Request by ION Geophysical for a Letter of Authorization to Allow the Incidental Take of Polar Bears and Pacific Walruses during a Marine Seismic Survey in the Beaufort Sea, October–December 2010

submitted by

(via electronic mail)

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to

U.S. Fish and Wildlife Service
Marine Mammal Section
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SUMMARY

ION Geophysical (IONION) plans to conduct a 2D seismic survey in portions of the Alaskan Beaufort Sea and northern Chukchi Sea in 2010 during the period 1 October to 15 December (approximately). The survey will be conducted from the SR/V *Geo Explorer*, a seismic source vessel, with assistance from the M/V *Vladimir Ignatyuk*, an arctic class icebreaker. The purpose of the proposed survey is to collect seismic reflection data that reveal the sub-bottom profile for assessments of geologic origin and potential petroleum reserves.

The polar bear is a year-round resident in the region and the Pacific walrus occurs seasonally in the northern Chukchi Sea with occasional observations in the Alaskan Beaufort Sea. These two marine mammal species fall under the management authority of the U.S. Fish and Wildlife Service (USFWS), and are protected under the Marine Mammal Protection Act of 1973. The polar bear is currently listed as a threatened species under the U.S. Endangered Species Act (ESA) based on the expected continuation of declines in sea ice which is their principal habitat. The USFWS has also recently proposed to designate critical habitat for polar bear populations in the U.S. under the ESA. The critical habitat proposal identifies habitat in three separate areas: barrier island habitat, sea ice habitat and terrestrial denning habitat. The total area proposed for designation would cover approximately 519, 403 km^2 (200, 541 mi^2) and is found entirely within the lands and waters in the United States. Barrier island habitat includes coastal barrier islands and spits along Alaska's coasts. Sea ice habitat is located over the continental shelf, and includes water 300 m and less in depth. Terrestrial denning habitat includes lands within 32 km of the northern coast of Alaska between the Canadian border and the Kavik River and within 8 km between the Kavik River and Barrow. The majority of the survey trackline (59%) will be conducted outside of the proposed critical habitat (>300 m of water). In addition, most surveying within the critical habitat will occur when the first-year ice is just starting to form, and is unlikely to support much movement or denning habitat for polar bears.

ION is requesting authorization from the USFWS for the non-lethal incidental take of small numbers of polar bear and walrus during the proposed geophysical survey. An Incidental Harassment Authorization (IHA) has also been requested from NMFS to allow the incidental take of small numbers of cetaceans and pinnipeds during the proposed seismic survey.

The items required to be addressed pursuant to 50 C.F.R. § 18.124, are included below. This includes location, description, and dates and duration of the proposed operations to be conducted, a site-specific monitoring program, a polar bear and Pacific walrus awareness and interaction plan, and a plan of cooperation to minimize adverse effects on the availability of polar bear and Pacific walrus for subsistence uses.

I. PLAN OF OPERATIONS

Location of Operations

ION proposes to conduct a 2D seismic survey primarily in the Alaskan Beaufort Sea with two lines extending into the Chukchi Sea (Fig. 1). The survey area will be bounded approximately by 138º to 168º W longitude and 70º to 73º N latitude ranging from ~12 to 250 km offshore in water depths from <20 m to >3500 m. The survey area will cover the continental shelf, the continental slope, and the abyssal plain. The approximate length of the proposed survey lines is 7,250 km. For mitigation and operational reasons the survey area has been bisected by a line that runs from 70.5° N, 150.5° W to 73° N, 148° W (Fig. 1). Weather and ice permitting, ION plans to begin survey operations east of the line described above (eastern survey area; Fig. 1) in offshore waters (>1000 m) where bowheads are expected to be least abundant in early October. The survey will then progress to shallower waters in the eastern survey area before moving to the west survey area (Fig. 1) in late October or early November. Ice conditions during the survey are expected to range from open water to 10/10 ice cover. The airguns and hydrophone streamer towed by the *Geo Explorer* have been specially designed for operations in ice covered seas.

