Federal Register

Thursday,
November 6, 2008

Part II

Department of Commerce

National Oceanic and Atmospheric Administration

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

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 Issuance of an Incidental Harassment Authorization.

SUMMARY: In accordance with regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that an Incidental Harassment Authorization (IHA) to take small numbers of marine mammals, by harassment, incidental to conducting a marine geophysical program, including deep seismic surveys, on oil and gas lease blocks located on Outer Continental Shelf (OCS) waters in the mid- and eastern-Beaufort Sea and in the Northern Chukchi Sea has been issued to Shell Offshore, Inc. (SOI) and WesternGeco.

DATES: Effective from August 19, 2008 through August 18, 2009.

ADDRESSES: SOI's IHA application and the IHA are available by writing 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. A copy of the application (containing a list of the references used in this document), the 2008 Supplemental Environmental Assessment (S-EA) and related documents 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*. 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 the address provided here.

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 proposed to conduct 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, the *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 was valid until August 1, 2008 (subsequently amended to run through August 18, 2008), this IHA request is intended, therefore, for the open water seasons between August 19, 2008 through August 18, 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 noted 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-August through late October, and conclude work in the Chukchi Sea around November 15, 2008. SOI later modified its plan to delay moving into the Beaufort Sea until early September and not start seismic operations until the conclusion of the fall bowhead whale subsistence harvest ends. For

purposes of the MMPA, the Chukchi and Beaufort seas meet the definition of a ''specific geographic region'' as defined under the Act, as they can be considered to have similar biogeographic characteristics. In addition, the areas in which SOI proposes to conduct their activities (e.g., LS 193 in the Chukchi Sea; Sivulluq in the Beaufort Sea) are well defined geographic regions. As proposed by SOI, the 2008 seismic survey effort will have approximately 100 days of active data acquisition (excluding downtime due to weather and other unforeseen delays). Around September 1st, SOI's seismic and associated vessels will transit to the Beaufort Sea to conduct seismic operations for part of this 100–day period. A commencement date of July 20th for starting seismic in the Chukchi Sea was designed to ensure that there would be no conflict with the spring bowhead whale migration and subsistence hunts conducted by Barrow, Pt. Hope, Pt. Lay, or Wainwright or the beluga subsistence hunt conducted by the village of Pt. Lay in early July. The approximate area of SOI's Chukchi Sea and Beaufort Sea seismic survey operations are shown in Figures 1 and 2 in SOI's IHA application, respectively.

3–D Deep Seismic Surveys

Chukchi Sea 3–D Deep Seismic Surveys

SOI and its geophysical (seismic) contractor, WesternGeco, are conducting a marine geophysical (deep 3–D seismic) survey program during the open water season on various Minerals Management Service's (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 will 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 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 2008 4MP 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 September 2008. This timing of activities in the fall will avoid any 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

In 2008, SOI used WesternGeco's 3147–in^3 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^3 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^3 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^3 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

Marine surveys (shallow hazards and other activities) were conducted by SOI in the Beaufort Sea in 2008. Acoustic systems similar to the ones being used by SOI during its 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 marine survey activities is described next.

Beaufort Sea Marine Surveys

SOI conducted 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 was accomplished by the *M/V Henry Christofferson*. No other vessels, such as chase boats, were necessary to accomplish this marine survey work. Any necessary crew changes or 4MP coordinated activities under this activity utilized 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 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 was on SOI's existing leases in the central and eastern Beaufort Sea, but some activity may have occurred outside of SOI's existing leases. Actual locations of site clearance and shallow hazard surveys occurred within the area outlined in Figure 2 of SOI's IHA application.

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

(1) Dual frequency subbottom profiler Datasonics CAP6000 Chirp II (2 to7 kiloHertz [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^3) (2 by 10 in^3) 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 focused on the potential, prospective pipeline corridor between the Sivulliq Prospect in Camden Bay and the nearshore Point Thomson area. The Sivulliq area was surveyed to gather geotechnical and seafloor hazard information as well as data on ice gouges.

SOI used the acoustic instrumentation described previously in this document, namely multi-beam bathymetric sonar, side scan sonar and subbottom profiling. The locations of the ice gouge surveys occurred within the area outlined in Figure 2 of SOI's IHA application.

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 eroded areas are called ''strudel scours''. Information on these features is required for prospective pipeline planning. Two activities are required to gather this information.

First, an aerial survey is 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 overflood 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.

Second, areas that have strudel scour identified during the aerial survey were surveyed with a marine vessel after the breakup of nearshore ice. This operation was conducted in the shallow water areas near the coast in the vicinity of Point Thomson. The diesel-powered *M/V Anika Marie* used the following equipment to conduct this work:

(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 planned for the Chukchi Sea were to include site clearance and shallow hazards surveys of potential exploratory drilling locations as required by MMS regulations. These surveys were to 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.

The Chukchi Sea marine surveys were to be conducted on leases acquired in

OCS LS 193. Site clearance surveys are confined to small specific areas within OCS blocks. Site clearance and shallow hazard survey locations were planned to occur within the general area outlined in Figure 1 in SOI's IHA application. However, due to vessel contract issues in the earlier part of the season and an ongoing bowhead whale subsistence hunt in the Chukchi Sea in the fall, this work was not conducted in 2008.

Additional Information

A detailed description of SOI's work during the open-water seasons of 2008/2009 is contained in SOI's application (see **ADDRESSES**). Also, a description of SOI's data acquisition program 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), and is not repeated here.

Comments and Responses

A notice of receipt of SOI's MMPA application and NMFS' proposal to issue an IHA to SOI was published in the **Federal Register** on June 25, 2008 (73 FR 36044). That notice described, in detail, SOI's seismic survey activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30–day public comment period on SOI's application, comments were received from the Marine Mammal Commission (Commission), EarthJustice (on behalf of themselves, the Center for Biological Diversity, Northern Alaska Environmental Center, The Wilderness Society, Sierra Club, Pacific Environment, Resisting Environmental Destruction on Indigenous Lands, Alaska Wilderness League, the Natural Resources Defense Council, and Native Village of Point Hope), the Alaska Eskimo Whaling Commission (AEWC), the North Slope Borough (NSB), and Oceana. The AEWC submitted comments on the Conflict Avoidance Agreement (CAA), which are addressed in this notice, but also submitted comments in regard to Alternative 9 in NMFS/MMS' 2007 Draft Programmatic EIS for Arctic Ocean Seismic Surveys. As the Final Programmatic EIS remains under development and as the comment period on that document closed in late 2007, NMFS will restrict its response to that part of the letter concerning the CAA. Additional responses to concerns raised by the public during public comments can be found at 73 FR 40512 (July 15, 2008) for BP Exploration (Alaska), Inc. in the Beaufort Sea, 73 FR 45969 (August 7, 2008) for PGS Onshore, Inc. in the Beaufort Sea; at 73 FR 46774 (August 11, 2008) for ASRC Energy Services, Inc. (AES) in the Chukchi Sea; and at 73 49421 (August 21, 2008) for ConocoPhillips, Inc. in the Chukchi Sea.

Activity Concerns

Comment 1: The NSB notes that AES has applied for an IHA for site clearance and shallow hazards surveys in the Chukchi Sea. AES surveys will be conducted for Shell. How do Shell's proposed marine surveys relate to AES? Are both organizations applying for IHAs for the same work? If so, this creates a tremendous amount of unnecessary duplicative work.

Response: At the time of its IHA application, AES planned to conduct shallow hazard work in the Chukchi Sea on behalf of several clients who had obtained leases as a result of Lease Sale 193. One of those clients was SOI. However, the Chukchi Sea shallow hazards survey work for SOI was not conducted this year. NMFS continues to encourage the offshore oil industry to combine seismic/shallow hazard survey efforts onto one or two vessels whenever possible to reduce potential noise impacts on marine mammals. Subsequent to NMFS processing IHA applications for SOI and other companies, SOI determined that in order to ensure that their proposed shallow hazard survey in the Chukchi Sea was conducted this year, it proposed to move a vessel stationed in the Beaufort Sea into the Chukchi Sea to conduct this work, if the AES was unable to do this work. NMFS believes that, while there was duplication this year, if, in future years, these operations can be combined onto a single vessel, those efforts would be beneficial to marine mammals.

MMPA Concerns

Comment 2: EarthJustice and the NSB state that because the proposed seismic activity carries the real potential to cause injury or death to marine mammals, neither an IHA, nor an LOA (because NMFS has not promulgated regulations for mortality by seismic activities) can be issued for SOI's proposed seismic survey activities.

Response: Section 101(a)(5)(D) of the MMPA authorizes Level A (injury) harassment and Level B (behavioral) harassment takes. While NMFS' regulations indicate that a LOA must be issued if there is a potential for serious injury or mortality, NMFS does not believe that SOI's seismic surveys require issuance of a LOA. As explained throughout NMFS' proposed IHA **Federal Register** Notice (73 FR 36044, June 25, 2008) and this **Federal Register** Notice, it is highly unlikely that marine mammals would be exposed to sound pressure levels (SPLs) that could result in serious injury or mortality. 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 (Southall *et al.*, 2007).

NMFS has determined that exposure to several seismic pulses at received levels near 200–205 dB (rms) might result in slight temporary threshold shift (TTS) in hearing 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. To understand this better, one must recognize that (1) the 180–dB zone is approximately 2500 m (8202 ft) beam-fire and 210 m (689 ft) for/end fire direction (Tables 3, 4 in MacGillivray *et al.* (2007)). The seismic airgun array is approximately 490 m (1608 ft) off the stern of the *M/V Gilavar*. Each of the *Gilavar*'s two airgun arrays is 15 m (49 ft) long and 16 m (52.5 ft) wide. The hydrophone cable array is approximately 500 m (1640 ft) wide and 4200 m (2.6 mi) active length. In addition, the *M/V Gilavar* is approximately 85 m (279 ft) long, 18 m (59 ft) wide. Therefore, NMFS believes that in order for a marine mammal to incur an auditory injury, it would be necessary for the marine mammal to be undeterred by seismic, ship, or hydrophone (turbulence) noises, and not be sighted by Marine Mammal Observers (MMOs) within this area. NMFS believes it is highly unlikely that marine mammals would intentionally enter into the turbulent area behind a moving vessel between the vessel, the seismic airgun array and the hydrophone array with supporting cables, wires and separators (although bottlenose dolphins have been reported on occasion by MMOs to approach and rub against the outside streamers). As a result, no marine mammals would likely incur either TTS or PTS, simply because they are likely to avoid the area directly behind the vessel. Furthermore, the dimensions of the ship also tends to preclude marine mammal entry into the area immediately ahead of the airguns. Essentially, bridge-stationed MMOs need to see only about 157 m (515 ft) abeam (to the side) of the vessel in order to ensure that no marine mammals enter the 200–m (656–ft) area for potential Level B harassment (TTS) zone

(presuming that 205 dB rms is about 200 m (656 ft) from the array). It is highly likely that MMOs would be able to detect marine mammals approaching this area and order a power-down or shut-down of the seismic array.

Moreover, Smultea and Holst (2003) and Holst (2004) report on two tests of the effectiveness of monitoring using night-vision devices (NVDs). Results of those tests indicated that the Night Quest NQ220 NVD is effective at least to 150 to 200 m (492 to 656 ft) away under certain conditions, but not at distances greater than 200 m (656 ft). However, it is in this smaller 200–m zone, where the received level is well above 180 dB, where the detection of any marine mammals that are present would be of particular importance. This zone for potential TTS and PTS is therefore sufficiently within the range of the NVDs to allow detection of marine mammals within the area of potential TTS during night-time seismic operations.

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 (bowhead and gray 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. Consequently, NMFS has determined that it was in full compliance with the MMPA when it issued an IHA to SOI for the 2008/2009 seismic survey program.

Comment 3: The NSB states that the activities proposed by SOI are not sufficiently described in either the **Federal Register** Notice or SOI's IHA application. Stating the dates and durations of activities in uncertain terms also makes it impossible for NMFS to assess whether SOI's activities will interfere with the subsistence hunting seasons. Because SOI has not sufficiently specified the geographic location, date, and duration of activities, NMFS cannot lawfully issue the IHA.

Response: NMFS disagrees with the statement. In regard to dates of SOI's seismic survey activities, SOI made clear in its IHA application that the ''dates and duration of the activity'' is for a one-year period during the open water period of 2008 and 2009. This statement meets the requirements of the MMPA. As a result of discussions with SOI, the NSB and the AEWC are aware that because of measures taken to protect the spring whale harvests in the Chukchi Sea, the start of seismic surveys cannot begin prior to July 20th in the Chukchi Sea and cannot move into the Beaufort Sea before ice conditions allow (around mid August). However, in regards to 2008, SOI has stated to the NSB that they will leave the Chukchi Sea on September 1st (as required by the CAA) and will not start shooting 3D seismic in the Beaufort Sea until the bowhead whale subsistence hunt at Kaktovik and Nuiqsut ends. SOI planned to return to the Chukchi Sea after about 20 days of shooting seismic or when weather conditions curtail seismic surveys in the Beaufort Sea, whichever is earlier. However, it was unable to collect seismic data and ended its 2008 seismic season on or about October 15, 2008.

In regards to the requirement that the activity area be specified, NMFS defines ''specified geographical region'' as ''an area within which a specified activity is conducted and which has certain biogeographic characteristics'' (50 CFR 216.103). In regard to how specific one must be to define a ''specific geographic region'' within which the activity would take place, House Report 97–228 states:

> The specified geographic region should not be larger than is necessary to accomplish the specified activity, and should be drawn in such a way that the effects on marine mammals in the region are substantially the same. Thus, for example, it would be inappropriate to identify the entire Pacific coast of the North American continent as a specified geographic region, but it may be appropriate to identify particular segments of that coast having similar characteristics, both biological and otherwise, as specified geographical regions.

NMFS believes that the U.S. Beaufort and Chukchi Seas meet Congressional intent and NMFS' definition because these two regions have similar geographic, physiographic (e.g., topography, temperature, sea ice), biologic (e.g., marine fauna (fish and marine mammals)), and sociocultural characteristics. Therefore, NMFS believes that SOI's description of the activity and the locations for conducting seismic surveys meet the requirements of the MMPA. Within the Chukchi Sea, SOI intends to conduct seismic activity within those areas contained in Lease Sale 193 area that were awarded to it by the MMS (shown in Figure 1 in SOI's IHA application). These areas were awarded after SOI submitted its IHA application, so they were unknown to SOI at the time of its IHA application. Regardless, the general Lease Sale 193 area more than meets the definition of ''specific geographic region'' as defined by NMFS. Also, more specific locations may be considered proprietary, depending upon whether the location is a potential future lease area. In the Beaufort Sea, the areas of seismic operations are shown in Figure 2 in SOI's IHA application. These are fairly specific regions and, therefore, NMFS believes that SOI has provided a well defined area within which certain biogeographic characteristics occur in compliance with the MMPA and Congressional intent.

Comment 4: The AEWC states that the MMPA does not guarantee a company a 12–month term when it applies for an IHA. If a company seeks authorization to operate for longer than a single season, it should be required to apply for an LOA for the term of years it wishes to work.

Response: Section 101(a)(5)(D)(i) of the MMPA states that: ''Upon request therefor by citizens of the United States who engage in a specified activity (other than commercial fishing) within a specific geographic region, the Secretary shall authorize, for periods of not more than 1 year, subject to such conditions as the Secretary may specify, the incidental, but not intentional, taking by harassment of small numbers of marine mammals of a species or population stock by such citizens while engaging in that activity within that region....''

As noted, the MMPA does not limit the issuance of an IHA to a single open water season (~July 20 to ~November 15 in the U.S. Beaufort and Chukchi Seas), a period of less than 4 months, and even less available time if an applicant's activity is located in an area subject to area closure due to native subsistence hunting. Moreover, an IHA that is effective over the course of two open water seasons does not necessarily result in an IHA that exceeds 1 year. For example, in the current case, SOI's IHA spans the course of two seismic seasons, but expires in the middle of the 2009 open water season. Provided the IHA application includes an analysis of the specified activities during the timeframe proposed by the applicant, NMFS will consider issuing an IHA that extends into a portion of the following year. NMFS agrees that, if industry wants a multi-year LOA for a period of 2 or even 3 years, it can apply under section 101(a)(5)(A) of the MMPA.

