEM has used adaptive management to meet the needs of subsistence whalers and industry operations, saying,

> *We have tried to do seasonal drilling restrictions [in the past] but kind of backed off. Normally those had a [set] date and sometimes that doesn't make any sense, if the ice is already moved in or out and you can't be there [anyway]. If the ice has moved out and clear and all [the] whaling is completed, why can't companies operate? And that is why we try other methods to meet the needs of subsistence hunters and industry. I can imagine if you are trying to protect subsistence, you don't need that protection if you are not doing a subsistence activity, and the whale migration might change [from year to year] and that is a problem with very seasonal set restriction. And we try to be more adaptive management. We encourage things like the CAA, and that has worked.* (BOEM Key Informant October 2012)

Speaking again on the benefits of adaptive management, the same BOEM individual also acknowledged the need for improvements in the area of oil development and addressing subsistence concerns. Increased communication and sharing of information were suggested by this person as ways to better address subsistence concerns:

> *There are improvements; I think we lean more towards adaptive management [than in the past]. That comes with a price. If you look at [public] comments, they believe that unless [it is] a condition of lease that there is no protection. But again, when you put some things into concrete then you can't change [them, and they are less effective]. I think adaptive management and communication and sharing more is there. Bureaucracy and government have their chew up time. [Things] don't happen instantaneously and it would be nice [if they did]; and there are other times where people are glad we don't act instantaneously, and we are making improvements. I think the public has much more involvement now than in the early program. I don't [think] a lot of issues that North Slope Natives have with our program have been resolved.* (BOEM Key Informant October 2012)

Adaptive management has also been recommended by the CEQ as an important part of any federal mitigation implementation and monitoring program (see CEQ 2011).

A Nuiqsut resident also commented on the process of implementing mitigation measures. This person explained that some companies are showing a lack of effort in their implementation of mitigation measures for their project, by copying the policies of other developers or areas, when they are not applicable to the Nuiqsut region or to the specific area of development:

> *One or two of the companies just obtain a copy of [another] operators' policies and regulations. That is where the pitfall has been for those two. I say that because they come to Nuiqsut and hold a meeting and [they need to] quit using the other companies' policies and regulations and, hey, use your own and make*

your own. And those policies don't work where you are at. In time it just became obvious those policies and regulations don't work for where they are at now. Some of those policies were meant for the coastal plain and the operators were in the foothills, see what I mean? (Nuiqsut Key Informant November 2012)

7.4 Monitoring Mitigation Measures

The monitoring of mitigation measures is addressed in the CEQ regulations which state that "a monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation" and "agencies may provide for monitoring…[and] upon request, make available to the public the results of relevant monitoring" (40 CFR sec. 1505.2, 1505.3). Several agencies have implemented such mitigation monitoring and enforcement programs although the level of detail and implementation varies among agencies. In one case, the study team found only a brief reference to a monitoring plan (e.g., USDOI, BLM 2013) in the ROD; in another example the monitoring and enforcement program in the ROD was more detailed and included requirements for compliance, list of responsible parties, and timing of mitigation measure (Bureau of Indian Affairs 2009). A 1997 study on the effectiveness of NEPA found that in most cases agencies do not collect long-term data on the impacts of projects (CEQ 1997). A 2003 NEPA task force report reaffirmed the conclusions of the earlier 1997 report that agencies do not typically conduct long-term monitoring on the environmental impacts of actions (NEPA Task Force 2003). In 2011, this deficiency still existed and the CEQ recommended a monitoring program be created or strengthened to ensure the implementation and effectiveness of mitigation (CEQ 2011).

The study team's own analysis of monitoring procedures by the agencies found several potential areas for monitoring improvements including increased community involvement, greater access to the status of agency monitoring efforts, and need for better methods to monitor mitigation measures that focus on subsistence activities and users. The study team found a focus on industry-agency interaction during the monitoring process, with less involvement of the community. One DO&G individual summarized this interaction saying, "Field presence focuses on operator-developer. [There is] little opportunity for local input during inspection [and] no planned outreach during inspections" (DO&G Key Informant August 2012). While some developers are required to employ subsistence advisors/monitors, agencies do not appear to include local community members during their monitoring inspections. During key informant discussions the study team observed mixed responses from local residents regarding whether or not mitigation measures were being implemented. Greater involvement of Nuiqsut community members during agency inspections would serve to alleviate part of this uncertainty as residents would become better informed of which measures were being implemented and monitored and subsequently be able to disseminate that knowledge to other community members. Such an effort on part of the agencies could occur by extending an invitation to subsistence representatives and monitors already in place in Nuiqsut to accompany agencies during their field inspections. The importance of public involvement is also emphasized in a recent CEQ (2011) guidance on mitigation and monitoring. In addition, the study team found that it was not

always clear who was responsible for monitoring each mitigation measure. To address this, each mitigation measure could clearly state which agency or entity is responsible for monitoring the measure, and whether the measure requires self-monitoring or self-reporting.

During their research, the study team also discovered a lack of readily available information from most agencies and industry regarding the results of ongoing monitoring and inspections. On their website, BSEE includes annual summaries of performance measures, information on civil and criminal penalties paid by operators (and the reason for the penalties), and investigation reports. However, this level of monitoring information is not available for all agencies. While both federal and state agencies emphasize public involvement in the planning process (see "Developing Mitigation Measures" above), the opportunity for public involvement in the monitoring process is much more limited. Several agency individuals explained to the study team that the results of field inspections are primarily for internal use and that while agency-industry correspondence would generally be available to the public, these inspection documents are not readily available and would require specific requests for information from the individual agencies. Similarly, industry monitoring reports are not easily accessible or distributed. The study team's own conclusions were supported by a 2003 review of the NEPA process, which emphasized the importance of timely availability of monitoring data to all affected agencies and stakeholders (NEPA Task Force 2003). A 2011 memorandum on NEPA mitigation and monitoring stated a similar goal saying, "agencies should encourage public participation and accountability through proactive disclosure of, and provisions of access to, agencies' mitigation commitments as well as mitigation monitoring reports and related documents" (CEQ 2011: 4). If agencies and industry made a greater effort to make available the results of their monitoring to interested parties, stakeholders would have access to current information and it would result in more awareness by stakeholders if the mitigation was in fact occurring. BSEE's repository of inspection reports and monitoring information on their agency website could be used as a model for such an effort. The repository for these monitoring reports could also include the ability to search for monitoring results by project, agency, and developer.

Finally, the study team found a lack of emphasis on monitoring by agencies for mitigation measures that address subsistence users and activities. Whereas mitigation measures for the protection of the environment or specific project design features appear to be more regularly monitored, the study team heard less from the agencies regarding efforts to monitor mitigation measures aimed at lessening direct impacts to subsistence users and activities. For the projects evaluated, the direct subsistence-related mitigation measures came primarily from the leasing agencies and land managers (DO&G, BOEM, and NSB). It appears that the primary mechanism by which subsistence-related mitigation measures are "monitored" is through concerns and complaints raised by local residents. In other words, if there are no complaints raised about a development activity, then the agencies generally assume that the mitigation measures are effectively avoiding or reducing the expected impacts on subsistence; community complaints may trigger review of the mitigation measures meant to reduce the impacts that are causing

complaints. Several agencies reported that they have inspectors who monitor certain mitigation measures in the field. For example, the DO&G indicated to the study team that they have inspectors in the field three weeks out of every month on the North Slope to ensure that companies are in compliance with their stipulations. However, this monitoring is primarily for compliance with design and operations-related mitigation, rather than mitigation addressing social and subsistence related impacts. The mitigation process would benefit additionally if inspectors, such as the DO&G inspectors and other agencies with subsistence-related mitigation, would implement a more proactive monitoring of mitigation measures designed to reduce social and subsistence-related impacts similar to their monitoring for design and operations-related mitigation. One potential approach for implementing monitoring for subsistence-related mitigation measures would be for inspectors to contact local subsistence representatives (e.g., KSOP) on a scheduled basis about the specific mitigation measures aimed at reducing impacts to subsistence users and activities, document their feedback on these measures, and make the results of this monitoring available. These inspectors could also make annual or semi-annual visits to Nuiqsut and meet with local community organizations to monitor whether the mitigations are occurring as expected.

7.5 Measuring the Effectiveness

The study team has identified four primary variables or parameters that could be used to help evaluate the effectiveness of subsistence mitigation measures in future research:

1. Inventory and tracking of mitigation measures (see discussion above)
2. Tracking community concerns and monitoring results
3. Monitoring subsistence uses and activities
4. Proactively engaging with affected community members and organizations

As many agencies had expressed to the study team during their discussions, the presence of a concern is one parameter that agencies use to discern whether or not a mitigation measures aimed at addressing that concern is working or not. The study team agrees that community feedback is one way in which to ascertain whether or not measures aimed at mitigating impacts to subsistence activities and other social concerns are effective. However, relying on the community to express concerns as an indicator of effectiveness puts the burden of proving "effectiveness" in the hands of the community, when the responsibility should lie more with the agencies and industry. Multiple problems exist with placing the responsibility on the community to self-report concerns, including lack of knowledge of who to direct concerns to (i.e., expressing OCS concerns to DO&G staff), technological limitations (i.e., not being able to provide feedback via internet), and community fatigue (i.e., burden on residents to attend year-round meetings and continually express concerns across multiple projects).

In general, studies have shown that public outreach under NEPA has not been meeting the public's desired level of involvement (CEQ 1997), and the study team found this to be the case in Nuiqsut as well. A more proactive approach on the part of industry and agencies would be an improvement to the assessment of effectiveness related to measures that are not focused on the physical and biological environment. Such a proactive approach might include better tracking of concerns, and ongoing dissemination of monitoring results with semi-annual or annual follow-up with community organizations (e.g., City of Nuiqsut, Native Village of Nuiqsut, or Kuukpik Corporation). For CPAI projects, including KSOP would also be useful and necessary. In addition, providing more venues for residents to report concerns or impacts would increase community representation. Views on the effectiveness of mitigation measures may vary within a single community. Providing more venues for feedback (e.g., periodic working groups with community residents, brief household concern surveys) would ensure that more people are given the opportunity to provide input and allow a better representation of overall community observations. Current community feedback avenues (public hearings and self-initiated comments) tend to represent the views of a more vocal subset of the community population. Certain federal agencies have already adopted such a tracking system known as an Environmental Management System or EMS that provide a systematic framework for monitoring and tracking performance (CEQ 2011) (see also CEQ 2007b for more information on NEPA and EMS). Agencies and industry could also potentially draw on subsistence representatives as part of engaging the community. If agencies and industry are fully engaged in the tracking of concerns then the presence or absence of concerns could be used as a parameter for evaluating the overall effectiveness of mitigation.

