



NMFS 90-Day Report for Marine Mammal Monitoring and Mitigation during SAExploration's Colville River Delta 3D Seismic Survey Beaufort Sea, Alaska

August to September 2014

Prepared for

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Cover Photo: Polar bear walking on Spy Island observed during the *CRD 3D 2014 Survey*, photo by Felix Smith

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Acronyms and Abbreviations

3D	three-dimensional
4MP	marine mammal monitoring and mitigation program
AEWC	Alaska Eskimo Whaling Commission
AKDT	Alaska Daylight Time
ASL	Above Sea Level
BF	Beaufort sea state
CAA	Conflict Avoidance Agreement
Com-Center	Communication and Call Center
CPA	closest point of approach
CRD	Colville River Delta
dB	decibel
ESA	Endangered Species Act
ft	feet
GPS	Global Positioning System
hr	hour
hr/d	hours per day
HSE	Health, Safety, and Environment
IC	Iñupiat Communicator
in ³	cubic inch(es)
IHA	Incidental Harassment Authorization
kHz	kilohertz
km	kilometer(s)
km ²	square kilometer(s)
km/hr	kilometers per hour
kt	knot(s)
LOA	Letter of Authorization
m	meter(s)
mi	mile(s)
mi ²	square mile(s)



min	minute(s)
MMPA	Marine Mammal Protection Act
M/V	motor vessel
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NVD	night vision device
OBN	ocean bottom node
PSO	protected species observer
QA/QC	quality assessment / quality check
rms	root mean square
SAE	SAExploration
SDI	Satellite Drilling Island
SPL	sound pressure level(s)
SSV	sound source verification
Unid	unidentified
U.S.	United States
USFWS	U.S. Fish and Wildlife Service



1. Introduction

SAExplorations, Inc (SAE) conducted an open-water three-dimensional (3D) ocean bottom node (OBN) seismic survey during the 2014 open-water season, hereafter referred to as the *Colville River Delta 3D 2014 (CRD 3D 2014 Survey)*. The Colville River Delta (CRD) is located approximately 190 kilometers (km) west of Prudoe Bay and drains into the western Beaufort Sea, Alaska (Figure 1). The project began on 25 August and was fully demobilized on 30 September 2014.

Eight species of marine mammals known to occur in the Beaufort Sea could possibly be encountered in or near the *CRD 3D 2014 Survey* area, including three cetacean (beluga, bowhead and gray whales), four pinniped (ringed, spotted, and bearded seals and Pacific walrus) and one marine fissiped species (the polar bear). Other marine mammal species are considered rare or extralimital to the survey area and are thus not further addressed herein.

Species considered most likely to be encountered in the *CRD 3D 2014 Survey* area are ringed seals, followed by bearded and spotted seals (SAE 2014). Though possible, beluga, bowhead and gray whale occurrence is considered very limited given the shallow (<10 meters [m]) water depth in the survey area combined with the barrier islands that separate the project area from the offshore Beaufort Sea (Figure 1). Most bowhead whales occur farther offshore during July or August, although some have been observed nearshore in the past few years (Clarke et al. 2014; 2013, 2014 Aerial Surveys of Arctic Marine Mammals (ASAMM) daily flight summaries). Four species known to occur regularly in the Beaufort Sea are listed under the United States (U.S.) Endangered Species Act (ESA): the endangered bowhead whale, the threatened bearded seal Distinct Population Segment, the threatened Arctic ringed seal, and the threatened polar bear.

Marine seismic surveys emit sound energy into the water and have the potential to affect marine mammals, given the reported auditory and behavioral sensitivity of many such species to underwater sounds (Richardson et al. 1995). Behavioral, distributional, or auditory effects (if they occur) could constitute a “take” under provisions of the Marine Mammal Protection Act (MMPA) and the ESA. The National Marine Fisheries Services (NMFS) has jurisdiction over whale and seal species that were likely to be encountered during the *CRD 3D 2014 Survey*. Under the MMPA, SAE applied for and on 21 August 2014 received from NMFS, an IHA authorizing “take”, by Level B harassment, of a small number of marine mammals incidental to conducting an open-water towed-array seismic survey (Appendix A). This IHA provided authorization to conduct the seismic survey and identified associated monitoring, mitigation and reporting requirements. The IHA included provisions to minimize the possibility that cetaceans and pinnipeds (excluding the Pacific walrus and polar bear managed by the U.S. Fish and Wildlife Service (USFWS) would be exposed to potentially harmful seismic sounds and to reduce potential “take” as



defined under the MMPA. In addition to the regularly occurring species mentioned above, SAE also requested harassment authorization from NMFS for a few individual rare or extralimital whale species to cover potential incidental occurrences.

SAE also requested and was issued an LOA from the USFWS allowing unintentional harassment of polar bears and Pacific walrus incidental to the planned seismic activities (USFWS 2013) (Appendix A). This LOA identified mitigation, monitoring, and reporting requirements specific to these species.

Regulations in the MMPA also require that IHA applicants planning activities in Arctic waters provide a Plan of Cooperation identifying measures to minimize adverse effects on the availability of marine mammals for subsistence purposes. SAE met with representatives of the community of Nuiqsut, the Alaska Eskimo Whaling Commission (AEWC), the North Slope Borough, and others to discuss appropriate measures to be implemented during the *CRD 3D 2014 Survey* to avoid potential conflicts with subsistence hunts. These measures were included in the Conflict Avoidance Agreement (CAA) received by SAE on 02 April 2014 (AEWC 2014) (Appendix B).

Trained, NMFS-approved Protected Species Observers (PSOs) were present aboard the source vessel in compliance with the issued NMFS IHA and USFWS LOA. Some of these PSOs also performed a role as Iñupiat Communicators (IC). The main goal of the PSOs and ICs was to (1) avoid or minimize potential effects of the *CRD 3D 2014 Survey* on marine mammals, and (2) communicate regularly with the locally established communication centers. As required by the IHA, this included observing for marine mammals within or about to enter the estimated safety radii (190 decibels [dB] re 1 μ Pa [rms] for pinnipeds and 180 dB re 1 μ Pa [rms] for cetaceans) and initiating an immediate power down or shutdown of the airguns, when needed. In addition, passive acoustic monitoring (PAM) was conducted as part of the 4MP to monitor for vocalizing marine mammals (Appendix C).

This 90-day report describes the methods and results of the *CRD 3D 2014 Survey* marine mammal mitigation and monitoring program (4MP) and addresses specific components required in the IHA and LOA. These include: (1) summarizing PSO effort and sighting data and implemented mitigation measures, (2) estimating numbers of marine mammals potentially exposed to seismic pulses exceeding sound levels of 160 dB re 1 μ Pa (rms), (3) describing reactions (if any) of marine mammals potentially exposed to seismic sounds, and (4) summarizing results of the PAM program. Note that all references to 160, 180 and 190 dB are re 1 μ Pa SPL rms and are henceforth indicated simply as dB (rms).



2. Summary of *CRD 3D 2014 Survey* Activities

The *CRD 3D 2014 Survey* was a 3D OBN seismic survey of the CRD and adjacent shallow offshore areas near the North Slope coast, Alaska. Project details are described in this section and include information on vessels, personnel, and equipment used during the survey. The IHA application (SAE 2014) provides more in-depth information on some of these topics. Changes that occurred from the IHA survey plan are described in this section. Survey events are summarized in Table 1. Vessel specifications and descriptions are provided in Table 2.

Table 1. Chronological summary of *CRD 3D 2014 Survey* events.

2014 Date	Activity
14 August	SAE received USFWS LOA valid 15 August through 31 October 2014.
21 August	SAE received NMFS IHA valid 25 August through 31 October 2014.
29 August	PAM equipment deployed.
30 August	<i>Peregrine</i> and <i>Maxime</i> transit from Prudoe Bay to <i>CRD 3D 2014 Survey</i> area.
31 August	Sound source verification (SSV) begins with <i>Peregrine</i> as source vessel and <i>Maxime</i> as mitigation vessel.
1 September	<i>Miss Diane</i> , <i>Mark Stevens</i> , <i>Sleep Robber</i> , and <i>Wingham</i> transit to <i>CRD 3D 2014 Survey</i> area.
2 September	SSV completed.
3 - 5 September	Operations delayed due to adverse weather.
6 - 12 September	Seismic surveys begin with <i>Peregrine</i> and <i>Maxime</i> as source vessels and mitigation vessels alternating between <i>Kimberlin Kat</i> , <i>Aubree Tara</i> , <i>Mark Stevens</i> and <i>Miss Diane</i> . SSV results received and distributed to NMFS. PSOs begin monitoring the new and more conservative exclusion zones based on SSV results.
13 - 14 September	Operations delayed by adverse weather. <i>Peregrine</i> anchored off Spy Island. Land PSOs stay at camp.



2014 Date	Activity
15 September	PSOs on watch observing daylight hours (hr)/day from aboard <i>Peregrine</i> and <i>Maxime</i> .
16 – 18 September	Seismic Surveys continue with <i>Peregrine</i> and <i>Maxime</i> as source vessels and <i>Aubree Tara</i> as mitigation vessel.
19 September	Operations delayed for weather.
20 - 25 September	Seismic survey continue with <i>Peregrine</i> and <i>Maxime</i> as source vessels and <i>Aubree Tara</i> and/or <i>Kimberlin Kat</i> as mitigation vessels.
25 September	End of all survey seismic operations at 19:50 for <i>Peregrine</i> and at 18:33 for <i>Maxime</i> .
26 September	<i>Peregrine</i> and <i>Maxime</i> depart for Prudhoe Bay.
27 – 28 September	<i>Miss Diane</i> , <i>Mark Stevens</i> , <i>Sleep Robber</i> and <i>Wingham</i> demobilized.
28 September	PAM equipment is retrieved





Figure 1. Location and boundaries of the *CRD 3D 2014 Survey* in the Beaufort Sea, Alaska.

2.1. Purpose

The *CRD 3D 2014 Survey* was the first part of a multi-year, multi-client project to replace and augment existing 2D datasets with 3D datasets. Using autonomous nodal seismic recording equipment and multiple points of observation, a more accurate and higher resolution 3D image of the project area can be produced than currently exists. The ultimate result of the *CRD 3D 2014 Survey* is to improve understanding of the geology and a potential target for future production or lease. Such information is needed to assist in making more accurate future geological and business decisions (SAE 2014).



2.2. Project Area

The *CRD 3D 2014 Survey* area was located offshore of Oliktok Point and inside of the Barrier Islands in the Beaufort Sea, Alaska (Figure 1). Approximately 50 square miles (mi²) of land, transition and marine zones were included in the seismic acquisition. Offshore zones were defined as waters at least 3 feet (ft) deep. The survey area included state waters and state and federal lands. Activities that occurred outside of the project area but in the permitted area included source vessels turning while operating the mitigation gun as well as vessel transit and project support.

2.3. Survey Equipment

Eight vessels were used throughout the *CRD 3D 2014 Survey*. This included two seismic source vessels (the Motor Vessel [M/V] *Peregrine* (*Peregrine*) and M/V *Maxime* [*Maxime*]), one mitigation vessel, four cable/node vessels and one support crew change vessel (Table 2). Initially, the M/V *Aubree Tara* (*Aubree Tara*) was the designated mitigation vessel. However, for logistical reasons during the sound source verification (SSV) and the first three days of operation, *Maxime*, M/V *Miss Diane* (*Miss Diane*), M/V *Mark Stevens* (*Mark Stevens*), and M/V *Kimberlin Kat* (*Kimberlin Kat*) were all used as mitigation vessels. Subsequently, on 9 September, *Aubree Tara* became the designated mitigation vessel for the duration of the survey excluding 20 September when the *Kimberlin Kat* was used for logistical reasons.

Table 2. Characteristics of vessels used for the *CRD 3D 2014 Survey*.

Vessel	Vessel Type / Purpose	Dimensions (feet [ft])	Main Activity	Operation Period
<i>Peregrine</i>	Source vessel	95 ft x 25 ft	Seismic data acquisition	24-hour (hr) operations
<i>Maxime</i>	Shallow source vessel	75 ft x 20 ft	Seismic data acquisition	During daylight hours
<i>Miss Diane</i> <i>Mark Stevens</i>	Node vessel	87 ft x 21 ft 85 ft x 25 ft	Deploy and retrieve receivers in offshore zones	24-hr operations
<i>Wingham</i>	Shallow water	34 ft x 12 ft	Deploy and retrieve	24-hr operations



Vessel	Vessel Type / Purpose	Dimensions (feet [ft])	Main Activity	Operation Period
<i>Sleep Robber</i>	node vessel	32 ft x 14 ft	receivers in shallow regions of off-shore zone	
<i>Aubree Tara</i>	Mitigation vessel	42 ft x 14 ft	Observation platform for PSOs	During daylight hours
<i>Kimberlin Kat</i>	Crew transport, Health Safety and Environment (HSE), support vessel	45 ft x 18 ft	Transport crew and supplies	24-hr operations

2.4. Source Arrays

A total of two airgun arrays were used during the survey, one from each source vessel (Table 3). Each airgun array consisted of eight airguns with a total discharge volume of 620 cubic inches (in³). The IHA was permitted for volumes of 1,760 in³, 880 in³, and 440 in³. However, SAE design parameters changed and conducted the SSV and all operations using only the 620 in³, 40 in³ and 10 in³ airgun(s) and/or arrays. The smallest airgun in the array (40 in³) and a separate 10 in³ airgun were used for mitigation purposes.

Source vessels traveled along pre-determined survey lines at an average speed of 5 knots (kt). When weather and operational conditions allowed, seismic data acquisition was conducted 24 hr/day (d) from the *Peregrine* and from the *Maxime* only during daylight periods.

Table 3. Airgun array configuration and source signatures as predicted by the Gundalf Airgun Array Model for 2 m water depth.

Array Specifics	Description
Total Array Volume (<i>Peregrine</i>)	620 in ³
Total Array Volume (<i>Maxime</i>)	620 in ³
Number of guns	Eight 2000 psi sleeve airguns in one array (2 x 110, 2 x 90, 2 x 70, and 2 x 40 in ³)



Array Specifics	Description
Zero to peak	237 dB re μPa @ 1 m
Peak to peak	243 dB re μPa @ 1 m
rms pressure (source level)	218 dB re μPa @ 1 m
Dominant frequencies	Typically less than 1 kHz
Towing distances	16.2 m (M/V <i>Peregrine</i>), 17.7 m (M/V <i>Maxime</i>)
Towing depth	1.9 m (M/V <i>Peregrine</i>), 1.4 m (M/V <i>Maxime</i>)

Both source vessels towed the same airgun array.

Source: IHA Application for CRD 3D 2014 Survey (SAE 2014)

Notes: dB re $1\mu\text{Pa}$ @ 1 m= decibels relative to 1 microPascal at one meter, in^3 =cubic inch (es), psi=pounds per square inch, kHz=kilohertz, rms = root mean square, M/V = motor vessel

2.5. Receivers and Recorders

The CRD 3D 2014 Survey utilized three different types of receivers for different areas as follows: (1) “onshore” (from the coastline inland), (2) “surf-zone” (0 to 6 ft water depths along the onshore coastline), and (3) “offshore” (depths ≥ 3 ft). Thus, water depths from 3 to 6 ft were categorized as both surf and offshore zones.

Shallow water marine nodes were used in “offshore” regions. These marine node receivers were laid on the ocean bottom using 110 ft spacing with acoustic pingers deployed on every other node. The acoustic pingers (sonardyne pinger) were used for determining the exact position of receivers. Source lines ran perpendicular to receiver lines.

2.6. Housing and Logistics

Approximately 103 people were involved in CRD 3D 2014 Survey operations on a day-to-day basis. Between 18 and 22 individuals were housed 24 hr/day on the *Peregrine*. The *Maxime*, *Aubree Tara* and *Kimberlin Cat* housed a small crew 24 hr/day. The remainder of the boats’ crews and gunners, navigation team and PSOs all commuted daily from the land camp at SAE Aliktauq Exclusion/Disturbance Zones and Sound Monitoring Program



3. Exclusion/Disturbance Zones and Sound Monitoring Program

Exclusion zones (i.e., “safety radii”) identified in the NMFS-issued IHA and the USFWS-issued LOA for the *CRD 3D 2014 Survey* were applied under the project 4MP, as proposed in the project IHA and LOA applications. These zones are based on current NMFS guidelines (e.g., 65 FR 16374) indicating that the “safety radii” for marine mammals around airgun arrays are customarily defined as the distances within which received pulse levels are ≥ 180 dB for cetaceans and ≥ 190 dB for pinnipeds. The USFWS-issued LOA identified a ≥ 180 dB (rms) safety radius for walrus and a ≥ 190 dB (rms) safety radius for polar bears in water. These safety criteria assume that seismic pulses at lower received levels will not injure these animals or impair their hearing ability, but that higher received levels could potentially have such effects. In addition, NMFS assumes that marine mammals exposed to ≥ 160 dB (rms) are potentially subject to behavioral disturbance.

Prior to completion of the project’s 2014 SSV, existing SSV measurements for the 880 in³ array (for the actual 620 in³ array) and the 10 in³ single gun were used to establish distances to received sound pressure levels (SPLs) of 190, 180, and 160 dB (rms) (Table 4). These initially applied radii were based on SSV results obtained in similarly shallow Beaufort Sea waters as described in the IHA application (SAE2014). The 2014 SSV began 31 August 2014, was completed 2 September 2014, and results were received 6 September 2014. These new radii based on the new SSV data were subsequently applied for the *CRD 3D 2014 Survey* beginning the evening of 6 September 2014. These revised applied mitigation radii are shown in Table 4 and Table 5.

Table 4. Exclusion and disturbance zone radii distance in meters (m) applied during the *CRD 3D 2014 Survey* prior to SSV results (31 August – 06 September, 2014 [evening]).

Airgun Discharge Volume	Exclusion Zones			Disturbance Zone
	190 dB re 1 μ Pa (rms)	180 dB re 1 μ Pa (rms)	160 dB re 1 μ Pa (rms)	
	880 in ³	167 m	494 m	1500 m
10 in ³	50 m	50 m	50 m	

190 dB: seals and polar bear

180 dB: cetaceans and walrus

160 dB: any marine mammal without permitted “takes” from NMFS



Table 5. Exclusion and disturbance zone radii distance in meters (m) applied during the CRD 3D 2014 Survey based on 2014 SSV results from 6 [evening]– 25 September)

Airgun Discharge Volume	Exclusion Zones		Disturbance Zone
	190 dB re 1 μ Pa (rms)	180 dB re 1 μ Pa (rms)	160 dB re 1 μ Pa (rms)
	620 in ³	195 m	635 m
40 in ³	156 m	233 m	1098 m
10 in ³	54 m	188 m	1049 m

190 dB: seals and polar bear

180 dB: cetaceans and walrus

160 dB: any marine mammal without permitted "takes" from NMFS



4. Marine Mammal Mitigation and Monitoring Program

This section describes the mitigation and monitoring measures implemented to address requirements specified in the NMFS-issued IHA, USFWS-issued LOA and CAA for the *CRD 3D 2014 Survey* (NMFS 2014, USFWS2013, Appendix A, and B). Data analyses, methods, and results for vessel-based visual monitoring are provided in Marine Mammal Monitoring Analyses and Results. Methods and results of the PAM program to monitor for vocalizing marine mammals are provided separately in Appendix C. The main purpose of the vessel-based PSOs and the PAM was to ensure compliance with provisions of the issued IH and LOA. Note, that, where necessary, human safety took precedence over mitigation measures related to avoidance, disturbance, and harassment of marine mammals. PSOs aboard the vessels had two primary areas of responsibility:

1. **Monitoring:** Record numbers, behavior and locations of marine mammals both during and in absence of seismic survey activity and document their reactions (where applicable). In addition, document selected environmental variables that may affect the ability to sight marine mammals.
2. **Mitigation:** Detect marine mammals within, or about to enter, the applicable exclusion zone and initiate immediate shutdown or power down of the airguns. Use visual monitoring to estimate the number of marine mammals potentially exposed to airgun sounds at specified levels.

4.1. Mitigation

Three types of mitigation measures were implemented during the *CRD 3D 2014 Survey*:

- 1) **General mitigation measures:** applicable to all survey vessels.
- 2) **Seismic survey mitigation measures:** applicable only to the two source vessels (*Peregrine* and *Maxime*) that operated the seismic airguns.
- 3) **Mitigation measures for subsistence activities:** applicable to all survey vessels.



4.1.1. General Mitigation Measures

General mitigation measures refer to general operation measures implemented to minimize and avoid vessel-related effects on marine mammals. These measures applied to all project vessels and operations and were implemented where applicable throughout the survey by the captain, crew, and PSOs of the *Peregrine* and *Maxime* source vessels, and the *Aubree Tara*, *Kimberlin Cat*, *Mark Stevens* and *Miss Dianne* crew transport/support vessels.

4.1.2. Seismic Survey Mitigation Measures

Five standard seismic-related mitigation measures were implemented for marine mammal sightings during the *CRD 3D 2014 Survey*: ramp ups, power downs, shutdowns, poor visibility conditions, and operation of a single source (10 in³) airgun (i.e., mitigation airgun). Exclusion zones (Table 5) plus a 160 dB (rms) disturbance zone for cetaceans and pinnipeds, were monitored by PSOs on the source vessel and mitigation vessel during all seismic vessel activities. Exclusion zone radii are based on distance from a marine mammal sighting to the airgun(s); however, it was easier for PSOs to estimate distances from their own positions on the vessels when making quick decisions in the field. This resulted in a larger buffer for marine mammals nearing the exclusion zones from positions in front of the source vessel.

An additional IHA stipulation to standard seismic mitigation measures required that airguns be shut down for aggregations of bowhead or gray whales apparently engaging in non-migratory behavior within the 160 dB (rms) disturbance zone. In addition if 12 or more bowhead or gray whales appeared to be engaged in non-migratory behavior, or a bowhead cow/calf pair were observed within the 160 dB (rms) disturbance zone, seismic activity was not to commence or continue (SAE2014). However, neither of the aforementioned measures needed to be implemented during the program as no such sighting events occurred.

Ramp-Up

A ramp-up is a gradual increase in the number of active airguns before seismic data acquisition. The purpose of a ramp up is to alert and provide marine mammals the opportunity to leave the immediate area before the airgun array reaches full volume. To begin ramp up from a cold start the entire exclusion zone must be visible and free of marine mammals for a consecutive 30 min period, known as a PSO clear. Ramp up may begin without a PSO clear if the mitigation gun has been in operation following the last PSO clear.

Standard ramp-up procedures were implemented by doubling the number of active airguns approximately every 5 minutes (min), starting with the smallest airgun in the array. Ramp up of the 620 in³ array from a shutdown



therefore took approximately 15 min for this eight-airgun array. The full array for the *CRD 3D 2014 Survey* consisted of a combination of airguns of different sizes, two 40 in³ guns and six 90 in³ were used. During ramp up, a single 40 in³ gun was first activated, followed by a second 40in³ after 5 min resulting in a total volume of 80in³. After another 5 min, two 90 in³ airgun were activated increasing the volume to 260 in³.

Power Down

A *power down* is a reduction of the number of active airguns (from a full or partial array) to the smallest-volume single-operating airgun (i.e., the 10 in³ project mitigation airgun). A power down was implemented when a marine mammal was sighted within or closely approaching the applicable exclusion zone for the full array (620 in³).

Shutdown

A *shutdown* consisted of the full stop of all active airguns due to a marine mammal sighting within or closely approaching the exclusion zone. Throughout the project, operating airgun(s) were shut down completely if a marine mammal approached or entered the applicable 180 or 190-dB (rms) exclusion zone. Airgun activity did not resume until the marine mammal had cleared the exclusion zone radius of the full array. Further details on shutdown procedures can be found in the IHA application (CRD 2014a).

Poor Visibility Conditions

During the 30-min clearing period prior to ramp up from a full shut down, the IHA required that the entire 180 dB exclusion zone be fully visible for the full 30-min clearing period. If the entire exclusion zone was not visible (e.g., due to fog, snow, rain or darkness), ramp up could only commence if one or more airguns had been operating before the visibility decreased.

Mitigation Airgun

The *mitigation airgun* for the project was a 10 in³ airgun and was fired at approximately one shot per minute during mitigation periods as directed by the IHA. The mitigation airgun was intended to (a) alert marine mammals to the presence of airgun activity, and (b) retain the option of initiating a ramp-up to full operations under poor visibility conditions.

4.1.3. Mitigation Measures for Subsistence Activities

One to three Inupiaq Communicator (IC) worked as PSOs for the duration of operations as specified in the CAA (Appendix B). For periods when only one IC PSO



was working, he/she was stationed on the main *Peregrine* source vessel. When there was more than one IC PSO, one was always stationed on the main source vessel, and additional IC PSOs moved between the secondary source vessel and the mitigation vessel.

An IC PSO is an Alaska Native resident knowledgeable about Arctic marine mammals and the subsistence hunt. Since duties of IC PSOs were identical to PSOs, "PSO" herein refers to both IC and non-IC PSOs. In accordance with the CAA, PSOs or vessel captains on the *Peregrine* communicated or attempted to communicate with Deadhorse Communication and Call Center (Com-Center) from 1 through 12 September 2014. PSOs attempted communication four times per day (at 0000, 0600, 1200, and 1800 Alaska Daylight Time [AKDT]) to exchange information. The *Peregrine* Captain often made the call at 0000 so as to allow the PSO time to sleep. Information reported to the Com-Center included reporter name, vessel name, vessel position, vessel speed, and planned activity for the next six hours (Appendix B).

4.2. Monitoring Procedures

The visual monitoring protocol implemented during the *CRD 3D 2014 Survey* was designed based on provisions of the IHA and LOA (NMFS 2014, USFWS 2013). Prior to the survey's start, all PSOs participated in an SES PSO training course taught by the SES project manager, PSO field lead and COO, each with over 5 years of experience implementing seismic mitigation for marine mammals. This training familiarized PSOs with the monitoring protocol, identification and differentiation of local project marine mammals, and operational procedures. In addition, all PSOs participated in a one-day cold water survival training, a one-day North Slope Training Cooperative training, and a one-day Health, Safety, and Environment (HSE) training required by the SAE contractor. During these trainings, all PSOs were instructed on HSE and operational procedures.