Comment 5: The NSB and EarthJustice are concerned that NMFS has not made separate findings for both small numbers and negligible impact. EarthJustice states that not withstanding the unlawful regulation, the proposed IHA fails to support a non-arbitrary finding that only ''small numbers'' of

marine mammals will be harassed by SOI's planned activities. The NSB states a similar concern.

Response: NMFS believes that the small numbers requirement of the MMPA has been satisfied. 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). This does not mean that this is the number of ringed seals that will be ''taken'' by Level B harassment, 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, these estimates are calculated based upon line miles of survey effort, animal density and the calculated zone of influence (ZOI). While this methodology is valid for seismic surveys that transect long distances, for bostrophodontical surveys that is, remain within a relatively small area, transiting back and forth while shooting seismic, the numbers tend to be highly inflated. As a result, NMFS believes that these exposure estimates are conservative and may actually affect much fewer animals.

Although it might be argued that the estimated number of ringed seals behaviorally harassed is not small in absolute numbers, the number of exposures is relatively small, representing approximately 5 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.

For beluga and bowhead whales, the estimated number of sound exposures during SOI's seismic surveys in the Arctic will be 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). While these exposure numbers represent a sizeable portion of their respective population sizes, NMFS believes that the estimated number of exposures by bowheads and belugas greatly overestimate actual takings for the following reasons: (1) The proposed seismic activities would occur early and late in the year in the Chukchi Sea when bowheads are fewer in number as they are concentrated in the Canadian Beaufort Sea at those times; (2) bowheads and belugas may be absent or widely distributed and likely occur in fairly low numbers within the seismic activity area in the Chukchi Sea; (3) seismic surveys are not authorized in the Beaufort Sea during that portion of the bowhead whale's westward migration that occurs during the subsistence harvest of bowheads; and (4) SOI will continue late-fall seismic surveys in the Chukchi Sea after most bowheads are presumed to have migrated through the area heading towards the Russian coast or Bering Straits. As a result, NMFS has determined it is very likely that even fewer numbers of bowhead whales will be taken than originally estimated (12–14 percent), thereby resulting in a smaller percentage of the stock size being exposed to SOI's activities. Therefore, NMFS believes that the number of bowhead whales that may be exposed to sounds at or greater than 160 dB re 1 microPa (rms) would be small.

Based on the fact that only small numbers of each species or stock will possibly be impacted and mitigation and monitoring measures will reduce the number of animals likely to be exposed to seismic pulses and therefore avoid injury and mortality, NMFS finds that SOI's seismic surveys in the Chukchi and Beaufort Seas will have a negligible impact on the affected marine mammal species or stocks.

Comment 6: The Commission recommends that, before issuing an IHA, NMFS conduct a more extensive analysis of the potential effects of SOI's proposed operations that considers (1) the direct effects of the proposed operations; (2) the potential or likely effects of other currently authorized and proposed oil and gas activities, climate change, and additional anthropogenic risk factors (e.g., industrial operations); and (3) possible cumulative effects of all of these activities over time.

Response: NMFS is required to base its determinations under section 101(a)(5)(D) of the MMPA on the best scientific information available. Provided NMFS can make a reasonable determination that the taking by the IHA applicant's activity will result in no more than a small number of marine mammals taken, have a negligible impact on affected marine mammal species/stocks, and will not have an unmitigable adverse impact on subsistence uses of marine mammals, the MMPA directs the Secretary to issue the IHA. There is no provision in the MMPA to delay issuance of the IHA in order to conduct additional analyses provided those determinations can be made.

In that regard, NMFS believes that MMS addressed the Commission's concerns in its 2006 Final Programmatic Environmental Assessment (Final PEA) for Arctic Ocean Seismic Activities. This Final PEA contained analyses of the above mentioned potential impacts on marine mammals by the offshore oil and gas seismic exploration. The analyses contained in that document have been updated where necessary by NMFS' 2008 Final Supplemental EA (SEA) for Arctic Seismic Surveys. That document, NMFS' 2008 SEA, and other supporting documents used the best information available for this analysis. As NMFS recognizes that there is a lack of information on certain aspects of the marine mammals in Arctic waters and the potential impacts on marine mammal species and stocks from offshore oil exploration, SOI and other offshore companies have developed and implemented a monitoring program to address data gaps.

Comment 7: The NSB states that in Shell's IHA application and NMFS's **Federal Register** notice, the level of 160 dB is emphasized. Shell estimates how many marine mammals they will take through seismic activities only at industrial sound levels down to 160 dB. There is clear evidence that bowhead whales respond to industrial sound level much lower than 160 dB (Miller *et al.*, 1999; Richardson, 2007; etc.). It is not clear why Shell and NMFS promote 160 dB and appear to ignore or de-emphasize the impact of industrial sounds a much lower levels than 160 dB. With regard to bowhead whales, ''NMFS believes that it cannot scientifically support adopting any single sound pressure level value below 160 dB.'' It appears NMFS needs ''conclusive'' evidence of harm before it will find more than a negligible impact from Shell's activity. In effect, this leads to a determination that largely ignores clear evidence that bowhead whales respond to industrial sound level much lower than 160 dB (Miller *et al.*, 1999; Richardson 2007; etc.). NMFS must consider impacts from the much quieter

(i.e. lower than 160 dB) industrial sounds in the discussion, analysis, conclusions, and decisions surrounding Shell's IHA application.

NMFS must also consider the views of the International Whaling Commission (IWC) scientific committee, which felt strongly that the lack of deflection by feeding whales in Camden Bay (during Shell seismic) likely shows that whales will tolerate and expose themselves to potentially harmful levels of sound when needing to perform a biologically vital activity, such as feeding (mating, giving birth, etc.). Requiring ''conclusive'' evidence of harm is not the standard, and a negligible impact finding influenced by such an unlawful standard will not pass muster. Overall, NMFS' determination that only ''small numbers'' of marine mammals will be affected by Shell's activities, and that only a ''negligible impact'' will occur, is not supported by science nor by anything in the IHA application or notice.

Response: NMFS considers a take to occur when there is a significant behavioral response on the part of an animal, not when there is some minor reaction to a sound such as a pinniped lifting its head in response to a sound, or a whale shortening its surface interval by a few seconds or minutes (this is different however, than the significant dive profile changes noted by beaked whales in response to some high-intensity military sonars). For bowhead whales, when these species deflect in a manner that is not detectable by MMOs, but only after computer analysis, NMFS does not believe that this results in a significant behavioral effect on the animal (although it may have a significant effect on subsistence uses of that species if that deflection is not mitigated). Discussion on potential bowhead whale impacts are addressed later in this document.

Comment 8: EarthJustice believes that the MMPA requires NMFS to find that the specified activities covered by the IHA ''will not have an unmitigable adverse impact on the availability of [marine mammal populations] for taking for subsistence uses....'' NMFS must ensure that Shell's activities do not reduce the availability of any affected population or species to a level insufficient to meet subsistence needs. Moreover, in making this determination, NMFS must factor in ongoing authorized activities that may also affect the availability of subsistence resources, and measure the effect of Shell's activities against the baseline of the effects of other activities on subsistence activities (see 54 Fed Reg. 40,338 at 40,342 (1989)).

Response: 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). NMFS has determined that, provided the mitigation and monitoring measures outlined herein and in the IHA are implemented, there will not be an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. This determination is supported by having the 2008 CAA signed by all but one offshore oil company and by the AEWC and the Whaling Captains' Association members.

With respect to the cumulative impact assessment referenced in the cited **Federal Register** final rule, NMFS notes that the discussion in that document pertains to authorizations under section 101(a)(5)(A) of the MMPA, not section 101(a)(5)(D) of the MMPA. In the preamble to that joint-agency final rule, NMFS and the U.S. Fish and Wildlife Service were focusing on the potential for serious injury and mortality (as noted by the use of the word ''removal''), not simply incidental harassment. Provisions for issuing authorizations under section 101(a)(5)(D) were not promulgated until 1991 (see 61 FR 15884, April 10, 1996). NMFS addresses impacts on subsistence uses of marine mammals later in this document.

Marine Mammal Biology Concerns

Comment 9: The NSB (citing pages 23–24 in SOI's IHA application) notes that Shell and NMFS do not do an adequate job of describing the uncertainty surrounding the distribution, abundance and habitat use of marine mammals in the Chukchi Sea. There are few estimates of population size or habitat use of marine mammals. There are some data available from 15 to 20 years (or older) ago, but few recent data. This lack of recent data and uncertainty must be acknowledged by NMFS and integrated into the mitigation and monitoring measures because a great deal has changed in the Arctic environment in the past 15 to 20 years. Global warming has caused the sea ice thickness, extent and timing to decrease markedly. Changes in sea ice have likely caused substantial changes in marine mammal use of the Chukchi and Beaufort seas. For example, it is likely that an increased number of gray whales are using the Chukchi and western Beaufort seas than occurred 20 years ago. The uncertainty in the information must be considered to avoid negative impacts to marine mammal populations or the subsistence harvest of marine mammals.

Response: The uncertainty of the data was addressed in significant detail in MMS' 2006 Final PEA prepared under NEPA, and incorporated by reference in NMFS' 2008 SEA. However, as demonstrated in Table 1 later in this **Federal Register** document, even using the maximum density for gray whales, approximately 734 gray whales might be exposed to seismic sounds by SOI's activity. With a population estimate for the eastern North Pacific population of gray whales at 18,813 (Table 4–1), approximately 4 percent of the gray whale stock might be affected by a relatively short-term behavioral modification. Considering that almost 100 percent of this stock migrates through the coastal waters of the Southern California Bight twice a year, where heavy shipping, recreational boating and industrial activity traffic create a significant noise signature, without apparent long-term effect to the stock (however, some gray whales have diverted their migration offshore outside the Channel Islands to avoid this area), NMFS believes that the relatively short-term impact of seismic noise on only 4 percent of the population will have a negligible impact. NMFS notes that the mitigation and monitoring mentioned by the commenter was reviewed by the commenter and, as they did not recommend alternative mitigation or monitoring to address their concern, NMFS is unsure what measures they suggest industry undertake. However, the IHA issued to SOI requires vessel surveys to ensure that large groups of gray whales (and bowhead whales) are not being significantly impacted.

Comment 10: The NSB states that the estimated takes for beluga and gray whales are likely low. Two stocks, numbering more than 40,000 animals, of belugas migrate through the Chukchi Sea. It is likely that more than 1200 animals will be exposed to sounds greater than 160 dB. Recent satellite tracking data for gray whales (Bruce Mate, pers. comm.) suggests that perhaps half of the population uses the northern Chukchi Sea for foraging.

Depending on the location of the seismic operations, more than 734 gray whales will likely be harassed. The spotted seal estimate is also likely low. There are thousands of spotted seals that use the northern Chukchi Sea during late July and August, including offshore areas. It is likely that many more than 804 spotted seals will be harassed by Shell's seismic activities.

Response: SOI used marine mammal density information obtained in 2006 and 2007 by vessel and aerial surveys to supplement published information (e.g., Stock Assessment Reports (SARs) in order to calculate noise ''exposure'' estimates. As a result, NMFS believes that this information is the best information available. In regard to gray whales, NMFS would welcome receipt of this information once it is published.

Comment 11: EarthJustice states that NMFS has no idea of the actual population status of several of the species subject to the proposed IHA. For example, in the most recent SARs (Stock Assessment Reports) prepared pursuant to the MMPA, NMFS acknowledges it has no accurate information on the status of spotted seals, bearded seals, and ringed seals. See 2006 Alaska SAR at 42 and 43. Without this data, NMFS cannot make a rational ''negligible impact'' finding. This is particularly so given there is real reason to be concerned about the status of these populations. Such concerns were raised in a recent letter to NMFS from the Marine Mammal Commission following the Commission's 2005 annual meeting in Anchorage, Alaska. With respect to these species, the Commission cautioned against assuming a stable population. Because the status of the spotted seals, ringed seals, bearded seals and other stocks is unknown, NMFS cannot conclude that surveys which will harass untold numbers of individuals of each species will have no more than a ''negligible effect'' on the stocks.

Response: As required by the MMPA implementing regulations at 50 CFR 216.102(a), NMFS has used the best scientific information available in making its determinations required

under the MMPA. While recent stock assessments are lacking for several species of ice seals, for reasons stated elsewhere in this **Federal Register** Notice, no ice seals are expected to be killed or seriously injured as a result of SOI's seismic and shallow hazards survey work and the number of takings by Level B behavioral harassments will be small relative to the best estimate of population size. Therefore, NMFS believes that SOI's activity would not result in a decrease in population sizes of any of the ice seal species. As a result of our analysis, NMFS believes that the proposed 3D and shallow hazard surveys by SOI is not expected to have adverse impacts on ice seals.

It is expected that approximately 13,256 ringed, 592 bearded seals, 422 spotted seals and 2 ribbon seals would be affected by Level B behavioral harassment as a result of the proposed combined 3D seismic and shallow hazard and site clearance surveys in the Chukchi and Beaufort Seas. No serious injury or mortality is expected, so this activity is not expected to affect population numbers, or the ability of these species to increase in abundance. For ringed, bearded and spotted seals these takes by Level B harassments represent less than 6 percent each, of the Alaska stocks of these species. Although ribbon seals could also be taken by Level B behavioral harassment as a result of the proposed marine surveys in the Chukchi Sea, the probability of take is very low since their presence is very rare within the proposed project area.

Comment 12: The NSB states that additional information is needed about fin, minke and humpback whales. All three of these species occur in the Chukchi or Beaufort Seas. Acoustic and visual surveys in the past have documented these species. NMFS' National Marine Mammal Laboratory has been conducting surveys in the Chukchi Sea in late June/early July 2008. They have already seen a fin whale in the Chukchi Sea where the animal might be exposed to seismic sounds. Shell and NMFS must evaluate impacts to these marine mammals.

Response: SOI and NMFS recognized that humpback, fin and minke whale presence is possible in the waters off northern Alaska. As a result, SOI requested take of these species incidental to conducting offshore seismic and shallow-hazard surveys in these waters and NMFS evaluated the potential impacts of seismic operation on these species. However, the relatively few animals sighted supports SOI's estimate of the small number of animals of these species potentially affected by SOI's seismic surveys.

Comment 13: The NSB states that many of the estimates in Table 4–1 are outdated or are unreliable (i.e., estimates for belugas and all pinnipeds).

Response: The SOI IHA application provides information (including data limitations) and references for its estimates of marine mammal abundance. As the NSB has not provided information contrary to the data provided by SOI and NMFS does not have information that these estimates are not reliable, NMFS considers this data to be the best available.

Comment 14: The NSB states that the IHA application (p.15) suggests that belugas do not occur in the central Beaufort Sea during the summer. This is not accurate. Belugas are rarely seen in nearshore areas of the central Beaufort Sea in summer. However, the eastern Chukchi Sea stock uses the shelf break of the central Beaufort Sea during summer. Thus, vessel traffic or sounds propagating from Shell's activities could harass belugas during the summer.

Response: NMFS does not agree that SOI's IHA application suggests that belugas do not occur in the central Beaufort Sea in the summer. As stated in SOI's IHA application, a large portion of the Beaufort Sea seasonal population spend most of the summer in offshore waters of the eastern Beaufort Sea and Amundsen Gulf (Davis and Evans, 1982; Harwood *et al.*,1996). Belugas are rarely seen in the central Alaskan Beaufort Sea during the summer. During late summer and autumn, most belugas migrate far offshore near the pack ice front (Hazard, 1988; Clarke *et al.*, 1993; Miller *et al.*, 1998) and may select deeper slope water independent of ice cover (Moore *et al.*, 2000). Small numbers of belugas are sometimes observed near the north coast of Alaska during the westward migration in late summer and autumn (Johnson, 1979), but the main fall migration corridor of beluga whales is greater than 100 km (62 miles) north of the coast. Aerial- and vessel-based seismic monitoring programs conducted in the central Alaskan Beaufort Sea from 1996 through 2001 observed only a few beluga whales migrating along or near the coast (LGL and Greeneridge, 1996; *et al.* 1998, 1999). The vast majority of belugas seen during those projects were far offshore. However, NMFS notes that these statements do not affect the calculation of Level B incidental harassment, which are partially based on density estimates obtained by MMOs in 2006.