Monitoring studies aimed at documenting subsistence uses, activities, and impacts is another parameter that could prove useful to agencies when evaluating mitigation. Studies such as social indicator studies, subsistence use area mapping, and harvest surveys are useful in establishing baseline conditions and identifying changes over time; however, identifying the cause of the change, when the potential sources of impacts are so varied, is often less clear. Although these studies may not be able to specifically address the effectiveness of a given mitigation measure, they can be used as a tool to alert agencies where further research on impacts and mitigation effectiveness is needed.

Using the above four parameters, agencies could better identify which mitigation measures are performing as expected and which ones are not performing, as evidenced by ongoing concerns or changes in the baseline environment. For ones that do not appear to be effective, agencies and industry could conduct assessments targeted specifically at providing recommendations to improve the effectiveness of mitigation measures that appear to not be working as intended. These assessments are generally lacking with agencies proposing and implementing mitigation measures with little follow-up as to whether they are effective. This lack of follow-up was also identified in the CEQ's (1997) report which expressed that the agencies do not generally gather data on the effectiveness of mitigation measures. Army regulations described in 32 CFR 651

App. C (g)(1-5) also suggest parameters for evaluating mitigation effectiveness, which include establishing a source of expertise to conduct the analysis, defining specific technical parameters, conducting baseline studies, using a control to isolate the effects of mitigation procedures, ensuring replicability, and making the results available in a timely manner.

7.6 Effectiveness of Mitigation

As discussed above, the study team evaluated the effectiveness of 16 mitigation types and associated individual mitigation measures. This evaluation relied heavily on the information provided by Nuiqsut residents and key agency informants. Throughout the project, the study team focused their research to learn whether formal mitigation efforts have been effective in reducing anticipated effects and of these mitigation measures, which ones seem to work best to reduce social conflict. The study team did not attempt to identify what additional measures may be necessary to reduce effects of unaddressed impacts but rather focused on assessing existing mitigation.

Based on the responses from key informants, it appears that most formal mitigation measures are effective in reducing anticipated effects when fully implemented. However, few if any of the mitigation measures addressed in this study eliminate anticipated effects completely, and in most cases the study team identified potential improvements that would increase the effectiveness of each mitigation measure. Mitigation measures generally improve over time as they are tested and refined over multiple projects. During discussions with agency and Nuiqsut respondents, the study team found that some mitigation measures were not as effective as they could be because industry was not implementing the measures as they were intended to be implemented (e.g., subsistence representatives, helicopter and airplane management). In these cases, the effectiveness could be improved through better implementation rather than refining the specific parameters of the given mitigation measure. The study team concluded that the measures requiring the greatest improvement are those social mitigation measures aimed at lessening impacts to subsistence users and activities.

Based on the research conducted for this study, the study team assessed all of the 16 mitigation types analyzed in this project as useful in reducing impacts to subsistence users and activities to varying degrees. None of these mitigation types are completely ineffective in their design. Certain mitigation measures such as the employee hunting prohibition appeared to be working effectively and not requiring further improvement, but the study team found that most measures could be implemented in a better manner or refined to improve their effectiveness.

Residents indicated that some mitigation measures were not as effective as they could be due to a lack of communication or a lack of ongoing commitment by industry. A majority of the 16 mitigation types require effective communication in order to be successful. Residents frequently cited lack of communication as a criticism of the mitigation process. Residents reported being unsure of the purpose of the Good Neighbor policies or whether policies such as subsistence

leave were being implemented. In some cases, agencies such as the NSB indicated that a mitigation measure was being implemented, yet residents were often unaware of the implementation. It may be that local community organizations do not have the capacity to receive, coordinate, and disseminate information to local residents about mitigation measures that have been implemented. As previously discussed in this report, a subsistence oversight panel that was funded by all companies working in the area, which included representatives from each community entity (e.g., City of Nuiqsut, Native Village of Nuiqsut, Kuukpik Corporation, Nuiqsut Whaling Captains Association), and which provided oversight of all interactions between subsistence activities and industry operations in the Nuiqsut area, could be an organization through which information on industry activities is received and then disseminated to community residents. While KSOP serves this role to a certain degree, its coordination efforts are limited to a single company. Implementing such a panel that provided oversight and coordination between community residents and all oil and gas operators in the vicinity of Nuiqsut would require strong commitment from industry, agencies, and community residents to build the capacity to effectively operate such a panel. The preferred avenue for implementing such a panel would be through expanding the existing oversight panel (KSOP).

Residents also criticized the lack of follow through or commitment of industry to implementing mitigation measures. Several residents expressed frustration that in some cases industry has stopped implementing certain measures after committing to them initially, only reinstating these measures when they receive complaints from community members. The examples most cited by local residents were those related to communication about aircraft over-flights and the presence of subsistence representatives on aircraft. More stringent monitoring of these measures by agencies would help address this problem as would a tracking repository of mitigation measures that is available to the public.

Based on the responses from key informants, the study team has concluded that many of the mitigation measures aimed at lessening effects to subsistence users and activities need improvement through modification of the measures themselves, or through improved communication with local residents. The following is a brief summary of the primary improvements for each of the 16 mitigation types, that were concluded by either the study team or recommended by Nuiqsut residents and agencies:

1. Community Consultation - ensure equal participation of all relevant community entities (City of Nuiqsut, Native Village of Nuiqsut, Kuukpik Corporation, KSOP), work with community to establish protocols for appropriate community consultation methods.

2. Conflict Avoidance Agreement - require that all companies conducting offshore activities that have the potential to disrupt subsistence activities sign a CAA with the AEWC, and extend the term of the CAA so that annual renewals are not necessary.

3. Employee Cultural Awareness Training - similar training should be extended beyond industry operators to other organizations including federal agencies working on the North Slope.

4. Employee Hunting Prohibition - no improvements identified.

5. Good Neighbor Policy - improve communication and transparency regarding the contents and purpose of Good Neighbor policies.

6. Guarantee Access to Subsistence Resources - stronger efforts in cultural awareness training to reduce conflicts between subsistence users and oil company workers, communication to local residents of company policies and efforts to protect the environment from contamination, and reducing activities in key subsistence use areas during peak harvesting seasons to lessen social barriers and impacts on user avoidance

7. Helicopter and Airplane Management – improve communication between industry and local community organizations regarding flying activities, avoid areas of high subsistence use during peak harvesting seasons, increase the minimum flight altitude, and include stipulations for agency aircraft activities.

8. Location of Facilities – conduct project specific research regarding subsistence use areas, wildlife habitat, migratory routes, and travel routes, to minimize impacts. Consult with communities regarding whether proposed design changes are adequate to reduce impacts as intended.

9. Mitigation Funds –review methods and criteria for distributing mitigation funds and assess the voucher amounts needed to meet the costs that residents are incurring, particularly as development in the vicinity of the community increases. Account for inflation and changes in the cost of living when determining mitigation fund amounts.

10. Pipeline Elevation and Placement – elevate all future pipelines to seven feet and conduct monitoring studies prior to pipeline placement to determine areas most likely to drift during the winter and elevate the pipeline higher than seven feet in those specific locations to allow for better access. Insert elevated passage points at key hunter access points along the pipeline.

11. Research on Subsistence Impacts – conduct a cumulative impact analysis that is not project-specific, disseminate results of monitoring studies to community residents and organizations.

12. Subsistence Leave Policies – inform local residents of company subsistence leave policies, ensure that leave policies are flexible to account for annual variation in the timing and length of subsistence activities.

13. Subsistence Oversight Panel – expand existing oversight panel to address all industry activities in the vicinity of Nuiqsut, improve communication flow between industry and the panel, and between the panel and community residents.

14. Subsistence Representatives - need for clearer communication protocols, better training, hiring local and knowledgeable residents, and inclusion of subsistence representatives in field activities, particularly aircraft overflights. Include subsistence representatives during agency operations (e.g., wildlife surveys) and inspections.

15. Water Vessel Management – review scope of water vessel management mitigation to potentially include small vessel traffic as well as non-industry vessels.

16. Winter Operations – no improvements identified, however, need for continued communication during winter operations to reduce potential impacts to winter subsistence activities.

7.7 Future Methods and Assessments

The study team's primary goal at the outset of the project was to evaluate mitigation measures intended to lessen the potential impacts of oil and gas development on subsistence activities for seven development projects in the vicinity of Nuiqsut. The results and conclusions related to this goal have been discussed above. During the course of this project, the study team also gained insight that could serve to better inform and develop methods of evaluating and monitoring mitigation effectiveness for future studies. Some of these methods have been discussed above, specifically in terms of potential improvements for monitoring mitigation by agencies and industry. However, the study team also learned much during the course of this project that could contribute to enhancing future research efforts to evaluate the effectiveness of mitigation for development projects that require federal, state, and local agency environmental reviews in Alaska and even the rest of the United States. These findings are best described under the following methodological steps: (1) Scope of Project (2) Field Visits and Interviews, (3) Mitigation Inventory, and (4) Mitigation Assessment.

7.7.1 Scope of Project

The first finding relates to the scope of future projects. The study team believes that future studies should evaluate mitigation effectiveness by narrowing the scope to evaluate a smaller subset of projects, preferably ones that are more recent. The reason is that multiple projects add to a high response burden on potential respondents as they have a greater number of mitigation measures to assess. Furthermore, the study team encountered a number of difficulties in requesting government agencies, industry, and community members to assess the effectiveness of measures that were in some cases nearly 30 years old. Many of the agencies had lost the institutional memory of these older projects and could not provide as accurate a review of the mitigation process for these older projects (e.g., Endicott) as they could for newer projects (e.g.,

Oooguruk). Nuiqsut residents as well had a harder time remembering mitigation for older projects versus newer projects.

An additional method of focusing research would be for future projects to concentrate on selected mitigation measures from one field of study (e.g., social, subsistence, physical, economic, or biological) that are led by researchers that specialize in each of the fields. If a long-term monitoring project of mitigation effectiveness was to be developed, then selecting a development project that is in the early stages of permitting would be the one best suited for collecting relevant mitigation measures as the data can be gathered in real time and researchers could gather effectiveness data each year as the impacts were either continuing to occur or were being mitigated.

A benefit of conducting studies on the effectiveness of mitigation types for separate projects and resources would be the potential use of these studies to inform cumulative effects analyses. By considering both successful mitigation measures as well as residual impacts (not adequately addressed through mitigation) one could gain a better understanding of aggregated effects on the North Slope.

7.7.2 Field Visits and Interviews

Based on the research for this project, the study team believes an improved method for future researchers for the process of conducting field visits and interviews would be to conduct two sets of interviews or field visits with involved parties. The first interview would focus on understanding the relevant process that the respondent (e.g., agency, industry, or community) follows in the mitigation process for the project. This would allow the researcher to introduce the project and answer any questions the respondent might have. The second interview would come later in the project and focus on monitoring specific mitigation (see #4 below). The benefits of this two tiered set of interviews are that the researchers are aware of each party's process before they proceed into the inventory of mitigation measures and know which measures are binding to industry and which ones are considered to be mitigation proposals.

