

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

RIN 0648-XJ55

**Incidental Takes of Marine Mammals During Specified Activities; Shallow Hazard and Site Clearance Surveys in the Chukchi Sea in 2008****ACTION:** Notice of issuance of a marine mammal incidental take authorization.

**SUMMARY:** In accordance with provisions of the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that an Incidental Harassment Authorization (IHA) to take marine mammals, by Level-B harassment, incidental to conducting open water shallow hazard and site clearance surveys by ASRC Energy Service (AES) in the Chukchi Sea, has been issued for a period of one year from the IHA effective date.

**DATES:** The authorization is effective from July 30, 2008, until September 25, 2008.

**ADDRESSES:** Copy of the application, IHA, the *Final Programmatic Environmental Assessment for Arctic Ocean Outer Continental Shelf Seismic Surveys - 2006* (2006 PEA) prepared by the Minerals Management Service (MMS), the 2008 Supplemental Environmental Assessment (SEA) for the Issuance of five IHAs for open water seismic surveys and shallow hazard and site clearance surveys in the Arctic, and/or a list of references used in this document may be obtained by writing to P. Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3225, or by telephoning one of the contacts listed here (see FOR FURTHER INFORMATION CONTACT).

**FOR FURTHER INFORMATION CONTACT:** Shane Guan, Office of Protected Resources, NMFS, (301) 713-2289, ext 137 or Brad Smith, Alaska Region, NMFS, (907) 271-5006.

**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.

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 certain subsistence uses, and if 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 March 25, 2008, NMFS received an application from AES for the taking, by Level B harassment, of several species of marine mammals incidental to conducting shallow hazard and site clearance surveys in the Chukchi Sea for up to 100 days from approximately July 1, 2008 until November 30, 2008. On June 26, 2008, AES notified NMFS that the proposed shallow hazard and site clearance survey could be finished before September 25, 2008, with a maximum of up to 60 days. The marine surveys would take place in the Chukchi Sea covering the area involved in MMS Lease Sale 193. The specific areas where the AES proposed shallow hazard and site clearance surveys would

be are the Burger, Crackerjack, Ulu, and Caramel prospect sites in the Chukchi Sea. The marine surveys will be performed from a seismic vessel.

Detailed information on the shallow hazard and seismic surveys can be found in the AES application and in the **Federal Register** notice for the proposed IHA published on April 28, 2008 (73 FR 22922) (hereinafter "FR Notice of Proposed IHA"). Except for the updated seismic activity period and specific locations, no changes have been made to the proposed activities.

**Comments and Responses**

A FR Notice of Proposed IHA was published on April 28, 2008 (73 FR 22922). During the 30-day public comment period, NMFS received comments from the Marine Mammal Commission (Commission), the California Gray Whale Coalition (CGWC); the Native Village of Point Hope (NVPH); the North Slope Borough (NSB); the Alaska Eskimo Whaling Commission (AEWC); the Center for Biological Diversity, Pacific Environment, Sierra Club, Natural Resources Defense Council and Alaska Wilderness League; Oceana and Ocean Conservancy; Dr. David E. Bain of the University of Washington; Dr. Richard Steiner of the University of Alaska; and one private citizen.

**General Comments**

**Comment 1:** The Commission recommends that NMFS issue the IHA provided that (a) the proposed marine mammal mitigation and monitoring activities are carried out as described in NMFS' FR Notice of Proposed IHA; and (b) operations be suspended immediately if a dead or seriously injured marine mammal is found in the vicinity of the operations and the death or injury could have occurred incidental to those operations.

**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 2:** The NSB points out that the AES application was poorly written, and that it did not reference the primary literature but used the summary information presented in the SAR. The NSB also points out that the scientific name of beluga whales was misspelled and the scientific name of the northern right whale was incorrect in the AES application. In essence, the NSB states that the application does not provide readers with confidence that AES has an

understanding of the background information or the need or expertise to conduct marine mammal monitoring or mitigation in association with the proposed site clearance or shallow hazard surveys.

*Response:* Comment noted. NMFS reviewed the AES application and verified the information provided within. While information is lacking, NMFS conducted relevant research so that complete information is provided in the FR Notice of Proposed IHA. In addition, detailed and updated information on bowhead whales and other marine mammal species is provided in the MMS 2006 PEA, MMS 2007 draft PEIS, NMFS 2008 SEA, and the SAR, as referenced in the FR Notice of Proposed IHA.

*Comment 3:* The NVPH, CBD, and NSB point out that neither NMFS, nor AES has identified the specific locations where AES plans to conduct its shallow hazard and site clearance surveys, except that its vessels would remain 40 km (25 mi) away from the Chukchi coast. The CBD further points out that NMFS did not provide specific dates of the proposed AES shallow hazard and site clearance surveys. As such, the CBD suggests NMFS should reject AES' application as incomplete and requests that NMFS reopen the public comment period for an additional 30 days. The NVPH requests that NMFS identify all of the areas where subsistence hunting occurs, and impose enforceable restrictions that would require AES to avoid such areas by a distance sufficient to prevent displacement of marine mammals.

*Response:* At the time of the publication of the FR Notice of Proposed IHA, no information was available regarding the exact locations of the survey and the specific dates because AES was in the stage of securing its client(s) and therefore could not have known where seismic survey operations would occur in the Chukchi Sea. Nevertheless, NMFS was able to conduct an analysis of AES' proposed 2008 open water seismic activities and its potential impacts on marine mammals and subsistence uses. NMFS' preliminary determination that the issuance of an IHA to AES would have a negligible impact on affected species or stocks of marine mammals and would result in no unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses was based on information contained in the AES application, including overall area (i.e., the area denoted as LS 193 in the Chukchi Sea), the period of the seismic operations (i.e., approximately July 1 - November 30, 2008), the acoustic

equipment planned to be used for the surveys, marine mammal species and stocks that are likely to be found in the vicinity of the project area, and the proposed mitigation and monitoring measures.

In addition, the MMPA and NMFS' implementing regulations provide a 30-day comment period on a proposed IHA. Based upon the information contained in the FR Notice of Proposed IHA, NMFS believes that the comment period afforded the public with ample time to comment on AES' proposed seismic surveys, despite the fact that AES did not identify an exact location in which the proposed surveys would occur. At this time, the precise survey locations and operation timeframe have been identified (see Description of the Specified Activity section above). Therefore, the IHA issued to AES limits its 2008 open water shallow hazard and site clearance surveys within these areas.

Finally, the areas and season where subsistence hunting occurs are described and analyzed in detail in the MMS 2007 EIS on Chukchi Sea Lease Sale 193, and NMFS has developed a list of mitigation measures that restrict seismic activities when the subsistence hunt occurs. For example, no seismic activities would be permitted before July 15 in the Chukchi Sea spring lead system. Also, as analyzed in the FR Notice of Proposed IHA, it is possible that small numbers of marine mammals could be temporarily displaced from their feeding areas as a result of the proposed shallow hazard and site clearance surveys. However, NMFS believes any displacement would constitute Level B behavioral harassment with the magnitude of displacement being relatively slight. NMFS does not believe the displacement of marine mammals would result in an unmitigable adverse impact to the availability of marine mammal species and/or stocks to subsistence uses because the AES would complete their seismic surveys before the fall bowhead hunting season, and it would not begin their operations prior to the completion of the late spring whale harvest, which is already over.

In addition, NMFS understands that AES has developed a POC with the Native communities. The POC specifies measures AES would take to help ensure that any harassment of marine mammals resulting from the proposed activities will not have an unmitigable adverse impact on the availability of marine mammal species or stocks for taking for subsistence uses. NMFS will also require AES to comply with certain terms and conditions in the IHA to help

ensure the availability of marine mammals for taking for subsistence uses. Please see description of the mitigation and monitoring measures below.

*Comment 4:* The CBD and CGWC urge NMFS not to issue any take authorization to AES for the proposed activities unless and until the agency can ensure that mitigation measures are in place that truly avoid adverse impacts to all species and their habitats and only after full and adequate public participation has occurred and environmental review of the cumulative impacts of such activities on these species and their habitats has been undertaken. The CBD feels that the proposed IHA does not meet these standards and therefore violate the MMPA, ESA, NEPA, and other governing statutes and regulations.

*Response:* NMFS does not agree with CBD's assessment. In its FR Notice of Proposed IHA, NMFS outlined in detail the proposed mitigation and monitoring requirements. The implementation of these measures will reduce the impacts of the proposed survey on marine mammals and their surrounding environment to the lowest level practicable, as required by the MMPA. The public was given 30 days to review and comment on these measures, in accordance with section 101(a)(5)(D) of the MMPA. NMFS has prepared a Supplemental EA to the 2006 MMS PEA. NMFS has fulfilled its obligations under NEPA by completing a SEA, which is not required to be available for public comment prior to its finalization. Additionally, NMFS completed a Biological Opinion in July, 2008, as required by section 7 of the ESA, which concluded that this action is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Therefore, NMFS does not believe the issuance of an IHA to AES would result in a violation of the MMPA, ESA, NEPA, and other governing statutes and regulations.

#### *Acoustics Impacts*

*Comment 5:* Citing studies on noise impacts to chinchillas (Henderson *et al.*, 1991) and human noise exposure standards by the U.S. Occupational Safety Health Administration (OSHA), Dr. Bain states that "in humans, chronic exposure to levels of noise too low to generate a TTS can result in PTS." As OSHA standards require limiting human exposure to noise at 115 dBA above threshold to 15 minutes per day, Dr. Bain concludes that this level is equivalent to 145 dB re 1 microPa for killer whales.

*Response:* Although NMFS agrees that chronic exposure to noise levels that would not cause TTS could result in hearing impairment in the long-term, it is important to understand that such exposure has to be of a chronic and long-term nature. The OSHA standards for permissible exposure are based on daily impacts throughout an employee's career, while the noise exposure to seismic surveys by marine mammals is short-term and intermittent, as described in the FR Notice of Proposed IHA and in the MMS 2006 PEA. In addition, the reference Dr. Bain cites to (Henderson *et al.*, 1991) does not address chronic noise impact to humans. The research by Henderson *et al.* (1991) focused on the applicability of the equal energy hypothesis (EEH) to impact (impulse) noise exposures on chinchillas, and the results indicated that hearing loss resulting from exposure to impact noise did not conform to the predictions of the EEH, which is the basis for OSHA standards for continuous noise exposure.

Most importantly, Dr. Bain's extrapolation of 145 dB re 1 microPa for killer whale hearing safety from OSHA's 115 dBA is fundamentally flawed for three reasons:

(1) The reference points when using decibel (dB) unit that address sound in air and in water are different. For airborne sounds, such as those by OSHA, the reference point is 20 microPa, while for underwater sounds, the reference point is 1 microPa. There are 26 dB differences between the values when different reference points are used for the same sound pressure, therefore, 115 dB re 20 microPa is 141 dB re 1 microPa for the same sound pressure. So 115 dB re 20 microPa in air above human threshold (defined as 0 dB re 20 microPa in air) would be 141 dB re 1 microPa underwater for the same sound pressure. Using the lowest threshold of 30 dB re 1 microPa as the killer whale hearing threshold, and assuming that noise impacts to killer whales are the same as for humans, one could extrapolate that continuous noise exposure of 171 dB re 1 microPa (141 dB over the 30 dB threshold) for 15 minutes for killer whales would be equivalent to humans exposed to 115 dB re 20 microPa for 15 minutes. Nevertheless, such extrapolation still leaves much uncertainty since marine mammals have a different mechanism for sound reception (Au, 1993; Richardson *et al.*, 1005). Some of the most recent science have shown that for some odontocetes, the onset of TTS when exposed to impulse noise is much higher (Finneran *et al.*, 2002) than NMFS' current thresholds.

(2) The decibel values used by OSHA are expressed as broadband A-weighted sound levels expressed in dBA. This frequency-dependent weighting function is used to apply to the sound in accordance with the sensitivity of the human ear to different frequencies. Thus, it is inappropriate to compare these values to an animal's hearing capability, including how an animal perceives sound in air (Richardson *et al.*, 1995). For marine mammals, M-weighting functions have been suggested based on five different hearing functional groups to address different hearing sensitivities of different frequencies by each of the marine mammal groups (Southall *et al.*, 2007).

(3) Finally, the sound characteristic used in OSHA standards is continuous sound, while the seismic sound from the proposed shallow hazard and site clearance surveys is impulse sound, which by its very nature is not a continuous sound.

*Comment 6:* Dr. Bain asserts that the zone of immediate risk of injury or death for marine mammals should be within the 150 - 215 dB re 1 microPa contours and assumes that values can be extrapolated from terrestrial species. Dr. Bain supports his argument by stating that immediate injury may result from brief exposure to sound levels that are 120 to 140 dB above threshold in terrestrial mammals, and that marine mammals vary in their best sensitivity from killer whales at around 30 dB re 1 microPa (killer whale) to 60 dB re 1 microPa (phocids) and 75 dB re 1 microPa (otariids)

*Response:* NMFS does not agree with Dr. Bain's assessment. As discussed in *Response to Comment 4*, the reference points when using decibel (dB) unit that address sound in air is 20 microPa, while in water the reference point is 1 microPa. Therefore, the decibel levels used to address injury in terrestrial mammals cannot be extrapolated to apply marine mammal species without adding a correction factor of 26 dB (see Richardson *et al.*, 1995). Even so, plenty of controlled laboratory experiments on several marine mammal species (e.g., beluga whales, bottlenose dolphins, harbor seals, California sea lions, and northern elephant seals) in the past decade point out injuries (PTS) to marine mammals would probably occur at much higher sound exposure levels, far above the 180 and 190 dB re 1 microPa NMFS currently applies to protect cetaceans and pinnipeds from onset of Level A harassment (injury). (see review by Southall *et al.*, 2007).

*Comment 7:* Citing OSHA (2007) standards for human noise exposure

standards, Nachtigall *et al.* (2003), and Henderson *et al.* (1991), Dr. Bain extrapolates that permanent injury to hearing from repeated exposure to noise at 120 dB re 1 microPa would occur to killer whales after being exposed for 8 hours.