Comment 15: The NSB states that Shell's IHA application suggests that harbor porpoises will not occur in the areas they plan to conduct seismic surveys. This is not consistent with the information they provide in Table 6–1 (in SOI's IHA application). Harbor porpoises were the second most abundant cetacean seen during Shell's 2007 surveys in the Chukchi Sea.

Response: Table 6–1 provides a population estimate of 47,356 (CV = 0.223) (Angliss and Outlaw, 2005) for harbor porpoise in Bristol Bay in 1998–1999. There is no information available that this stock moves to the Chukchi Sea

in summer, but a portion may do so. However, NMFS does not believe that this population size is relevant for estimating potential takes in the Chukchi Sea, as SOI estimates density of a species based on sightings during non-seismic survey operations. The most commonly recorded cetacean species in 2007 in the Chukchi Sea was the gray whale (32 sightings), followed by harbor porpoise (10 sightings), bowhead whale (6 sightings), unidentified mysticete whale (6 sightings), unidentified whale (3 sightings), minke whale (3 sightings), humpback whale (2 sightings), one killer whale and one unidentified odontocete whale (Table 3.4). Harbor porpoise densities contained in SOI's 2008 IHA application were estimated from seismic industry data collected during 2006 activities in the Chukchi Sea, as 2007 data was not available at the time SOI submitted its 2007 IHA application. NMFS expects SOI will update its density and Level B harassment take levels in its 2009 IHA application.

Comment 16: The NSB states that SOI's IHA application (Pg. 18) in regard to the spotted seal is not sufficient. For example, spotted seals also haul out in Dease Inlet. Shell references a study (Johnson *et al.*, 1999) for information about how many spotted seals use the Colville River Delta. That study was not intended for specifically surveying spotted seals. These seals haul out based on tides and other environmental conditions not considered by Johnson *et al.* (1999). It is very feasible that many more seals, more than 20, use the Colville River Delta. Furthermore, based on satellite tracking data, spotted seals only use a haul out about 10 percent of the time (Lowry *et al.*, 1994). Thus, a sighting of 20 seals may actually represent about 200 animals. Shell's activities in Harrison Bay will likely expose every spotted seal that uses the Colville River haul out to loud seismic sounds. Shell should be required by NMFS to collect data on spotted seals using surveys that are specifically designed for spotted seals.

Response: NMFS does not believe that an IHA application needs to be a compendium of information on a species. NMFS and others recognize that an IHA application is only a single source of information. As noted in SOI's IHA application, a small number of spotted seal haul-outs are documented in the central Beaufort Sea near the deltas of the Colville River and, previously, the Sagavanirktok River. Historically, these sites supported as many as 400 to 600 spotted seals, but in recent times less than 20 seals have been seen at any one site (Johnson *et al.*, 1999). Previous studies from 1996 to 2001 indicate that few spotted seals (a few tens) utilize the central Alaskan Beaufort Sea (Moulton and Lawson, 2002; Treacy, 2002a, b) very few, if any, occurring in the eastern portion of the Beaufort Sea.

Moreover, in 2008, SOI is focusing its seismic and shallow hazards activities in areas significantly east of Harrison Bay. As a result, it is unlikely that this haul-out will be significantly affected. As the spotted seals from the Colville River Delta move into the area(s) of planned seismic activities, the potential Level B harassment take is calculated as they will become part of the overall density calculation discussed on page 25. NMFS addresses the suggested research on spotted seals later in this document.

Marine Mammal Impact Concerns

Comment 17: EarthJustice notes that the monitoring records from seismic surveys conducted in 2006 and 2007 establish that, despite the exclusion zones, scores of marine mammals were exposed to seismic pulses loud enough to potentially cause permanent hearing loss.

Response: First, as described previously in this document, auditory injury is unlikely to occur unless the animal was significantly closer to the seismic airguns than the distance to the 180 dB (cetaceans) or 190 dB (pinnipeds) zone. Second, NMFS believes that EarthJustice has misinterpreted the findings of the 2006 CPAI and SOI monitoring reports. When all data are considered, sighting rates are greater for all marine mammal groups during non-seismic than seismic periods. This is largely due to the high sighting rates from the chase vessel which were all considered to be unaffected by seismic activities. An overall higher sighting rate for all marine mammal groups during non-seismic periods compared to periods of seismic is expected if one presumes that marine mammals will deflect from the airgun array noise and therefore, not be within detection range from either the seismic or support vessel(s).

Comment 18: The NSB states that available data show that bowheads show avoidance at sounds much lower than 160 dB contrary to Shell's statement that bowheads will show disturbance only if they receive airgun sounds at levels ≤160 dB. How can NMFS justify using sound levels only down to 160 dB? As mentioned above, there are many data that show that bowheads react to much lower levels of industrial sounds than 160 dB. Miller *et al.* (1999) showed that bowheads were excluded from a 20–km (12.4–mi) area around active seismic operations. The approximate received sound level at this distance was approximately 120 dB. Exclusion from a 20–km (or sim;120 dB) zone around active seismic is substantial harassment. Therefore, NMFS must require that estimated takes of bowhead whales be calculated down to at least the 120–dB level.

Response: First, the best information available to date for reactions by bowhead whales to noise, such as seismic, is based on the results from the 1998 aerial survey (as supplemented by data from earlier years) as reported in Miller *et al.* (1999). In 1998, 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 microPa rms, depending upon propagation. Corresponding levels at 30 km (18.6 mi) were about 107–126 dB re 1 microParms. 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 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, it should be pointed out that these minor course changes are during migration and, as indicated in MMS' 2006 Final PEA, have not been seen at other times of the year and during other activities.

Third, as we have stated previously, NMFS does not believe that minor course corrections during a migration across the Beaufort Sea rises to a level of being a significant behavioral response as explained previously. 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 that determination requires a post-survey computer analysis to find that bowheads have made a 1 or 2 degree course change, NMFS believes that does not rise to a level of 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 microPa). However, NMFS needs to point out that while this might not be a ''taking'' in the sense that there is not a significant behavioral response by the bowheads, that 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.

Comment 19: The NSB states that it is not clear how Shell estimated how many bowheads would be taken at the 120–dB level. Sound from the seismic surveys attenuates to 160 dB at about 8 km (5 mi) and to the 120 dB level at approximately 60 km (37.3 mi) or greater. Even though the area ensonified to 120 dB is much larger than the 160 dB area, the number of takes of bowheads has only doubled. This does not make sense. Additional information is needed as to how Shell calculated how many bowheads, especially migrating bowheads, will be exposed to industrial sounds down to 120 dB.

Response: Bowhead whale exposure estimates were not calculated using the density x area method as these animals are expected to be migrating and detailed information on their migration is available allowing more precise estimates to be made for this species than for other marine mammal species in the Beaufort and Chukchi Seas. Thus, the assumption that the number of bowhead whales exposed at the 120–dB level would be proportional to the larger area exposed to that level is not correct. The number of bowheads estimated to be exposed to seismic sounds at or above 120 dB was estimated in the same manner as described in the IHA application for the 160 dB level. That is, the proportion of the bowhead population expected to pass within each depth bin during the planned 14 days of survey activity was multiplied by the proportion of each depth bin that was expected to be exposed to seismic sounds at or above 120 dB.

Comment 20: The NSB asserts that the estimated take for bowhead whales in the Beaufort Sea is also an underestimate. The ensonified zone around seismic operations, down to 120 dB, has the potential to deflect and harass perhaps the majority of bowhead whales that migrate through the Beaufort Sea. Estimating a take of only 1582 is too low. It is likely that many thousands of bowheads will be deflected from Shell's seismic operations. It is likely that many thousands of bowheads will also be deflected due to Shell's planned drilling operations in the Camden Bay of the Beaufort Sea (if it is allowed to proceed). Given these two large projects, a large percentage of the bowhead population will be harassed during the summer/autumn of 2009. The potential for population-level effects exists, especially if many bowheads miss feeding opportunities and expend more energy because they are deflected.

Response: First, please see previous responses in regard to bowhead whales not having a significant behavioral response at levels below 160 dB. Second, NMFS is required by the MMPA to make the determinations required under section 101(a)(5)(D) of the MMPA, independent of other activities. Third, SOI cancelled its 2008 drilling program in the Beaufort Sea and the IHA issued to SOI on August 19, 2008, for seismic and shallow hazard surveys will expire on August 18, 2009, prior to the fall migratory period of the Beaufort Sea bowhead whales. Fourth, in the Beaufort Sea, mitigation measures required under SOI's IHA prohibit seismic surveys from operating within areas where 12 or more bowhead or gray whales are detected or operating during the fall bowhead subsistence hunt.

In conclusion, as the NSB has not provided specific information contradicting the data and information provided by SOI, NMFS believes that the numbers of bowhead whales being exposed to seismic sounds is based on the best scientific information as provided in SOI's IHA application.

Comment 21: The NSB notes that Shell states that, ''...impacts would be temporary and short term displacement of seals and whales from within ensonified zones.'' This conclusion is not supported by data. Impacts to seals and belugas are unknown. Further, duration of impacts to bowhead whales are unknown. There are not sufficient data to evaluate the duration of impacts to marine mammals or the biological significance of these impacts. NMFS should require Shell to specifically investigate impacts from seismic to beluga whales, the duration of impacts to all marine mammals and the biological significance of these impacts.

Response: To date, there have not been any reported large scale impacts attributable to offshore oil and gas development in the Arctic. NMFS would expect that villagers who hunt and fish in the offshore waters would notice changes in marine life. In regard to study of the beluga whale, SOI's monitoring program for assessing impacts to marine mammals by offshore industry activities is developed through input from the AEWC, the NSB, and the public. The 2008 monitoring program is discussed later in this document.

Comment 22: The NSB states that SOI's IHA application indicates that Richardson *et al.* (1999) showed that bowheads returned to original migratory path shortly after being deflected because of seismic sounds. The statement is false. Richardson *et al.* (1999) were not able to investigate the duration of effects to bowhead whales from seismic sounds. One of the goals of the monitoring plan is to investigate the duration of deflection. The statement that bowheads are only deflected for a short period of time is not supported by data and should be disregarded by NMFS and decision makers in this section of Shell's application as well as other sections.

Response: NMFS agrees that the reference does not support the statement and has not been considered in making our statutory determinations.

Comment 23: The NSB states that during the period of seismic acquisition, some species may be dispersed (as claimed by Shell) while other species may not be dispersed. Bowheads will not be dispersed during migration. Belugas are not dispersed during migration, and seem to be aggregated along the shelf break during the summer. Spotted seals aggregate at haulout areas along the Chukchi and Beaufort seas coasts. Thus, the conclusion that there will be few impacts to marine mammals is not supported by data. NMFS must require extensive mitigation and monitoring of Shell if they allow Shell to incidentally take marine mammals. Shell must collect data that can be used to evaluate impacts to marine mammals. Further, NMFS must ensure that Shell is complying with mitigation measures.

Response: The statement by SOI is that ''During the period of seismic acquisition (mid-July through mid-November), most marine mammals would be dispersed throughout the area.'' The document goes on to provide species specific information (where available) to allow estimates of Level B harassment.

SOI's mitigation and monitoring program was reviewed by the public

during the public comment period on SOI's IHA application and during the Open Water Meeting held in Anchorage, AK in April, 2008. The NSB was an active participant in critiquing those plans and providing valuable information to SOI and others for improvements in its design. Finally, NMFS has no reason to believe that SOI would not carry out the mitigation and monitoring requirements stated in its IHA and in its submitted monitoring plan.

Comment 24: The NSB notes that Shell states, '' impacts would be temporary and short term displacement of seals and whales from within ensonified zones .'' This conclusion is not supported by data. Impacts to seals and belugas are unknown. Further, duration of impacts to bowhead whales are unknown. There are not sufficient data to evaluate the duration of impacts to marine mammals or the biological significance of these impacts. NMFS should require Shell to specifically investigate impacts from seismic to beluga whales, the duration of impacts to all marine mammals and the biological significance of these impacts.

Response: NMFS agrees that there is some uncertainty on the current status of some marine mammal species in the Beaufort and Chukchi Seas and on impacts on marine mammals from seismic surveys. NMFS is currently proposing to conduct new population assessments for Arctic pinniped species and current information is available on-line through its SARS program. In regard to impacts, there is no indication that seismic survey activities are having a long-term impact on marine mammals. For example, apparently, bowhead whales continued to increase in abundance during periods of intense seismic in the Chukchi Sea in the 1980s (Raftery *et al.*, 1995; Angliss and Outlaw, 2007), even without implementation of current mitigation requirements. As a result, NMFS believes that seismic survey noise in the Arctic will have no more than a short-term effect on marine mammals in the Beaufort and Chukchi Seas.

In regards to impacts on beluga whales, impact assessments on marine mammal species from offshore seismic activities have been ongoing since 2006 through the industry's 4MP. NMFS along with the AEWC, the NSB, oil exploration companies and others have developed an off-seismic vessel monitoring program to help address the potential impact of seismic activities on marine mammals and subsistence uses of marine mammals. This program is described later in this document (see Joint Industry Studies Program). If the NSB wishes to s*et al.*ernative priorities for this impact assessment program, it should make that concern known to NMFS and SOI as soon as possible.

Comment 25: The NSB states that NMFS refers to Shell's estimates as being inflated due to accounting for multiple exposures to one animal. While this may show inflation in the number of the animals affected, it understates the number of animals that may suffer more prolonged or serious injury due to multiple exposures to anthropogenic sounds. NMFS recognizes that for pinnipeds, exposure to several seismic pulses may cause temporary threshold shift (TTS) (temporary hearing loss) at somewhat lower received levels than would be required for a single seismic pulse to cause TTS. Relationships between TTS and PTS (permanent threshold shift) have not been studied in marine mammals, but repeated exposure to seismic pulses may result in hearing damage that could lead to PTS. NMFS has previously recognized that permanent hearing loss (also known as PTS) is considered a serious injury to marine mammals, and has explained that ''if [an] acoustic source at its maximum level had the potential to cause PTS in a marine mammal's hearing ability, that activity would be considered capable of causing serious injury to a marine mammal and would therefore not be appropriate for an incidental harassment authorization.'' If NMFS argues that take estimates are inflated due to accounting for multiple exposures, NMFS must also examine the possibility that those multiple exposures will cause PTS in marine mammals. If this is a possibility, an IHA cannot be issued.

Response: As explained in detail elsewhere in this **Federal Register** notice, marine mammals will need to be significantly closer to the seismic source and be exposed to sound pressure levels greater than 180 dB to be injured or killed by the seismic airgun array. For large airgun arrays, this distance may be within 200 m (656 ft) of the vessel. In order for a marine mammal to receive multiple exposures (and thereby incur PTS), the animal would (1) need to be close to the vessel and not detected during that period of multiple exposure, (2) be swimming in approximately the same direction and speed as the vessel, and (3) not be deflected away from the vessel as a result of the noise from the seismic array. Preliminary model simulations for seismic surveys in the Gulf of Mexico, indicate that marine mammals are unlikely to incur single or multiple exposure levels that could result in PTS, as the seismic vessel would be moving at about 4–5 knots, while the marine mammals would not likely be moving within the zone of potential auditory injury in the same direction and speed as the vessel, especially for those marine mammals that take measures to avoid areas of seismic noise. .

Comment 26: EarthJustice states that they referenced the scientific literature linking seismic surveys with marine mammal stranding events in its comments to MMS on the Draft PEA. NMFS' failure to address these studies, and the threat of serious injury or mortality to marine mammals from seismic surveys renders NMFS' conclusionary determination that serious injury or morality will not occur from SOI's activities arbitrary and capricious.

