

**DEPARTMENT OF COMMERCE****National Oceanic and Atmospheric Administration**

RIN 0648–XD76

**Taking Marine Mammals Incidental to Specified Activities; Seismic Surveys in the Beaufort and Chukchi Seas**

**AGENCY:** National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

**ACTION:** Notice of receipt of application and proposed incidental take authorization; request for comments.

**SUMMARY:** NMFS has received an application from Shell Offshore, Inc. (SOI) and its contractor WesternGeco for an Incidental Harassment Authorization (IHA) to take small numbers of marine mammals, by harassment, incidental to conducting marine geophysical programs, including deep seismic surveys, on oil and gas lease blocks located on Outer Continental Shelf (OCS) waters in the Beaufort and Chukchi Seas. Under the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to SOI and WesternGeco to incidentally take, by Level B harassment, small numbers of several species of marine mammals during the Arctic Ocean open-water seasons between August 1, 2008 and July 31, 2009, incidental to conducting these seismic surveys.

**DATES:** Comments and information must be received no later than July 25, 2008.

**ADDRESSES:** Written comments on the application should be addressed to Mr. P. Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3225, or by telephoning the contact listed here. The mailbox address for providing email comments is [PR1.XD76@noaa.gov](mailto:PR1.XD76@noaa.gov). Comments sent via e-mail, including all attachments, must not exceed a 10-megabyte file size.

A copy of the application (containing a list of the references used in this document) may be obtained by writing to this address or by telephoning the contact listed here and are also available at: <http://www.nmfs.noaa.gov/pr/permits/incidental.htm#iha>.

A copy of the Minerals Management Service (MMS) Final Programmatic Environmental Assessment (Final PEA) and the NMFS/MMS Draft Programmatic Environmental Impact Statement (Draft PEIS) are available at: <http://www.mms.gov/alaska/>.

Documents cited in this document that are not available through standard public library access methods, may be viewed, by appointment, during regular business hours at this address.

**FOR FURTHER INFORMATION CONTACT:**

Kenneth Hollingshead, Office of Protected Resources, NMFS, (301) 713–2289, or Brad Smith, NMFS, Alaska Regional Office 907–271–3023.

**SUPPLEMENTARY INFORMATION:****Background**

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses and the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined “negligible impact” in 50 CFR 216.103 as “...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Except with respect to certain activities not pertinent here, the MMPA defines “harassment” as:

any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public

notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization.

**Summary of Request**

On October 16, 2007, NMFS received an application from SOI for the taking, by harassment, of several species of marine mammals incidental to conducting a marine seismic survey program during the open water season between August 1, 2008 and July 31, 2009 (referred to in this document as 2008/2009). SOI is planning a variety of programs in the Chukchi and Beaufort Seas during the 2008/2009 open water seasons, including a: (1) Chukchi Sea deep 3–D seismic survey; (2) Beaufort Sea deep 3–D seismic survey; and (3) Beaufort Sea marine surveys, which includes three activities: (a) site clearance and shallow hazards surveys; (b) an ice-gouge survey; and (c) a strudel scour survey.

The deep seismic survey components of the program will be conducted from WesternGeco’s vessel, *M/V Gilavar*. Detailed specifications on this seismic survey vessel are provided in Attachment A of SOI’s IHA application. These specifications include: (1) complete descriptions of the number and lengths of the streamers which form the hydrophone arrays; (2) airgun size and sound propagation properties; and (3) additional detailed data on the *M/V Gilavar*’s characteristics. In summary, the *M/V Gilavar* will tow two source arrays, comprising three identical subarrays each, which will be fired alternately as the ship progresses downline in the survey area. The *M/V Gilavar* will tow up to 6 streamer cables up to 5.4 kilometers (km) (3.4 mi) long. With this configuration each pass of the *M/V Gilavar* can record 12 subsurface lines spanning a swath of up to 360 meters (1181 ft). The seismic acquisition vessel will be supported by the *M/V Gulf Provider*, or a similar vessel. The *M/V Gulf Provider* will serve as a crew change, resupply, fueling support of acoustic and marine mammal monitoring, and seismic chase vessel. It will not deploy seismic acquisition gear.

As SOI’s 2007 IHA for open water seismic activities in the Chukchi and Beaufort Seas is valid until August 1, 2008, this IHA request is intended, therefore, for the open water seasons between August 2, 2008 through July 31, 2009.

As marine mammals may be affected by seismic and vessel noise, SOI has requested an authorization under section 101(a)(5)(D) of the MMPA to

take marine mammals by Level B harassment while conducting seismic surveys and related activities.

### Plan for Seismic Operations

In its application, SOI notes that it plans for the *M/V Gilavar* to be in the Chukchi Sea to begin seismic acquisition data on or after July 20, 2008, move to the Beaufort Sea in mid-July through late October, and conclude work in the Chukchi Sea around November 15, 2008. For purposes of the MMPA, the Chukchi and Beaufort seas meet the definition of a "specific geographic region" as defined under the Act. As proposed, the 2008 seismic survey effort will last a maximum of 100 days of active data acquisition (excluding downtime due to weather and other unforeseen delays). When ice conditions permit or when SOI determines to do so (at present, SOI plans to work in the Chukchi Sea until around September 25), the seismic and associated vessels will transit to the Beaufort Sea to conduct seismic operation for part of the this 100-day period. The proposed commencement date of July 20th for starting seismic in the Chukchi Sea is designed to ensure that there will be no conflict with the spring bowhead whale migration and subsistence hunts conducted by Barrow, Pt. Hope, or Wainwright or the beluga subsistence hunt conducted by the village of Pt. Lay in early July. The approximate area of SOI's seismic survey operations are shown in Figure 1 in SOI's IHA application.

### 3-D Deep Seismic Surveys

#### Chukchi Sea 3-D Deep Seismic Surveys

SOI and its geophysical (seismic) contractor, WesternGeco, propose to conduct a marine geophysical (deep 3-D seismic) survey program during open water season on various MMS Outer Continental Shelf (OCS) lease blocks in the northern Chukchi Sea (see Figure 1 in SOI's IHA application). The Chukchi Sea 3-D Deep Seismic survey will be conducted on leases obtained under Lease Sale (LS) 193. The exact locations where operations will occur within that sale area were not known at the time of SOI's IHA application, but NMFS presumes they will take place on lease blocks obtained as a result of the sale. However, in general SOI notes that the seismic data acquisition will occur at least 25 mi (40 km) offshore of the coast and in waters with depths averaging about 40 m (131 ft).

The deep 3-D seismic survey is proposed to be conducted from WesternGeco's vessel *M/V Gilavar*, described previously. Two "chase

boats" will accompany the seismic vessel. These two chase boats will provide the following functions: (1) re-supply, (2) marine mammal monitoring, (3) ice scouting, and (4) general support for the *M/V Gilavar*. The chase boat vessels proposed for use in 2008 are the *M/V Theresa Marie* and the *M/V Torsvik*. These vessels will not deploy any seismic gear. In addition, a crew change vessel, the *M/V Gulf Provider* or similar vessel and a landing craft, such as the *M/V Maxime* or similar vessel, will support the *M/V Gilavar*, and the two chase boats in the Chukchi Sea. The crew change vessel will be used to move personnel and supplies from the seismic vessel, and two chase boats to the nearshore areas. In turn, the landing craft will move personnel and supplies from the crew change vessel, when it is located in nearshore areas, to the beach (most likely this will be at Barrow). Lastly, the Marine Mammal Monitoring and Mitigation Program (4MP) will have a separate vessel for the proposed 2008 Program. The landing craft also will be used to move personnel and equipment from the 4MP vessel to the near shore areas.

#### Beaufort Sea Deep 3-D Seismic Surveys

The same seismic vessel (*M/V Gilavar*), seismic equipment, and chase boats that are described for the Chukchi Sea Deep 3-D Seismic survey, will be used to conduct deep 3-D seismic surveys in the central and eastern Beaufort Sea (see Figure 2 in SOI's IHA application). The focus of this activity will be on SOI's existing leases, but some activity in the Beaufort Sea may occur outside of SOI's existing leases. The landing craft, which will be used to move personnel and supplies from vessels in the near shore to docking sites will most likely use West Dock, or Oliktok Dock. Smaller vessels such as the Alaska Clean Seas (ACS) bay boats, or similar vessels, may be used to assist in the movement of people and supplies and support of the 4MP in the Beaufort Sea. The specific geographic region for SOI's deep seismic program in the Beaufort Sea will be in OCS waters including SOI leases beginning east of the Colville River delta to west of the village of Kaktovik (see Figure 2 in SOI's application). According to SOI's IHA application, the Beaufort Sea program is planned to occur for a maximum of 60 days (excluding downtime due to weather and unforeseen delays) during open-water from mid-August to the end of October; however, recent communications with SOI indicates that the Beaufort Sea seismic program will not start until after September 25, 2008. This timing of activities in the fall will

avoid any significant conflict with the Beaufort Sea bowhead whale subsistence hunt conducted by the Beaufort Sea villages, because it is anticipated that the fall bowhead whale hunt will have ended by that time.

#### Description of Marine 3-D Seismic Data Acquisition

In the seismic method, reflected sound energy produces graphic images of seafloor and sub-seafloor features. The seismic system consists of sources and detectors, the positions of which must be accurately measured at all times. The sound signal comes from arrays of towed energy sources. These energy sources store compressed air which is released on command from the towing vessel. The released air forms a bubble which expands and contracts in a predictable fashion, emitting sound waves as it does so. Individual sources are configured into arrays. These arrays have an output signal, which is more desirable than that of a single bubble, and also serve to focus the sound output primarily in the downward direction, which is useful for the seismic method. This array effect also minimizes the sound emitted in the horizontal direction.

The downward propagating sound travels to the seafloor and into the geologic strata below the seafloor. Changes in the acoustic properties between the various rock layers result in a portion of the sound being reflected back toward the surface at each layer. This reflected energy is received by detectors called hydrophones, which are housed within submerged streamer cables which are towed behind the seismic vessel. Data from these hydrophones are recorded to produce seismic records or profiles. Seismic profiles often resemble geologic cross-sections along the course traveled by the survey vessel.

#### Description of WesternGeco's Air-Gun Array

SOI is proposing to use WesternGeco's 3147-in<sup>3</sup> Bolt-Gun Array for its 3-D seismic survey operations in the Chukchi and Beaufort Seas. WesternGeco's source arrays are composed of 3 identically tuned Bolt-gun sub-arrays operating at an air pressure of 2,000 psi. In general, the signature produced by an array composed of multiple sub-arrays has the same shape as that produced by a single sub-array while the overall acoustic output of the array is determined by the number of sub-arrays employed.

The airgun arrangement for each of the three 1049-in<sup>3</sup> sub-array is detailed in SOI's application. As indicated in the

application's diagram, each sub-array is composed of six tuning elements; two 2-airgun clusters and four single airguns. The standard configuration of a source array for 3-D surveys consists of one or more 1049-in<sup>3</sup> sub-arrays. When more than one sub-array is used, as here, the strings are lined up parallel to each other with either 8 m or 10 m (26 or 33 ft) cross-line separation between them. This separation was chosen so as to minimize the areal dimensions of the array in order to approximate point source radiation characteristics for frequencies in the nominal seismic processing band. For the 3147-in<sup>3</sup> array the overall dimensions of the array are 15 m (49 ft) long by 16-m (52.5-ft) wide.

#### Characteristics of Airgun Pulses

A discussion of the characteristics of airgun pulses was provided in several previous **Federal Register** documents (see 69 FR 31792 (June 7, 2004) or 69 FR 34996 (June 23, 2004)) and is not repeated here. Additional information can be found in the NMFS/MMS Draft PEIS (see **ADDRESSES**). Reviewers are encouraged to read these earlier documents for additional background information.

#### Marine Surveys

SOI proposes to conduct marine surveys (shallow hazards and other activities) in the Beaufort and Chukchi seas in 2008. Acoustic systems similar to the ones proposed for use by SOI during its planned marine surveys have been described by NMFS previously (see 66 FR 40996 (August 6, 2001), 70 FR 13466 (March 21, 2005)). NMFS encourages readers to refer to these documents for additional information on these systems. A summary of SOI's planned activities is described next.

#### Beaufort Sea Marine Surveys

SOI proposes to conduct three marine survey activities in 2008 in the U.S. Beaufort Sea: (1) Site Clearance and Shallow Hazards (2) Ice Gouge Surveys, and (3) Strudel Scour Surveys. Marine surveys for site clearance and shallow hazards, ice gouge, or strudel scour in the Beaufort Sea can be accomplished by the *M/V Henry Christofferson*. No other vessels, such as chase boats, are necessary to accomplish the proposed marine survey work. Any necessary crew changes or 4MP coordinated activities under this activity will utilize the same crew change, landing craft, or 4MP vessel mentioned under the Beaufort Sea Deep 3-D Seismic survey.

#### Site Clearance and Shallow Hazards

Marine surveys will include site clearance and shallow hazards surveys of potential exploratory drilling locations. These surveys gather data on: (1) bathymetry, (2) seabed topography and other seabed characteristics (e.g., boulder patches), (3) potential geohazards (e.g., shallow faults and shallow gas zones), and (4) the presence of any archeological features (e.g., shipwrecks).

The focus of this activity will be on SOI's existing leases in the central and eastern Beaufort Sea, but some activity may occur outside of SOI's existing leases. Actual locations of site clearance and shallow hazard surveys have not been definitively set as of the date of this publication, although they will occur within the area outlined in Figure 2 of SOI's IHA application.