7.7.3 Mitigation Inventory

The study team believes that the inventory of mitigation should start with a list of sources of concerns, mitigation proposals, and mitigation measures and follow up with relevant agencies and industry to confirm that all source documents have been adequately identified. This includes monitoring reports required by agencies or self-reported among industry. Once the sources have been identified, the inventory should consider a coding of concerns, mitigation proposals, mitigation measures into impact categories and mitigation types, similar to the coding scheme employed in this study, with consideration for identifying duplicate measures found in multiple documents. Part of this inventory should also include identification and documentation of informal mitigation measures that are primarily associated with industry and not available in the written record. While this approach would be sufficient to identify mitigation measures, as the

study team learned during their own inventory, this process is a time consuming approach. If agencies would require future developers to create a traceable list of mitigation measures that they are responsible for implementing (see "Compiling and Tracking Mitigation Measures" above) and that list is readily available to the public, then this process could be improved in regards to efficiency and accuracy of inventorying mitigation. Having industry publically inventory and track their implementation of mitigation measures is a principal methodological finding for this study. Not only would it improve the efficiency and accuracy of the inventory, but it would also allow for an improved and more complete assessment (see next section).

In addition to conducting an inventory of concerns, mitigation proposals, and mitigation measures, the study team proposes that in future studies a greater effort be made to track whether individual mitigation proposals in NEPA documents are carried forward as mitigation measures in final permitting and leasing documents. This would allow a better understanding of the extent to which concerns are addressed through mitigation and to identify whether certain mitigation proposals are not being carried forward as permit stipulations.

7.7.4 Mitigation Assessment

As mentioned above, the assessment of mitigation would benefit greatly if industry had a comprehensive list of required mitigation measures applicable to their project. Interviews are one of the primary means of assessing mitigation effectiveness, particularly for social-cultural measures, and industry participation may be greater if they are already engaged in tracking their implementation. Future assessments of effectiveness should focus on a greater sample of individuals than those contacted in this study which was limited to key informants. In addition, keeping the list of mitigation measures focused to a particular project and field of study (e.g., subsistence, health, air quality) will reduce response burden and improve individual assessments. Furthermore, if these measures were to be monitored over an extended study period the effectiveness assessment would also be improved as it could allow for initial assessments, industry response, and re-evaluation after industry response or modification to those measures seen as requiring improvement.

The distinction between spatial/temporal mitigation measures (Chapter 5) and social mitigation measures (Chapter 6) did not occur until after the analysis of mitigation was complete and, in this report, is purely for organization purposes. The study team did not conduct its assessment of mitigation with these distinctions in mind, but believes that future projects would benefit from categorizing mitigation measures into these broader categories and examining the strengths and weaknesses of both spatial/temporal and social approaches to mitigating impacts on subsistence uses.

The study team hopes that the above findings, in addition to insight made during the course of future research projects, could improve the process of implementing mitigation and lessening impacts from development and ensure that the intended protections proposed by mitigation measures are in fact working efficiently and effectively for all interested parties.

CHAPTER 8: SUMMARY

This was an evolving study that originally focused on documenting mitigation measures found in NEPA documents and tracking concerns and mitigation measures from scoping testimony through EISs and RODS or FONSIs. When the study team learned that binding mitigation stipulations are contained primarily in permits and leases, the study grew to include stipulations found in permits, DPP letters of approval, and lease sale agreements. The information provided by individuals from governmental agencies, industry, and the community of Nuiqsut was key to the success of the study by helping focus and refine the research and providing information that increased the researchers' understanding of the mitigation process. It was through discussions with agency key informants that the study team learned that binding mitigation stipulations are found not in RODs, but in leases, permits, and letters of approval.

Through its inventory of mitigation measures for the seven development projects, the study team found a considerable number of mitigation measures (over 800) that addressed subsistence users, activities, resources, and habitats either directly or indirectly. The number of mitigation measures that directly addressed subsistence users and activities (rather than subsistence resources and habitats) was far smaller, at 80 measures. Overall, developers on the North Slope of Alaska are responsible for implementing a large number of mitigation measures for a single development project. The study team also found that a majority of the concerns raised during scoping meetings were addressed, either directly or indirectly, through mitigation proposals and measures. Because of the large overall number of direct and indirect measures, the study team chose to focus its analysis on the smaller set of measures that addressed subsistence users and activities.

Through its discussions with key informants, the study team found that a majority of mitigation measures were, in concept, considered to be effective. However, individual mitigation stipulations varied in effectiveness due to differences in how they were implemented by development companies. No measures were considered to be "ineffective" in their design, but rather in their implementation. In many cases, key informants provided recommendations for how a mitigation measure could be enhanced to improve its effectiveness. The study team found that in a number of cases local residents were unaware of the presence of a mitigation measure and therefore were unable to provide information about the effectiveness of these measures. In addition, local residents' frustrations were often directed toward the mitigation process rather than the mitigation measures themselves, indicating that improved communication and consultation with local communities could improve local perceptions related to mitigation.

The study team found that in most cases there is no official mechanism for monitoring mitigation measures after they have been implemented, or for measuring their effectiveness. This is particularly true for social mitigation measures aimed at reducing impacts on subsistence activities. Increased local input throughout the NEPA process and during and after project development, with equal opportunities for participation by local subsistence harvesters and local

entities, would provide a more effective mechanism for developing, implementing, monitoring, and measuring the effectiveness of mitigation measures addressing local subsistence uses. In addition, the study team found that providing a more transparent and accessible way for agencies and the public to track stipulated mitigation measures by project and developer would also contribute to efforts to monitor mitigation.

During discussions with key informants in Nuiqsut, researchers did not ask about the impacts of oil and gas development directly, but rather gathered information about the effectiveness of individual mitigation measures, which sometimes resulted in residents noting the presence of impacts. More often than not, residents' comments were focused on perceived failures in the mitigation process or in implementation procedures, rather than direct effects of oil and gas development. This should not be taken to mean that residents are experiencing few direct impacts on subsistence activities. Several recent studies (Pedersen et al. 2000; SRB&A 2013, 2012, 2011, 2009) indicate that oil and gas activities continue to affect subsistence activities in the vicinity of Nuiqsut and that enhanced mitigation strategies have been developed to lessen, but not eliminate, certain impacts.

Overall, this study provides a useful basis for agencies, developers, and local residents to increase collaboration in the development of new mitigation measures, enhance existing mitigation measures, and streamline the mitigation process. If implemented, the recommendations in this report could serve as a starting point for meaningful discussion about changes to mitigation measures that improve their effectiveness and, ultimately, reduce impacts on Nuiqsut subsistence activities.

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APPENDIX A: FINAL SELECTED MITIGATION MEASURES

Mitigation Measures Selected For Analysis

Mitigation No: M1

Record Id: 1651

Developer: BP

Project: Endicott

Agency: NSB

Year: 2009

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *BPXA shall have signed Conflict Avoidance Agreement (CAA) with Alaska Eskimo Whaling Commission (AEWC), the Whaling Captains of Nuiqsut prior to commencement of dredging activities. NSBMC 19.70.040 (E).*

Reference: NSB 09-356, Draft Development Permit, Endicott Seawater Intake Maintenance, Duck Island Unit, T12N, R16E, Section 36, Resource Development District. 2009.

Mitigation No: M2

Record Id: 1190

Developer: BP

Project: Northstar

Agency: Minerals Management Service

Year: 1999

Mitigation Type: Community Consultation

Mitigation Measure:

> *Before production begins, BPXA must provide this office, the NSB, the AEWC, and the Native villages and tribal governments of Nuiqsut, Kaktovik, Barrow, and the ICAS with a plan for long-term coordination with local communities and subsistence users. At a minimum, BPXA must conduct an annual review of Northstar activities with these interests. BPXA must notify this office of changes to plans and of any unresolved issues identified during coordination efforts.*

Reference: USDOI, MMS 1999b: Record of Decision for Northstar Project.

Mitigation No: M3

Record Id: 1188

Developer: BP

Project: Northstar

Agency: Minerals Management Service

Year: 1999

Mitigation Type: Mitigation Fund

Mitigation Measure:

Before production begins, BPXA must provide this office with the contact (title or position) and description of the process through which claimants (particularly Native subsistence users) would file a claim for oil-spill removal costs and damages, pursuant to 30 CFR 253 Subpart F. This information must also be provided to the NSB, the Alaska Eskimo Whaling Commission (AEWC), and the Native villages and tribal governments of Kaktovik, Nuiqsut, Barrow, and the Iñupiat Community of the Arctic Slope (ICAS).

Reference: USDOI, MMS 1999b: Record of Decision for Northstar Project.

Mitigation No: M4

Record Id: 2577

Developer: BP

Project: Northstar

Agency: NSB

Year: 2008

Mitigation Type: Helicopter and Airplane Management

Mitigation Measure:

Helicopter use in support of study activities shall maintain an altitude of 1500 feet over concentrations of 25 or more caribou, and over hunters in the area in of pursuit of subsistence animals. NSBMC 19.70.050 (L) 4, NSBCMP 2.4.6 (d), NSBMC 19.70.050 (J) 3.