One Lead PSO, four to five PSOs, and one to three IC PSOs were on-site during project operations. The Lead PSO, one to two PSOs, and one IC PSO were based on the main source vessel, *Peregrine*. The remaining (three or four) PSOs commuted from their land-based sleeping accommodations to the secondary source vessel, *Maxime* and the mitigation vessel, *Aubree Tara* for on-watch daylight observations. Lead PSO responsibilities included communicating among agencies and operations personnel, scheduling, and PSO point of contact for SES.

PSOs observed only during daylight hours for a maximum of 4 hr per shift and no more than 12 hr per day to minimize observer fatigue. Provisions in the NMFS-issued IHA did not require PSOs to maintain watch during nighttime activities. Monitoring took place from three platforms; the main source vessel (*Peregrine*), secondary source vessel (*Maxime*) and a mitigation vessel (*Aubree Tara*).



PSOs observed from the bridge of the *Peregrine*, *Maxime* and *Aubree Tara* where average observer's eye height was measured to be 15 ft, 20 ft and 6 ft above sea level (ASL). Visibility was unrestricted ahead of and to the sides of these vessels. However, behind the observer, visibility was obscured for approximately 90 degrees due to vessel superstructure. While on watch, one PSO systematically scanned using the naked eye and/or Fujinon 7 x 50 reticle binoculars during all vessel activities.

*Mysticetus*TM Systems software (*Mysticetus*) software was used on a laptop PC throughout the project to collect field data, run daily, weekly, monthly and final summaries of effort and sightings, and plot sightings on bathymetric maps. For example, daily summaries were produced with the touch of a few buttons and reported totals for user-selected variables and units, effort in km and hours, sightings by species, etc. *Mysticetus* software increased efficiency and accuracy of observations by instantly displaying positions and distances to marine mammal sightings when the PSO entered a binocular reticle or estimated visual distance. In addition, *Mysticetus* displayed vessel and sighting locations in real-time relative to the exclusion and disturbance zone distances from the seismic source location.

All data parameters identified as required in the NMFS-issued IHA were recorded along with supplemental data into a customized *Mysticetus* data form (with dropdown menus) as follows.

Effort and vessel activity data: date, time, seismic activity (i.e., seismic or non-seismic periods), array volume, Beaufort wind force (Bf), visibility, glare, cloud cover, and sea-ice percentage, as well as the location, speed, and activity of the vessel. These data were recorded approximately every 30 min, or whenever conditions changed significantly.

Seismic period was defined periods that any airguns operated. This included ramp up as well as mitigation airgun and full array operations.

Non-seismic period was defined as periods when no airguns were operational.

Marine mammal sighting data: whenever marine mammal(s) were sighted, the following data were recorded: date, time, species, total number of individuals, number of juveniles, clock-face bearing of the sighting relative to vessel's heading (e.g., 10:00), direction of movement relative to the vessel, initial distance from the vessel, closest point of approach (CPA) to the vessel, behavior state when sighted, secondary behavior, whether the animal was in the water or hauled out on ice or land, pace (i.e., animal's speed of movement), vessel position, water depth, number and location of other vessels within a 5 km radius, and the time that mitigation measures were requested and implemented (if necessary). Juvenile beluga whales were identified by their off-white color. Juvenile seals were identified by their smaller size relative to adults.



Mysticetus did not allow entry of nonsensical data (e.g., an entry that did not match the dropdown menu), which increased data accuracy and assisted with QA/QC. Data were visually checked by PSOs at the start and end of each watch shift. This provided multiple reviews of data, as PSOs looked at both their and their watch partner's entries.



5. Marine Mammal Monitoring Analyses and Results

This section first describes data analysis methods followed by the presentation of the results of the 4MP implemented during the *CRD 3D 2014 Survey*. The minimum and maximum estimated number of marine mammals potentially exposed to seismic survey operations is then provided. Numeric values in this section are presented in metric units only unless conventional use dictates imperial units (e.g., in³).

Table 6. Definitions of data collection and analysis terminology.

Off-watch Effort	Periods when Protected Species Observers (PSOs) were not on active watch duty and thus were not consistently looking for marine mammals. Any sightings made during these periods were considered opportunistic. For example, when PSOs were sitting in the bridge and occasionally looking for marine mammals, or were taking a break on or off the bridge but made a sighting.
On-watch Effort	Periods when at least one PSO was on active watch duty and dedicated to looking for marine mammals.
Seismic Effort	Periods when at least one PSO was on watch while airguns were operating from the <i>Peregrine</i> or <i>Maxime</i> source vessel. This included ramp ups, power downs, and when the single mitigation airgun was operating. PSOs were on-watch during all daylight airgun operations on both vessels.
Non-Seismic Effort	Periods when no airguns were operating from <i>Peregrine</i> or <i>Maxime</i> .
Visibility	Visibility refers to the clarity of the atmosphere between the observer's position and the horizon and is adversely affected by such environmental conditions as fog, rain, snow, haze, and the degree of light. For data analysis purposes, we categorized visibility data as unobscured (≥ 1 km and ≤ 3.9 km) or obscured (< 1 km).
Group (i.e., Sighting)	One or more individuals seen close together and coordinated in a similar manner (e.g., coordinated surfacings, orientation, etc.).
Sighting Rate	The number of marine mammal groups (or individuals) seen per hour of "usable" PSO effort
Usable Effort	PSO effort limited to specific viewing conditions to facilitate comparison of sighting rates under standardized sighting conditions. Usable data was limited to periods when PSOs were on-watch under the following conditions: vessel speed ≥ 2 kt; visibility > 1 km; daylight; Beaufort sea state (Bf) < 5 ; glare $< 60^\circ$ within the forward 180° of the vessel.



5.1. Analysis Methods

At the end of the field project, daily data were merged into one “master” database from which to filter for analyses. Herein, we describe and define the approach and methods used to summarize PSO effort and sighting data, marine mammal sighting rates, and estimated numbers of marine mammal exposures to seismic sounds based on NMFS-regulated sound exposure criteria.

5.1.1. Effort and Sighting Summary Methods

General summaries of PSO effort and data included all sightings and effort. In other words, effort totals were not filtered or restricted by environmental conditions in the general summaries presented in graphs and figures. However, these data were filtered to certain “usable” conditions for sighting rates to standardize comparisons as described later in Section 5.

Data on the number of marine mammal sightings are presented to the species level whenever possible in species summary tables. However, some sightings were not identified to species or genus if the PSO did not feel confident in their identification, as instructed to do during the PSO training conducted prior to the project start. Environmental factors including high Bf, poor visibility, ice coverage, distance from the observer, observer eye height ASL, and glare can limit the ability to identify marine mammals to species. During the project, pinnipeds in particular could not always be identified to species with a high level of certainty. Distinguishing ringed seals from spotted seals is especially difficult; therefore, this survey included a ringed/spotted seal category. PSOs labeled animals as “unidentified” if unsure of species identification.

After totaling sightings by species and unidentified categories, all pinnipeds (e.g., pinnipeds identified to species plus any unidentified pinnipeds) were combined for analysis purposes. This was done to increase sample size, facilitating more meaningful comparisons across selected observation conditions. (As no walrus were seen, pinnipeds only included seals). Addressing both IHA and LOA reporting requirements within this same report follows summary analyses done in other 90-day reports submitted to NMFS and USFWS (e.g., Smultea et al. 2004, Aerts et al. 2008, Blees et al. 2010, Hartman et al. 2011, Lomac-MacNair et al. 2013).

Distribution of sightings around the source vessel was assessed relative to several variables. These included bearing from the PSO to the sighting, initial and subsequent resight distances of the sighting from the PSO, and CPA of the animal(s) to the PSO.

Marine mammal movement relative to the vessel and initial and secondary behaviors were recorded for each marine mammal sighting based on pre-defined protocol and ethograms provided to the PSOs during training and made available on the project vessels. Marine mammal movements included swim away, swim



towards, swim parallel, no movement, and unknown. Initial behaviors included swim, look, dive, sink, rest, surface active, mill, and unknown/other. These parameters followed those presented in numerous other 90-day reports associated with seismic operations (e.g., Aerts et al. 2008, Bles et al. 2010).

5.1.2. Methods for Calculating Sighting Rates

Sighting rates of marine mammals were calculated as the number of groups seen per hour of “usable” effort as defined in Table 6. Sighting rates were based on hours of effort because distance (i.e., km) was not considered appropriate for the survey conditions where survey lines were spaced closely together in the same small region.

5.1.3. Methods for Estimating Number of Exposures

NMFS considers exposures of cetaceans and pinnipeds to anthropogenic received sound levels ≥ 160 dB (rms) to be a “take by harassment” (Level B harassment) that could potentially result in disturbance of these animals (NMFS 2005, 71 FR 50027). For polar bears in water, USFWS applies only a 190 dB (rms) exclusion zone isopleth per the project LOA (USFWS 2013). Given the nature of the project survey design, it was not reasonable to apply standard survey density data to estimate exposures as reported in other seismic surveys (e.g., Richardson 1998; Funk et al. 2008). The project design involved repeated coverage of closely spaced survey lines within the same small 10 mi² area over approximately five weeks. This design violated a basic assumption of line transect sampling requiring independence of sightings (i.e., no repeated sighting of the same individual during a survey) (Buckland et al. 2001). For example, it is highly likely that seals were resighted from adjacent closely spaced survey lines and also during periods when the survey vessel was docked or moving at slow speed (< 2 kt). Especially when animals dive for several minutes and resurface several hundred meters away, it is not possible to confirm whether or not it is the same animal. Therefore, instead, the minimum and maximum number of marine mammals potentially exposed to received seismic sound levels ≥ 160 dB was estimated, following Aerts et al. (2008). Further, all seismic sound other than that produced by the single mitigation airgun was conservatively assumed to be a full array. Thus, ramp-up periods with 1 to 2 airguns operating were treated as if the full array was operating.

Methods for estimating the potential minimum and maximum number of exposures to project seismic sounds ≥ 160 dB (rms) were as follows:

1. The estimated **minimum** number of exposures was based on direct observations/counts of cetaceans and pinnipeds during seismic activities. This approach has been applied previously by various seismic monitoring studies in the Chukchi and Beaufort seas (e.g., Aerts et al. 2008, Bles et al.



2010), as well as other oceans around the world (e.g., Smultea et al. 2004, 2005; MacLean and Koski 2005).

2. The estimated **maximum** number of exposures was calculated using marine mammal sighting rates (sightings/hr) calculated for usable non-seismic daylight hours during the project period. This approach assumes that the non-seismic sighting rate represents numbers that would have been seen had there been no seismic sounds occurring (similar to previous 90-day reports cited above). This non-seismic sighting rate was then multiplied by the total number of hours of daylight with seismic operations and the mean observed group size by species (as possible). The resulting number was considered the maximum number of potentially exposed individuals. Separate sighting rates were calculated for cetaceans and pinnipeds. Estimated exposures by species were calculated by prorating the percent of each confirmed species by the total number of estimated exposures; this was done separately for pinnipeds and cetaceans (i.e., beluga whales since no other cetacean species were seen during the survey).

5.2. Results

5.2.1. Observer Effort Results

Overall, more on-watch PSO effort occurred during seismic (54 % of 2,631 hr) vs. non-seismic periods (25 %) based on both kilometers and hours from all survey vessels (Table 7 and Table 8, Figure 2). After filtering for useable conditions (see definition in Table 6), 31 % (631.9 hr) of the total 2,631 hr of PSO watch effort was considered usable and was thus used to calculate sighting rates (Table 9). Overall, most PSO effort occurred on the *Peregrine* source vessel (Figure 3).

Table 7. Total on-watch Protected Species Observer effort (kilometers [km]) during seismic and non-seismic periods from the source (*Peregrine* and *Maxime*) and mitigation vessels.

Vessel (s)	Non-Seismic On-Watch Effort (km)	Seismic On-Watch Effort (km)	Opportunistic Off-Watch Effort (km)	Total (km)
<i>Maxime</i>	399.9	500.8	0.0	900.7
<i>Peregrine</i>	100.2	678.2	1.1	779.5
Mitigation Vessels	167.9	783.1	0.0	951.0
Total (km)	668.0	1,962.0	1.1	2,631.2



Table 8. Total on-watch Protected Species Observer (PSO) effort (hours [hr]) during seismic and non-seismic periods from the source (*Peregrine* and *Maxime*) and mitigation vessels.

Vessel(s)	Non-Seismic On-Watch Effort (hr)	Seismic On-Watch Effort (hr) ^{1/}	Opportunistic Off-Watch Effort (hr)	Total (hr)
<i>Maxime</i>	107.0	87.2	8.0	202.2
<i>Peregrine</i>	137.0	124.3	14.4	275.7
Mitigation Vessels	36.1	111.3	6.6	154.0
Total (hr)	280.1	322.8	29.0	631.9

^{1/} PSOS were on watch during all seismic operations during the survey.

Table 9. Total usable effort (hours [hr]) during seismic and non-seismic periods from source (*Peregrine* and *Maxime*) and mitigation vessels.

Vessel(s)	Non-Seismic Period Usable Effort (hr)	Seismic Period Usable Effort (hr) ^{1/}	Total Usable Effort (hr)
<i>Maxime</i>	36.5	37.9	74.4
<i>Peregrine</i>	6.8	52.8	59.6
Mitigation Vessels	11.41	51.14	62.6
Total (hr)	54.71	141.84	196.6

^{1/} PSOS were on watch during all seismic operations during the survey.



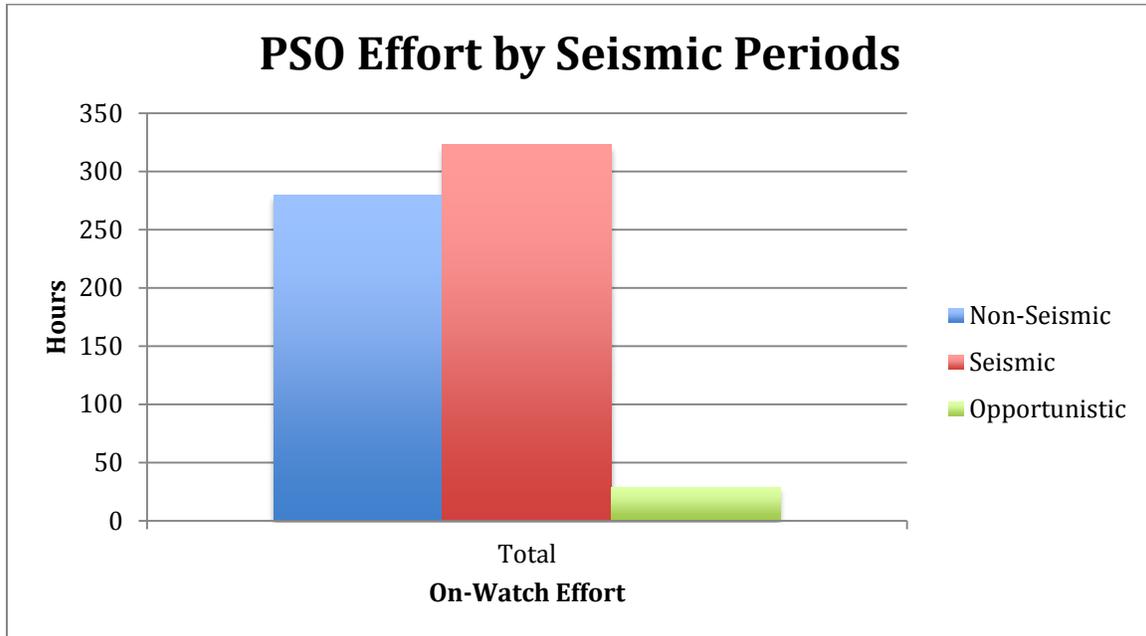


Figure 2. Total Protected Species Observer (PSO) effort by seismic and non-seismic periods.

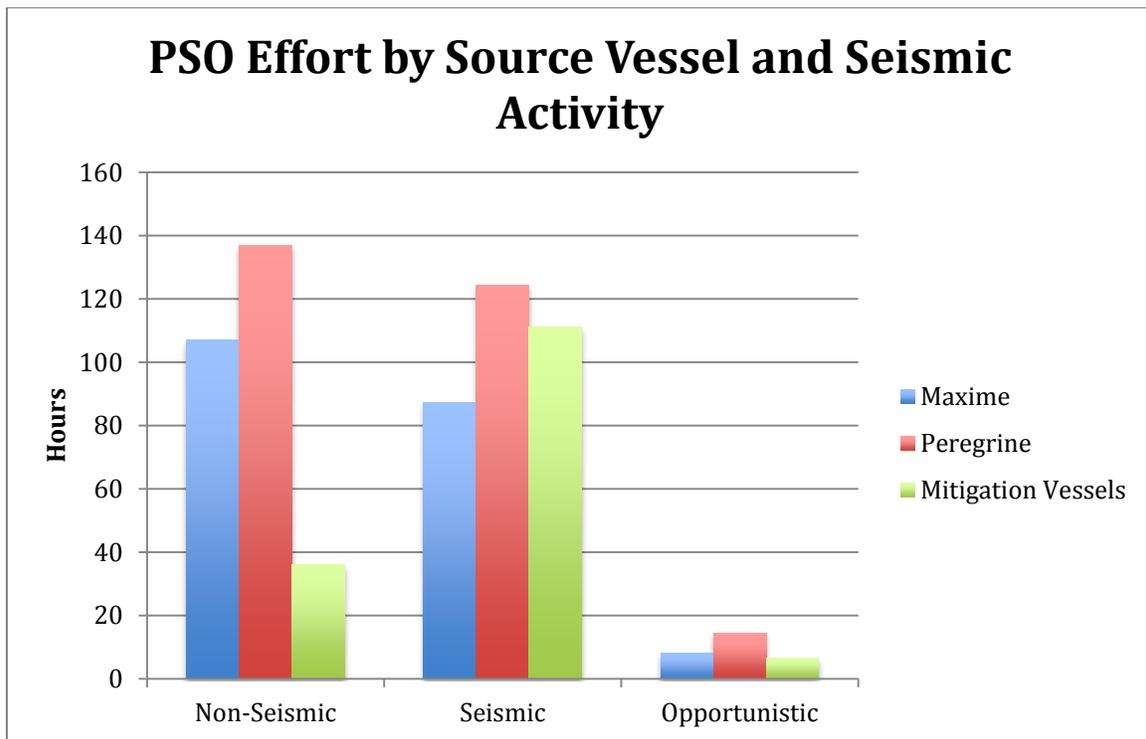


Figure 3. Protected Species Observer (PSO) effort for source vessel by seismic period.



5.2.2. Marine Mammal Sighting Results

A total of 82 groups of an estimated 87 individual marine mammals were observed by PSOs aboard survey vessels (Table 10 and Figures 4-9). Four marine mammals were confirmed to species: the spotted, ringed and bearded seal and the beluga whale. The spotted seal was the most frequently observed species (40 groups, 40 individuals), followed by the ringed/spotted seal (25 groups, 28 individuals). Relatively few confirmed ringed and bearded seals were observed (3 groups, 5 individuals and 2 groups, 2 individuals, respectively). Two individual beluga whales were seen by PSOs from the vessels; these two sightings may have been the same individual based on the relatively short period and distance between the times and locations, though this could not be confirmed (Figure 5). A detailed list of each cetacean and pinniped sighting made during the project is provided in Appendix D. There were a total of five polar bear sightings; however, these are discussed in more detail in Section 5.2.3 and are therefore not further addressed in this section.

It is important to note that an unknown, though relatively high number of seal sightings were likely resights of the same individuals within or across days. This is because seals generally spent brief time at the water surface. In addition, PSOs were trained to focus on monitoring the entire exclusion zone rather than concentrating on resights of individual animals; this was to maximize time spent monitoring the full exclusion zone. When resights were recorded, it was typically because the animal was sighted closer to the vessel than initially observed in order to note the CPA. Thus, the total number of different individual seals within the survey area is likely considerably lower than the total sightings reported herein. The latter assumption is based on the small size of the project area, repeated transits within the same area over the approximate five-week project period, closely spaced survey lines, and considerable PSO effort expended while the vessel was docked or moving very slowly (< 2 kt). Although these conditions likely contributed to a high number of resights, it is not possible to quantify this number given the above protocol limitations combined with the difficulty of identifying individual animals at distance.

Nearly all sightings ($n = 66, 80\%$) were made from the two source vessels. The highest number of sightings occurred from the *Maxime* ($n = 38, 46\%$), followed by the *Peregrine* ($n = 28, 34\%$) and the mitigation vessels ($n = 16, 20\%$) (Figure 9).

Most sightings occurred during a Bf 2 or 3, coinciding with the majority of PSO effort (Figure 7). Most sightings also occurred during non-seismic periods coinciding with the majority of PSO effort (Table 11 and Figure 8). Sighting rates by seismic and non-seismic periods that account for differential effort during these two periods are discussed later in Section 5.2.4.



Table 10. Total number of pinnipeds and cetaceans observed throughout the CRD 3D 2014 Survey. Sighting totals are not corrected for effort.

Species	No. Groups	No. Estimated Individuals
<i>Pinnipeds</i>	80	85
Spotted Seal	40	40
Ringed Seal	3	5
Ringed/Spotted Seal	25	28
Bearded Seal	2	2
Unidentified Pinniped	10	10
<i>Cetaceans</i>	2	2
Beluga Whale	2	2
Total	82	87

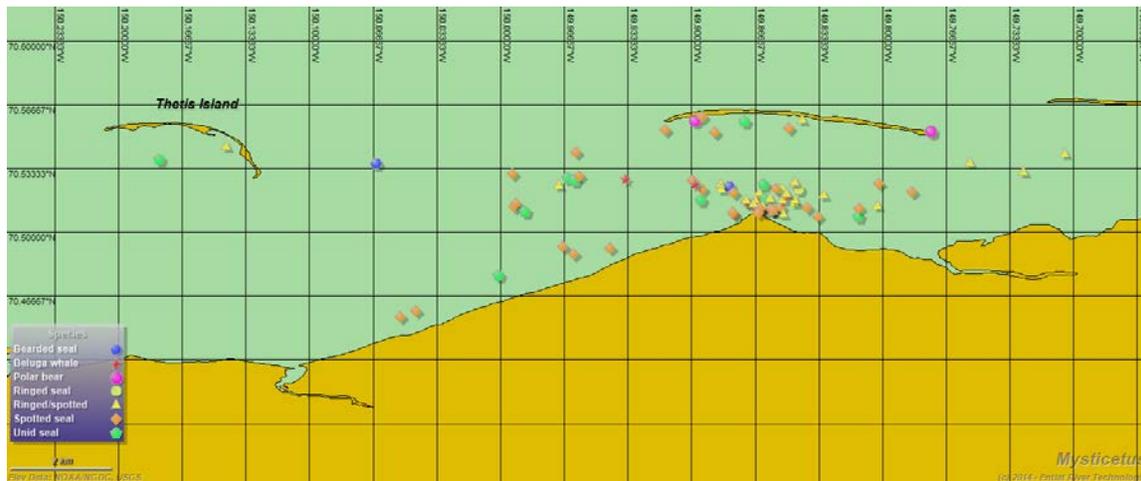


Figure 4. Locations of all marine mammal groups observed by Protected Species Observers from vessels.



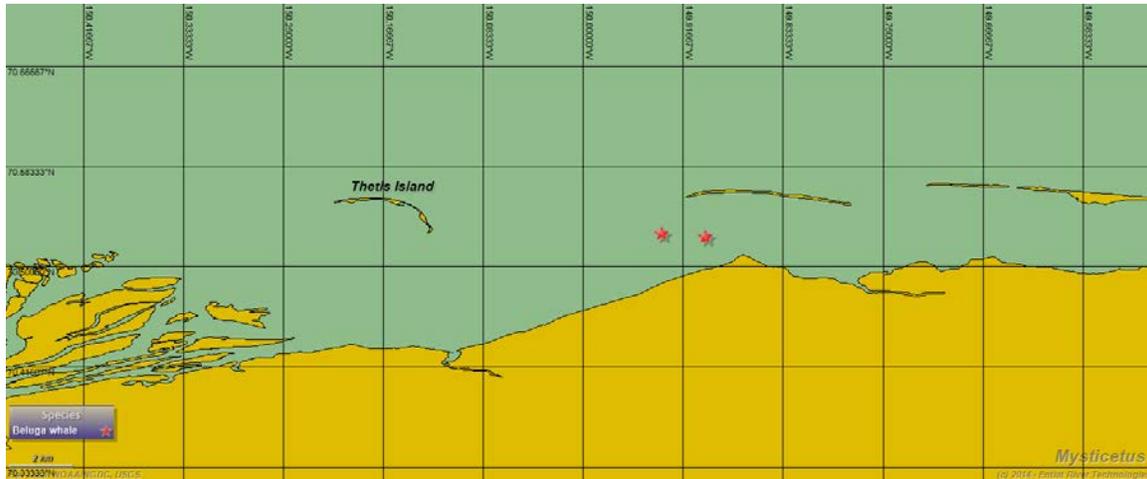


Figure 5. Locations of all beluga whale groups (both singletons) observed by Protected Species Observers from vessels (possibly a resight of the same individual based on the short distance and time between sighting).