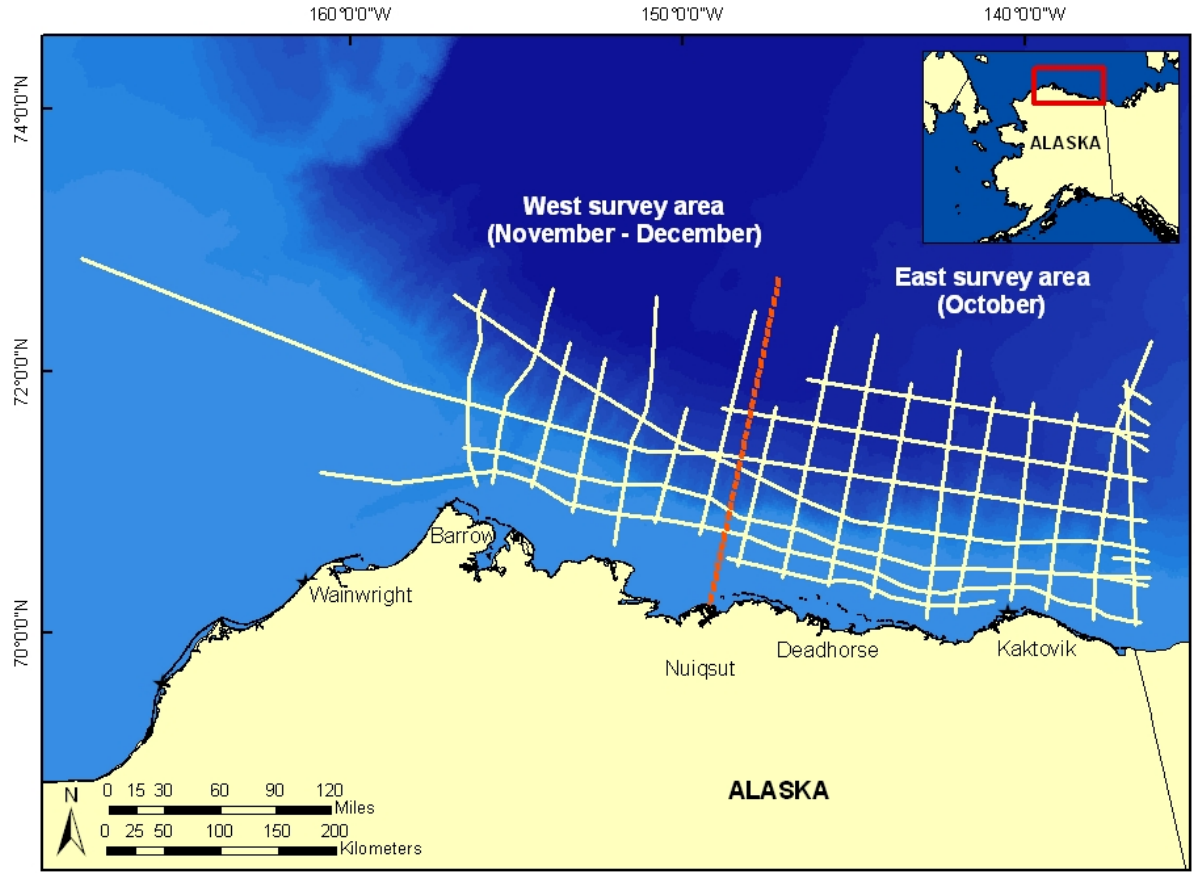

FIGURE 1. Proposed survey lines for the ION seismic survey in the Alaskan Beaufort Sea during October–December 2010.

Description of Operations

Geophysical (seismic reflection and refraction) and bathymetric surveys will be conducted from the *Geo Explorer*, a 2D seismic source vessel, and the M/V *Vladimir Ignatyuk*, an arctic-class icebreaker. The *Geo Explorer* will deploy an airgun array comprised of 28 Bolt airguns with a total volume of 4330 in^3 and a single hydrophone streamer which will extend ~8.5 km behind the vessel. The *Geo Explorer* will follow the lead of the accompanying icebreaker, the *Vladimir Ignatyuk*, which will generally operate ~0.5–1 km ahead of the *Geo Explorer*.

Along with the airgun operations, additional acoustic systems to be operated during the cruise will include a single-beam echo sounder, and an ice profiler. These sources will operate throughout most of the cruise, and will generally operate simultaneously with the airgun array.

The majority of the survey (62%) will be conducted in water depths >200 m, however, 19% of operations will occur in water depths ≤50 m. The survey will consist of 38 transect lines ranging in length from ~11 to 923 km and totaling ~7,250 km of trackline. After completion of the survey both vessels will exit from the western end of the study area and transit south through the Chukchi and Bering seas.

Dates and Duration of Operations

Both vessels will enter the Alaskan Beaufort Sea from Canadian waters on ~1 October and return to Dutch Harbor on or before~30 December. The seismic survey is scheduled to occur over ~76 days from ~1 October to 15 December 2010, though some variation is possible given the uncertainties in ice conditions and other environmental variables.

II. VESSEL-BASED MONITORING, MITIGATION, AND REPORTING PLAN

Introduction

ION's vessel-based monitoring program is designed to meet the requirements of the Incidental Harassment Authorization (IHA) and Letter of Authorization (LOA) requested from NMFS and USFWS, respectively, as well as to meet any other agreements between ION and other agencies or groups. The objectives of the program will be:

- to ensure that disturbance to marine mammals and subsistence hunts is minimized and all permit stipulations are followed,
- to document the effects of the proposed survey activities on marine mammals, and
- to collect baseline data on the occurrence and distribution of marine mammals in the survey area.