Reference: NSB 08-371, Administrative Approval, 2008-2013 Northstar MetOcean Survey, T13N, R13E, Sections 2-3, 10-12, Northstar Unit, Resource Development District

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Mitigation No: M5

Record Id: 2576

Developer: BP

Project: Northstar

Agency: NSB

Year: 2008

Mitigation Type: Water Vessel Management

Mitigation Measure:

> *All vessel activity associated with this permit must be completed prior to September 1st of each year to avoid conflict with the subsistence whale hunt.*

Reference: NSB 08-371, Administrative Approval, 2008-2013 Northstar MetOcean Survey, T13N, R13E, Sections 2-3, 10-12, Northstar Unit, Resource Development District

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Mitigation No: M6

Record Id: 1013

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Employee Cultural Awareness Training

Mitigation Measure:

> *[Action]: Provide non-resident oil field workers with cultural awareness training. Possible use of existing ASRC Iñupiat cultural awareness program. [Benefit]: Avoids/minimizes cultural misunderstandings by increasing sensitivity of oil field workers to Nuiqsut's culture and lifestyle including values of land and natural resources used for subsistence, importance of access to traditional hunting areas, protection of grave and other sacred sites, and maintenance of community social cohesion.*

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M7

Record Id: 1014

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Employee Hunting Prohibition

Mitigation Measure:

[Action]: Sport fishing and hunting by ARCa employees while conducting company business will be prohibited. [Benefit]: Avoids additional pressure on Colville subsistence resources.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M8

Record Id: 1007

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Guarantee Access to Subsistence Resources

Mitigation Measure:

[Action]: Provide signage at facility and pipeline locations in English and Iñupiaq languages warning non-ARCO visitors of safety and awareness issues. Coordinate signage through Subsistence Oversight Panel. [Benefit]: Minimizes impact to subsistence or cultural use patterns. Maximizes human safety and facilities integrity.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M9

Record Id: 991

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Location of Facilities

Mitigation Measure:

[Action]: Re-locate all pads more north of Nanuk Lake. Respond to Nuiqsut comments regarding high subsistence use in and around lake. Also integrates 1996 well results. Re-configure location of airstrip and processing facility to consolidate sources of noise, activities, and potential oil spill at a maximum distance away from ilie Nechelik (Nigliq) Channel, an identified high-subsistence-use area, and away from sensitive waterfowl nesting areas. [Benefit]: Minimizes impact to fish, wildlife, habitat, and subsistence use. Consolidates facilities. Locates potential oil spill source closer to an area and waterway more conducive for response, containment, and cleanup. Responds to Nuiqsut comments identifying Nechelik (Nigliq) Channel as highest-subsistence-use waterway.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M10

Record Id: 977

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

[Action]: Re-route pipeline (using ARCO's habitat and use mapping and interested parties' comments) to minimize contact with sensitive habitats and use areas. [Benefit]: Avoids impact to fish, wildlife, habitat, and subsistence use areas.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M11

Record Id: 972

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Subsistence Oversight Panel

Mitigation Measure:

Primary mitigation for subsistence would be achieved through planning and policies developed between the Subsistence Oversight Panel and the operator. Open access would be maintained to traditional subsistence areas. Habitat restoration is addressed in the wildlife and fishery sections of this chapter. The Subsistence Oversight Panel would be funded by ARCO up to a certain dollar amount. It would meet on a scheduled basis and provide guidance to ARCO for establishing policy and procedures for the management of the development relative to concerns of local interest. The Panel would provide the mitigative mechanism to ensure conservation of the subsistence resource base, guarantees of free access to subsistence resource areas, and maintenance of a close working relationship between the operator and local residents. The applicant recognizes that maintenance of these socio-cultural components of the subsistence lifestyle are central to its practice.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M12

Record Id: 982

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Winter Operations

Mitigation Measure:

[Action]: Construct pipelines over two winter seasons. [Benefit]: Avoids summer construction surface impact, wildlife and subsistence disturbance. Minimizes winter construction, wildlife and subsistence disturbance, and seasonal water demand for ice roads/pads.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Mitigation No: M13

Record Id: 2304

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Community Consultation

Mitigation Measure:

> *CPAI shall avoid impacting subsistence activities by communicating with the village of Nuiqsut to let them know they will be flying in the area. NSBMC 19.70.050 (L), NSBMC 19.70.050 (J) 3.*

Reference: NSB 10-033, Administrative Approval, 2009-2010 Alpine Area Studies, Colville River Unit, (See Attached Map for Studies Location), Resource Development District

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Mitigation No: M14

Record Id: 2314

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Subsistence Representatives

Mitigation Measure:

> *Permittee shall employ subsistence representatives from the village of Nuiqsut that will serve to minimize impacts to wildlife and local subsistence activities. NSBMC 19.70.050 (L) 4, NSBMC 19.70.050 (J) 3.*

Reference: NSB 10-066, Administrative Approval, Alpine Area Seismic Scouting Study, Colville River Unit, Conservation & Resource Development Districts

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Mitigation No: M15

Record Id: 1649

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2004

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *Permittee shall design and work with the NSB, Village of Nuiqsut on a Conflict Avoidance Agreement, which addresses subsistence use areas, security, and access, to be implemented for the life of the development. NSBCMP 2.4.3*

Reference: NSB: 04-117, Development Permit, CD-4, Nanuq, PAD, GRAVEL ROAD, PIPELINES. 18 WELLS, Alpine Unit, Resource Development District. 2004.

Mitigation No: M16

Record Id: 1647

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2004

Mitigation Type: Good Neighbor Policy

Mitigation Measure:

> *CPAI shall develop a "Good Neighbor Policy" with the Community of Nuiqsut and the North Slope Borough that addresses the critical importance of subsistence hunting and fishing defined as "Net Public Benefit." Development and rezoning could result in negative consequences to the community of Nuiqsut and its culture. Specifically, subsistence hunting and fishing access and harvest could be reduced as the result of the development. Similarly, Nuiqsut's ability to engage in the other cultural activities associated with subsistence hunting and fishing could be reduced. The purpose of the Good Neighbor Policy is to mitigate the effects and impacts of oil and gas development, its infrastructure, and from potential oil spills. While CPAI recognizes state and federal applicable laws and regulations, as matter of company policy CPAI shall also mitigate subsistence related impacts from oil and gas development, infrastructure, and potential spills and cooperation with the village of Nuiqsut and the North Slope Borough. At minimum, CPAI shall develop its policies to address:*

1. Historical and Contemporary Status of the Community of Nuiqsut as outlined in NSB Comprehensive Plan and Nuiqsut Paisanich;
2. Importance of fish and wildlife, especially caribou habitats and the community's sharing and bartering characteristics;
3. Develop criteria to be used to define a cause and effect relationship between the impacts of development to the loss of opportunity, access, and adequate populations of fish and game to the communities of the North Slope Borough. The intent of this criterion is to define the threshold at which the communities of the North Slope Borough will be compensated for adverse impacts due to oil and gas development and infrastructure.
4. Acknowledge the potential threat to fish and wildlife habitats, the adverse impacts to their populations that could result in state and federal quota system and in turn could prevent communities of the North Slope Borough from harvesting adequate amount of resources for their sustenance. Present a list of options for alternative resources and or financial subsidies in the event of an oils spill or if development infrastructures reduces the availability or access to those resources.
5. Define the cumulative impact of the infrastructures to the fish and wildlife habitat and nutrient and ecosystems in relation to the availability for subsistence use due to changes in migratory behavior, reduced numbers, or contamination of the subsistence resources, forcing hunters to travel further to find subsistence resources or forces subsistence hunters to find alternative subsistence foods.
6. Create "Trustees" or a "Commission" responsible for implementation of the financial assurance instrument in the event of oil spills and/or diminished subsistence resources occurs.
7. Develop a Plan to execute the disbursement of funds, interim transportation to alternate hunting areas in the event of oil spill or displacement of wildlife resources, provision for alternative food supplies due to occurrence of events, provision for counseling and cultural assistance, restoration assistance of depleted subsistence resources, and dispute resolution should there be disagreement to issues that may be hard to resolve by Trustees or Commission.

Reference: NSB: 04-117, Development Permit, CD-4, Nanuq, PAD, GRAVEL ROAD, PIPELINES. 18 WELLS, Alpine Unit, Resource Development District. 2004.

Mitigation No: M17

Record Id: 2315

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Helicopter and Airplane Management

Mitigation Measure:

Helicopter use in support of exploration activities shall maintain an altitude of 1500 feet over concentrations of 25 or more caribou, and with hunter in the area of pursuit of subsistence animals. NSBMC 19.70.050 (L) 4, NSBMC 19.70.050 (J) 3.

Reference: NSB 10-066, Administrative Approval, Alpine Area Seismic Scouting Study, Colville River Unit, Conservation & Resource Development Districts.

Mitigation No: M18

Record Id: 2034

Developer: CPAI

Project: Alpine Satellites

Agency: NSB

Year: 2004

Mitigation Type: Mitigation Fund

Mitigation Measure:

(a) CPAI shall make annual deposits of $50,000 per year for ten years into a ?Mitigation Fund.? The total deposits shall not exceed $500,000. On January 1 of the winter in which construction is begun on either CD-4 or another CPAI Alpine satellite development, CPAI shall make a deposit of $50,000 with annual $50,000 payments payable on January 1 of each of the following nine (9) years. It is intended that this contribution to the Mitigation Fund will address the possible impacts of CD-4 development as well as the additional anticipated CPAI satellite developments proposed for construction prior to year 2010 within the 30-mile radius of the CD-4 development. The North Slope Borough shall administer the Fund, subject to the recommendations, by a majority vote, of the Mitigation Fund Advisory Committee (MFAC). Use of the Fund is intended to offset costs related to mitigation of impacts on subsistence harvests associated with the construction and operation of CD-4 and other satellite developments within 30 miles of CD-4,

including, but not limited to, impacts resulting from the displacement or reduction of subsistence resources or disruption of access to traditionally used subsistence harvest areas. The Fund may be used to offset the costs of (1) transportation of subsistence hunters/fishermen and their equipment from their villages to alternate hunting/fishing areas and safely returning them, their equipment and subsistence catches to their villages in order that they may acquire alternate subsistence resources in the event that subsistence resources are found by the MFAC to have fallen below minimum levels of community needs as a result of infrastructure or activities associated within CD-4 or other satellite development within 30 miles of CD-4, or access to subsistence resources is restricted; or (2) other mitigation measures deemed appropriate by the Mitigation Fund Advisory Committee. The Mitigation Fund is not intended to address the effects or consequences of a permit violation or a release of oil, gas or other associated substances into the environment.

Reference: NSB 04-117, Revised September 30, 2004, Development Permit, CD-4, Nanuq, PAD, GRAVEL ROAD, PIPELINES. 18 WELLS, Alpine Unit, Resource Development District.

Mitigation No: M19

Record Id: 2033

Developer: CPAI

Project: Alpine Satellites

Agency: NSB

Year: 2004

Mitigation Type: Research on Subsistence Impacts

Mitigation Measure:

CPAI shall hire a third party to conduct a subsistence study to better understand and act upon the impacts of the CD-4 development and other CPAI satellite developments within a 30-mile radius of CD-4. The third party contractor shall be selected with the concurrence of the North Slope Borough. The purpose of the study will be to evaluate the short and long term impacts of CD-4 and other CPAI satellite developments on the people of Nuiqsut. The scope of the study shall include but is not limited to (a) harvest success by area and species, (b) changes in harvest levels by area and species composition over time, (c) changes in use of subsistence areas and identification of the causes for any changes. The study design shall be forwarded to the North Slope Borough Department of Wildlife Management for review and approval. The contractor will collaborate with the on-going North Slope Borough subsistence harvest documentation study to avoid duplication of efforts, and especially to avoid "burnout" of interviewees. A draft annual report shall be submitted to the North Slope Borough, City of Nuiqsut, Native Village of Nuiqsut, and Kuukpik Corporation for review and comments. The final report shall address any comments made by these parties. The study shall commence no later than November 1 of the winter CPAI begins construction and will continue annually for 10 years. At the end of 5 years, CPAI and the North Slope Borough will discuss the results of the study and determine if the study methods should be adjusted. At the end of 10 years, the third party contractor shall summarize the results and CPAI and the North Slope Borough shall then review the summary and synthesize the results from the study. Based on the study results, CPAI and NSB shall evaluate the need for additional subsistence impact studies. It is intended that the study design will address the possible impacts of CD-4 development as well as the additional anticipated CPAI satellite developments proposed for construction prior to 2010 within the 30-mile radius of the CD-4 development.