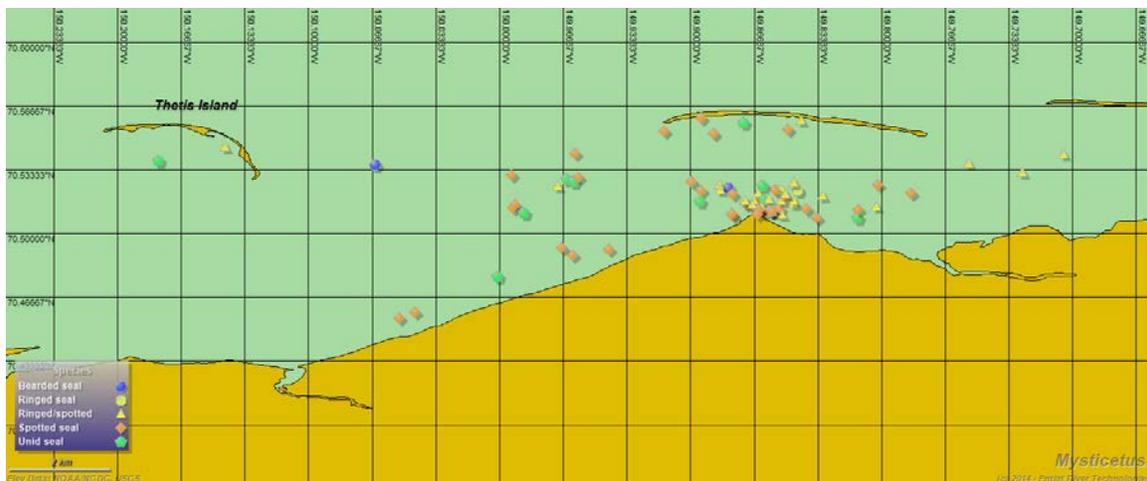


Figure 6. Locations of all pinniped groups observed by Protected Species Observers from vessels. (No walrus were seen.)



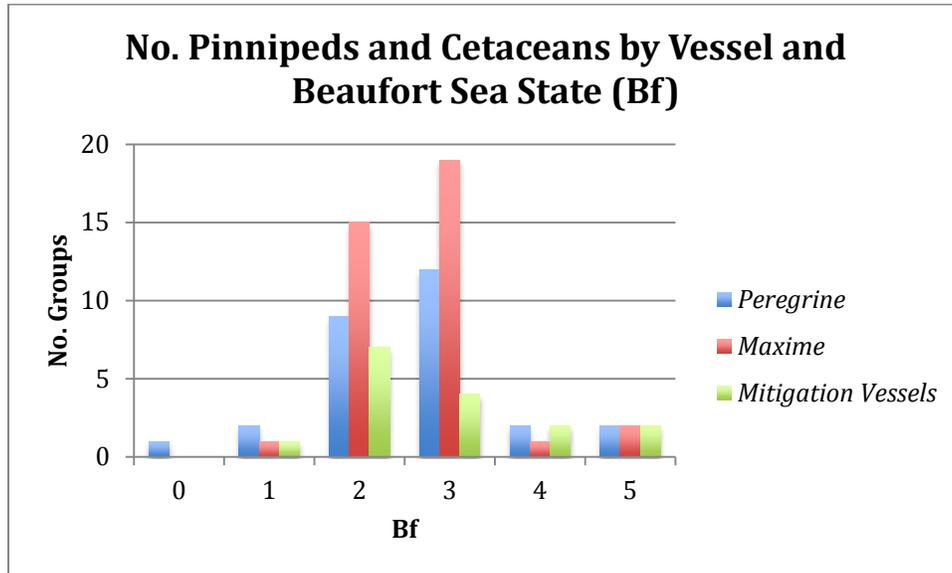


Figure 7. Number of pinniped and cetacean groups observed by vessel and Beaufort sea state (Bf).

Table 11. Total number of pinniped and cetacean groups seen by Protected Species Observers based on effort type during the CRD 2D 2014 Survey.

Species	Non-Seismic Effort	Seismic Effort	Off Watch	Total
Bearded Seal	2	0	0	2
Beluga Whale	1	1	0	2
Ringed Seal	2	0	1	3
Ringed/Spotted	19	0	6	25
Spotted Seal	33	4	3	40
Unidentified Pinniped	9	0	1	10
Total	66	5	11	82



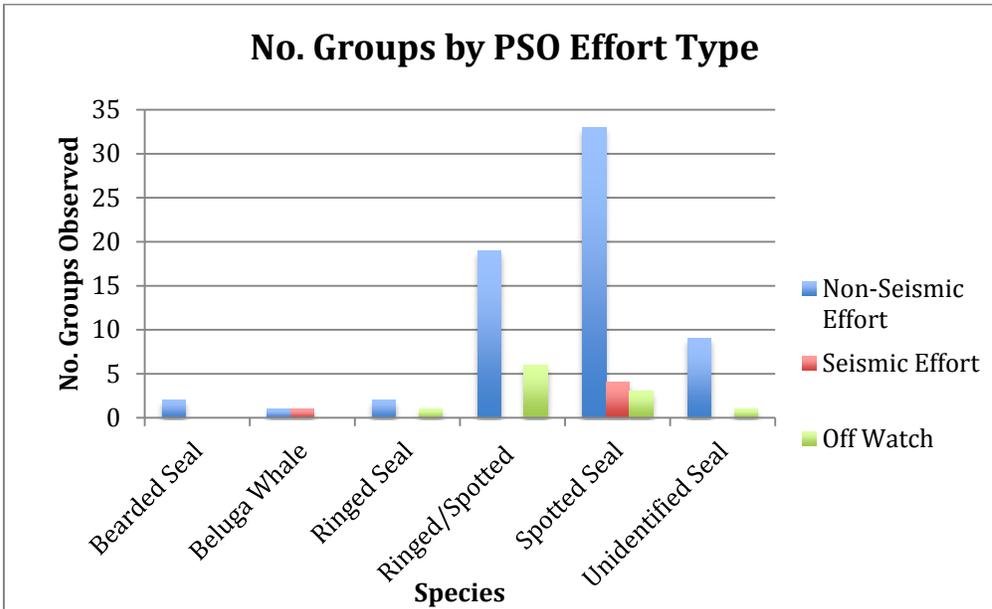


Figure 8. Total number of pinniped and cetacean groups observed by Protected Species Observers based on effort type.

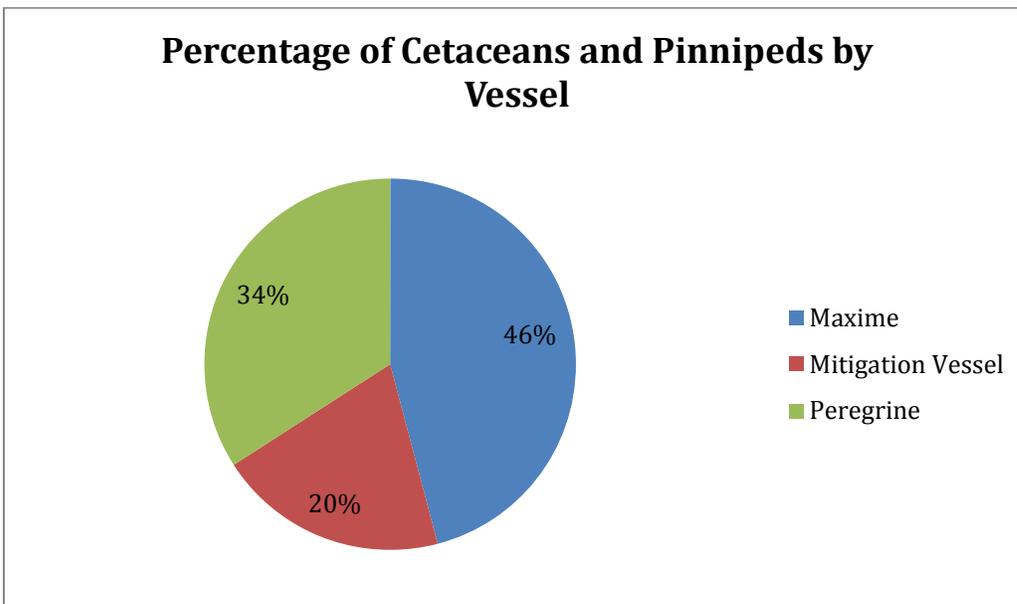


Figure 9. Percentage of cetacean and pinniped groups sighted by vessel.



5.2.3. Polar Bears and Walrus

Three single polar bears were seen by vessel-based PSOs during the *CRD 3D 2014 Survey* (Appendix E). All three bears were seen on the barrier islands on September 14, 17 and 23 (Figure 10).

Two additional polar bears were observed by non-PSO personnel from other survey-related vessels. A polar bear sighting summary table and respective forms are included in Appendices E and F. All information on both vessel and land-based sightings of polar bears as required in the LOA will be provided under separate cover to the USFWS to meet associated annual reporting document requirements. There were no sightings of walrus.

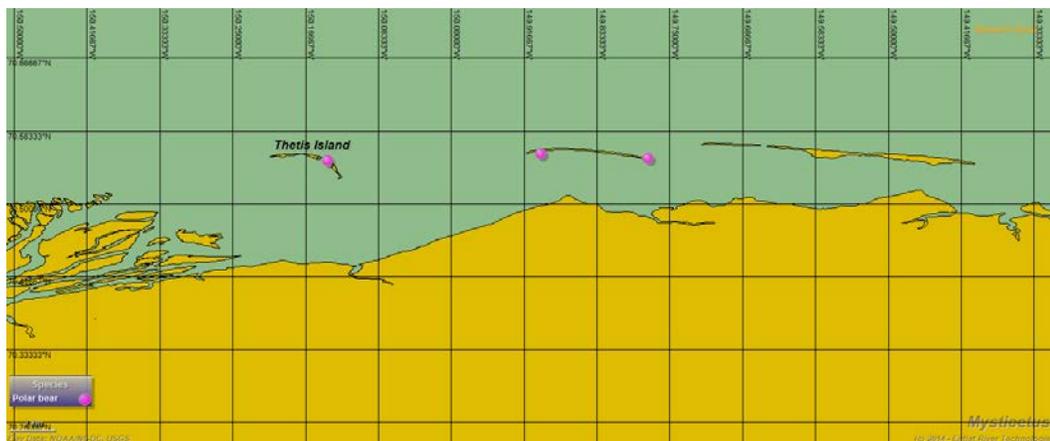


Figure 10. Locations of all polar bear groups (all singletons) observed by Protected Species Observers (PSOs). Two additional polar bear sightings were observed by non-PSO project personnel that are not plotted here.

5.2.4. Sighting Rates

Calculations of sighting rates are limited to usable data for effort and sightings to standardize effort (Table 9). A total of 68 (83 %) of 82 cetacean and pinniped groups were considered usable and thus used to calculate sighting rates. These usable sightings consisted of two beluga groups and 66 pinniped groups (Table 12). The remaining 14 groups were “non-usable” and excluded from sighting rate analyses as they did not meet usable criteria (i.e., they were seen during periods of limited visibility [<1 km], $B_f > 6$ or opportunistically during off-watch periods). Sample sizes based on useable data were too small during seismic periods ($n = 3$ marine mammal groups) to allow comparisons between seismic and non-seismic periods (Table 13). Pinniped sighting rates during non-seismic periods ranged from 0.22 to 2.94 groups/hr, with the lowest sighting rate occurring from the mitigation vessels and the highest from the Peregrine source vessel (Table 13).



Table 12. Number of "non-usable" and "usable" groups observed during seismic and non-seismic periods.

	Non-usable	Usable	Total
Non-Seismic	12	65	77
Bearded Seal	0	2	2
Beluga Whale	0	1	1
Ringed Seal	1	2	3
Ringed/Spotted	6	19	25
Spotted Seal	3	33	36
Unidentified Seal	2	8	10
Seismic	2	3	5
Beluga Whale	0	1	1
Spotted Seal	2	2	4
Total	14	68	82

Table 13. Sighting rates of pinniped and cetacean groups from each vessel during seismic and non-seismic usable effort periods based on usable sightings.

	Seismic			Non-seismic		
	Seismic Usable Effort (hr)	Number of Groups	Sighting Rate (# Groups/hr)	Non Seismic Usable Effort (hr)	Number of Groups	Sighting Rate (# Groups/hr)
Beluga whale						
<i>Maxime</i>	37.9	0	0	36.5	0	0
<i>Peregrine</i>	52.8	1	0.02	6.8	0	0
<i>Mitigation Vessels</i>	51.1	0	0	11.4	1	0.09
Subtotal	141.8	1	0.01	54.7	1	0.02
Pinniped						
<i>Maxime</i>	37.9	2	0.05	36.5	30	0.82
<i>Peregrine</i>	52.8	0	0	6.8	20	2.94
<i>Mitigation Vessels</i>	51.1	0	NA	11.4	14	1.23
Subtotal	141.8	2	0.01	54.7	64	1.17
GRAND TOTAL		3	0.02		65	1.19



5.2.5. Marine Mammal Behavior

All sightings were evaluated relative to behavior (i.e., usable and non-useable sightings) to maximize sample size. However, due to the limited number of sightings during seismic periods ($n = 5$), meaningful analysis of behavior relative to seismic operations was not possible for either pinnipeds ($n = 4$ groups) or beluga whales ($n = 1$ group) (Table 14). Furthermore, a total of only two beluga sightings (that may have been the same single animal) also preclude any meaningful interpretation of behavior. However, the 76 seal groups seen during non-seismic periods provide a reasonable sample size from which to interpret trends in behavior during this condition. Among these 76 groups “look” was by far the most commonly observed behavior (62%) during non-seismic periods and thus was likely a relatively mild reaction to vessel presence/activity (Figure 11).

Table 14. Initial behavior states observed during seismic and non-seismic periods for pinnipeds and cetaceans.

Species	Behavior	Seismic	Non-Seismic	Total
Pinniped	Diving		2	2
	Look	1	47	48
	Mill		1	1
	Rest		2	2
	Sink		1	1
	Surface Active		4	4
	Swim	3	18	21
	Unknown		1	1
Total Pinnipeds		4	76	80
Beluga whales	Swim	1	1	2



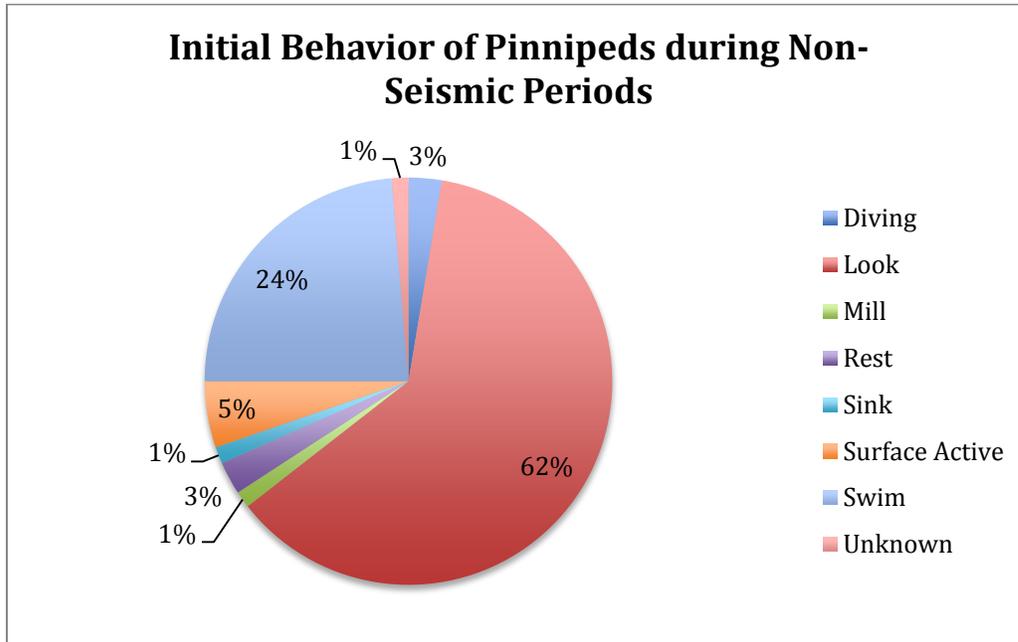


Figure 11. Initial behaviors of pinniped groups observed during non-seismic periods ($n = 76$) from all vessels.

With respect to CPA of sightings relative to the vessels, small sample size during seismic periods ($n = 4$ pinniped and 1 beluga whale groups) also precluded meaningful interpretation of potential differences during seismic and non-seismic periods (Table 14). However, during non-seismic periods, pinniped CPA decreased with increasing distance from the PSO/source vessel (Figure 12). The latter result was likely related to increased ability to see pinnipeds closer to the vessel.

In summary, for behavior, sample sizes of beluga whales ($n = 1$ or 2 groups) and during seismic periods among pinnipeds ($n = 4$) were too small to allow meaningful interpretation of potential effects of seismic operations. However, the relatively large ($n = 64$) number of pinniped sightings during non-seismic periods suggests that pinnipeds most commonly looked toward the vessel, and that few pinnipeds were seen more than 500 m from the vessels.



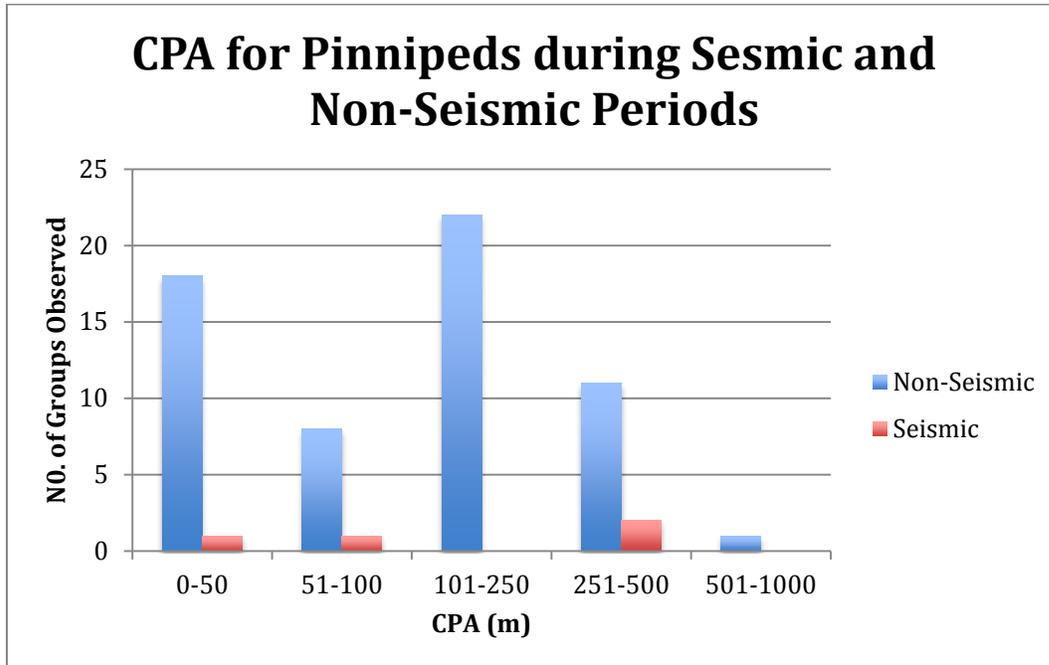


Figure 12. Number of pinniped sightings by closest points of approach (CPA) category during seismic and non-seismic periods as observed from the two source vessels (*Peregrine* and *Maxime*).

5.3. Mitigation Measures Implemented

5.3.1. General and Support Vessel Mitigation Measures

The captain and crew of the source vessels, *Peregrine* and *Maxime*, complied with all general mitigation measures identified in the NMFS-issued IHA and USFWS-issued LOA (NMFS2014, USFWS 2013). The captain and crew of the support vessels also complied with all support vessel mitigation measures described in Section 3.

5.3.2. Seismic Survey Mitigation Measures

Seismic survey mitigation measures specifically implemented for marine mammal sightings during the *CRD 3D 2014 Survey* consisted of four shutdowns. Ramp-up procedures occurred prior to the commencement of all seismic source operations. Details of the four shutdown mitigation measure are presented in Table 15.



Table 15. Summary of mitigation measures implemented for marine mammal sightings.

2014 Date/Time	Mitigation Measure	Event Description
11 September/ 13:02:16	Shutdown	Unidentified seal seen once ~3 m off <i>Maxime</i> bow “looking” at it while the <i>Maxime</i> operated 10 in ³ mitigation gun. 15-min clear began after seal last seen. No additional sightings and clear completed at 13:17:41. <i>Maxime</i> began ramp up to full volume at 13:35:08.
16 September/ 12:10:01	Shutdown	Spotted seal seen swimming away ~50 m off <i>Maxime</i> bow while <i>Maxime</i> operated 620 in ³ gun. After shutdown, the seal was briefly resighted resting 150 m from <i>Maxime</i> at 12:10:38, then disappeared below water surface and was not seen again. The 15-min clear period ensued with no further sightings. Ramp up began at 12:25:42.
21 September/ 14:45:21	Shutdown	Spotted seal first seen ~100 m from <i>Maxime</i> looking during ramp up. Seal resighted at the surface at 14:46:03 after shutdown. 15-min clear period restarted after sighting. Ramp up did not begin until 15:09:51.
22 September/ 14:00:50	Shutdown	Beluga whale spotted by <i>Peregrine</i> PSOs at 14:00:50 swimming ~150 m from the <i>Peregrine</i> . The whale was not resighted during 30 min clear period. Ramp up began at 14:31:47.

5.4. Estimated Number of Potential Exposures

It is required under the IHA to provide estimates of the amount and nature of potential harassment of marine mammals during the *CRD 3D 2014 Survey*. Meaningful estimates of the number of marine mammals potentially exposed to seismic sounds are difficult to obtain for several reasons: (i) the relationship between numbers of marine mammals that are observed and the number actually present is uncertain; (ii) the distance at which a received sound level exceeds a specific criterion such as 190 dB and 180 dB (rms) is variable, especially in the shallow-water survey environment (Section 3; see also Greene 1998, Greene et al. 1998; Burgess and Greene 1999; Caldwell and Dragoset 2000; Tolstoy et al. 2004a,b); (iii) sounds received by marine mammals vary depending on their depth



in the water and will be considerably reduced for animals near the surface (Greene and Richardson 1988; Tolstoy et al. 2004a,b); and (iv) the most appropriate criteria for harassment from exposure to sounds are uncertain and presumed to vary among different species and situations. In addition to these reasons, there were relatively few marine mammal sightings during the project, which further complicates the provision of meaningful estimates.

The method applied to estimate the number of marine mammals exposed to seismic sound levels strong enough that they might have caused a disturbance or other potential impacts is explained in Section 5.6.5. It includes (i) minimum estimates based on direct observations of marine mammals by PSOs, and (ii) maximum estimates based on pinniped and cetacean sighting rates obtained during this survey. The estimated number that may have been exposed was calculated using individual sighting rates during non-seismic daylight hours during the project period. This approach assumes that the non-seismic sighting rate represents the number of animals that would have been seen had there been no airguns operations. This non-seismic sighting rate was then multiplied by the total number of hours of daylight and low light with airgun operations. The resulting number of animals was considered the maximum number of potentially exposed individuals.

The actual number of individuals exposed to, and potentially impacted by, strong seismic survey sounds likely was between the minimum and maximum estimates provided in the following sections and summarized in Table 16. The actual number of marine mammals observed within the applicable safety radii of the source vessels during airgun operations provides a minimum estimate of the number potentially exposed to airgun sounds regulated by NMFS. This likely underestimates the actual number potentially exposed because PSOs were likely unable to detect all marine mammals near the vessel. During daylight, animals are missed if they are below the surface when the vessel is nearby. Other marine mammals, even if they surface near the vessel, could be missed because of limited visibility due to conditions such as fog, rain, snow, haze, and darkness.

Cetacean exposures — One cetacean (beluga whale) sighting of a lone individual was made within the 160 dB (rms) exposure zone (estimated at 150 m from the source) while airguns were operating. The minimum number of beluga whale exposures to ≥ 160 dB (rms) is therefore one.

Pinniped exposures — Four single pinnipeds were within the 160 dB (rms) exposure zone during seismic periods. All pinnipeds observed within the 160 dB (rms) zone were spotted seals observed at distances of 300, 300, 100 and 50 m from the operating seismic source. The minimum number of pinniped exposures to ≥ 160 dB (rms) is therefore four.



5.4.1. Maximum Estimate

The maximum estimated number of potential pinniped and cetacean exposures to *CRD 3D 2014 Survey* seismic sounds ≥ 160 dB (rms) was calculated as follows:

- = Total duration of all seismic operations (*Maxime* seismic hr + *Peregrine* seismic hr) x mean group size observed during survey x non-seismic sighting rate (no. groups observed/hr during usable non-seismic conditions)

Beluga whale exposures —

- Total duration of seismic operations (hr) (*Maxime* seismic + *Peregrine* seismic) = 87.2 hr (*Maxime*) + 124.3 hr (*Peregrine*) = 211.5 hr
- Mean group size of beluga whales seen during this survey = 1
- The non-seismic sighting rate for beluga whales (no. groups observed/hr during usable non-seismic conditions) was 0.02 sightings/hr

Thus, the maximum number of potential beluga whale exposures = 211.5 hr x 1.0 individuals/sightings x 0.02 sightings/hr = 4.23 beluga whales = 5 belugas whales (rounded up).

Pinniped exposures —

- Total duration of seismic operations (hr) (*Maxime* seismic + *Peregrine* seismic) = 87.2 hr (*Maxime*) + 124.3 hr (*Peregrine*) = 211.5 hr
- Mean group size of pinnipeds seen during this survey = 1.06
- The non-seismic sighting rate for pinnipeds (no. groups observed/hr during usable non-seismic conditions) was 0.60 sightings/hr

Thus, the maximum estimated number of potential pinniped exposures = 211.5 hr x 1.06 individuals/sighting x 1.17 sightings/hr = 262.3 pinnipeds = 263 pinnipeds (rounded up).



Table 16. Summary of minimum and estimated maximum number of potential pinniped and cetacean exposures to airgun sounds ≥ 160 dB (rms) from the two source vessels. The estimated numbers of pinniped and cetacean exposures as per the IHA are provided for comparison.

Species	Potential calculated exposures to ≥ 160 dB (rms)		Requested maximum exposures to ≥ 160 dB (rms) as per IHA
	Minimum	Maximum**	
Beluga whales	1	5 (4.23)	40
Pinnipeds	4	264 (262.3)	702
<i>Ringed Seal*</i>	0	18 (17.6)	638
<i>Bearded Seal*</i>	0	12 (11.7)	32
<i>Spotted Seal*</i>	4	235 (234.7)	32

*A total of 45 pinniped sightings were identified to species, $n = 40$ were spotted seals (89.0 %), $n = 2$ were bearded seal (4.4 %), $n=3$ were ringed seal (6.7 %). These percentages were multiplied by the total estimated maximum potential calculated pinniped exposures to obtain maximum exposure by species to survey seismic sounds ≥ 160 dB (rms).