Response: The MMS briefly addressed the humpback whale stranding in Brazil on page 127 in the Final PEA. Marine mammal strandings are also discussed in the NMFS/MMS Draft PEIS. Detailed response to the cited strandings have been provided in several previous IHA issuances for seismic surveys (see for example: 69 FR 74905 (December 14, 2004), 71 FR 49418 (August 23, 2006), 71 FR 50027 (August 24, 2006), 73 FR 45969 (August 7, 2008), and 73 FR 46774 (August 11, 2008). The statement here by EarthJustice simply repeats the information it has provided in the past regarding these strandings to which NMFS has responded (as here). As NMFS has stated, the evidence linking marine mammal strandings and seismic surveys remains tenuous at best. Two papers, Taylor *et al.* (2004) and Engel *et al.* (2004) reference seismic signals as a possible cause for a marine mammal stranding. Taylor *et al.* (2004) noted two beaked whale stranding incidents related to seismic surveys. The statement in Taylor *et al.* (2004) was that the seismic vessel was firing its airguns at 1300 hrs on September 24, 2004, and that between 1400 and 1600 hrs, local fishermen found live stranded beaked whales some 22 km (12 nm) from the ship's location. A review of the vessel's trackline indicated that the closest approach of the seismic vessel and the beaked whales stranding location was 18 nm (33 km) at 1430 hrs. At 1300 hrs, the seismic vessel was located 25 nm (46 km) from the stranding location. What is unknown is the location of the beaked whales prior to the stranding in relation to the seismic vessel, but the close timing of events indicates that the distance was not less than 18 nm (33 km). No physical evidence for a link between the seismic survey and the stranding was obtained. In addition, Taylor *et al.*

(2004) indicates that the same seismic vessel was operating 500 km (270 nm) from the site of the Galapagos Island stranding in 2000. Whether the 2004 seismic survey caused to beaked whales to strand is a matter of considerable debate (see Cox *et al.*, 2004). However, these incidents do point to the need to look for such effects during future seismic surveys. To date, follow up observations on several scientific seismic survey cruises have not indicated any beaked whale stranding incidents.

Engel *et al.* (2004), in a paper presented to the International Whaling Commission (IWC) in 2004 (SC/56/E28), mentioned a possible link between oil and gas seismic activities and the stranding of 8 humpback whales (7 off the Bahia or Espirito Santo States and 1 off Rio de Janeiro, Brazil). Concerns about the relationship between this stranding event and seismic activity were raised by the International Association of Geophysical Contractors (IAGC). The IAGC (2004) argues that not enough evidence is presented in Engel *et al.* (2004) to assess whether or not the relatively high proportion of adult strandings in 2002 is anomalous. The IAGC contends that the data do not establish a clear record of what might be a ''natural'' adult stranding rate, nor is any attempt made to characterize other natural factors that may influence strandings. As stated previously, NMFS remains concerned that the Engel *et al.* (2004) article appears to compare stranding rates made by opportunistic sightings in the past with organized aerial surveys beginning in 2001. If so, then the data are suspect.

Second, marine mammal strandings do not appear to be related to seismic survey work the Arctic Ocean. Moreover, NMFS notes that in the Beaufort Sea, aerial surveys have been conducted by MMS and industry during periods of industrial activity (and by MMS during times with no activity). No strandings or marine mammals in distress have been observed during these surveys, that appear to be related to seismic survey activity, and none have been reported by NSB inhabitants (although dead marine mammals are occasionally sighted). 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 Shell to ramp-up the seismic array to avoid a startle effect, strandings, similar to what was observed in the Bahamas in 2000, are unlikely to occur in the Arctic Ocean. In conclusion, NMFS does not expect any marine mammals will incur serious injury or mortality as a result of Arctic Ocean seismic surveys in 2008/2009.

Comment 27: EarthJustice mentions a recent stranding of a large number of melon-headed whales in an area off Madagascar where seismic surveys were being conducted.

Response: Information available to NMFS at this time indicates that the seismic airguns were not active around the time of the stranding. Scientists continue to investigate this stranding and a determination of cause is expected early in 2009.

Comment 28: EarthJustice states that NMFS's assertion that there is no evidence that marine mammal strandings in the Arctic that are related to seismic surveys only reflects the fact that efforts have not been made to determine the cause of such strandings.

Response: NMFS maintains a nationwide marine mammal stranding database. While a small number of Arctic marine mammal species may have stranded within various parts of their range, there are no records of strandings in the northern Chukchi and Beaufort Seas attributable to offshore seismic and/or shallow hazard surveys.

Comment 29: The NSB states that while Shell's IHA application and NMFS' **Federal Register** notice mention the various transit routes through U.S. waters in the Bering, Chukchi and Beaufort Seas that the numerous vessels associated with Shell's seismic surveys will take, there is no discussion nor analysis of the take that will occur from these vessels along the way. Shell needs to adequately specify the activities and impacts of these vessels.

Response: The specified activity that has been proposed and for which an IHA has been requested is the use of seismic airguns to conduct oil and gas exploration. While the support vessels play a role in facilitating seismic operations, NMFS does not expect these operations to result in the incidental take of marine mammals. NMFS believes that normal shipping and transit operations do not rise to a level requiring an authorization under the MMPA, unless they are conducting an activity that has noise levels significantly greater than normal shipping, such as towing oil rigs or heavy ice breaking, or operations during the spring or fall bowhead subsistence whaling season. To require IHAs for standard shipping would require NMFS to seek IHA applications from activities, such as barge companies supplying North Slope villages and shoreside facilities. This would also potentially affect NMFS' ability to review activities that have a potential to cause harm to marine mammal species or population stocks.

Fish and Zooplankton Concerns

Comment 30: The NSB is concerned about the potential impacts of SOI's seismic survey to the food sources of marine mammals (fish and zooplankton). Additional information is needed about impacts from seismic surveys to marine mammal prey and the resulting impacts to the marine mammals themselves. The NSB recommends an effort be made to monitor potential fish death behind the seismic boat by using some type of net to sample for these casualties.

Response: NMFS does not expect the proposed action to have a substantial impact on biodiversity or ecosystem function within the affected area. The potential for the SOI's activity to affect ecosystem features and biodiversity components, including fish and invertebrates, is fully analyzed in MMS'2006 Final PEA and incorporated by reference into the NMFS' 2008 SEA. MMS/NMFS' evaluation in the 2006 Final PEA indicates that any direct, indirect, or cumulative effects of the action would not result in a substantial impact on biodiversity or ecosystem function. In particular, the potential for effects to these resources are considered in the Final PEA with regard to the potential effects on biological diversity and ecosystem functions in the Beaufort and Chukchi Seas that may serve as essential components of marine mammal habitat. Most of the potential effects on marine mammal food sources (fish and invertebrates) are considered to be short term and unlikely to rise to a level that may affect normal ecosystem function or predator/prey relationships; therefore, NMFS believes that there will not be a substantial impact on marine life biodiversity or on the normal function of the nearshore or offshore Beaufort Sea ecosystems.

During the seismic survey, only a small fraction of the available habitat would be ensonified at any given time. Disturbance to fish species would be short term, and fish would return to their pre-disturbance behavior once the seismic activity in a specific area ceases. Thus, the proposed survey would have little, if any, impact on the ability of marine mammals to feed in the area where seismic work is conducted.

Some mysticetes, including bowhead whales, feed on concentrations of zooplankton. Some feeding bowhead whales may occur in the Alaskan Beaufort Sea in July and August, and others feed intermittently during their westward migration in September and October (Richardson and Thomson

[eds.], 2002; Lowry *et al.*, 2004). A reaction by zooplankton to a seismic impulse would only be relevant to whales if it caused concentrations of zooplankton to scatter. Pressure changes of sufficient magnitude to cause that type of reaction would probably occur only very close to the acoustic source, if any would occur at all. Impacts on zooplankton behavior are predicted to be negligible, and that would translate into negligible impacts on availability of mysticete prey. Therefore, no impacts to mysticete feeding are anticipated.

Little mortality to fish and/or invertebrates is anticipated. The proposed Chukchi and Beaufort seas seismic survey are predicted to have negligible to low physical effects on the various life stages of fish and invertebrates. Though these effects do not require authorization under an IHA, the effects on these features were considered by NMFS with respect to consideration of effects to marine mammals and their habitats, and NMFS finds that these effects from the survey itself on fish and invertebrates are not anticipated to have a substantial effect on biodiversity and/or ecosystem function within the survey area.

Subsistence Concerns

Comment 31: The Commission recommends that the issuance of the requested IHA be contingent upon NMFS establishing specific mitigation measures for bowhead and beluga whales that will ensure that the proposed activities do not affect the subject species in ways that will make them less available to subsistence hunters. Such measures should reflect the provisions of any CAA as well as meeting the requirements of the MMPA.

Response: NMFS has required SOI, through the IHA, to implement mitigation measures for conducting seismic surveys that are designed to avoid, to the greatest extent practicable, impacts on coastal marine mammals and thereby, meet the needs of those subsistence communities that depend upon these mammals for sustenance and cultural cohesiveness. For the 2008 season, these mitigation measures are similar to those contained in the CAA signed by SOI on July 21, 2008 (and subsequently amended by SOI and the AEWC), and include a prohibition on shooting seismic before July 20, 2008, in the Chukchi Sea; black out areas during the subsistence hunt for bowhead whales; coastal stand-off distances for seismic and vessel transiting activities; coastal community communication stations; and emergency assistance to whalers, among other measures.

Comment 32: The AEWC notes that SOI signed the 2008 CAA on July 21, 2008, with minor modifications set forth in the addendum to the CAA. To help mitigate the impacts of offshore geophysical operations on marine mammals and subsistence hunting, the whaling captains of the AEWC have agreed to an understanding and put into the CAA that only two geophysical operations will occur at any one time in either the Beaufort or the Chukchi Seas. The industry participants conducting geophysical operations agree to coordinate the timing and location of such operations so as to reduce, by the greatest extent reasonably possible, the level of noise energy entering the water from such operations at any given time and at any given location. The AEWC points out that this does not limit the number of geophysical operations that may be permitted, planned or conducted in a single season, only on the number of active geophysical operations being conducted simultaneously.

Response: While NMFS agrees that limiting the number of geophysical operations in either the Chukchi or Beaufort Seas would reduce impacts on marine mammals, this condition is unnecessary for a determination on whether there will be an unmitigable adverse impact on subsistence uses of marine mammals because SOI's geophysical operations will not occur during the spring and fall bowhead whale subsistence hunt, and additional mitigation measures have been imposed to ensure that coastal subsistence hunters are not affected.

NMFS understands that, under the terms of an OCS lease, the lessee is required to make progress on exploration and development on its leases in order to hold that lease beyond the initial lease term. Ancillary activities (such as seismic and shallow hazard surveys) are those activities conducted on a lease site to obtain data and information to meet MMS' regulations to explore and develop a lease. If a limit is placed by NMFS on the number of ancillary activities authorized for a planning area in a given year, NMFS may preclude the lessee from complying with MMS regulations to proceed in a timely manner on exploring or developing its OCS leases. Therefore, based on both practicability and that it is not necessary, NMFS has not adopted this suggested mitigation measure. However, NMFS encourages industry participants to work together to reduce seismic sounds in the Arctic Ocean through cooperative programs in data collection to reduce impacts on marine mammals.

Comment 33: In light of increasing offshore oil and gas production (and exploration), the AEWC believes it is in the interest of all stakeholders for our federal government, especially NMFS, to continue to support the CAA process and its reliance on the AEWC's leadership in promoting sound management of offshore oil and gas development.

Response: NMFS believes that the CAA is a means to ensure that there is not an unmitigable adverse impact on the availability of species or stocks of marine mammals for taking for subsistence uses. However, the CAA is a document entered into between two entities (industry applicants and native community stakeholders). NMFS is neither a signatory to the CAA, nor does it play any formal role in the development of the CAA other than by requiring industry applicants to develop a Plan of Cooperation (POC) pursuant to 50 CFR 216.104(a)(12). Although NMFS has a limited role in this process, NMFS supports the continuation of the CAA process to help ensure that native subsistence harvests are successful.

Comment 34: EarthJustice notes that NMFS fails to provide any meaningful assessment of the effectiveness of the vaguely identified mitigation measures. It does not appear that NMFS has made any effort to discern whether seismic surveying activities in the Chukchi or Beaufort Seas in 2006 or 2007 had an adverse impact on the availability of seal and whale species for subsistence uses. Before authorizing another year of surveys, NMFS must at least evaluate the effect of recent surveys, assess the effectiveness of mitigation measures used during those surveys, and make the results of such assessment available to the affected public.

Response: The MMPA does not prohibit an activity from having an adverse impact on the availability of marine mammals for subsistence uses; rather, the MMPA requires NMFS to ensure the activity does not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. NMFS provided the definition for ''unmitigable adverse impact'' previously in this **Federal Register** document.

Second, specific mitigation measures contained in the 2008 CAA relevant to mitigating impacts on subsistence hunting of marine mammals are required to be implemented, including a prohibition on vessel transits prior to July 1st, a prohibition on conducting seismic surveys in the Chukchi Sea prior to July 20th, an agreement by vessel operators for vessel transits to remain as far offshore as safe transit

allows; not creating new leads that might attract bowhead or beluga whales away from subsistence communities, blackout periods in the Beaufort and Chukchi Seas and coastal standoff distances for survey vessels and for transiting vessels to avoid impact potential subsistence harvests of coastal marine mammals. NMFS believes that implementation of all of these measure ensures that SOI's seismic survey program will not have an unmitigable adverse impact on subsistence uses of marine mammals. However, it should be recognized that mitigation measures designed to reduce impacts on subsistence uses of marine mammals are not quantifiable as no seismic survey activity occurs during these periods. As a result, NMFS must use alternative methods for assessing effectiveness. One way is to review annual marine mammal harvests and determine effectiveness.

A second measure is more timely and that is through SOI's Com-Centers established to ensure conflicts are at the lowest level practicable. NMFS notes that it has not received any direct communication, either during the public review period on the issuance of IHAs for 2008, through the Com Centers established to address subsistence use concerns, or independently from subsistence hunters, that document any significant impact that could potentially relate to SOI's 2006, 2007, or 2008 seismic program.

Comment 35: EarthJustice states that NMFS has not analyzed the impacts of SOI's surveying activity against the background of the many seismic surveys planned for the Chukchi and Beaufort Seas in the summer of 2008, l*et al.*ne provided adequate mitigation of the effects of this activity on subsistence activities.

Response: Potential cumulative impacts on subsistence uses of marine mammals have been addressed in MMS' 2006 PEA and NMFS' 2008 SEA. The 2006 PEA addressed the potential impacts from 4 seismic survey activities in the Beaufort Sea and 4 seismic survey activities operating at the same time. The activity level in 2008 is less than the level analyzed in the 2006 PEA. As a result, NMFS believes that by requiring all participants in seismic/shallow hazard surveys in 2008 in the Chukchi and Beaufort Seas to conduct appropriate mitigation measures, such as vessel standoff distances from shore, limiting startup dates for seismic, and blackout areas during the bowhead whale subsistence hunt, NMFS believes that there will not be a unmitigable adverse impact on subsistence uses of marine mammals in 2008 by oil and gas surveys.

Comment 36: EarthJustice notes that SOI proposes to mitigate impacts to subsistence activities via measures developed through a POC with the AEWC and a variety of meetings and consultations. There is no guarantee that these processes will result in enforceable limits that ensure SOI's activities will not have an unmitigable adverse impact on the availability of marine mammals for taking for subsistence purposes. As a result, NMFS has deferred its MMPA determination until after such a POC has been developed. The NSB notes that POC meetings consist of companies telling NSB communities what oil and gas activities will occur in the Beaufort and Chukchi Seas. There is little opportunity for detailed and meaningful dialogue and the POC is not appropriate for negotiating means to avoid conflicts between company activities and subsistence hunts.

Response: First, it should be understood that the POC is not the same document as the CAA. While these are two different documents, the POC meetings will likely aide in developing the CAA. It should also be understood that the POC is required by NMFS regulations to be submitted as part of the industry's IHA application; so it is logical that NMFS' MMPA determinations would be made after submission of the POC. The POC is required by NMFS regulations in order to bring industry and the village residents together to discuss planned offshore activities and to identify potential problems. To be effective, NMFS and SOI believe 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.