The vessel that SOI expects to use for the site clearance and shallow hazards surveys is the *M/V Henry Christofferson*, which is a diesel-powered tug as described in Attachment A to SOI's IHA application. SOI proposes to use the following acoustic instrumentation, (or similar equipment) during this work. This is the same equipment as was used on the *M/V Henry Christofferson* during 2007:

(1) Dual frequency subbottom profiler Datasonics CAP6000 Chirp II (2 to 7 kHz or 8 to 23 kHz) or similar;

(2) Medium penetration subbottom profiler, Datasonics SPR-1200 Bubble Pulser (400 (hertz [Hz]) or similar;

(3) High resolution multi-channel 2D system, 20 cubic inches (in<sup>3</sup>) (2 by 10) gun array (0 to 150 Hz) or similar;

(4) Multi-beam bathymetric sonar, Seabat 8101 (240 Hz); or similar; and

(5) Side-scan sonar system, Datasonics SIS-1500 (190 to 210 kHz) or similar.

#### Ice Gouge Survey

Ice gouge surveys are a type of marine survey to determine the depth and distribution of ice gouges in the sea bed. Ice gouge is created by ice keels which project from the bottom of moving ice that gouge into seafloor sediment. Remnant ice gouge features are mapped to aid in predicting the prospect of, orientation, depth, and frequency of future ice gouge. These surveys will focus on the potential, prospective pipeline corridor between the Sivulliq Prospect in Camden Bay and the nearshore Point Thomson area. The Sivulliq area will be surveyed to gather geotechnical and seafloor hazard information as well as data on ice gouges.

SOI proposes that the acoustic instrumentation described previously in

this document (or something similar) will be used, namely multi-beam bathymetric sonar, side scan sonar and subbottom profiling. Actual locations of the ice gouge surveys have not been definitively set as of the date of this publication, although these will occur within the area outlined in Figure 2 of SOI's IHA application. There are also some platform siting lines proposed, which would employ a high resolution multi-channel 2D system, 20 cubic inches (in<sup>3</sup>) (2 by 10) airgun array (0 to 150 Hz) or similar system.

#### Strudel Scour Survey

During the early melt on the North Slope, the rivers begin to flow and discharge water over the coastal sea ice near the river deltas. That water rushes down holes in the ice ("strudels") and scours the seafloor. These erosional areas are called "strudel scours". Information on these features is required for prospective pipeline planning. Two proposed activities are required to gather this information.

First, an aerial survey will be conducted via helicopter overflights during the melt to locate the strudels; and strudel scour marine surveys to gather bathymetric data. The overflights investigate possible sources of overflowed water and will survey local streams that discharge in the vicinity of Point Thomson including the Staines River, which discharges to the east into Flaxman Lagoon and the Canning River, which discharges to the east directly into the Beaufort Sea. These helicopter overflights were scheduled to occur during late May/early June 2008 and, weather permitting, should take no more than four days. There are no planned landings during these overflights other than at the Deadhorse or Kaktovik airports.

Second, areas that have strudel scour identified during the aerial survey will be verified and surveyed with a marine vessel after the breakup of nearshore ice. This proposed activity is not anticipated to take more than 5 days to conduct. The operation is conducted in the shallow water areas near the coast in the vicinity of Point Thomson. The vessel has not been contracted; however, it is anticipated that it will be the diesel-powered *R/V Annika Marie*. This vessel will use the following equipment:

(1) Multi-beam bathymetric sonar, Seabat 8101 (240 Hz); or similar sonar; and

(2) Side-scan sonar system, Datasonics SIS-1500 (190 to 210 kHz) or similar sonar.

The multi-beam bathymetric sonar and the side-scan sonar systems both operate at frequencies greater than 180

kHz, the highest frequency considered by knowledgeable marine mammal biologists to be of possible influence to marine mammals. Because no taking of marine mammals will occur from this equipment, no measurements of those two sources are planned by SOI, and no exclusion zones for seals or whales would be established during operation of those two sources. The acoustic instrumentation used on the seismic vessels are described in SOI's IHA application.

#### Chukchi Sea Marine Surveys

Marine surveys will include site clearance and shallow hazards surveys of potential exploratory drilling locations as required by MMS regulations. These surveys gather data on: (1) bathymetry, (2) seabed topography and other seabed characteristics (e.g., boulder patches), (3) potential geohazards (e.g., shallow faults and shallow gas zones), and (4) the presence of any archeological features (e.g., shipwrecks). Marine surveys for site clearance and shallow hazards can be accomplished by one vessel with acoustic sources. No other vessels, such as chase boats, are necessary to accomplish the proposed work. Any necessary crew changes or 4MP coordinated activities under this activity will utilize the same crew change, landing craft, or 4MP vessel mentioned under the Chukchi Sea deep 3D seismic surveys.

The Chukchi Sea marine surveys will be conducted by SOI on leases acquired in OCS LS 193. Site clearance surveys are confined to small specific areas within OCS blocks. Actual locations of site clearance and shallow hazard surveys have not been definitively set as of the date of SOI's IHA application, although these will occur within the general area outlined in Figure 1 in SOI's IHA application. Before the commencement of operations, survey location information will be supplied to NMFS, MMS, other agencies and affected members of the public as it becomes available. SOI has not contracted for a vessel at the time of publication of this document.

#### Additional Information

A detailed description of the work proposed by SOI for the open-water seasons of 2008/2009 is contained in SOI's application which is available for review (see **ADDRESSES**). Also, a description of SOI's data acquisition program proposed for the 2008/2009 season, and WesternGeco's air-gun array to be employed during 2008/2009 has been provided in previous IHA notices on SOI's seismic program (see 71 FR

26055, May 3, 2006; 71 FR 50027, August 24, 2006).

#### Description of Habitat and Marine Mammals Affected by the Activity

A detailed description of the Beaufort and Chukchi sea ecosystems and their associated marine mammal populations can be found in the NMFS/MMS Draft PEIS and the MMS Final Programmatic Environmental Assessment (Final PEA) on Seismic Surveys (see **ADDRESSES** for availability) and also in several other documents (e.g., MMS, 2007 Final EIS for Chukchi Sea Planning Area: Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea. MMS 2007-026).

#### Marine Mammals

The Beaufort/Chukchi Seas support a diverse assemblage of marine mammals, including bowhead whales, gray whales, beluga whales, killer whales, harbor porpoise, ringed seals, spotted seals, bearded seals, walrus and polar bears. These latter two species are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and are not discussed further in this document. Descriptions of the biology and distribution of the marine mammal species under NMFS' jurisdiction can be found in SOI's IHA application, the 2007 NMFS/MMS Draft PEIS on Arctic Seismic Surveys, and the MMS 2006 Final PEA on Arctic Seismic Surveys. Information on these marine mammal species can also be found in NMFS Stock Assessment Reports (SARS). The 2007 Alaska SARS document is available at: <http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2007.pdf>. Please refer to those documents for information on these species.

#### Potential Effects of Seismic Surveys on Marine Mammals

Disturbance by seismic noise is the principal means of taking by this activity. Support vessels and aircraft may provide a potential secondary source of noise. The physical presence of vessels and aircraft could also lead to non-acoustic effects on marine mammals involving visual or other cues.

As outlined in previous NMFS documents, the effects of noise on marine mammals are highly variable, and can, in general, be categorized as follows (based on Richardson *et al.*, 1995):

(1) The noise may be too weak to be heard at the location of the animal (i.e., lower than the prevailing ambient noise level, the hearing threshold of the animal at relevant frequencies, or both);

(2) The noise may be audible but not strong enough to elicit any overt behavioral response;

(3) The noise may elicit reactions of variable conspicuousness and variable relevance to the well being of the marine mammal; these can range from temporary alert responses to active avoidance reactions such as vacating an area at least until the noise event ceases;

(4) Upon repeated exposure, a marine mammal may exhibit diminishing responsiveness (habituation), or disturbance effects may persist; the latter is most likely with sounds that are highly variable in characteristics, infrequent and unpredictable in occurrence, and associated with situations that a marine mammal perceives as a threat;

(5) Any anthropogenic noise that is strong enough to be heard has the potential to reduce (mask) the ability of a marine mammal to hear natural sounds at similar frequencies, including calls from conspecifics, and underwater environmental sounds such as surf noise;

(6) If mammals remain in an area because it is important for feeding, breeding or some other biologically important purpose even though there is chronic exposure to noise, it is possible that there could be noise-induced physiological stress; this might in turn have negative effects on the well-being or reproduction of the animals involved; and

(7) Very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity. In terrestrial mammals, and presumably marine mammals, received sound levels must far exceed the animal's hearing threshold for there to be any temporary threshold shift (TTS) in its hearing ability. For transient sounds, the sound level necessary to cause TTS is inversely related to the duration of the sound. Received sound levels must be even higher for there to be risk of permanent hearing impairment. In addition, intense acoustic or explosive events may cause trauma to tissues associated with organs vital for hearing, sound production, respiration and other functions. This trauma may include minor to severe hemorrhage.

#### Effects of Seismic Survey Sounds on Marine Mammals

##### Behavioral Effects

In its IHA application, SOI states that the only anticipated impacts to marine mammals associated with noise propagation from vessel movement and seismic airgun operations would be the

temporary and short term displacement of whales and seals from within ensonified zones produced by such noise sources. Any impacts on the whale and seal populations of the Beaufort and Chukchi Seas activity areas are likely to be short-term and transitory arising from the temporary displacement of individuals or small groups from locations they may occupy at the times they are exposed to seismic sounds between the 160- to 190-dB received levels. In the case of bowhead whales however, that displacement might well take the form of a deflection of the swim paths of migrating bowheads away from (seaward of) received noise levels lower than 160 dB (Richardson *et al.*, 1999). Moreover, it is not presently known at what distance after passing the seismic source that bowheads will return to their previous migration route. However, NMFS does not believe that this offshore deflection is biologically significant (although it might be significant for purposes of subsistence hunting, as discussed later) as the bowhead migration is believed to remain within the general bowhead whale migratory corridor in the U.S. Beaufort Sea, which varies annually based on environmental factors.

SOI cites Richardson and Thomson [eds]. (2002) to support its contention that there is no conclusive evidence that exposure to sounds exceeding 160 dB have displaced bowheads from feeding activity. NMFS notes that, in 2006, observations conducted onboard a seismic vessel operating in the Canadian Beaufort Sea found that feeding bowhead whales were not observed to respond to seismic sounds at levels of 160 dB or lower.

Results from the 1996–1998 BP and Western Geophysical seismic monitoring programs in the Beaufort Sea indicate that most fall migrating bowheads deflected seaward to avoid an area within about 20 km (12.4 mi) of an active nearshore seismic operation, with the exception of a few closer sightings when there was an island or very shallow water between the seismic operations and the whales (Miller *et al.*, 1998, 1999). The available data do not provide an unequivocal estimate of the distance (and received sound levels) at which approaching bowheads begin to deflect, but this may be on the order of 35 km (21.7 mi).

When the received levels of noise exceed some threshold, cetaceans will show behavioral disturbance reactions. The levels, frequencies, and types of noise that will elicit a response vary between and within species, individuals, locations, and seasons. Behavioral changes may be subtle

alterations in surface, respiration, and dive cycles. More conspicuous responses include changes in activity or aerial displays, movement away from the sound source, or complete avoidance of the area. The reaction threshold and degree of response also are related to the activity of the animal at the time of the disturbance. Whales engaged in active behaviors, such as feeding, socializing, or mating, appear less likely than resting animals to show overt behavioral reactions, unless the disturbance is perceived as directly threatening.

#### Masking

Although NMFS believes that some limited masking of low-frequency sounds (e.g., whale calls) is a possibility during seismic surveys, the intermittent nature of seismic source pulses (1 second in duration every 16 to 24 seconds (i.e., less than 7 percent duty cycle)) will limit the extent of masking. Bowhead whales are known to continue calling in the presence of seismic survey sounds, and their calls can be heard between seismic pulses (Greene *et al.*, 1999, Richardson *et al.*, 1986). Masking effects are expected to be absent in the case of belugas, given that sounds important to them are predominantly at much higher frequencies than are airgun sounds.

#### Injury and Mortality

NMFS and SOI believe that there is no evidence that bowheads or other marine mammals exposed to seismic sounds in the Arctic have incurred an injury to their auditory mechanisms. While it is not positively known whether the hearing systems of marine mammals very close to an airgun would be at risk of temporary or permanent hearing impairment, Richardson *et al.* (1995) notes that TTS is a theoretical possibility for animals within a few hundred meters of the source. More recently, scientists have determined that the received level of a single seismic pulse might need to be ~210 dB re 1  $\mu$ Pa rms (~221–226 dB pk-pk) in order to produce brief, mild TTS. Exposure to several seismic pulses at received levels near 200–205 dB (rms) might result in slight TTS in a small odontocete, assuming the TTS threshold is a function of the total received pulse energy. Seismic pulses with received levels of 200–205 dB or more are usually restricted to a radius of no more than 200 m (656 ft) around a seismic vessel operating a large array of airguns. For baleen whales, there are no data, direct or indirect, on levels or properties of sound that are required to induce TTS. However, according to SOI, there

is a strong likelihood that baleen whales (i.e., bowheads, gray whales and humpback whales) would avoid the approaching airguns (or vessel) before being exposed to levels high enough for there to be any possibility of onset of TTS.

For pinnipeds, information indicates that for single seismic impulses, sounds would need to be higher than 190 dB rms for TTS to occur while exposure to several seismic pulses indicates that some pinnipeds may incur TTS at somewhat lower received levels than do small odontocetes exposed for similar durations. This indicates to NMFS that the 190-dB safety zone (see Mitigation and Monitoring later in this document) provides a sufficient buffer to prevent permanent threshold shift (PTS) in pinnipeds.