**All maximum potential calculated exposures to survey seismic sounds ≥ 160 dB (rms) were rounded up to the next highest whole number (i.e., $2.1 = 3$). Actual calculations are shown parenthetically.

5.5. Impact on Subsistence

The CRD 3D 2014 Survey began in 2014 during the fall bowhead whale migration and the corresponding subsistence hunt by the village of Nuiqsut. Calls to the Deadhorse Com-Center (CC) began on 01 September 0030 and continued through the end of active hunting on 12 September. One IC PSO was on board the source vessel at all times. Calls to the CC were made every 6 hours, primarily by the Inupiaq Communicators and occasionally by a non-Inupiaq PSO or the boat Captain. Each call to the CC provided the position (latitude and longitude) of the *Peregrine* and *Maxime* and a brief description of planned activities. The first call was made at 0030 hours on 01 September. The last such call was made at 0000 hours on 12 September when it was confirmed hunting was complete. There is no indication that any of the CRD 3D 2014 Survey activities resulted in an impact to the subsistence resources of the local community.



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APPENDIX A

INCIDENTAL HARASSMENT AUTHORIZATION (NMFS) AND LETTER OF AUTHORIZATION (USFWS) ISSUED TO SAE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20810

Incidental Harassment Authorization

SAExploration, Inc. (SAE), 8240 Sandlewood Place, Anchorage, Alaska 99507, is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1371(a)(5)(D)) and 50 CFR 216.107 to take, by Level B harassment only, small numbers of marine mammals incidental to conducting open-water 3D ocean bottom node (OBN) seismic surveys in the U.S. Beaufort Sea, contingent upon the following conditions:

1. This Authorization is valid from August 25 through October 31, 2014.
2. This Authorization is valid only for activities associated with open-water 3D OBN seismic surveys and related activities in the Beaufort Sea. The specific areas where SAE's survey will be

conducted are within the Beaufort Sea, Alaska, as shown in Figure 1-1 of SAE's IHA application.

3. (a) The species authorized for incidental harassment takings, Level B harassment only, are: beluga whales (*Delphinapterus leucas*); bowhead whales (*Balaena mysticetus*); bearded seals (*Erignathus barbatus*); spotted seals (*Phoca largha*); and ringed seals (*P. hispida*).

The authorization for taking by harassment is limited to the following acoustic sources and from the following activities:

- (i) (i) 440-in³, 880-in³, and 1,760-in³ airgun arrays and other acoustic sources for 3D open-water seismic surveys; and

- (ii) Vessel activities related to open-water seismic surveys listed in (i).

(c) The taking of any marine mammal in a manner not explicitly authorized under this Authorization must be reported within 24 hours of the taking to the Alaska Regional Administrator (907-586-7221) or his designee in Anchorage (907-271-3023), National Marine Fisheries Service (NMFS) and the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, or her designee, at (301) 427-8401.

4. The holder of this Authorization must notify the Chief of the Permits and Conservation Division, Office of Protected Resources, at least 48 hours prior to the start of collecting seismic data (unless constrained by the date of issuance of this Authorization in which case notification shall be made as soon as possible).

5. Prohibitions

- (a) The taking, by incidental harassment only, is limited to the species listed under condition 3(a) above and by the numbers listed in Table 1 (attached). The taking by Level A harassment, injury, or death of these species or the taking by harassment, injury,



or death of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this Authorization.

(b) The taking of any marine mammal is prohibited whenever the required source vessel protected species observers (PSOs), required by condition 7(a)(i), are not onboard in conformance with condition 7(a)(i) of this Authorization.

6. Mitigation

(a) Establishing Exclusion and Disturbance Zones:

(i) Establish and monitor with trained PSOs preliminary exclusion zones for cetaceans surrounding the airgun array on the source vessel where the received level would be 180 dB (rms) re 1 μ Pa. For purposes of the field verification test, described in condition 7(e)(i), these radii are estimated to be 325, 494, and 842 m from the seismic source for the 440-in³, 880-in³, and 1,760-in³ airgun arrays, respectively.

(ii) Establish and monitor with trained PSOs preliminary exclusion zones for pinnipeds surrounding the airgun array on the source vessel where the received level would be 190 dB (rms) re 1 μ Pa. For purposes of the field verification test, described in condition 7(e)(i), these radii are estimated to be 126, 167, and 321 m from the seismic source for the 440-in³, 880-in³, and 1,760-in³ airgun arrays, respectively.

(iii) Establish zones of influence (ZOis) for cetaceans and pinnipeds surrounding the airgun array on the source vessel where the received level would be 160 dB (rms) re 1 μ Pa. For purposes of the field verification test described in condition 7(e)(i), these radii are estimated to be 1,330, 1,500, and 2,990 m from the seismic source for the 440-in³, 880-in³, and 1,760-in³ airgun arrays, respectively.

(iv) Immediately upon completion of data analysis of the field verification measurements required under condition 7(e)(i) below, the new 160-dB, 180-dB, and 190-dB marine mammal ZOis and exclusion zones shall be established based on the sound source verification and reported to NMFS.

(b) Vessel Movement Mitigation:

(i) Avoid concentrations or groups of whales by all vessels under the direction of SAE. Operators of support vessels should, at all times, conduct their activities at the maximum distance practicable from such concentrations of whales.

(ii) If any vessel approaches within 1.6 km (1 mi) of observed whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the whales by taking one or more of the following actions, as appropriate:

(A) Reducing vessel speed to less than 5 knots within 300 yards (900 feet or 274m) of the whale(s);

(B) Steering around the whale(s) if possible;



- (C) Operating the vessel(s) in such a way as to avoid separating members of a group of whales from other members of the group;
 - (D) Operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and
 - (E) Checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged.
- (iii) Reduce vessel speed to 5 knots when weather conditions require, such as when visibility drops, to avoid the likelihood of injury to whales.

(c) Mitigation Measures for Airgun Operations

(i) Ramp up:

(A) A ramp up, following a cold start, can be applied if the exclusion zone has been free of marine mammals for a consecutive 30-minute period. The entire exclusion zone must have been visible during these 30 minutes. If the entire exclusion zone is not visible, then ramp up from a cold start cannot begin.

(B) If a marine mammal(s) is sighted within the exclusion zone during the 30-minute watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the exclusion zone or the animal(s) is not sighted for at least 15-30 minutes: 15 minutes for pinnipeds, or 30 minutes for cetaceans.

(C) If, for any reason, electrical power to the airgun array has been discontinued for a period of 10 minutes or more, ramp-up procedures shall be implemented. If, and only if, the PSO watch has been suspended during that time, a 30-minute clearance of the exclusion

zone is required prior to commencing ramp-up. Discontinuation of airgun activity for less than 10 minutes does not require a ramp-up.

(D) The seismic operator and PSOs shall maintain records of the times when ramp ups start and when the airgun arrays reach full power.

(ii) Power-down/Shutdown:

(A) The airgun array shall be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable exclusion zone of the full array, but is outside the applicable exclusion zone of the single mitigation airgun.

(B) If a marine mammal is already within the exclusion zone when first detected, the airguns shall be powered down immediately.

(C) The airgun array shall be shut down when aggregations of bowhead whales or gray whales that appear to be engaged in non-migratory significant biological behavior (e.g., feeding, socializing) are observed within the 160-dB harassment zone around the seismic operations.

(D) Following a power-down, firing of the full airgun array shall not resume until the marine mammal has cleared the exclusion. The animal will be considered to have cleared the exclusion zone if it is visually observed to have left the exclusion zone of the full array, or has not been seen within the zone for 15 minutes for pinnipeds, or 30 minutes for cetaceans.

(E) If a marine mammal is sighted within or about to enter the 190 or



180 dB (rms) applicable exclusion zone of the single mitigation airgun, the airgun array shall be shutdown.

(F) Firing of the full airgun array or the mitigation gun shall not resume until the marine mammal has cleared the exclusion zone of the full array or mitigation gun, respectively. The animal will be considered to have cleared the exclusion zone as described above under ramp up procedures.

(G) Whenever aggregations of 12 or more bowhead or gray whales appear to be engaged in non-migratory behavior (e.g. feeding, socializing), or bowhead whale cow/calf pairs are observed within the 160 dB harassment zone around the seismic activity, the seismic operation will not commence or will shut down if operating.

(iii) Poor Visibility Conditions:

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(A) If during foggy conditions, heavy snow or rain, or darkness, the full 180 dB exclusion zone is not visible, the airguns cannot commence a ramp-up procedure from a full shut-down.

(B) If one or more airguns have been operational before nightfall or before the onset of poor visibility conditions, they can remain operational throughout the night or poor visibility conditions. In this case ramp-up procedures can be initiated, even though the exclusion zone may not be visible, on the assumption that marine mammals will be alerted by the sounds from the single airgun and have moved away.

(iv) Use of a Small-Volume Airgun during Turns and Transits

(A) Throughout the seismic survey, during turning movements and short transits, SAE will employ the use of the smallest volume airgun (i.e., "mitigation airgun") to deter marine mammals from being within the immediate area of the seismic operations. The mitigation airgun would be operated at approximately one shot per minute and would not be operated for longer than three hours in duration (turns may last two to three hours for the proposed project).

(B) During turns or brief transits (e.g., less than three hours) between seismic tracklines, one mitigation airgun will continue operating. The ramp-up procedure will still be followed when increasing the source levels from one airgun to the full airgun array. However, keeping one airgun firing during turns and brief transits will allow SAE to resume seismic surveys using the full array without having to ramp up from a "cold start," which requires a 30-minute observation period of the full exclusion zone and is prohibited during darkness or other periods of poor visibility. PSOs will be on duty whenever the airguns are firing during daylight, during the 30 minute periods prior to ramp ups.

(d) Mitigation Measures for Subsistence Activities:

(i) For the purposes of reducing or eliminating conflicts between subsistence whaling activities and SAE's survey program, the holder of this Authorization will participate with other operators in the Communication and Call Centers (Com-Center) Program. Com-Centers will be operated to facilitate



communication of information between SAE and subsistence whalers. The ComCenters will be operated 24 hours/day during the 2014 fall subsistence bowhead whale hunt.

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(ii) All vessels shall report to the appropriate Com-Center at least once every six hours, commencing each day with a call at approximately 06:00 hours.

(iii) The appropriate Com-Center shall be notified if there is any significant change in plans. The appropriate Com-Center also shall be called regarding any unsafe or unanticipated ice conditions.

(iv) Upon notification by a Com-Center operator of an at-sea emergency, the holder of this Authorization shall provide such assistance as necessary to prevent the loss of life, if conditions allow the holder of this Authorization to safely do so.

(v) SAE shall monitor the positions of all of its vessels and exercise due care in avoiding any areas where subsistence activity is active.

(vi) Routing barge and transit vessels:

(A) Vessels transiting in the Beaufort Sea east of Bullen Point to the Canadian border shall remain at least 5 miles offshore during transit along the coast, provided ice and sea conditions allow. During transit in the Chukchi Sea, vessels shall remain as far offshore as weather and ice conditions allow, and at all times at least 5 miles offshore.

(B) From August 31 to October 31, vessels in the Chukchi Sea or Beaufort Sea shall remain at least 20 miles offshore of the coast of Alaska from Icy Cape in the Chukchi Sea to Pitt Point on the east side of Smith Bay in the Beaufort Sea, unless ice conditions or an emergency that threatens the safety of the vessel or crew prevents compliance with this requirement. This condition shall not apply to vessels actively engaged in transit to or from a coastal community to conduct crew changes or logistical support operations.

(C) Vessels shall be operated at speeds necessary to ensure no physical contact with whales occurs, and to make any other potential conflicts with bowheads or whalers unlikely. Vessel speeds shall be less than 10 knots in the proximity of feeding whales or whale aggregations.

(D) If any vessel inadvertently approaches within 1.6 kilometers (1 mile) of observed whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the whales by taking one or more of the following actions, as appropriate:

- o reducing vessel speed to less than 5 knots within 900 feet of the whale(s);

- o steering around the whale(s) if possible;

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7. Monitoring

- o operating the vessel(s) in such a way as to avoid separating members of a group of whales from other members of the group;

- o operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and

- o checking the waters immediately adjacent to the vessel(s)



to ensure that no whales will be injured when the propellers are engaged.

(vii) Limitation on seismic surveys in the Beaufort Sea

(A) Kaktovik: No seismic survey from the Canadian Border to the Canning River from August 25 to close of the fall bowhead whale hunt in Kaktovik and Nuiqsut. From August 10 to August 25, SAE will communicate and collaborate with the Alaska Eskimo Whaling Commission (AEWC) on any planned vessel movement in and around Kaktovik and Cross Island to avoid impacts to whale hunting.

(B) Nuiqsut:

o Pt. Storkerson to Thetis Island: No seismic survey prior to July 25 inside the Barrier Islands. No seismic survey from August 25 to close of fall bowhead whale hunting outside the Barrier Island in Nuiqsut.

o Canning River to Pt. Storkerson: No seismic survey from August 25 to the close of bowhead whale subsistence hunting in Nuiqsut.

(C) Barrow: No seismic survey from Pitt Point on the east side of Smith Bay to a location about half way between Barrow and Peard Bay from September 15 to the close of the fall bowhead whale hunt in Barrow.

(viii) SAE shall complete operations in time to allow such vessels to complete transit through the Bering Strait to a point south of 59 degrees North latitude no later than November 15, 2014. Any vessel that encounters weather or ice that will prevent compliance with this date shall coordinate its transit through the Bering Strait to a point south of 59 degrees North latitude with the appropriate ComCenters. SAE vessels shall, weather and ice permitting, transit east of St. Lawrence Island and no closer than 10 miles from the shore of St. Lawrence Island.

(a) Vessel-based Visual Monitoring:

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(i) Vessel-based visual monitoring for marine mammals shall be conducted by NMFS-approved protected species observers (PSOs) throughout the period of survey activities.

(ii) PSOs shall be stationed aboard the seismic survey vessels and mitigation vessel through the duration of the surveys.

(iii) A sufficient number of PSOs shall be on board the survey vessel to meet the following criteria:

(A) 100% monitoring coverage during all periods of survey operations in daylight;

(B) maximum of 4 consecutive hours on watch per PSO; and

(C) maximum of 12 hours of watch time per day per PSO.

(iv) The vessel-based marine mammal monitoring shall provide the basis for real-time mitigation measures as described in (6)(c) above.

(v) Results of the vessel-based marine mammal monitoring shall be used to calculate the estimation of the number of "takes" from the marine surveys and equipment recovery and maintenance program.



(b) Protected Species Observers and Training

(i) PSO teams shall consist of Inupiat observers and NMFS-approved field biologists.

(ii) Experienced field crew leaders shall supervise the PSO teams in the field. New PSOs shall be paired with experienced observers to avoid situations where lack of experience impairs the quality of observations.

(iii) Crew leaders and most other biologists serving as observers in 2014 shall be individuals with experience as observers during recent seismic or shallow hazards monitoring projects in Alaska, the Canadian Beaufort, or other offshore areas in recent years.

(iv) Resumes for PSO candidates shall be provided to NMFS for review and acceptance of their qualifications. Inupiat observers shall be experienced in the region and familiar with the marine mammals of the area.

(v) All observers shall complete a NMFS-approved observer training course designed to familiarize individuals with monitoring and data collection procedures. The training course shall be completed before the anticipated start of the 2014 open-water season. The training session(s) shall be conducted by

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qualified marine mammalogists with extensive crew-leader experience during previous vessel-based monitoring programs.

(vi) Training for both Alaska native PSOs and biologist PSOs shall be conducted at the same time in the same room. There shall not be separate training courses for the different PSOs.

(vii) Crew members should not be used as primary PSOs because they have other duties and generally do not have the same level of expertise, experience, or training as PSOs, but they could be stationed on the fantail of the vessel to observe the near field, especially the area around the airgun array, and implement a power-down or shutdown if a marine mammal enters the safety zone (or exclusion zone).

(viii) If crew members are to be used as PSOs, they shall go through some basic training consistent with the functions they will be asked to perform. The best approach would be for crew members and PSOs to go through the same training together.

(ix) PSOs shall be trained using visual aids (e.g., videos, photos), to help them identify the species that they are likely to encounter in the conditions under which the animals will likely be seen.

(x) SAE shall train its PSOs to follow a scanning schedule that consistently distributes scanning effort according to the purpose and need for observations. All PSOs should follow the same schedule to ensure consistency in their scanning efforts.

(xi) PSOs shall be trained in documenting the behaviors of marine mammals. PSOs should record the primary behavioral state (i.e., traveling, socializing, feeding, resting, approaching or moving away from vessels) and relative location of the observed marine mammals.

(c) Marine Mammal Observation Protocol

(i) PSOs shall watch for marine mammals from the best available vantage point on the survey vessels, typically the bridge.



(ii) Observations by the PSOs on marine mammal presence and activity shall begin a minimum of 30 minutes prior to the estimated time that the seismic source is to be turned on and/or ramped-up. Monitoring shall continue during the airgun operations and last until 30 minutes after airgun array stops firing.

(iii) For comparison purposes, PSOs shall also document marine mammal occurrence, density, and behavior during at least some periods when airguns are not operating

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(iv) PSOs shall scan systematically with the unaided eye and 7 x 50 reticle binoculars, supplemented with 20 x 60 image-stabilized binoculars or 25 x 150 binoculars, and night-vision equipment when needed.

(v) Personnel on the bridge shall assist the marine mammal observer(s) in watching for marine mammals.

(vi) PSOs aboard the marine survey vessel shall give particular attention to the areas within the marine mammal exclusion zones around the source vessel, as noted in (6)(a)(i) and (ii). They shall avoid the tendency to spend too much time evaluating animal behavior or entering data on forms, both of which detract from their primary purpose of monitoring the exclusion zone.

(vii) Monitoring shall consist of recording of the following information:

(A) the species, group size, age/size/sex categories (if determinable), the general behavioral activity, heading (if consistent), bearing and distance from seismic vessel, sighting cue, behavioral pace, and apparent reaction of all marine mammals seen near the seismic vessel and/or its airgun array (e.g., none, avoidance, approach, paralleling, etc);

(B) the time, location, heading, speed, and activity of the vessel (shooting or not), along with sea state, visibility, cloud cover and sun glare at (I) any time a marine mammal is sighted (including pinnipeds hauled out on barrier islands), (II) at the start and end of each watch, and (III) during a watch (whenever there is a change in one or more variable);

(C) the identification of all vessels that are visible within 5 km of the seismic vessel whenever a marine mammal is sighted and the time observed;

(D) any identifiable marine mammal behavioral response (sighting data should be collected in a manner that will not detract from the PSO's ability to detect marine mammals);

(E) any adjustments made to operating procedures; and

(F) visibility during observation periods so that total estimates of take can be corrected accordingly.

(vii) Distances to nearby marine mammals will be estimated with binoculars (7 x 50 binoculars) containing a reticle to measure the vertical angle of the line of sight to the animal relative to the horizon. Observers may use a laser rangefinder to test and improve their abilities for visually estimating distances to objects in the water.

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(viii) PSOs shall understand the importance of classifying marine mammals as "unknown" or "unidentified" if they cannot identify the animals to species with



confidence. In those cases, they shall note any information that might aid in the identification of the marine mammal sighted. For example, for an unidentified mysticete whale, the observers should record whether the animal had a dorsal fin.

(ix) Additional details about unidentified marine mammal sightings, such as "blow only," mysticete with (or without) a dorsal fin, "seal splash," etc., shall be recorded.

(x) When a marine mammal is seen approaching or within the exclusion zone applicable to that species, the marine survey crew shall be notified immediately so that mitigation measures described in (6) can be promptly implemented.

(xi) SAE shall use the best available technology to improve detection capability during periods of fog and other types of inclement weather. Such technology might include night-vision goggles or binoculars as well as other instruments that incorporate infrared technology.

(d) Field Data-Recording and Verification

(i) PSOs aboard the vessels shall maintain a digital log of seismic surveys, noting the date and time of all changes in seismic activity (ramp-up, power-down, changes in the active seismic source, shutdowns, etc.) and any corresponding changes in monitoring radii in a software spreadsheet.

(ii) PSOs shall utilize a standardized format to record all marine mammal observations and mitigation actions (seismic source power-downs, shut-downs, and ramp-ups).

(iii) Information collected during marine mammal observations shall include the following:

(A) Vessel speed, position, and activity

(B) Date, time, and location of each marine mammal sighting

(C) Number of marine mammals observed, and group size, sex, and age categories

(D) Observer's name and contact information

(E) Weather, visibility, and ice conditions at the time of observation

(F) Estimated distance of marine mammals at closest approach

(G) Activity at the time of observation, including possible attractants present

(H) Animal behavior

(I) Description of the encounter

(J) Duration of encounter

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(K) Mitigation action taken

(iv) Data shall be recorded directly into handheld computers or as a back-up, transferred from hard-copy data sheets into an electronic database.

(v) A system for quality control and verification of data shall be facilitated by the pre-season training, supervision by the lead PSOs, and in-season data checks, and shall be built into the software.

(vi) Computerized data validity checks shall also be conducted, and the data shall be managed in such a way that it is easily summarized during and after the field program and transferred into statistical, graphical, or other programs for further processing.



(e) Passive Acoustic Monitoring

(i) Sound Source Measurements: Using a hydrophone system, the holder of this Authorization is required to conduct sound source verification tests for seismic airgun array(s) and other marine survey equipment that are involved in the open-water seismic surveys.

(A) Sound source verification shall consist of distances where broadside and endfire directions at which broadband received levels reach 190, 180, 170, 160, and 120 dB (rms) re 1 μ Pa for the airgun array(s). The configurations of airgun arrays shall include at least the full array and the operation of a single source that will be used during power downs.

(B) The test results shall be reported to NMFS within 5 days of completing the test.

(ii) Passive Acoustic Monitoring (PAM)

(A) Starting at least 24 hour before and until at least 24 hour after the seismic survey, SAE shall conduct passive acoustic monitoring using fixed hydrophone(s) located at the west, north, and east of the survey area to:

(I) collect information on the occurrence and distribution of marine mammals (including beluga whale, bowhead whale, walrus, and other species) that may be available to subsistence hunters near villages located on the Beaufort Sea coast and to document their relative abundance, habitat use, and migratory patterns; and

(II) measure the ambient soundscape throughout the Beaufort Sea coast and to record received levels of sounds from industry and other activities.

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(f) Spotted Seal Haulout Monitoring

(i) SAE shall conduct a biweekly boat-based survey of spotted seals before, during, and after the seismic survey, to identify where seals haul out in the action area.

(ii) The survey will begin at the village of Nuiqsut and follow the far west channel of the Colville River, survey all the outer islands of the river delta, and then return to Nuiqsut following the farthest east river channel.

(iii) All seals will be identified to species, and GPS location and whether the animals were hauled out or in the water will be noted. Collected data will be combined with available traditional knowledge and historical information to determine whether there are locations of consistent seal haulout use that might be affected by the seismic survey.

(iv) If sites of suspected high use are found, SAE shall contact NMFS and the North Slope Borough Department of Wildlife to identify additional mitigation measures to minimize impacts to these sites.

(g) SAE shall engage in consultation and coordination with other oil and gas companies and with federal, state, and borough agencies to ensure that they have the most up-to-date information and can take advantage of other monitoring efforts.

8. Data Analysis and Presentation in Reports

(a) Estimation of potential takes or exposures shall be improved for times with low visibility (such as during fog or darkness) through interpolation or possibly using a



probability approach. Those data could be used to interpolate possible takes during periods of restricted visibility.

(b) SAE shall provide a database of the information collected, plus a number of summary analyses and graphics to help NMFS assess the potential impacts of SAE's survey.

Specific summaries/analyses/graphics would include:

- (i) sound verification results, including isopleths of sound pressure levels plotted geographically;
- (ii) a table or other summary of survey activities (i.e., did the survey proceed as planned);
- (iii) a table of sightings by time, location, species, and distance from the survey vessel;
- (iv) a geographic depiction of sightings for each species by area and month;
- (v) a table and/or graphic summarizing behaviors observed by species;
- (vi) a table and/or graphic summarizing observed responses to the survey by species;
- (vii) a table of mitigation measures (e.g., power-downs, shutdowns) taken by date, location, and species;
- (viii) a graphic of sightings by distance for each species and location;
- (ix) a table or graphic illustrating sightings during the survey versus sightings when the airguns were silent; and
- (x) a summary of times when the survey was interrupted because of interactions with marine mammals.

(c) To help evaluate the effectiveness of PSOs and more effectively estimate take, if appropriate data are available, SAE shall perform analysis of sightability curves (detection functions) for distance-based analyses.

(d) SAE shall collaborate with other industrial operators in the area to integrate and synthesize monitoring results as much as possible (such as submitting "sightings" from their monitoring projects to an online data archive, such as OBIS-SEAMAP) and archive and make the complete databases available upon request.

9 Reporting

(a) Sound Source Verification Report: A report on the preliminary results of the sound source verification measurements, including the measured 190, 180, 160, and 120 dB (rms) radii of the airgun sources and other acoustic survey equipment, shall be submitted within 14 days after collection of those measurements at the start of the field season. This report will specify the distances of the exclusion zones that were adopted for the survey.

(b) Throughout the survey program, PSOs shall prepare a report each day, or at such other interval as is necessary, summarizing the recent results of the monitoring program. The reports shall summarize the species and numbers of marine mammals sighted. These reports shall be provided to NMFS.