In its Interim Rule for Arctic Activities (61 FR 1588, April 10, 1996), NMFS clarified that if either a POC or information required by 50 CFR 216.104(a)(12) is not submitted, and, if during the comment period, evidence is provided indicating that an adverse impact to subsistence needs will result from the activity, an authorization may be delayed in order to resolve this disagreement. The requirements for meeting this requirement are clearly stated in 50 CFR 216.104(12).

In any event, SOI and the AEWC and Whaling Captains Associations signed a CAA in July 2008, which contains measures agreed to by the parties. Many of these subsistence-related measures (as they pertain to marine mammals and the related subsistence harvests) have been included in the IHA and are enforceable.

Comment 37: EarthJustice claims that NMFS has failed its basic duty under the MMPA and its own regulations to make a proposed determination available to the public to scrutinize and comment on. Absent specification of the restrictions and mitigation measures that will result from these processes, NMFS cannot reasonably conclude that they will be effective, which it must in order to determine that they will eliminate the potential for substantial impacts to subsistence activities.

Response: NMFS does not agree with the statement. NMFS published a notice of receipt of SOI's IHA application for conducting seismic and shallow hazard surveys in the Chukchi and Beaufort Seas in 2008/2009 on June 25, 2008 (73 FR 36044) and provided a 30–day public comment period on that application and NMFS' preliminary determinations that the proposed action would result in taking by harassment of small numbers of marine mammals of a species or population stock; (2) the harassment would have a negligible impact on affected marine mammal species or stocks; and (3) the harassment would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. The preliminary determination in regard to subsistence uses of marine mammals was provided in this document, including statements on mitigation measures likely to be required to ensure that there will not be an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses, including dates of seismic operation to avoid spring and fall bowhead hunts and the application of procedures established in a CAA between the seismic operators and the AEWC and the Whaling Captains' Associations of Kaktovik, Nuiqsut, Barrow, Pt. Hope and Wainwright. The IHA application (and **Federal Register** notice) clearly noted 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. Unless NMFS believes that the measures recommended by the applicant are insufficient to result in an unmitigable adverse impact to subsistence uses of marine mammals, it is not necessary to add additional mitigation measures.

Additional practicable mitigation measures can be added at the IHA stage either through comment on the proposed IHA notice, negotiations between industry and the communities, or final review by NMFS of its preliminary determination. There is no requirement in the MMPA to have its final determination, including mitigation measures subject to additional public review.

Comment 38: EarthJustice states that ''Pursuant to the MMPA an IHA must prescribe ''means of effecting the least practicable impact . . . on the availability of [an affected species or stock] for subsistence uses . . . .'' NMFS fails to set forth its determination that the mitigation measures identified in the **Federal Register** notice will ensure the least practicable adverse impact on the availability of marine mammals to subsistence users. Because NMFS has failed to impose several practicable mitigation measures that would reduce potential impacts on the availability of marine mammals for subsistence uses, the agency has failed to satisfy the ''stringent standard'' imposed by Congress in the MMPA.

Response: EarthJustice's citation was taken out of context. The complete statement reads: ''The authorization for such activity shall prescribe, where applicable–

(I)permissible methods of taking by harassment pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for subsistence uses pursuant to subsection (b) of this section or section 1379 (f) of this title or pursuant to a cooperative agreement under section 1388 of this title.''

In regards to reducing potential impacts on the availability of marine mammals for subsistence purposes, NMFS believes that the mitigation measures described in the **Federal Register** notice on SOI's IHA application, discussed previously in this document, and analyzed elsewhere in this **Federal Register** document meet the intent of this paragraph of the MMPA.

Comment 39: EarthJustice states that NMFS has failed to impose mitigation measures that would reduce potential disturbance and biological impacts to essential subsistence resources such as bowhead whales, seals and beluga whales. For example, NMFS has failed to impose a mandatory 120–dB bowhead cow/calf pair monitoring zone for all of Shell's activities. NMFS should require such monitoring, at the least. NMFS can and should impose a safety zone for bowhead cow-calf pairs exposed to 107 dB or more. Similar measures should be taken with respect to beluga whales, which are also sensitive to sound over great distances, and can be found in large groups at certain times.

Response: Section 101(a)(5)(D)(ii) states that: ''The authorization for such activity shall prescribe, where applicable–(I) permissible methods of taking by harassment pursuant to such activity, and other means of effecting the least practicable impact on such species or stock... .'' As discussed elsewhere in this **Federal Register** document, implementation of mitigation measures (e.g., shutdowns) such as to 107 dB for bowhead cow/calf pairs, 120 dB for bowhead cow/calf pairs and beluga whales, and to an unstated dB level for seals, are neither practicable nor warranted. Safety zones to 107 dB would extend significant distances with little ability to monitor effectively without a fleet of aircraft and practical only when within safe flight distances from shore in the Beaufort Sea. Aircraft safety factors also prevent the use of aircraft in offshore waters of the Chukchi Sea where weather may prevent an aircraft from returning safely to land. Also, distances north of seismic vessel operations could not be observed without significant modifications to currently available aircraft due to flight (fuel) limitations and other safety factors that must be considered.

Second, please see response to comment 18 previously in this document in regards to shutdowns for bowhead whale cow/calf paris within the 120–dB zone. As indicated in that response, while a 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 SPL where deflection first begins is at 120 dB, it could be at another SPL lower or higher than 120 dB. As a result, 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.

Comment 40: EarthJustice states that another practicable mitigation measure that NMFS fails to discuss, l*et al*.ne impose, is a mandatory limit on the number of concurrent seismic and/or shallow hazard surveys in the Chukchi and Beaufort Seas. At all times, but especially during the fall bowhead migration, NMFS should prohibit the simultaneous operations of multiple vessels within the Chukchi and Beaufort Seas. Moreover, it should require that no two vessels operate within 100 km (62 mi) of one another. Given the large size of the 120–dB zone, closer simultaneous operation would pose a real risk of disrupting the bowhead whale migration and the behaviors of beluga and gray whales.

Response: EarthJustice has not provided NMFS with any data to support its argument that multiple seismic vessels should not be permitted in the Beaufort and Chukchi Seas or that no more than 2 vessels be allowed to operate within 100 km (62 mi) of one another. In regard to limiting seismic and shallow hazard vessels to no more than 2 vessels, please see response to comment 32. In regard to a 100–km (62–mi) vessel separation distance, NMFS believes that the 100–km separation distance for the 120–dB zone between vessels is not scientifically supportable. The distance where the received level reaches 120 dB re 1 microPa is dependent upon the source level and oceanographic conditions. For the same oceanographic conditions, the higher the source level, the longer the distance where the received level would reach 120 dB. Therefore, at this time, there is no basis upon which to limit effort to no more than 2 vessels within 100 km (62 mi) of one another.

Finally, the MMS 2006 Final PEA, which NMFS adopted in 2006 and incorporated into its 2008 SEA, provided a thorough analysis on the maximum number of eight seismic activities that could occur in the Chukchi and Beaufort Seas. The analysis lead NMFS and MMS to conclude that up to a maximum of eight seismic surveys would not result in significant impacts to the quality of the human environment. In addition, NMFS' 2008 SEA, which analyzed the effect of multiple seismic surveys also lead NMFS to conclude that the SOI survey would not result in a significant impacts.

Comment 41: The NSB asks how will SOI not impact the summer, open-water beluga hunt in Wainwright and protect the subsistence hunts of other marine mammals in the Chukchi Sea?

Response: Wainwright residents hunt beluga whales in the spring and early summer. While bowhead and beluga whale hunting is likely to have concluded by the time that seismic operations begin, NMFS recognizes that seismic noise and vessel traffic disturbance could have effects on this harvest. As a result, the IHA (and the CAA) contain time restrictions and coastal standoff distances for transiting vessels to avoid an unmitigable adverse impact on coastal subsistence hunts for marine mammals.

Cumulative Impact Concerns

Comment 42: The NSB states that, cumulative impacts are largely ignored by the SOI IHA action, even though SOI's proposal is only one of numerous oil industry activities recently occurring, planned or on-going in the U.S. portion of the Chukchi and Beaufort Seas. As stated previously, the cumulative impacts of all industrial activities must be factored into any negligible impact determination. NMFS has not done so for 2008, and, therefore, the proposed IHA should not be issued until a cumulative impact assessment is conducted.

Response: Section 101(a)(5)(D) of the MMPA requires NMFS to make a determination that the taking by the activity is taking small numbers of marine mammals, has a negligible impact on marine mammals, and does not result in an unmitigable adverse impact on the subsistence uses of those species and stocks. The MMPA does not instruct NMFS to make these determinations by taking into account other events (subsistence hunting, Arctic warming, and other human activities) or over time periods more than a year, if a request for take has been made under section 101(a)(5)(D) of the MMPA. Cumulative impact assessments have been addressed by MMS (and NMFS) in the 2006 Final PEA and NMFS in its 2007 and 2008 Supplemental EAs. Because these documents are part of NMFS' Administrative Record on this matter, the information contained within them do not need to be repeated. Please refer to these documents for that assessment.

The proposed monitoring plans were provided to the NSB and others for review and comment in October, 2007 and during the public review period for SOI's proposed IHA application. SOI's monitoring plans were also reviewed at the April, 2008 Open Water Meeting in Anchorage, AK. A critical component of those reviews was to ensure that the monitoring plans address the issue of cumulative impacts.

Mitigation and Monitoring Concerns

Comment 43: EarthJustice contends that the MMPA authorizes NMFS to issue a small take authorization only if it can first find that it has required adequate monitoring of such taking and all methods and means of ensuring the least practicable impact have been adopted. The proposed IHA largely ignores this statutory requirement. While the proposed IHA lists various monitoring measures, it contains virtually nothing by way of mitigation measures. The specific deficiencies of the ''standard'' MMS mitigation measures as outlined in the 2006 PEA are described in detail in our NEPA comments. The problems with the mitigation measures as explained for NEPA purposes are even more compelling with regard to the substantive standards of the MMPA. Because the MMPA explicitly requires that ''means effecting the least practicable impact'' on a species, stock or habitat be included, an IHA must explain why measures that would reduce the impact on a species were not chosen. Neither the proposed IHA, Shell's application, the 2006 PEA, nor the 2007 DPEIS attempt to do this.

Response: In the proposed IHA notice, NMFS describes those mitigation measures that SOI proposed to implement in 2008/2009. There is no requirement for NMFS to propose additional mitigation measures at that time as long as NMFS can make its preliminary determinations required under the MMPA that the taking will (1) have no more than a negligible impact on affected species and stocks of marine mammals; (2) be small relative to the stock or population size; and (3) not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. It is only at the time that it has completed its review of SOI's proposed activity (which may have been modified since the time of the application), the comments received during the public comment period, and any recent information on the activity, potential impacts on affected marine mammal stocks, and/or subsistence uses of marine mammals, that it will determine what mitigation measures are practicable to ensure that impacts are at the lowest level practicable. NMFS has conducted that review and analysis in this **Federal Register** document and has analyzes a variety of mitigation and monitoring measures in its 2008 SEA.

Comment 44: EarthJustice notes that while NMFS has not performed any analysis of why additional mitigation measures are not ''practicable,'' the proposed IHA contains information to suggest that many such measures are in fact practicable. For example, in 2006 NMFS required monitoring of a 120–dB safety zone for bowhead cow/calf pairs and large groups >12 individuals). The IHA and **Federal Register** notice are somewhat ambiguous as to whether the 120–dB safety zone will be required in the Chukchi Sea. NMFS should require Shell to employ the 120–dB safety zone for all operations in both oceans, including shallow hazard and ice gouge surveys in the Beaufort Sea, to ensure the least practicable adverse impact on marine mammals.

Response: In its final determination and the IHA issued to SOI, NMFS required SOI to establish a 160–dB safety zone whenever an aggregation of 12 or more bowhead whales or gray whales are observed, whether in the Chukchi or Beaufort Seas. If an aggregation of 12 or more bowhead or gray whales is observed within the 160–dB safety zone around the seismic activity, the seismic and shallow hazard operations will not commence, or will shut-down, until surveys indicate they are no longer present within the 160–dB safety zone of seismic-surveying operations. In addition, the IHA issued to SOI established a 120–dB seismic shut-down zone whenever 4 or more migrating bowhead whale cow/calf pairs are within that safety zone in the Beaufort Sea. Seismic and shallow-hazard surveys cannot resume until two aerial surveys indicate that there are 3 or fewer migrating bowhead whale cow/calf pairs within that safety zone.

However, NMFS has not imposed a requirement to conduct aerial monitoring of the 120–dB safety zone for the occurrence of four ore more cow-calf pairs in the Chukchi Sea because it is not practicable. First, NMFS determined that monitoring the 120–dB safety zone was not necessary in the Chukchi Sea because there would not be the level of effort by 3D seismic survey operations found in 2006. This provides cow/calf pairs with sufficient ability to move around the seismic source without significant effort. Second, aerial surveys are not required in the Chukchi Sea because they have currently been determined to be impracticable due to lack of adequate landing facilities, the prevalence of fog and other inclement weather in that area, potentially resulting in an inability to return to the airport of origin, thereby resulting in safety concerns.

Comment 45: EarthJustice states that because the 120–dB safety zone is possible for aggregations of bowheads, means that such a zone is also possible for other marine mammals, such as belugas which are also subject to disturbance at similar levels. The failure to require such, or at least analyze it, violates the MMPA.

Response: Implementing a safety/shutdown zone for marine mammal species, other than migrating bowhead whale cow/calf aggregations, is neither practicable, necessary, nor warranted. NMFS notes that EarthJustice has not provided information that it is necessary to implement such a mitigation measure. First, as noted elsewhere in this **Federal Register** document, the best

scientific information available indicates that the marine mammal species found in these waters will not have a significant behavioral response at SPLs as low as 120 dB (including non-migratory bowhead whales). Second, implementing a shutdown requirement at 120–dB for all marine mammal species would significantly reduce the ability of SOI to conduct seismic surveys without significant, and costly delays. This could result in SOI needing multiple years to acquire the data necessary for exploratory drilling. Third, for reasons discussed elsewhere in this **Federal Register** notice, a 120–dB safety zone has not been implemented for the Chukchi Sea for safety reasons. As a result, NMFS does not believe that implementing a shutdown requirement for all marine mammal species at 120 dB is warranted.

Comment 46: EarthJustice believes that, because it is practicable, NMFS should also require Shell to suspend operations if BWASP (Bowhead Whale Aerial Survey Project) aerial surveys detect the requisite number of whales. In 2007, the BWASP surveys appear to have been more effective than Shell's surveys at detecting mother-calf pairs.

Response: At this time, sightings from BWASP aerial surveys are posted within 1–2 days of the conclusion of each survey at *http://www.afsc.noaa.gov/nmml/cetacean/bwasp/index.php* and, therefore, while they are available for managers, the oil/gas industry, and the interested public on a near-real-time basis, it is not possible at this time to determine that this information is useable for mitigation purposes. Moreover, involving the BWASP project more directly in providing information on the numbers of cow/calf pairs within a certain distance of seismic activity is problematic at this time because the location of the seismic activity - and thus the 120–dB zone around the vessel - is often unknown to the BWASP aerial survey team. At other times the vessel location is considered proprietary and, therefore, not available for this purpose.

Comment 47: EarthJustice and NSB note that with regard to night time and poor visibility conditions, Shell proposes essentially no limitations on operations, even though they acknowledge that the likelihood of observers seeing marine mammals in such conditions is low. The obvious solution, not analyzed by Shell or NMFS, is to simply prohibit seismic surveying when conditions prevent observers for detecting all marine mammals in the safety zone.

Response: NMFS is required by section 101(a)(5)(D)of the MMPA to reduce impacts to the lowest level practicable. Elsewhere in this **Federal Register** notice, NMFS provides information that: (1) marine mammals would need to be within about 200 m (656 ft) of the airgun array in order to incur TTS (Level B harassment) and significantly closer in order to incur an auditory injury; (2) the hydrophone array and vessel precludes or discourages marine mammals from entering the area for potential injury, and (3) using NVDs during periods of darkness would allow detection of marine mammals on the surface to that distance.