This monitoring plan will be implemented by a team of experienced MMOs, including both biologists and Inupiat personnel. MMOs will be stationed aboard the source vessel and icebreaker throughout the duration of the seismic survey. Reporting of the results of the vessel-based monitoring program will include the estimation of the number of "takes" as stipulated in the IHA and LOA.

The vessel-based monitoring will provide:

- the basis for real-time mitigation, if necessary, as required by the various permits that ION receives,
- information needed to estimate the number of "takes" of marine mammals by harassment, which must be reported to NMFS and USFWS,
- data on the occurrence, distribution, and activities of marine mammals in the areas where the survey program is conducted,
- information to compare the distances, distributions, behavior, and movements of marine mammals relative to the survey vessel at times with and without airgun activity, and
- a communication channel to coastal communities including Inupiat whalers.

ION's vessel-based monitoring program will be operated and administered consistent with other monitoring programs conducted during seismic surveys in the Arctic or such alternative requirements as may be specified in the IHA or LoA issued by NMFS and USFWS, respectively. Any other agreements between ION and agencies or groups such as MMS, the North Slope Borough (NSB), and the Alaska Eskimo Whaling Commission (AEWC) will also be fully incorporated into the monitoring plan. All MMOs will be provided training as described below. At least one Inupiat knowledgeable about the mammals of the area is expected to be included as a member of the MMO team and will have the additional responsibility of communicating with coastal communities and directly with Inupiat whalers during the whaling season should it become necessary. Details of the vessel-based monitoring program are described below.

Marine Mammal Observers

Vessel-based monitoring for marine mammals will be performed by trained MMOs throughout the period of survey activities to comply with expected provisions in the permits issued to ION. An experienced field crew leader will supervise the MMO teams onboard the vessels. The observers will monitor the occurrence and behavior of marine mammals near the survey vessel during all daylight periods while airguns are active, and during most daylight periods when airgun operations are not occurring. MMO duties will include watching for and identifying marine mammals; recording their numbers, distances, and reactions to the survey operations; and documenting "take by harassment" as defined by NMFS.

Number of Observers

Recent permits issued for seismic surveys in the Arctic have required that a sufficient number of MMOs be onboard the survey vessel to meet the following criteria:

- 100% monitoring coverage during all periods of airgun operations in daylight;
- maximum of 4 consecutive hours on watch per MMO;
- maximum of ~12 hours of watch time per day per MMO.

These previous surveys have typically been conducted at times with nearly 24 hrs of daylight and thus required four to five MMOs to be aboard the survey vessel. However, ION's proposed survey will occur in the October–December period when the number of hours of daylight is significantly lower, and thus will require fewer MMOs to be aboard the survey vessel. MMOs aboard the icebreaker operating 0.5–1 km ahead of the survey vessel will provide early detection of marine mammals along the survey track. Three MMOs will be stationed aboard the icebreaker to take advantage of this forward operating platform and provide advanced notice of marine mammals to the MMO on the survey vessel. A single MMO will be

stationed aboard the survey vessel to monitor the exclusion zones centered on the airguns and to request mitigation actions when necessary.

Observer Qualifications and Training

Crew leaders and most other biologists serving as observers will be individuals with recent experience as observers during one or more seismic monitoring projects in Alaska, the Canadian Beaufort, or other offshore areas.

Biologist-observers will have previous marine mammal observation experience, and field crew leaders will be highly experienced with previous vessel-based marine mammal monitoring and mitigation projects. Resumés for those individuals will be provided to NMFS and USFWS for review and acceptance of their qualifications. Inupiat observers will be experienced in the region, familiar with the marine mammals of the area, and complete a NMFS approved observer training course designed to familiarize individuals with monitoring and data collection procedures. A marine mammal observers' handbook, adapted for the specifics of the planned survey program will be prepared and distributed beforehand to all MMOs (see summary below).

Most observers, including Inupiat observers, will also complete a minimum two-day training and refresher session on marine mammal monitoring, to be conducted shortly before the anticipated start of the seismic survey. Any exceptions will have equivalent experience or training. The training session(s) will be conducted by qualified marine mammalogists with extensive crew-leader experience during previous vessel-based seismic monitoring programs.