(c) Seismic Vessel Monitoring Program: A draft report will be submitted to the Director, Office of Protected Resources, NMFS, within 90 days after the end of SAE's 2014 open-water seismic surveys in the Beaufort Sea. The report will describe in detail:

- (i) summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state



- and other factors affecting visibility and detectability of marine mammals);
- (ii) summaries that represent an initial level of interpretation of the efficacy, measurements, and observations, rather than raw data, fully processed analyses, or a summary of operations and important observations;
 - (iii) summaries of all mitigation measures (e.g., operational shutdowns if they occur) and an assessment of the efficacy of the monitoring methods;
 - (iv) analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);
 - (v) species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;
 - (vi) data analysis separated into periods when an airgun array (or a single airgun) is operating and when it is not, to better assess impacts to marine mammals -the final and comprehensive report to NMFS should summarize and plot:
 - (A) data for periods when a seismic array is active and when it is not; and
 - (B) the respective predicted received sound conditions over fairly large areas (tens of km) around operations;
 - (vii) sighting rates of marine mammals during periods with and without airgun activities (and other variables that could affect detectability), such as:
 - (A) initial sighting distances versus airgun activity state;
 - (B) closest point of approach versus airgun activity state;
 - (C) observed behaviors and types of movements versus airgun activity state;
 - (D) numbers of sightings/individuals seen versus airgun activity state;
 - (E) distribution around the survey vessel versus airgun activity state;
 - and
 - (F) estimates of take by harassment;
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 - (viii) reported results from all hypothesis tests, including estimates of the associated statistical power, when practicable;
 - (ix) estimates of uncertainty in all take estimates, with uncertainty expressed by the presentation of confidence limits, a minimum-maximum, posterior probability distribution, or another applicable method, with the exact approach to be selected based on the sampling method and data available;
 - (x) A clear comparison of authorized takes and the level of actual estimated takes; and
 - (xi) A complete characterization of the acoustic footprint resulting from various activity states.
- (d) The draft report shall be subject to review and comment by NMFS. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS. The draft report will be considered the final report for this activity under this Authorization if NMFS has not provided comments and recommendations within 90 days of receipt of the draft report.
10. (a) In the unanticipated event that survey operations clearly cause the take of a marine



mammal in a manner not authorized by this Authorization, such as an injury (Level A harassment), serious injury, or mortality (e.g., ship-strike, gear interaction, and/or entanglement), SAE shall immediately cease survey operations and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and Shane.Guan@noaa.gov and the Alaska Regional Stranding Coordinators (Aleria.Jensen@noaa.gov and Barbara.Mahoney@noaa.gov). The report must include the following information:

- (i) time, date, and location (latitude/longitude) of the incident;
- (ii) the name and type of vessel involved;
- (iii) the vessel's speed during and leading up to the incident;
- (iv) description of the incident;
- (v) status of all sound source use in the 24 hours preceding the incident;
- (vi) water depth;
- (vii) environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
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- (viii) description of marine mammal observations in the 24 hours preceding the incident;
- (ix) species identification or description of the animal(s) involved;
- (x) the fate of the animal(s); and
- (xi) photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with SAE to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMP A compliance. SAE may not resume their activities until notified by NMFS via letter, email, or telephone.

(b) In the event that SAE discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), SAE will immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Jolie.Harrison@noaa.gov and Shane.Guan@noaa.gov and the NMFS Alaska Stranding Hotline (1-877-925-7773) and/or by email to the Alaska Regional Stranding Coordinators (Aleria.Jensen@noaa.gov and Barbara.Mahoney@noaa.gov). The report must include the same information identified in Condition 10(a) above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with SAE to determine whether modifications in the activities are appropriate.

(c) In the event that SAE discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in Condition 3 of this Authorization (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), SAE shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Jolie.Harrison@noaa.gov and Shane.Guan@noaa.gov and the NMFS Alaska Stranding Hotline (1-877-925-7773) and/or by email to the Alaska Regional Stranding Coordinators (Aleria.Jensen@noaa.gov and Barbara.Mahoney@noaa.gov), within 24 hours of the discovery. SAE shall provide photographs or video footage (if available) or other documentation of the stranded animal



sighting to NMFS and the Marine Mammal Stranding Network. SAE can continue its operations under such a case.

11. Activities related to the monitoring described in this Authorization do not require a separate

scientific research permit issued under section 104 of the Marine Mammal Protection Act.

12. The Plan of Cooperation, outlining the steps that will be taken to cooperate and communicate with the native communities to ensure the availability of marine mammals for subsistence uses, must be implemented.

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13. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by

the conditions prescribed herein, if the authorized taking is having more than a negligible impact

on the species or stock of affected marine mammals, or if there is an unmitigable adverse impact

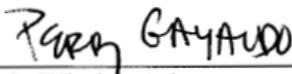
on the availability of such species or stocks for subsistence uses.

14. A copy of this Authorization and the Incidental Take Statement must be in the possession of

each seismic vessel operator taking marine mammals under the authority of this Incidental Harassment Authorization.

15. SAE is required to comply with the Terms and Conditions of the Incidental Take Statement

corresponding to NMFS' Biological Opinion.

for


 Donna S. Wieting, Director
 Office of Protected Resources
 National Marine Fisheries Service

AUG 21 2014
 Date

Table 1. Species/stocks and numbers of marine mammals allowed to be taken incidental to activities conducted under this IHA.

Species / Stocks	Take Allowed
Bowhead whale / Bering-Chukchi-Beaufort Sea	131
Beluga whale / Beaufort Sea or Eastern Chukchi Sea	40
Ringed seal / Alaska	638
Bearded seal / Alaska	32
Spotted seal / Alaska	32



APPENDIX B

CONFLICT AVOIDANCE AGREEMENT

2014 CAA FINAL FOR SIGNATURE

**2014 OPEN WATER SEASON
PROGRAMMATIC CONFLICT AVOIDANCE
AGREEMENT
BETWEEN
BP EXPLORATION (ALASKA), INC.
ENI US OPERATING CO INC.
EXXON MOBIL CORPORATION
GX TECHNOLOGY CORP.
CAELUS ENERGY ALASKA
SAExploration
SHELL OFFSHORE, INC
TGS-NOPEC Geophysical Company
AND
THE ALASKA ESKIMO WHALING COMMISSION
THE BARROW WHALING CAPTAINS' ASSOCIATION
THE GAMBELL WHALING CAPTAINS' ASSOCIATION
THE KAKTOVIK WHALING CAPTAINS' ASSOCIATION
THE KIVALINA WHALING CAPTAINS' ASSOCIATION
THE LITTLE DIOMEDE WHALING CAPTAINS'
ASSOCIATION
THE NUIQSUT WHALING CAPTAINS' ASSOCIATION
THE PT. HOPE WHALING CAPTAINS' ASSOCIATION
THE PT. LAY WHALING CAPTAINS' ASSOCIATION
THE SAVOONGA WHALING CAPTAINS' ASSOCIATION
THE WAINWRIGHT WHALING CAPTAINS' ASSOCIATION
THE WALES WHALING CAPTAINS' ASSOCIATION**



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TITLE I – GENERAL PROVISIONS

SECTION 101. APPLICATION.

Title I applies to all Participants, except as provided in Title VI.

Title II applies to all Participants, except as provided in Titles III or VI.

Title III applies to those Participants who operate barge or transit vessels in the Beaufort Sea or Chukchi Sea.

Titles IV and V apply only to those Participants who engage in oil and gas operations, except as provided in Title VI.

Title VI applies to those Participants who engage exclusively in geophysical activities that are conducted at least 5 miles or more from the Alaska coast in the Beaufort Sea or Chukchi Sea and begin on or after October 1, 2014.

Provisions that apply to a specific activity or are designated as specific to either the Beaufort Sea or Chukchi Sea apply only to Participants that engage in that activity or operate in that area, and provisions applicable to activities a Participant does not engage in or areas in which a Participant does not operate do not apply to that Participant.

SECTION 102. PURPOSE.

The purpose of this Agreement is to provide:

- (1) Equipment and procedures for communications between Subsistence Participants and Industry Participants;
- (2) Avoidance guidelines and other mitigation measures to be followed by the Industry Participants working in or transiting the vicinity of active subsistence hunters, in areas where subsistence hunters anticipate hunting, or in areas that are in sufficient proximity to areas expected to be used for subsistence hunting that the planned activities could potentially adversely affect the subsistence bowhead whale hunt through effects on bowhead whales;
- (3) Measures to be taken in the event of an emergency occurring during the term of this Agreement; and
- (4) Dispute resolution procedures.



SECTION 103. DEFINITIONS.**(a) Defined Terms.**

For the purposes of this Agreement:

- (1) The term “Agreement” means this 2014 Open Water Season Programmatic Conflict Avoidance Agreement and any attachments to such agreement.
- (2) The term “at-sea oil and gas operations” does not include gravel islands or fixed platform developments located near shore (for example Northstar or Oooguruk) or Near Shore Operations Support Vessels.
- (3) The term “barge” means a non-powered vessel that is pushed or towed, and the accompanying pushing or towing vessel, which is used solely to transport materials through the Beaufort Sea or Chukchi Sea. Such term does not include any vessel used to provide supplies or support to at-sea oil and gas operations or Near Shore Operations Support Vessels.
- (4) The term “Com-Center” means a communications systems coordination center established under Section 203.
- (5) The term “geophysical activity” means any activity the purpose of which is to gather data for imaging the marine subsurface environment, including but not limited to use of air guns, sonar, and other geophysical equipment used for seismic exploration or shallow hazard identification. “Geophysical activity” does not include support vessels that are not actively employing geophysical equipment, or other supporting activities that do not generate sound waves for the purposes of imaging the subsurface marine environment.
- (6) The term “geophysical equipment” means equipment, such as air gun arrays over 300 cubic inches or sparker arrays over 20,000 kJ, employed on a vessel or a towed array, that generates sound waves for the purpose of imaging the subsurface marine environment for exploration and development purposes. The term does not include vessel engines, generators, or sources such as fathometers, fish finders, side-scan sonar, or other sources intended for engineering and /or transportation purposes.
- (7) The term “Industry Participants” means all parties to this Agreement who are not Subsistence Participants.
- (8) The term “Marine Mammal Observer / Inupiat Communicator” or “MMO/IC” means an observer hired by an Industry Participant for the purpose of spotting and identifying marine mammals in the area of that Industry Participant’s operations during the Open Water Season. The MMO/IC also serves as the on-board Inupiat communicator who can communicate directly with whaling crews.¹
¹ Following the 2013 CAA meeting, a request was put in to change the title of MMO/IC to “Protected Species Observer,” to make the term consistent with the terminology used by the National Science Foundation. The AEWG will raise this suggestion during the 2014 CAA meeting.
- (9) The term “Near Shore Operations Support Vessels” means vessels (including aircraft) used to support related activities (such as supply, re-supply, crew movement, and facility maintenance) for near shore oil and gas operations by an Industry Participant.
- (10) The terms “NSB” and “NSB DWM” mean the North Slope Borough and the North Slope Borough Department of Wildlife Management, respectively.
- (11) The term “oil and gas operations” means all oil and gas exploration, development, or production activities (including, but not limited to, geophysical activity, exploratory drilling, development activities (such as dredging or construction), production drilling, or production, and related activities (such as



supply, re-supply, crew movements, and facility maintenance) by or for any Industry Participant, including aircraft and vessels of whatever kind used in support of such activities, occurring in the Beaufort Sea or Chukchi Sea, whether occurring near shore or offshore, but does not include barge traffic, transit vessel traffic, cable laying vessel traffic, or research vessel traffic (i.e. traffic by a vessel which is only conducting research and is not conducting any geophysical activities) by or for any Participant.

(12) The term “Open Water Season” means the period of the year when ice conditions permit navigation or oil and gas operations to occur in the Beaufort Sea or Chukchi Sea, as appropriate.

(13) The term “Participants” means all parties identified in this Agreement by name and whose representative(s) has signed the Agreement, and all contractors of such parties. When used alone the term includes both Industry Participants and Subsistence Participants.

(14) The term “Primary Sound Source Vessel” means a vessel owned or operated by or for an Industry Participant that (A) employs air gun arrays greater than 300 cubic inches or sparkers greater than 20,000 kJ, for imaging the subsurface environment, (B) is used to monitor any safety zone around a vessel described in subsection (A), (C) is engaged in ice-breaking, or (D) is the lead vessel in a group of barge or transit vessels.

(15) The term “sonar” means equipment, employed as hull mounted or towed array, intended for the active location of surface or underwater vessels. The term does not include vessel engines, generators, or sources such as fathometers, fish finders, side-scan sonar, or other sources intended for engineering, cable laying or routing, and/or transportation purposes.

(16) The term “Subsistence Participants” means the Alaska Eskimo Whaling Commission (AEWC) and its members, including the whaling captains’ associations identified on the cover of this Agreement, as well as any individual members of those associations.

(17) The term “transit vessel” means a powered vessel that is used solely to transport materials through the Beaufort Sea or Chukchi Sea. Such term does not include a vessel used to provide supplies or other support to at-sea oil and gas operations or Near Shore Operations Support Vessels.

(b) Geographically Limited Terms.

For the purposes of this Agreement:

(1) The term “Beaufort Sea” means all waters off the northern coast of Alaska from Point Barrow to the Canadian border.

(2) The term “Chukchi Sea” means all waters off the western and northern coasts of Alaska from Cape Prince of Wales to Point Barrow.



SECTION 104. TERMS, SCOPE, AND LIMITATIONS.**(a) Term.**

The term of this Agreement shall commence with the signing of this document by the Participants and shall terminate upon completion of the Nuiqsut, Kaktovik, Barrow, Wainwright, Pt Lay, and Pt. Hope Fall Bowhead Hunts or the Beaufort Sea Post Season Meeting required under Section 108(a) and Chukchi Sea Post-Season Meetings in Barrow, Wainwright, Pt. Lay, and Pt. Hope required under Section 108(b), whichever is later.

(b) Scope.

The Participants agree that, unless otherwise specified:

(1) The mitigation measures identified in this Agreement, which are intended to mitigate interference by oil and gas operations and barge and transit vessel traffic with the Alaskan Eskimo subsistence bowhead whale hunt, are designed to apply to all activities of each Participant during the 2014 Open Water Season, whether referenced specifically or by category, and to all vessels and locations covered by this Agreement, whether referenced specifically or by category.

(2) This Agreement is intended to apply to all oil and gas operations and barge and transit vessel traffic during the 2014 Open Water Season in the Beaufort Sea or Chukchi Sea.

(3) Vessels and locations covered by this Agreement include those identified in the Agreement, as well as any other vessels or locations that are employed by or for the Industry Participants in the Beaufort Sea or Chukchi Sea during the 2014 Open Water Season.

(c) Limitations of Obligations.

The following limitations apply to this Agreement.

(1) No cooperation among the Participants, other than that required by this Agreement, is intended or otherwise implied by their adherence to this Agreement. In no event shall the signatures of any representative of the Alaska Eskimo Whaling Commission (AEWC), or of the Barrow, Nuiqsut, Kaktovik, Wainwright, Pt. Hope, or Pt. Lay Whaling Captains' Associations, or of any other Whaling Captains' Association be taken as an endorsement of any Arctic operations or Beaufort Sea or Chukchi Sea OCS operations by any oil and/or gas operator or contractor. 8

(2) Adherence to the procedures and guidelines set forth in this Agreement does not in any way indicate that any Inupiat or Siberian Yupik whalers or the AEWC agree that industrial activities are not interfering with the bowhead whale migration or the bowhead whale subsistence hunt. Such adherence does not represent an admission on the part of the Industry Participants or their contractors that the activities covered by this Agreement will interfere with the bowhead whale migration or the bowhead whale subsistence hunt.

(3) No member of the oil and gas industry or any contractor has the authority to impose restrictions on the subsistence hunting of bowhead whales or associated activities of the AEWC, residents of the Villages of Nuiqsut, Kaktovik, Barrow, Wainwright, Pt. Lay, or Pt. Hope, or residents of any other village represented by the AEWC.

(4) In the event additional parties engage in oil and gas operations in the Beaufort Sea or Chukchi Sea during the summer or fall of 2014 the Participants shall exercise their good-faith efforts to encourage those parties to enter into this Agreement.

Should additional parties enter into this Agreement at a date subsequent to the date



of the signing of this document and before the termination of the 2014 bowhead whale subsistence hunting season, the AEWG will provide to all Participants a supplement to this document with the added signatures.

(5) No Participant is responsible for enlisting additional parties to adhere to the terms and conditions of the Agreement. Similarly, **THE AEWG IS NOT RESPONSIBLE FOR, OR A PARTY TO, ANY AGREEMENT AMONG THE INDUSTRY PARTICIPANTS** concerning the apportionment of expenses necessary for the implementation of this Agreement.

(6) In adhering to this Agreement, none of the Participants waives any rights existing at law. All Participants agree that the provisions of this document do not establish any precedent as between them or with any regulatory or permitting authority.

(7) **PARTICIPANTS' OBLIGATIONS SHALL BE SEPARABLE:** All Participants to this Agreement understand that each Participant represents a separate entity. The failure of any Participant to adhere to this Agreement or to abide by the terms and conditions of this Agreement shall not affect the obligation of other Participants to adhere to this Agreement and to proceed accordingly with all activities covered by this Agreement. Nor shall any Participant's adherence to this Agreement affect that Participant's duties, liabilities, or other obligations with respect to any other Participant beyond those stated in this Agreement. If an Industry Participant does not receive permit approvals from regulatory agencies to conduct its proposed activities, then that company may withdraw from this Agreement.

SECTION 105. REGULATORY COMPLIANCE.

(a) United States Coast Guard Requirements.

The Participants shall comply with all applicable United States Coast Guard requirements for safety, navigation, and notice.

(b) Environmental Regulations and Statutes.

The Participants shall comply with all applicable environmental regulations and statutes.

(c) Other Regulatory Requirements.

The Participants shall comply with all applicable federal, state, and local government requirements.

SECTION 106. DISPUTE RESOLUTION.

Subject to the terms of Section 104(c)(7) of this Agreement, all disputes arising between any Industry Participants and any Subsistence Participants shall be addressed as follows:

(1) The dispute shall first be addressed between the affected Participant(s) in consultation with the affected village Whaling Captains' Association and the Industry Participant(s)' Local Representative.

(2) If the dispute cannot be resolved to the satisfaction of all affected Participants, then the dispute shall be addressed with the affected Participants in consultation with the AEWG.

(3) If the dispute cannot be satisfactorily resolved in accordance with paragraphs (1) and (2) above, then the dispute shall be addressed with the AEWG and the affected Participants in consultation with representatives of NOAA Fisheries.

(4) All Participants shall seek to resolve any disputes in a timely manner, and shall work to ensure that requests for information or decisions are responded to promptly.



SECTION 107. EMERGENCY AND OTHER NECESSARY ASSISTANCE.**(a) Emergency Communications.**

ALL VESSELS SHOULD NOTIFY THE APPROPRIATE COM-CENTER IMMEDIATELY IN THE EVENT OF AN EMERGENCY. The appropriate Com-Center operator will notify the nearest vessels and appropriate search and rescue authorities of the problem and advise them regarding necessary assistance. (See attached listing of local search and rescue organizations in Attachment I.)

(b) Emergency Assistance for Subsistence Whale Hunters.

Section 403 of Public Law 107-372 (16 U.S.C. 916c note) provides that "Notwithstanding any provision of law, the use of a vessel to tow a whale, taken in a traditional sub-sistence whale hunt permitted by Federal law and conducted in waters off the coast of Alaska is authorized, if such towing is performed upon a request for emergency assistance made by a subsistence whale hunting organization formally recognized by an agency of the United States government, or made by a member of such an organization, to prevent the loss of a whale." Industry Participants will advise their vessel captains that, under the circumstances described above, assistance to tow a whale is permitted under law when requested by a Subsistence Participant. Under the circumstances described above, Industry Participants will provide such assistance upon a request for emergency assistance from a Subsistence Participant, if conditions permit the Industry Participant's vessel to safely do so.

SECTION 108. POST-SEASON REVIEW / PRESEASON INTRODUCTION.**(a) Beaufort Sea Post-Season Joint Meeting.**

Following the end of the fall 2014 bowhead whale subsistence hunt and prior to the 2015 Pre-Season Introduction Meetings, the Industry Participant that establishes the Deadhorse and Kaktovik Com Centers will offer to the AEW/C Chairman to host a joint meeting with all whaling captains of the Villages of Nuiqsut, Kaktovik and Barrow, the Marine Mammal Observer / Inupiat Communicators stationed on the Industry Participants' vessels in the Beaufort Sea, and with the Chairman and Executive Director of the AEW/C, at a mutually agreed upon time and place on the North Slope of Alaska, to review the results of the 2014 Beaufort Sea Open Water Season, unless it is agreed by all designated individuals or their representatives that such a meeting is not necessary.

(b) Chukchi Sea Post-Season Village Meetings.

Following the completion of the 2014 Chukchi Sea Open Water Season and prior to the 2015 Pre-Season Introduction Meetings, the Industry Participants involved, if requested by the AEW/C or the Whaling Captain's Association of each village, will host a meeting in each of the following villages: Wainwright, Pt. Lay, Pt. Hope, Kivalina, Little Diomedea, Wales, Savoonga, and Barrow (or a joint meeting of the whaling captains from all of these villages if the whaling captains agree to a joint meeting) to review the results of the 2014 operations and to discuss any concerns residents of those villages might have regarding the operations. The meetings will include the Marine Mammal Observer / Inupiat Communicators stationed on the Industry Participants' vessels in the Chukchi Sea. The Chairman and Executive Director of the AEW/C will be invited to attend the meeting(s).

(c) Pre-season Introduction Meetings.

(1) Immediately following each of the above meetings, and at the same location, the Industry Participants will provide a brief introduction to their planned operations for



the 2015 Open Water Season. Each Industry Participant should provide hand-outs explaining their planned activities that the whaling captains can review.

(2) Subsistence Participants understand that any planned operations discussed at these Pre-Season Introduction Meetings, and the corresponding maps, will represent the Industry Participant's best estimate at that time of its planned operations for the coming year, but that these planned operations are preliminary, and are subject to change prior to the 2015 Open Water Season Meeting.

(d) Map of Planned Industry Participant Activities.

As practicable, Industry Participants shall jointly prepare and provide the AEWG with a large-scale map of the Beaufort and Chukchi Seas showing the locations and types of oil and gas and barge and transit activities planned by each Industry Participant. This map will be for use by the AEWG and Industry Participants during the 2015 CAA Meeting.

SECTION 109. INDIVIDUAL NOTIFICATION.

In the event that any Industry Participant does not become a signatory to this Agreement, the local Whaling Captains' Associations shall be notified by the AEWG, no later than March 31, 2014, so that the local Whaling Captains' Associations can prepare to talk with the non-signatories to avoid conflict during that association's fall subsistence bowhead whaling season.



TITLE II -- OPEN WATER SEASON COMMUNICATIONS

SECTION 201. MARINE MAMMAL OBSERVERS / INUPIAT COMMUNICATORS.

(a) Marine Mammal Observer / Inupiat Communicator Required.

(1) In General. Each Industry Participant agrees to employ a Marine Mammal Observer / Inupiat Communicator (MMO/IC) on board each Primary Sound Source Vessel owned or operated by such Industry Participant in the Beaufort Sea or Chukchi Sea. Native residents of the eleven villages represented by the Alaska Eskimo Whaling Commission shall be given preference in hiring for MMO/IC positions.

(2) Special Rule for Inside Beaufort Sea Barrier Islands. Industry Participants whose seismic acquisition operations are limited to an area exclusively within the barrier islands need employ an MMO/IC on one Primary Sound Source Vessel only.

(3) Near Shore Operations Support Vessels. Industry Participants are not required to employ an MMO/IC on Near Shore Operations Support Vessels.

(4) Sealift Operations. For Industry Participants conducting sealift operations in which two tugs towing barges are accompanied within ½ mile by a third light tug at all times, a MMO/IC is required to be employed on the light tug only.

(b) Duties of Marine Mammal Observer / Inupiat Communicator.

(1) Each MMO/IC is to be employed as an observer and Inupiat communicator for the duration of the 2014 Open Water Season on the vessel on which he or she is stationed.

(2) As a member of the crew, the MMO/IC will be subject to the regular code of employ-ee conduct on board the vessel and will be subject to discipline, termination, suspension, layoff, or firing under the same conditions as other employees of the vessel operator or appropriate contractor.

(3) Once the source vessel on which the MMO/IC is employed is in the vicinity of a whaling area and the whalers have launched their boats, the MMO/IC's primary duty will be to carry out the communications responsibilities set out in this Title.

(4) At all other times, the MMO/IC will be responsible for keeping a lookout for bowhead whales and/or other marine mammals in the vicinity of the vessel to assist the vessel cap-tain in avoiding harm to the whales and other marine mammals.

(5) It is the MMO/IC's responsibility to call the appropriate Com-Center as set out in Sections 202 and 203.

(6) The MMO/IC will be responsible for all radio contacts between vessels owned or operated by each of the Industry Participants and whaling boats covered under Section 207 of this Agreement and shall interpret communications as needed to allow the vessel operator to take such action as may be necessary pursuant to this Agreement.

(7) The MMO/IC shall contact directly subsistence whaling boats that may be in the vicinity to ensure that conflicts are avoided to the greatest possible extent.

(8) The MMO/IC will maintain a record of his or her communications with each Com-Center and the subsistence whaling boats, as well as any marine mammal sightings by the MMO/IC.

SECTION 202. COM-CENTER GENERAL COMMUNICATIONS SCHEME.

(a) Reporting Positions for Vessels Owned or Operated by the Industry Participants.



(1) All vessels (other than vessels covered under sections 302 and 602) shall report to the appropriate Com-Center at least once every six hours commencing with a call at approximately 06:00 hours. Each call shall report the following information:

(A) Vessel name, operator of vessel, charter or owner of vessel, and the project the vessel is working on.

(B) Vessel location, speed, and direction.

(C) Plans for vessel movement between the time of the call and the time of the next call. The final call of the day shall include a statement of the vessel's general area of expected operations for the following day, if known at that time.

EXAMPLE: This is the Arctic Endeavor, operated by _____ for _____ at Chukchi Sea prospect. We are currently at ___'___ north ___'___ west, proceeding SE at ___ knots. We will proceed on this course for ___ hours and will report location and direction at that time.