On the matter of practicability, NMFS has been informed by SOI that requiring a shutdown of the airgun arrays due to inclement weather or darkness in the Arctic would reduce overall effectiveness by about 40 percent. Such a loss in efficiency could increase the potential for SOI and other companies to increase effort by bringing additional seismic vessels into the Beaufort and/or Chukchi Seas. As a result, implementation of this suggestion as a mitigation measure is considered by NMFS as not practicable for both economic and practical reasons.

However, an alternative mitigation measure has been identified by NMFS and is being reviewed that could increase detection of marine mammals during darkness. Using a high-frequency marine mammal monitoring (HF/M3) sonar, similar to a model used by the U.S. Navy. The HF/M3 sonar is capable of detecting marine mammals out to about 2 km (1.1 mi), with up to 98 percent detection ability (depending upon animal size, distance from sonar and animal depth) (Ellison and Stein, 1999) and has the capability to be ramped up to avoid injury to marine mammals (as it can detect the mammal prior to the HF/M3 sonar reaching levels of auditory injury). It should be noted that this sonar does not require a marine mammal to be vocalizing in order to be detected and has the capability of being ramped-up, ensuring that, once a marine mammal is detected within a 2–km (1.1 mi) radius, powering up the HF/M3 ceases until the marine mammal is no longer detected within the 2–km zone. Once ramp-up of the HF/M3 is complete, seismic surveys can commence. During surveys, the HF/M3 would continue to monitor the area closest to the array where there is a higher potential for injury, if marine mammals were not either deflected by the seismic noise or detected by MMOs, passive acoustics or active acoustics. NMFS believes that utilizing the HF/M3 with ramp-up will result in fewer marine mammal harassments and prevent auditory injury as it is most effective close to the vessel where potential auditory injury may occur.

Moreover, as stated in the **Federal Register** Notice of Proposed IHA, once the safety zones are visually established and pre-survey monitoring has concluded that there are no marine mammals within the safety zones, seismic surveys can commence and continue into low visibility conditions. However, if for any reasons the seismic sources are stopped during low visibility conditions, they are not to be restarted until the conditions are suitable for the marine mammal visual monitoring so that the safety zones can be re-established. Nevertheless, ramping up of airguns and other seismic equipment during under normal visual conditions is expected to keep marine mammals from entering the established safety zones. Please refer to Monitoring and Mitigation Measures section below for a detailed description.

Comment 48: The NSB states that Shell's current application states that the safety zone for Deep Seismic activities in the Beaufort Sea will be 13.45 km (8.4 mi) from the sound source, and that the entire safety zone will be monitored by one on-duty MMO aboard the seismic vessel, and one MMO aboard a single chase vessel. Even with the aide of binoculars, night-vision equipment, and laser equipment (as Shell proposes), it is highly unlikely that two MMOs can monitor an entire 13.45 km (8.4 mi) safety radius with more than limited effectiveness. It is unclear how NMFS can permit Shell to conduct seismic operations when industry is not capable of adequately monitoring safety zones which are designed to protect marine mammals from physical harm or death.

Response: NMFS clarifies that the stated distance of 13.45 km (8.4 mi) is the safety zone established to ensure that SPLs of 160 dB or greater do not affect 12 or more non-migratory bowhead or gray whales. All parties recognize that marine mammals will not be detected by MMOs onboard the M/V Gillavar at these distances. As a result, SOI is required to monitor this zone by chase (support) vessels in the Beaufort and Chukchi Seas, and may use aircraft in the Beaufort Sea. It should be recognized that the 160–dB monitoring program is designed to locate concentrations of marine mammals that may be feeding or conducting another biologically significant activity (and not migrating). As a result, they should be more easily detected by vessel and aircraft MMOs. However, as noted in this **Federal Register** notice, at 160 dB, marine mammals may, at worst, experience a

significant behavioral response to seismic noise. It is NMFS' intent here, that bowhead and gray whales not be harassed away from important habitat (even temporary habitat), not that they simply not be annoyed.

Comment 49: The Commission recommends that NMFS require that the IHA require that operations be suspended immediately if a dead or seriously injured marine mammal is found in the vicinity of the operations and if that death or injury could be attributable to the applicant's activities. Any suspension should remain in place until NMFS has: (1) has reviewed the situation and determined that further deaths or serious injuries are unlikely to occur or (2) has issued regulations authorizing such takes under section 101(a)(5)(A) of the MMPA.

Response: NMFS concurs with the Commission's recommendation and will require the immediate suspension of seismic activities if a dead or injured marine mammal has been sighted within an area where the Holder of the IHA deployed and utilized seismic airguns within the past 24 hours.

Comment 50: The Commission states that if NMFS chooses to proceed with issuance of the requested incidental harassment authorization absent a broader, longer term analysis, it should require the applicant to implement all practicable monitoring and mitigation measures to minimize behavioral disturbance and other possible adverse impacts to bowhead whales, beluga whales, and other marine mammal species with an emphasis on key areas known to be important for breeding, molting, and feeding.

Response: NMFS agrees with the Commission's recommendation as it pertains to the monitoring and mitigation requirements. As described in this **Federal Register** document, NMFS believes that it has required, through the IHA issued to SOI on August 19, 2008, all practicable mitigation and monitoring measures that will result in the least practicable adverse impact on affected marine mammal species and stocks and not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. In addition to standard mitigation measures, such as shutdowns for marine mammals within a 180/190–dB safety zone, and ramp-up of airguns to avoid potential injury or startle effect, the IHA requires (1) a 120–dB rms monitoring-safety zone for cow/calf pairs of bowhead whales in the Beaufort Sea; (2) a 160–dB rms monitoring-safety zone for aggregations of feeding whales in the Beaufort and Chukchi seas; (3) seismic shut-down criteria to protect bowhead and gray whales when inside the 120–dB or 160–dB monitoring-safety zones; and (4) time, area and distance measures to ensure no unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses.

Comment 51: The Commission recommends that NMFS together with the applicant and other appropriate agencies and organizations, develop a broad based population monitoring and impact assessment program to assess whether these activities, in combination with other risk factors, are (1) individually or cumulatively having any significant adverse population level effects on marine mammals, or (2) having an unmitigable adverse effect on the availability of marine mammals for subsistence use by Alaska Natives. Expeditious development of such a monitoring program is important to ensure that scientists have the baseline information necessary to detect and possibly identify the causes of change over time. The Commission would welcome the opportunity to discuss with NMFS and interested parties how best to develop such a program (for example, through co-sponsorship of a workshop).

Response: A detailed description of the monitoring program submitted by SOI was provided in SOI's application, cited in the **Federal Register** notice of the proposed IHA, and posted on the NMFS' IHA webpage. As a result of a dialogue on monitoring by scientists and stakeholders attending NMFS' public meetings in Anchorage in April 2006, October 2006, April 2007, and April 2008, the industry has expanded its monitoring program in order to fulfill its responsibilities under the MMPA and to address concerns raised by potentially impacted North Slope communities. For the third year, SOI (and other industry participants) have included a far-field marine mammal monitoring component designed to provide baseline data on marine mammals for future operations planning. A description of this monitoring program is provided later in this document (see Joint Industry Program). Scientists are continuing discussions to ensure that the research effort obtains the best scientific information possible. NMFS would welcome the Commission's participation at these Open Water Meetings.

Finally, it should be noted that this far field monitoring program follows the guidance of the Commission's recommended approach for monitoring seismic activities in the Arctic (Hofman and Swartz, 1991), that additional research might be warranted when impacts to marine mammals would not be detectable as a result of vessel observation programs.

Comment 52: The Commission notes that NMFS is proposing to require additional mitigation and monitoring measures in 2008, as were included in the incidental harassment authorization issued to SOI in 2006 and 2007. The Commission also notes that studies conducted as part of a joint industry studies program by the applicant during their 2006 and 2007 seismic survey operations would continue during the proposed 2008 seismic operations. These studies include aerial surveys of marine mammal distribution and abundance along the Chukchi Sea coastline, collection of data (using an acoustic net array) on the occurrence and distribution of beluga whales and on ambient noise levels near villages along the Chukchi Sea coast, and collection of data on the characteristics and propagation of sounds from offshore seismic and vessel based drilling operations that may have the potential to deflect bowhead whales from the migratory routes in the Beaufort Sea. The Commission supports these additional mitigation and monitoring measures and recommends that they be incorporated in the IHA, if issued.

Response: NMFS appreciates the Commission's support for this multi-year undertaking in the Arctic Ocean.

Comment 53: The Commission recommends that known key areas, such as breeding, molting, and feeding areas receive an increased level of monitoring.

Response: Breeding and molting areas for marine mammals are not well described, are likely widespread in the Arctic and, therefore, not easily monitored, and of questionable value for monitoring if seismic survey activities are not nearby. As a result, the monitoring program, agreed upon by participants at the 2008 Open Water Meeting in Anchorage, will focus on specific aspects for monitoring that are believed to be important, including migration and feeding concerns. For additional information, see the relevant discussion elsewhere in this document.

Comment 54: EarthJustice believes that NMFS and Shell are also deficient in regards to passive acoustic monitoring. EarthJustice states that Shell apparently will deploy ''acoustic net arrays'' in the Beaufort and Chukchi Seas to monitor whale calls, ambient noise, and seismic sounds. While the data gathered may be useful, it is not properly termed a mitigation as there is no apparent plan to use the gathered information in real-time to monitor the presence of whales in or near the safety

zone. Additionally, the acoustic net array was apparently used by Shell in 2006 and 2007, yet none of the data presumably acquired from its use is mentioned by either Shell or NMFS in any of the documents associated with the current IHA. To merely collect monitoring data but not incorporate it into management decisions renders such decision-making arbitrary.

Response: Both SOI's IHA application and NMFS' proposed IHA notice describe the Beaufort and Chukchi Seas passive acoustic monitoring (PAM) programs as part of the long-term industry monitoring program. As EarthJustice notes this PAM program is not a mitigation measure. The purpose of the monitoring program is described later in this document. The data collected from the net arrays in the Chukchi and Beaufort Sea will require several years of data collection to determine meaningful trends in potential bowhead whale displacement as a result of industrial sounds in these areas. At this time, NMFS does not believe this PAM system can be modified to provide real-time data and is not practicable nor necessary to employ similar near-real-time systems as marine mammal vocalizations do not provide information on the number of marine mammals in the area, but simply provide a cue to MMOs to marine mammal presence.

Comment 55: EarthJustice recommends that NMFS require Shell to collect fecal samples to monitor stress and reproductive status to individual animals exposed to seismic surveys. This information can be used to determine whether stress from exposure to seismic surveys may lead to reproductive failure.

Response: NMFS concurs that conducting research to monitor stress and reproduction in marine mammals can be a valuable tool for conservation, as indicated by similar studies on North Atlantic right whales. However, this type of research requires a Scientific Research Permit to be issued by NMFS under section 104 of the MMPA, unless the scat collection did not involve a close approach to a marine mammal. Currently, the NSB Department of Wildlife is collecting feces from harvested whales. Intended analyses include looking at stress and reproductive hormones. The NSB Wildlife Department does not have a permit to collect feces from live bowheads, although they do have a permit for biopsy sampling and satellite tagging. As the NSB Wildlife Department has archived fecal samples from harvested bowheads going back several years, there may be some merit to examining hormone levels in feces relative to the amount of industrial activity in the Beaufort Sea (although stress hormones cannot be analyzed from old material). NMFS believes this research should be discussed further at the 2009 Open Water Meeting.

Reporting Concerns

Comment 56: The Commission requests that NMFS provide information on whether and, if so, how many times activities were shut-down during the 2006 and 2007 operations within the 180–dB, 160–dB, and 120–dB safety and disturbance zones due to the presence of cetaceans.

Response: For information regarding times for shutdowns by SOI in 2006 and 2007, for ConocoPhillips in 2006 and for GX Technology in 2006, NMFS recommends the Commission review the Comprehensive Report for the 2006 seismic survey program and the 90–day report for SOI's 2007 seismic season which are available on line (see **ADDRESSES**).

Comment 57: The NSB notes that in 2006, Shell and other oil and gas companies suggested that data collected in 2006 would be available to modify and improve future monitoring and mitigation efforts. These data were not analyzed fully and available until the end of 2007. Thus, these data were not available to adjust the monitoring program for 2007. Results from 2008 must be available with sufficient time to review and revise results for the 2009 season. For this to occur, industry must have their draft reports completed by late March 2009. NMFS should set such a deadline for reporting. This report should include an assessment of cumulative effects from the multiple oil and gas operations and other human activities occurring in the Chukchi and Beaufort Seas.

Response: Under NMFS regulations, previous IHAs, and the IHA issued to SOI on August 19, 2008, SOI is required to submit a report on seismic activities and a preliminary assessment on the impacts the activity may have had on marine mammals within 90 days of completion of the activity. SOI's 2007 draft 90–day report was provided to the NSB and others in late February, 2008. Moreover, the IHA also requires SOI to schedule a post-season review of their activities with Native communities no later than 90 days following the completion of geophysical activities in the Chukchi Sea. The intent of these meetings is to share preliminary results of geophysical activities, any potential impacts they may have had on marine mammals and to discuss any concerns residents may have concerning the fall 2008 Chukchi Sea operations.

It is not realistic to believe, however, that a cumulative impact assessment would be available within 90 days of completion of SOI's activity and contained in the 90–day report. SOI's 2008 IHA (similar to the 2007 IHA) requires the final comprehensive report to be submitted to NMFS within 240 days of issuance of the IHA. This document is usually available prior to the spring open-water meeting. In conclusion, NMFS notes that, while the 2006 data was not totally available (one analysis was missing) to adjust the monitoring program for 2007, it and the 2007 Comprehensive Report were available were available prior to the April, 2008 Open Water Meeting and its review of SOI's 2007 mitigation and monitoring program and SOI's 2008 program.

Comment 58: The NSB notes that in 2008, Shell commits to reporting measurements of the airgun array sounds ''as soon as possible'' after recovery of the equipment. In 2007, Shell committed to report this information within 72 hours after recovery. The NSB strongly recommends NMFS require the 72–hour turnaround time.

Response: The 2007 and 2008 IHAs issued to SOI require SOI to submit to NMFS the sound source verification (SSV) test results, including the distances to the various radii within 5 days of completing the measurements. NMFS believes that this requirement is consistent with the CAA, which requires an SSV test to be conducted within 72 hours of initiating or having initiated operations in the Beaufort or Chukchi Seas. The IHA, therefore, provides SOI with only two days after completing the SSV to complete the analyses and submit the report to NMFS. NMFS does not believe this additional time for submitting the SSV results in adverse impacts on marine mammals as SOI will have already established preliminary marine mammal safety zones for the protection of marine mammals.

Research Concerns

Comment 59: The NSB states that NMFS must require SOI to conduct studies on the impacts of seismic to important fish and invertebrate species.

Response: In this **Federal Register** document, NMFS has determined that impacts to food sources for marine mammals are unlikely to result in more than a negligible impact on marine mammals. As a result, NMFS recommends that this research be added to the agenda at the 2009 Open Water

Meeting where this research can be discussed and prioritized in relation to the proposed monitoring being conducted on impacts on marine mammals, principally bowhead and beluga whales.

Comment 60: The NSB states that Shell should be required by NMFS to collect data on spotted seals using surveys that are specifically designed for spotted seals.

Response: Similar to the previous response, NMFS recommends that additional marine mammal assessment studies be on the agenda at the 2009 Open Water Meeting where marine mammal assessments and monitoring impacts on marine mammals from industry activities can be discussed and prioritized in relation to the monitoring program proposed by SOI and other industry participants.

National Environmental Policy Act Concerns

Comment 61: Oceana states that SOI's proposal, while very large in scope, is only one of numerous oil and gas activities proposed or ongoing in the Arctic, and it is well documented that these activities may have substantial negative effects on marine mammals and other Arctic species. Nonetheless, there has never been a comprehensive evaluation of the cumulative effects of seismic activities in the Arctic. Particularly in light of the dramatic effects of climate change in the Arctic, NMFS must not approve further seismic activities without such an evaluation.