*Response:* NMFS does not agree with Dr. Bain's assessment as such an extrapolation is invalid. First, as discussed in *Response to Comment 5*, the reference point addressing sound levels or intensities in air, which is used by OSHA for the human noise exposure standards, is relative to 20 microPa, while the reference point used to address sound levels or intensities in water is relative to 1 microPa. These are fundamentally different acoustical measures and should not be confused. Second, as discussed in *Response to Comment 5*, the noise exposure standard unit used by OSHA is dBA, which is the weighted sound exposure level based on human hearing sensitivities, and is not suitable to be used in other animals which have very different hearing sensitivities across the spectrum. Third, the sound sources used by OSHA are based on continuous sound, as is the referenced paper by Nachtigall *et al.* (2003), while the sound sources from the proposed seismic surveys are impulse sounds. The prediction of acoustic injury from continuous noise exposure is not applicable to impulse noise exposure, as is shown in the referenced paper by Henderson *et al.* (1991); therefore, the extrapolation is invalid. Fourth, ambient noise levels at many shallow water areas could easily reach 120 dB re 1 microPa, coupled with surf and wave actions. If killer whales suffered from permanent hearing damage when exposed to this noise level for 8 hours as suggested by Dr. Bain, then most killer whales in the coastal areas would have no hearing left. The lab controlled experiments by Nachtigall *et al.* (2003), as cited by Dr. Bain, show that an Atlantic bottlenose dolphin exhibited TTS of an average 11 dB after being exposed to continued noise up to 179 dB re 1 microPa for 55 minutes, a much higher level than where Dr. Bain would consider TTS to occur. However, in the wild, animals are expected to avoid such intense noise levels, thus preventing onset of TTS. Finally, killer whales are not expected to occur frequently in the proposed Arctic shallow hazard and site clearance project area, so the risk to this species is minimal.

*Comment 8:* Citing several papers on killer whales, harbor porpoises, and marbled murrelets, Dr. Bain states that major behavior changes of these animals appear to be associated with received

levels of around 135 dB re 1 microPa, and that minor behavioral changes can occur at received levels from 90 - 110 dB re 1 microPa or lower. Citing his own studies, Dr. Bain states that “killer whales are 40% less likely to forage at all when vessels are nearby, perhaps because vessel noise masks echoes from prey, making the probability of foraging successfully negligible (Bain *et al.*, 2006a; 2006b).” In addition, Dr. Bain states that the threshold for effects on harbor porpoise is 90 dB re 1 microPa, for killer whale is 100 dB re 1 microPa, and for beluga whale is 153 dB re 1 microPa, which are all lower than the threshold used to estimate the takes. CBD also cited a study of Canadian beluga whales showing flight responses from ice-breakers at received sound levels as low as 94 dB.

*Response:* NMFS does not agree with Dr. Bain and CBD’s assessment. Although it is possible that marine mammals could react to any sound levels detectable above the ambient noise level within the animals’ respective frequency response range, this does not mean that such animals would react in a biologically significant way. In addition, as discussed in *Response to Comment 6*, ambient noise levels in many of the world’s ocean can easily exceed 90 dB re 1 microPa (Urlick, 1983).

According to experts on marine mammal behavior, the degree of reaction which constitutes a “take,” i.e., a reaction deemed to be biologically significant that could potentially disrupt the migration, breathing, nursing, breeding, feeding, or sheltering, etc. of a marine mammal is complex and context specific, and it depends on several variables in addition to the received level of the sound by the animals. These additional variables include, but are not limited to, other source characteristics (such as frequency range, duty cycle, continuous vs. impulse vs. intermittent sounds, duration, moving vs. stationary sources, etc.); specific species, populations, and/or stocks; prior experience of the animals (naive vs. previously exposed); habituation or sensitization of the sound by the animals; and behavior context (whether the animal perceives the sound as predatory or simply annoyance), etc. (Southall *et al.*, 2007).

The references cited by Dr. Bain and CBD in this comment address different source characteristics (continuous sound rather than impulse sound that are planned for the proposed shallow hazard and site clearance surveys) or species (killer whales and harbor porpoises) that rarely occur in the proposed Arctic action area. No

reference supporting the “threshold for effects” on beluga whales is provided by Dr. Bain. Much research regarding bowhead and gray whales response to seismic survey noises has been conducted in addition to marine mammal monitoring studies during prior seismic surveys. Detailed descriptions regarding behavior responses of these marine mammals to seismic sounds are available (e.g., Richardson *et al.*, 1995; review by Southall *et al.*, 2007), and are also discussed in this document.

*Comment 9:* Dr. Bain states that sound sources are typically divided into continuous and pulsed categories, and that behavioral effects from pulsed sound are likely to be independent of the repetition rate and duty cycle, and depend primarily on the duration of the survey. Dr. Bain further states that intermittent pulses can result in continuously received noise when sound arrives via multiple paths, which Dr. Bain explains as “sound that bounces between the bottom and the surface will take longer to reach an animal than sound traveling via a direct path,” and that “noise can mask signals for a brief period before and after it is received, meaning an almost continuous received noise can mask signals continuously.” Dr. Bain concludes that “the subbottom profilers proposed for use during the site clearance surveys, with the very short intervals between pulses, present a risk of continuous masking effects.”

*Response:* NMFS does not agree with Dr. Bain’s statement on ocean acoustics and his subsequent analysis and assessment regarding underwater sound propagation and its effects to marine mammals. Within the scientific community on ocean acoustics and bioacoustics, two types of sounds are traditionally recognized: transient sounds (sounds of relatively short duration) and continuous sounds (sounds that go on and on). Transient sounds can be further classified into impulsive (such as seismic airguns, explosives, pile driving) and non-impulsive (such as military tactic sonars) sounds (Richardson *et al.*, 1995). Other researchers working on noise impacts to marine mammals classified sound types into a single pulse (such as a single explosive), multiple pulses (seismic airguns, pile driving), and nonpulses (ship, sonar) (Southall *et al.*, 2007). A simple way to distinguish pulses sound from nonpulses (continuous sound included) is that the former have rapid rise-time in relation to its extremely short duration. As mentioned in *Response to Comment 8*, behavioral responses from marine

mammals when exposed to underwater noise is complex and context specific, and often depend on the sound characteristics (such as received levels, duration, duty cycles, frequency, etc.) and other variables.

NMFS agrees that the distinction between transient and continuous sounds is not absolute, as continuous sound from a fast moving vessel is often treated as transient sound in relation to a stationary or slow moving marine mammal. Further, the distinction between pulses and nonpulses is also not always clear as certain pulsed sound sources (e.g., seismic airguns and explosives) may become nonpulses at greater distances due to signal decay through reverberation and other propagation paths. However, Dr. Bain’s statement that intermittent pulses can result in continuously received noise when sound arrives via multiple paths is unfounded. For a marine mammal exposed to noise, multipath propagation would expose the animal to the noise multiple times, usually each subsequent exposure with lower sound level due to loss of acoustic energy from surface and bottom reflections; however, the noise arriving via multipath propagation would not become continuous sound because the intervals between signals would always exist. In addition, noise cannot mask a signal before or after it is received by the animal. Noise masking of signals can only occur when the unwanted sound (noise) interferes with the signal when received by the animal, generally at similar frequencies (Richardson *et al.*, 1995). Therefore, Dr. Bain’s assessment that the subbottom profilers proposed for shallow hazard and site clearance surveys would cause continuous masking effects to marine mammals is not supported.

*Comment 10:* Dr. Bain states that one characteristic of pulsed sources is known as “time-bandwidth” product, and he explains that it is “any sound with a finite duration (that is, any real-world sound) contains additional frequencies to the nominal frequency. That is, pulsed sources that nominally have a frequency that is too high to hear, may, in fact, be audible, as the source will contain lower frequencies that are detectable.”

*Response:* NMFS does not agree with Dr. Bain’s statement that high frequency pulsed sources nominally contain additional frequencies that are audible. The high frequency pulsed sources are expected to operate within their frequency range, although some mechanical noise at lower frequencies may be produced as a byproduct during the operation. The mechanical noise associated with acoustic equipment is

expected to be low intensity and is not expected to result in harassment of marine mammals. Furthermore, the term "time-bandwidth product" is generally used in signal process, which is irrelevant to the proposed Arctic seismic survey.

*Comment 11:* Dr. Bain states that the directionality of the sources and whether they are on during turns would also affect the ensonified area.

*Response:* All acoustic sources are downward directional, thus no additional ensonified area would result during turns.

*Comment 12:* The CBD argues that NMFS analysis of the various high-energy sound sources on marine mammals is deficient, with NMFS for the most part simply asserting that the sound generated by these sources is outside the hearing range of most marine mammals. The CBD further states that even NMFS acknowledges that odontocetes such as beluga whales can in fact hear these sounds.

*Response:* NMFS does not agree with the CBD statement as it does not have scientific basis. In the FR Notice of the Proposed IHA, NMFS stated that the 445 kHz frequency band from the Klein System 3000 dual frequency digital side-scan sonar is outside any marine mammal species' hearing range, therefore, there would be no effect to marine mammals when this frequency is chosen. High frequency sounds above 200 kHz are clearly outside the hearing ranges for any marine mammals, which is well accepted among marine mammal bioacousticians (Richardson *et al.*, 1995; Southall *et al.*, 2007). In addition, NMFS never acknowledged that odontocetes such as beluga whales can hear these sounds (CBD did not provide any reference to support its statement.) Furthermore, the sound generated by various side-scan sonars operated at the frequency of 120 kHz and beyond produce signals above the hearing ranges for mysticetes, such as bowhead, gray, humpback, and minke whales (Richardson *et al.*, 1995; Southall *et al.*, 2007).

*Comment 13:* Citing Weilgart (2007), the CGWC states that seismic surveys can raise low-frequency noise over vast areas for more than a month, exposing large portions of a cetacean population to chronic noise. Citing Tyack (1988), the CGWC further states that avoidance behavior has been reported for gray whales in response to decibels great than 120 dB for continuous noise and 160 - 170 dB for pulsed sounds. In addition, the CGWC points out that playback of sounds from a Bell 212 turbine helicopter projected at random intervals of 10 seconds to 2 minutes

showed significant course changes in gray whales in apparent avoidance of the sounds. Finally, the CGWC states that reactions to noise by gray whales are more pronounced on their breeding/calving grounds (Malme *et al.*, 1983; 1984), and that gray whales were displaced for greater than 5 years from one of their breeding lagoons in response to industrial sounds (Jones *et al.*, 1994).

*Response:* NMFS does not agree with CGWC's "one size fits all" statement that "seismic surveys can raise low-frequency noise over vast areas for more than a month, exposing large portions of a cetacean population to chronic noise." The degree and number of cetaceans, or any marine mammal species that can be exposed to a seismic survey depends on the duration of the survey, the intensity of the airgun source, and the density of cetacean population, or other marine mammals, in the vicinity of the survey area.

NMFS agrees with CGWC's comments that behavioral modification of many marine mammals starts when exposed to pulsed sounds at 160 - 170 dB, as cited in Tyack (1988), which is consistent with NMFS current criteria for Level B behavioral harassment of 160-dB when exposed to pulsed sounds, and 120-dB when exposed to continuous sounds. The signals produced by airguns and other acoustic equipment for the proposed AES shallow hazard and site clearance survey are all pulsed sounds.

Finally, the proposed survey area in the Arctic Ocean is not gray whale breeding/calving grounds, so there will be no effect to this species' breeding/calving activities from the proposed activity.

*Comment 14:* The CGWC states that when gray whales were on their feeding grounds, Malme *et al.* (1986) estimated that there was a 50 percent probability of gray whale avoidance when the average pulse level of the received noise was approximately 173 dB and a 10 percent probability of avoidance at 163 dB.

*Response:* Comment noted. Though some gray whales (10 percent) may be temporarily affected by seismic surveys when exposed to received level at 163 dB as referenced by Malme *et al.* (1986), NMFS does not consider this effect to be significant for the following reasons: (1) the proposed shallow hazard and site clearance survey area is in the Chukchi Sea and is not a primary feeding ground for gray whales. The majority of gray whales feed on amphipods in shallow coastal waters in the Bering Sea which is not located near the proposed seismic survey area; and (2) a 160-dB safety

zone will be established requiring shut-down of airguns when a congregation of 12 or more bowhead or gray whales is sighted during the AES seismic activities.

*Comment 15:* Citing NMFS (2002), Weller *et al.* (2006a; 2006b), and IWC (2007), the CGWC states that noise has been thought to at least contribute to some species' decline or lack of recovery.

*Response:* Comment noted. However, since the CGWC did not provide the full reference of the citation, NMFS is not able to verify its statement. Nevertheless, for the proposed AES shallow hazard and site clearance survey, NMFS has conducted a thorough analysis of the potential impacts from seismic noise to marine mammals in its FR Notice of Proposed IHA. More extensive analyses are also provided in the MMS 2006 PEA, the MMS 2007 draft PEIS and the 2008 SEA. As stated in this document, NMFS finds that the impact of conducting the shallow hazard and site clearance surveys in Chukchi Sea may result, at worst, in a temporary modification in behavior of small numbers of certain species of marine mammals.

#### MMPA Comments

*Comment 16:* The CBD and NSB state that since NMFS has not promulgated any regulations related to shallow hazard and site clearance surveys under the MMPA, and because such surveys and associated activities carry the real potential of injury or death to marine mammals, neither an IHA nor an LOA can be issued for the AES' proposed activities.

*Response:* NMFS does not agree with the CBD and NSB's statement. 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 AES' shallow hazard and site clearance survey require issuance of a LOA. As explained throughout this **Federal Register** Notice of the Proposed IHA, 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. Received levels of 200 205 dB or more from the loudest acoustic device would be restricted to a radius of no more than 5 m (16 ft) around a seismic vessel. AES' airgun array is considered to be of small size. 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 would be lawful to issue an IHA to AES for the 2008 seismic survey program.

*Comment 17:* The CBD states that it referenced the scientific literature linking seismic surveys with marine mammal stranding events in its comments to MMS on the 2006 Draft PEA and in comments to NMFS and MMS on the 2007 DPEIS. The CBD further states that NMFS' failure to address these studies and the threat of serious injury or mortality to marine mammals from seismic surveys renders NMFS' conclusory determination that serious injury or mortality will not occur from AES' activities arbitrary and capricious.