Primary objectives of the training include:

- review of the marine mammal monitoring plan for this project, including any amendments specified by NMFS or USFWS in the IHA or LOA, by MMS, or by other agreements in which ION may elect to participate;
- review of marine mammal sighting, identification, and distance estimation methods;
- review of operation of specialized equipment (reticle binoculars, night vision devices, and GPS system);
- review of, and classroom practice with, data recording and data entry systems, including procedures for recording data on marine mammal sightings, monitoring operations, environmental conditions, and entry error control. These procedures will be implemented through use of a customized computer database and laptop computers;
- review of the specific tasks of the Inupiat Communicator.

MMO Handbook

A Marine Mammal Observers' Handbook will be prepared for IONs' monitoring program. Handbooks contain maps, illustrations, and photographs, as well as text, and are intended to provide guidance and reference information to trained individuals who will participate as MMOs. The following topics will be covered in the MMO Handbook for the ION project:

- summary overview descriptions of the project, marine mammals and underwater noise, the monitoring program, the NMFS IHA and USFWS LOA and other regulations/permits/agencies, the Marine Mammal Protection Act;
- monitoring and mitigation objectives and procedures, initial safety radii;
- responsibilities of staff and crew regarding the marine mammal monitoring plan;
- instructions for ship crew regarding the marine mammal monitoring plan;

- data recording procedures: codes and coding instructions, common coding mistakes, electronic database; navigational, marine physical, field data sheet;
- use of specialized field equipment (reticle binoculars, NVDs, FLIR cameras, laser rangefinders);
- reticle binocular distance scale;
- table of wind speed, Beaufort wind force, and sea state codes;
- data storage and backup procedures;
- list of species that might be encountered: identification, natural history;
- safety precautions while onboard;
- crew and/or personnel discord; conflict resolution among MMOs and crew;
- drug and alcohol policy and testing;
- scheduling of cruises and watches;
- communications;
- list of field gear that will be provided;
- suggested list of personal items to pack;
- suggested literature, or literature cited; and
- copies of the NMFS IHA and USFWS LOA when available.

Monitoring Methodology

The observer(s) will watch for marine mammals from the best available vantage point on the vessel, typically the bridge. The observer(s) will scan systematically with the unaided eye and 7×50 reticle binoculars, supplemented with 20×60 image-stabilized Zeiss Binoculars or Fujinon 25×150 "Big-eye" binoculars, a thermal imaging (FLIR) camera, and night-vision equipment when needed (see below). Personnel on the bridge will assist the marine mammal observer(s) in watching for marine mammals.

Information to be recorded by marine mammal observers will include the same types of information that were recorded during recent monitoring programs associated with Industry activity in the Arctic (e.g., Ireland et al. 2009). When a mammal sighting is made, the following information about the sighting will be recorded:

- Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from observer, apparent reaction to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace.
- Time, location, speed, and activity of the vessel, sea state, ice cover, visibility, and sun glare.
- The positions of other vessel(s) in the vicinity of the observer location.

The ship's position, speed of the vessel, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.

Distances to nearby marine mammals will be estimated with binoculars (Fujinon 7 × 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. However, previous experience has shown that a Class 1 eye-safe device was not able to measure distances to seals more than about 70 m (230 ft) away. The device was very useful in improving the distance estimation abilities of the observers at distances up to about 600 m

(1968 ft)—the maximum range at which the device could measure distances to highly reflective objects such as other vessels. Humans observing objects of more-or-less known size via a standard observation protocol, in this case from a standard height above water, quickly become able to estimate distances within about ±20% when given immediate feedback about actual distances during training.

When a marine mammal is seen within the safety radius applicable to that species, the geophysical crew will be notified immediately so that mitigation measures called for by the IHA and LoA can be implemented. It is expected that the airgun arrays will be shut down within several seconds—often before the next shot would be fired, and almost always before more than one additional shot is fired. The marine mammal observer will then maintain a watch to determine when the mammal(s) appear to be outside the safety zone such that airgun operations can resume.

Monitoring At Night and In Poor Visibility

Night-vision equipment ("Generation 3" binocular image intensifiers, or equivalent units) will be available for use when/if needed. Past experience with night-vision devices (NVDs) in the Beaufort Sea and elsewhere has indicated that NVDs are not nearly as effective as visual observation during daylight hours (e.g., Harris et al. 1997, 1998; Moulton and Lawson 2002). A forward looking thermal imaging (FLIR) camera system mounted on a high point in front of the icebreaker will also be available to assist with detecting the presence of seals and polar bears on ice and in water ahead of the airgun array.

Specialized Field Equipment

ION will provide or arrange for the following specialized field equipment for use by the onboard MMOs: 7×50 reticle binoculars, +20× binoculars, GPS unit, laptop computers, night vision binoculars, and possibly digital still and digital video cameras.