Response: NMFS believes that proactive efforts to conserve and protect marine mammals and other Arctic species, such as NMFS' initiation of status reviews of ice seals and the recent FWS' ESA listing of polar bears, combined with prudent natural resources management and regulations on industrial activities by Federal Agencies would reduce these adverse impacts to biologically non-significant or negligible levels. In addition, monitoring and mitigation measures required for industrial activities that have a potential to take marine mammals further reduce and minimize negative effects to marine mammal species and stocks. Long term research and monitoring results on ice seals in the Alaska's North Slope have shown that effects of oil and gas development on local distribution of seals and seal lairs are no more than slight, and are small relative to the effects of natural environmental factors (Moulton *et al.*, 2005; Williams *et al.*, 2006).

NMFS does not agree with Oceana's statement that there has never been a comprehensive evaluation of the cumulative effects of seismic activities in the Arctic. The MMS 2006 PEA, the NMFS 2007 SEA, the NMFS/MMS 2007 draft PEIS, and the NMFS 2008 SEA for the proposed issuance of five seismic survey and shallow hazard and site clearance survey activities for the 2008 open water season all provide comprehensive evaluation of the cumulative effects of seismic activities in the Arctic. For additional information, please see responses to comments on this subject previously in this document.

Comment 62: EarthJustice states that NMFS indicates that it will rely on a supplemental EA (SEA) to satisfy its obligations under NEPA. The SEA has not yet been made available to the public. NMFS has repeatedly denied requests for a copy of the SEA, stating that the document is not yet complete and promising to post it to the public on its incidental take webpage when it is complete. The document is not presently posted on that webpage. Prior to issuing any IHAs, however, NMFS must make its SEA available for public review and comment. We hereby renew our request for the SEA and an opportunity to comment on it.

Response: NMFS prepared and released to the public its Supplemental EA to the 2006 MMS PEA on this activity in early August, 2008. NMFS has fulfilled its obligations under NEPA by completing an SEA that describes proposed action of issuing IHAs to the seismic industry to conduct offshore seismic and shallow hazard surveys in the Beaufort and Chukchi Seas in 2008, the alternatives to that action, the potential impacts on the human environment (including cumulative impacts) by issuance of these IHAs and an analysis of the mitigation measures to reduce impacts on marine mammals and subsistence hunters to the greatest level practicable. Contrary to the statement by EarthJustice, Federal agencies are not required in every circumstance to make a draft Environmental Assessment available for public review and comment. NMFS provided the public with environmental information related to SOI's request for an IHA during the 30–day comment period on the proposed notice of issuance of SOI's IHA. Once the Supplemental EA was finalized, the document was posted on NMFS' website for public review. The 2008 SEA is available for downloading on its web-page (see **ADDRESSES**).

Comment 63: EarthJustice states that NMFS has initiated the process of preparing an EIS analyzing the seismic surveying in the Arctic Ocean, and has produced a draft programmatic environmental impact statement. NMFS must complete a final EIS to evaluate Shell's surveys, together with the other seismic and shallow hazard surveying activity proposed for the summer of 2008 in the Beaufort and Chukchi Seas, before permitting such activities to go forward. It cannot continue to rely on and ''update'' the 2006 PEA with subsequent EAs in light of these potentially significant impacts. EarthJustice identifies in its comments (addressed elsewhere) the flaws with the analysis provided in the 2006 PEA that make it inappropriate for NMFS to continue to rely on that obsolete document and the comments submitted on the PEA that further recount the inadequacies of the PEA.

Response: In 2008, NMFS prepared a Final SEA to analyze further the effects of SOI's (and other companies) proposed 3D deep and open-water shallow hazard and site clearance survey activities for the 2008 season. NMFS has incorporated by reference the analyses contained in MMS 2006 Final PEA for Arctic OCS Seismic Surveys in the Beaufort and Chukchi Seas and has also relied in part on analyses contained in the MMS 2007 Final EIS for the Chukchi Sea Lease Sale 193, the MMS 2003 Final EIS for multiple lease sales, and the NMFS/MMS 2007 DPEIS.

The MMS' 2006 Final PEA analyzed a broad scope of proposed seismic activities in the Arctic Ocean. In fact, the PEA assessed the effects of multiple, ongoing seismic surveys (up to 8 surveys) in the Beaufort and Chukchi Seas for the Arctic open water season. Although SOI's proposed activity for this season was not explicitly identified in the 2006 PEA, the PEA did contemplate that future seismic activity, such as those by SOI and other companies could occur. NMFS believes the range of alternatives and environmental effects considered in the MMS 2006 PEA, combined with NMFS' SEA for the 2008 season are sufficient to meet the agency's NEPA responsibilities. In addition, the 2008 SEA includes new information obtained since the 2006 Final PEA was issued, including updated information on cumulative impacts. NMFS also includes a new section in the 2008 SEA, which describes in summary, the results of the 2006 and 2007 monitoring reports. As a result of our review and analysis, NMFS has determined that it was not necessary to prepare an EIS for the issuance of an IHA to SOI in 2008 for 3D deep seismic and shallow hazard survey activities in the Beaufort and Chukchi Seas, but that preparation of an SEA and issuance of a Finding of No

Significant Impact (FONSI) were sufficient under NEPA.

Comment 64: EarthJustice states that the analysis in the PEA understates the risk of significant impacts to bowhead whales and all marine mammals. It assumes that source vessels-both 3–D seismic and shallow hazard vessels-will ensonify much smaller zones than those which have been subsequently measured in the field. In practice, seismic airgun noise has propagated far greater distances than NMFS anticipated in the PEA, and thus th authorized activity presumably has displaced marine mammals from far more habitat, including important feeding and resting habitats, than NMFS's analysis in the PEA anticipated. Based on the propagation actually measured in 2006 and 2007, the impacts of a single 3–D seismic survey are two to three times as large as NMFS anticipated, or more. The impacts of a single shallow hazard survey or ice gouge survey are comparable to the impacts NMFS anticipated from a single 2D or 3D seismic survey. Before authorizing further seismic surveying activity or shallow hazard surveys in the Arctic Ocean, NMFS must complete the programmatic EIS that it began in 2006 to evaluate the potentially significant impacts of such activities.

Response: NMFS believes that a SEA is the appropriate NEPA analysis for this season as the amount of activity for 2008 is less than what was analyzed in the 2006 PEA. As noted in the 2006 PEA, 20 km (12.4 mi) was used for illustrative purposes in an exercise to estimate impact of 4 seismic vessels operating within 24 km (15 mi) of each other. To do so, MMS created a box (that was moveable along the Beaufort or Chukchi Sea coast) to make these estimates. NMFS believes that the use of 20 km (12.4 mi) remains the best information available at this time and was the radius agreed to by participants at the 2001 Arctic Open-water Noise Peer Review Workshop in Seattle, Washington. This estimate is based on the results from the 1998 aerial survey (as supplemented by data from earlier years) as reported in Miller *et al.* (1999). In 1998, 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 microPa rms, depending upon propagation. Although EarthJustice states that propagation actually measured in 2006 and 2007 showed that the impacts of a single 3D seismic survey are two to three times as large as NMFS anticipated, EarthJustice has failed to provide any data to support this statement. In fact, the marine mammal monitoring reports on the 2006 and 2007 open water seismic surveys clearly showed that at 20 km (12.4 mi) the received levels from large airgun arrays used in 3D seismic surveys fall between 140 and 160 dB re 1 microPa (Ireland *et al.*, 2007a; 2007b; Patterson *et al.*, 2007; Funk *et al.*, 2007; 2008), which is below NMFS' current noise exposure standard for Level B behavioral harassment. For this reason, until more data collection and analyses are conducted on impacts of anthropogenic noise (principally from seismic) on marine mammals in the Beaufort and Chukchi Seas, NMFS will continue to use 20 km (12.4 mi) as the radius for estimating impacts on bowhead whales during the fall migration period.

Comment 65: EarthJustice states that the 2006 PEA fails to provide site-specific analysis. In 2006, in order to reduce the likelihood of significant impacts in the face of a lack of site-specific analysis, NMFS imposed 160–dB and 120–dB safety zones when authorizing surveys pursuant to the 2006 PEA. At a minimum, it must do the same for SOI's seismic surveys here.

Response: NMFS does not agree with EarthJustice's comment. Although the MMS 2006 PEA did not explicitly provide site- specific analysis on the proposed SOI 3D deep seismic and shallow hazard and site clearance surveys, the NMFS SEA prepared for the 2008 open-water season described its specific location and time of all offshore seismic operations. As in MMS' 2006 PEA, NMFS' 2008 SEA has described additional mitigation measures such as imposing the 160–dB safety zone for seismic activities in the Beaufort and Chukchi Seas when an aggregation of 12 or more bowhead or gray whales is sighted and a 120–dB safety zone in the Beaufort Sea when 4 of more cow/calf pairs are sighted by aerial surveys. This mitigation measure is required in the IHA issued to SOI. Regarding imposing the 120–dB safety zone in the Chukchi Sea, NMFS has determined that it would pose safety and practical concerns for marine mammal monitoring. Therefore, a safety zone based on received level of 120 dB re 1 microPa will not imposed in the Chukchi Sea as it has been determined to be impracticable under the MMPA.

Comment 66: EarthJustice states that the scope of the PEA is explicitly limited to activities that occurred during 2006. Those seismic survey activities have already occurred, as well as an additional season worth of activities in 2007. The PEA does not evaluate activities that will occur over a period of several years, though NMFS has continued to rely on it as if its scope were for a multi-year program of seismic surveys. In addition, the PEA uses arbitrary significance criteria for non-endangered marine mammals that would allow long-lasting impacts to populations, or in fact the entire Arctic ecosystem, that would nonetheless be deemed insignificant.

Response: NMFS does not agree with the statement. In addition, EarthJustice has failed to provide any support for their statements. The MMS 2006 PEA, which NMFS was a cooperating agency, provided a thorough description and analysis on the affected environment, including ESA-listed and non-ESA-listed species. Under the NEPA, there is no ''significance criteria for non-endangered'' species. The criteria for determining whether a proposed action would result in significant effects to the environment are contained in CEQ's regulations. EarthJustice's statement that such analysis ''would allow long-lasting impacts to populations, or in fact the entire Arctic ecosystem, that would nonetheless be deemed insignificant'' we would argue supports our adoption of MMS' 2006 Final PEA. In addition, NMFS has prepared and released to the public an SEA for the proposed 2008 Arctic seismic surveys in the Chukchi and Beaufort Seas (see **ADDRESSES** for availability). This SEA incorporates by reference the relevant information contained in the 2006 PEA and updates that information where necessary to assess impacts on the marine environment from the 2008 seismic survey activities. Further, the SEA and FONSI considered the CEQ significance criteria (including the criteria developed by NMFS) to determine whether take of marine mammals incidental to SOI's seismic and shallow hazard surveys would result in significant impacts to the human environment. NMFS believes that the agency has complied with the requirements of NEPA in its preparation of its NEPA documents.

Comment 67: EarthJustice suggests that, as it has done with the bowhead whale in recent NEPA analyses of seismic surveys, in order to ensure that it takes a hard look at the potential significance of impacts to all marine mammals, NMFS should use PBR (potential biological removal) as the metric to measure significance for other species that will be affected. Thus, for humpback whales from the western North Pacific stock that may be affected by seismic and shallow-hazard or site-clearance surveys in the Chukchi and Beaufort Seas, an impact that affects the reproduction or survival of one humpback whale annually should be deemed a significant impact. The

scientifically indefensible significance criteria used in the PEA for all species other than bowhead whales are inappropriate for an evaluation of impacts from seismic surveys, as indicated by MMS's use of more defensible significance criteria based on potential biological removal for marine mammal populations affected by seismic surveys in the Gulf of Mexico.

Response: MMS used the PBR concept in its 2004 PEA on ''*Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf*'' to determine whether its action of issuing Geological and Geophysical permits was significant under NEPA. For all affected marine mammal species, MMS found that exposure to seismic operations in the Gulf of Mexico was not expected to result in any mortality or serious injury, thereby it would not result in exceeding the PBRs for affected marine mammal species. This was interpreted by MMS to mean that while the activity could be potentially adverse, it would not have a significant impact. As a result, MMS determined that it did not need to prepare an EIS. This use of PBR did not extend to an analysis the relationship between Level B behavioral harassment and PBR. It should be recognized that MMS and NMFS are preparing a Draft EIS on the Gulf of Mexico seismic survey industry (see 69 FR 67535, November 18, 2004). That Draft PEIS is expected to be released for public review in early in 2009. Also, it should be understood that PBR is used by NMFS to estimate the number of marine mammals (by species or stock) that can be *removed by serious injury* (any injury that can result in mortality (50 CFR 216.3)) *or mortality* by commercial fisheries, subsistence hunting, or other activities. Use of the PBR concept in the 2006 MMS Final PEA on Arctic Seismic, was conducted for purposes of making a determination of significance under NEPA, not for potential removals from the population. As serious injury and mortality are neither expected nor authorized for SOI's seismic surveys, the use of PBR is not warranted for determining take quotas for marine mammals.

Comment 68: Commenters state that NMFS appears to rely on the NEPA analysis in the draft PEIS in clear violation of NEPA law. NEPA requires agencies to prepare a draft EIS, consider public and other agency comments, respond to these comments in its final EIS, and wait 60 days before issuing a final decision. Before the record of decision has been issued on the final PEIS, NMFS cannot take any action on the proposed seismic surveys that would allow activities that adversely effect the environment. Here, the very purpose of the PEIS process is to consider open water seismic surveys in the Chukchi and Beaufort Seas for the years 2007 and beyond. NMFS cannot authorize such activities before the NEPA process is complete. NMFS may not avoid this requirement by completing only a supplemental EA this season. This is because the seismic activity has the potential to significantly impact marine resources and subsistence hunting, and therefore an EIS is required.

Response: See previous responses on this concern. Contrary to the statement, NMFS relied on information contained in the MMS 2006 Final PEA, as updated by NMFS' 2008 SEA for making its determinations under NEPA and that the 2007 Draft PEIS was not the underlying document to support NMFS' issuance of SOI's IHA. NMFS merely relied upon specific pieces of information and analyses contained in the Draft PEIS to assist in preparing the SEA. It is NMFS' intention that the Final PEIS currently being developed will be used to support, in whole, or in part, future MMPA actions relating to oil and gas exploration in the Arctic Ocean. Additionally, NMFS believes that a SEA is the appropriate NEPA analysis for this season as the amount of activity for 2008 is less than what was analyzed in the 2006 PEA.

Comment 69: The NSB states that neither the 2006 PEA nor the Draft PEIS satisfy NMFS' NEPA obligation. First, the PEA explicitly limited its scope to the 2006 season. Additional seismic work cannot be authorized without further NEPA analysis of the cumulative impacts of increasing activity offshore in the Arctic Ocean. In addition, the proposed surveys threaten potentially significant impacts to the environment, and must be considered in a full EIS.

Response: See responses to previous concerns regarding NMFS' implementation of NEPA.

Endangered Species Act Concerns

Comment 70: EarthJustice and NSB state that the proposed IHA will affect, at a minimum, one endangered species, the bowhead whale. It will likely also affect endangered humpback and fin whales. As a consequence, NMFS must engage in consultation under Section 7 of the ESA prior to issuing the IHA. Previous recent biological opinions for industrial activities in the Arctic (e.g., Northstar) have suffered from inadequate descriptions of the species, inadequate descriptions of the environmental baseline, inadequate descriptions of the effects of the action, inadequate analysis of cumulative effects, and inadequate descriptions and analysis of proposed mitigation. NMFS has also failed to evaluate the effects of such activities on humpback and fin whales. EarthJustice expects NMFS will perform the full analysis required by law and avoids these problems in its consultation for the proposed IHA. Also, EarthJustice notes that the law is clear (citing *Connor* v. *Burford*, 848 F.2d 1441, 1453 (9th Cir. 1988) that the ESA requires the Biological Opinion (BiOp) to analyze the effect of the entire agency action. Given that SOI plans to conduct exploration drilling in the Beaufort Sea, any consultation on the IHA must cover these activities as well.