*Response:* The MMS briefly addressed the humpback whale stranding in Brazil on page PEA-127 in the 2006 Final PEA. Marine mammal strandings are also discussed in the MMS 2007 DPEIS. A more detailed response to the cited strandings has been provided in several previous IHA issuance notices for seismic surveys (e.g., 73 FR 40512, July 15, 2008). Additional information has not been provided by CBD or others regarding these strandings. 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 33 km (18 nm) at 1430 hrs. At 1300 hrs, the seismic vessel was located 46 km (25 nm) 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 33 km (18 nm). 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 two beaked whales to strand is a matter of considerable debate (see Cox *et al.*, 2004). NMFS believes that scientifically, these events do not constitute evidence that seismic surveys have an effect similar to that of mid-frequency tactical sonar. 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 eight humpback whales (seven off the Bahia or Espirito Santo States and one 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, strandings have not been recorded for those marine mammal

species expected to be harassed by seismic in the Arctic Ocean. Beaked whales and humpback whales, the two species linked in the literature with stranding events with a seismic component are either extralimital or not located in the Chukchi Sea where shallow hazard and site clearance survey would occur. Moreover, NMFS notes that in the Arctic, marine mammal observation and monitoring have been conducted by the 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; nor reported by NSB inhabitants. 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 AES to ramp-up the seismic array to avoid a startle effect, strandings are highly unlikely to occur in the Arctic Ocean. Ramping-up of the array will allow marine mammals the opportunity to vacate the area of ensonification and thus avoid any potential injury or impairment of their hearing capabilities. In conclusion, NMFS does not expect any marine mammals will incur serious injury or mortality as a result of AES' shallow hazard and site clearance survey in the Chukchi Sea in 2008.

*Comment 18:* The CBD states that NMFS failed to adequately specify AES' activities and impacts of vessels because neither AES' application nor NMFS' FR Notice of the Proposed IHA mention the various transit routes through U.S. waters in the Bering, Chukchi and/or Beaufort Seas that these vessels associated with AES' surveys would take.

*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. Since these support vessels are typically slow-moving, any risk of vessel collisions with marine mammals is expected to be minimal. Moreover, normal shipping and transit operations do not rise to a level requiring an authorization under the MMPA. To require IHAs and LOAs for standard shipping would reduce the ability of NMFS to review activities that have a potential to cause harm to marine mammal populations.

*Comment 19:* The AEWG and NSB state that a "small take" finding cannot be supported with actual data for the proposed AES shallow hazard and site

clearance survey, therefore, placing NMFS in the position of having to make an arbitrary decision. In addition, the CBD states that NMFS did not make the distinction between "small number" and "negligible impact" while making the decision in the FR Notice of the Proposed IHA.

*Response:* NMFS does not agree with the CBD's statement. The analysis provided in the FR Notice of the Proposed IHA clearly described in detail the numbers of bowhead, gray, and beluga whales, and ringed and bearded seals that may be potentially taken by Level B harassment as a result of the seismic operations in the Chukchi Sea. (Take estimates for pinnipeds have since been revised based on the 160-dB rms threshold.) As clearly stated in the aforementioned **Federal Register** notice, take numbers of these species represent 0.06, 0.06, and 0.6 percent of the western Arctic stock of bowhead (population estimated at 10,545), eastern North Pacific stock of gray (population estimated at 18,178), and eastern Chukchi stock of Beluga whales (population estimated at 3,710), respectively; and 3.96 and 0.438 percent of the Alaska stocks of ringed (population estimated at 249,000 in the Chukchi Sea) and bearded seal (population estimated at 250,000 - 300,000 in the Bering and Chukchi Seas) populations within the Chukchi Sea, respectively. Although no take number was estimated for humpback, fin, minke, and killer whales, harbor porpoises, and spotted and ribbon seals in the vicinity of the project area due to their rare presence based in the Chukchi Sea, NMFS believes that the harassment of these species would be much less likely than those of bowhead and beluga whales and ringed and bearded seals. NMFS believes that the numbers for all affected species are small relative to their stock size. Separate detailed analyses on the levels of take by noise exposure and cumulative impacts to these marine mammal species and stocks from a wide spectrum in the past, current, and foreseeable future were also conducted and described in the aforementioned **Federal Register** notice, the MMS 2006 PEA, and NMFS 2008 SEA. These analyses led NMFS to conclude that while behavioral modifications, including temporarily vacating the area during the project period may be made by these species to avoid the resultant visual and acoustic disturbance, NMFS nonetheless found that this action would result in no more than a negligible impact on the affected marine mammal species and/or stocks. NMFS also found that the proposed

action would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. Please refer to the **Federal Register** notice (73 FR 22922, April 28, 2008), MMS 2006 PEA, and NMFS 2008 SEA for a detailed description of the analysis.

*Comment 20:* The CBD points out that AES only provided estimates for exposure to sounds greater than 170 dB re 1 microPa (rms) for pinnipeds, and that NMFS has in the previous IHAs rejected this threshold. The CBD further points out that neither NMFS nor ASRC provide any estimate of how many pinnipeds would be exposed to sounds greater than 160 dB.

*Response:* To be consistent with NMFS' Level B behavioral harassment criteria for pinnipeds, NMFS will continue to use 160 dB re microPa as the threshold of onset for Level B behavioral harassment, as noted in this document. The estimated numbers of pinnipeds that could be exposed to SPLs by AES' activities have been recalculated based on NMFS' application of the 160-dB rms threshold and are described in this **Federal Register** notice (see response to comment 19). Nevertheless, it is important to note that even with the 160 dB criteria, NMFS expects that only small numbers of pinnipeds would be exposed to seismic noises that could cause Level B behavioral harassment. In addition, research by Moulton and Lawson (2002) showed that most pinnipeds exposed to seismic sounds lower than 170 dB do not visibly react to that sound, and, therefore, pinnipeds are not likely to react to seismic sounds unless they are greater than 170 dB re 1 microPa (rms). While the number of potential exposures of pinnipeds at 170 dB is smaller than that at 160 dB, the overall environmental effect of received sound levels at 170 dB versus 160 dB is expected to be similar based on the best available science.

*Comment 21:* The CBD and NSB state that NMFS' estimates of the number of marine mammals that may be harassed based on the assumption that sounds below 160 dB re 1 microPa (rms) do not constitute harassment is incorrect because an activity can constitute harassment if it has the "potential" to affect marine mammal behavior. In addition, the CBD argues that 160 dB threshold for belugas is similarly flawed, as it points out in previous IHA notices. NMFS has acknowledged the impacts of sounds on beluga even at significant distances from a sound source (up to 20 km).

*Response:* NMFS does not agree with CBD and NSB's statement. As stated in

the MMPA, Level B harassment is defined as any act of pursuit, torment, or annoyance which "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." Activities that affect marine mammal behavior briefly but not cause disruption of behavioral patterns are not considered "takes."

In addition, in regard to impacts to marine mammal behaviors, distance is not the only factor that counts. The received levels at which marine mammals are affected are related to a number of factors including source levels, distances, and acoustic propagation pathways. The particular example CBD brought up regarding the seismic surveys by the National Science Foundation used airgun arrays with total discharge volume of 2,840 in<sup>3</sup>, while the proposed AES shallow hazard and site clearance survey would only use an airgun array with total discharge volume of 40 in<sup>3</sup>. The different source levels determine the ensonified zone where marine mammals, including beluga whales, would be impacted.

*Comment 22:* The CBD and NSB state 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 Stock Assessment Reports (SARs) prepared pursuant to the MMPA, NMFS acknowledges it has no accurate information on the status of ribbon, spotted, bearded, and ringed seals. CBD and NSB both indicate that without these data, NMFS cannot conclude that surveys which will harass untold numbers of individuals of each species would have no more than a "negligible impact" 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. The Alaska SAR provides population estimates based on past survey work conducted in the region, and the SAR shows that based on the most recent information, all of these Alaska stocks of ice seal species have robust populations. The proposed survey by AES is not expected to have adverse impacts on ice seals. The activity will last for approximately 60 days in the open-water environment of the Chukchi Sea, where bearded and spotted seals are found only occasionally.

In addition, it is expected that approximately 9,850 and 1,094 ringed and bearded seals would be affected by



Level B behavioral harassment as a result of the proposed shallow hazard and site clearance surveys, respectively, and that these take numbers represent 3.96 and 0.438 percent of the Alaska stocks of ringed and bearded seal populations within the Chukchi Sea, respectively. Although spotted and 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. Nonetheless, NMFS believes their take numbers would be much lower as compared to those marine mammals whose take numbers were calculated.

*Comment 23:* Citing research on long term adverse effects to whales and dolphins from whale watching activities (Trites and Bain, 2000; Bain, 2002; Lusseau *et al.*, 2006), Dr. Bain states that Level B behavioral harassment could be the primary threat to cetacean populations.

*Response:* Although NMFS agrees that long-term, persistent, and chronic exposure to Level B harassment could have a profound and significant impact on marine mammal populations, such as described in the references cited by Dr. Bain, however, those examples do not reflect the impacts of seismic surveys to marine mammals for the proposed AES project. First, whale watching vessels are intentionally targeting and making close approaches to cetacean species so the tourists onboard can have a better view of the animals. Some of these whale/dolphin watching examples cited by Dr. Bain occurred in the coastal waters of the Northwest Pacific between April and October and for extended periods of time (“[r]ecreational and scientific whale watchers were active by around 6 a.m., and some commercial whale watching continued until around sunset.”) Thus multiple vessels have been documented to be in relatively close proximity to whales for about 12 hours a day, six months a year, not counting some “out of season” whale watching activities and after dark commercial filming efforts. In addition, noise exposures to whales and dolphins from whale watching vessels are probably significant due to the vessels’ proximity to the animals. To the contrary, the proposed 2008 open water shallow hazard and site clearance surveys, along with other potential four seismic activities and existing industrial operations in the Chukchi and Beaufort Seas, do not intentionally approaching marine mammals in the project areas. The two areas situate in a much larger Arctic Ocean Basin which is far away from most human impacts. Therefore,

the adverse effects from each activity are remote and spread farther apart, as analyzed in the MMS 2006 PEA and draft EIS. The proposed seismic activities would only be conducted between July and November for a maximum of 100 days, weather permitting. In addition, although studies and monitoring reports from previous seismic surveys have detected Level B harassment of marine mammals, such as avoidance of certain areas by bowhead and beluga whales during the airgun firing, no evidence suggests that such behavioral modification is biologically significant or non-negligible (Malme *et al.*, 1986; 1988; Richardson *et al.*, 1987; 1999; Miller *et al.*, 1999; 2005), as compared to those exposed by chronic whale watching vessels cited by Dr. Bain. Therefore, NMFS believes that potential impacts to marine mammals in the Arctic by shallow hazard and site clearance surveys would be limited to Level B harassment only, and due to the limited scale and remoteness of the projects in relation to a large area, such adverse effects would not accumulate to the point where biologically significant effects would realized.

*Comment 24:* Dr. Bain states that changes in behavior resulting from noise exposure could lead to indirect injury in marine mammals in the wild. He presented several examples to suggest that marine mammals repeatedly exposed to Level B behavioral harassment could result in Level A takes: (1) Gas bubble lesions in beaked whales due to acoustically mediated bubble growth or rapid ascent by animals after deep diving; (2) a minke whale and harbor porpoises were observed traveling at high speed during exposure to mid-frequency sonar in Haro Strait in 2003, and that exhaustion from rapid flight could lead to heart or other muscle damage, which could cause mortality; (3) citing MMS’ (2004) Environmental Assessment on Proposed Oil and Gas Lease Sale 195 in the Beaufort Sea Planning Area (OCS EIS/EA MMS 2004–028) that feeding requires a prey density of 800 mg/m<sup>3</sup> and his own observation, Dr. Bain is concerned displacement from high productive feeding areas would negatively affect individual whales, and that small cetaceans such as harbor porpoises would face a risk of death if they are unable to feed for periods as short as 48 - 72 hours; (4) individual killer whales have been observed splitting their pod when frightened by sonar, and that other killer whales’ separation from their social units has resulted in death; (5) TTS may lead to harm as a minke whale was nearly

struck by a research vessel in the area where one had been observed fleeing mid-frequency sonar; and (6) impaired auditory ability may increase predation as white-sided dolphins were attacked by killer whales due to the noise of the research vessel caused the approach of killer whales undetected by the dolphins.

*Response:* NMFS agrees that it is possible that changes in behavior or auditory masking resulting from noise exposure could lead to injury in marine mammals under certain circumstances in the world, such as those examples/hypotheses raised by Dr. Bain. However, it is not likely that received sound pressure levels (SPLs) from the shallow hazard and site clearance surveys would drastically cause changes in behavior or auditory masking in marine mammals in the vicinity of the proposed action area. First, marine mammals in the aforementioned examples and hypotheses were exposed to high levels of non-pulse intermittent sounds such as the military sonar, which has been shown to cause flight activities (e.g., Haro Strait killer whales); and continuous sounds such as the vessel, which could cause auditory masking when animals are closer to the source. The sources produced by the acoustic equipment and airguns for the proposed shallow hazard and site clearance surveys are impulse sounds used in seismic profiling, bathymetry, and seafloor imaging. Unlike military sonar, seismic pulses have an extremely short duration (tens to hundreds milliseconds), and relatively long intervals (several seconds) between pulses. Therefore, the sound energy levels from these acoustic equipment and small airguns are far lower in a given time period. Second, the intervals between each short pulse would allow the animals to detect any biologically significant signals, and thus avoid or prevent auditory masking. In addition, NMFS requires mitigation measures to ramp up acoustic sources at a rate of no more than 6 dB every 5 minutes. This ramp up would prevent marine mammals from being exposed to high level noises without warning, thereby eliminating the possibility that animals would dramatically alter their behavior (i.e. from a “startle” reaction). NMFS also believes that long-term displacement of marine mammals from a feeding area is not likely because the seismic vessel is constantly moving, and the maximum 160-dB ensonified radius is about 4 km, which would make an ensonified zone of approximately 50 km<sup>2</sup> at any given moment, which is a small area compared to the Chukchi



Sea. In reality, NMFS expects the 160-dB ensonified zone to be smaller due to absorption and attenuation of acoustic energy in the water column.

*Comment 25:* Citing that the difference between takes by subsistence harvest and potential biological removal (PBR) of the Western Arctic stock bowhead whales is about 28 individuals whales, or less than 0.3 percent of the population, Dr. Bain is concerned that the cumulative effects of multiple seismic surveys would not need to be very large to push takes over PBR for bowheads.

*Response:* NMFS does not agree with Dr. Bain's assessment. None of the five proposed 2008 open water Arctic seismic surveys and shallow hazard and site clearance surveys is expected to result in any Level A harassment (i.e., injury) or mortality. As analyzed in the NMFS 2008 supplemental environmental assessment (SEA) for the issuance of five Arctic seismic surveys and shallow hazard and site clearance surveys, all incidental takes of marine mammals are expected to be Level B behavioral harassment (NMFS, 2008). Therefore, no PBR would be applied for the proposed AES seismic activities and other 2008 seismic activities in the Chukchi and Beaufort Seas.

*Comment 26:* Citing MMS 2006 Programmatic Environmental Assessment (MMS 2006 PEA) and the MMS 2007 draft Programmatic Environmental Impact Statement (DEIS) for seismic surveys in the Arctic Ocean, Dr. Bain states that he supports the mitigation measures established in these documents that no more than 12 cow/calf pairs and aggregation of feeding or resting bowheads are within the area to be ensonified by 120 dB and 160 dB, respectively. The CBD also states that the monitoring of a 120 dB safety zone for bowhead cow/calf pairs and monitoring of a 160 dB safety zone for large groups of bowhead or gray whales ( $\leq 12$  individuals) were required by NMFS in 2006 and were practicable. The CBD states that the failure to require such conditions, or at least analyze it, violates the MMPA. Dr. Bain presumes that these numbers (using 120 and 160 dBs) reflect the difference between takes allocated to hunters and the PBR for the stock. Dr. Bain further suggests that this number be applied to all seismic activities combined, not individual seismic surveys, thus, if four seismic surveys occur concurrently, no single survey should be allowed to affect the migration of more than 3 cow/calf pairs or 3 aggregation of feeding or resting bowhead whales.

*Response:* First, the additional mitigation measures in the MMS 2006

PEA and the MMS 2007 draft PEIS, as well as in the 2007 NMFS SEA for the issuance of an IHA to Shell Offshore Inc. for its open water seismic surveys conducted in the Chukchi and Beaufort Seas in 2007, establish safety (shut-down) zones of 120 dB re 1 microPa for an aggregation of four or more bowhead cow/calf pairs and 160 dB re 1 microPa for an aggregation of 12 or more bowhead or gray whales, not 12 cow/calf pairs as Dr. Bain states in his comment. The rationale for this cautious and conservative approach when addressing the 120-dB and 160-dB safety zones is clearly stated in the MMS 2006 PEA. These additional mitigation and monitoring measures were identified through the analyses to further reduce the potential for adverse environmental impacts and, depending on the scope of seismic-survey activities, could be adopted as requirements for seismic-survey-related marine mammal incidental take authorizations. With respect to CBD's concern that these measures were "practicable" in 2006, NMFS has re-evaluated the practicability of requiring aerial monitoring to the 120-dB isopleth in the Chukchi. NMFS has determined that it is not practicable to conduct aerial monitoring to the 120-dB isopleth because aerial surveys 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, thereby resulting in safety concerns. Additionally, these conditions are analyzed in NMFS' 2008 SEA. These numbers have nothing to do with the PBR of the bowhead whale stock, as assumed by Dr. Bain. As discussed in FR Notice of Proposed IHA, the proposed 2008 Arctic seismic surveys and shallow hazard and site clearance surveys are not expected to result in Level A harassment (injury) or mortality.

In addition, Dr. Bain's suggestion of "breaking up" the aggregated takes of bowheads into small subsets that can be "allocated" to each seismic survey is based on his assumption that these numbers were set by PBR. NMFS does not support this suggestion because it has no scientific support other than assumption. The safety zones of 120-dB for four or more cow/calf pairs and 160-dB for an aggregation of 12 bowhead or gray whales are based on the biology of the bowhead and gray whales as analyzed in the MMS 2007 draft PEIS.

The threshold of four or more fall-migrating bowhead whale cow/calf pairs was set based on the following: (a) cow/calf pairs are identified as the most vulnerable portion of the population

and disruption of their biologically significant behaviors or their avoidance of important habitats is more likely to lead to population level impacts; (b) mitigation measures for this portion of the population should be cautiously developed to ensure that takings are at the lowest practicable level and that significance is avoided; (c) bowhead whale cow/calf pairs migrate in groupings or pulses and the observed presence of cow/calf pairs by surveys generally indicates that additional cow/calf pairs are present but unseen; (d) using professional judgment, NMFS and MMS have determined that the presence of four or more cow/calf pairs (as observed during surveys) indicates that enough cow/calf pairs are likely present (but some unseen) in the area in numbers equal to or greater than 12 animals; and (e) the potential for significance to occur therefore increases when four or more bowhead whale cow/calf pairs are observed (MMS, 2007).

The threshold of an aggregation of 12 or more bowhead or gray whales is based on the following premises: (a) whales aggregate in order to communicate and perform "biologically significant" behaviors (as defined by NRC, 2005), such as feeding, resting, socializing, mating, and calving; (b) aggregations of animals can also indicate an area of preferred habitat and locations where biologically significant behaviors are likely occurring; (c) disruptions of these biologically significant behaviors and important habitats have a greater potential to lead to population level effects (i.e., result in limiting reproductive potential or recruiting success, impeding important mother/calf bonding); (d) protective measures should be designed to reduce the potential for disruption of biologically significant behaviors or help ensure whales do not avoid important key habitat areas (and thus potentially negate a negligible impact finding under the MMPA); and (e) standard scientific acceptance that the presence of observed whales (i.e., at the surface) during monitoring surveys indicates that additional whales are also present in the area but non-detectable (i.e., below the surface) (MMS, 2007).

*Comment 27:* Dr. Bain is concerned that the North Pacific right whale is excluded from consideration for the proposed seismic activity in the Chukchi Sea. Citing Nowacek *et al.* (2004), Dr. Bain further states that the [North] Atlantic right whale is less easily disturbed [than the North Pacific right whale], is known to be affected by received levels below 135 dB.

*Response:* NMFS does not agree with Dr. Bain and believes his concern is

unwarranted. The North Pacific right whales are found in the northern part of the Pacific, such as the Bering Sea and the Gulf of Alaska (Moore *et al.*, 2000; 2002; LeDuc *et al.*, 2001; Waite *et al.*, 2003; Mellinger *et al.*, 2004; Wade *et al.*, 2006). They do not enter Chukchi Sea in the Arctic Ocean, where the proposed seismic activity is planned. In addition, NMFS is not able to verify Dr. Bain's statement that the North Atlantic right whale is less easily disturbed than the North Pacific right whale, since he did not provide a supporting reference.

*Comment 28:* Dr. Bain is concerned that many species are sedentary, territorial, or have strong tendencies toward site fidelity, and that these species are unlikely to move away from a noise source. In addition, Dr. Bain is concerned that many predators are used to experiencing pain during feeding, and hence tolerate pain [from being exposed to loud noise] rather than abandoning their prey (e.g., many mammals involved in fishery-interactions).

*Response:* First, the monitoring and mitigation measures described in this document and implemented for the proposed open water seismic activity would prevent any marine mammals from being exposed to received levels that could cause onset of injury (180 dB re 1 microPa for cetaceans and 190 dB re 1 microPa for pinnipeds). Second, there are no sedentary marine mammals. The proposed seismic activity is fundamentally different from commercial fisheries activity in which the appearance of a seismic vessel does not reinforce the marine mammal with food or prey, therefore, it is unlikely that predatory marine mammals would approach the seismic vessel or acoustic source while searching for prey. Even if a marine mammal happens to be in close vicinity of the vessel or source, monitoring and mitigation measures will required the crew to power-down or shut-down the acoustic sources so that the animal will not be affected by Level A harassment.

*Comment 29:* Dr. Bain comments on NMFS' and AES' method of calculating estimated take numbers of marine mammals by multiplying the "strip width" by the length of the survey, and states that "[f]or bowheads, some studies showed behavioral changes in nearly all whales out to 20 km, and in many cases to at least 30 km." Dr. Bain further states that "belugas and bowheads are known to be affected at 10 - 20 km or more." At such, Dr. Bain observes that the ramp-up procedures would not be effective as it would take about 5 hours for the bowheads [near the source] to move to a distance of 30

km, and marine mammal monitoring over a distance of 20 km is very difficult.

*Response:* First, the estimated takes of marine mammals were calculated by multiplying the expected average animal densities by the area of ensonification for the 160 dB re 1 microPa (rms) and 170 dB re 1 microPa (rms) isopleths, for cetaceans and pinnipeds, respectively. The area of ensonification was determined by multiplying the total proposed trackline (760 km or 410 nm) times 2 (both sides of the trackline) times the distance to the 160-dB or 170-dB isopleths (not "strip width," a term usually used in the population survey, as stated by Dr. Bain in his comment).

NMFS cannot verify Dr. Bain's statement that "some studies showed behavioral changes in nearly all whales out to 20 km, and in many cases to at least 30 km" and that "belugas and bowheads are known to be affected at 10 - 20 km or more," since he did not provide any supporting references. Neither did Dr. Bain provide the source levels and displacement volumes of the airgun arrays in which these studies were conducted, nor the severity of the behavioral changes by the whales. Nevertheless, it is important to understand that the distance from the seismic sources where bowheads or other marine mammals can be affected depends on the source levels of the airgun arrays, which is also related to the size, or displacement volume of the airgun array. It is possible that if a large airgun array was used in the seismic survey, the received level at 20 to 30 km distance could still be high enough to cause behavioral changes (or behavioral harassment) by the bowhead whales. However, for the proposed shallow hazard and site clearance surveys, the source levels of the airgun array and other acoustic equipment are relatively low (about 214 dB re 1 Pa for the GeoChirp II, the loudest acoustic equipment planned to be used), and that the modeled distance to the 160-dB isopleths is estimated at 4,000 m (13,123 ft). Please see Number of Marine Mammals Estimated to be Taken section below for a detailed description of the calculation.

As far as mitigation measures are concerned, NMFS expects that the distance from the source to the safety zone for cetaceans is approximately 185 m (607 ft), where the received level is at 180 dB re 1 microPa, which is a small enough area to be effectively monitored by NMFS-approved marine mammal monitors (MMOs). Furthermore, no seismic surveys, ramp up included, will

commence if there is a marine mammal within the safety zone.

*Comment 30:* Citing the 90-day monitoring report for the SOI 2007 open water seismic activities, the NVPH is concerned that the shallow hazard and site clearance surveys could exclude nearly all migrating bowhead whales from waters within 20 km or more of the survey vessel, since the 120-dB isopleth extends over 25 km. The NVPH states that similar displacement of beluga whales at large distance is also possible.

*Response:* NMFS does not agree with NVPH's assessment regarding the potential acoustic impacts to bowhead and beluga whales. First, as discussed in Response to Comment 5, although it is possible that marine mammals could react to any sound levels detectable above the ambient noise level within the animals' respective frequency response range, this does not mean that such animals are taken by Level B harassment (see definition of Level B harassment above). The degree of reaction which constitutes a "take," i.e., a reaction deemed to be biologically significant that could potentially disrupt the migration, breathing, nursing, breeding, feeding, or sheltering, etc. of a marine mammal is complex and context specific, and it depends on several variables in addition to the received level of the sound by the animals. In many cases, bowhead or beluga whales that are exposed to 120 dB re 1 Pa or higher do not exhibit noticeable behavioral changes (e.g., Malme *et al.*, 1984; Richardson *et al.*, 1986; 1999; Miller *et al.*, 2005). Second, only migrating bowhead whales showed behavioral disturbance in a biologically significant manner from exposure to seismic airgun at received level around 120 dB re 1 microPa (Richardson *et al.*, 1999). The proposed shallow hazard and site clearance surveys would be concluded by September 25, before the fall migrating bowhead whales arrive the Chukchi Sea. Therefore, NMFS does not believe that bowhead and beluga whales would be displaced when exposed to received level from seismic airguns at 120 dB re 1 microPa.

*Comment 31:* The NSB states that if AES conducts surveys into October or November, it would also encounter belugas from the Beaufort Sea stock as the animals are migrating toward wintering areas. There are no density estimates for belugas (or other marine mammals) during the darker months of October and November. The NSB further suggests allowing AES to conduct surveys until late October.

*Response:* AES will complete its shallow hazard and site clearance

surveys by September 25, as stated in this document.

#### *Subsistence Uses*

*Comment 32:* NVPH states that NMFS did not present a preliminary determination that AES' shallow hazard surveys would not have an unmitigable adverse impact on the availability of affected marine mammal populations to subsistence hunters in coastal villages of the Chukchi Sea in the FR Notice of Proposed IHA. NVPH further states that NMFS failed its basic duty under the MMPA and its regulations to make a proposed determination available to the public to scrutinize and comment on. NVPH requests that NMFS issue another **Federal Register** notice to set forth the full scope of its required proposed findings and afford an opportunity for the public to comment on the adequacy of NMFS' assessment of the adverse effect of AES' shallow hazard surveys on the availability of seals and whales for subsistence uses.

*Response:* NMFS does not agree with NVPH's statement. A detailed analysis on the subsistence harvest of marine mammals by Alaskan natives in and around the Chukchi Sea was provided in the FR Notice of Proposed IHA. NMFS also understands that as part of the application for the IHA, AES has developed a Plan of Cooperation (POC) with the Native communities. The POC specifies measures AES would take to minimize adverse effects on marine mammals where proposed activities may affect the availability of a species or stock of marine mammals for Arctic subsistence uses or near a traditional subsistence hunting area. In addition, AES has conducted POC meetings for its seismic operations in the Chukchi Sea in Barrow, Wainwright, Point Lay, and Point Hope, and with the Alaska Eskimo Whaling Commission (AEWC). AES also indicated to NMFS that a Conflict Avoidance Agreement would be signed with the AEWC prior to its proposed seismic activities in the Chukchi Sea. Furthermore, NMFS has preliminarily determined that the impact of conducting the shallow hazard and site clearance surveys in the Chukchi Sea may result, at worst, in a temporary modification in behavior of small numbers of marine mammals. Therefore, although NMFS did not specifically include its preliminary determination that the proposed shallow hazard and site clearance surveys by AES would have an unmitigable adverse impact on the availability of affected marine mammal populations to subsistence hunters in coastal villages of the Chukchi Sea, the analysis provided in

the FR Notice of Proposed IHA supports such a determination.

NMFS also does not believe that NVPH's request of issuing another **Federal Register** notice is warranted. The FR Notice of Proposed IHA provided a 30-day comment period and plenty opportunity for the public to comment on AES' proposed shallow hazard and site clearance surveys in the Chukchi Sea and NMFS preliminary determination to issue an IHA to AES for the said proposed activity.