Field Data-Recording, Verification, Handling, and Security

The observers will record their observations onto datasheets or directly into handheld computers. During periods between watches and periods when operations are suspended, those data will be entered into a laptop computer running a custom computer database. The accuracy of the data entry will be verified in the field by computerized validity checks as the data are entered, and by subsequent manual checking of the database printouts. These procedures will allow initial summaries of data to be prepared during and shortly after the field season, and will facilitate transfer of the data to statistical, graphical or other programs for further processing. Quality control of the data will be facilitated by (1) the start-of-season training session, (2) subsequent supervision by the onboard field crew leader, and (3) ongoing data checks during the field season.

The data will be backed up regularly onto CDs and/or USB disks, and stored at separate locations on the vessel. If possible, data sheets will be photocopied daily during the field season. Data will be secured further by having data sheets and backup data CDs carried back to the Anchorage office during crew rotations.

Field Reports

Throughout the survey program, the observers will prepare a report each day or at such other interval as the IHA, LOA, or ION may require, summarizing the recent results of the monitoring program. The reports will summarize the species and numbers of marine mammals sighted. These reports will be provided to NMFS, USFWS and to the survey operators.

Mitigation Measures During Survey Activities

ION's planned seismic survey incorporates both design features and operational procedures for minimizing the potential impacts on marine mammals and on subsistence hunts. Survey design features include:

- Scheduling the survey to occur in October–December in order to avoid periods of higher abundance of marine mammal species and most of the subsistence hunting activities that occur during the open-water season;
- Planning the survey to proceed from east to west across the US Beaufort Sea to avoid, as much as possible, any remaining migratory animals and associated subsistence activities; and
- Completing the survey prior the time when female polar bears that may den on sea-ice would establish and enter reliable dens for the winter.

The potential disturbance of marine mammals during survey operations will be minimized further through the implementation of several ship-based mitigation measures when necessary.

Safety and Disturbance Zones

Under current USFWS guidelines (50CFR18.118), "safety radii" for marine mammals around industrial sound sources are defined as the distances within which received sound levels are ≥180 dB re 1 μPa (rms) for walrus and ≥190 dB re 1 μPa (rms) for polar bear. These safety criteria are based on an assumption that sound energy received at lower received levels will not injure these animals or impair their hearing abilities, but that higher received levels might have some such effects. Disturbance or behavioral effects to marine mammals from underwater sound may occur after exposure to sound at distances greater than the safety radii (Richardson et al. 1995).

Initial safety and disturbance radii for the sound levels produced by the airgun array have been modeled. These radii will be used for mitigation purposes until results of field measurements are available early during the exploration activities. The planned survey will use an airgun source composed of 28 airguns with a total discharge volume of 4330 in^3. The modeled 190 and 180 dB distances from the array were at most likely to be 670 and 2850 m, respectively, in shallow water (<100 m) where sound propagation is expected to be greatest (Zykov et al. 2010).

A single 65-in^3 airgun will be used as a mitigation gun during turns or if a power down of the full array is necessary due to the presence of a marine mammal within or about to enter the applicable safety radius of the full airgun array. Underwater sound propagation of a 40-in^3 airgun was measured near Harrison Bay in 2007 and results were reported in Funk et al. (2008). The 190 dB and 180 dB distances from those measurements, 5 m and 20 m respectively, multiplied by 2 (10 m and 40 m, respectively) will be used as the safety zones during use of the single mitigation gun.

An acoustics contractor will perform the field measurements of the received levels of underwater sound versus distance and direction from the energy source arrays using calibrated hydrophones. The acoustic data will be analyzed as quickly as reasonably practicable in the field and used to verify (and if necessary adjust) the safety distances. The mitigation measures to be implemented at the 190 and 180 dB sound levels will include power downs and shut downs as described below.

Power-down Procedures

A power down involves decreasing the number of operating airguns resulting in a reduction of the radius of the 180-dB (or 190-dB) safety zone. A power down may be implemented to reduce or eliminate

the potential for marine mammal exposure to possibly harmful sound levels. During a power down, one airgun (or some other number of airguns less than the full airgun array) is operated. The continued operation of one airgun is intended to (a) alert marine mammals to the continued presence of the seismic vessel in the area, and (b) retain the option of initiating a ramp up to full operations under poor visibility conditions. In contrast, a shut down occurs when all airgun activity is suspended.

If a polar bear or Pacific walrus is detected outside the safety radius but is likely to enter the safety radius, and if the vessel's speed and/or course cannot be changed, the airguns may (as an alternative to a complete shut down) be powered down before the mammal is within the safety radius. Likewise, if a polar bear or Pacific walrus is already within the safety radius when first detected, the airguns will be powered down immediately if this is a reasonable alternative to a complete shut down. During a power down of the 28-airguns, the number of guns operating will be reduced to a single 65-in^3 airgun. If a polar bear or Pacific walrus is detected within or near the smaller safety radius around the single 65-in^3 airgun, all airguns will be shut down (see next subsection).