Reference: NSB 04-117, Revised September 30, 2004, Development Permit, CD-4, Nanuq, PAD, GRAVEL ROAD, PIPELINES. 18 WELLS, Alpine Unit, Resource Development District.

Mitigation No: M20

Record Id: 1477

Developer: CPAI

Project: Meltwater

Agency: ADNR

Year: n.d.

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

This project will not introduce barriers to movement of caribou or other wildlife and will not affect subsistence users' ability to access wildlife. The 5-foot minimum pipeline height was designed to ensure unrestricted wildlife passage and human use of the area.

Reference: AK DNR: Meltwater Development Project ACMP Consistency Analysis.

Mitigation No: M21

Record Id: 1669

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2008

Mitigation Type: Subsistence Leave Policy

Mitigation Measure:

Developers are encouraged to conduct operations to the extent practical and feasible:

Utilizing flexible employment procedures, which allow the pursuit of subsistence opportunities by Borough resident employees.

Reference: NSB. 2008. NSB 09-194, Administrative Approval, 2P Ice Staging Pad, Near 2P, Meltwater, /Rolligon Trail from DS2P to Ocean Point, Kuparuk River Unit, T8N, R7E, Sec. 17, U.M., Resource Development District.

Mitigation No: M22

Record Id: 1662

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2001

Mitigation Type: Research on Subsistence Impacts

Mitigation Measure:

Phillips Alaska, Inc. shall continue to study alternative pipeline designs that would be safe around human use activities utilizing North Slope Borough Wildlife Department and traditional knowledge, i.e., hunting, cross country snow machine use; would provide for the unimpeded movement of migratory caribou and other animals; would be environmentally sound; and could be used in areas critical for village use. This study shall incorporate the data gathered from the radio-collared caribou study. All findings shall be forwarded, at least annually, to the NSB permitting office in Barrow, Alaska..

Reference: NSB. 2001. NSB 01-149, Administrative Approval, Meltwater Master Plan, Meltwater Development Area. 2001.

Mitigation No: M23

Record Id: 1504

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2001

Mitigation Type: Community Consultation

Mitigation Measure:

Develop a schedule and timetable for a series of meetings, prior to oil and gas development in the Meltwater Prospect, between the traditional knowledge and other experts to develop a fair and just agreement regarding the socio-economic and socio-cultural impacts of development on residents of the North Slope Borough. The discussions shall include the impact of development on caribou, caribou migration, fur bearing animals, fish, and waterfowl and access versus availability of these resources. The results of these meetings and conferences shall be the development of mitigation measures that will serve as guidelines for exploration and development in the Meltwater Prospect. These guidelines shall be updated at the request of any party participating in the documentation of subsistence needs every 3 years. NSBMC 19.70.050.

Reference: NSB. 2001. NSB 01-149, Administrative Approval, Meltwater Master Plan, Meltwater Development Area.

Mitigation No: M24

Record Id: 1584

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2001

Mitigation Type: Community Consultation

Mitigation Measure:

Prior to submitting a plan of operations for both onshore and offshore activities which have the potential to disrupt subsistence activities, the lessee shall consult with the potentially affected subsistence communities and the North Slope Borough (NSB) (collectively "parties") to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. The parties shall also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee shall make reasonable efforts to assure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable Interference with subsistence harvests.

Reference: ADNR 2001. Unit Operations Approval Meltwater.

Mitigation No: M25

Record Id: 1559

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2000

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

Development is required to be located, designed and maintained in a manner that does not interfere with the use of a site that is important for significant cultural uses or essential for transportation to subsistence use areas. The proposal as submitted by Phillips Alaska, Inc. shows accommodation for both terrestrial travels for cultural and essential travel. Phillips has proposed a minimum of 7-feet for the pipeline height for the subsistence user transportation needs. Additionally, the KSOP has taken the opportunity to listen and suggest concerns that may be conflicting. The general feeling is that the 7-foot minimum is certainly directed to address the concern.

Reference: NSB: Staff Recommendation - Zoning Map Amendment - From Conservation District to Resource Development District 00-001. 2000.

Mitigation No: M26

Record Id: 1240

Developer: CPAI

Project: Meltwater

Agency: Phillips Alaska, Inc.

Year: 2000

Mitigation Type: Guarantee Access to Subsistence Resources

Mitigation Measure:

> *[Design Feature]: No access restrictions in oilfield to subsistence users. Establish procedures for entrance to facilities, use of permanent gravel roads, and firearm discharge. These procedures will be coordinated with the KSOP. [Expected Benefit]: Maximizes safety precautions. Safeguards PAI and its contractors from harm while providing oilfield access to subsistence hunters.*

Reference: Phillips Alaska, Inc. Phillips Alaska, Inc. Meltwater Development Project Plan of Operations. 2000

Mitigation No: M27

Record Id: 1287

Developer: CPAI

Project: Tarn

Agency: ADNR

Year: 1998

Mitigation Type: Guarantee Access to Subsistence Resources

Mitigation Measure:

> *Lease-related use will be restricted when the Director determines it is necessary to prevent unreasonable conflicts with subsistence harvests.*

Reference: AK DNR: Competitive Oil and Gas Lease (389059), Tarn Project. 1998.

Mitigation No: M28

Record Id: 1076

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2005

Mitigation Type: Good Neighbor Policy

Mitigation Measure:

> *Pioneer will also work with the North Slope Borough (NSB) to develop and implement a mutually acceptable Good Neighbor Policy designed to address and mitigate subsistence impacts, if any.*

Reference: Alaska DNR 2005: Pioneer Oooguruk Development Project, Beaufort Sea: Final Consistency Determination.

Mitigation No: M29

Record Id: 1063

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2005

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *Project activities necessary after September 1, must be coordinated with the Alaska Eskimo Whaling Commission (AEWC) and the Nuiqsut Whaling Captains Association to avoid and minimize potential impacts to whaling operations. Such coordination will be documented in the Conflict Avoidance Agreement with the AEWC.*

Reference: Alaska DNR 2005: Pioneer Oooguruk Development Project, Beaufort Sea: Final Consistency Determination.

Mitigation No: M30

Record Id: 1389

Developer: PNRC

Project: Oooguruk

Agency: Kuukpik Corporation

Year: 2007

Mitigation Type: Mitigation Fund

Mitigation Measure:

WHEREAS, as a result of those negotiations and its desire to be a good neighbor, Pioneer agreed to pay $50,000 per year for the life of the Oooguruk field for a Pioneer/Oogurok Nuiqsut Mitigation Fund to help mitigate the impacts of the Oooguruk oil field and its facilities on the subsistence resources and lifestyle of all of the subsistence users of the community of Nuiqsut.

Reference: Pioneer/Oooguruk - Nuiqsut Mitigation Fund. 2007.

Mitigation No: M31

Record Id: 1679

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2006

Mitigation Type: Community Consultation

Mitigation Measure:

Pursuant to NSBMC Section 19.40.070(A) and NSCMP Policy 2.4.3(a)(d), 2.4.5.1(a), 2.4.5.2(b), 2.4.6(b), industrial operations shall be conducted in a manner which does not reduce subsistence resources below the level of need, does not unreasonably disrupt subsistence activities, and does not prohibit reasonable subsistence user access to subsistence resources. Pioneer Natural Resources Alaska, Inc., shall satisfy these provisions through consultation with the village of Nuiqsut prior to the initiation of proposed activities, and shall halt or otherwise restrict or modify planned activities, including the selection of water sources and ice road routes, as deemed necessary by the village of Nuiqsut. Through this consultation, Pioneer Natural Resources Alaska, Inc., shall make every reasonable effort, including such mechanisms as a conflict avoidance plan, to assure that planned activities are compatible with subsistence activities and will not result in unreasonable interference with subsistence harvests or subsistence resources. A report of this consultation, including areas of agreement and identification of any unresolved conflicts, shall be submitted to the Land Management Administrator (LMA) no more than ten working days prior to the commencement of activities. In the event of unresolved conflicts, planned activities may be further restricted by the LMA if deemed necessary to achieve compliance with the above provisions.

Reference: NSB 07-067, Administrative Approval, Oooguruk Development Project, Flowline Construction, Winter 2006/2007. 2006.

Mitigation No: M32

Record Id: 1672

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2006

Mitigation Type: Subsistence Representatives

Mitigation Measure:

Permittee shall employ subsistence representatives to assure that conflicts are minimized and that proper notification of areas that may be dangerous to local subsistence users are identified and properly notified to residence. NSBMC 19.40.070(A), NSCMP 2.4.3(a)(d), 2.4.5.1(a), 2.4.5.2(b), 2.4.6(b).

Reference: NSB 06-138, Administrative Approval, OOOGURUK DEVELOPMENT PROJECT, T13N, R7E, Sec 11, Drillsite Island, R8E, R9E, T12N, R8E, Sec 12, -Tie-in-Pad, U.M., Oooguruk Unit, Resource Development District. 2006.

Mitigation No: M33

Record Id: 1682

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2006

Mitigation Type: Research on Subsistence Impacts

Mitigation Measure:

A "Cumulative Response Panel" consisting of State, Local, and Federal agencies shall be formed. This panel shall be charged with the implementation of programs designed to address the cumulative effects associated with Oil & Gas Development. First and foremost, this panel shall tackle the impacts, which are cited in many studies and referenced in this analysis "as formerly used traditional areas" Displacement of hunting areas, loss of traditional space. The goal of this panel is to restore the socio-cultural, the socio-economics of displacement of traditional subsistence areas and the harvest thereof. The panel shall find solutions to make a positive co-existence of friendly traditional activities and harvest with Oil & Gas activities. This panel shall be charged to seek impact funds to implement programs identified to restore a vibrant traditional subsistence economy. NSBCMP 2.4.3.(d), 2.4.5.1(f), 2.4.5.2(h).

Reference: NSB 07-067, Administrative Approval, Oooguruk Development Project, Flowline Construction, Winter 2006/2007. 2006.

Mitigation No: M34

Record Id: 1767

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2008

Mitigation Type: Subsistence Leave Policy

Mitigation Measure:

> *Developers are encouraged to conduct operations to the extent practical and feasible: Utilizing flexible employment procedures, which allow the pursuit of subsistence opportunities by Borough resident employees.*

Reference: NSB 08-336, Administrative Approval, Request for Modification of Drilling Restrictions (NSB07-211), T13N, R7E, Section 11, Umiat Meridian, Oooguruk Development Project, Resource Development District. 2008.