A marine mammal within a radius of  $\leq 100$  m ( $\leq 328$  ft) around a typical large array of operating airguns may be exposed to a few seismic pulses at received levels of  $\geq 205$  dB, and possibly more pulses if the marine mammal moved with the seismic vessel. When PTS occurs, there is physical damage to the sound receptors in the ear. In some cases, there can be total or partial deafness, whereas in other cases, the animal has an impaired ability to hear sounds in specific frequency ranges. However, as scientists are reluctant to cause injury to a marine mammals, there is no specific evidence that exposure to pulses of airgun sound can cause PTS in any marine mammal, even with large arrays of airguns. Given the possibility that mammals close to an airgun array might incur TTS, there has been further speculation about the possibility that some individuals occurring very close to airguns might incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage in terrestrial mammals.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, but are assumed to be similar to those in humans and other terrestrial mammals. Acousticians are in general agreement that a temporary shift in hearing threshold of up to 40 dB due to moderate exposure times is fully recoverable and does not involve tissue damage or cell loss. Liberman and Dodds (1987) state, "... acute threshold shifts as large as 60 dB are routinely seen in ears in which the surface morphology of the stereocilia is perfectly normal." (Stereocilia are the sensory cells responsible for the sensation of hearing.). In the chinchilla, no cases of TTS involve the loss of stereocilia, but all cases of PTS do (Ahroon *et al.*, 1996). Cell death clearly qualifies as Level A harassment (injury)

under the MMPA. Because there is no cell death with modest (up to 40 dB) TTS, such losses of sensitivity constitute a temporary impairment but not an injury, further supporting NMFS' precautionary approach that establishment of seismic airgun shutdown at 180 dB for cetaceans and 190 dB for pinnipeds, will prevent auditory injury to marine mammals by seismic airgun sounds.

NMFS notes that planned monitoring and mitigation measures (described later in this document) have been designed to avoid sudden onsets of seismic pulses at full power, to detect marine mammals occurring near the array, and to avoid exposing them to sound pulses that have any possibility of causing hearing impairment. Moreover, NMFS does not expect that any marine mammals will be seriously injured or killed during SOI's seismic survey activities, even if some animals are not detected prior to entering the 180-dB and 190-dB isopleths (safety zones) for cetaceans and pinnipeds, respectively. These criteria were set to approximate a level below where Level A harassment (i.e., defined as "any act of pursuit, torment or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild") from acoustic sources was believed to begin. Because, a decade or so ago, scientists did not have information on where PTS might occur in marine mammals, the High Energy Seismic Survey (HESS) workshop (HESS, 1997, 1999) set the level to prevent injury to marine mammals at 180 dB. NMFS concurred and determined that TTS, which is the mildest form of hearing impairment that can occur during exposure to a strong sound, may occur at these levels (180 dB for cetaceans, 190 dB for pinnipeds). When a marine mammal experiences TTS, the hearing threshold rises and a sound must be stronger in order to be heard. TTS can last from minutes or hours to (in cases of strong TTS) days. For sound exposures at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the noise ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound.

#### Strandings

In numerous past IHA notices for seismic surveys, commenters have referenced two stranding events allegedly associated with seismic activities, one off Baja California and a second off Brazil. NMFS has addressed this concern several times and without

new information, does not believe that this issue warrants further discussion. For information relevant to strandings of marine mammals, readers are encouraged to review NMFS' response to comments on this matter found in 69 FR 74905 (December 14, 2004), 71 FR 43112 (July 31, 2006), 71 FR 50027 (August 24, 2006), and 71 FR 49418 (August 23, 2006). In addition, a June, 2008 stranding of 30–40 melon-headed whales (*Peponocephala spp.*), off Madagascar that appears to be associated with seismic surveys is currently under investigation. One report indicates that the stranding began prior to seismic surveys starting.

It should be noted that marine mammal strandings recorded in the Beaufort and Chukchi seas do not appear to be related to seismic surveys. Finally, if bowhead and gray whales react to sounds at very low levels by making minor course corrections to avoid seismic noise and mitigation measures require SOI to ramp-up the seismic array to avoid a startle effect, strandings are unlikely to occur in the Arctic Ocean. As a result, NMFS does not expect any marine mammals will incur serious injury, mortality or strandings in the Arctic Ocean.

#### Potential Impacts on Affected Species and Stocks of Marine Mammals

According to SOI, the only anticipated impacts to marine mammals associated with SOI's seismic activities with respect to noise propagation are from vessel movements and seismic air gun operations. SOI states that these impacts would be temporary and short term displacement of seals and whales from within ensonified zones produced by such noise sources. Any impacts on the whale and seal populations of the Beaufort and Chukchi Sea activity areas are likely to be short term and transitory arising from the temporary displacement of individuals or small groups from locations they may occupy at the times they are exposed to seismic sounds at the 160–190 dB (or higher) received levels. As noted elsewhere, it is highly unlikely that animals will be exposed to sounds of such intensity and duration as to physically damage their auditory mechanisms. In the case of bowhead whales that displacement might well take the form of a deflection of the swim paths of migrating bowheads away from (seaward of) received noise levels greater than 160 db (Richardson *et al.*, 1999). There is no evidence that bowheads so exposed have incurred injury to their auditory mechanisms. Also, there is no evidence that seals are more than temporarily displaced from ensonified zones and no

evidence that seals have experienced physical damage to their auditory mechanisms even within ensonified zones.

During the period of seismic acquisition in the Chukchi and Beaufort seas, most marine mammals are expected to be dispersed throughout the area. Bowhead whales are expected to be concentrated in the Canadian Beaufort Sea during much of this time, where they are not expected to be affected by SOI's seismic program. The peak of the bowhead whale migration through the Beaufort and Chukchi seas typically occurs in late August through October, and efforts to reduce potential impacts during this time will be addressed with the actual start of the migration and through discussions with the affected whaling communities. In the Chukchi Sea, the timing of seismic activities will take place while the whales are widely distributed and would be expected to occur in very low numbers within the seismic activity area. If SOI conducts seismic surveys in late September or October in the Beaufort or Chukchi Sea, bowheads may travel in proximity to the seismic survey activity areas and hear sounds from vessel traffic and seismic activities, of which some might be displaced by the planned activities.

The reduction of potential impacts during the fall bowhead whale migratory period will be addressed through discussions with the whaling communities. Starting in late August bowheads may travel in proximity to SOI's planned Beaufort Sea seismic activity areas and may hear sounds from vessel traffic and seismic activities, of which some might be displaced seaward by the planned activities. However, at the present time, SOI expects to significantly reduce its period of seismic operations in the Beaufort Sea by remaining in the Chukchi Sea until mid-September, entering the Beaufort Sea only after the fall subsistence hunt has concluded and after a significant portion of the bowhead whales would have left the Canadian Beaufort Sea on their westward migration to the Chukchi Sea.

In addition, although there was apparently a period of concentrated feeding in the central Beaufort Sea in September 2007, feeding does not normally appear to be an important activity by bowheads migrating through the eastern and central part of the Alaskan Beaufort Sea or the Chukchi Sea in most years. Sightings of bowhead whales occur in the summer near Barrow (Moore and DeMaster, 2000), and there are suggestions that certain areas near Barrow are important feeding

grounds. In addition, a few bowheads can be found in the Chukchi and Bering Seas during the summer and Rugh *et al.* (2003) suggests that this may be an expansion of the western Arctic stock, although more research is needed. In the absence of important feeding areas, the potential diversion of a small number of bowheads away from seismic activities is not expected to have any significant or long-term consequences for individual bowheads or their population.

#### *Effects on Individual Arctic Ocean Marine Mammal Species*

In order to facilitate the reader's understanding of the knowledge of impacts of impulsive noise on the principal marine mammal species that are expected to be affected by SOI's proposed seismic survey program, NMFS has previously provided a summary of potential impacts on the bowhead, gray, and beluga whales and the ringed, largha and bearded seals. This information can be found in the **Federal Register** (72 FR 31553, June 7, 2007). Information on impacts on marine mammals by seismic activities can also be found in SOI's IHA application.

#### **Numbers of Marine Mammals Expected to Be Harassed by Seismic Survey Activities**

The methodology used by SOI to estimate incidental take by harassment by seismic and the numbers of marine mammals that might be affected in the proposed seismic acquisition activity area in the Chukchi and Beaufort seas has been presented in SOI's 2008 IHA application.

In its application, SOI provides estimates of the number of potential "exposures" to sound levels equal to or greater than 160 dB re 1  $\mu$ Pa (rms). NMFS clarifies here that, except possibly for bowhead whales, calculations of the number of exposures by SOI, does not necessarily indicate that this is the number of Level B harassments that SOI's seismic activity will take. First, exposure estimates do not take into account variability between species or within a species by activity, age or sex. What this means is that not all animals are expected to react at the same level as its conspecifics, and all species are not expected to react at the same level, as some species in the Arctic will respond to sounds differently, if at all, depending upon whether or not they have good hearing in the same frequency range as seismic. Second, NMFS believes that SOI's use of the maximum density estimates for its requested take authorization (see IHA

application and references for details) is overly cautious as it tends to inflate harassment take estimates to an unreasonably high number and is not based on good empirical science. NMFS believes that these inflated numbers have been provided and used by SOI for its Level B harassment take request in an abundance of caution because they present a worst-case estimate. NMFS, on the other hand prefers to use the average density estimate numbers provided in Tables 6-1 through 6-5 in SOI's IHA application as these are the more realistic and scientifically supportable estimates. NMFS notes, for example, that the most comprehensive survey data set on ringed and bearded seals from the central and eastern Beaufort Sea was conducted on offshore pack ice in late spring. Density estimates of ringed and bearded seals were based on counts of seals on the ice during this survey, not in open water where seismic surveys are conducted. Consequently, the density and potential take (exposure) numbers for seals in the Beaufort and Chukchi seas will likely overestimate the number of seals that could be encountered and/or exposed to seismic airguns because only animals in the water near the survey area would be exposed to seismic and site clearance activity sound sources. Because seals would be more widely dispersed while in open water, NMFS presumes that animal densities would be less than when seals are concentrated on and near the ice. Compounding that error, SOI calculated the maximum density for seals as 4 times the average density, which NMFS does not believe is supported by the best available science.

The estimates for marine mammal "exposure" are based on a consideration of the number of marine mammals that might be appreciably disturbed during approximately 7974 km (4955 mi) of full 3D seismic surveys and approximately 4294 km (2668 mi) of mitigation gun activity in the Chukchi Sea and by approximately 4784 km (2973 mi) of full 3D seismic surveys and approximately 2576 km (1600 mi) of mitigation gun (a single small airgun used when the airgun array is not active to alert marine mammals to the presence of the survey vessel) activity in the Beaufort Sea. In addition to the 3D seismic program, the shallow hazards surveys using a 2 10 in<sup>3</sup> airgun array will be performed along approximately 1237 km (769 mi) in the Beaufort Sea and approximately 432 km (268 mi) in the Chukchi Sea.

NMFS further notes that the close spacing of neighboring tracklines within the planned 3D seismic survey areas results in a limited amount of total area of the Chukchi and Beaufort seas being

exposed to sounds  $\geq$  160 dB while much of the survey area is exposed repeatedly. This means that the number of non-migratory cetaceans and pinnipeds exposed to seismic sounds would be less than if the seismic vessel conducted straight line transects of the sea without turning and returning on a nearby, parallel track. However, these animals may be exposed several times before the seismic vessel moves to a new site. In that regard, NMFS notes that the methodology used by SOI in its "exposure" calculations is more valid for seismic surveys that transect long distances, for those surveys that "mow the lawn" (that is, remain within a relatively small area, transiting back and forth while shooting seismic). In such situations, the Level B harassment numbers tend to be highly inflated, if each "exposure" is calculated to be a different animal and not, as here, a relatively small number of animals residing in the area and being "exposed" to seismic sounds several times during the season. As a result, NMFS believes that SOI's estimated number of individual exposures does not account for multiple exposures of the same animal (principally non-migratory pinnipeds) instead of single animal exposures as the survey conducts a number of parallel transects of the same area (sometimes called bostrophodontical surveys) and the fact that the mitigation procedures would serve to reduce exposures to affected marine mammals.

As mentioned previously, 3D seismic airgun arrays are composed of identically tuned Bolt-gun sub-arrays operating at 2,000 psi. In general, the signature produced by an array composed of multiple sub-arrays has the same shape as that produced by a single sub-array while the overall acoustic output of the array is determined by the number of sub-arrays employed. The gun arrangement for the 1,049 square inches (in<sup>2</sup>) sub-array is detailed below and is comprised of three subarrays comprising a total 3,147 in<sup>2</sup> sound source. The anticipated radii of influence of the bathymetric sonars and pinger are less than those for the air gun configurations described in Attachment A in SOI's IHA application. It is assumed that, during simultaneous operations of those additional sound sources and the air gun(s), any marine mammals close enough to be affected by the sonars or pinger would already be affected by the air gun(s). In this event, SOI believes that marine mammals are not expected to exhibit more than short-term and inconsequential responses, and such responses have not been



considered to constitute “taking” therefore, potential taking estimates only include noise disturbance from the use of air guns. The specifications of the equipment, including site clearance activities, to be used and areas of ensonification are described more fully in SOI’s IHA application (see Attachment B in SOI’s IHA application).

#### Cetaceans

For belugas and gray whales, in both the Beaufort and Chukchi Seas and bowhead whales in the Chukchi Sea, Moore *et al.* (2000b and c) offer the most current data to estimate densities during summer. Density estimates for bowhead whales in the Beaufort Sea were updated by information provided by Miller *et al.* (2002).