(2) The appropriate Com-Center shall be notified if there is any significant change in plans, such as an unannounced start-up of operations or significant deviations from an- nounced course, and such Com-Center shall notify all whalers of such changes. A call to the appropriate Com-Center shall be made regarding any unsafe or unanticipated ice con-ditions.

(3) In the event that the Industry Participant's operation includes seismic data acqui-sition, the operator reserves the right to restrict exact vessel location information and provide more general location information.

(b) Reporting Positions for Subsistence Whale Hunting Crews.

(1) All subsistence whaling captains shall report to the appropriate Com-Center at the time they launch their boats from shore and again when they return to shore.

(2) All subsistence whaling captains shall report to such Com-Center the initial GPS co-ordinates of their whaling camps.

(3) Additional communications shall be made on an as needed basis.

(4) Each call shall report the following information:

(A) The crew's location and general direction of travel.

EXAMPLE: This is _____. We are just starting out. We will be traveling north-east from _____ to scout for whales. I will call if our plans change.

(B) The presence of any vessels or aircraft owned or operated by any of the In-dustry Participants, or their contractors, that are not observing the specified guide-lines set forth in Title V on Avoiding Conflicts.

(C) The final call of the day shall include a statement of the whaling captain's general area of expected operations for the following day, if known at the time.

(5) Any subsistence whale hunter preparing to tow a caught whale shall report to the ap-propriate Com-Center before starting to tow.

EXAMPLE: This is Archie Ahkiviana. I am ___'___ north, ___'___ west. I have a whale and am towing it into _____.

(6) Each time a subsistence whaling camp is moved, it shall be reported promptly to the appropriate Com-Center, including the new GPS coordinates.

(7) Subsistence whale hunters shall notify the appropriate Com-Center promptly if, due to weather or any other unforeseen event, whaling is not going to take place that day.



(8) Subsistence whaling captains shall contact the appropriate Com-Center promptly and report any unexpected movements of their vessel.

(c) Responsibilities of Participants.

(1) Monitoring VHF Channel 16.

All vessels covered by Sections 207, 301, and 401 of this Agreement shall monitor marine VHF Channel 16 at all times.

(2) Avoidance of Whale Hunting Crews and Areas

It is the responsibility of each vessel owned or operated by any of the Industry Participants and covered by Sections 301 or 401 of this Agreement to determine the positions of all of their vessels and to exercise due care in avoiding any areas where subsistence whale hunting is active.

(3) Vessel-to-Vessel Communication

After any vessel owned or operated by any of the Industry Participants and covered by Sections 301 or 401 of this Agreement has been informed of or has determined the location of subsistence whale hunting boats in its vicinity, the MMO/IC shall contact those boats in order to coordinate movement and take necessary avoidance precautions.

SECTION 203. THE COMMUNICATIONS SYSTEM COORDINATION CENTERS (COM-CENTERS).

(a) Chukchi Lead System Included in Com-Center Coverage.

In addition to the Beaufort Sea and Chukchi Sea, the communications scheme shall apply in the Chukchi Sea lead system, as identified and excluded from leasing in the current MMS Five-Year Leasing Program, 2007-2012.

(b) Set Up and Operation.

(1) Subject to the terms of Section 104(c) and Section 601 of this Agreement, the Industry Participants conducting operations during the Com-Center operational window specified in Section 203(c) in:

(A) the Beaufort Sea jointly will arrange for the funding of Com-Centers in Deadhorse and Kaktovik; and

(B) the Chukchi Sea jointly will arrange for the funding of Com-Centers in Barrow, Wainwright, Pt. Lay, Pt. Hope, Kivalina, Wales, and St. Lawrence Island.

(2) All nine Com-Centers will be staffed by Inupiat operators. **GROUND TRANSPORTATION MUST BE PROVIDED FOR COM-CENTER OPERATIONS IN KAKTOVIK FOR POLAR BEAR AND BROWN BEAR SAFETY.** The Com-Centers will be operated 24 hours per day during the 2014 subsistence bowhead whale hunt. One Industry Participant in the Beaufort Sea and one Industry Participant in the Chukchi Sea, or their respective contractor, will be designated as the operator of the Com-Centers for that Sea, in consultation with the AEWG.

(3) Each Industry Participant shall contribute to the funding of the Com-Centers covering the areas in which it conducts oil and gas operations. The level of funding for the Com-Centers provided by each of the Industry Participants is intended to be in proportion to the scale of their respective activities, and shall be mutually agreed by the Industry Participants.

(4) The procedures to be followed by the Com-Center operators are set forth in subsection (d) below.

(c) Staffing.



- (1) Each Com-Center shall have an Inupiat operator (“Com-Center operator”) on duty 24 hours per day from August 15, or one week before the start of the fall bowhead whale hunt in each respective village, until the end of the bowhead whale subsistence hunt in villages listed in subparagraphs (A) through (G) and until the completion of all Industry Participant vessel transits (other than a vessel covered under Title V) in villages listed in subpara-graphs (G) through (I):
- (A) Kaktovik for the Kaktovik Com-Center;
 - (B) Nuiqsut for the Deadhorse Com-Center;
 - (C) Barrow for the Barrow Com-Center;
 - (D) Wainwright for the Wainwright Com-Center.
 - (E) Pt. Lay for the Pt. Lay Com-Center, which will be located in the Pt. Lay Whaling Captains’ Association building; and
 - (F) Pt. Hope for the Pt. Hope Com-Center, which will be located in the Pt. Hope Whaling Captains’ Association building.
 - (G) Kivalina for the Kivalina Com-Center.
 - (H) Wales for the Wales Com-Center.
 - (I) Gambell or Savoonga for the St. Lawrence Island Com-Center.
- (2) All Com-Center staff shall be local hire.

(d) Duties of the Com-Center Operators.

- (1) The Com-Center operators shall be available to receive radio and telephone calls and to call vessels as described below. A record shall be made of all calls from every vessel covered by Sections 207, 301, and 401 of this Agreement. Information reported regarding whales struck, lost, landed, or the location of whales struck, lost, or landed, or the number of strikes remaining, shall be confidential and shall not be disclosed to anyone other than the AEWC or the local Whaling Captains’ Association. The record of all reporting calls should contain the following information:
- (A) Industry Participant Vessel:
 - (i) Name of caller and vessel.
 - (ii) Vessel location, speed, and direction.
 - (iii) Time of call.
 - (iv) Anticipated movements between this call and the next report.
 - (v) Reports of any industry or subsistence activities.
 - (B) Subsistence Whale Hunting Boat:
 - (i) Name of caller.
 - (ii) Location of boat or camp.
 - (iii) Time of call.
 - (iv) Plans for travel.
 - (v) Any special information such as caught whale, whale to be towed, or industry vessel conflicts with whale or whaler. Any report of the number of whales struck, lost, or landed, or of the number of strikes remaining, shall be kept confidential and shall not be disclosed by the Com-Center or any Com-Center operator to anyone other than the AEWC or the local Whaling Captains’ Association. The location of whales struck, lost, or landed shall be kept confidential and shall not be disclosed except to the extent needed to avoid an Industry/Subsistence Whale Hunter conflict.



(2) Report of Industry/Subsistence Whale Hunter Conflict. In the event an industry/subsistence whale hunter conflict is reported, the appropriate Com-Center operator shall record:

- (A) Name of industry vessel.
- (B) Name of subsistence whaling captain.
- (C) Location of vessels.
- (D) Nature of conflict, data, and time.

(3) If all vessels and boats covered by Sections 207, 301, and 401 of this Agreement have not reported to the appropriate Com-Center within one hour of the recommended time, that Com-Center operator shall attempt to call all non-reporting vessels to determine the information set out above under the Duties of the Com-Center operator.

(4) As soon as location information is provided by a vessel covered by Sections 207, 301, or 401 of this Agreement, the appropriate Com-Center operator shall plot the location and area of probable operations on the large map provided at the Com-Center.

(5) If, in receiving information or plotting it, a Com-Center operator observes that operations by Industry Participants might conflict with subsistence whaling activities, such Com-Center operator shall contact the industry vessel involved and advise the Industry Participant's Local Representative(s) and the vessel operators of the potential conflict.

SECTION 204. STANDARDIZED LOG BOOKS.

The Industry Participants will provide the Com-Centers and Marine Mammal Observer / Inupiat Communicators with identical log books to assist in the standardization of record keeping associated with communications procedures required pursuant to this Agreement.

SECTION 205. COMMUNICATIONS EQUIPMENT.

(a) Communications Equipment to be Provided to Subsistence Whale Hunting Crews.

(1) In General. The Industry Participants will provide (or participate in the provision of) the communications equipment described in paragraphs (4) and (6) of this subsection and subsection (b) of this section.

(2) Beaufort Sea. The Industry Participants funding Com-Centers in Deadhorse and Kaktovik will fund the provision of communications equipment for the whaling captains of Kaktovik and Nuiqsut in the same proportion as they fund those Com-Centers.

(3) Chukchi Sea. The Industry participants conducting operations in the Chukchi Sea will coordinate with each other to participate in funding the provision of communications equipment for the whaling captains of Barrow, Wainwright, Pt. Hope, and Pt. Lay.

(4) All-Channel, Water-Resistant VHF Radios.

These VHF radios are specifically designed for marine use and allow monitoring of Channel 16 while using or listening to another channel.

- (A) Kaktovik Subsistence Whaling Boats: 8
- (B) Kaktovik Base and Search and Rescue: 2
- (C) Nuiqsut Subsistence Whaling Boats: 12
- (D) Nuiqsut Base and Search and Rescue: 3
- (E) Barrow Base and Search and Rescue: 2



- (F) Wainwright Base and Search and Rescue: 2
- (G) Wainwright Subsistence Whaling Boats: 4
- (H) Pt. Hope Base and Search and Rescue: 2
- (I) Pt. Hope Subsistence Whaling Boats: 10
- (J) Pt. Lay Base and Search and Rescue: 2
- (K) Pt. Lay Subsistence Whaling Boats: 4
- (5) Specific VHF Channels For Each Village.

The whaling boats from each of the villages have been assigned individual VHF channels for vessel-to-vessel and vessel-to-Com-Center communications as follows:

- (A) Nuiqsut whaling crews will use Channel 68.
- (B) Kaktovik whaling crews will use Channel 69.
- (C) Barrow whaling crews will use Channel 72. 20
- (D) Wainwright Whaling Crews will use Channel 12.
- (E) Pt. Lay Whaling Crews will use Channel 72.
- (F) Pt. Hope Whaling Crews will use Channel 68.
- (6) Satellite Telephones.

The satellite telephones are to be used as backup for the VHF radios. The satellite tele-phones for use on subsistence whaling boats are for emergency use only and should be programmed for direct dial to the nearest Com-Center.

- A. Kaktovik Base Phones: 2
- B. Kaktovik Subsistence Whaling Boats: 8
- C. Nuiqsut Base Phones: 2
- D. Nuiqsut Subsistence Whaling Boats: 12
- E. Barrow Subsistence Whaling Boats: 2
- F. Wainwright Subsistence Whaling Boats: 4
- G. Pt. Lay Subsistence Whaling Boats: 2
- (7) Distribution and Return of Equipment.

The distribution of the VHF radios and satellite telephone equipment to whaling captains for use during the 2014 fall bowhead subsistence whale hunting season shall be completed no later than August 15, 2014. All such units and telephone equipment provided under this Agreement, whether in this section or otherwise, will be returned promptly by the Subsistence Participants to the Industry Participant or the person providing such units and equipment at the end of each Village's 2014 fall bowhead whale subsistence hunt.

(b) Communications Equipment on Vessels Owned or Operated by the Industry Participants and/or their Contractors.

The Marine Mammal Observer / Inupiat Communicators onboard source vessels owned or operated by the Industry Participants and/or their contractors will also be supplied with all-channel VHF radios. The MMO/ICs have been assigned Channel 7 for their exclusive use in communicating with the Com-Center. Such radios shall be returned upon the completion or termination of the MMO/IC's assignment. 21

(c) Radio Installation and User Training.

The Whaling Captains of Nuiqsut, Kaktovik, Wainwright, Pt. Lay, and Pt. Hope, with assistance from the Industry Participants, will be responsible for the installation of the VHF radio equipment. The Industry participants will provide (or participate in the provision of) on-site user training for the VHF and satellite telephone equipment on or before August 15, 2014, if requested and as scheduled by the Whaling Captains' Associations of Nuiqsut, Kaktovik, Barrow, Wainwright, Pt. Lay, and Pt. Hope, and



the Industry Participant operating the Beaufort Sea Com-Centers or Chukchi Sea Com-Centers, as appropriate.

SECTION 206. INDIVIDUALS TO CONTACT.

Listed below are the primary contact names and phone numbers for each of the Participants.

(1) BP Exploration (Alaska), Inc.'s (BP) Local Representative

LOWRY BROTT will be BP's local representative on the North Slope during the Term of this Agreement and will be stationed at Northstar Island and will be available by telephone at (907) 670-3520 and when Mr. Brott is not available, his alternate, Jeff Carter, will be stationed at Northstar Island and will be available by telephone at the above number.

(2) Eni's Local Representative

Robert Province: Robert.Province@enipetroleum.com 907-865-3350

(3) Exxon Mobil's Local Representative

Anthony Pennino: anthony.pennino@exxonmobil.com (907) 334-2929

Brien Reep: Brien.e.reep@exxonmobil.com (907) 564-3617

(4) GX Technology's Local Representative

Ed Nelson (832) 344-6852

(5) CAELUS Energy Alaska Local Representative

DALE HOFFMAN will be Caelus's local representative during the Term of this Agreement and will be stationed in Anchorage and will be available by telephone at (907) 343-2108. 22

(6) Shell Offshore Inc.'s (Shell) Local Representatives

CRAIG BLANCHARD and HOWARD HILL will be Shell's local representatives on the North Slope during the Term of this Agreement and will be stationed at Barrow during Chukchi Sea operations and at Deadhorse during Beaufort Sea operations and will be available by telephone at (907) 770-3700.

(7) STATOIL's Local Representative

Ella Ede: eede@statoil.com (907) 444-3473

(8) SAExploration, Inc.

Sue Simonds: ssimonds@saexploration.com (907)522-4499

(9) TGS-NOPEC Geophysical Company

Troy Nelson, 403-781-1448, Troy.Nelson@tgs.com

(10) The Village of Kaktovik

For purposes of this Agreement, the individuals to contact for the Village of Kaktovik will be: JOSEPH KALEAK at (907) 640-6213 or 640-6515, and CHRISTOPHER GORDON at (907) 640-0022.

(11) The Village of Nuiqsut

For purposes of this Agreement, the individuals to contact for the Village of Nuiqsut will be: ISAAC NUKAPIGAK at (907) 480-6220 (Work), (907) 480-2400 (Home); CARL BROWER at (907) 242 -1013.

(12) The Village of Barrow

For purposes of this Agreement, the individuals to contact for the Village of Barrow will be: HARRY BROWER, JR. at (907) 852-0350 (Work), and EUGENE BROWER at (907) 852-3601.

(13) The Village of Wainwright



For purposes of this Agreement, the individuals to contact for the Village of Wainwright will be: JOHN HOPSON JR. at (907) 231-9178 (cell), and WALTER NAYAKIK at (907)763-2915 (Work); OLIVER PEETOOK at (907) 763-0220, (907) 763-0295.

(14) The Village of Pt. Hope

For purposes of this Agreement, the individuals to contact for the Village of Pt. Hope will be: JOE OKTOLLIK. at (907) 368-2088 (Home), (907) 368-1430 (cell); CLARK LANE at (907) 368-2453, (907) 947-5190 (cell).

(15) The Village of Pt. Lay

For purposes of this Agreement, the individuals to contact for the Village of Pt. Lay will be: JULIUS REXFORD (907) 833-4592 (Home), (907) 833-2214 (Work), (907) 833-2320 (Fax), THOMAS NUKAPIAK (907) 833-0191 (Home).

(16) The Village of Kivilina

For the purposes of this Agreement, the individuals to contact for the Village of Kivilina will be: RAYMOND HAWLEY at (907) 645-2164 (Home); KALEB WESLEY at (907) 645-2150 (Home), (907) 444-8905 (cell).

(17) The Village of Little Diomede

For the purposes of this Agreement, the individuals to contact for the Village of Little Diomede will be: RONALD OZENNA at (907) 434-1436.

(18) The Village of Wales

For the purposes of this Agreement, the individuals to contact for the Village of Wales will be: RAYMOND SEETOOK at (907) 664-2356 (Home), (907) 634-0320 (cell); WINTON WEYAPUK at (907) 664-8139 (cell).

(19) The Village of Savoonga

For the purposes of this Agreement, the individuals to contact for the Village of Savoonga will be: GEORGE NOONGWOOK at (907) 984-2461 and THOMAS AKEYA at (907) 984-6649, (907) 984-6414 (Home).

(20) The Village of Gambell

For the purposes of this Agreement, the individuals to contact for the Village of Gambell will be: MERLIN KOONOOKA at (907) 985-5113 or (907) 434-1180 (cell), and BRUCE BOLOWON at (907) 985-5212.

(21) The AEWC

For purposes of this Agreement, the individuals to contact for the AEWC shall be: PRICE LEAVITT at (907) 852-2392.



SECTION 207. SUBSISTENCE WHALE HUNTING BOATS.

The following is a list of the number of boats each of the Subsistence Participants plan to use:

(1) Boats Owned/Used by Whaling Captains of Nuiqsut (NWCA)

The subsistence whaling crews of the Village of Nuiqsut plan to use (16) twelve boats for subsistence whale hunting during the late summer and fall of 2014.

(2) Boats Owned/Used by Whaling Captains of Kaktovik (KWCA)

The subsistence whaling crews of the Village of Kaktovik plan to use (6) eight boats for subsistence whale hunting during the late summer and fall of 2014.

(3) Boats Owned/Used by Whaling Captains of Barrow (BWCA)

The subsistence whaling crews of the Village of Barrow plan to use (34) forty boats for subsistence whale hunting during the late summer and fall of 2014.

(4) Boats Owned/Used by Whaling Captains of Wainwright (WWCA)

The subsistence whaling crews of the Village of Wainwright plan to use (4) four boats for subsistence whale hunting during the fall of 2014.

(5) Boats Owned/Used by Whaling Captains of Pt. Hope (Pt. HWCA)

The subsistence whaling crews of the Village of Pt. Hope plan to use (14) ten boats for subsistence whale hunting during the late fall of 2014.

(6) Boats Owned/Used by Whaling Captains of Pt. Lay (Pt. LWCA)

The subsistence whaling crews of the Village of Pt. Lay plan to use (4) four boats for subsistence whale hunting during the fall of 2014.

If any additional boats are put in use by subsistence whaling crews, the Industry Participants will be notified promptly through the Com-Center.



TITLE III – BARGE AND TRANSIT VESSEL OPERATIONS

SECTION 301. IN GENERAL.

A Participant may employ barges or transit vessels to transport materials through the Beaufort Sea or Chukchi Sea during the term of this Agreement. Any Industry Participant who employs a barge or transit vessel to transport materials through the Beaufort Sea or Chukchi Sea during the term of this Agreement shall require the barge or transit vessel operator to comply with Sections 201, 205(b) and 302 of this Agreement while providing services to that Industry Participant.

SECTION 302. BARGE AND TRANSIT VESSEL OPERATIONS.

(a) Reporting Positions for Barge or Transit Vessels Owned or Operated by industry Participants.

(1) All barge, transit, or cable laying vessels shall report to the appropriate Com-Center at least once every six hours commencing with a call at approximately 06:00 hours. Each call shall report the following information:

(A) Barge, transit, or cable laying vessel name, operator of vessel, charterer or owner of vessel, and the project or entity the vessel is transporting materials for.

(B) Barge, transit, or cable laying vessel location, speed, and direction.

(C) Plans for barge, transit, or cable laying vessel movement between the time of the call and the time of the next call. The final call of the day shall include a statement of the barge or transit vessel's general area of expected operations for the following day, if known at that time.

EXAMPLE: This is the Arctic Endeavor, operated by _____ for _____ in the Chukchi Sea. We are currently at ___'___ north ___'___ west, proceeding SE at ___ knots. We will proceed on this course for ___ hours and will report location and direction at that time.

(2) The appropriate Com-Center also shall be notified if there is any significant change in plans, such as an unannounced start-up of operations or significant deviations from an announced course, and such Com-Center shall notify all whalers of such changes. A call to the appropriate Com-Center shall be made regarding any unsafe or unanticipated ice conditions.

(b) Operator Duties.

All barge or transit vessel operators are responsible for the following requirements.

(1) Monitoring VHF Channel 16. All barge and transit vessel operators shall monitor marine VHF Channel 16 at all times.

(2) Avoidance of Whale Hunting Crews and Areas. It is the responsibility of each Industry Participant and barge or transit vessel operator to determine the positions of their barge or transit vessels and to exercise due care in avoiding any areas where subsistence whale hunting is active.

(3) Vessel-to-Vessel Communication. After any barge or transit vessel owned or operated by any Industry Participant has been informed of or has determined the location of subsistence whale hunting boats in its vicinity, the Marine Mammal Observer / Inupiat Communicator shall contact those boats in order to coordinate movement and take necessary avoidance precautions.

(c) Routing Barge and Transit Vessels.

(1) All barge or transit vessel routes shall be planned so as to minimize any potential conflict with bowhead whales or subsistence whaling activities. All barges and transit



ves-sels shall avoid areas of active or anticipated whaling activity, as reported pursuant to Section 202.

(2) Beaufort Sea. Vessels transiting east of Bullen Point to the Canadian border should remain at least five (5) miles offshore during transit along the coast, provided ice and sea conditions allow.

(3) Chukchi Sea. Vessels should remain as far offshore as weather and ice conditions allow, and at all times at least five (5) miles offshore during transit.

(4) Safe Harbor / Loitering. Notwithstanding paragraphs 2 and 3, from August 31 to October 31 vessels in the Chukchi Sea or Beaufort Sea shall remain at least 20 miles offshore of the coast of Alaska from Icy Cape in the Chukchi Sea to Pitt Point on the east side of Smith Bay in the Beaufort Sea whether in transit or engaging in activities in support of oil and gas operations, unless ice conditions or an emergency that threatens the safety of the vessel or crew prevents compliance with this requirement. This paragraph shall not apply to vessels actively engaged in transit to or from a coastal community to conduct crew changes or logistical support operations.

(d) Vessel Speeds.

Barge and transit vessels shall be operated at speeds necessary to ensure no physical contact with whales occurs, and to make any other potential conflicts with bowhead whales or whalers unlikely. Vessel speeds shall be less than 10 knots in the proximity of feeding whales or whale aggregations.

(e) Vessels Operating in Proximity of Bowhead Whales.

If any barge or transit vessel inadvertently approaches within 1.6 kilometers (1 mile) of observed bowhead whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the bowhead whales by taking one or more of the following actions, as appropriate:

- (1) reducing vessel speed to less than 5 knots within 900 feet of the whale(s);
- (2) steering around the whale(s) if possible;
- (3) operating the vessel(s) in such a way as to avoid separating members of a group of whales from other members of the group;
- (4) operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and
- (5) checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged.

(f) Marine Mammal Sighting Data.

Industry Participants whose operations are limited exclusively to barge or vessel traffic will submit to the AEW and NSB DWM all marine mammal sighting data.



TITLE IV – VESSELS, TESTING, AND MONITORING

SECTION 401. INDUSTRY PARTICIPANT VESSELS AND EQUIPMENT.

(a) List of Vessels and Equipment Required.

Each Industry Participant engaged in oil and gas operations shall provide a list identifying all vessels or other equipment (including but not limited to boats, barges, aircraft, or similar craft) that are owned and/or operated by, or that are under contract to the Industry Participants, for use in the Beaufort Sea or Chukchi Sea for oil and gas operations or for implementation of such Industry Participant's monitoring plan. Vessels and equipment used for oil and gas operations shall be listed in Attachment II, and vessels and equipment used for monitoring plans shall be listed in Attachment III.

(b) Only Listed Vessels and Equipment (or Like Vessels and Like Equipment) May Be Used.

(1) **NONE OF THE INDUSTRY PARTICIPANTS INTENDS TO OPERATE ANY VESSEL OR EQUIPMENT (EXCEPT FOR LIKE VESSELS OR LIKE EQUIPMENT) NOT IDENTIFIED IN THE LISTS REQUIRED UNDER SUBSECTION (a) DURING THE TERM OF THIS AGREEMENT.**

(2) Notwithstanding paragraph 1, if any Industry Participant decides to use different vessels or equipment or additional vessels or equipment, such vessels and equipment shall be used only for purposes identified in Attachments II or III; and the AEWC and the whaling captains of Nuiqsut, Kaktovik, Barrow, Wainwright, Pt. Hope, and Pt. Lay shall be notified promptly through the appropriate Com-Center, as identified in Section 203 of this Agreement, and in writing, of their identity and their intended use, including location of use.

SECTION 402. SOUND SIGNATURE TESTS.

Unless the AEWC approves an alternate approach for providing sound source verification, the following testing shall be required:

(a) Sound Source Verification Testing.

(1) Geophysical Equipment. For purposes of obtaining a sound signature for Industry Participants' geophysical equipment, the Industry Participants shall have initiated a test of all geophysical equipment within 72 hours of initiating or having initiated operations in the Beaufort Sea or Chukchi Sea. Such tests shall be conducted as set forth in section 402(b).

(2) Vessels. For vessels engaged in geophysical activity, Industry Participants will conduct a sound source verification test for all geophysical equipment used for geophysical activity. Each Industry Participant shall establish a sound source verification range or Industry Participants may participate jointly in establishing a range for the Chukchi Sea and Beaufort Sea, or both. A separate range shall be used for the Chukchi Sea and Beaufort Sea, and vessels shall use the appropriate range for each sea in which they operate. For testing each vessel shall proceed through the range and record information on the date, time, vessel speed, vessel route, vessel load, weather conditions, and equipment operating on the vessel (all noise generating equipment on the vessel, other than geophysical equipment subject to separate testing under paragraph (1), shall be in operation while the vessel is proceeding through the range). The range should be established near a location where details on wind speed and direction are regularly monitored and archived.