Mitigation No: M35

Record Id: 1524

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2005

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *Pioneer Natural Resources shall work within a conflict avoidance agreement with the Alaska Eskimo Whaling Commission, which will remain enforced throughout the life of the project.*

Reference: North Slope Borough Planning Department RE: ADL 417497 Easement, Oooguruk Development. September 2005.

Mitigation No: M36

Record Id: 1397

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2005

Mitigation Type: Research on Subsistence Impacts

Mitigation Measure:

Pioneer will be required to have an Onshore Monitoring Program developed and operational prior to the start of caribou calving activities, approximately May 10, 2006. The monitoring must continue for as many years as needed to clearly show that there is no impact, and may only be discontinued by approval of the Administrator. The NSB retains the right to regulate project activities if monitoring identifies impacts that justify additional conditions. Pioneer must work cooperatively with all other onshore oil and gas operators to implement the Onshore Monitoring Program required by the NSB.

At a minimum, the program must:

1. Be in place prior to May 10, 2006, or prior to the start of caribou calving activities;

2. Study caribou distribution along the Oooguruk pipeline shore crossing;

3. Document caribou calving within 5-miles on either side of the Oooguruk pipeline corridor;

4. Document subsistence harvest activities within the area;

5. Document insect relief activities, including what percent of the general animal population is utilizing the area;

6. Document the distribution of caribou within 20-miles of the Oooguruk onland corridor and impacts they sustain by the cumulative effect of the Oooguruk pipeline in addition to the pipelines already existing in the area;

7. Study, or supplement a study, that includes the impacts to caribou from elevated pipelines. The study must include, but is not limited to: a. data that is gathered with radio-collared caribou during migration, insect relief, and calving, and b. funding for a period sufficient to collect scientific data that is statistically significant, will withstand peer review, and will result in a high quality scientific and technical report.

8. Issue a report at the conclusion of the study that contains: a. a map of all pipelines within 20 miles of the Oooguruk pipeline and within any caribou migratory routes within the area of the project, b. the identification of different herds so as to fully understand the herds' specific movements, and c. information on motivated and non-motivated caribou, habituation, and visual aspects of all pipelines.

9. Include in the study group the NSB, Alaska Department Fish and Game, KSOP, and SB School District to allow for possible participation by different schools within the borough, based on herds that may be affecting the village;

10. Include a design basis report, annual report and final report. These reports will take into account existing data from all sources;

11. Continue until the Administrator approves discontinuation; and

12. Reports must be submitted to the NSB Planning Department in Barrow.

Reference: North Slope Borough: Ordinance No. 75-6-50. Oooguruk Project. 2005.

Mitigation No: M37

Record Id: 1400

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2005

Mitigation Type: Research on Subsistence Impacts

Mitigation Measure:

Pioneer shall conduct a comprehensive cumulative impact analysis of subsistence, terrestrial animals, marine mammals, fish, waterfowl, and water circulation in relation to other offshore and near shore development and its impacts to the socio-cultural and socio-economic structure of the area. The analysis shall be completed within 12 months of approval of the rezoning.

Reference: North Slope Borough: Ordinance No. 75-6-50. Oooguruk Project. 2005.

Mitigation No: M38

Record Id: 1367

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2005

Mitigation Type: Community Consultation

Mitigation Measure:

Prior to submitting a plan of operations for both onshore and offshore activities which have the potential to disrupt subsistence activities, the lessee shall consult with the potentially affected subsistence communities and the North Slope Borough (NSB) (collectively "parties") to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. The parties shall also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee shall make reasonable efforts to assure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable interference with subsistence harvests.

Reference: AK DNR, Division of Oil and Gas: LO/NS 05-009, Oooguruk Development on ADL 355036. 2005.

Additional Mitigation Measures Not Selected for Analysis

Record Id: 2510

Developer: BP

Project: Northstar

Agency: NSB

Year: 2002

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

This permit is contingent upon the approval of a conflict avoidance agreement between BP Exploration and the Alaska Eskimo Whaling Commission (AEWC). The terms and conditions of this agreement may be enforceable under this permit. NSBCMP 2.4.3.(b)

Reference: NSB 03-032 Administrative Approval, Northstar Ice Road Construction, Northstar Unit, Resource Development District

Record Id: 989

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Air Emissions Reduction

Mitigation Measure:

ROAD: CONSTRUCTION AND OPERATION

Action: Employ dust control and speed limits.

Benefit: Minimizes dust generation, disturbance to wildlife and subsistence use, and probability of vehicle(s) striking wildlife.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

Record Id: 998

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Aquatic Habitat Protection

Mitigation Measure:

LOGISTICS: DESIGN

Action: Design modules for vehicular transport along ice road in winter.

Benefit: With current level of analysis, avoids dredging of river channel, construction of off-loading structure, and road, which would be required for barging modules up Colville River or Nechelik (Nigliq) Channel. Avoids impact to fish, wildlife, habitat, and subsistence use and avoids cross-drainage alterations.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 1006

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Guarantee Access to Subsistence Resources

Mitigation Measure:

NUIQSUT

Action: No access restrictions in oil field to subsistence users. Establish procedures for entrance to facilities, use of permanent gravel roads, and firearms discharge. These procedures will be coordinated through the Subsistence Oversight Panel.

Benefit: Minimizes impact to subsistence or cultural use patterns. Maximizes human safety and facilities integrity.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 997

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Helicopter and Airplane Management

Mitigation Measure:

LOGISTICS: DESIGN

Action: Design a logistics plan that transports and stockpiles a majority of the materials and supplies during winter (i.e., December I-April 19).

Benefit: Minimizes aircraft traffic during summer months (Le., April 20-November 30) when waterfowl populations are high and subsistence use is high.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 996

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Helicopter and Airplane Management

Mitigation Measure:

AIRSTRIP: CONSTRUCTION AND OPERATION

Action: Restrict airstrip use from June I-July 15 to aircraft weighing less than 105,000 lbs take-off weight (i.e., Boeing 737 prohibited) unless excepted by FAR PART 36-Stage 3 (noise level category), safety emergency, or by Subsistence Oversight Panel (see Nuiqsut mitigation). Minimize aircraft use during June I-July 15, and maintain 500-ft minimum altitude except for take-off and landing patterns. Maximize aircraft use during winter.

Benefit: Minimizes noise disturbance during critical wildlife use periods (nesting/breeding/brood-rearing) and subsistence use periods.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 988

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Ice Roads and Ice Pads

Mitigation Measure:

ROAD: CONSTRUCTION AND OPERATION

Action: Haul gravel via ice road and construct the 3-mi road during winter.

Benefit: Minimizes impact to fish, wildlife, habitat, and subsistence use. Avoids sensitive wildlife periods.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 993

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Ice Roads and Ice Pads

Mitigation Measure:

PADS: CONSTRUCTION AND OPERATION

Action: Haul gravel via ice road and construct the pads during winter.

Benefit: Minimize impact to fish, wildlife, habitat, and subsistence use. Avoids sensitive wildlife use periods.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 995

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Ice Roads and Ice Pads

Mitigation Measure:

AIRSTRIP: CONSTRUCTION AND OPERATION

Action: Haul gravel via ice road and construct the airstrip during winter.

Benefit: Minimizes impact to fish, wildlife, habitat, and subsistence use. Avoids sensitive wildlife use periods.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 994

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Location of Facilities

Mitigation Measure:

AIRSTRIP: DESIGN

Action: Optimize siting by mapping wildlife habitat and use, subsistence areas, and important terrain features.

Benefit: Avoids impacts to sensitive fish and wildlife habitat use periods and subsistence use areas.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 987

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Mitigation Through Design

Mitigation Measure:

ROAD: DESIGN

Action: Prudently automate drill sites/processing facility to reduce road use by the labor force during operations.

Benefit: Minimizes vehicular traffic/road use and associated noise and dust disturbance to wildlife and subsistence users near facility.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 974

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

PIPELINE: DESIGN

Action: X14 HDD pipeline entry and exit locations to be at least 300 ft from each river bank.

Benefit: Avoids visual barrier of pipeline to caribou moving parallel to the river seeking a crossing. Allows on-land vehicular/human crossing. Reduces chance of oil spill entering the Colville River by locating pipeline transitions farther away from the Colville River. Responds to NSB government request for setbacks.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 975

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

PIPELINE: DESIGN

Action: Elevate pipelines to heights greater than 5 ft at river/ stream crossings (as dictated by local topography) and a special use area between lakes located two miles east of the Colville River.

Benefit: Avoids impacts to fish, wildlife, habitat, and water quality. Enhances free passage for migrating caribou.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 976

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

PIPELINE: DESIGN

Action: Elevate pipelines to heights greater than 5 ft at river/ stream crossings (as dictated by local topography) and a special use area between lakes located two miles east of the Colville River.

Benefit: Avoids impacts to fish, wildlife, habitat, and water quality. Enhances free passage for migrating caribou.

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 1003

Developer: CPAI

Project: Alpine

Agency: ARCO Alaska, Inc.

Year: 1996

Mitigation Type: Subsistence Oversight Panel

Mitigation Measure:

NUIQSUT

Action: Reimburse Kuukpik Corporation up to $40,000 annually, or greater by mutual agreement, for a Subsistence Oversight Panel composed of five Nuiqsut residents who shall monitor the health of subsistence resources on Kuukpik Lands and any impact of exploration, development, and production by ARCO on such resources. Reimbursement shall continue for a period of five years. Panel to meet at least twice annually and produce a status report re: complaints, concerns, or recommendations to be submitted to ARCO and Kuukpik at least annually.

Benefit: Avoids and minimizes impact to subsistence use and social structures, provides a communication channel and entity to minimize cultural misunderstandings and resolve problems, minimizes potential conflict with operations or subsistence use, and allows transfer of safety-related information."

Reference: Arco Alaska, Inc. 1996: Alpine Development Project Environmental Evaluation Document

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Record Id: 1627

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2000

Mitigation Type: Community Consultation

Mitigation Measure:

4. Due to subsistence activities, (caribou and fishing hunting season.) surrounding the State/Corporation Lands, these geotechnical activities shall inform the community and KSOP of the use these Lands.

Reference: NSB: 01-038, Development Permit, Geotechnical Soil Boring Sampling Program, Alpine Fields, Colville River Unit, Umiat Meridian, T12N, R5E, Sections 4,5,8,9,15,16,17,20,21,22,27,28,32,33, Conservation District. 2000.

Record Id: 2313

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Community Consultation

Mitigation Measure:

HELICOPTER STIPULATIONS

Permitee shall avoid impacting subsistence activities by communicating with the village of Nuiqsut by setting up a communications link. NSBMC 19.70.050 (L), NSBMC 19.70.050 (J) 3.