Tables 6–1 and 6–2 (Chukchi Sea) and Tables 6–3 and 6–4 (beluga and bowhead: Beaufort Sea) provide density estimates for the summer and fall, respectively. Table 6–5 provides a summary of the expected densities for cetaceans (other than bowheads and belugas) and pinnipeds during all seasons in the Beaufort Sea. The number of different individuals of each species potentially exposed to received levels  $\geq 160$  dB re 1  $\mu$ Pa (rms) within each survey region, time period, and habitat zone was estimated by multiplying the expected species density, by the anticipated area to be ensonified to the 160–dB level in the survey region, time period, and habitat zone to which that density applies.

The numbers of “exposures” were then summed by SOI for each species across the survey regions, seasons, and habitat zones. Some of the animals estimated to be exposed, particularly migrating bowhead whales, might show avoidance reactions before being exposed to  $\geq 160$  dB re 1  $\mu$ Pa (rms). Thus, these calculations actually estimate the number of individuals potentially exposed to  $\geq 160$  dB that would occur if there were no avoidance of the area ensonified to that level.

For the full–3D airgun array, the cross track distance is 2 the 160–dB radius which was measured in 2007 as 8.1 km (5.0 mi) in the Chukchi Sea and 13.4 km (8.3 mi) in the Beaufort Sea. The mitigation gun’s 160–dB radius was measured at 1370 m (4495 ft) in the Chukchi Sea and Beaufort seas. For shallow hazards surveys to be

performed by the *Henry Christofferson*, the 160–dB radius measured in 2007 was equal to 621 m (2037 ft). Using these distances, SOI estimates that the area ensonified in the Chukchi Sea is approximately 15,000 km<sup>2</sup> and approximately 10,100 km<sup>2</sup> in the Beaufort Sea.

The estimated numbers of potential marine mammal “exposures” by SOI’s surveys are presented in Tables 6–6 for the summer/fall period in the Chukchi Sea, Table 6–7 for bowhead and beluga whales in the U.S. Beaufort Sea and in Table 6–8 for marine mammals (other than bowheads and belugas) in the Beaufort Sea. Table 1 in this document (Table 6–9 in the IHA application) summarizes these exposure estimates based on the 160–dB re 1  $\mu$ Pa (rms) criteria for cetaceans exposed to impulse sounds (such as seismic).

SOI’s estimates show that the bowhead whale is the only endangered marine mammal expected to be exposed to noise levels  $\geq 160$  dB unless, as expected during the fall migratory period, bowheads avoid the approaching survey vessel before the received levels reach 160 dB. Migrating bowheads are likely to take avoidance measures, though many of the bowheads engaged in other activities, particularly feeding and socializing, probably will not. SOI’s estimate of the number of bowhead whales potentially exposed to  $\geq 160$  dB is 1540 animals (9 in the Chukchi Sea and 1531 in the Beaufort Sea (see Table 1)). Two other endangered cetacean species that may be encountered in the northern Chukchi/western Beaufort Sea area, the fin whale and humpback whale, are estimated by SOI to have two exposures each in the Chukchi Sea. However, NMFS believes that at least for the fin whale, no animals would be so exposed given their low “average” estimates of densities in the area.

Most of the cetaceans exposed to seismic sounds with received levels  $\geq 160$  dB would involve bowhead, gray, and beluga whales, and the harbor porpoise. Average estimates of the number of exposures of cetaceans by 3D seismic surveys (other than bowheads), in descending order, are beluga (298), gray whale (183), and harbor porpoise (58). The regional breakdown of these numbers is shown in Tables 6–6 to 6–8. Estimates for other species are lower

(Table 6–9). These estimates are also provided in Table 1 in this **Federal Register** notice.

#### Pinnipeds

Ringed, spotted, and bearded seals are all associated with sea ice, and most census methods used to determine density estimates for pinnipeds are associated with counting the number of seals hauled out on ice. Correction factors have been developed for most pinniped species that address biases associated with detectability and availability of a particular species. Although extensive surveys of ringed and bearded seals have been conducted in the Beaufort Sea, the majority of the surveys have been conducted over the landfast ice and few seal surveys have been in open water. The most comprehensive survey data set on ringed seals (and bearded seal) from the central and eastern Beaufort Sea was conducted on offshore pack ice in late spring (Kingsley, 1986). It is important to note that all proposed activities will be conducted during the open-water season and density estimates used here were based on counts of seals on ice. Therefore, densities and potential take numbers will overestimate the numbers of seals that would likely be encountered and/or exposed because only the animals in the water would be exposed to the seismic and clearance activity sound sources.

The ringed seal is the most widespread and abundant pinniped in ice-covered arctic waters and ringed seals are expected to account for the vast majority of marine mammals expected to be encountered, and hence exposed to airgun sounds with received levels  $\geq 160$  dB re 1  $\mu$ Pa (rms) during SOI’s seismic survey. The average estimate is that 13,256 ringed seals might be exposed to seismic sounds with received levels  $\geq 160$  dB. Two additional pinniped species (other than the Pacific walrus) are expected to be encountered. They are the bearded seal (592 exposures), and the spotted seal (422 exposures) (see Table 1 in this document or Table 6–9 in the IHA application). The spotted seal and ribbon seal are unlikely to be encountered during SOI’s seismic surveys.



TABLE 1.SUMMARY OF THE NUMBER OF POTENTIAL EXPOSURES OF MARINE MAMMALS TO RECEIVED SOUND LEVELS IN THE WATER OF  $\geq 160$  dB DURING SOI'S PROPOSED SEISMIC PROGRAM IN THE CHUKCHI SEA AND BEAUFORT SEA, ALASKA, JULY - NOVEMBER, 2008. NOT ALL MARINE MAMMALS WILL CHANGE THEIR BEHAVIOR WHEN EXPOSED TO THESE SOUND LEVELS, ALTHOUGH SOME MIGHT ALTER THEIR BEHAVIOR SOMEWHAT WHEN LEVELS ARE LOWER (SEE TEXT).

Species	Number of Individuals Exposed to Sound Levels $\geq 160$ dB					
	Chukchi Sea		Beaufort Sea		Total	
	Avg.	Max.	Avg.	Max.	Avg.	Max.
<b>Odontocetes</b>						
<i>Monodontidae</i>						
Beluga	63	254	234	938	298	1192
Narwhal	0	0	0	0	0	0
<i>Delphinidae</i>						
Killer whale	2	6	0	0	2	6
<i>Phocoenidae</i>						
Harbor porpoise	57	227	2	6	58	234
<b>Mysticetes</b>						
<i>Bowhead Whale</i> <sup>a</sup>	9	46	1531	1536	1540	1582
<i>Fin whale</i>	2	6	0	0	2	6
Gray whale	182	727	2	6	183	734
<i>Humpback whale</i>	2	6	0	0	2	6
Minke whale	2	6	0	0	2	6
<b>Total Cetaceans</b>	70	281	1533	1543	1603	1824
<b>Pinnipeds</b>						
Bearded seal	270	405	322	1286	592	1691
Ribbon seal	2	6	0	0	2	6
Ringed seal	6951	10827	6305	25221	13256	36047
Spotted seal	361	562	61	243	422	804
<b>Total Pinnipeds</b>	5678	8836	6687	26750	12366	35586

<sup>a</sup> See text for description of bowhead whale estimate for the Beaufort Sea

#### *Potential Marine Mammal Disturbance At Less Than 160 dB Received Levels*

During autumn seismic surveys in the Beaufort Sea, migrating bowhead whales displayed avoidance (i.e., deflection) at distances out to 20–30 km (12–19 mi) and received sound levels of ~130 dB (rms) (Miller *et al.*, 1999; Richardson *et al.*, 1999). Therefore, it is possible that a larger number of bowhead whales than estimated above may be disturbed to some extent if reactions occur at  $\geq 130$  dB (rms).

However, these references note that bowhead whales below the water surface at a distance of 20 km (12.4 mi) from an airgun array received pulses of about 117–135 dB re 1  $\mu$ Pa rms, depending upon propagation. Corresponding levels at 30 km (18.6 mi) were about 107–126 dB re 1  $\mu$ Pa rms. Miller *et al.* (1999) surmise that deflection may have begun about 35 km (21.7 mi) to the east of the seismic operations, but did not provide SPL measurements to that distance, and noted that sound propagation has not been studied as extensively eastward in the alongshore direction, as it has northward, in the offshore direction. Therefore, while this single year of data analysis indicates that bowhead whales may make minor deflections in

swimming direction at a distance of 30–35 km (18.6–21.7 mi), there is no indication that the sound pressure level (SPL) where deflection first begins is at 120 dB- it could be at another SPL lower or higher than 120 dB. Miller *et al.* (1999) also note that the received levels at 20–30 km (12.4–18.6 mi) were considerably lower in 1998 than have previously been shown to elicit avoidance in bowheads exposed to seismic pulses. However, the seismic airgun array used in 1998 was larger than the ones used in 1996 and 1997. Therefore, NMFS believes that it cannot scientifically support adopting any single SPL value below 160 dB and apply it across the board for all species and in all circumstances.

Second, NMFS has noted in the past that minor course changes during migration are not considered a significant behavioral change and, as indicated in MMS' 2006 Final PEA, have not been seen at other times of the year and during other activities. To show the contextual nature of this minor behavioral modification, recent monitoring studies of Canadian seismic operations indicate that when not migrating but involved in feeding, bowhead whales do not move away from a noise source at an SPL of 160 dB.

Therefore, while bowheads may avoid an area of 20 km (12.4 mi) around a noise source, when such a determination requires a post-survey computer analysis to find that bowheads have made slight course change, NMFS believes that this does not rise to a level considered to be a significant behavioral response on the part of the marine mammals or under the MMPA, a "take." NMFS therefore continues to estimate "takings" under the MMPA from impulse noises, such as seismic, as being at a distance of 160 dB (re 1  $\mu$ Pa). NMFS needs to point out however, that while this might not be a "taking" in the sense that there is not a significant behavioral response by bowhead whales, a minor course deflection by bowheads can have a significant impact on the subsistence uses of bowheads. As a result, NMFS still requires mitigation measures to ensure that the activity does not have an unmitigable adverse impact on subsistence uses of bowheads.

Finally, it is likely that SOI will not conduct seismic operations in the Beaufort Sea during that part of the fall bowhead migration that occurs at the same time as the fall bowhead subsistence hunt. As a result, a large proportion of the bowhead population would migrate past the Beaufort Sea

seismic survey area without being exposed to any seismic sounds. Limiting operations during the fall bowhead whale migration is also meant to reduce any chance of conflicting with subsistence hunting and will continue at least until hunting quotas have been filled by the coastal communities.

#### Potential Impact on Habitat

SOI states that the proposed seismic activities will not result in any permanent impact on habitats used by marine mammals, or to their prey sources. Seismic activities will mostly occur during the time of year when bowhead whales are widely distributed and would be expected to occur in very low numbers within the seismic activity area (mid- to late-July through September). Any effects would be temporary and of short duration at any one place. The primary potential impacts to marine mammals is associated with elevated sound levels from the proposed airguns were discussed previously in this document.

A broad discussion on the various types of potential effects of exposure to seismic on fish and invertebrates can be found in the NMFS/MMS Draft PEIS for Arctic Seismic Surveys (see **ADDRESSES**).

Mortality to fish, fish eggs and larvae from seismic energy sources would be expected within a few meters (0.5 to 3 m (1.6 to 9.8 ft)) from the seismic source. Direct mortality has been observed in cod and plaice within 48 hours that were subjected to seismic pulses two meters from the source (Matishov, 1992), however other studies did not report any fish kills from seismic source exposure (La Bella *et al.*, 1996; IMG, 2002; Hassel *et al.*, 2003). To date, fish mortalities associated with normal seismic operations are thought to be slight. Saetre and Ona (1996) modeled a worst-case mathematical approach on the effects of seismic energy on fish eggs and larvae, and concluded that mortality rates caused by exposure to seismic are so low compared to natural mortality that issues relating to stock recruitment should be regarded as insignificant.

Limited studies on physiological effects on marine fish and invertebrates to acoustic stress have been conducted. No significant increases in physiological stress from seismic energy were detected for various fish, squid, and cuttlefish (McCauley *et al.*, 2000) or in male snow crabs (Christian *et al.*, 2003). Behavioral changes in fish associated with seismic exposures are expected to be minor at best. Because only a small portion of the available foraging habitat would be subjected to seismic pulses at a given time, fish would be expected to

return to the area of disturbance anywhere from 15–30 minutes (McCauley *et al.*, 2000) to several days (Engas *et al.*, 1996).

Available data indicates that mortality and behavioral changes do occur within very close range to the seismic source, however, the proposed seismic acquisition activities in the Chukchi and Beaufort seas are predicted by SOI to have a negligible effect to the prey resource of the various life stages of fish and invertebrates available to marine mammals occurring during the project's duration. In addition, it is unlikely that bowheads, gray, or beluga whales will be excluded from any habitat.

#### Effects of Seismic Noise and Other Related Activities on Subsistence

The disturbance and potential displacement of marine mammals by sounds from seismic activities are the principal concerns related to subsistence use within the Beaufort and Chukchi seas. The harvest of marine mammals (mainly bowhead whales, but also ringed and bearded seals) is central to the culture and subsistence economies of the coastal North Slope and Western Alaskan communities. In particular, if fall-migrating bowhead whales are displaced farther offshore by elevated noise levels, the harvest of these whales could be more difficult and dangerous for hunters. The impact would be that whaling crews would necessarily be forced to travel greater distances to intercept westward migrating whales thereby creating a safety hazard for whaling crews and/or limiting chances of successfully striking and landing bowheads. The harvest could also be affected if bowheads become more skittish when exposed to seismic noise. Hunters relate how bowhead whales also appear "angry" due to seismic noise, making whaling more dangerous.

This potential impact on subsistence uses of marine mammals is proposed by SOI to be mitigated by application of the procedures established in a Conflict Avoidance Agreement (CAA) between the seismic operators and the AEWC and the Whaling Captains' Associations of Kaktovik, Nuiqsut, Barrow, Pt. Hope and Wainwright. SOI notes that the times and locations of seismic and other noise producing sources are likely to be curtailed during times of active bowhead whale scouting and actual whaling activities within the traditional subsistence hunting areas of the potentially affected communities. (See Mitigation for Subsistence). SOI states that seismic survey activities will also be scheduled to avoid the traditional subsistence beluga hunt which annually

occurs in July in the community of Pt. Lay. As a result, SOI believes that there should be no adverse impacts on the availability of whale species for subsistence uses. In the event that a CAA is not signed by either party, then NMFS will implement mitigation measures it determines are necessary to ensure that the taking of marine mammals by SOI's seismic and related activities do not have an unmitigable adverse impact on the subsistence uses of marine mammals.

In the Chukchi Sea, SOI's seismic work should not have unmitigable adverse impacts on the availability of the whale species for subsistence uses. The whale species normally taken by Inupiat hunters are the bowhead and belugas. SOI's Chukchi Sea seismic operations will not begin until after July 20, 2008 by which time the majority of bowheads will have migrated to their summer feeding areas in Canada. Even if any bowheads remain in the northeastern Chukchi Sea after July 20, they are not normally hunted after this date until the return migration occurs around late September when a fall hunt by Barrow whalers takes place. In recent years, bowhead whales have occasionally been taken in the fall by coastal villages along the Chukchi coast, but the total number of these animals has been small. Seismic operations for the Chukchi Sea seismic program will be timed and located so as to avoid any possible conflict with the Barrow fall whaling, and specific provisions governing the timing and location are expected to be incorporated, if signed, into a CAA established between SOI and WesternGeco, the AEWC, and the Whaling Captains Associations.

Beluga whales may also be taken sporadically for subsistence needs by coastal villages, but traditionally are taken in small numbers very near the coast. However, SOI will establish "communication stations" in the villages to monitor impacts. Gray whales, which will be abundant in the northern Chukchi Sea from spring through autumn, are not taken by subsistence hunters.

#### Plan of Cooperation (POC)

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a POC or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes. SOI has summarized concerns received during 2006 and 2007 into the 2007 POC, which was submitted during June 2007 to federal agencies as well as to

subsistence stakeholders, and updated in July 2007 and earlier this year. SOI has developed the POC to mitigate and avoid any unreasonable interference by SOI's planned activities on North Slope subsistence uses and resources. The POC is the result of numerous meetings and consultations between SOI, affected subsistence communities and stakeholders, and federal agencies beginning in October 2006 (see Table 12-1 in SOI's IHA application for a list of meetings). The POC identifies and documents potential conflicts and associated measures that will be taken to minimize any adverse effects on the availability of marine mammals for subsistence use. To be effective, SOI believes the POC must be a dynamic document which will expand to incorporate the communications and consultation that will continue to occur throughout 2008. Outcomes of POC meetings are included in quarterly updates attached to the POC and distributed to federal, state, and local agencies as well as local stakeholder groups.

SOI hopes that a CAA will result from the POC meetings. In that regard, the AEWC submitted a draft CAA to the industry earlier this spring. If signed, the CAA will incorporate all appropriate measures and procedures regarding the timing and areas of the operator's planned activities (e.g., times and places where seismic operations will be curtailed or moved in order to avoid potential conflicts with active subsistence whaling and sealing); a communications system between operator's vessels and whaling and hunting crews (i.e., the communications center will be located in strategic areas); provision for marine mammal observers/Inupiat communicators aboard all project vessels; conflict resolution procedures; and provisions for rendering emergency assistance to subsistence hunting crews. If requested, post-season meetings will also be held to assess the effectiveness of a 2008 CAA between SOI, the AEWC, and the Whaling Captains Associations, to address how well conflicts (if any) were resolved; and to receive recommendations on any changes (if any) might be needed in the implementation of future CAAs.

It should be noted that NMFS is required by the MMPA to make a determination that an activity would not have an unmitigable adverse impact on the subsistence needs for marine mammals. While this includes usage of both cetaceans and pinnipeds, the primary impact from seismic activities is expected to be impacts from noise on bowhead whales during its westward

fall migration and feeding period in the Beaufort Sea. NMFS has defined unmitigable adverse impact as an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) causing the marine mammals to abandon or avoid hunting areas; (ii) directly displacing subsistence users; or (iii) placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met (50 CFR 216.103).

Therefore, while a signed CAA allows NMFS to make a determination that the activity will not have an unmitigable adverse impact on the subsistence use of marine mammals, if one or both parties fail to sign the CAA, then NMFS will make the determination that the activity will or will not have an unmitigable adverse impact on subsistence use of marine mammals. This determination may require that the IHA contain additional mitigation measures in order for this decision to be made.

#### Mitigation and Monitoring

As part of its application, SOI has proposed implementing a marine mammal mitigation and monitoring program (4MP) that will consist of monitoring and mitigation during SOI's seismic and shallow-hazard survey activities. In conjunction with monitoring during SOI's exploratory drilling program (subject to a separate notice and review), monitoring will provide information on the numbers of marine mammals potentially affected by these activities and permit real time mitigation to prevent injury of marine mammals by industrial sounds or activities. These goals will be accomplished by conducting vessel-, aerial-, and acoustic-monitoring programs to characterize the sounds produced by the seismic airgun arrays and related equipment and to document the potential reactions of marine mammals in the area to those sounds and activities. Acoustic modeling will be used to predict the sound levels produced by the seismic, shallow hazards and drilling equipment in the U.S. Beaufort and Chukchi seas. For the seismic program, acoustic measurements will also be made to establish zones of influence (ZOIs) around the activities that will be monitored by observers. Aerial monitoring and reconnaissance of marine mammals and recordings of ambient sound levels, vocalizations of

marine mammals, and received levels should they be detectable using bottom-founded acoustic recorders along the Beaufort Sea coast will be used to interpret the reactions of marine mammals exposed to the activities. The components of SOI's mitigation and monitoring programs are briefly described next. Additional information can be found in SOI's application.

#### Proposed Mitigation Measures

As part of its IHA application, SOI submitted its proposed mitigation and monitoring program for SOI's seismic programs in the Chukchi and Beaufort seas for 2008/2009. SOI notes that the proposed seismic exploration program incorporates both design features and operational procedures for minimizing potential impacts on cetaceans and pinnipeds and on subsistence hunts. Seismic survey design features include: (1) Timing and locating seismic activities to avoid interference with the annual fall bowhead whale hunts; (2) configuring the airgun arrays to maximize the proportion of energy that propagates downward and minimizes horizontal propagation; (3) limiting the size of the seismic energy source to only that required to meet the technical objectives of the seismic survey; and (4) conducting pre-season modeling and early season field assessments to establish and refine (as necessary) the appropriate 180 dB and 190 dB safety zones, and other radii relevant to behavioral disturbance.

The potential disturbance of cetaceans and pinnipeds during seismic operations will be minimized further through the implementation of the following several ship-based mitigation measures.

#### Safety and Disturbance Zones

Safety radii for marine mammals around airgun arrays are customarily defined as the distances within which received pulse levels are greater than or equal to 180 dB re 1  $\mu$ Pa (rms) for cetaceans and greater than or equal to 190 dB re 1  $\mu$ Pa (rms) for pinnipeds. These safety criteria are based on an assumption that seismic pulses at lower received levels will not injure these animals or impair their hearing abilities, but that higher received levels might result in such effects. It should be understood that marine mammals inside these safety zones will not necessarily be seriously injured or killed as these zones were established prior to the current understanding that significantly higher levels of impulse sounds would be required before injury or mortality would occur. This has been described previously in this document.

SOI anticipates that monitoring similar to that conducted in the Chukchi Sea in 2007 will also be required in the Chukchi and the Beaufort seas in 2008. SOI plans to use marine mammal observers (MMOs) onboard the seismic vessel to monitor the 190- and 180-dB (rms) safety radii for pinnipeds and cetaceans, respectively and to implement appropriate mitigation as discussed in the proceeding sections. SOI also plans to monitor the 160-dB (rms) disturbance zone with MMOs onboard the chase vessels in 2008 as was done in 2006 and 2007. There has also been concern that received pulse levels as low as 120 dB (rms) may have the potential to disturb some whales. In 2006 and 2007, there was a requirement in the IHAs issued to SOI by NMFS to implement special mitigation measures if specified numbers of bowhead cow/calf pairs might be exposed to seismic sounds greater than 120 dB rms or if large groups (greater than 12 individuals) of bowhead or gray whales might be exposed to sounds greater than or equal to 160 dB rms. In 2007, monitoring of the 120-dB (rms) zone was required in the Beaufort Sea after 25 September. For 2008, SOI anticipates that it will not operate in the Chukchi Sea between September 25th and the time ice prevents additional work in the Beaufort Sea, by which time NMFS believes the bowhead whale cow/calf migration period to have been completed. As a result, it is unlikely that SOI will not need to monitor the 120 dB (rms) zone in the Chukchi Sea in 2008.

During the 2006 and 2007 seismic programs in the Chukchi and Beaufort Seas, SOI utilized a combination of pre-season modeling and early season sound source verification to establish safety zones for these sound level criteria. As the equipment being utilized in 2008 is the same as that used in the 2006 and 2007 field seasons, and the majority of locations where seismic data is to be acquired were modeled prior to the 2006 and 2007 seasons, SOI will initially utilize the derived (measured) sound criterion distances from 2006. Any locations not modeled previously will be modeled prior to 2008 survey initiation and mitigation distances and safety zones adjusted up, if necessary following sound measurements at the new locations. Modeling of the sound propagation is based on the size and configuration of the airgun array and on available oceanographic data. An acoustics contractor will perform the direct measurements of the received levels of underwater sound versus distance and direction from the airgun

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 will include ramp ups, power downs, and shut downs as described next.

#### Ramp-Up

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" cetaceans and pinnipeds 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 seismic program, the seismic operator will ramp up the airgun arrays slowly, at a rate no greater than 6 dB/5 minute period. Full ramp ups (i.e., from a cold start after a shut down, when no airguns have been firing) will begin by firing a small airgun in the arrays. 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. That depends on ship speed and the size of the 180-dB safety radius, which are not known at this time.

A full ramp up, after a shut down, will not begin until there has been a minimum of a 30-minute period of observation by MMOs of the safety zone to assure that no marine mammals are present. The entire safety zone must be visible during the 30-minute leading up 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 15–30 minutes: 15 minutes for small odontocetes and pinnipeds, or 30 minutes for baleen whales and large odontocetes.

During periods of turn around and transit between seismic transects, at least one airgun will remain operational to alert marine mammals in the area of the vessel's location. The ramp-up procedure still will be followed when increasing the source levels from one air gun to the full arrays. Moreover, keeping one air gun 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 24 hr/day until mid-August, so until that date MMOs will automatically be observing during the 30-minute period preceding a ramp up. Later in the season, MMOs will be called out 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.

#### Power Downs and Shut Downs

A power down is the immediate reduction in the number of operating airguns from all guns firing to some smaller number. A shut down is the immediate cessation of firing of all airguns. The airgun arrays will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable safety zone of the full airgun arrays (i.e., 180 dB rms for cetaceans, 190 dB rms for pinnipeds), but is outside the applicable safety zone of the single airgun. If a marine mammal is sighted within the applicable safety zone of the single airgun, the airgun array will be shut down (i.e., no airguns firing). Although observers will be located on the bridge ahead of the center of the airgun array, the shutdown criterion for animals ahead of the vessel will be based on the distance from the bridge (vantage point for MMOs) rather than from the airgun array - a precautionary approach. For marine mammals sighted alongside or behind the airgun array, the distance is measured from the array.

#### Operations at Night and in Poor Visibility

When operating under conditions of reduced visibility attributable to darkness or to adverse weather conditions, infra-red or night-vision binoculars will be available for use. However, it is recognized that their effectiveness is limited. For that reason, MMOs will not routinely be on watch at night, except in periods before and during ramp-ups. It should be noted that if one small airgun remains firing, the rest of the array can be ramped up during darkness or in periods of low visibility. Seismic operations may continue under conditions of darkness or reduced visibility.

### *Preliminary Mitigation Determination*

As NMFS believes that the combination of use of the mitigation gun, ramp-up of the seismic airgun array and the slow vessel speed (to allow marine mammals sufficient time to take necessary avoidance measures), the use of trained marine mammal observers and shut-down procedures (to avoid potential injury if the animal is close to the vessel), and the behavioral response of marine mammals (especially bowhead whales) to avoid areas of high anthropogenic noise all provide protection to marine mammals from serious injury or mortality. As a result, NMFS believes that it is not necessary to require termination of survey activities during darkness or reduced visibility and that the current level of mitigation will result in the lowest level of impact on marine mammals practicable.

### **Proposed Marine Mammal Monitoring**

SOI has proposed to implement a marine mammal monitoring program (4MP) to collect data to address the following specific objectives: (1) improve the understanding of the distribution and abundance of marine mammals in the Chukchi and Beaufort sea project areas; (2) understand the propagation and attenuation of anthropogenic sounds in the waters of the project areas; (3) determine the ambient sound levels in the waters of the project areas; and (4) assess the effects of sound on marine mammals inhabiting the project areas and their distribution relative to the local people that depend on them for subsistence hunting.

These objectives and the monitoring and mitigation goals will be addressed by: (1) vessel-based MMOs on the seismic source and other support vessels; (2) an acoustic program to predict and then measure the sounds produced by the seismic operations and the possible responses of marine mammals to those sounds; (3) an aerial monitoring and reconnaissance of marine mammals available for subsistence harvest along the Chukchi Sea coast; and (4) bottom-founded autonomous acoustic recorder arrays along the Alaskan coast and offshore in the Chukchi and Beaufort seas to record ambient sound levels, vocalizations of marine mammals, and received levels of seismic operations should they be detectable.

### *Seismic Source Vessel-based Visual Monitoring*

A sufficient number of MMOs will be required to be onboard the seismic

source vessel to meet the following criteria: (1) 100 percent monitoring coverage during all periods of seismic operations in daylight and for the 30 minutes prior to starting ramp-up and for the number of minutes required to reach full ramp-up; (2) coverage during darkness for 30-minutes before and during ramp-ups (provided MMOs verify that they can clearly see the entire safety zone); (3) maximum of 4 consecutive hours on watch per MMO; (4) maximum of approximately 12 hours on watch per day per MMO with no other shipboard duties; and (5) two-MMO coverage during ramp-up and the 30 minutes prior to full ramp-ups and for as large a fraction of the other operating hours as possible.

To accomplish these tasks SOI proposes to have from three to five MMOs (including one Inupiat observer/communicator) based aboard the seismic vessel. However, NMFS does not consider Inupiat observers to be included in the required minimum number of MMOs unless they have undergone MMO training at a facility approved in advance by NMFS. MMOs will search for and observe marine mammals whenever seismic operations are in progress and for at least 30 minutes before the planned start of seismic transmissions or whenever the seismic array's operations have been suspended for more than 10 minutes. The MMOs will scan the area immediately around the vessels with reticle binoculars during the daytime. Laser rangefinding equipment will be available to assist with distance estimation. After mid-August, when the duration of darkness increases, image intensifiers will be used by observers and additional light sources may be used to illuminate the safety zone.

The seismic vessel-based work will provide the basis for real-time mitigation (airgun power downs and, as necessary, shut downs), as called for by the IHAs; information needed to estimate the "take" of marine mammals by harassment, which must be reported to NMFS; data on the occurrence, distribution, and activities of marine mammals in the areas where the seismic program is conducted; information to compare the distances, distributions, behavior; movements of marine mammals relative to the source vessels at times with and without seismic activity; a communication channel to Inupiat whalers through the Communications Coordination Center in coastal villages; and continued employment and capacity building for local residents, with one objective being to develop a larger pool of experienced Inupiat MMOs.

The use of four or more MMOs allows two observers to be on duty simultaneously for up to 50 percent of the active airgun hours. The use of two observers increases the probability of detecting marine mammals, and two observers will be on duty for the entire duration of time whenever the seismic array is ramped up. As mentioned previously, individual watches will be limited to no more than 4 consecutive hours to avoid observer fatigue (and no more than 12 hours on watch per 24 hour day). When mammals are detected within or about to enter the safety zone designated to prevent injury to the animals (see Mitigation), the geophysical crew leader will be notified so that shutdown procedures can be implemented immediately. Details of the vessel-based marine mammal monitoring program are described in SOI's IHA application (see Appendix B).

### *Chase Boat Monitoring*

MMOs will also be present on smaller support vessels that travel with the seismic source vessel. These support vessels are commonly known as "guard boats" or "chase boats." During seismic operations, a chase boat remains very near to the stern of the source vessel anytime that a member of the source vessel crew is on the back deck deploying or retrieving equipment related to the seismic array. Once the seismic array is deployed the chase boat then serves to keep other vessels away from the seismic source vessel and the seismic array itself (including hydrophone streamer) during production of seismic data and provide additional emergency response capabilities.

In the Chukchi and Beaufort seas in 2008, SOI's seismic source vessel will have one associated chase boat and possibly an additional supply vessel. The chase boat and supply vessel (if present) will have three MMOs onboard to collect marine mammal observations and to monitor the 160 dB (rms) disturbance zone from the seismic airgun array. MMOs on the chase boats will be able to contact the seismic ship if marine mammals are sighted. To maximize the amount of time during the day that an observer is on duty, two observers aboard the chase boat or supply vessel will rarely work at the same time. As on the source vessels, shifts will be limited to 4 hrs in length and 12 hrs total in a 24 hr period.

SOI plans to monitor the 160-dB (rms) disturbance radius in 2008 using MMOs onboard the chase vessel. The 160-dB radius in the Chukchi Sea in 2007 was determined by JASCO (2007) to extend ~8.1 km from the airgun

source on the *M/V Gilavar*. In the Beaufort Sea, the 160-dB radius was measured at 13.45 km (8.4 mi) (JASCO, 2007). This area around the seismic vessel was monitored by MMOs onboard the *M/V Gulf Provider* (the chase boat used in 2006 and 2007 operations). As in 2007 during monitoring of the 160-dB zone the *M/V Gulf Provider* will travel ~8 km (5 mi) ahead and to the side of the *M/V Gilavar*. MMOs onboard the *M/V Gulf Provider* will search the area ahead of the *M/V Gilavar* within the 160-dB zone for marine mammals. Every 8 km (5 mi) or so, the *M/V Gulf Provider* will move to the other side of the *M/V Gilavar* continuing in a stair-step type pattern. The distance at which the *M/V Gulf Provider* (or other equivalent vessel) travels ahead of the *M/V Gilavar* will be determined by the measured 160-dB radius. Mitigation (i.e., power down or shut down of the airgun array) will be implemented if a group of 12 or more bowhead or gray whales enter the 160-dB zone. SOI will use this same protocol in the Beaufort Sea after the 160-dB radius has been determined. Depending upon the size of the measured 160-dB zone around the airgun array SOI may decide to use a vessel equipped with a Passive Acoustic Monitoring (PAM) system (if it has been independently field tested and certified to NMFS as being capable of detecting marine mammals that inhabit the Arctic Ocean) or may use a second chase boat to ensure effective monitoring of the area.

In 2007 the measured distance to the 180-dB isopleth ranged from about 2.45 km (1.5 mi) in the Chukchi Sea to about 2.2 km (1.4 mi) in the Beaufort Sea near the Sivulliq prospect. SOI decided to use an additional vessel to monitor this zone given its importance in protecting marine mammals from potential injury associated with exposure to seismic pulses. Depending upon the measured radius for the 180-dB zone in 2008/2009 SOI may elect to use a PAM system to help monitor this area around the *M/V Gilavar* as well.

#### *Aerial Survey Program*

SOI proposes to conduct an aerial survey program in support of the seismic exploration program in the Beaufort Sea during summer and fall of 2008. The objectives of the aerial survey will be: (1) to advise operating vessels as to the presence of marine mammals in the general area of operation; (2) to provide mitigation monitoring (120 dB zones) as may be required under the conditions of the IHA; (3) to collect and report data on the distribution, numbers, movement and behavior of marine mammals near the seismic

operations with special emphasis on migrating bowhead whales; (4) to support regulatory reporting and Inupiat communications related to the estimation of impacts of seismic operations on marine mammals; (5) to monitor the accessibility of bowhead whales to Inupiat hunters and (6) to document how far west of seismic activities bowhead whales travel before they return to their normal migration paths, and if possible, to document how far east of seismic operations the deflection begins.

The same aerial survey design will be implemented during the summer (August) and fall (late August-October) period, but during the summer, the survey grid will be flown twice a week, and during the fall, flights will be conducted daily. During the early summer, few cetaceans are expected to be encountered in the nearshore Alaskan Beaufort Sea where seismic surveys will be conducted. Those cetaceans that are encountered are expected to be either along the coast (gray whales: (Maher, 1960; Rugh and Fraker, 1981; Miller *et al.*, 1999; Treacy, 2000) or seaward of the continental shelf among the pack ice (bowheads: Moore *et al.*, 1989b; Miller *et al.*, 2002; and belugas: Moore *et al.*, 1993; Clark *et al.*, 1993; Miller *et al.*, 1999) north of the area where seismic surveys and drilling activities are to be conducted. During some years a few gray whales are found feeding in shallow nearshore waters from Barrow to Kaktovik but most sightings are in the western part of that area.

During the late summer and fall, the bowhead whale is the primary species of concern, but belugas and gray whales are also present. Bowheads and belugas migrate through the Alaskan Beaufort Sea from summering areas in the central and eastern Beaufort Sea and Amundsen Gulf to their wintering areas in the Bering Sea (Clarke *et al.*, 1993; Moore *et al.*, 1993; Miller *et al.*, 2002). Some bowheads are sighted in the eastern Alaskan Beaufort Sea starting mid-August and near Barrow starting late August but the main migration does not start until early September.

The aerial survey procedures will be generally consistent with those during earlier industry studies (Miller *et al.*, 1997, 1998, 1999; Patterson *et al.*, 2007). This will facilitate comparison and pooling of data where appropriate. However, SOI notes that the specific survey grids will be tailored to SOI's operations and the time of year. Information on survey procedures can be found in SOI's IHA application.

#### *Survey Design in the Beaufort Sea in Summer*

The main species of concern in the Beaufort Sea is the bowhead whale but small numbers of belugas, and in some years, gray whales, are present in the Beaufort Sea during summer (see above). Few bowhead whales are expected to be found in the Beaufort Sea during early August; however, a reduced aerial survey program is proposed during the summer prior to seismic operations to confirm the distribution and numbers of bowheads, gray whales and belugas, because no recent surveys have been conducted at this time of year. The few bowheads that were present in the Beaufort Sea during summer in the late 1980s were generally found among the pack ice in deep offshore waters of the central Beaufort Sea (Moore and DeMaster, 1998; Moore *et al.*, 2000). Although gray whales were rarely sighted in the Beaufort Sea prior to the 1980's (Rugh and Fraker, 1981), sightings appear to have become more common along the coast of the Beaufort Sea in summer and early fall (Miller *et al.*, 1999; Treacy 1998, 2000, 2002; Patterson *et al.*, 2007) possibly because of increases in the gray whale population and/or reductions in ice cover in recent years. Because no summer surveys have been conducted in the Beaufort Sea since the 1980s, the information on summer distribution of cetaceans will be valuable for planning future seismic or drilling operations. The grid that will be flown in the summer will be the same grid flown later in the year, but it will be flown twice a week instead of daily. If cetaceans are encountered in the vicinity of planned seismic operations, then SOI would consider flying the survey grid proposed for later in the season, rather than the early-season survey plan. Surveys will be conducted 2 days/week until the period one week prior to the start of seismic operations in the Beaufort Sea. Beginning approximately one week prior to the start of seismic operations, daily surveys would be initiated and they would be conducted using the grid shown in Figure 3 in Appendix B of SOI's IHA application.

#### *Survey Design in the Beaufort Sea in Fall*

Aerial surveys during the late August-October period will be designed to provide mitigation monitoring as required by the IHA. SOI notes that, if, as in 2006 and 2007, mitigation monitoring is required to ensure that large aggregations of mother-calf bowheads do not approach to within the

120 dB re 1  $\mu$ Pa (rms) radius from the active seismic operation, priority will be given to mitigation monitoring to the east of the seismic operation (see Appendix B, Figure 2). SOI suggests, that, if permitted by the IHA, it is prepared to conduct some surveys to collect data on the extent of westward deflection while still monitoring the 120-dB radius to the east of the seismic operation. These surveys will obtain detailed data (weather permitting) on the occurrence, distribution, and movements of marine mammals, particularly bowhead whales, within an area that extends about 100 km (62 mi) to the east of the primary seismic vessel to a few km west of it, and north to about 65 km (40 mi) offshore. A westward emphasis would obtain the same data for an area about 100 km (62 mi) to the west of the primary seismic vessel and about 20 km (12 mi) east of it; again about 65 km (40 mi) offshore. This site-specific survey coverage will complement the simultaneous MMS/NMFS National Marine Mammal Laboratory Bowhead Whales Aerial Survey Program (BWASP) survey coverage of the broader Beaufort Sea area.

The proposed survey grid will provide data both within and beyond the anticipated immediate zone of influence of the seismic program, as identified by Miller *et al.* (1999). Miller *et al.* (1999) were not able to determine how far upstream and downstream (i.e., east and west) of the seismic operations bowheads began deflecting and then returned to their "normal" migration corridor. That is an important concern for the Inupiat whalers. SOI notes that the proposed survey grid is not able to address that concern because of the need to extend flights well to the east to detect mother-calf pairs before they are exposed to seismic sounds greater than 120 dB re 1  $\mu$ Pa.

It is possible that the east-west extent of seismic surveys will change during the season due to ice or other operational restrictions. If so, SOI may need to modify the aerial survey grid to maintain observations to 100 km (62 mi) east (or west) of the seismic survey area, but the total km/mi of survey that can be conducted each day are limited by the fuel capacity of the aircraft. The only alternative to ensure adequate aerial survey coverage over the entire area where seismic activities might influence bowhead whale distribution is to space the individual transects farther apart. For each 15–20 km (9.3–12.4 mi) increase in the east-west size of the seismic survey area, the spacing between lines will need to be increased by 1 km (0.62 mi) to maintain survey

coverage from 100 km (62 mi) east to 20 km (12.4 mi) west of the seismic activities (or vice versa). Data from the easternmost transects of the proposed survey grid will document the main bowhead whale migration corridor east of the seismic exploration area and will provide the baseline data on the location of the migration corridor relative to the coast.

SOI does not propose to fly a smaller "intensive" survey grid in 2008/2009. In previous years, a separate grid of 4–6 shorter transects was flown, whenever possible, to provide additional survey coverage within about 20 km (12.4 mi) of the seismic operations. This coverage was designed to provide additional data on marine mammal utilization of the actual area of seismic exploration and immediately adjacent waters. The 1996–98 studies showed that bowhead whales were almost entirely absent from the area within 20 km (12.4 mi) of the active seismic operation (Miller *et al.* 1997, 1998, 1999). Thus, the flying-time that (in the past) would have been expended on flying the intensive grid will be used to extend the coverage farther to the east and west of the seismic activity.

Depending on the distance offshore where seismic is being conducted, the survey grid may not extend far enough offshore to document whales which could potentially deflect north of the operation. In this case, SOI plans to extend the north ends of the transects farther north so that they extend 30–35 km (19–22 mi) north of the seismic operation and the two most westerly (or easterly depending upon the survey design) lines will not be surveyed. This will mean that the survey lines will only extend as far west as the seismic operation or start as far east as the seismic operations. SOI states that it is not possible to move the grid north without surveying areas south of the seismic operation because some whales may deflect south of the seismic operation and that deflection must be monitored.

If seismic surveys of the Beaufort Sea end while substantial numbers of bowhead whales are still migrating west, aerial survey coverage of the area of most recent seismic operations will continue for several days after seismic surveys have ended. This will provide "post-seismic" data on whale distribution for comparison with whale distribution during seismic periods. These data will be used in analyses to estimate the extent of deflection during seismic activities and the duration of any potential deflection after surveys end. Post seismic coverage will not be conducted if the bowhead migration has ended by that time, but it is expected

that due to freeze-up, seismic operations will move out of the Beaufort Sea before the end of the bowhead whale migration.

The survey grid patterns for summer and fall time periods being proposed by SOI are described in SOI's IHA application.

#### *Joint Industry Studies Program*

##### *Chukchi Sea Coastal Aerial Survey*

The only recent aerial surveys of marine mammals in the Chukchi Sea were conducted along coastal areas of the Chukchi Sea to approximately 20 nmi (37 km) offshore in 2006 and 2007 in support of SOI's summer seismic exploration. These surveys provided data on the distribution and abundance of marine mammals in nearshore waters of the Chukchi Sea. Population sizes of several species found they may have changed considerably since earlier surveys were conducted and their distributions may have changed because of changes in ice conditions. SOI plans to conduct an aerial survey program in the Chukchi Sea in 2008 that will be similar to the 2006 and 2007 programs.

Alaskan Natives from several villages along the east coast of the Chukchi Sea hunt marine mammals during the summer and Native communities are concerned that offshore oil and gas development activities such as seismic exploration may negatively impact their ability to harvest marine mammals. Of particular concern is the potential impact on the beluga harvest at Point Lay and on future bowhead harvests at Point Hope, Wainwright and Barrow. Other species of concern in the Chukchi Sea include the gray whale, bearded, ringed, and spotted seals, and walrus. The gray whale is expected to be the most numerous cetacean species encountered during the proposed summer seismic activities, although beluga whales also occur in the area. The ringed seal is likely to be the most abundant pinniped species. The current aerial survey program has been designed to collect distribution data on cetaceans but will be limited in its ability to collect similar data on pinnipeds because of aircraft altitude.

The aerial survey program will be conducted in support of the SOI seismic program in the Chukchi Sea during summer and fall of 2008/2009. The objectives of the aerial survey will be (1) to address data deficiencies in the distribution and abundance of marine mammals in coastal areas of the eastern Chukchi Sea; and (2) to collect and report data on the distribution, numbers, orientation and behavior of marine mammals, particularly beluga



whales, near traditional hunting areas in the eastern Chukchi Sea.

With agreement from hunters in the coastal villages, aerial surveys of coastal areas to approximately 20 mi (37 km) offshore between Point Hope and Point Barrow will begin in early- to mid-July and will continue until mid-November or until seismic operations in the Chukchi Sea are completed. Weather and equipment permitting, surveys will be conducted twice per week during this time period. In addition, during the 2008/2009 field season, SOI will coordinate and cooperate with the aerial surveys conducted by NMML for MMS and any other groups conducting surveys in the same region. For a description of the aerial survey procedures, please see SOI's IHA application.

#### *Acoustic "Net" Array: Chukchi Sea*

The acoustic "net" array used during the 2007 field season in the Chukchi Sea was designed to accomplish two main objectives. The first was to collect information on the occurrence and distribution of beluga whales that may be available to subsistence hunters near villages located on the Chukchi Sea coast. The second objective was to measure the ambient noise levels near these villages and record received levels of sounds from seismic survey activities further offshore in the Chukchi Sea.

The net array configuration used in 2007 is again proposed for 2008/2009. The basic components are 30 ocean bottom hydrophones (OBH) systems. Two separate deployments with different placement configurations are planned. The first deployment will occur in mid-July immediately following the beluga hunt and will be adjusted to avoid any interference with the hunt. The initial net array configuration will include and extend the 2006 configuration (see Figures 8 and 9 in Appendix B of SOI's application for number of OBHs and locations for the two deployments). These offshore systems will capture seismic exploration sounds over large distances to help characterize the sound transmission properties of larger areas of the Chukchi Sea.

The second deployment will occur in late August at the same time that all currently deployed systems will be recovered for battery replacement and data extraction. The second deployment emphasizes the offshore coverage out to 72 degrees North (80 nm north of Wainwright, 150 nm (172 mi; 278 km) north of Point Lay, and 180 nm (207 mi; 333 km) north of Cape Lizbourne. The primary goal of extending the arrays further offshore later in the season is to

obtain greater coverage of the central Chukchi Sea to detect vocalization from migrating bowheads starting in September. The specific geometries and placements of the arrays are primarily driven by the objectives of (a) detecting the occurrence and approximate offshore distributions of belugas and possibly bowhead whales during the July to mid-August period and primarily by bowhead whales during the mid-August to late-October period, (b) measuring ambient noise, and (c) measuring received levels of seismic survey activities. Timing of deployment and final positions will be subject to weather and ice conditions, based on consultation with local villages, and carried out to minimize any interference with subsistence hunting or fishing activities.

Additionally, a set of 4 to 6 OBH systems will be deployed near the end of the season to collect data throughout the winter.

#### *Acoustic Array: Beaufort Sea*

In addition to the continuation of the acoustic net array program in the Chukchi Sea in 2008/2009, SOI proposes to also continue a program that deployed directional acoustic recording systems in the Beaufort Sea. The purpose of the array will be to further understand, define, and document sound characteristics and propagation resulting from offshore seismic and other industry operations that may have the potential to cause deflections of bowhead whales from anticipated migratory pathways. Of particular interest will be the east-west extent of deflection (i.e. how far east of a sound source do bowheads begin to deflect and how far to the west beyond the sound source does deflection persist). Of additional interest will be the extent of offshore deflection that occurs.

In previous work around seismic and drill-ship operations in the Alaskan Beaufort Sea, the primary method for studying this question has been aerial surveys. Acoustic localization methods provide a supplementary methods for addressing these questions. As compared with aerial surveys, acoustic methods have the advantage of providing a vastly larger number of whale detections, and can operate day or night, independent of visibility, and to some degree independent of ice conditions and sea state—all of which prevent or impair aerial surveys. However, acoustic methods depend on the animals to call, and to some extent assume that calling rate is unaffected by exposure to industrial noise. Bowheads do call frequently in the fall, but there is some evidence that their calling rate

may be reduced upon exposure to industrial sounds, complicating interpretation. The combined use of acoustic and aerial survey methods will provide information about these issues.

SOI has contracted with Greeneridge to conduct the whale acoustic monitoring program using the passive acoustics techniques developed and used successfully since 2001 for monitoring the bowhead migration past BP's Northstar oil production facility northwest of Prudhoe Bay. Those techniques involve using directional autonomous seafloor acoustic recorders (DASARs) to measure the arrival angles of bowhead calls at known locations, then triangulating to locate the calling whale. Thousands, in some years tens of thousands, of whale calls have been located each year since 2001. The 2008/2009 study will use a new model of the DASAR similar to those deployed in 2007. Figure 11 in Appendix B of SOI's IHA application shows potential locations of the DASARs. The results of these data will be used to determine the extent of deflection of migrating bowhead whales from the sound sources. More information on DASARs and this part of SOI's monitoring program can be found in SOI's IHA application.

#### *Additional Mitigation and Monitoring Measures*

In addition to the standard mitigation and monitoring measures mentioned previously, NMFS is proposing to incorporate additional mitigation/monitoring measures (such as expanded monitoring-safety zones for bowhead and gray whales, and having those zones monitored effectively) into the 2008/2009 IHA to ensure that impacts on marine mammals are at the lowest level practicable. The additional mitigation measures are specific for the SOI seismic project, in part because SOI incorporated monitoring measures in the 4MP document that makes this monitoring practicable. It should be recognized that these mitigation/monitoring measures do not establish NMFS policy applicable to other projects or other locations under NMFS' jurisdiction, as each application for an IHA is context-specific. These measures have been developed based upon available data specific to the project areas. NMFS and MMS intend to collect additional information from all sources, including industry, non-governmental organizations, Alaska Natives and other federal and state agencies regarding measures necessary for effectively monitoring marine mammal populations, assessing impacts from seismic on marine mammals, and

determining practicable measures for mitigating those impacts. MMS and NMFS anticipate that mitigation measures applicable to future seismic and other activities may change and evolve based on newly-acquired data.

## Reporting

### *Daily Reporting*

In its IHA application, SOI proposes to collect, via the aerial flights, unanalyzed bowhead sighting and flightline data which will be exchanged between MMS and SOI on a daily basis during the field season. NMFS is proposing that each team will also submit its sighting information to NMFS in Anchorage each day. After the SOI and MMS data files have been reviewed and finalized, they will be shared in digital form.

### *Interim Report*

The results of the 2008 SOI vessel-based monitoring, including estimates of take by harassment, will be presented in the "90 day" and final Technical Report as required by NMFS under IHAs. SOI proposes that the Technical Report will include: (1) summaries of monitoring effort: total hours, total distances, and distribution through study period, sea state, and other factors affecting visibility and detectability of marine mammals; (2) analyses of the effects of various factors influencing detectability of marine mammals: sea state, number of observers, and fog/glare; (3) species composition, occurrence, and distribution of marine mammal sightings including date, water depth, numbers, age/size/gender categories, group sizes, and ice cover; (4) sighting rates of marine mammals versus operational state (and other variables that could affect detectability); (5) initial sighting distances versus operational state; (6) closest point of approach versus seismic state; (7) observed behaviors and types of movements versus operational state; (8) numbers of sightings/individuals seen versus operational state; (9) distribution around the drilling vessel and support vessels versus operational state; and (10) estimates of take based on (a) numbers of marine mammals directly seen within the relevant zones of influence (160 dB, 180 dB, 190 dB (if SPLs of that level are measured)), and (b) numbers of marine mammals estimated to be there based on sighting density during daytime hours with acceptable sightability conditions. This report will be due 90 days after termination of the 2008 open water season and will include the results from any seismic work conducted in the

Chukchi/Beaufort Seas in 2008 under the previous IHA.

### *Comprehensive Monitoring Reports*

In November, 2007, SOI (in coordination and cooperation with other Arctic seismic IHA holders) released a final, peer-reviewed edition of the 2006 Joint Monitoring Program in the Chukchi and Beaufort Seas, July-November 2006 (LGL, 2007). This report is available for downloading on the NMFS website (see **ADDRESSES**). A draft comprehensive report for 2007 was provided to NMFS and those attending the NMFS/MMS Arctic Ocean open water meeting in Anchorage, AK on April 14–16, 2008. Based on reviewer comments made at that meeting, SOI is currently revising this report and plans to make it available to the public shortly.

Following the 2008 open water season, a comprehensive report describing the proposed acoustic, vessel-based, and aerial monitoring programs will be prepared. The 2008 comprehensive report will describe the methods, results, conclusions and limitations of each of the individual data sets in detail. The report will also integrate (to the extent possible) the studies into a broad based assessment of industry activities and their impacts on marine mammals in the Beaufort Sea during 2008 (work conducted in 2009 under the proposed 2008/2009 IHA will be analyzed in a 2009 comprehensive report). The 2008 report will form the basis for future monitoring efforts and will establish long term data sets to help evaluate changes in the Beaufort/Chukchi Sea ecosystems. The report will also incorporate studies being conducted in the Chukchi Sea and will attempt to provide a regional synthesis of available data on industry activity in offshore areas of northern Alaska that may influence marine mammal density, distribution and behavior.

This comprehensive report will consider data from many different sources including two relatively different types of aerial surveys; several types of acoustic systems for data collection (net array, passive acoustic monitoring, vertical array, and other acoustical monitoring systems that might be deployed), and vessel based observations. Collection of comparable data across the wide array of programs will help with the synthesis of information. However, interpretation of broad patterns in data from a single year is inherently limited. Much of the 2008 data will be used to assess the efficacy of the various data collection methods and to establish protocols that will

provide a basis for integration of the data sets over a period of years.

### **Endangered Species Act (ESA)**

Under section 7 of the ESA, the NMFS has begun consultation with MMS on the proposed seismic survey activities in the Beaufort and Chukchi seas during 2008/2009. NMFS will also consult on the issuance of the IHA under section 101(a)(5)(D) of the MMPA to SOI for this activity. Consultation will be concluded prior to NMFS making a determination on the issuance of an IHA.

### **National Environmental Policy Act (NEPA)**

In 2006, the MMS prepared Draft and Final Programmatic Environmental Assessments (PEAs) for seismic surveys in the Beaufort and Chukchi Seas. Availability of the Draft and Final PEA was noticed by NMFS in several Federal Register notices regarding issuance of IHAs to SOI and others. NMFS was a cooperating agency in the preparation of the MMS PEA. On November 17, 2006, NMFS and MMS announced that they were jointly preparing a Draft Programmatic Environmental Impact Statement (PEIS) to assess the impacts of MMS' annual authorizations under the Outer Continental Shelf (OCS) Lands Act to the U.S. oil and gas industry to conduct offshore geophysical seismic surveys in the Chukchi and Beaufort seas off Alaska, and NMFS' authorizations under the MMPA to incidentally harass marine mammals while conducting those surveys. On March 30, 2007, the Environmental Protection Agency (EPA) noticed the availability for comment of the NMFS/MMS Draft PEIS. A Final PEIS has not been completed. In order to meet NMFS' NEPA requirements for the proposed IHA to SOI, NMFS is preparing a supplement to the 2006 Final PEA which incorporates by reference the 2006 Final PEA and other related documents. Upon completion, a copy of this Supplemental EA will be available upon request.

### **Preliminary Determinations**

Based on the information provided in SOI's application, this document, the MMS 2006 Final PEA for Arctic Seismic Surveys, the 2006 and 2007 Comprehensive Monitoring Reports by SOI and others, and NMFS' 2008 Final Supplemental EA, NMFS has preliminarily determined that the impact of SOI conducting seismic surveys in the northern Chukchi Sea and eastern and central Beaufort Sea in 2008/2009 will have no more than a negligible impact on marine mammals and that there will not be any

unmitigable adverse impacts to subsistence communities, provided the mitigation measures described in this document are implemented (see Mitigation).

For reasons explained previously in this document, NMFS has preliminarily determined that no take by serious injury, death or stranding is anticipated by, or authorized to, SOI's 2008/2009 seismic survey activities, and the potential for temporary or permanent hearing impairment is low and will be avoided through the incorporation of the mitigation measures mentioned in this document. The best scientific information indicates that an auditory injury is unlikely to occur as apparently sounds need to be significantly greater than 180 dB for injury to occur. NMFS has preliminarily determined that exposure to several seismic pulses at received levels near 200-205 dB (rms) might result in slight TTS in hearing in a small odontocete. Seismic pulses with received levels of 200-205 dB or more are usually restricted to a radius of no more than 200 m (656 ft) around a seismic vessel operating a large array of airguns. For baleen whales, while there are no data, direct or indirect, on levels or properties of sound that are required to induce TTS, there is a strong likelihood that baleen whales (bowheads, gray whales and humpback whales) would avoid the approaching airguns (or vessel) before being exposed to levels high enough for there to be any possibility of onset of TTS. For pinnipeds, information indicates that for single seismic impulses, sounds would need to be higher than 190 dB rms for TTS to occur while exposure to several seismic pulses indicates that some pinnipeds may incur TTS at somewhat lower received levels than do small odontocetes exposed for similar durations. Therefore, the requirement for MMOs to monitor safety zones (180 dB for cetaceans, 190 dB for pinnipeds) and power-down or shutdown arrays even at this distance and the increasing effectiveness of an MMO seeing a marine mammal prior to entering a close-in zone where auditory injury could occur indicates to NMFS that the 180 dB and 190-dB safety zones for cetaceans and pinnipeds respectively, provides a sufficient buffer to prevent PTS in marine mammals.

NMFS has also preliminarily determined that only small numbers of marine mammals will be harassed by SOI's 2008 seismic and shallow hazard programs. As discussed previously, the species most likely to be harassed during seismic surveys in the Arctic Ocean area is the ringed seal, with a total "best estimate" of 13,256 animals

being "exposed" to sound levels of 160 dB or greater (6,951 animals in the Chukchi Sea and 6,305 animals in the Beaufort Sea) (see Table 1). As explained previously, this does not mean that this is the number of ringed seals that will actually have a behavioral reaction to the noise, rather it is simply the best estimate of the number of animals that potentially could have a behavioral modification due to the noise. For example Moulton and Lawson (2002) indicate that most pinnipeds exposed to seismic sounds lower than 170 dB do not visibly react to that sound; pinnipeds are not likely to react to seismic sounds unless they are greater than 170 dB re 1 microPa (rms). In addition as discussed previously, these estimates are calculated based upon line miles of survey effort (also animal density and the calculated zone of influence), the resulting take estimate numbers tend to be highly inflated, because animals that might have been affected (taken) are likely to have moved out of the area to avoid additional annoyance from the seismic sounds (assuming they were taken in the first place). As a result, NMFS believes that these "exposure" estimates for pinnipeds are conservative and seismic and shallow hazard surveys will actually affect significantly less than 5 percent of the Beaufort and Chukchi Sea ringed seal populations. This preliminary finding also applies to other pinniped species in the Arctic.

Even if the estimate of 13,256 ringed seals being behaviorally harassed is not a small number in absolute terms, it is relatively small, representing only about 5.3 percent of the regional stock size of that species (249,000), if each "exposure" at 160 dB represents an individual ringed seal that has reacted to that sound and less if a higher SPL is required for a behavioral reaction (as is expected) or animals moved out of the seismic area. As a result, we believe that these "exposure" estimates are conservative and seismic and shallow hazard surveys will actually affect significantly less than 5 percent of the Beaufort and Chukchi Sea ringed seal populations. This finding also applies to other pinniped species in the Arctic.

The estimated number of Level B harassment takes represented as "exposures" during SOI's seismic and shallow hazard surveys in the Beaufort and Chukchi seas is 297 beluga (63 in the Chukchi Sea, 234 in the Beaufort Sea) and 1,540 bowheads (9 in the Chukchi Sea and 1,531 in the Beaufort Sea). The Level B harassment "take" estimate represents less than 1 percent of the combined Beaufort and Chukchi Seas beluga stock size of 42,968 (39,258

in the Beaufort Sea; 3,710 in the Chukchi Sea), a relatively small number. For bowhead whales, this Level B harassment "take" estimate represents between 12 percent (based on 13,326 bowheads which assumes a 3.4 percent annual population growth rate from the 2001 estimate) and 14 percent of the Bering-Chukchi-Beaufort Seas bowhead population (based on the 2001 population estimate of 10,545 animals). However, NMFS currently estimates that this population percentage estimate will be lower because SOI has significantly reduced its planned days of seismic surveys in the Beaufort Sea to only 20 days (September 25 to about October 15th or when surveys are curtailed by ice).

While these exposure numbers may represent a somewhat sizable portion of the population size of bowhead whales (12-14 percent), NMFS believes that the estimated number of bowhead exposures overestimate actual takings for the following reasons: (1) SOI plans to concentrate its 3D seismic survey program in 2008 in the Lease Sale 193 area of the Chukchi Sea and only move into the Beaufort Sea after the bowhead subsistence hunt is completed (and a sizeable portion of the bowhead population will have migrated past SOI's planned seismic location by that time), and (2) the proposed shallow hazard survey activities would occur in the Chukchi and Beaufort seas at a time when bowheads are mostly concentrated in the Canadian Beaufort Sea. As a result, NMFS has preliminarily determined that relatively few bowhead whales will be taken and that only small numbers of marine mammals will be harassed by SOI's 2008 seismic and shallow hazard programs.

Therefore, NMFS has preliminarily determined that the short-term impact of conducting seismic surveys in the U.S. Chukchi and Beaufort seas may result, at worst, in a temporary modification in behavior by certain species of marine mammals. While behavioral and avoidance reactions may be made by these species in response to the resultant noise, this behavioral change is expected to have a negligible impact on the animals. While the number of potential incidental harassment takes will depend on the distribution and abundance of marine mammals (which vary annually due to variable ice conditions and other factors) in the area of seismic operations, the number of potential harassment takings is estimated to be small (see Estimated Takes for NMFS' analysis). In addition, for reasons described previously, injury (temporary

or permanent hearing impairment) and/or mortality is unlikely and will be avoided through the incorporation of the mitigation measures mentioned in this document and required by the authorization. No rookeries, mating grounds, areas of concentrated feeding, or other areas of special significance for marine mammals occur within or near the planned area of operations during the season of operations.

Finally, NMFS has preliminarily determined that the proposed seismic activity by SOI in the northern Chukchi Sea and central and eastern Beaufort Sea in 2008/2009 will not have an unmitigable adverse impact on the subsistence uses of bowhead whales and other marine mammals. This preliminary determination is supported by the information in this Federal Register Notice, including: (1) Seismic activities in the Chukchi Sea will not begin until after July 20 by which time the spring bowhead hunt is expected to have ended; (2) that the fall bowhead whale hunt in the Beaufort Sea will either be governed by a CAA between SOI and the AEWC and village whaling captains or by mitigation measures to protect subsistence hunting of marine mammals contained in the IHA; (3) the CAA or IHA conditions will significantly reduce impacts on subsistence hunters to ensure that there will not be an unmitigable adverse impact on subsistence uses of marine mammals; (4) while it is possible that accessibility to belugas during the spring subsistence beluga hunt could be impaired by the survey, it is unlikely because very little of the proposed survey is within 25 km (15.5 mi) of the Chukchi Sea coast, meaning the vessel will usually be well offshore and away from areas where seismic surveys would influence beluga hunting by communities; and (5) because seals (ringed, spotted, bearded) are hunted in nearshore waters and the seismic survey will remain offshore of the coastal and nearshore areas of these seals where natives would harvest these seals, it should not conflict with harvest activities.

As a result of these preliminary determinations, NMFS proposes to issue an IHA to SOI for conducting a seismic survey in the northern Chukchi Sea and central and eastern Beaufort Sea in 2008/2009, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: June 20, 2008.

**P. Michael Payne,**

*Acting Director, Office of Protected Resources,  
National Marine Fisheries Service.*

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## **COMMITTEE FOR THE IMPLEMENTATION OF TEXTILE AGREEMENTS**

### **Request for Public Comment on Commercial Availability Request under the North American Free Trade Agreement (NAFTA)**

June 19, 2008.

**AGENCY:** The Committee for the Implementation of Textile Agreements (CITA).

**ACTION:** Request for Public Comments concerning a request for modification of the NAFTA rules of origin for thread and yarn of acrylic staple fiber.

**SUMMARY:** On June 10, 2008, the Government of the United States received a request from the Government of Canada alleging that acrylic staple fiber, classified in subheading 5503.30 of the Harmonized Tariff Schedule of the United States (HTSUS), cannot be supplied by the domestic industry in commercial quantities in a timely manner and requesting that the governments of Mexico and the United States consult to consider whether the North American Free Trade Agreement (NAFTA) rule of origin for thread and yarns classified under HTSUS subheadings 55.08 through 55.11 should be modified to allow the use of non-North American acrylic staple fiber.

The President may proclaim a modification to the NAFTA rules of origin only after reaching an agreement with the other NAFTA countries on the modification. CITA hereby solicits public comments on this request, in particular with regard to whether acrylic staple fiber of HTSUS subheading 5503.30 can be supplied by the domestic industry in commercial quantities in a timely manner. Comments must be submitted by July 25, 2008 to the Chairman, Committee for the Implementation of Textile Agreements, Room 3001, United States Department of Commerce, Washington, D.C. 20230.

**FOR FURTHER INFORMATION CONTACT:** Martin J. Walsh or Maria K. Dybczak, International Trade Specialists, Office of Textiles and Apparel, U.S. Department of Commerce, (202) 482-2818 and (202) 482-3651, respectively.

**SUPPLEMENTARY INFORMATION:**

**Authority:** Section 204 of the Agricultural Act of 1956, as amended (7 USC 1854); Section 202(q) of the North American Free Trade Agreement Implementation Act (19 USC 3332(q)); Executive Order 11651 of March 3, 1972, as amended.

## **Background**

Under the NAFTA, NAFTA countries are required to eliminate customs duties on textile and apparel goods that qualify as originating goods under the NAFTA rules of origin, which are set out in Annex 401 to the NAFTA. The NAFTA provides that the rules of origin for textile and apparel products may be amended through a subsequent agreement by the NAFTA countries. See Section 202(q) of the NAFTA Implementation Act. In consultations regarding such a change, the NAFTA countries are to consider issues of availability of supply of fibers, yarns, or fabrics in the free trade area and whether domestic producers are capable of supplying commercial quantities of the good in a timely manner. The NAFTA Implementation Act provides the President with the authority to proclaim modifications to the NAFTA rules of origin as are necessary to implement an agreement with one or more NAFTA country on such a modification. See section 202(q) of the NAFTA Implementation Act.

On June 10, 2008, the Government of the United States received a request from the Government of Canada alleging that acrylic staple fiber, classified in subheading 5503.30 of the HTSUS, cannot be supplied by the domestic industry in commercial quantities in a timely manner and requesting that the governments of Mexico and the United States consult to consider whether the NAFTA rule of origin for thread and yarns classified under HTSUS subheadings 55.08 through 55.11 should be modified to allow the use of non-North American acrylic staple fiber.

CITA is soliciting public comments regarding this request, particularly with respect to whether acrylic staple fiber can be supplied by the domestic industry in commercial quantities in a timely manner. Comments must be received no later than July 25, 2008. Interested persons are invited to submit six copies of such comments or information to the Chairman, Committee for the Implementation of Textile Agreements, room 3100, U.S. Department of Commerce, 14th and Constitution Avenue, N.W., Washington, DC 20230.

If a comment alleges that acrylic staple fiber can be supplied by the domestic industry in commercial quantities in a timely manner, CITA will