(b) Mutual Agreement on Site for Testing; Advance Notice Required.

(1) In General. Each geophysical equipment sound signature test shall be conducted at a site mutually agreed upon by the Industry Participant conducting such test and the AEW. Each Industry Participant conducting such sound signature test(s) will make a good faith effort to provide three (3) weeks advance notice to the AEW and the NSB DWM of its intent to perform each test.

(2) Beaufort Sea Testing. For geophysical equipment sound signature tests conducted in the Beaufort Sea, the Industry Participant conducting such tests shall provide transportation for an appropriate number of representatives from: the AEW, the whaling captains of the Villages of Barrow, Nuiqsut, and Kaktovik, and the NSB DWM to observe the sound signature tests.

(3) Chukchi Sea Testing. For geophysical equipment sound signature tests conducted on vessels to be used in the Chukchi Sea, the Industry Participant(s) conducting such tests shall provide transportation for an appropriate number of representatives from: the AEW, the whaling captains of the Villages of Barrow, Wainwright, Pt. Lay, and Pt. Hope, and the NSB DWM to observe the sound signature tests. 30

(c) Sound Signature Data to be Made Available.

(1) Within fourteen (14) days of completing the sound signature field tests for geophysical equipment and within thirty (30) days of the end of the operating season for sound source verification ranges, each Industry Participant and/or its contractor conducting such test(s) will make preliminary and final quality controlled results of the sound signature test(s) available upon request to the AEW and the NSB DWM. The Industry Participant and/or its contractor will also provide the AEW and the NSB DWM the preliminary analysis of that data, as well as any other applicable sound signature data that is available and that the AEW, the NSB DWM, and the Industry Participant agree is relevant to understanding the potential noise impacts of the proposed operations to migrating bowhead whales or other affected marine mammals.

(2) Once completed the final data analysis will be provided to the AEW and the NSB DWM upon request. The final data report for the sound source verification testing shall be provided to the NSB DWM and the AEW no later than December 31, 2014.

(3) Any Industry Participant who prepares a model of the sound signature of its vessels and operations, whether before or after the sound signature test, will provide copies of those models and any related analysis to the AEW and the NSB DWM upon request.

SECTION 403. MONITORING PLANS.**(a) Monitoring Plan Required.**

(1) Each Industry Participant agrees to prepare and implement a monitoring plan to collect data designed to determine the potential effects of its oil and gas operations on fall migrating bowhead whales.

(2) The monitoring plans shall be designed in cooperation with the AEW, the NSB DWM, and NOAA Fisheries, together with the Bureau of Ocean Energy Management (BO-EM) when operating in Federal waters. If additional outside review is requested by any of the above entities, the Industry Participant will evaluate the request on a case by case basis.

(b) Beaufort Sea Monitoring Plans.

In the Beaufort Sea, the monitoring plans should focus on the identity, timing, location, and numbers of marine mammals and their behavioral responses to the noise source. The monitoring plans will place emphasis on understanding potential impacts from industrial sounds on bowhead whales.

(c) Chukchi Sea Monitoring Plans.

In the Chukchi Sea, the monitoring plans should focus on the identity, timing, location, and numbers of marine mammals and their behavioral responses to the noise source. The monitoring plans will place emphasis on understanding potential impacts from industrial sounds on bowhead whales.

(d) Use of Prior Information and Peer Reviewed Data.

(1) Prior impact study results shall be incorporated into the monitoring plans prepared by each Industry Participant as applicable.

(2) Each monitoring plan for oil and gas operations shall be subject to peer review by stakeholders on a peer review panel identified by NOAA Fisheries at the 2014 Open Water Season Peer Review Meeting, convened by NOAA Fisheries. Draft plans will be submitted to the NSB DWM and AEWC no later than two weeks prior to the 2014 Open Water Peer Review Meeting.

(e) Raw Data, Communication, and Summary Required.

(1) Each Industry Participant conducting site-specific monitoring will:

(A) after quality control reviews are completed, make electronic data, available to the NSB DWM at the end of the season.

(B) permit and encourage open communications among their contractors and the AEWC and NSB DWM.

(2) Each Industry Participant will submit a summary of monitoring plan results and progress to the AEWC and NSB DWM every two weeks during the operating season.

SECTION 404. CUMULATIVE NOISE IMPACTS STUDY.

Each Industry Participant further agrees to provide its monitoring plan and sound signature data, for use in a cumulative effects analysis of the multiple sound sources and their possible relationship to any observed changes in marine mammal behavior, to be undertaken pursuant to a Cumulative Noise Impacts Study.

The study design for the Cumulative Impacts Study shall be developed through a Cumulative Impacts Workshop to be organized by the North Slope Borough in the winter of 2014/2015. The results of this workshop will be presented at the 2015 Open Water Meeting.



TITLE V – AVOIDING CONFLICTS DURING THE OPEN WATER SEASON

Industry Participants are reminded that Sections 101(a)(5)(A) and (D) of the Marine Mammal Protection Act provide, among other things, that the Secretary can authorize the incidental taking of small numbers of marine mammals of a species or population stock if the Secretary finds, among other things, that the total of such takings during the authorized period **will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses.**

The following Operating Guidelines apply in the Beaufort Sea and Chukchi Sea, except as otherwise specified and in all cases with due regard to environmental conditions and operational safety. These Operating Guidelines are in addition to any permit re-strictions or stipulations imposed by the applicable governmental agencies.

SECTION 501. GENERAL PROVISIONS FOR AVOIDING INTERFERENCE WITH BOW-HEAD WHALES OR SUBSISTENCE WHALE HUNTING ACTIVITIES.

(a) Routing Vessels and Aircraft.

(1) All vessel and aircraft routes shall be planned so as to minimize any potential conflict with bowhead whales or bowhead subsistence whaling activities. All vessels shall avoid areas of active or anticipated whaling activity (as reported pursuant to Section 202).

(2) Beaufort Sea. Vessels transiting east of Bullen Point to the Canadian border should remain at least five (5) miles offshore during transit along the coast, provided ice and sea conditions allow.

(3) Chukchi Sea. Vessels should remain as far offshore as weather and ice conditions allow, and at least five (5) miles offshore during transit.

(4) Safe Harbor / Loitering. Notwithstanding paragraphs 2 and 3, from August 31 to October 31 vessels in the Chukchi Sea or Beaufort Sea shall remain at least 20 miles offshore of the coast of Alaska from Icy Cape in the Chukchi Sea to Pitt Point on the east side of Smith Bay in the Beaufort Sea whether in transit or engaging in activities in support of oil and gas operations unless ice conditions or an emergency that threatens the safety of the vessel or crew prevents compliance with this requirement. This paragraph shall not apply to vessels actively engaged in transit to or from a coastal community to conduct crew changes or logistical support operations. 33

(b) Aircraft Altitude Floor and Flight Path.

(1) AIRCRAFT SHALL NOT OPERATE BELOW 1500 FEET unless the aircraft is engaged in marine mammal monitoring, approaching, landing or taking off, or unless engaged in providing assistance to a whaler or in poor weather (low ceilings) or any other emergency situations. Aircraft engaged in marine mammal monitoring shall not operate below 1500 feet in areas of active whaling; such areas to be identified through communications with the Com-Centers.

(2) Except for airplanes engaged in marine mammal monitoring, aircraft shall use a flight path that keeps the aircraft at least five (5) miles inland until the aircraft is directly south of its offshore destination, then at that point it shall fly directly north to its destination.

(c) Vessel Speeds.



Vessels shall be operated at speeds necessary to ensure no physical contact with whales occurs, and to make any other potential conflicts with bowhead whales or whalers unlikely. Vessel speeds shall be less than 10 knots in the proximity of feeding whales or whale aggregations.

(d) Vessels Operating in Proximity of Bowhead Whales.

If any vessel inadvertently approaches within 1.6 kilometers (1 mile) of observed bowhead whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the bowhead whales by taking one or more of the following actions, as appropriate:

- (1) reducing vessel speed to less than 5 knots within 900 feet of the whale(s);
- (2) steering around the whale(s) if possible;
- (3) operating the vessel(s) in such a way as to avoid separating members of a group of whales from other members of the group;
- (4) operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and
- (5) checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged. 34

SECTION 502. GEOPHYSICAL ACTIVITY LIMITATIONS.

The following operating limitations are to be observed and the operations are to be accompanied by a monitoring plan as set forth in Section 403 and Attachment III of this Agreement. The Industry Participants conducting geophysical activity agree to co-ordinate the timing and location of such activity so as to reduce, by the greatest extent reasonably possible, the level of noise energy entering the water from such activity at any given time and at any given location.

(a) Limitations on Geophysical Activity in the Beaufort Sea.

All geophysical activity in the Beaufort Sea shall be conducted in accordance with the terms set forth below.

(1) Kaktovik: No geophysical activity from the Canadian Border to the Canning River (146 deg. 4 min. W) from 25 August to close of the fall bowhead whale hunt in Kaktovik and Nuiqsut. ² From August 10 to August 25, Industry Participants will communicate and collaborate with AEWC on any planned vessel movement in and around Kaktovik and Cross Island to avoid impacts to whale hunt.

² The bowhead whale subsistence hunt will be considered closed for a particular village when the village Whaling Captains' Association declares the hunt ended or the village quota has been exhausted (as announced by the village Whaling Captains' Association or the AEWC), whichever occurs earlier.

³ Geophysical activity allowed in this area after August 25 shall include a source array of no more than 12 air guns, a source layout no greater than 8 m x 6 m, and a single source volume no greater than 880 in³.

(2) Nuiqsut:

A. Pt. Storkerson (~148 deg. 42 min. W) to Thetis Island (~150 deg. 10.2 min. W).

(i) *Inside the Barrier Islands*: No geophysical activity prior to July 25. Geophysical activity is allowed from July 25 until completion of operations³

(ii) *Outside the Barrier Islands*: No geophysical activity from August 25 to close of fall bowhead whale hunting in Nuiqsut. Geophysical activity is allowed at all other times.



b. Canning River (~146 deg. 4 min. W) to Pt. Storkerson (~148 deg. 42 min. W): No geophysical activity from August 25 to the close of bowhead whale sub-sistence hunting in Nuiqsut. 35

(3) Barrow: No geophysical activity from Pitt Point on the east side of Smith Bay (~152 deg. 15 min. W) to a location about half way between Barrow and Peard Bay (~157 deg. 20 min. W) from September 15 to the close of the fall bowhead whale hunt in Barrow.

(b) Limitations on Geophysical Activity in the Chukchi Sea.

All geophysical activity in the Chukchi Sea shall be conducted in accordance with the terms set forth below.

(1) Beginning September 15, and ending with the close of the fall bowhead whale hunt, ⁴ if Wainwright, Pt. Lay, or Pt. Hope intend to whale in the Chukchi Sea, no more than two geophysical activities employing geophysical equipment within 60 miles of the coastline will occur at any one time in the Chukchi Sea. During the fall bowhead whale hunt, geophysical equipment will not be used by Participants within 30 miles of any point along the Chukchi Sea coastline. Industry Participants will contact the Whaling Captains' Associations of each of those villages to determine if a village is prepared to whale and will notify the AEWG of any response.

⁴ The bowhead whale subsistence hunt will be considered closed when village Whaling Captains' Associations of Wainwright, Pt. Lay, and Pt. Hope have each declared that (A) they do not intend to hunt, (B) their village hunt has ended, or (C) the village quota has been exhausted (as announced by the village Whaling Captains' Association or the AEWG), whichever occurs earlier.

(2) Safe harbor will be at sites selected by the Industry Participants and the AEWG. Safe harbor sites will be agreed upon no later than the beginning of operations and shall be listed in Attachment IV. However, a vessel captain will seek safety for his assets (vessel and personnel) as is his duty under the Law of the Sea.

(3) Any vessel operating within 60 miles of the Chukchi Sea coast will follow the communications procedures set forth in Title II of this Agreement. All vessels will adhere to the conflict avoidance measures set forth in Section 501 of this Agreement.

(4) If a dispute should arise, the resolution process set forth in Section 106 of this Agreement shall apply.

(5) Barrow: Within 100 miles of the coastline, no geophysical activity from Pitt Point on the east side of Smith Bay (~152 deg. 15 min. W) to a location about half way between Barrow and Peard Bay (~157 deg. 20 min. W) from September 15 to the close of the fall bowhead whale hunt in Barrow. 36

(6) Notwithstanding any other provision of this Agreement, any Industry Participant who engages exclusively in geophysical activities that are conducted at least 45 miles or more from the Alaska coast in the Chukchi Sea shall only be responsible for complying with Title I (excluding Sections 104(c)(4) and 108(a) and (b)) and Sections 201, 205(b), 206, 501, and this subsection 502(b) of this Agreement. For the avoidance of doubt, an Industry Participant described in this subsection 502(b) shall be subject to the requirements of Section 203 only to the extent of one Community at the closest community to the seismic acquisition area.

SECTION 503. DRILLING AND PRODUCTION.

(a) Camden Bay.

For exploratory drilling and production between 144 deg. W and the Canning River (~146 deg. 4 min. W), zero discharge of:



- (1) drilling fluids;
- (2) cuttings after 20" casing;
- (3) treated sanitary and gray water; and
- (4) ballast and bilge water.

(b) Drilling Operations in the Beaufort Sea East of Cross Island.

No drilling equipment or related vessels used for at-sea oil and gas operations shall be onsite at any offshore drilling location east of Cross Island from 25 August until the close of the bowhead whale hunt in Nuiqsut and Kaktovik. However, such equipment may remain within the Beaufort Sea in the vicinity of 71 degrees 25 minutes N and 146 degrees 4 minutes W., or at the edge of the Arctic ice pack, whichever is closer to shore. 37

(c) Drilling Operations in the Beaufort Sea West of Cross Island.

In 2014, no drilling equipment or related vessels used for at-sea oil and gas operations shall be moved onsite at any location outside the barrier islands west of Cross Island until the close of the bowhead whale hunt in Barrow.

(d) Oil Spill Mitigation Agreement.

Industry Participants engaged in drilling operations agree to enter into a binding oil spill mitigation agreement with the Alaska Eskimo Whaling Commission, the North Slope Borough, and the Inupiat Community of the Arctic Slope to provide for hunter transport to alternate hunting locations in the event of an oil spill. The agreement shall be attached as Attachment V.

SECTION 504. SHORE-BASED SERVICE AND SUPPLY AREAS.

Shore-based service and supply areas used by Industry Participants shall be located and operated so as to ensure compliance with the terms of this Agreement.

SECTION 505. TERMINATION OF OPERATIONS AND TRANSIT THROUGH THE BERING STRAIT.

Except as provided in Title VI, all Industry Participant vessels shall complete operations in time to allow such vessels to complete transit through the Bering Strait to a point south of 59 degrees North latitude no later than November 15, 2014. Any Industry Participant vessel that encounters weather or ice that will prevent compliance with the date in the preceding sentence shall coordinate its transit through the Bering Strait to a point south of 59 degrees North latitude with the appropriate Com-Centers listed in Section 203. All Industry Participant vessels shall, weather and ice permitting, transit east of St. Lawrence Island and no closer than 10 miles from the shore of St. Lawrence Island.



TITLE VI – LATE SEASON SEISMIC OPERATIONS

SECTION 601. IN GENERAL.

Notwithstanding any other provision of this Agreement, any Industry Participant who engages exclusively in geophysical activities that are conducted at least 5 miles or more from the Alaska coast in the Beaufort Sea or Chukchi Sea and begin on or after October 1, 2014 shall only be responsible to comply with Title I (excluding Sections 104(c)(4) and 108(a) and (b)) and Sections 201, 205(b), 206, 502(a), and 602 of this Agreement. For the avoidance of doubt, an Industry Participant described in this Section 601 shall not be subject to the requirements of Section 203 including but not limited to funding of Com-Centers, providing certain equipment, training and providing representatives as designated operators of Com-Centers.

SECTION 602. VESSEL OPERATIONS.

(a) Reporting Positions When Vessels Come Within 40 Miles of the Coast.

(1) A vessel subject to this section operating within 40 miles of the Alaska coast shall report to the appropriate Com-Center, if open, at least once every six hours commencing with a call at approximately 06:00 hours. Each call shall report the following information:

(A) Vessel name, operator of vessel, charter or owner of vessel, and the project or entity the vessel is conducting operations for.

(B) Vessel location, speed, and direction.

(C) Plans for vessel movement between the time of the call and the time of the next call. The final call of the day shall include a statement of the vessel's general area of expected operations for the following day, if known at that time.

EXAMPLE: This is the Arctic Endeavor, operated by _____ for _____ in the Chukchi Sea. We are currently at ___'___ north ___'___ west, proceeding SE at ___ knots. We will proceed on this course for ___ hours and will report location and direction at that time.

(2) The appropriate Com-Center, if open, also shall be notified if there is any significant change in plans, such as an unannounced start-up of operations or significant deviations from announced course, and such Com-Center shall notify all whalers of such changes. A call to the appropriate Com-Center shall be made regarding any unsafe or unanticipated ice conditions.

(b) Operator Duties.

All vessel operators subject to this title are responsible for the following requirements.

(1) Monitoring VHF Channel 16. All vessel operators shall monitor marine VHF Channel 16 at all times.

(2) Avoidance of Whale Hunting Crews and Areas. It is the responsibility of each Industry Participant and vessel operator to determine the positions of their vessels and to exercise due care in avoiding any areas where subsistence whale hunting is active.

(3) Vessel-to-Vessel Communication. After any vessel owned or operated by any Industry Participant has been informed of or has determined the location of subsistence whale hunting boats in its vicinity, the Marine Mammal Observer / Inupiat Communicator shall contact those boats in order to coordinate movement and take necessary avoidance precautions.

(c) Routing Vessels.



(1) All vessel routes within 40 miles of the Alaska coast shall be planned so as to minimize any potential conflict with bowhead whales or subsistence whaling activities. All vessels shall avoid areas of active or anticipated whaling activity, as reported pursuant to Section 202.

(2) Beaufort Sea. Vessels transiting east of Bullen Point to the Canadian border should remain at least five (5) miles offshore during transit along the coast, provided ice and sea conditions allow.

(3) Chukchi Sea. Vessels should remain as far offshore as weather and ice conditions allow, and at all times at least five (5) miles offshore during transit.

(4) Safe Harbor / Loitering. Notwithstanding paragraphs 2 and 3, from August 31 to October 31 vessels in the Chukchi Sea or Beaufort Sea shall remain at least 20 miles offshore of the coast of Alaska from Icy Cape in the Chukchi Sea to Pitt Point on the east side of Smith Bay in the Beaufort Sea whether in transit or engaging in activities in support of oil and gas operations unless ice conditions or an emergency that threatens the safety of the vessel or crew prevents compliance with this requirement.

(d) Vessel Speeds.

Vessels shall be operated at speeds necessary to ensure no physical contact with whales occurs, and to make any other potential conflicts with bowhead whales or whalers unlikely. Vessel speeds shall be less than 10 knots in the proximity of feeding whales or whale aggregations.

(e) Vessels Operating in Proximity of Bowhead Whales.

If any vessel inadvertently approaches within 1.6 kilometers (1 mile) of observed bowhead whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the bowhead whales by taking one or more of the following actions, as appropriate:

- (1) reducing vessel speed to less than 5 knots within 900 feet of the whale(s);
- (2) steering around the whale(s) if possible;
- (3) operating the vessel(s) in such a way as to avoid separating members of a group of whales from other members of the group;
- (4) operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and
- (5) checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged.

(f) Marine Mammal Sighting Data.

Industry Participants whose operations are subject to this title will submit to the AEWC and NSB DWM all marine mammal sighting data.



TITLE VII – PARTICIPANTS

This Agreement shall be binding and effective when signed by the duly authorized rep-representatives of the Participants. Signatures may be by facsimile on separate pages.

 George Noongwook Harry Brower, Jr.
 AEWG Chairman AEWG Commissioner for Barrow
 Dated: _____ Dated: _____

 Merlin Koonooka Joseph Kaleak
 AEWG Commissioner for Gambell AEWG Commissioner for Kaktovik
 Dated: _____ Dated: _____

 Raymond Hawley Ronald Ozenna, Jr.
 AEWG Commissioner for Kivalina AEWG Commissioner for Little Diomede
 Dated: _____ Dated: _____

 Isaac Nukapigak Herbert Kinneeveauk
 AEWG Commissioner for Nuiqsut AEWG Commissioner for Pt. Hope
 Dated: _____ Dated: _____

 Julius Rexford George Noongwook
 AEWG Commissioner for Pt. Lay AEWG Commissioner for Savoonga
 Dated: _____ Dated: _____

 John Hopson, Jr. Raymond Seetook
 AEWG Commissioner for Wainwright AEWG Commissioner for Wales
 Dated: _____ Dated: _____

 Name: Name:
 BP Exploration (Alaska) Inc. Eni US Operating Co Inc.
 Dated: _____ Dated: _____

 Name: Name:
 Exxon Mobil Corporation GX Technology Corp.
 Dated: _____ Dated: _____

 Name: Name:
 Caelus Energy of Alaska Shell Offshore, Inc.
 Dated: _____ Dated: _____

 Name: Name:
 SAEExploration TGS-NOPEC Geophysical Company
 Dated: _____ Dated: _____



ATTACHMENT I -- LOCAL SAR CONTACTS LOCAL SEARCH AND RESCUE ORGANIZATIONS - CONTACT PERSONS

(IN EMERGENCIES, ALWAYS DIAL 911)

North Slope Borough

Search and Rescue (Pilots)

Director Price E. Brower 852-2822 WK
367-3225 Home

Barrow Volunteer

Search and Rescue Station 852-2808 OFS

President Crawford Patkotak 852-3798 HM
360-3477 Cell

Vice-Pres. Johnny Adams 852-7761 HM
878-2411 Cell

Secretary Isabelle Kanayurak 852-2822 Wk

Treasurer James Patkotak 852-4686 HM
855-0733 Cell

Coordinator Roy Ahmaogak 367-4184 Cell

Director Stephanie Lozano 244-4011 WK
382-6304

Director Vernon Edwardsen 852-0521 WK
855-1264 Cell

Nuiqsut Volunteer

Search and Rescue Station 480-6613 (Fire Hall)

Fire Chief Steven Kunaknana 480-6613 WK

Coordinator Gordon Brown 480-6225/6223
480-0040 Cell

Volunteer Winford Ipalook 480-0046 Cell

Volunteer Willie Sielak 480-0003 Cell

Volunteer Larry Kasak Sr. 480-0020 Cell

Kaktovik Volunteer

Search and Rescue Station 640-6212 (Fire Hall)

President Lee Kayotuk 640-5893 HM

640-0033 Cell 640-6213 Home

Vice-Pres. Tom Gordon 640-

Secretary Nathan Gordon 640-6925

Treasurer Don Kayotuk 640-2947

Fire Chief Sheldon Brower 640-6212 WK

Wainwright Volunteer Search and Rescue 763-2728 (Fire Station)

President Joe Ahmaogak Jr. 763-2826 Home

Vice President John Hopson, Jr. 763-3464 Home

Secretary Raymond Negovanna 763-2102 Home

Treasurer Ben Ahmaogak, Jr. 763-3030 Home

Director Artic Kittick 763-2534 Home

Director Raymond Negovanna 763-2826

Pt. Lay Volunteer Search and Rescue 833-2714 (Fire Hall)

President Warren H Lampe 833-0049



Vice Pres. Leo Ferreira 833-3185
Secretary Misty Plymale 833-1209
Treasurer Lily Anniskett 833-0060
Fire Chief Anthony Neakok 833-2714/833-2253
Coordinator 1 Marie Tracey 833-2127/2428/350-9712
Coordinator 2 Cyrus Nukapigak 833-1209/2318

Pt. Hope Volunteer Search and Rescue

Coordinator Midas Koenig .368-2774Work
Fire Chief Art Oomittuk 368-2774 Work (Note: Only contact for Pt. Hope)

North Slope Borough Disaster Relief Coordinator

Frederick Brower 852-0284 OFS 48



**ATTACHMENT II -- OPERATIONS VESSELS
VESSELS TO BE USED FOR AND IN SUPPORT OF
INDUSTRY PARTICIPANTS' OPERATIONS
AS IDENTIFIED IN SECTION 401(b)(1)(B)**

[ALL VESSELS TO BE IDENTIFIED BY COMPANY]

NOTE:

**COPY OF PRESENTATION OF THE INDUSTRY PARTICIPANT ATTACHED
IDENTIFYING VESSELS TO BE USED FOR AND IN SUPPORT OF THE
INDUSTRY PARTICIPANTS' OPERATIONS.**



**ATTACHMENT III -- MONITORING VESSELS
VESSELS TO BE USED
FOR AND IN SUPPORT
OF THE INDUSTRY PARTICIPANTS MONITORING PLANS
AS IDENTIFIED IN SECTION 401(b)(1)(B)**

[ALL VESSELS TO BE IDENTIFIED BY COMPANY]

NOTE:

**COPY OF PRESENTATION OF THE INDUSTRY PARTICIPANT ATTACHED
IDENTIFYING VESSELS TO BE USED FOR AND IN SUPPORT OF THE
INDUSTRY PARTICIPANTS' MONITORING PLAN.**