Reference: NSB 10-066, Administrative Approval, Alpine Area Seismic Scouting Study, Colville River Unit, Conservation & Resource Development Districts

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Record Id: 2322

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Helicopter and Airplane Management

Mitigation Measure:

HELICOPTER STIPULATIONS

To minimize impacts to subsistence activities, a helicopter route shall be established from routine site locations, Permitee shall not deviate from that prescribed route, unless avoidance of large concentration of animals is occurring, or for human safety. NSBMC 19.70.050 (L) 4, NSBMC 19.70.050 (J) 3.

Reference: NSB 10-066, Administrative Approval, Alpine Area Seismic Scouting Study, Colville River Unit, Conservation & Resource Development Districts

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Record Id: 2353

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Mitigation Fund

Mitigation Measure:

Permittee shall provide impact mitigation for area hunters and trappers, by providing fuel. This is needed for displacement of hunting activities, or extended hunting and trapping opportunities caused by seismic operations. Hunters may need to access alternative hunting and trapping locations. Notice of this provision shall be forwarded to Native allotment owners and camp owners in the impact zone. (NSBCMP 2.4.3.(d)).

Reference: NSB 10-146, Development Permit, Alpine 3D, T13N, R3E, T10N, R6E, Umiat Meridian, Alpine, Conservation, Village and Resource Development District.

Record Id: 2359

Developer: CPAI

Project: Alpine

Agency: NSB

Year: 2009

Mitigation Type: Vehicle Management

Mitigation Measure:

Seismic operations shall avoid all subsistence traps, caribou antlers or other similar animals attractants used for fur-bearings animals traps. (NSBCMP 2.4.3.(d)

Reference: NSB 10-146, Development Permit, Alpine 3D, T13N, R3E, T10N, R6E, Umiat Meridian, Alpine, Conservation, Village and Resource Development District.

Record Id: 2032

Developer: CPAI

Project: Alpine Satellites

Agency: NSB

Year: 2004

Mitigation Type: Research on Fish

Mitigation Measure:

CPAI shall hire a third party to conduct a fish study to better understand and act upon the impacts of the CD-4 development and other CPAI satellite developments within a 30-mile radius of CD-4. The purpose of the study will be to evaluate the short and long term impacts of CD-4 and other CPAI satellite developments on the numbers and distribution of area subsistence fish species. The study design shall be forwarded to the North Slope Borough Department of Wildlife Management for review and approval. Additionally, a draft annual report shall be submitted to the North Slope Borough, City of Nuiqsut, Native Village of Nuiqsut, and Kuukpik Corporation for review and comments. The final report shall address any comments made by these parties. The study shall commence no later than November 1 of the winter CPAI begins construction and will continue annually for 10 years. At the end of 5 years, CPAI and the North Slope Borough will discuss the results of the study and determine if the study methods should be adjusted. At the end of 10 years, the third party contractor shall summarize the results and CPAI and the North Slope Borough shall then review the summary and synthesize the results from the study. Based on the study results, CPAI and NSB shall evaluate the need for additional fish studies. It is intended that the study design will address the possible impacts of CD-4 development as well as the additional anticipated CPAI satellite developments proposed for construction prior to 2010 within the 30-mile radius of the CD-4 development.

Reference: NSB 04-117, Revised September 30, 2004, Development Permit, CD-4, Nanuq, PAD, GRAVEL ROAD, PIPELINES. 18 WELLS, Alpine Unit, Resource Development District.

Record Id: 2270
Developer: CPAI
Project: Alpine Satellites
Agency: NSB
Year: 2006
Mitigation Type: Subsistence Oversight Panel
Mitigation Measure:

Pursuant to NSBMC Section 19.40.070(A) and NSCMP Policy 2.4.3(a)(d), 2.4.5.1(a), 2.4.5.2(b), 2.4.6(b), industrial operations shall be conducted in a manner which does not reduce subsistence resources below the level of need, does not unreasonably disrupt subsistence activities, and does not prohibit reasonable subsistence user access to subsistence resources. ConocoPhillips shall satisfy these provisions through consultation with the Kuukpik Subsistence Oversight Panel (KSOP) prior to the initiation of proposed activities, and shall halt or otherwise restrict or modify planned activities, including the selection of water sources and ice road routes, as deemed necessary by the KSOP. Through this consultation, ConocoPhillips shall make every reasonable effort to assure that planned activities are compatible with subsistence activities and will not result in unreasonable interference with subsistence harvests or subsistence resources. A report of this consultation, including areas of agreement and identification of any unresolved conflicts, shall be submitted to the Land Management Administrator (LMA) no more than ten working days prior to the commencement of activities. In the event of unresolved conflicts, planned activities may be further restricted by the LMA if deemed necessary to achieve compliance with the above provisions.

Reference: NSB 07-032, Development Permit, Multi Year Ice Road ? Alpine, Various Locations, Colville River Unit, Resource Development & Conservation District

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Record Id: 1474
Developer: CPAI
Project: Meltwater
Agency: Alaska Division of Governmental Coordination
Year: 2001
Mitigation Type: Guarantee Access to Subsistence Resources
Mitigation Measure:

(b) Development which restricts subsistence user access to a subsistence resource.

The Meltwater Project is not expected to restrict subsistence user access. Subsistence activities will be allowed to occur in the project area as long as they are done in a safe manner. As discussed elsewhere in this analysis, the seven-foot minimum height of the pipeline will provide adequate height for access by subsistence users on snow machines. The mine site will be rehabilitated with no restrictions for access. The discussion under North Slope Borough enforceable policy 2.4.3(d) provides more information on the effect of the project on subsistence access.

Reference: AK DCG Final Consistency Determination: Meltwater Development Project, Kuparuk River Unit Final Consistency Determination. 2001.

Record Id: 1459

Developer: CPAI

Project: Meltwater

Agency: Alaska Division of Governmental Coordination

Year: 2001

Mitigation Type: Pipeline Elevation and Placement

Mitigation Measure:

> *The height of the pipeline will minimize barriers to movement of caribou or other wildlife, and subsistence users' ability to access wildlife is not expected to be changed. The pipeline will be at least seven feet high to ensure unrestricted wildlife passage and human use of the area.*

Reference: AK DCG Final Consistency Determination: Meltwater Development Project, Kuparuk River Unit Final Consistency Determination. 2001.

Record Id: 1670

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2008

Mitigation Type: Subsistence Representatives

Mitigation Measure:

> *Developers are encouraged to conduct operations to the extent practical and feasible: CPAI shall employ Subsistence Representatives to minimize conflicts during activities.*

Reference: NSB 09-194, Administrative Approval, 2P Ice Staging Pad, Near 2P, Meltwater, /Rolligon Trail from DS2P to Ocean Point, Kuparuk River Unit, T8N, R7E, Sec. 17, U.M., Resource Development District. 2008.

Record Id: 1505

Developer: CPAI

Project: Meltwater

Agency: NSB

Year: 2001

Mitigation Type: Community Consultation

Mitigation Measure:

As part of the development of mitigation measures, PAI works with the people of Nuiqsut to document and incorporate their knowledge and opinions with the mandated PAl contracted caribou study. This undertaking shall commence immediately and be monitored by observers from PAI, NSB, the State, and the Nuiqsut people. Any interviews with Iñupiat people shall include compensation for both interviewees and observers in the field. Specific terminology shall be developed to insure that traditional and other experts are speaking about the same issues. NSBMC 19.70.050, NSBMC 19.70.030

Initial mitigation measures shall be achieved through the Kuukpik Subsistence Oversight Panel (KSOP), North Slope Borough Wildlife Department, and North Slope Borough Planning and Community Services Department representatives already in place for the Alpine Development Project. Subsequent to the meetings and conferences required above, any changes or additions to the mitigation measures shall be incorporated in the Meltwater Prospect development plan. Any guidelines developed for establishing policies or procedures for mitigation shall be monitored rigorously and frequently. NSBMC 19.70.050

Reference: NSB: Administrative Approval, Meltwater Master Plan, Meltwater Development Area. 2001.

Record Id: 1239

Developer: CPAI

Project: Meltwater

Agency: Phillips Alaska, Inc.

Year: 2000

Mitigation Type: Employee Cultural Awareness Training

Mitigation Measure:

Design Feature: Provide non-resident oilfield workers with cultural awareness training. Expected Benefit: Avoids/minimizes cultural misunderstandings by increasing sensitivity of oilfield workers to Nuiqsut's culture and lifestyle including values of land and natural resources used for subsistence, importance of access to traditional hunting areas, protection of grave and other sacred sites, and maintenance of community social cohesion.

Reference: Phillips Alaska, Inc. Phillips Alaska, Inc. Meltwater Development Project Plan of Operations. 2000

Record Id: 1235

Developer: CPAI

Project: Meltwater

Agency: Phillips Alaska, Inc.

Year: 2000

Mitigation Type: Employee Hunting Prohibition

Mitigation Measure:

Design Feature: Prohibit hunting by oilfield personnel and allow traditional subsistence hunting.

Expected Benefit: Reduce potential for harassment of wildlife, reduces noise in area, reduces impacts to subsistence hunters.

Reference: Phillips Alaska, Inc. Phillips Alaska, Inc. Meltwater Development Project Plan of Operations. 2000

Record Id: 1243

Developer: CPAI

Project: Meltwater

Agency: Phillips Alaska, Inc.

Year: 2000

Mitigation Type: Vehicle Management

Mitigation Measure:

Design Feature: Employ dust control by watering road and setting speed limits.

Expected Benefit: Minimizes dust generation, disturbance to wildlife and subsistence use, and probability of vehicle(s) striking wildlife.

Reference: Phillips Alaska, Inc. Phillips Alaska, Inc. Meltwater Development Project Plan of Operations. 2000

Record Id: 1237

Developer: CPAI

Project: Meltwater

Agency: Phillips Alaska, Inc.

Year: 2000

Mitigation Type: Winter Operations

Mitigation Measure:

Design Feature: Conduct all major activities (e.g. pipeline construction, bridge construction, gravel mining, road construction) during winter.

Expected Benefit: Eliminate impacts of construction on wildlife, minimize impacts to tundra and wetlands during construction and eliminate impacts from an access road.

Reference: Phillips Alaska, Inc. Phillips Alaska, Inc. Meltwater Development Project Plan of Operations. 2000

Record Id: 1285

Developer: CPAI

Project: Tarn

Agency: ADNR

Year: 1998

Mitigation Type: Community Consultation

Mitigation Measure:

Prior to submitting a plan of operations for both onshore and offshore activities which have the potential to disrupt subsistence activities, the lessee shall consult with the potentially affected subsistence communities and the North Slope Borough (NSB) (collectively 'parties) to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. The parties shall also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee shall make reasonable efforts to assure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable interference with subsistence harvests.

Reference: AK DNR: Competitive Oil and Gas Lease (389059), Tarn Project. 1998.