Following a power down, operation of the full airgun array will not resume until the polar bear or Pacific walrus has cleared the safety zone. The animal will be considered to have cleared the safety zone if it 1) is visually observed to have left the safety zone, or 2) has not been seen within the zone for 15 min.

Shut-down Procedures

The operating airgun(s) will be shut down completely if a polar bear or Pacific walrus approaches or enters the then-applicable safety radius and a power down is not practical or adequate to reduce exposure to <190 or <180 dB (rms), as appropriate. The operating airgun(s) will also be shut down completely if a polar bear or Pacific walrus approaches or enters the estimated safety radius around the reduced source (one 65-in^3 airgun) that will be used during a power down.

Airgun activity will not resume until the polar bear or Pacific walrus has cleared the safety radius. The animal will be considered to have cleared the safety radius as described above. Ramp-up procedures will be followed during resumption of full seismic operations.

Ramp Ups

A ramp up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of airguns firing until the full volume is achieved. The purpose of a ramp up (or "soft start") is to "warn" marine mammals in the vicinity of the airguns and to provide the time for them to leave the area and thus avoid any potential injury or impairment of their hearing abilities.

During the proposed shallow hazards survey program, the seismic operator will ramp up the airgun arrays slowly. Full ramp ups (i.e., from a cold start after a shut down, when no airguns have been firing) will begin by firing a single airgun in the array. The minimum duration of a shut-down period, i.e., without air guns firing, which must be followed by a ramp up typically is the amount of time it would take the source vessel to cover the 180-dB safety radius. The actual time period depends on ship speed and the size of the 180-dB safety radius. We estimate that period to be about 5 minutes in intermediate (100-1000 m) and deep (>1000 m) waters, and ~23 min in shallow waters (<100 m) based on the airgun array modeling results (Zykov et al. 2010) and a survey speed of 4 kts.

A full ramp up, after a shut down, will not begin until there has been a minimum of 30 min of observation of the safety zone by MMOs to assure that no marine mammals are present. The entire safety

zone must be visible during the 30-minute lead-in to a full ramp up. If the entire safety zone is not visible, then ramp up from a cold start cannot begin. If a marine mammal(s) is sighted within the safety 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 safety zone or the animal(s) is not sighted for at least 15 minutes.

During turns and transit between seismic transects, at least one airgun will remain operational. The ramp-up procedure will still be followed when increasing the source levels from one air gun to the full arrays. However, keeping one airgun firing will avoid the prohibition of a cold start during darkness or other periods of poor visibility. Through use of this approach, seismic operations can resume upon entry to a new transect without a full ramp up and the associated 30-minute lead-in observations. MMOs will be on duty whenever the airguns are firing during daylight, and during the 30-min periods prior to ramp-ups as well as during ramp-ups. Daylight will occur for ~11 h/day at the start of the survey in early October diminishing to ~3 h/day in mid November. MMOs will be called up at night to observe prior to and during any ramp up. The seismic operator and MMOs will maintain records of the times when ramp-ups start, and when the airgun arrays reach full power.

Speed or Course Alteration

If a polar bear or Pacific walrus is detected, the vessel's speed and/or course may, when practical and safe, be changed in a manner that also minimizes the effect on the planned project objectives. The activity and movement of the animal(s) relative to the vessel will be closely monitored to ensure their safety. Given the expected presence of sea ice during the survey periods, it often may not be possible to reduce speed or alter course, so other mitigation actions will be taken as described above, i.e., power down or shut down of the airgun(s).

Reporting

The results of the vessel-based monitoring, including estimates of "take by harassment", will be presented in the 90-day and final technical reports. Reporting will address the requirements established by NMFS in the IHA.

The technical report(s) will include:

- summaries of monitoring effort: total hours, total distances, and distribution of marine mammals through the study period accounting for sea state and other factors affecting visibility and detectability of marine mammals;
- analyses of the effects of various factors influencing detectability of marine mammals including sea state, number of observers, and fog/glare;
- species composition, occurrence, and distribution of marine mammal sightings including date, water depth, numbers, age/size/gender categories, group sizes, and ice cover;
- analyses of the effects of survey operations:
  - sighting rates of marine mammals during periods with and without airgun activities (and other variables that could affect detectability);
  - initial sighting distances versus airgun activity state;
  - closest point of approach versus airgun activity state;
  - observed behaviors and types of movements versus airgun activity state;
  - numbers of sightings/individuals seen versus airgun activity state;
  - distribution around the survey vessel versus airgun activity state;
  - estimates of "take by harassment".