ATTACHMENT IV -- SAFE HARBOR

ATTACHMENT V -- OIL SPILL MITIGATION



APPENDIX C

PASSIVE ACOUSTIC MONITORING REPORT



APPENDIX D

SUMMARY LIST OF ALL PINNIPEDS AND CETACEANS SIGHTED DURING THE *CRD 3D 2014 SURVEY*

Vessel	Time	Species	Grp size	Behavior	Location	Depth (ft)	Array Volume	Bf sea state	Seismic (Y/N)
Peregrine	2014-08-31 12:05:12.5 AKDT	Ringed/Spotted	2	Looking	70.51334 N 149.84245 W	9	0	3	Non-Seismic
Peregrine	2014-08-31 12:55:39.3 AKDT	Ringed/Spotted	1	Looking	70.51131 N 149.85684 W	9	0	2	Non-Seismic
Peregrine	2014-08-31 13:05:29.9 AKDT	Unid Seal	1	Diving	70.51618 N 149.85073 W	9	0	3	Non-Seismic
Peregrine	2014-08-31 13:42:20.5 AKDT	Ringed/Spotted	1	Looking	70.51670 N 149.86359 W	9	0	3	Non-Seismic
Maxime	2014-08-31 13:48:19.3 AKDT	Spotted Seal	1	Looking	70.51468 N 149.85919 W		0	2	Non-Seismic
Peregrine	2014-08-31 13:58:41.1 AKDT	Ringed/Spotted	1	Looking	70.51761 N 149.85888 W	9	0	3	Non-Seismic
Maxime	2014-08-31 14:14:49.0 AKDT	Ringed/Spotted	1	Looking	70.52503 N 149.88476 W		0	3	Non-Seismic
Peregrine	2014-08-31 14:17:33.3 AKDT	Ringed/Spotted	2	Surface Active	70.51666 N 149.84606 W	9	0	2	Non-Seismic
Maxime	2014-08-31 14:21:03.4 AKDT	Spotted Seal	1	Looking	70.52742 N 149.89966 W		0	3	Non-Seismic
Peregrine	2014-08-31 14:31:01.6 AKDT	Ringed/Spotted	1	Looking	70.52052 N 149.85023 W	8	0	3	Non-Seismic
Peregrine	2014-08-31 14:46:22.5 AKDT	Spotted Seal	1	Looking	70.52267 N 149.89454 W	9	0	3	Non-Seismic
Maxime	2014-08-31 15:10:08.8 AKDT	Unid Seal	1	Looking	70.52867 N 149.96465 W		0	3	Non-Seismic
Maxime	2014-08-31 15:26:24.9 AKDT	Unid Seal	1	Looking	70.52744 N 149.96123 W		0	3	Non-Seismic
Maxime	2014-08-31 19:18:11.8 AKDT	Spotted Seal	1	Looking	70.51333 N 149.99271 W		0	3	Non-Seismic
Peregrine	2014-09-01 08:55:11.3 AKDT	Ringed/Spotted	1	Looking	70.51686 N 149.87156 W	6.9	0	2	Non-Seismic
Maxime	2014-09-01 08:57:43.7 AKDT	Spotted Seal	1	Looking	70.52068 N 149.87788 W	7.5	0	2	Non-Seismic
Maxime	2014-09-01 08:59:19.9 AKDT	Ringed/Spotted	1	Looking	70.52265 N 149.88453 W		0	2	Non-Seismic
Peregrine	2014-09-01 10:24:32.5 AKDT	Ringed/Spotted	1	Looking	70.51766 N 149.87856 W	8.5	0	3	Non-Seismic



Peregrine	2014-09-01 10:58:49.7 AKDT	Spotted Seal	1	Surface Active	70.51247 N 149.85760 W	9	0	1	Non-Seismic
Maxime	2014-09-01 10:59:54.7 AKDT	Spotted Seal	1	Looking	70.51353 N 149.86097 W		0	2	Non-Seismic
Maxime	2014-09-01 11:08:20.9 AKDT	Ringed/Spotted	1	Surface Active	70.51074 N 149.85686 W		0	2	Non-Seismic
Peregrine	2014-09-01 13:04:31.2 AKDT	Ringed/Spotted	1	Looking	70.51102 N 149.85692 W	10	0	2	Non-Seismic
Peregrine	2014-09-01 13:19:13.9 AKDT	Unid Seal	1	Looking	70.51707 N 149.89542 W	10	0	2	Non-Seismic
Maxime	2014-09-01 13:19:19.3 AKDT	Spotted Seal	1	Looking	70.51590 N 149.87158 W	7.5	0	2	Non-Seismic
Maxime	2014-09-01 14:18:00.9 AKDT	Spotted Seal	1	Looking	70.53317 N 149.98851 W	11	0	3	Non-Seismic
Maxime	2014-09-01 16:39:50.1 AKDT	Ringed/Spotted	1	Looking	70.52474 N 149.96946 W	9.4	0	3	Non-Seismic
Maxime	2014-09-01 18:08:44.1 AKDT	Spotted Seal	1	Looking	70.54212 N 149.96065 W	9	0	2	Non-Seismic
Maxime	2014-09-01 19:35:51.3 AKDT	Spotted Seal	1	Swimming	70.51314 N 149.86651 W	7	0	2	Non-Seismic
Maxime	2014-09-02 08:57:40.4 AKDT	Ringed Seal	3	Looking	70.51280 N 149.86422 W	7	0	1	Non-Seismic
Peregrine	2014-09-02 09:04:40.3 AKDT	Ringed/Spotted	1	Swimming	70.51486 N 149.86739 W	7	0	2	Non-Seismic
Maxime	2014-09-02 10:44:07.5 AKDT	Bearded Seal	1	Looking	70.53582 N 150.06491 W	6.6	0	3	Non-Seismic
Mitigation Vessel	2014-09-02 11:28:21.9 AKDT	Spotted Seal	1	Looking	70.51318 N 149.86350 W		0	3	Non-Seismic
Peregrine	2014-09-02 13:58:01.5 AKDT	Spotted Seal	1	Swimming	70.51264 N 149.86392 W	8.4	0	5	Non-Seismic
Peregrine	2014-09-02 16:53:52.2 AKDT	Ringed/Spotted	1	Swimming	70.50940 N 149.85210 W	8	0	3	Non-Seismic
Maxime	2014-09-02 19:46:52.2 AKDT	Spotted Seal	1	Swimming	70.52104 N 149.78461 W	7	0	3	Non-Seismic
Peregrine	2014-09-03 06:28:49.2 AKDT	Spotted Seal	1	Looking	70.50994 N 149.86514 W	7	0	4	Non-Seismic
Peregrine	2014-09-06 07:48:01.4 AKDT	Ringed/Spotted	1	Looking	70.53644 N 149.75449 W	4.3	0	0	Non-Seismic
Mitigation Vessel	2014-09-06 13:50:28.1 AKDT	Ringed/Spotted	1	Looking	70.54120 N 149.70453 W	4.6		2	Non-Seismic
Peregrine	2014-09-06 15:38:29.0 AKDT	Spotted Seal	1	Milling	70.51184 N 149.85727 W	3	0	1	Non-Seismic
Peregrine	2014-09-06 17:59:39.9 AKDT	Spotted Seal	1	Swimming	70.50844 N 149.83402 W	3.2	0	3	Non-Seismic
Maxime	2014-09-06 20:26:07.9 AKDT	Ringed/Spotted	1	Looking	70.52534 N 149.84656 W	6	0	2	Non-Seismic



Mitigation Vessel	2014-09-07 10:23:13.4 AKDT	Bearded Seal	1	Looking	70.52388 N 149.88004 W		0	2	Non-Seismic
Mitigation Vessel	2014-09-07 19:30:54.5 AKDT	Ringed/Spotted	1	Swimming	70.53165 N 149.72296 W	4.7	0	1	Non-Seismic
Peregrine	2014-09-08 11:11:28.8 AKDT	Ringed/Spotted	1	Looking	70.51390 N 149.80284 W	7.3	0	2	Non-Seismic
Peregrine	2014-09-08 12:10:54.6 AKDT	Spotted Seal	1	Swimming	70.51259 N 149.81238 W	8	0	2	Non-Seismic
Maxime	2014-09-09 09:01:13.2 AKDT	Ringed/Spotted	1	Looking	70.51685 N 149.85247 W		0	3	Non-Seismic
Maxime	2014-09-09 10:04:00.0 AKDT	Ringed Seal	1	Looking	70.52256 N 149.85324 W	5.8	0	3	Non-Seismic
Maxime	2014-09-09 10:14:43.8 AKDT	Spotted Seal	1	Looking	70.52297 N 149.85573 W	6	0	3	Non-Seismic
Maxime	2014-09-09 10:24:34.7 AKDT	Ringed Seal	1	Looking	70.52256 N 149.84377 W	5.5	0	3	Non-Seismic
Peregrine	2014-09-10 10:10:04.9 AKDT	Unid Seal	1	Diving	70.55772 N 149.87236 W	7	0	3	Non-Seismic
Mitigation Vessel	2014-09-10 12:20:36.2 AKDT	Spotted Seal	1	Looking	70.51006 N 149.86178 W		0	4	Non-Seismic
Mitigation Vessel	2014-09-10 18:21:27.4 AKDT	Spotted Seal	1	Swimming	70.52568 N 149.80192 W		0	3	Non-Seismic
Mitigation Vessel	2014-09-11 12:40:35.3 AKDT	Spotted Seal	1	Looking	70.51315 N 149.83932 W	6	0	3	Non-Seismic
Maxime	2014-09-11 13:02:28.8 AKDT	Unid Seal	1	Looking	70.50803 N 149.81254 W		0	3	Non-Seismic
Maxime	2014-09-11 16:49:40.5 AKDT	Ringed/Spotted	1	Swimming	70.52623 N 149.84584 W	5.2	0	3	Non-Seismic
Maxime	2014-09-11 17:09:04.8 AKDT	Ringed/Spotted	1	Swimming	70.51936 N 149.83078 W	5	0	3	Non-Seismic
Maxime	2014-09-11 17:21:23.9 AKDT	Spotted Seal	1	Looking	70.51893 N 149.85025 W	5	0	3	Non-Seismic
Mitigation Vessel	2014-09-11 17:47:45.4 AKDT	Spotted Seal	1	Swimming	70.55214 N 149.88795 W	7	0	3	Non-Seismic
Peregrine	2014-09-11 17:54:25.7 AKDT	Spotted Seal	1	Looking	70.55373 N 149.90684 W	5	0	3	Non-Seismic
Peregrine	2014-09-12 09:06:53.0 AKDT	Ringed/Spotted	2	Looking	70.55689 N 149.85164 W	5	0	3	Non-Seismic
Maxime	2014-09-12 10:29:18.3 AKDT	Spotted Seal	1	Swimming	70.55445 N 149.83849 W		0	4	Non-Seismic
Maxime	2014-09-12 13:25:58.8 AKDT	Ringed/Spotted	1	Surface Active	70.52059 N 149.86448 W		0	5	Non-Seismic
Maxime	2014-09-12 13:38:57.3 AKDT	Unid Seal	1	Unknown	70.52503 N 149.86236 W		0	5	Non-Seismic



Maxime	2014-09-15 13:09:44.3 AKDT	Unid Seal	1	Looking	70.53815 N 150.17862 W	7	0	2	Non-Seismic
Maxime	2014-09-16 08:53:05.8 AKDT	Spotted Seal	1	Swimming	70.49178 N 149.94268 W	5	10	3	Seismic
Maxime	2014-09-16 12:10:00.0 AKDT	Spotted Seal	1	Swimming	70.48836 N 149.95924 W	6	620	2	Seismic
Maxime	2014-09-16 16:19:14.4 AKDT	Spotted Seal	1	Swimming	70.49264 N 149.96726 W	5	0	2	Non-Seismic
Mitigation Vessel	2014-09-18 07:41:38.5 AKDT	Spotted Seal	1	Swimming	70.50914 N 149.87762 W	7	0	4	Non-Seismic
Peregrine	2014-09-18 09:51:45.1 AKDT	Spotted Seal	1	Looking	70.52962 N 149.95886 W	6.9	0	5	Non-Seismic
Maxime	2014-09-21 12:30:25.4 AKDT	Spotted Seal	1	Swimming	70.51051 N 149.87820 W	4	620	2	Seismic
Maxime	2014-09-21 14:45:21.0 AKDT	Spotted Seal	1	Looking	70.51536 N 149.99199 W	8	620	2	Seismic
Maxime	2014-09-21 14:53:03.0 AKDT	Unid Seal	1	Looking	70.51100 N 149.98707 W	7	0	2	Non-Seismic
Mitigation Vessel	2014-09-21 17:40:29.2 AKDT	Spotted Seal	1	Swimming	70.51262 N 149.86627 W	7.5	0	2	Non-Seismic
Maxime	2014-09-22 13:04:13.4 AKDT	Unid Seal	1	Sink	70.47770 N 150.00115 W	6	0	3	Non-Seismic
Mitigation Vessel	2014-09-22 13:56:11.0 AKDT	Beluga Whale	1	Swimming	70.52448 N 149.93097 W	9	0	2	Non-Seismic
Peregrine	2014-09-22 14:00:27.2 AKDT	Beluga Whale	1	Swimming	70.52488 N 149.89816 W	6	620	2	Seismic
Mitigation Vessel	2014-09-22 15:44:54.9 AKDT	Spotted Seal	1	Resting	70.51698 N 149.86562 W	6	0	2	Non-Seismic
Mitigation Vessel	2014-09-22 17:13:00.0 AKDT	Spotted Seal	1	Resting	70.51281 N 149.86420 W		0	2	Non-Seismic
Mitigation Vessel	2014-09-22 18:02:19.9 AKDT	Spotted Seal	1	Swimming	70.51556 N 149.87103 W	8	0	2	Non-Seismic
Mitigation Vessel	2014-09-23 10:43:35.2 AKDT	Spotted Seal	1	Looking	70.45892 N 150.04443 W	5.6	0	5	Non-Seismic
Mitigation Vessel	2014-09-23 11:04:25.9 AKDT	Spotted Seal	1	Looking	70.45598 N 150.05231 W	5.5	0	5	Non-Seismic
Peregrine	2014-09-23 16:58:12.4 AKDT	Spotted Seal	1	Swimming	70.55965 N 149.89608 W	7	0	4	Non-Seismic



APPENDIX E

TABLE OF POLAR BEAR SIGHTINGS MADE FROM SURVEY VESSELS

Vessel	Date	Time (AKDT)	Dist. to Vessel (m)	No. of Individuals	Behavior	Location	Activity	Array Volume	Effort
Mitigation Vessel	23-Sep	15:00:21	500	1	Walking	70.55833 N 149.89811 W	Transit	0	Non-Seismic Effort
<i>Maxime</i>	17-Sep	17:41:05	560	1	Walking	70.55270 N 149.77472 W	Seismic	620	Seismic Effort
<i>Kimberlin Kat</i>	16-Sep	10:56:00	400	1	Walking	70.55751 N 149.92315 W	Support	0	Opportunistic
<i>Peregrine</i>	14-Sep	17:29:36	650	1	Walking	70.54986 N 150.14197 W	Anchor/Dock	0	Off Watch
<i>Sleep Robber</i>	01-Sep	20:32:00	800	1	Resting	70.782778N 149.782778 W	Support	0	Opportunistic



APPENDIX F

POLAR BEAR SIGHTING FORMS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

1011 E. Tudor Road

Anchorage, Alaska 99503-6199

SAE 2014 Colville River Delta Seismic Survey

LOA 14-12

Type of Polar Bear Sighting Report: LAND MARINE

Date: 9/1/2014 **Observer name:** Mark Riddle

Time: 20:32 local **Contact number/email:** 903-815-8810

Location: 70°46.586N 149°46.586

Vessel Name: Sleeprobber

Vessel Heading: West **Speed:** 5knts **Activity:** Bathymetry runs

Vessels within 5KM; Identification: Miss Diane **Bearing:**

Heading: 130 **Speed:** 2knts **Activity:** Node laying

Identification: Mark Stevens **Bearing:** **Heading:** 180 **Speed:** 4knts **Activity:** Node laying

Identification: Maxine **Bearing:** **Heading:** 67 **Speed:** 0 **Activity:** Mitigation for seismic survey (tied alongside Peregrine Falcon)

Identification: Peregrine Falcon

Bearing: **Heading:** 67 **Speed:** 0 **Activity:** Seismic survey (10cu mitigation gun)

Identification: Wingham **Bearing:** **Heading:** 270 **Speed:** 5knts **Activity:** Bathymetry runs

Latitude: 70°33.131 **Longitude:** 149°46.586 **Datum:** WGS 84

Weather conditions: Fog Snow Rain Clear Temperature 32.9 F F/C

Wind speed 21kts mph/kts **Wind direction** 143°

Water depth: 2.1 (meters)

Ice condition: 1) Estimate % ice cover using 10% increments: 0;

2) Estimated distance to pack ice: NA (km, mi or nm)

Visibility: 1) Est Distance can see: 3.5 (km); 2) light dark twilight: ;

3) Glare: none: little: moderate: severe:



Number of bears: 1 unknown sex Adult M/F

 Sub-adult

 Unknown

 Sow/cub(s)

 Sow/yearling(s)

 Sow/2YO(s)

Estimated distance of bear(s) from vessel (initial sighting) half mile (km, m, mi or nm) and vessel (closest point) half mile (km, m, mi or nm)

Heading of bear: NA **Bearing of bear:** _____

Sighting Cue: _____ **Body** _____

Bear behavior (Initial Contact):

Curious Swimming Resting x Hunting Walking Other (explain) _____

Bear behavior (After Contact):

Curious Swimming Resting x Hunting Walking Other (explain) _____

Possible attractants present:

Description of encounter/other bear behavior: Sleeprobber reported sighting of single adult Polar Bear on East end of Spy Islands, half a mile from boat. No reaction of bear to boat, bear was sat still when first encountered and stayed still for the encounter.

Action taken by vessel in response to sighting: Vessels moved away to continue work on node lines further from the bear sighting to ensure a mile/1600m radius was maintained from the bear. All company boats were radioed and instructed to maintain at least a half mile radius from the bear location.

Duration of encounter:

Other Comments or Notes: Information reported to Felix Smith, Peregrine Falcon PSO.

Deterrents used/distance (IN ORDER OF ESCALATION 1-9):

1.) Bear Monitors

2.) Vehicle (position/revving)

3.) Spotlight/Headlight

4.) Yelling/Clapping

5.) Horn

6.) Sirens

7.) Acoustic Recordings

8.) Chemical Repellents

9.) Other



All polar bear sightings must be reported to agencies within twenty-four hours.

USFWS – Craig Perham (**Email:** Craig_Perham@fws.gov, 907-786-3810, Fax: 907-786-3816*)

USFWS – Christopher Putnam (**Email:** Christopher_Putnam@fws.gov, 907-786-3844, Fax: 907-786-3816*)

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United States Department of the Interior
 FISH AND WILDLIFE SERVICE
 1011 E. Tudor Road
 Anchorage, Alaska 99503-6199

SAE 2014 Colville River Delta Seismic Survey
LOA 14-12

Type of Polar Bear Sighting Report: LAND X MARINE

Date: 09/14/2014 Observer Name: Ryan Ard

Time: 17:29 Contact number/email: ryan.ard@ncs-subsea.com

Location: Spy Island, near Oliktok Point, AK

Vessel Name: M/V Peregrine Falcon

Vessel Heading: Anchored Speed: N/A Activity: Anchored

Vessels within 5KM:

Identification: M/V Maxime Bearing: N/A Heading: N/A

Speed: 0 Activity: Tied to Peregrine Falcon, effectively anchored.

Identification: M/V Miss Diane Bearing: N/A Heading: N/A

Speed: 0 Activity: Anchored 250m NW of Peregrine Falcon. Similar distance from Spy Island

Identification: Bearing: Heading:

Speed: Activity:

Identification: Bearing: Heading:

Speed: Activity:



Identification: _____ **Bearing:** _____ **Heading:** _____

Speed: _____ **Activity:** _____

Latitude: N 70-32-7466 **Longitude:** W 150-09.261 **Datum:** WGS 84

Weather conditions: Fog Snow Rain Clear Temperature 33.1F °F/C

Wind speed: 39.8kts mph/kts **Wind direction:** S 144

Water depth: 2 Meters

Ice condition: 1) Estimate % ice cover using 10% increments: 0

2) Estimated distance to pack ice: N/A (km, mi or nm)

Visibility: 1) Estimated Distance that can be seen: 1 km; 2) light dark twilight

3) Glare: none: Little: Moderate: Severe:

Number of bears:

_____	Adult M/F	_____	Sows/cub(s)
<u>X</u>	Sub-adult	_____	Sow/yearling(s)
_____	Unknown	_____	Sow/2YO(s)

Estimated distance of bear(s) 1) from vessel (initial sighting) 800m (km, m, mi or nm)

2) from vessel (closest point) 650m (km, m, mi or nm)

Heading of bear: 120 **Bearing of bear:** 120

Sighting Cue: _____ **Body** _____

Bear behaviour (Initial Contact):

Curious Swim Rest Hunt Walk Other (explain) _____

Bear behaviour (After Contact):

Curious Swim Rest Hunt Walk Other (explain) Chased a seagull & defecated, and continued to walk the length of Spy Island from NW to SE.



Possible attractants present:

N/A

Description of encounter/other bear behaviour:

Polar bear walked the length of Spy Island from NW to SE. It stopped to playfully chase a seagull, to defecate, then continued to walk until outside range of view.

Action taken by vessel in response to sighting:

Polar bear took no notice of vessels. To move vessels away would have been more likely to elicit a response than to leave them as they are.

Direction of encounter: NW to SE

Other comments or notes:**Deterrents used/distance (IN ORDER OF ESCALATION 1-9):**

- | | |
|-------------------------------------|------------------------------|
| 1) Bear monitors _____ | 6) Sirens _____ |
| 2) Vehicle (position/revving) _____ | 7) Acoustic recordings _____ |
| 3) Spotlight/headlight) _____ | 8) Chemical repellents _____ |
| 4) Yelling/clapping _____ | 9) Other _____ |
| 5) Horn _____ | |



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Speed: _____ Activity: _____

Latitude: 70.55751N Longitude: 149.92315W Datum: _____ WGS 84

Weather conditions: Fog Snow _____ Rain _____ Clear _____ Temperature 34F °F/C

Wind speed: 15kts mph/kts Wind direction: South

Water depth: _____ Meters

Ice condition: 1) Estimate % ice cover using 10% increments: 0

2) Estimated distance to pack ice: N/A (km, mi or nm)

Visibility: 1) Estimated Distance that can be seen: .75 km; 2) light dark _____ twilight _____

3) Glare: none: Little: _____ Moderate: _____ Severe: _____

Number of bears:

_____	Adult M/F	_____	Sows/cub(s)
<u>1</u>	Sub-adult	_____	Sow/yearling(s)
_____	Unknown	_____	Sow/2YO(s)

Estimated distance of bear(s) 1) from vessel (initial sighting) 400m (km, m, mi or nm)

2) from vessel (closest point) 400m (km, m, mi or nm)

Heading of bear: E Bearing of bear: W

Sighting Cue: _____ Body _____

Bear behaviour (Initial Contact):

Curious _____ Swim _____ Rest _____ Hunt _____ Walk _____ Other (explain) _____

Bear behaviour (After Contact):

Curious _____ Swim _____ Rest _____ Hunt _____ Walk _____ Other (explain) _____

Possible attractants present:

N/A



Description of encounter/other bear behaviour:

While running fathom lines, the Kimberlin's Cat spotted a polar bear emerging from the water on the north side of the west end of Spy Island. Bear is described as dark colored and not very large. Not a cub, but smaller than others the observer has seen. The bear took no notice of the boat and proceeded to walk west.

Action taken by vessel in response to sighting:

Vessel moved outside of 800m range and continued work.

Direction of encounter: North

Other comments or notes:

The initial sighting was made by ENI Security. This report is based on information from the encounter of the Kimberlin's Cat crew.

Deterrents used/distance (IN ORDER OF ESCALATION 1-9):

- | | | | |
|-------------------------------|-------|------------------------|-------|
| 1) Bear monitors | _____ | 6) Sirens | _____ |
| 2) Vehicle (position/revving) | _____ | 7) Acoustic recordings | _____ |
| 3) Spotlight/headlight) | _____ | 8) Chemical repellents | _____ |
| 4) Yelling/clapping | _____ | 9) Other | _____ |
| 5) Horn | _____ | | |

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

SAE 2014 Colville River Delta Seismic Survey
LOA 14-12

Type of Polar Bear Sighting Report: LAND x MARINE

Date: 9/17/2014 Observer Name: Roxann Merizan
 Time: 17:41:05 Contact number/email: 909-567-6977
 Location: East Point of Spy Island
 Vessel Name: M/X Maxime
 Vessel Heading: 090 Speed: 3.2 knots Activity: Transit

Vessels within 5KM:

Identification: Peregrine Falcon Bearing: Heading: 269
 Speed: 4.5 Activity: Seismic survey 620 cui
 knots

Identification: Miss Diane Bearing: Heading:
 Speed: Activity: Node laying

Identification: Wingham Bearing: Heading:
 Speed: Activity: Node laying

Identification: Aubree Tara Bearing: Heading:
 Speed: Activity: Mitigation Boat



Possible attractants present:

None

Description of encounter/other bear behaviour:

Bear sighted on land, did not appear affected by boat presence. Moved off land into water to the North

Action taken by vessel in response to sighting:

Continued to head away from Polar Bear

Direction of encounter: North of boat.

Other comments or notes:**Deterrents used/distance (IN ORDER OF ESCALATION 1-9):**

- | | |
|-------------------------------------|------------------------------|
| 1) Bear monitors _____ | 6) Sirens _____ |
| 2) Vehicle (position/revving) _____ | 7) Acoustic recordings _____ |
| 3) Spotlight/headlight _____ | 8) Chemical repellents _____ |
| 4) Yelling/clapping _____ | 9) Other _____ |
| 5) Horn _____ | |



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coloration was dark and it was foggy/snowy, so could not get a clear visual. Only had eyes on it for 30 seconds, then lost it. Could have been a grizzly bear or a muddy polar bear.

Action taken by vessel in response to sighting:

Used caution and called it into security just in case. There was no seismic operations taing place at the time of sighting.

Direction of encounter: 245.5 degrees

Other comments or notes:

Deterrents used/distance (IN ORDER OF ESCALATION 1-9):

- | | |
|-------------------------------------|------------------------------|
| 1) Bear monitors _____ | 6) Sirens _____ |
| 2) Vehicle (position/revving) _____ | 7) Acoustic recordings _____ |
| 3) Spotlight/headlight _____ | 8) Chemical repellents _____ |
| 4) Yelling/clapping _____ | 9) Other _____ |
| 5) Horn _____ | |

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