Record Id: 1784

Developer: CPAI

Project: Tarn

Agency: NSB

Year: 2000

Mitigation Type: Subsistence Oversight Panel

Mitigation Measure:

> *Permittee shall work with the Kuukpik subsistence oversight panel to make sure subsistence activities will not be interfered with.*

Reference: NSB 00-107, Development Permit, Nuiqsut route Iceroad to Tarn 2L, Village & Resource & Conservation District. 2000.

Record Id: 1063

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2005

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *CONDITIONS / MODIFICATIONS OF PROJECT DESCRIPTION: Pioneer Natural Resources, Inc. has agreed to abide by the following specific conditions developed in response to comments received during the public comment period of OPMP's review of this proposal.*
>
> *3. Project activities necessary after September 1, must be coordinated with the Alaska Eskimo Whaling Commission (AEWC) and the Nuiqsut Whaling Captains Association to avoid and minimize potential impacts to whaling operations. Such coordination will be documented in the Conflict Avoidance Agreement with the AEWC.*

Reference: Alaska DNR 2005: Pioneer Oooguruk Development Project, Beaufort Sea: Final Consistency Determination

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Record Id: 1079

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2005

Mitigation Type: Subsistence Oversight Panel

Mitigation Measure:

Pioneer will continue to coordinate with the Kuukpik Subsistence Oversight Panel (KSOP); local Native Allotment owner(s); the NSB Planning Department; and representatives of the Iñupiat Community of the Arctic Slope for the duration of the Oooguruk Development Project in eastern Harrison Bay to ensure that Pioneer's activities avoid and minimize potential impacts to subsistence resources and their use.

Reference: Alaska DNR 2005: Pioneer Oooguruk Development Project, Beaufort Sea: Final Consistency Determination

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Record Id: 1064

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2005

Mitigation Type: Water Vessel Management

Mitigation Measure:

CONDITIONS / MODIFICATIONS OF PROJECT DESCRIPTION: Pioneer Natural Resources, Inc. has agreed to abide by the following specific conditions developed in response to comments received during the public comment period of OPMP's review of this proposal.

4. All nonessential boat, barge and air traffic associated with drilling activity shall occur prior to or after the period of whale migration through the area. Essential traffic (traffic that could not reasonably occur prior to or after the period of whale migration through the area) shall avoid disrupting whale migration, subsistence activities, and be coordinated with the Alaska Eskimo Whaling Commission.

Reference: Alaska DNR 2005: Pioneer Oooguruk Development Project, Beaufort Sea: Final Consistency Determination

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Record Id: 1390

Developer: PNRC

Project: Oooguruk

Agency: Kuukpik Corporation

Year: 2007

Mitigation Type: Mitigation Fund

Mitigation Measure:

> *$35,000 shall be allocated to lump sum payments to all households in Nuiqsut of Nuiqsut residents that are Substantially Dependent (as defined below) on subsistence and meet all of the eligibility requirements as provided in Paragraph 2.*

Reference: Pioneer/Oooguruk - Nuiqsut Mitigation Fund. 2007.

Record Id: 1684

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2006

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *Permittee shall design and work with the NSB, Village of Nuiqsut on a Conflict Avoidance Agreement, which addresses subsistence use areas, security, and access, to be implemented for the life of the development. NSBCMP 2.4.3(e)*

Reference: NSB 07-067, Administrative Approval, Oooguruk Development Project, Flowline Construction, Winter 2006/2007. 2006.

Record Id: 1401

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2005

Mitigation Type: Guarantee Access to Subsistence Resources

Mitigation Measure:

Pioneer must exercise due diligence to mitigate all adverse impacts on subsistence use activities caused by Qooguruk Project activities. Pioneer shall not preclude subsistence user access to the proposed gravel island to provide safe harbor in an emergency.

Reference: North Slope Borough: Ordinance No. 75-6-50. Oooguruk Project. 2005.

Record Id: 1528

Developer: PNRC

Project: Oooguruk

Agency: NSB

Year: 2005

Mitigation Type: Mitigation Fund

Mitigation Measure:

Subsistence Activities and Native Allotments are now central to impacts caused by development. The long-term impacts of recovering oil from this area is identified. Native allotments are less than a 1/4 mile from the pipeline shore crossing area. The limitation on the use of these native allotments must be considered in the overall program.

Proposed Modification:

2. Pioneer Natural Resources shall work with the impacted native allotment owners of the area in addressing direct impacts of development on the use-ability of those native allotments. Communication shall at a minimum include impact funds for displacement, direct leasing and continued use by the owners, including limitations if any, ""fire-arms"" and so on.

Reference: North Slope Borough Planning Department RE: ADL 417497 Easement, Oooguruk Development. September 2005.

Record Id: 1520

Developer: PNRC

Project: Oooguruk

Agency: PNRC

Year: 2005

Mitigation Type: Conflict Avoidance Agreement

Mitigation Measure:

> *Bowhead whale issues will be coordinated with the Alaska Eskimo Whaling Commission and the Nuiqsut Whaling Captains Association.*

Reference: Pioneer Natural Resources Alaska, Inc.: Oooguruk Development Project Plan of Operations. July 2005.

Record Id: 636

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2009

Mitigation Type: Guarantee Access to Subsistence Resources

Mitigation Measure:

> *Traditional and customary access to subsistence areas shall be maintained unless reasonable alternative access is provided to subsistence users. Reasonable access is access using means generally available to subsistence users. Lessees will consult the NSB, nearby communities, and native organizations for assistance in identifying and contacting local subsistence users.*

Reference: Alaska Division of Oil and Gas 2009: Beaufort Sea Areawide Oil and Gas Lease Sale

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Record Id: 614

Developer: PNRC

Project: Oooguruk

Agency: ADNR

Year: 2009

Mitigation Type: Prohibit Development Interfering with Subsistence

Mitigation Measure:

> *Facilities must be designed and operated to avoid or minimize sight and sound impacts in areas of high residential, commercial, recreational, and subsistence use and important wildlife habitat. Methods may include providing natural buffers and screening to conceal facilities, sound insulation of facilities, or by using alternative means approved by the director, in consultation with ADF&G and the NSB.*

Reference: Alaska Division of Oil and Gas 2009: Beaufort Sea Areawide Oil and Gas Lease Sale

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APPENDIX B: LIST OF CUES/QUESTIONS FOR KEY INFORMANT DISCUSSIONS

QUESTIONS FOR INDUSTRY DISCUSSIONS

1. What is your company's role in the mitigation process?
    a. State developments
    b. Federal developments

2. When are you brought into the mitigation decision making process for a development project?

3. Does your company propose mitigation measures for development projects?

4. Who or what informs your company's proposed mitigation decisions?
    i. Concerns and Stakeholder Suggestions (e.g., scoping, comment letters)?
    ii. Other Agency Recommendations?
    iii. Professional judgment?
    iv. Previously developed mitigation measures?
    v. Other?

5. In what form are final mitigation decisions legally binding to your Project (e.g., permit, record of decision)?

6. Is your company responsible for ensuring that subcontractors follow the mitigation measures stipulated in their respective permits? If so, how?

7. Are there agencies that determine whether or not mitigation measures are implemented by your company? If so, who?

8. Does your company monitor the mitigation measures after implementation? If so, how?
    a. Are the results of this monitoring provided to state and/or federal agencies?
    b. Nuiqsut residents?

9. If monitoring, does your company have established measures of effectiveness?
    a. If measuring effectiveness, what types of data are most useful in evaluating the effectiveness?

10. Have formal mitigation efforts been effective in reducing anticipated effects?
    a. Are there mitigation decisions that are not effective?

11. What types of mitigation are most effective in addressing Nuiqsut concerns regarding subsistence impacts?

12. Have informal mitigation measures emerged, and with what effect?

13. Has your company been responsive to community feedback? Examples?

14. What about the mitigation process could be improved?

15. What about the mitigation process is effective?

QUESTIONS FOR AGENCY DISCUSSIONS

1. What is your agency's role in the mitigation process?
    a. State Developments?
    b. Federal Developments?

2. When is your agency brought into the decision making process for a development project?

3. Who or what informs your agency's mitigation ideas?
        i. Concerns and Stakeholder Suggestions (e.g., scoping, comment letters)?
        ii. Other Agency Recommendations?
        iii. Developer's Proposed Mitigation?
        iv. Professional judgment?
        v. Previously developed mitigation measures?
        vi. Other?

4. What is the process for determining which mitigation ideas are carried forward as mitigation decisions?

5. Does your agency only recommend mitigation measures or does your agency have the responsibility to determine if your mitigation measures are implemented?
    a. If so, how does your agency follow up?
    b. If not, who does?

6. In what form, if any, are your agency's final mitigation decisions legally binding to a developer (e.g., permit, record of decision)?

7. Does your agency ever monitor ongoing mitigation decisions after implementation? If so, how?

8. If monitoring, does your agency have established measures of effectiveness?
    a. If measuring effectiveness, what types of data are most useful in evaluating the effectiveness?

9. Have mitigation decisions been effective in reducing anticipated effects?
    a. Are there mitigation decisions that are not effective?

10. What types of mitigation are most effective in addressing Nuiqsut concerns regarding subsistence impacts?

11. Have informal mitigation measures emerged and with what effect?

12. Have industry operations been responsive to community feedback?

13. What about the mitigation process could be improved?

14. What about the mitigation process is effective?

QUESTIONS FOR NUIQSUT RESIDENT DISCUSSIONS

1. How do Nuiqsut residents provide suggestions that will lessen the effects of oil and gas development on Nuiqsut subsistence activities?

2. When are Nuiqsut residents brought into the process of suggesting and deciding mitigation measures?

3. How do you develop ideas for mitigation measures?
    a. Traditional Knowledge?
    b. First-hand experience with impacts?
    c. Other ideas developed for other projects that you have read or heard about?
    d. Other?

4. Are agencies and industry responsive to local ideas for mitigation measures?
    a. Who is most responsive and why?
    b. Who is least responsive and why?

5. Are there any concerns about impacts to Nuiqsut subsistence that have not been adequately addressed by agencies and industry?

6. Are local residents involved in monitoring whether mitigation measures are implemented? How?

7. Do you think that the mitigation measures that have been implemented are effective?
    a. Which ones and why?
    b. Which ones are not and why?

8. Have informal mitigation measures emerged that you find effective?

9. What about the mitigation process could be improved?

10. What about the mitigation process is effective?

11. How satisfied are you with the overall process of lessening impacts of oil and gas development on Nuiqsut subsistence activities?

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 Bureau of Ocean Energy Management

As a bureau of the Department of the Interior, the Bureau of Ocean Energy Management (BOEM) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS) in an environmentally sound and safe manner.

The BOEM Environmental Studies Program

The mission of the Environmental Studies Program (ESP) is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments.