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Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to an Exploration Drilling Program in the Chukchi Sea, Alaska; Notice

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XA811

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to an Exploration Drilling Program in the Chukchi Sea, Alaska

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

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to Shell Gulf of Mexico Inc. (Shell) to take marine mammals, by harassment, incidental to offshore exploration drilling on Outer Continental Shelf (OCS) leases in the Chukchi Sea, Alaska.

DATES: Effective July 1, 2012, through October 31, 2012.

ADDRESSES: A copy of the issued IHA, application with associated materials, and NMFS' Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) may be obtained by writing to Tammy Adams, Acting Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910, telephoning the contact listed below (see **FOR FURTHER INFORMATION CONTACT**), or visiting the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Candace Nachman, Office of Protected Resources, NMFS, (301) 427–8401.

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 small numbers 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 for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), 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 U.S. can apply for an authorization to incidentally take small numbers of marine mammals by 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.

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''].''

Summary of Request

NMFS received an application on June 30, 2011, from Shell for the taking, by harassment, of marine mammals incidental to offshore exploration drilling on OCS leases in the Chukchi Sea, Alaska. NMFS reviewed Shell's application and identified a number of issues requiring further clarification. After addressing comments from NMFS, Shell modified its application and submitted a revised application on September 12, 2011. NMFS carefully evaluated Shell's application, including their analyses, and deemed the application complete. The September 12, 2011, application is the one available for public comment (see **ADDRESSES**) and considered by NMFS for this IHA. NMFS published a Notice of Proposed IHA in the **Federal Register** on November 9, 2011 (76 FR 69958). That notice contained in depth descriptions and analyses that are generally not repeated in this document. Only in cases where descriptions or analyses changed is that information updated here. The most notable changes include: (1) Modifications to the aerial monitoring program presented in the marine mammal monitoring plan; and (2) updated information regarding Shell's Oil Spill Response Plan (OSRP).

Shell plans to drill up to three exploration wells at three possible drill sites and potentially a partial well at a fourth drill site on OCS leases offshore in the Chukchi Sea, Alaska, during the 2012 Arctic open-water season (July through October). Impacts to marine mammals may occur from noise produced by the drillship, zero-offset vertical seismic profile (ZVSP) surveys, and supporting vessels (including icebreakers) and aircraft. Shell requested authorization to take 13 marine mammal species by Level B harassment. However, the narwhal (*Monodon monoceros*) is not expected to be found in the activity area. Therefore, NMFS has authorized take of 12 marine mammal species, by Level B harassment, incidental to Shell's offshore exploration drilling in the Chukchi Sea. These species include: beluga whale (*Delphinapterus leucas*); bowhead whale (*Balaena mysticetus*); gray whale (*Eschrichtius robustus*); killer whale (*Orcinus orca*); minke whale (*Balaenoptera acutorostrata*); fin whale (*Balaenoptera physalus*); humpback whale (*Megaptera novaeangliae*); harbor porpoise (*Phocoena phocoena*); bearded seal (*Erignathus barbatus*); ringed seal (*Phoca hispida*); spotted seal (*P. largha*); and ribbon seal (*Histriophoca fasciata*).

Description of the Specified Activity and Specified Geographic Region

Shell plans to conduct an offshore exploration drilling program on U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM, formerly the Minerals Management Service) Alaska OCS leases located greater than 64 mi (103 km) from the Chukchi Sea coast during the 2012 open-water season. The leases were acquired during the Chukchi Sea Oil and Gas Lease Sale 193 held in February 2008. During the 2012 drilling program, Shell plans to drill up to three exploration wells at three drill sites and potentially a partial well at a fourth drill site at the prospect known as Burger. See Figure 1–1 in Shell's application for the lease block and drill site locations

(see **ADDRESSES**). All drilling is planned to be vertical.

The Notice of Proposed IHA (76 FR 69958, November 9, 2011) contained a full description of Shell's planned operations. That notice describes the equipment to be used for the different operational activities, the timeframe of activities, and the sound characteristics of the associated equipment. Except to clarify changes to the information contained in the proposed IHA notice, the information is not repeated here; therefore, please refer to the proposed IHA for the full description of the specified activity and specified geographic region.

Drilling Vessel

Shell intends to use the ice strengthened drillship *Discoverer* to drill the wells. The Notice of Proposed IHA (76 FR 69958, November 9, 2011) included the incorrect maximum anchor radius for the 8-point anchored mooring system. While on location at the Burger prospect drill sites, the maximum anchor radius is anticipated to be 2,609–2,904 ft (795–885 m).

Comments and Responses

A Notice of Proposed IHA published in the **Federal Register** on November 9, 2011 (76 FR 69958) for public comment. During the 30-day public comment period, NMFS received 10 comment letters from the following: the Alaska Eskimo Whaling Commission (AEWC); Inupiat Community of the Arctic Slope (ICAS); the Marine Mammal Commission (MMC); State of Alaska Department of Natural Resources; Consumer Energy Alliance; Resource Development Council; the North Slope Borough (NSB); BOEM; Shell; and Alaska Wilderness League (AWL), Audubon Alaska, Center for Biological Diversity, Defenders of Wildlife, Earthjustice, Natural Resources Defense Council, Northern Alaska Environmental Center, Ocean Conservancy, Oceana, Pacific Environment, Resisting Environmental Destruction on Indigenous Lands, Sierra Club, the Wilderness Society, and World Wildlife Fund (collectively ''AWL''), along with an attached letter from David E. Bain, Ph.D.

AWL submitted several journal articles and documents as attachments to their comment letter. NMFS acknowledges receipt of these articles and documents but does not intend to address each one specifically in the responses to comments. All of the public comment letters received on the Notice of Proposed IHA (76 FR 69958, November 9, 2011) are available on the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Following are the public comments and NMFS' responses.

General Comments

Comment 1: Shell notes that the proposed IHA states that the IHA application was submitted by Shell Offshore Inc. when in fact it was submitted by Shell Gulf of Mexico Inc.

Response: NMFS has corrected this error. It does not change any analyses.

Comment 2: Shell notes that the proposed IHA contained the wrong anchor radius information for the *Discoverer* at the Burger prospect.

Response: NMFS has updated that information in the description found earlier in this document. Because the radius is smaller than what was contained in the proposed IHA, it does not alter the analysis.

Comment 3: Shell notes that the community of Point Hope is located approximately 206 mi (332 km) from the Burger prospect, not 180 mi (290 km) as indicated in the proposed IHA.

Response: NMFS has updated that information in this notice. Because the distance is farther, it does not alter the analysis.

Comment 4: The State of Alaska Department of Natural Resources, Consumer Energy Alliance, and Resource Development Council all urge NMFS to finalize Shell's IHA since NMFS has issued the proposed IHA.

Response: After careful evaluation of all comments and the data and information available regarding potential impacts to marine mammals and their habitat and to the availability of marine mammals for subsistence uses, NMFS has issued the final authorization to Shell to take marine mammals incidental to conducting an exploration drilling program in the Chukchi Sea during the 2012 Arctic open-water season.

Comment 5: ICAS incorporates the comments made by the AEWC into its letter by reference and urges NMFS to address the concerns of AEWC and its whaling captains.

Response: All comments made by the AEWC are addressed in this document.

Comment 6: The NSB stated in their letter that comments made previously on Shell's IHA applications for seismic and drilling are still applicable and are incorporated by reference into their letter dated December 9, 2011.

Response: NMFS has responded to comments on Shell's seismic IHA requests in previous **Federal Register** notices. Those responses are incorporated into this document by reference (*e.g.*, 73 FR 66106, November 6, 2008; 74 FR 55368, October 27, 2009; 75 FR 49710, August 13, 2010). The NSB submitted letters regarding Shell's proposed Camden Bay exploration drilling programs for the years 2007, 2008, and 2010. Shell did not request (and NMFS did not propose to issue or issue) IHAs for exploratory drilling programs in the Chukchi Sea in 2007 and 2008. Shell did request an IHA (and NMFS published a Notice of Proposed IHA) for a 2010 exploratory drilling program in the Chukchi Sea. However, the NSB did not submit a letter regarding that program. NMFS has only provided responses to comments contained in the 2007, 2008, and 2010 letters that are different from comments in the NSB's 2011 letter on this IHA. Additionally, some of the comments in those three earlier letters are no longer relevant to Shell's program as currently proposed in this document.

MMPA Statutory Concerns

Comment 7: The NSB states that the proposed IHA does not demonstrate that Shell's activities will take only a small number and have only a negligible impact on the species or stock. Additionally, the proposed IHA fails to distinguish between these two standards.

Response: NMFS is required to authorize the take of ''small numbers'' of a species or stock if the taking by harassment will have a negligible impact on the affected species or stocks and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence purposes. See 16 U.S.C. 1371(a)(5)(D). In determining whether to authorize ''small numbers'' of a species or stock, NMFS determines that the taking will be small relative to the estimated population size and relevant to the behavior, physiology, and life history of the species or stock. With the exception of killer and minke whales, less than 1% of each species stock or population would be taken by Level B harassment incidental to Shell's activities. The modeling results indicate that only 1.2–1.85% of the minke whale population and 2.3% of the killer whale population would be taken by Level B harassment. NMFS is confident that takes resulting from Shell's activities will constitute only a ''small number'' of affected species or stocks for the following reasons:

(1) In all of the modeling submitted by Shell, a 1.5x correction factor was included;

(2) The estimated take levels do not mean that those numbers will *actually* be ''taken'' by Level B behavioral harassment. Some marine mammal species, such as bowheads, may engage

in avoidance behavior preventing their exposure to these levels of sound, and, even if exposed, may not exhibit a behavioral reaction; and

(3) The modeling results do not take into account the implementation of mitigation measures, which will lower the number of animals taken even further.