*Comment 33:* NVPH questions whether NMFS's assessment of the impacts to subsistence was based on the "best available scientific evidence" and whether NMFS has made any effort to discern whether seismic surveying activities in the Chukchi Sea in 2006 or 2007 had an adverse impact on the availability of any or all seal and whale species for subsistence uses.

*Response:* In making its final determination of whether the proposed shallow hazard and site clearance surveys would have unmitigable impacts to subsistence use of marine mammal populations in the affected area, NMFS relies upon the best available scientific information to make its MMPA determinations. In this case, NMFS has reviewed the 90-day marine mammal monitoring and mitigation reports for the 2006 and 2007 open water seismic survey and shallow hazard and site clearance survey conducted by Shell Offshore, Inc. (SOI), ConocoPhillips Alaska, Inc., and GXTechnology in 2006 and by SOI in 2007 (Ireland *et al.*, 2007a; 2007b; Patterson *et al.*, 2007; Funk *et al.*, 2007; 2008). These monitoring reports point out that the potential impacts to marine mammals as a result from the 2006 and 2007 Arctic seismic activities were negligible. In addition, actual take of marine mammals by Level B harassment was generally lower than expected due to the implementation of monitoring and mitigation measures. No marine mammals were observed to have suffered injuries or death as a result of the seismic surveys and none were suspected. In addition, information presented by the oil and gas industry and independent researchers who conducted marine mammal monitoring at the 2007 and 2008 Arctic Open Water Scientific Meetings was also taken into consideration.

*Comment 34:* NVPH states that NMFS failed to provide the substantive analysis to support any meaningful finding regarding the possible effect of AES' activities on the availability of beluga whales, seals, and bowhead whales for subsistence uses by coastal communities along the Chukchi Sea or

the effectiveness of mitigation measures to eliminate such impacts. The NVPH further states that the Chukchi Sea and the adjoining coast existed as a relatively pristine ocean environment, free of industrial operations that would disturb bowhead and beluga whales and seals with their availability for subsistence uses. Therefore, NVPH states that even a slight interference with the availability of these species to communities on the Chukchi Sea would constitute an unmitigable adverse impact to their overall availability for subsistence uses.

*Response:* NMFS does not agree with NVPH's statement. The FR Notice of Proposed IHA provided a detailed analysis regarding the possible effect of seismic surveys and underwater sound on marine mammals in the planned action area. This analysis prompted NMFS to make a preliminarily determination that the impact of conducting the shallow hazard and site clearance surveys in Chukchi Sea may result, at worst, in a temporary modification in behavior of small numbers of marine mammals.

NMFS agrees that the Chukchi Sea and the adjoining coast existed as a relatively pristine ocean environment that was free of industrial operations, however, NMFS does not agree with NVPH's assessment that within this environment, a slight interference with the availability of these species to communities on the Chukchi Sea would constitute an unmitigable adverse impact for subsistence uses of these species. The proposed shallow hazard and site clearance surveys proposed by AES would only occur in a small area within the much larger Chukchi Sea basin for a brief period of 60 days. Furthermore, mitigation and monitoring measures required for the seismic activities would reduce all potential impacts to negligible levels to marine mammals and their habitat. In addition, AES will be working with Native communities in the affected region to ensure that seismic operations do not result in an unmitigable adverse impact on the availability of marine mammals to subsistence uses by the Native communities in and around the Chukchi Sea.

*Comment 35:* The CBD and NSB state that the MMPA requires that any incidental take authorized will not have "an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives. The NSB is concerned about impacts to subsistence hunts of marine mammals early in the summer. The NSB points out that the beluga hunt at Point Lay typically occurs between June 20

and July 10. Additionally, CBD notes they are aware that the NVPH, a federally recognized tribal government, has submitted comments opposing the proposed take authorizations due to impacts on subsistence, and along with many community members has commented on myriad other related agency documents that have direct bearing on these take authorization such as the Chukchi Sea Sale 193, MMS Five-Year Plan, and the DPEIS. Similarly, the NSB, the AEW, and REDOIL have all filed challenges in federal court and/or the IBLA challenging offshore activities due to impacts on the subsistence hunt of bowheads and other species. In light of the positions of these communities and organizations, the CBD does not think that NMFS can lawfully make the findings required under the MMPA for approving AES' proposed IHA.

*Response:* NMFS does not agree with CBD and NSB's statement. The AES shallow hazard and site clearance survey will not start after July 15, after the spring subsistence hunt of marine mammals. NMFS believes that the concerns expressed by subsistence hunters and their representatives have been addressed by NMFS in this FR Notice and other supporting documents prepared or relied upon by NMFS in issuing the AES IHA.

*Comment 36:* The AEW states that under current Federal rules, protections for the subsistence uses are little more than an after-thought in Federal regulation, since they do not become effectively relevant until after exploration or development permits are issued. When these protections do come into play, at the point of IHA or LOA review, companies already have been allowed to address, substantively, mitigation or risk-reduction measures for likely impacts to the resources and lives of Alaskan natives. In addition, the AEW states that Federal law do not require consultation with the native coastal communities until after offshore exploration and development plans have been finalized, permitted, and authorized. Then at the point at which these requirements do come into play, Federal agencies, including NMFS, are reluctant to give teeth to the very minimal protections articulated in the MMPA.

*Response:* NMFS does not agree with the AEW's statement. Under sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*), an IHA or LOA would be granted to U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if NMFS finds that the taking of marine mammals 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 certain subsistence uses, and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. In other words, no marine mammal take authorizations may be issued if NMFS has reason to believe that the proposed exploration or development activities would not have an unmitigable adverse impact on the availability of marine mammal species or stock(s) for Alaskan native subsistence uses. Although Federal laws do not require consultation with the native coastal communities until after offshore exploration and development plans have been finalized, permitted, and authorized, pre-permitting consultations between oil and gas industries and the Alaskan coastal native communities are considered by NMFS when the agency makes a determination whether such activities would have an unmitigable adverse impact on the availability of marine mammal species or stock(s) for subsistence uses. For the proposed shallow hazard and site clearance survey, AES has conducted POC meetings for its seismic operations in the Chukchi Sea in Barrow, Wainwright, Point Lay, and Point Hope, and with the Alaska Eskimo Whaling Commission. AES also indicated to NMFS that a CAA would be signed with the AEW prior to its proposed seismic activities in the Chukchi Sea.

*Comment 37:* The AEW notes that NMFS and the AEW share management responsibility for bowhead whales and for the bowhead whale subsistence hunt through the NOAA-AEW Cooperative Agreement. The AEW asserts that Alaska Native citizens who are part of the Agreement should be provided an opportunity to consult directly on all proposed actions affecting bowhead whales, rather than mere notice that NMFS has made a decision concerning the issuance or proposed issuance of authorizations to take marine mammals.

*Response:* There are numerous opportunities, including the Cooperative Agreement, in which Alaska Native citizens can play a role in matters affecting bowhead whales. These include, but are not limited to, the MMPA's requirement that proposed notices of IHAs be published in the **Federal Register** for a 30-day comment period; the requirement in NMFS' regulations that oil and gas companies seeking take authorizations consult directly with Alaska Native communities to address subsistence use

issues (i.e., development and submission of a Plan of Cooperation); the sharing of information between applicants and Alaska Native citizens; and annual stakeholder meetings in Alaska to discuss oil and gas development (i.e., open-water meetings).

*Comment 38:* NVPH states that NMFS failed to discuss a mandatory limit on the number of concurrent seismic and/or shallow hazard surveys in the Chukchi Sea. NVPH requests NMFS to prohibit the simultaneous operation of multiple vessels within the Chukchi Sea during the fall bowhead migration. NVPH further requests that NMFS require that no two vessels operate within 100 km (62 mi) of one another, because given the large size of the 120 dB zone, closer simultaneous operation would pose a real risk of disrupting the bowhead whale migration.

*Response:* NMFS does not agree with NVPH's statement and request. First, the MMS 2006 PEA, which NMFS 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 AES survey would not result in a significant impacts.

NVPH has not provided NMFS with any data to support its argument that multiple seismic vessels should not be permitted in the Chukchi Sea or that no more than 2 vessels be allowed to operate within 100 km (62 mi) of one another. As mentioned above, NMFS and MMS analyzed the environmental effects of conducting multiple seismic surveys in both the Beaufort and Chukchi Seas. NMFS and MMS evaluated each seismic permit under the applicable NEPA document (i.e., the 2006 PEA, 2007 SEA and 2008 SEA) to determine whether the action would result in significant effects. In AES' case, NMFS has determined that the shallow hazard and site clearance surveys would not result in significant effects to the quality of the human environment. The 100 km (62 mi) separating distance for the 120 dB zone between vessels is also 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 condition, the

higher the source level, the longer the distance where the received level would reach 120 dB. Therefore, NMFS considers that the 100 km (62 mi) separation distance is arbitrary and baseless.

#### *Mitigation and Monitoring*

*Comment 39:* Dr. Bain questions about the effectiveness of marine mammal monitoring with only two MMOs on duty full time. Citing Forney and Barlow (1998) and Dahlheim and Towell (1994), Dr. Bain states that a common work schedule where consistent effort is required would be 40 minutes on, 40 minutes off, 40 minutes on, two hours off, three times a day. Dr. Bain suggests that an observation team of 12 MMOs would be required to cover a 24-hour period. Dr. Bain further states that the probability of detecting marine mammals would drop with increased distance from the vessel.

*Response:* NMFS does not agree with Dr. Bain's assessment and suggestions regarding MMOs and marine mammal monitoring. NMFS reviewed the references (Dahlheim and Towell, 1994; Forney and Barlow, 1998) provided by Dr. Bain, and did not find any type of work schedules described. Unlike observers during marine mammal population surveys who are required to search the entire field for any marine mammals, the primary responsibility for MMOs is to monitor the safety zones, which in this case are 185 m (607 ft) radius for the 180-dB isopleths and 40 m (131 m) radius for the 190-dB isopleths, and to ensure that proper mitigation measures (power-down or shut-down acoustic sources) are implemented if a marine mammal enters or is sighted within these safety zones. NMFS agrees that the detection probability of a marine mammal drops with increased distance from the ship. However, the occurrence of marine mammals outside the safety zones is not a big concern for marine mammal monitoring during the proposed seismic activity because it is presumed these animals would not be within a zone that could result in injury. In addition, all MMOs hired for the proposed seismic surveys must be NMFS-approved observers who are qualified to perform the required monitoring tasks.

*Comment 40:* Dr. Bain is concerned that many species that are capable of diving for more than 30 minutes could be missed during the monitoring.

*Response:* NMFS agrees with Dr. Bain that for deep diving marine mammals it pose a challenge for monitoring. However, within the proposed seismic survey area, there are no marine mammals that normally dive for more

than 30 minutes. However, in the event that a marine would be missed during the initial pre-survey monitoring, ramp-up procedures will be followed when an acoustic source begin to operate, so the undetected animal(s) would have an opportunity to detect the sound as it increases gradually and move away from the source. Please refer to Monitoring and Mitigation Measures section below for a detailed description.

*Comment 41:* NVPH is concerned that NMFS did not discuss the option of requiring AES to power down its airguns and other sound sources when aggregations of feeding, resting or socializing bowhead whales or gray whales are located within the 160 dB isopleths, and that NMFS fails to discuss the option of requiring AES to monitor the 120 dB isopleths for bowhead cow-calf pairs and to require AES to power down its sound sources when four or more cow-calf pairs are observed to be exposed to noises at or above 120 dB. NVPH requests NMFS to have both of these mitigation measures. Citing Richardson's observation, NVPH further states that nearly all bowhead whales avoid seismic airguns at received levels as low as 107 dB, and requests NMFS to impose a safety zone for bowhead cow-calf pairs exposed to 107 dB or more. In addition, as NVPH observes that it would be impossible to monitor such a large area by ship-based observation, NVPH requests that such monitoring be conducted by aerial observation together with ship-based observers, for both of these safety zones.

*Response:* In its final determination and the IHA issued to AES, NMFS requires AES to establish a 160-dB safety zone whenever an aggregation of 12 or more bowhead whales or gray whales are observed. 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 operation will not commence, or will shut down, until two consecutive vessel surveys indicate they are no longer present within the 160-dB safety zone of seismic-surveying operations.

However, NMFS will not impose a requirement to conduct aerial monitoring of the 120-dB safety zone for the occurrence of four or more cow-calf pairs in the Chukchi Sea because it is not practicable. First, the 120-dB safety zone would require a safety zone of 20 km (12 mi) in radius, which is beyond the range for visual monitoring. The 120-dB ensounded zone is also too large to be monitored by chase boats. 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, thereby resulting in safety concerns. Third, the proposed AES shallow hazard and site clearance would be completed by September 25, before the large number of bowhead whales migrate pass the Chukchi Sea.

As far as the NVPH's statement that nearly all bowhead whales avoid seismic airguns at received levels as low as 107 dB, NMFS is not able to verify NVPH's assessment because NVPH did not provide a reference to support its statement. A comprehensive review by Southall *et al.* (2007) on the potential acoustic impacts to low-frequency cetaceans (bowhead and other large whales) does not list any reference that shows these animals react to received levels under 110 dB re 1 microPa, regardless of severity. Therefore, NMFS does not believe bowhead whales exposed to 107 dB would be taken by Level B behavioral harassment, and that imposing a safety zone of 107 dB is not appropriate.

*Comment 42:* NVPH states that NMFS failed to provide for peer review of AES' proposed monitoring plans. It further states that the presentation provided by AES at the 2008 Open Water Scientific Meeting only gave very limited information and was unable to respond to even the most basic questions raised by attendees. NVPH requests NMFS to reject any suggestion that the meeting satisfied the peer review requirement. NVPH states that peer review by independent, objective reviewers remains necessary.

*Response:* In order for the independent peer-review of Arctic area activity monitoring plans, it must be conducted in an open and timely process. Review by organizations, such as the National Academy of Sciences, would take at least a year to complete and would likely provide for an inflexible monitoring plan (e.g., any modifications would require reconvening the Committee). As a result, NMFS believes that independent peer-review of monitoring plans can be conducted via two means. First, the monitoring plans are made public and available for review by scientists and members of the public in addition to scientists from the NSB, NMFS, and the FWS. In accordance with the MMPA, the Marine Mammal Commission's Committee of Scientific Advisors reviews all IHA applications, including the monitoring plans. Second, monitoring plans and the results of previous monitoring measures are reviewed once or twice annually at public meetings held with the industry, the AEWC, the NSB, Federal agencies

and the public. AES' mitigation and monitoring plan was reviewed by scientists and stakeholders at a meeting in Anchorage between April 14, 2008, and April 16, 2008, and by the public between April 28, 2008 (73 FR 22922) and May 28, 2008. NMFS believes that it has met the requirements of section 101(a)(5)(D) of the MMPA.