ION will support marine mammal monitoring during the present project, in order to implement the proposed mitigation measures that require real-time monitoring, to satisfy the anticipated monitoring requirements of the USFWS LoA (and NMFS IHA), and to meet any monitoring requirements agreed to as part of the Plan of Cooperation / Conflict Avoidance Agreement. ION understands that this Monitoring and Mitigation Plan will be subject to review by USFWS and others, and that refinements may be required.

The monitoring work described here has been planned as a self-contained project independent of any other related monitoring projects that may be occurring simultaneously in the same region. ION is prepared to discuss coordination of its monitoring program with any related work that might be done by other groups insofar as this is practical and applicable to the time during which the proposed survey will occur.

III. POLAR BEAR AND PACIFIC WALRUS AWARENESS AND INTERACTION PLAN

The objective of this plan is to avoid interactions by identifying polar bear and Pacific walrus in the area as early as possible during vessel operations and taking action to avoid interactions. The captain and operations officers of the *Geo Explorer* and *Vladimir Ignatyuk*, as well as the marine mammal observers will have copies of this interaction plan. Both vessels will be self-contained, and the crews will live aboard the vessels for the entire survey, so awareness and avoidance measures pertinent to land-based operations, such as a snow management plan, will not directly apply. Also, the two vessels are very large and an access point where a polar bear could climb aboard the vessel is not present. Both vessels will avoid polar bears and Pacific walruses to the greatest extent possible while maintaining safe operations. To avoid interactions with polar bears and Pacific walruses, and the incidental harassment of them, during offshore activities the measures described below will be adopted (in addition to those described above specific to airgun operations), provided that doing so will not compromise operational safety requirements.

Food and Waste Management Plan

The most important way to avoid attracting wildlife to active field operations is to handle food and associated waste correctly. Both vessels to be used for this project are very large and an access point where a polar bear could climb aboard the vessel to access food or waste is not present. In addition, ION plans to use only receptacles for food and associated waste that are secure from wildlife access. Waste produced on the vessels will not be disposed of on ice or near land where it would be available to or attract polar bears. MMOs will immediately report bear sightings to the captain and/or designated representative, so the information can be relayed to the ships personnel in charge of food and waste management.

Personnel Training Materials and Procedures

The employee safety training program will address the following:

- Polar bear/walrus interaction plan will be posted in multiple areas within each vessel for everyone's awareness
- Ship personnel will be made aware of both the dangers posed by polar bears and their protected status

- Polar bear and Pacific walrus awareness will be reinforced during safety meetings
- Video training material

    - "Human/Bear Interaction" (Alaska Oil & Gas Association)
    - Working in Bear Country, For Industrial Managers, Supervisors and Workers
    - Staying Safe in Bear Country, A Behavioral-Based Approach to Reducing Risk

Site At-Risk Locations and Situations

At-Risk Locations

The following list locations where bear encounter risks may be higher:

- Sea ice floes
- Barrier islands
- Coastal bluffs
- Icebreaker vessels

At-Risk Situations and Activities

The following situations and activities may involve a higher risk of a bear encounter:

- Icebreaking activities
- Winter geophysical survey operations

Observation Reporting Procedures

Polar Bear

For each polar bear sighting marine mammal observers will complete a separate Polar Bear Sighting Report. The sighting report will filled out and sent to the project manager, who will make agency notification within 24 hours of the observation to:

Primary Polar Bear contact:

Craig Perham
USFWS – Marine Mammals Section
1011 E. Tudor Road
Anchorage, AK 99503
Phone: 907-786-3810
FAX: 907-786-3816

Pacific Walrus

Instead of the individual sightings reports required for polar bears, walrus observations will be recorded on the standard MMO sightings datasheet, and submitted separately by the project manager to the USFWS on a weekly basis.

Polar Bear Avoidance and Encounter Procedure

Both vessels will avoid polar bears to the greatest extent possible while maintaining safe operations. In an attempt to do so, a forward looking thermal imaging (FLIR) camera system will be mounted on a high point in front of the icebreaker. Survey activities will also observe a 1-mile operational exclusion zone around all known polar bear dens during the denning season (if any dens have been established and location information is provided to the survey operators or MMOs). Should previously unknown occupied dens be discovered within 1 mile of survey activities, work in the immediate area will cease and the USFWS will be contacted for guidance.

MMOs will immediately report bear sightings to the captain and/or designated representative, so the information can be relayed to the ships personnel. MMOs will then follow reporting procedures described above.