Response: Under section 7 of the ESA, NMFS has completed consultation with the MMS on ''*Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the Marine Mammal Protection Act.*'' In a BiOp issued on July 17, 2008, NMFS concluded that the issuance of seismic survey permits by MMS and the small take authorization under the MMPA for seismic surveys are not likely to jeopardize the continued existence of the endangered fin, humpback, or bowhead whale. As no critical habitat has been designated for these species, none will be affected. The 2008 BiOp takes into consideration all oil and gas related activities that are reasonably likely to occur, including exploratory oil drilling activities. This BiOp does not include impacts from production activities, which are subject to a separate consultation.

In addition, NMFS has issued an Incidental Take Statement under this BiOp for SOI's seismic survey activities which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of bowhead whales.

Comment 71: EarthJustice states NMFS may authorize incidental take of bowhead whales under the ESA pursuant to Section 7(b)(4) of the ESA, but only where such take occurs while ''carrying out an otherwise lawful activity.'' To be ''lawful,'' such activities must ''me*et al.* State and Federal legal requirements except for the prohibition against taking in section 9 of the ESA.'' As noted in its comment letter, EarthJustice believes that SOI's proposed activities violate the MMPA and NEPA and therefore are ''not otherwise lawful.'' Any take authorization for listed marine mammals would, therefore, violate the ESA, as well as these other statutes.

Response: As noted in this **Federal Register** document, NMFS has made the

necessary determinations under the MMPA, the ESA, and NEPA regarding the incidental harassment of marine mammals by SOI while it is conducting activities permitted legally under MMS' jurisdiction.

Other Concerns

Comment 72: EarthJustice, in a footnote requested that NMFS include in its administrative record for this permit, all material presented at the 2008 open water meeting, including power point presentations.

Response: The administrative record for this IHA contains the draft report of the meeting, in addition to those documents that were provided to attendees at the meeting, principally the draft 2007 Comprehensive JMP Report. Power point presentations remain the property of the presenters and were not provided to either NMFS, MMS or attendees. As a result, NMFS does not have copies of the presentations as part of its Administrative Record.

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 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 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). Presently, it is not 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, however, 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). While Miller *et al.* (1999) surmise that deflection may have begun about 35 km to the east of the seismic operations, they 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 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.

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 microPa 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 PTS in pinnipeds.

A marine mammal within a radius of ≤100 m (≤328 ft) around a typical large array of operating airguns may be exposed to a few seismic pulses at received levels of ≥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 mammal, 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 is 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), 71 FR 49418 (August 23, 2006), 73 FR 46774 (August 11, 2008), and 73 FR 49421 (August 21, 2008). 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 preliminary 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.

Migration and Feeding

During the period of seismic acquisition in the Chukchi and Beaufort seas, most marine mammals are expected to be widely 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 or another company 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 2008 fall bowhead whale migratory period were addressed through discussions with the whaling communities (and will continue through the late fall and winter, 2008/2009 in preparation for the 2009 season). Starting around 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, SOI believes that it has significantly reduced its period of seismic operations in the Beaufort Sea in 2008 by remaining in the Chukchi Sea until early-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 (SOI ended its seismic collection program in the Beaufort Sea on October 10, 2008).

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 seismic survey program, NMFS has previously provided a summary of potential impacts on the bowhead, gray, and beluga whales and the ringed, spotted, 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 during the 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 microPa (rms). NMFS clarifies here that, except possibly for bowhead whales, the number of potential exposures calculated by SOI does not necessarily mean that this is the actual number of Level B harassments that would occur. 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 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^3 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 ≤ 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 for non-migratory marine mammals, 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 (in2) sub-array is detailed below and is comprised of three subarrays comprising a total 3,147 in^3 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 a ''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 ≤160 dB re 1 microPa (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 ≤160 dB re 1 microPa (rms). Thus, these calculations actually estimate the number of individuals potentially exposed to ≤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 x 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 in 2007 at 1370 m (4495 ft) in the Chukchi Sea and Beaufort seas. For shallow hazards surveys to be performed by the *M/V 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 km² and approximately 10,100 km² 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 (all tables are found in SOI's 2008 IHA application). Table 1 in this document (Table 6–9 in the IHA application) summarizes these exposure estimates based on the 160–dB re 1 microPa (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 ≥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 ≥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 areas, 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 ≥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.

TABLE 1. SUMMARY OF THE NUMBER OF POTENTIAL EXPOSURES OF MARINE MAMMALS TO RECEIVED SOUND LEVELS IN THE WATER OF ?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 ≥160dB					
	Chukchi Sea		Beaufort Sea		Total	
	Avg.	Max.	Avg.	Max.	Avg.	Max.
Odontocetes						
Monodontidae						
Beluga	63	254	234	938	298	1192
Narwhal	0	0	0	0	0	0
Delphinidae						
Killer whale	2	6	0	0	2	6
Phocoenidae						
Harbor porpoise	57	227	2	6	58	234
Mysticetes						
Bowhead Whale [a]	9	46	1531	1536	1540	1582
Fin whale	2	6	0	0	2	6
Gray whale	182	727	2	6	183	734
Humpback whale	2	6	0	0	2	6
Minke whale	2	6	0	0	2	6
Total Cetaceans	70	281	1533	1543	1603	1824
Pinnipeds						
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
Total Pinnipeds	5678	8836	6687	26750	12366	35586

[a] See text for description of bowhead whale estimate for the Beaufort Sea

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 conducted 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 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 ≥160 dB re 1 microPa (rms) during SOI's seismic survey. The average estimate is that 13,256 ringed seals might be exposed to seismic sounds with received levels ≥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 ribbon seal is unlikely to be encountered during SOI's seismic surveys since their presence is considered rare within the proposed SOI's survey areas.

Potential Marine Mammal Disturbance At Less Than 160 dB Received Levels

As mentioned previously, 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 ≥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 microPa rms, depending upon propagation. Corresponding levels at 30 km (18.6 mi) were about 107–126 dB re 1 μParms. 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 μPa). 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, SOI did 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 proportion of the bowhead population was able to 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 continues at least until hunting quotas have been filled by the coastal communities.

Potential Impact on Habitat

SOI states that the 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 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 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 will be mitigated by application of the procedures established in the CAA signed by SOI and the AEWC and the Whaling Captains' Associations of Kaktovik, Nuiqsut, Barrow, Pt. Hope and Wainwright. The CAA resulted in a curtailment of the times and locations of seismic and other noise producing sources 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 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 did 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 have been timed and located so as to avoid any possible conflict with the Village of Barrow's fall whaling, and specific provisions governing the timing and location have been incorporated into the previously mentioned CAA

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 established ''communication stations'' in the villages to monitor impacts. Gray whales, which will be relatively abundant in the northern Chukchi Sea from spring through autumn are not taken by subsistence hunters.

POC and CAA

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 carried this multi-year POC forward to address its proposed 2008 activities. 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.

In regard to the CAA, the AEWC submitted a draft CAA to the industry earlier this spring and was signed by SOI on July 28, 2008. The 2008 CAA incorporated all appropriate measures and procedures regarding the timing and areas of the SOI'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 SOI'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. In addition, NMFS has included in SOI's IHA, those mitigation and monitoring measures contained in the CAA that it believes would ensure that SOI's activities will not have an unmitigable impact on subsistence uses of marine mammals.

Mitigation and Monitoring

As part of its application, SOI has implemented a marine mammal mitigation and monitoring program (4MP) that will consist of monitoring and mitigation during SOI's seismic and shallow-hazard survey activities. 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 and shallow hazards equipment in the U.S. Beaufort and Chukchi Seas. For SOI's 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.

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 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 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 microPa (rms) for cetaceans and greater than or equal to 190 dB re 1 microPa (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 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.

In addition, monitoring similar to that conducted in the Chukchi Sea in 2007 is required under SOI's 2008/2009 IHA in the Chukchi and the Beaufort Seas. SOI is required to use 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 is also required to monitor the 160–dB (rms) marine mammal disturbance zone with MMOs onboard the chase vessels 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 September 25. As SOI did not conduct seismic surveys in the Chukchi Sea between September 25th and the time ice prevented additional work in the Beaufort Sea (around October 10th), NMFS determined that SOI will not need to monitor the 120–dB (rms) zone in the Chukchi Sea in 2008 as the bowhead whale cow/calf migration period will have been substantially completed by that time. However, even if SOI had intended to operate during the timeframe immediately after September 25th, monitoring to the 120 dB for cow/calf pairs would not be required because NMFS has also determined aerial monitoring to the 120–dB isopleth in the Chukchi Sea was impracticable due to safety concerns.

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 was authorized under the IHA to initially utilize the derived (measured) sound criterion distances from 2006. In addition, 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 were analyzed and incorporated within the time period specified in the IHA and CAA. The mitigation measures implemented in 2008/2009 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 time for them to leave the area and thus avoid any potential injury or impairment of their hearing abilities. During the 2008/2009 seismic program, SOI is required to 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. Also, the minimum shut-down period, (i.e., without air guns firing), which must be followed by a ramp-up is the amount of time it would take the source vessel to cover the 180–dB safety radius.

A full ramp-up, after a shut-down, cannot 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 may 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 shut-down 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 and required to be used. 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.

Determination on Mitigation

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 achieve the least practicable impact on marine mammal species or stocks result.

Marine Mammal Monitoring

SOI will 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

SOI is required to deploy and utilize a specified number of MMOs on each of the seismic source vessels 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 is required to have 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 IHA; 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 and 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 sited. 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 is required 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 and 2008 was determined by JASCO (2007, 2008)) to extend broadside of the vessel to ~8.1 km (5.0 mi) and 12.3 km (7.6 mi) from the airgun source on the *M/V Gilavar* in 2007 and 2008, respectively. In the Beaufort Sea, the 160–dB radius was measured at 13.45 km (8.4 mi)in 2007 and 9.0 km (5.6 mi) in 2008 (JASCO, 2007, 2008). 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, the *M/V Gulf Provider* will travel ~8 km (5 mi) ahead and to the side of the *M/V Gilavar* as it monitors the 260–dB zone. 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 Gilivar 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., 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.

The measured distance to the 180–dB isopleth ranges 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. For 2008, 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.

Aerial Survey Program

SOI conducted 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 are to: (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 is required to be implemented during the summer (August) and fall (late August-October) period, but during the summer, the survey grid was 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 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 smaller 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 will be conducted 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 1980s (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 was flown in the summer was essentially the same grid flown later in the year, but it was flown twice a week instead of daily. If cetaceans are encountered in the vicinity of planned seismic operations, then SOI will fly the survey grid proposed for later in the season, rather than the early-season survey plan. Surveys were conducted 2 days/week until the period one week prior to the start of seismic operations in the Beaufort Sea (early September). Approximately one week prior to the start of seismic operations, daily surveys were begun using the grid shown in Figure 3 in Appendix B of SOI's IHA application. Exact dates for activities will be provided in SOI's 90–day report, due later this year.

Survey Design in the Beaufort Sea in Fall

Aerial surveys flown during the late August-October period were designed to provide mitigation monitoring as required under by the IHA. For example, mitigation monitoring is required under SOI's IHA to ensure that 4 or more mother-calf bowhead pairs do not approach to within the 120 dB re 1 microPa (rms) radius from the active seismic operation. However, priority is given to mitigation monitoring to the east of the seismic operation (see Appendix B, Figure 2 in SOI's 2008 IHA application). 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 are necessary to 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 complements the simultaneous MMS/NMFS National Marine Mammal Laboratory Bowhead Whales Aerial Survey Program (BWASP) survey coverage of the broader Beaufort Sea area.

The 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 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 μPa.

If, due to ice or other operational restrictions, SOI may modify the aerial survey grid in order to maintain aerial observations to 100 km (62 mi) east (or west) of the seismic survey area. This is necessary because the total km/mi of aerial survey that can be conducted each day is 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 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 did not fly a smaller ''intensive'' survey grid in 2008 (and the current IHA will expire prior to this activity in 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 would 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 means 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.

Aerial survey coverage of the area of most recent seismic operations continued for several days after seismic surveys by the M/V Gillavar ended on October 10, 2008. This survey provided ''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 are completed.

The survey grid patterns for summer and fall time periods are described in detail 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 will 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 one of the most numerous cetacean species encountered during the summer seismic activities, although beluga whales and harbor porpoise may 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.

Aerial surveys of coastal areas to approximately 20 mi (37 km) offshore between Point Hope and Point Barrow began 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 NMFS' National Marine Mammal Laboratory 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 2008 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 deployed again in 2008. 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.

A second deployment occurred in late August at the same time that all currently deployed systems will be recovered for battery replacement and data extraction. The second deployment emphasized 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 (207mi; 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 b 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 were scheduled to 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 also continued a program to deploy 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 issue has been aerial surveys. Acoustic localization methods provide a supplementary method 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 contracted with JASCO 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, the IHA issued to SOI requires SOI to undertake additional mitigation/monitoring measures (such as expanded monitoring-safety zones for bowhead and gray whales, and having those zones monitored effectively) to ensure that impacts on marine mammals are at the lowest level practicable. The additional mitigation measures are specific to 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

SOI will 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 recommends that each team 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 in the IHAs. SOI's 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 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 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.

ESA

Under section 7 of the ESA, NMFS has completed consultation with the MMS on ''Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the

Marine Mammal Protection Act.'' In a Biological Opinion (BiOp) issued on July 17, 2008, NMFS concluded that the issuance of seismic survey permits by MMS and the authorization of small takes under the MMPA for seismic surveys are not likely to jeopardize the continued existence of the endangered fin, humpback, or bowhead whale. As no critical habitat has been designated for these species; none will be affected. The 2008 BiOp takes into consideration all oil and gas related activities that are reasonably likely to occur, including exploratory (but not production) oil drilling activities. A copy of the BiOp is available at: *http://www.mms.gov/alaska/ref/BiOpinions*.

In addition, NMFS has issued an Incidental Take Statement under this BiOp which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of bowhead whales.

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 (Draft 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. Because NMFS has been unable to complete the Final PEIS, it was determined that the 2006 PEA would need to be updated in order to meet NMFS' NEPA requirement. This approach was warranted as it was reviewing five proposed Arctic seismic survey IHAs for 2008, well within the scope of the PEA's eight consecutive seismic surveys. To update the 2006 Final PEA, NMFS has prepared an SEA which incorporates by reference the 2006 Final PEA and other related documents.

In conclusion, the NMFS Office of Protected Resources has determined that the MMS 2006 Final PEA (which NMFS adopted) and the NMFS 2008 Supplemental EA for 2008 accurately and completely describe the NMFS selected action alternative, reasonable additional alternatives, and the potential impacts on marine mammals, endangered species, other marine life and native subsistence lifestyles that could be impacted by the selected alternative and the other alternatives. As a result of our review and analysis, we have determined that it is not necessary to prepare and issue an environmental impact statement for the issuance of an IHA to Shell for seismic activities in the Chukchi and Beaufort seas in 2008/2009.

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 other reports, NMFS' 2008 Final Supplemental EA, and other relevant documents, NMFS has 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 determined that no take by serious injury or death is authorized or anticipated by 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.

As described earlier, NMFS has also determined that only small numbers of marine mammals, relative to their population or stock size, will be harassed by SOI's 2008 seismic and shallow hazard programs.

Therefore, NMFS has 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 determined that the 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 determination is supported by the information in this **Federal Register** Notice, including: (1) Seismic activities in the Chukchi Sea would 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 is governed by a CAA between SOI and the AEWC and village whaling captains and by mitigation measures to protect subsistence hunting of marine mammals contained in the IHA; (3) the CAA and 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 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.

Authorization

As a result of these determinations, NMFS has issued an IHA to SOI to take small numbers of marine mammals, by harassment, incidental to conducting a seismic survey in the northern Chukchi Sea and central and eastern Beaufort Sea in 2008/2009, provided the mitigation, monitoring, and reporting requirements described in this document are undertaken.

Dated: October 28, 2008.

James H. Lecky,

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

[FR Doc. E8–26269 Filed 11–5–08; 8:45 am]

BILLING CODE 3510–22–S