*Comment 43:* The CBD, NSB, Dr. Bain, and Dr. Steiner state that during night-time and poor visibility condition, AES proposes essentially no limitations on operations, even though the likelihood of observers seeing marine mammals in such conditions is very low. The CBD and Dr. Steiner recommend prohibiting seismic surveying when conditions prevent observers from detecting all marine mammals in the safety zone. One private citizen requests NMFS to clarify whether seismic sources are to be restarted in low visibility conditions.

*Response:* The IHA issued to AES does not allow the start up of acoustic sources when the entire safety zones cannot be adequately monitored. However, as stated in the FR Notice of Proposed IHA, once the safety zones are visually established and that pre-survey monitoring has concluded that there is 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 reestablished. 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 44:* The CBD and NSB state that in its treatment of passive acoustic monitoring (PAM), NMFS and AES are also deficient. While past IHAs have required PAM, this IHA completely ignores even discussing the possibility of using such monitoring.

*Response:* NMFS disagrees. The MMPA has not established standards for monitoring requirements. The monitoring requirements proposed are to ensure 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. Monitoring measures are also used to reduce the level of takes to the lowest level practicable due to

implementation of the mitigation measures.

Monitoring measures for different projects are proposed on a case-by-case basis, and there is no "one size fits all" type of monitoring protocol. For the proposed shallow hazard and site clearance survey in the Chukchi Sea, the radius of the safety zone (185 m, or 607 ft) based on the 180 db re: 1 microPa isopleths is too small to allow accurate and effective passive?? acoustic monitoring. As the Joint Nature Conservation Committee (JNCC, 2004) stated that in practice the exclusion zone (safety zone) needs to be more than 500 m (1,640 ft) to allow for accurate passive acoustic monitoring (PAM). JNCC also noted that in many cases PAM is not as accurate as visual observation when determining range. NMFS believes that in the subject seismic survey projects, where the safety zone is as small as 185 m (607 ft), passive acoustic monitoring is not warranted. The presence of additional vessels for deploying PAM would only introduce more noise to the small area where the proposed projects are to occur.

#### NEPA

*Comment 45:* NVPH, CBD, and the NSB state that NMFS must prepare an Environmental Impact Statement (EIS) to evaluate AES' shallow hazard surveys, together with the other seismic and shallow hazard surveying activity proposed for the summer of 2008 in the Beaufort and Chukchi Seas.

*Response:* NMFS prepared a Final SEA to analyze further the effects of AES' (and other companies) proposed 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 FEIS for the Chukchi Sea Lease Sale 193, the MMS 2003 FEIS for multiple lease sales, and the MMS 2007 DPEIS submitted for public comment on March 30, 2007.

The 2006 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 AES' proposed activity for this season was not explicitly identified in the 2006 PEA, the PEA did contemplate that future seismic activity, such as AES' 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 provides a review 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 and issue an EIS for the issuance of an IHA to AES in 2008 for seismic activity in the Chukchi Sea but that preparation of an SEA and issuance of a Finding of No Significant Impact (FONSI) were sufficient under NEPA.

*Comment 46:* The NSB and CBD state that NMFS appears to rely on the NEPA analysis in the DPEIS in clear violation of NEPA law. They state that 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. The CBD further states that before the record of decision has been issued on the final PEIS, NMFS cannot authorize AES' proposed seismic surveys because the purpose of the PEIS process is to consider seismic surveys in the Chukchi and Beaufort Seas for the years 2008 and beyond. The CBD states that NMFS seems to either be relying on a NEPA document that is not just inadequate, but which by its very terms only covers activities from two years ago (the 2006 PEA), or one which is nowhere near complete (the 2007 DPEIS).

*Response:* See Response to Comment 44 on this concern. Contrary to the NSB's and CBD's 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 DPEIS was not the underlying document to support NMFS' issuance of AES' IHA. NMFS merely relied upon specific pieces of information and analyses contained in the DPEIS to assist in preparing the SEA. It is NMFS' intention that the 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 47:* NVPH states that the MMS 2006 PEA is flawed since it understates the risk of significant impacts to bowhead whales, and



therefore, it is inappropriate for NMFS to rely on that document. NVPH states that the 2006 PEA assumed the source vessels would ensnare much smaller zones than those which have been subsequently measured in the field. NVPH states that based on the propagation actually measured in 2006 and 2007, the impacts of a single 3D seismic survey are two to three times as large as NMFS anticipated or more. The impacts of a single shallow hazard 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, NVPH requests NMFS to complete the PEIS that it began in 2006 to evaluate the potentially significant impacts of such activities.

*Response:* NMFS does not agree with NVPH's statement. First, the subject 2006 PEA was written by MMS, not NMFS. However, NMFS was a cooperating agency under NEPA in its preparation. Second, as noted in your cited part 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  $\mu$ Pa rms, depending upon propagation. Although NVPH 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, NVPH 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 48:* NVPH states that the MMS 2006 PEA fails to provide site-specific analysis. Thus, in order to reduce the likelihood of significant impacts, NMFS has imposed 160 dB and 120 dB safety zones when authorizing surveys pursuant to the PEA. At a minimum, it must do the same for AES' surveys but with the modifications to the safety zones discussed above.

*Response:* NMFS does not agree with NVPH's statement. Although the MMS 2006 PEA did not explicitly provide site-specific analysis on the proposed AES shallow hazard and site clearance surveys, NMFS SEA prepared for the 2008 open-water season described its specific location and time of operation. As in the PEA, NMFS' 2008 SEA has described additional mitigation measures such as imposing the 160 dB safety zone for seismic activities in the Chukchi Sea when an aggregation of 12 or more bowhead or gray whales is sighted. This mitigation measure is required in the IHA issued to AES. Regarding imposing the 120-dB safety zone, it would pose safety and practical concerns for marine mammal monitoring in the Chukchi Sea. Therefore, a safety zone based on received level of 120 dB re 1 microPa will not be imposed in the Chukchi Sea as it has been determined to be impracticable under the MMPA.

*Comment 49:* The NVPH and NSB state that the scope of the MMS 2006 PEA is explicitly limited to activities that occur during 2006, and that those seismic survey activities have already occurred, as well as an additional season worth of activities in 2007. NVPH states that 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, NVPH states that 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. NVPH states that these significance criteria are inappropriate for an evaluation of impacts from seismic surveys, as indicated by MMS' use of more defensible significance criteria based on potential biological removal form marine mammal populations

affected by seismic surveys in the Gulf of Mexico.

*Response:* NMFS does not agree with the NVPH and NSB's statement, as failed to provide any support for their position. The MMS 2006 PEA, in 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. NVPH's statement that MMS' such analysis "would allow long-lasting impacts to populations, or in fact the entire Arctic ecosystem, that would nonetheless be deemed insignificant" in a way supports the MMS 2006 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 AES' seismic survey 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 50:* Oceana and Ocean Conservancy are concerned that oil and gas activities may have substantial negative effects on marine mammals and other Arctic species. Oceana and Ocean Conservancy further state that there has never been a comprehensive evaluation of the cumulative effects of seismic activities in the Arctic. Oceana and Ocean Conservancy request that in light of the dramatic effects of climate change in the Arctic, NMFS must not approve further seismic activities without such a comprehensive evaluation.

*Response:* NMFS shares Oceana and Ocean Conservancy's concern that the increasing industrial activities, including oil and gas development, could have profound negative effects on marine mammals in the Arctic region. Nevertheless, 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 certain industrial activities would further reduce and minimize such 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 Ocean and Ocean Conservancy's statement that there has never been a comprehensive evaluation of the cumulative effects of seismic activities in the Arctic. The MMS 2006 PEA, NMFS 2007 SEA, MMS 2007 draft PEIS, and 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.

*Comment 51:* NSB and CBD are both concerned about cumulative impacts from multiple operations. AES' proposal is only one of numerous oil industry activities recently occurring, planned, or ongoing in the U.S. portions of the Chukchi and Beaufort Seas (e.g., proposed IHA for on-ice seismic surveys in Harrison Bay; proposed scientific seismic survey by the National Science Foundation (NSF); NMFS' 5-year regulations for activities related to Northstar; SOI IHA for Beaufort Sea exploratory drilling; CPAI IHA for Beaufort Sea; SOI IHA for Beaufort Sea; two proposed IHAs for Chukchi Sea and two proposed for the Beaufort Sea; and FWS 5-year regulations for oil and gas activities in the Beaufort Sea). No analysis of seismic surveys in the Russian or Canadian portions of the Chukchi and Beaufort seas is mentioned either. Similarly, significant increases in onshore oil and gas development with attendant direct impacts and indirect impacts on marine mammals such as through increased ship traffic are also occurring and projected to occur at greater rates than in the past. CBD states that further cumulative effects impacting the marine mammals of the Beaufort and Chukchi Seas are outlined in their NEPA comments on the MMS PEA and the DPEIS.

The NSB points out that in addition to the proposed offshore industrial operations listed above, there will be supply and fuel barging to villages, barging for support of onshore development and exploration, scientific cruises, climate change studies, USCG operations, tourist vessel traffic, and other activities as well. The cumulative impacts of all these activities must be factored into any negligible impact determination. Further, without an analysis of the effects of all of the planned operations, it is impossible to determine whether the monitoring plans are sufficient.

*Response:* Under section 101(a)(5)(D) of the MMPA, NMFS is required to determine whether the taking by the applicant's specified activity will have a negligible impact on the affected marine mammal species or population stocks. Cumulative impact assessments are NMFS' responsibility under NEPA, not the MMPA. In that regard, the MMS Final PEA and NMFS SEA address cumulative impacts. The Final PEA's cumulative activities scenario and cumulative impact analysis focused on oil and gas-related and non-oil and gas-related noise-generating events/activities in both Federal and State of Alaska waters that were likely and foreseeable. Other appropriate factors, such as Arctic warming, military activities, and noise contributions from community and commercial activities were also considered. Appendix D of the Final PEA addresses similar comments on cumulative impacts, including global warming. That information was incorporated into and updated in the NMFS 2008 SEA and into this document by citation. NMFS adopted the MMS Final PEA, and it is part of NMFS' Administrative Record. Finally, NMFS does not require authorizations under section 101(a)(5) of the MMPA for normal shipping or transit.

*Comment 52:* According to CBD, another factor causing NMFS' "negligible impact" findings to be suspect is the fact that the Chukchi Sea area is undergoing rapid change as a result of global warming. For species under NMFS' jurisdiction, and therefore subject to the proposed IHA, seals are likely to face the most severe consequences. The Arctic Climate Impact Assessment (ACIA) concluded that ringed, spotted, and bearded seals would all be severely negatively impacted by global warming this century. The ACIA stated that ringed seals are particularly vulnerable: "Ringed seals are likely to be the most highly affected species of seal because all aspects of their lives are tied to sea

ice" (ACIA, 2004). In 2003, the NRC noted that oil and gas activities combined with global warming presented a serious cumulative impact to the species: "Climate warming at predicted rates in the Beaufort Sea region is likely to have serious consequences for ringed seals and polar bears, and those effects will accumulate with the effects of oil and gas activities in the region." NMFS' failure to address global warming as a cumulative effect renders its negligible impact findings invalid.

*Response:* Under section 101(a)(5)(D) of the MMPA, "the Secretary shall authorize... 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 if the Secretary finds that such harassment during each period concerned (I) will have a negligible impact on such species or stock, and (II) will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses." Section 101(a)(5)(D) of the MMPA does not require NMFS to base its negligible impact determination on the possibility of cumulative effects of other actions.

As stated in previous responses, cumulative impact assessments are NMFS' responsibility under NEPA, not the MMPA. In that regard, the MMS 2006 Final PEA and NMFS' 2008 SEA address cumulative impacts. The PEA's cumulative activities scenario and cumulative impact analysis focused on oil and gas-related and non-oil and gas-related noise-generating events/activities in both Federal and State of Alaska waters that were likely and foreseeable. Other appropriate factors, such as Arctic warming, military activities, and noise contributions from community and commercial activities were also considered. Appendix D of the PEA addresses similar comments on cumulative impacts, including global warming. That information was incorporated into and updated in the NMFS 2008 SEA and into this document by citation. NMFS adopted the MMS Final PEA, and it is part of NMFS' Administrative Record.

#### *Endangered Species Act*

*Comment 53:* The CBD states that the proposed IHA will affect, at a minimum, four endangered species, the bowhead, humpback and fin whales, and the polar bear. 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., the 2006 Arctic Regional Biological

Opinion (ARBO)) have suffered from inadequate descriptions of the proposed action, inadequate descriptions of the status 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. The CBD hopes NMFS performs the full analysis required by law and avoids these problems in its consultation for the proposed IHA.

**Response: Response:** Under section 7 of the ESA, NMFS has completed consultation with the MMS on the issuance of seismic permits for offshore oil and gas activities in the Beaufort and Chukchi seas. In a Biological Opinion issued on July 17, 2008, NMFS concluded that the issuance of seismic survey permits by MMS and the issuance of the associated IHAs for seismic surveys are not likely to jeopardize the continued existence of threatened or endangered species (specifically the bowhead, humpback, and fin whales) under the jurisdiction of NMFS or destroy or adversely modify any designated critical habitat. The 2008 Biological Opinion takes into consideration all oil and gas related activities that are reasonably likely to occur, including exploratory (but not production) oil drilling activities. In addition, NMFS has issued an Incidental Take Statement under this Biological Opinion which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of bowhead, humpback, and fin whales. Regarding the polar bear, MMS has contacted the USFWS about conducting a section 7 consultation.

**Comment 54:** The CBD states that NMFS may authorize incidental take of the listed marine mammals 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 "meet all State and Federal legal requirements except for the prohibition against taking in section 9 of the ESA." The CBD states that AES' proposed activities violate the MMPA and NEPA and therefore are "not otherwise lawful." The CBD concludes that any take authorization for listed marine mammals would, therefore, violate the ESA, as well as these other statutes.

**Response:** NMFS does not agree with the CBD statement. As noted in this document, NMFS has made the necessary determinations under the MMPA, the ESA, and NEPA regarding the incidental harassment of marine mammals by AES while it is conducting

activities permitted legally under MMS' jurisdiction.