If polar bears are habitually present, which is unlikely given the constant movement of the vessels, the vessels will use an acceptable means to haze the bears away, such as using the ships horn. Under no circumstances are polar bears to be sought out or harassed unless they are creating a hazard or remain habitually present. The vessels to be used for this project are both very large and an access point where a polar bear could climb aboard the vessel is not present, so a designated polar bear monitor or "hazer" will not be present. Craig Perham at USFWS will be contacted if a problem bear is encountered. In the unlikely event of an intentional take, the Lead MMO will:

1. Record all details of the event including the time, exact location, bear's behavior, preventative measures followed, etc.;
2. Record all witnesses statements; and
3. Immediately notify Craig Perham with USFWS at (907) 786-3810 or alternate office number at (907) 786-3800 or email Craig_Perham@fws.gov. If there is a lethal "take", transport the entire animal carcass to Deadhorse for sealing and processing under the direction of a responsible USFWS agent designee. USFWS will determine disposition of useable meat (e.g. donation to a Native village).

IV. Plan of Cooperation with Affected Subsistence Villages

It is ION's intent to develop a "Plan of Cooperation" (POC) for the proposed 2010 seismic survey in the Beaufort and Chukchi seas in consultation with representatives of communities along the Beaufort Sea coast at Barrow, Nuiqsut, and Kaktovik. In the event that satisfactory terms for a "Plan of Cooperation" cannot be reached, it would become ION's intention to file a "Plan of Avoidance" as allowed under the regulations. ION is consulting with the people of these communities to identify and avoid areas of potential conflict.

Considering the timing and location, the proposed seismic survey is not expected to have any significant impacts on the availability of marine mammals for subsistence harvest. Walruses are hunted primarily from June through mid-August to the west of Point Barrow and southwest to Peard Bay. Walruses rarely occur in the Beaufort Sea north and east of Barrow and become less abundant further east (Fuller and George 1999; Schliebe 2002 *in* USDI/BLM 2005). Because walrus hunting typically occurs during summer months, the proposed survey is not expected to affect walrus harvests.

Polar bears are typically harvested during periods of heavy ice coverage (winter and spring; USDI/BLM 2005), not when ice is forming, which corresponds with the timing of the proposed seismic survey. Therefore, the proposed survey is not expected to disrupt subsistence hunting of polar bears. In the event that both marine mammals and hunters were near the vessels, the proposed project potentially could impact the availability of marine mammals for the harvest in a very small area immediately around the vessels. However, most marine mammals are taken by hunters within ~24-33 km off shore (USDI/BLM 2005), and the majority of the proposed survey operations are significantly farther offshore than that.

Meetings with stakeholders that have taken place or are planned are listed in Table 1. ION will attempt to meet with as many subsistence and community representatives as possible during future meetings to obtain feedback on the proposed project. ION will work with community leadership to come up with solutions to potential conflicts identified during the meetings. Based upon these communications, a Draft POC document will be developed and submitted to each member of the leadership involved in the meetings. ION will also submit the Draft POC document to NMFS, USFWS, and MMS as part of the permit application process. Public meetings will be held after the submittal of the Draft POC document to obtain input from the general public and individual subsistence hunters in the community. Members of marine mammal co-management groups and groups that address subsistence activities will be specifically notified of the public meetings so that they can provide input (Table 2).

A record of all consultation with subsistence users and stakeholders will be included in the Final POC documents. The Final POC documents will be submitted to NMFS, USFS, and MMS upon completion of consultation. All additional consultation with communities and subsistence users will be maintained in the project Administrative Record.

Table 1. List of meetings with affected communities and groups to explain the proposed project and receive comments.

Community/Stakeholder	**Date**	**Location**	**Notes**
NSB – Department of Wildlife Management	15 December 2009	Barrow	Met with Robert Sudam of NSB to discuss proposed project
AEWC and Village Whaling Captains	12 – 13 February 2010	Barrow	Presented the proposed project to AEWC as part of the 2010 Annual Captains' Mini-Convention
Kaktovik Leadership	16 March 2010	Kaktovik	planned
Nuiqsut Leadership	17 March 2010	Nuiqsut	planned
Barrow Leadership	18 - 19 March 2010	Barrow	planned
NMFS Open Water Meeting	22 – 26 March 2010	Anchorage	planned
NSB Planning Commission meeting	22 April 2010	Barrow	planned
Barrow public meeting	Mid-April 2010	Barrow	planned
Nuiqsut public meeting	Mid-April 2010	Nuiqsut	planned
Kaktovik public meeting	Mid-April 2010	Kaktovik	planned

Table 2. List of co-management groups and groups that address subsistence activities.

Subsistence and Community Groups	
Alaska Eskimo Whaling Commission	Inupiat Community of the Arctic Slope
Alaska Ice Seal Committee	Native Village of Nuiqsut
Alaska Nanuuq Commission	Native Village of Barrow
Alaska Beluga Whale Committee	Native Village of Kaktovik
Eskimo Walrus Committee	
Kuukpikmiut Subsistence Oversight Panel, Inc.	

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