#### Other Comments

**Comment 55:** The CGWC states that gray whale population estimate was based on outdated data, and that there is no comprehensive assessment in the 2008 SAR. The CGWC points out that recent research by Professor Stephen Palumbi of Stanford University suggests the original gray whale population numbered approximately 118,000, nearly 5 times that of previous estimates.

**Response:** Although the population estimates of several marine mammal species or stocks used in this document may not be up to date, these are the best available scientific information NMFS considered. In terms of gray whale population estimate, NMFS still believes that using the mean of the 2000/01 and 2001/02 abundance estimates (not significantly different) of 18,813 is the best estimate. As long as the cited Palumbi research (Alter *et al.*, 2007) on historical gray whale population is concerned, it is irrelevant to the issuance of the IHA. Alter *et al.*'s (2007) research hypothesized that the decline of gray whale population from between 76,000 and 118,000 (average estimate at 96,000) occurred over the past 1,100 - 1,600 years, much before the western whaling began in the 19th century.

#### Description of Marine Mammals in the Activity Area

In general, the marine mammal species under NMFS' management authority that occur in or near the proposed survey area within the Chukchi Sea are the bowhead (*Balaena mysticetus*), gray (*Eschrichtius robustus*), humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), minke (*B. acutorostrata*), beluga (*Delphinapterus leucas*), and killer whales (*Orcinus orca*); harbor porpoises (*Phocoena phocoena*); and the bearded (*Erignathus barbatus*), ringed (*Phoca hispida*), spotted (*P. largha*), and ribbon seals (*P. fasciata*). Among these species, the bowhead, humpback, and fin whales are listed as "Endangered" under the Endangered Species Act (ESA).

A detailed description of the biology, population estimates, and distribution and abundance of these species is provided in the AES' IHA application. Additional information regarding the stock assessments of these species is in NMFS Alaska Marine Mammal Stock Assessment Report (Angliss and Outlaw, 2007), and can also be assessed via the following URL link: <http://www.nmfs.noaa.gov/pr/pdfs/sars/po2006.pdf>.

Additional information on those species that are under NMFS' management authority within or near the proposed survey areas is described in the FR Notice of Proposed IHA and is not repeated here.

#### Potential Effects on Marine Mammals

Operating a variety of acoustic equipment such as side-scan sonars, echo-sounders, bottom profiling systems, and airguns for seafloor imagery, bathymetry, and seismic profiling has the potential for adverse effects on marine mammals.

#### Potential Effects of Airgun Sounds on Marine Mammals

The effects of sounds from airguns might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and, at least in theory, temporary or permanent hearing impairment, or non-auditory physical or physiological effects (Richardson *et al.*, 1995)

The potential effects of airguns discussed below are presented without consideration of the mitigation measures that AES has presented and that will be required by NMFS. When these measures are taken into account, it is unlikely that this project would result in temporary, or especially, permanent hearing impairment or any significant non-auditory physical or physiological effects.

#### (1) Tolerance

Numerous studies have shown that pulsed sounds from airguns are often readily detectable in the water at distances of many kilometers. Studies have also shown that marine mammals at distances more than a few kilometers from operating seismic vessels often show no apparent response (tolerance). That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to airgun pulses under some conditions, at other times mammals of all three types have shown no overt reactions. In general, pinnipeds, and small odontocetes seem to be more tolerant of exposure to airgun pulses than are baleen whales.

#### (2) Masking

Masking effects of pulsed sounds (even from large arrays of airguns) on marine mammal calls and other natural sounds are expected to be limited,

although there are very few specific data of relevance. Some whales are known to continue calling in the presence of seismic pulses. Their calls can be heard between the seismic pulses (e.g., Richardson *et al.*, 1986; McDonald *et al.*, 1995; Greene *et al.*, 1999; Nieuwirth *et al.*, 2004). Although there has been one report that sperm whales cease calling when exposed to pulses from a very distant seismic ship (Bowles *et al.*, 1994), a more recent study reports that sperm whales off northern Norway continued calling in the presence of seismic pulses (Madsen *et al.*, 2002). That has also been shown during recent work in the Gulf of Mexico (Tyack *et al.*, 2003; Smulter *et al.*, 2004). Masking effects of seismic pulses are expected to be negligible in the case of the smaller odontocete cetaceans, given the intermittent nature of seismic pulses. Dolphins and porpoises commonly are heard calling while airguns are operating (e.g., Gordon *et al.*, 2004; Smulter *et al.*, 2004; Holst *et al.*, 2005a; 2005b). Also, the sounds important to small odontocetes are predominantly at much higher frequencies than are airgun sounds.

### (3) Disturbance Reactions

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement.

Reactions to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors. If a marine mammal does react briefly to an underwater sound by slightly changing its behavior or moving a small distance, the impacts of the change are unlikely to be biologically significant to the individual, let alone the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on the animals could be significant.

### (4) Hearing Impairment and Other Physical Effects

Temporary or permanent hearing impairment is a possibility when marine mammals are exposed to very strong sounds, but there has been no specific documentation of this for marine mammals exposed to sequences of airgun pulses. NMFS advises against exposing cetaceans and pinnipeds to impulsive sounds above 180 and 190 dB re 1 microPa (rms), respectively (NMFS, 2000). Those thresholds have been used in defining the safety (shut down) radii planned for the proposed seismic surveys. Although those thresholds were established before there were any

data on the minimum received levels of sounds necessary to cause temporary auditory impairment in marine mammals, they are considered to be conservative.

Several aspects of the planned monitoring and mitigation measures for this project are designed to detect marine mammals occurring near the airguns to avoid exposing them to sound pulses that might, at least in theory, cause hearing impairment (see Mitigation and Monitoring section below). In addition, many cetaceans are likely to show some avoidance of the area with high received levels of airgun sound. In those cases, the avoidance responses of the animals themselves will reduce or (most likely) avoid any possibility of hearing impairment.

Non-auditory physical effects may also occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that theoretically might occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, and other types of organ or tissue damage. It is possible that some marine mammal species (i.e., beaked whales) may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds. However, there is no definitive evidence that any of these effects occur even for marine mammals in close proximity to large arrays of airguns. It is unlikely that any effects of these types would occur during the proposed project given the brief duration of exposure of any given mammal, and the planned monitoring and mitigation measures (see below).

### (5) Strandings and Mortality

Marine mammals close to underwater detonations of high explosive can be killed or severely injured, and the auditory organs are especially susceptible to injury (Ketten *et al.*, 1993; Ketten, 1995). Airgun pulses are less energetic and have slower rise times, and there is no evidence that they can cause serious injury, death, or stranding even in the case of large airgun arrays.

Nonetheless, the airgun array proposed to be used in the proposed site clearance surveys in Chukchi Sea is small in volume (40 cu inches) and the source level is expected at 196 dB re 1 microPa (peak), which is approximately 190 dB re 1 microPa (rms). The 160, 170, and 180 dB re 1 microPa (rms) radii, in the beam below the transducer, would be 32 m (104 ft), 10 m (33 ft), and 3.2 m (10 ft), respectively, for the 40-cu-inch airgun array, assuming spherical spreading.

### Possible Effects of Bathymetry Echo Sounder Signals

Two types of bathymetry echo sounders are planned to be used for the proposed surveys. The Odom Hydrotrac Digital Echo Sounder is a single beam echo sounder that emits a single pulse of sound directly below the ship along the vessel trackline and provides a continuous recording of water depth along the survey track. The second sonar is a Reson Seabat 8101 Multibeam Echo Sounder, which consists of a transducer array that emits a swath of sound. The seafloor coverage swath of the multibeam sonar is water depth dependent, but is usually equal to two to four times the water depth. Nonetheless both echo sounders produce acoustic signals above 200 kHz which is below any marine mammal species' upper hearing threshold, therefore, NMFS does not believe that there will be any effects on marine mammals as a result from operating these sonars.

### Possible Effects of Sub-bottom Profiler Signals

A high resolution subbottom profiler (GeoAcoustics GeoPulse sub-bottom profiling system or GeoAcoustics GeoChirp II sub-bottom profiling system) and an intermediate frequency seismic profiling system ("boomer") are planned to be used for the proposed surveys.

The frequency range for these high resolution subbottom profilers are 3.5 to 5 kHz for the GeoPulse and 500 Hz to 13 kHz for the GeoChirp II. Either subbottom profiler has a source level at approximately 214 dB re 1 microPa-m (rms). The 160, 170, 180, and 190 dB re 1 microPa (rms) radii, in the beam below the transducer, would be 501 m (1,644 ft), 158 m (520 ft), 50 m (164 ft), and 16 m (52 ft), respectively, for either subbottom profiler, assuming spherical spreading.

The Applied Acoustics Model AA300 intermediate frequency seismic profiler ("boomer") has a maximum energy input of 350 J per shot, though the maximum energy would be used in the surveys is 300 J. The pulse length ranges from 150 msec to 400 msec with a reverberation of less than 1/10 of the initial pulse. The peak in the source level beam reaches 218 dB re 1 microPa-m (or 209 dB re 1 microPa-m (rms)) at 300 J with a frequency range of 500 Hz to 300 kHz. The 160, 170, 180, and 190 dB re 1 microPa (rms) radii, in the beam below the transducer, would be 282 m (925 ft), 89 m (292 ft), 28 m (92 ft), and 9 m (29 ft), respectively, assuming spherical spreading.

The corresponding distances for an animal in the horizontal direction of these transducers would be much smaller due to the direct downward beam pattern of the subbottom profilers. Therefore, the horizontal received levels of 180 and 190 dB re 1 microPa (rms) would be within much smaller radii than 50 m (164 ft) and 16 m (52 ft) when using the GeoAcoustics subbottom profilers, which have the highest downward source level, respectively. In addition, the pulse duration of these subbottom profilers is extremely short, in the order of tens to hundreds of msec, and the survey is constantly moving. Therefore, for a marine mammal to receive prolonged exposure, the animal has to stay in a very small zone of ensonification and keep with the vessel's speed, which is very unlikely.

#### *Possible Effects of Side-Scan Sonar Signals for Seafloor Imagery*

One of the two types of side-scan sonars is planned to be used for the proposed shallow hazard and site clearance surveys for seafloor imagery. The EdgeTech 4200 dual-frequency side scan sonar operates at 120 kHz up to 410 kHz, with source level reaching 210 dB re 1 microPa-m (rms). The 160, 170, 180, and 190 dB re 1 microPa (rms) radii, in the beam below the transducer, would be 316 m (1,037 ft), 100 m (328 ft), 32 m (104 ft), and 10 m (33 ft), respectively, assuming spherical spreading.

The Klein System 3000 dual-frequency digital side-scan sonar emits pulses between 25 msec and 400 msec. The peak in the 132 kHz source level beam reaches 234 dB re 1 microPa-m (or 225 dB re 1 microPa-m (rms)). The peak in the 445 kHz source level beam reaches 242 dB re 1 microPa-m. The 445 kHz frequency band is outside any marine mammal species' hearing range, therefore, there would be no effect to marine mammals when this frequency is chosen. The 160, 170, 180, and 190 dB re 1 microPa (rms) radii, in the beam below the transducer, would be 1,778 m (5,834 ft), 562 m (1,844 ft), 178 m (583 ft), and 56 m (184 ft), respectively, assuming spherical spreading.

Nonetheless, these side scan sonars operate in an extremely high frequency range (over 120 kHz) relative to marine mammal hearing (Richardson *et al.*, 1995; Southall *et al.*, 2007). The frequency range from these side scan sonars is beyond the hearing range of mysticetes (baleen whales) and pinnipeds. Therefore, these sonars are not expected to affect bowhead, gray, humpback, fin, and minke whales and pinniped species in the proposed project area. The frequency range from

these side scan sonars falls within the upper end of odontocete (toothed whale) hearing spectrum (Richardson *et al.*, 1995), which means that they are not perceived as loud acoustic signals with frequencies below 120 kHz by these animals. Therefore, these animals would not react to the sound in a biologically significant way. Further, in addition to spreading loss for acoustic propagation in the water column, high frequency acoustic energies are more quickly absorbed through the water column than sounds with lower frequencies (Urlick, 1983). Therefore, NMFS believes that the potential effects from side scan sonar to marine mammals are negligible.

#### **Numbers of Marine Mammals Estimated to be Taken**

All anticipated takes would be taken by Level B harassment, involving temporary changes in behavior. The proposed mitigation measures to be applied would prevent the possibility of injurious takes.

The methods to estimate take by harassment and present estimates of the numbers of marine mammals that might be affected during the proposed seismic surveys in the Chukchi Sea are described below. The density estimates for cetaceans covered under this IHA area based on the estimates developed by LGL (2006) for the GXT IHA and used here for consistency. However, density estimates for these species were not separated by summer and fall. Rather, in a conservative approach, the higher of the two estimates was selected for use in the analysis. Density estimates on summering bowhead, gray, and beluga whales in the Beaufort and Chukchi seas are based on the data from Moore *et al.* (2000). Density estimates on ringed and bearded in the Chukchi Sea are based on Bengtson *et al.* (2005). Since the Bengtson *et al.* (2005) surveys were focused mainly on the coastal zone within 37 km (23 mi) of the shoreline, some adjustments were made to reflect the animals' density in offshore waters where the site clearance surveys are proposed. Ringed seals were relatively common in nearshore fast ice and pack ice, with lower densities in offshore pack ice; while bearded seals were generally more common in offshore pack ice, with the exception of high bearded seal numbers observed near the shore south of Kivalina. To make the adjustment, the average ringed seal density number (1.62 seals/km<sup>2</sup>) for the year 2000 was used, while the raw density number (0.18 seal/km<sup>2</sup>) for the offshore bearded seals was adopted. In addition, the seal density numbers represent the near-ice animal density, which are higher than open water

densities where the site clearance surveys would be conducted. Therefore, the seal density numbers are overestimates because the survey method focused on animals on ice, not in water.

Specifically, the average estimates of "take" were calculated by multiplying the expected average animal densities by the area of ensonification for the 160 dB re 1 microPa (rms) isopleth for all marine mammals. The area of ensonification was determined by multiplying the total proposed trackline (760 km or 410 nm) times 2 (both sides of the trackline) times the distance to the 160-dB isopleth. The distance to the 160-dB isopleth was estimated as approximately 4,000 m (13,123 ft) with a corresponding area of ensonification of 6,080 km<sup>2</sup> (1,773 nm<sup>2</sup>).

Based on the calculation, it is estimated that up to approximately 7 bowhead, 11 gray, and 21 beluga whales, 9,850 ringed and 1,094 bearded seals would be affected by Level B behavioral harassment as a result of the proposed shallow hazard and site clearance surveys. These take numbers represent 0.06, 0.06, and 0.6 percent of the western Arctic stock of bowhead, eastern North Pacific stock of gray, and eastern Chukchi stock of Beluga whales, respectively; and 3.96 and 0.438 percent of the Alaska stocks of ringed and bearded seal populations within the Chukchi Sea, respectively. These numbers are small relative to the respective species' stock size.

In addition, a numbers of humpback, fin, minke, and killer whales, harbor porpoises, and spotted and ribbon seals could also be affected by Level B behavioral harassment as a result of the proposed marine surveys in the Chukchi Sea. However, since the occurrence of these marine mammals is very rare within the proposed project area in the Chukchi Sea, take numbers cannot be estimated. Nonetheless, NMFS believes their take numbers would be much lower as compared to those marine mammals whose take numbers were calculated.

#### **Potential Impacts to Subsistence Harvest of Marine Mammals**

Subsistence hunting and fishing is historically, and continues to be, an essential aspect of Native life, especially in rural coastal villages. The Inupiat participate in subsistence hunting and fishing activities in and around the Chukchi Sea.

Alaska Natives, including the Inupiat, legally hunt several species of marine mammals. Communities that participate in subsistence activities potentially affected by seismic surveys within Lease Sale 193 are Point Hope, Point Lay,

Wainwright, and Barrow. Marine animals used for subsistence in the proposed area include: bowhead whales, beluga whales, ringed seals, spotted seals, bearded seals, Pacific walrus, and polar bears. Humpback whales are not typically found within the proposed project area of Lease Sale 193. However, during the summer of 2007, both humpback and fin whales were observed or detected as far as the Beaufort Sea (Joling, 2007). In each village, there are key subsistence species. Hunts for these animals occur during different seasons throughout the year. Depending upon the village's success of the hunt for a certain species, another species may become a priority in order to provide enough nourishment to sustain the village.

Point Hope residents subsistence hunt for bowhead and beluga whales, polar bears and walrus. Bowhead and beluga whales are hunted in the spring and early summer along the ice edge. Beluga whales may also be hunted later in the summer along the shore. Walrus are harvested in late spring and early summer, and polar bear are hunted from October to April (MMS, 2007). Seals are available from October through June, but are harvested primarily during the winter months, from November through March, due to the availability of other resources during the other periods of the year (MMS, 2007).

With Point Lay situated near Kasegaluk Lagoon, the community's main subsistence focus is on beluga whales. Seals are available year-round, and polar bears and walrus are normally hunted in the winter. Hunters typically travel to Barrow, Wainwright, or Point Hope to participate in bowhead whale harvest, but there is interest in reestablishing a local Point Lay harvest.

Wainwright residents subsist on both beluga and bowhead whales in the spring and early summer. During these two seasons the chances of landing a whale are higher than during other seasons. Seals are hunted by this community year-round and polar bears are hunted in the winter.

Barrow residents' main subsistence focus is concentrated on biannual bowhead whale hunts. They hunt these whales during the spring and fall. Other animals, such as seals, walrus, and polar bears are hunted outside of the whaling season, but they are not the primary source of the subsistence harvest (URS Corporation, 2005).

The seismic survey could affect subsistence uses particularly if bowhead or beluga whales are permanently deflected away from their migration path. In such a case, a permanent deflection could result in substantial

impacts to Alaska Native communities who rely on these species for their subsistence harvest. However, mitigation measures will be put into place to minimize or avoid completely any adverse effects on all marine mammals. AES has proposed and NMFS will require that no seismic surveys would be conducted in areas where subsistence harvests would occur. Areas being used for subsistence hunting grounds would be avoided. Communication between the project vessels and land-based Com and Call Centers would provide additional insight to current subsistence activities to further ensure that there will be no negative impacts on subsistence activities.

As part of the application for the IHA, AES has developed a Plan of Cooperation (POC) with the Native communities. The POC specifies measures AES would take to minimize adverse effects on marine mammals where proposed activities may affect the availability of a species or stock of marine mammals for arctic subsistence uses or near a traditional subsistence hunting area. The POC has been distributed to the affected subsistence communities.

AES has conducted POC meetings for its seismic operations in the Chukchi Sea in Barrow, Wainwright, Point Lay, and Point Hope, and with the Alaska Eskimo Whaling Commission. Additional meetings will be held with the Alaska Ice Seal Committee, Alaska Beluga Committee, Eskimo Walrus Commission, and Alaska Nanuq Commission prior to operations. At these meetings, AES will present its program and discuss local concerns regarding subsistence activities.

#### **Potential Impacts on Habitat**

The proposed site clearance surveys would not result in any permanent impact on habitats used by marine mammals, or to the food sources they use. The main impact issue associated with the proposed activity would be temporarily elevated noise levels and the associated direct effects on marine mammals, as discussed above.

#### **Monitoring and Mitigation Measures**

##### *Monitoring*

In order to further reduce and minimize the potential impacts to marine mammals from the proposed site clearance surveys, NMFS proposes the following monitoring and mitigation measures to be implemented for the proposed project in Chukchi Sea.

##### (1) Proposed Safety Zones

Based on a 214 dB re 1 microPa-m source sound for the GeoChirp II, the loudest acoustic equipment with sound in the sensitive hearing ranges of marine mammals, and a conservative acoustic modeling approach between spherical and cylindrical (i.e., "15 Log R") to estimate sound propagation loss, the calculated distance to the 180 dB isopleth is approximately 185 m (607 ft), and the distance to the 190 dB isopleth is about 40 m (131 ft). Because these values are based on calculation instead of field measurement during actual operations, NMFS proposes, as a precautionary measure, safety radii of 250 m (820 ft) for cetaceans and 75 m (246 ft) for pinnipeds.

In addition, a 160-dB vessel monitoring zone for bowhead and gray whales shall be established and monitored during all seismic surveys. Whenever an aggregation of 12 or more bowhead whales or gray whales are observed during a vessel monitoring program within the 160-dB safety zone around the seismic activity, the seismic operation will not commence, or will shut down, until two consecutive surveys indicate they are no longer present within the 160-dB safety zone of seismic-surveying operations. The radius of 160-dB isopleth based on modeling is 4,000 m (13,123 ft).

Before the commencement of the shallow hazard and site clearance survey, AES is required to conduct empirical measurements of acoustic sources to be used in the seismic survey and verify the radii of the modeled safety zones at 160, 170, 180, and 190 dB re 1 microPa (rms).

##### (2) Vessel-based Visual Monitoring

Marine mammal monitoring during the site clearance surveys would be conducted by qualified, NMFS-approved marine mammal observers (MMOs). Vessel-based MMOs would be on board the seismic source vessel to ensure that no marine mammals would enter the relevant safety radii of 180 and 190-dB isopleths while noise-generating equipment is operating.

For monitoring of the larger 160-dB safety zone, a chase vessel would be used for monitoring.

##### (3) Communication between Vessel and Shore

Communication of vessel operations and transit would occur in accordance with protocols set forth by the Com and Call Centers proposed to be operated in Barrow, Point Hope, and Point Lay. This would further enable vessel operators to be aware of marine mammals and subsistence activity in the area.

### Mitigation

Proposed mitigation measures include (1) vessel speed or course alteration, provided that doing so will not compromise operational safety requirements, (2) acoustic equipment shut down, and (3) acoustic source ramp up.

#### (1) Speed or Course Alteration

If a marine mammal is detected outside the relevant safety zone but appears likely to enter it based on relative movement of the vessel and the animal, then if safety and survey objectives allow, the vessel speed and/or course would be adjusted to minimize the likelihood of the animal entering the safety zone.

#### Shut down Procedures

If a marine mammal is detected within, or appears likely to enter, the relevant safety zone of the array in use, and if vessel course and/or speed changes are impractical or will not be effective to prevent the animal from entering the safety zone, then the acoustic sources that relate to the seismic surveys would be shut down.

Following a shut down, acoustic equipment would not be turned on until the marine mammal is outside the safety zone. The animal would be considered to have cleared the safety zone if it (1) is visually observed to have left the 250-m or 75-m safety zone, for a cetacean or a pinniped species, respectively; or (2) has not been seen within the relevant safety zone for 15 minutes in the case of odontocetes and pinnipeds, and for 30 minutes in the case of mysticetes. For the aggregation of bowhead or gray whales, the seismic equipment will not be turned on until the aggregation has left the 4,000-m safety zone or the animals forming the aggregation are reduced to fewer than 12 bowhead or gray whales.

Following a shut down and subsequent animal departure as above, the acoustic sources may be turned on to resume operations following ramp-up procedures described below.

#### (3) Ramp-up Procedures

A ramp-up procedure will be followed when the acoustic sources begin operating after a specified period without operations. It is proposed that, for the present survey, this period would be 30 min. Ramp up would begin with the power on of the smallest acoustic equipment for the survey at its lowest power output. The power output would be gradually turned up and other acoustic sources would be added in a way such that the source level would increase in steps not exceeding 6 dB per

5-min period. During ramp-up, the MMOs would monitor the safety zone, and if marine mammals are sighted, decisions about course/speed changes and/or shutdown would be implemented as though the acoustic equipment is operating at full power.

#### (4) Poor Visibility Conditions

AES plans to conduct 24-hr operations. The proposed provisions associated with operations at night or in periods of poor visibility include:

(1) During any nighttime operations, if the entire 180-dB safety radius is visible using vessel lights and/or night vision devices, then start of a ramp-up procedure after a complete shutdown of the airgun array may occur following a 30-min period of observation without sighting marine mammals in the safety zone.

(2) If during foggy conditions or darkness (which may be encountered starting in late August), the full 180-dB safety zone is not visible, the airguns cannot be ramped-up if the seismic source is in a full shutdown mode.

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

#### Data Collection and Reporting

MMOs would record data to estimate the numbers of marine mammals present and to document apparent disturbance reactions or lack thereof. Data would be used to estimate numbers of animals potentially "taken" by harassment. They would also provide information needed to order a shut down of acoustic equipment when marine mammals are within or entering the safety zone.

When a sighting is made, the following information about the sighting would be recorded:

(1) Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, and apparent reaction to the acoustic sources or vessel.

(2) Time, location relative to the acoustic sources, heading, speed, activity of the vessel (including whether and the level at which acoustic sources are operating), sea state, visibility, and sun glare.

The data listed under (2) would also be recorded at the start and end of each observation watch, and during a watch whenever there is a change in one or more of the variables.

A final report will be submitted to NMFS within 90 days after the end of the shallow hazard and site clearance surveys. The report will describe the operations that were conducted and sightings of marine mammals near the operations. The report also will provide full documentation of methods, results, and interpretation pertaining to all monitoring. The report will summarize the dates and locations of seismic operations, and all marine mammal sightings (dates, times, locations, activities, associated seismic survey activities), and the amount and nature of potential take of marine mammals by harassment or in other ways.

#### Endangered Species Act

Under section 7 of the ESA, NMFS has completed consultation with the MMS on the issuance of seismic permits for offshore oil and gas activities in the Beaufort and Chukchi seas. In a Biological Opinion issued on July 17, 2008, NMFS concluded that the issuance of seismic survey permits by MMS and the issuance of the associated IHAs for seismic surveys are not likely to jeopardize the continued existence of threatened or endangered species (specifically the bowhead, humpback, and fin whales) under the jurisdiction of NMFS or destroy or adversely modify any designated critical habitat. The 2008 Biological Opinion takes into consideration all oil and gas related activities that are reasonably likely to occur, including exploratory (but not production) oil drilling activities. In addition, NMFS has issued an Incidental Take Statement under this Biological Opinion which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of bowhead whales.

#### NEPA

In 2006, the MMS prepared Draft and Final PEAs for seismic surveys in the Beaufort and Chukchi Seas. NMFS was a cooperating agency in the preparation of the MMS PEA. On November 17, 2006 (71 FR 66912), NMFS and MMS announced that they were preparing a DPEIS in order to assess the impacts of MMS' annual authorizations under the Outer Continental Shelf 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 (72 FR 15135), the Environmental Protection Agency (EPA) noted the availability for comment of the NMFS/MMS DPEIS. Based upon several verbal and written requests to NMFS for additional time to review the DPEIS, EPA has twice announced an extension of the comment period until July 30, 2007 (72 FR 28044, May 18, 2007; 72 FR 38576, July 13, 2007). Because NMFS has been unable to complete the 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 prepared a SEA which incorporates by reference the 2006 Final PEA and other related documents.

#### **Determination**

Based on the preceding information, and provided that the mitigation and monitoring are incorporated, NMFS has determined that the impact of conducting the shallow hazard and site clearance surveys in Chukchi Sea may result, at worst, in a temporary

modification in behavior of small numbers of certain species of marine mammals. While behavioral and avoidance reactions may be made by these species in response to the resultant noise from the airguns, side-scan sonars, seismic profilers, and other acoustic equipment, these behavioral changes are expected to have a negligible impact on the affected species and stocks of marine mammals. In addition, NMFS has determined that the AES' shallow hazard and site clearance survey would have no unmitigable adverse impact to the subsistence use of marine mammal species and/or stocks.

While the number of potential incidental harassment takes will depend on the distribution and abundance of marine mammals in the area of site clearance operations, the number of potential harassment takings is estimated to be relatively small in light of the population or stock size. NMFS anticipates the actual take of individuals to be lower than the numbers presented in the analysis because those numbers do not reflect either the implementation of the mitigation measures or the fact that some animals will avoid the sound at levels lower than those expected to result in harassment.

In addition, no take by death and/or injury is anticipated, and the potential

for temporary or permanent hearing impairment will be avoided through the incorporation of the required mitigation measures described in this document. This determination is supported by (1) the likelihood that, given sufficient notice through slow ship speed and ramp-up of the acoustic equipment, marine mammals are expected to move away from a noise source that it is annoying prior to its becoming potentially injurious; (2) TTS is unlikely to occur, especially in odontocetes, until levels much above 180 dB re 1 microPa (rms) are reached; and (3) the fact that injurious levels of sound are only likely if an animal is very close to the vessel.

#### **Authorization**

As a result of these determinations, NMFS has issued an IHA to AES for conducting a shallow hazard and site clearance survey in the Chukchi Sea in 2008, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: July 30, 2008.

#### **James H. Lecky.**

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

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