In making a negligible impact determination, NMFS considers a variety of factors, including: (1) The number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the takes occur. NMFS has determined that Shell's activities will not result in injury or mortality of marine mammals. The proposed IHA analyzed the number, nature, intensity, and duration of the Level B harassment that may occur and the context in which it may occur. That analysis led us to make a negligible impact finding.

Comment 8: The AEWC and AWL state that NMFS cannot make a negligible impact determination without considering other activities planned for this year and future years in the U.S. Arctic Ocean and Russian and Canadian waters. AWL states that NMFS should also evaluate the potential impacts of future activities in both oceans and the acknowledged uncertainty regarding the effects of noise in the marine environment in the context of subsistence hunting.

Response: NMFS considered the cumulative effects analysis contained in NMFS' Draft Environmental Impact Statement (EIS) on the ''Effects of Oil and Gas Activities in the Arctic Ocean'' (NMFS, 2011), NMFS' EA for the ''Issuance of Incidental Harassment Authorizations for the Take of Marine Mammals by Harassment Incidental to Conducting Exploratory Drilling Programs in the U.S. Beaufort and Chukchi Seas,'' and other relevant data to inform its MMPA determination here. Pursuant to the National Environmental Policy Act (NEPA), those documents contained a cumulative impacts assessment, as well as an assessment of the impacts of the proposed exploratory drilling program on marine mammals and other protected resources.

Section 101(a)(5)(D) of the MMPA and its implementing regulations require NMFS to consider a request for the taking of marine mammals incidental to *a specified activity* within a specified geographical region and, assuming certain findings can be made, to authorize the taking of small numbers of marine mammals while engaged in that activity. NMFS has defined ''specified activity'' in 50 CFR 216.103 as ''any activity, other than commercial fishing, that takes place in a specified geographical region and potentially involves the taking of small numbers of marine mammals.'' When making a negligible impact determination, NMFS considers the total impact during each 1-year period resulting from the specified activity only and supports its determination by relying on factors such as: (1) The number of anticipated mortalities from the activity; (2) the number and nature of anticipated injuries from the activity; (3) the number, nature, intensity, and duration of Level B harassment resulting from the activity; (4) the context in which the takes occur; (5) the status of the species or stock; (6) environmental features that may significantly increase the potential severity of impacts from the proposed action; (7) effects on habitat that could affect rates of recruitment or survival; and (8) how the mitigation measures are expected to reduce the number or severity of takes or the impacts to habitat. When making its finding that there will be no unmitigable adverse impact on the availability of the affected species or stock for taking for subsistence uses, NMFS analyzes the measures contained in the applicant's Plan of Cooperation (POC). Additionally, Shell signed the 2012 Conflict Avoidance Agreement (CAA) with the AEWC. NMFS included all necessary measures from both documents in the IHA to ensure no unmitigable adverse impacts to subsistence.

NMFS considered the impacts analyses (*i.e.,* direct, indirect, and cumulative) contained in the previously mentioned EIS and EA in reaching its conclusion that any marine mammals exposed to the sounds produced by the drillship, ice management/icebreaking vessels, support vessels and aircraft, and airguns would be disturbed for only a short period of time and would not be harmed or killed. Furthermore, the required mitigation and monitoring measures are expected to reduce the likelihood or severity of any impacts to marine mammals or their habitats over the course of the activities.

Moreover, NMFS gave careful consideration to a number of other issues and sources of information. In particular, NMFS relied upon a number of scientific reports, including the 2010 U.S. Alaska Marine Mammal Stock Assessment Reports (SARs) to support its findings. The SARs contain a description of each marine mammal stock, its geographic range, a minimum population estimate, current population trends, current and maximum net productivity rates, optimum sustainable population levels and allowable removal levels, and estimates of annual human-caused mortality and serious injury through interactions with commercial fisheries and subsistence harvest data. NMFS also used data from the annual and final Bowhead Whale Aerial Survey Program (BWASP) and Chukchi Offshore Monitoring in Drilling Area (COMIDA) reports.

After careful consideration of the proposed activities, the context in which Shell's proposed activities would occur, the best available scientific information, and all effects analyses (including cumulative effects), NMFS has determined that the specified activities: (1) Would not result in more than the behavioral harassment (*i.e.,* Level B harassment) of small numbers of marine mammal species or stocks; (2) the taking by harassment would not result in more than a negligible impact on affected species or stocks; and (3) the taking by harassment would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. Therefore NMFS has decided to issue an IHA to Shell to take, by no more than Level B harassment, small numbers of marine mammals incidental to its Chukchi Sea exploratory drilling program.

Comment 9: The MMC recommends that NMFS require Shell to evaluate the source levels of the *Discoverer* at the proposed drilling location and recalculate the 120-dB re 1 μPa harassment zone and estimated takes, as appropriate.

Response: As conditioned in the IHA, Shell is required to conduct sound source verification and characterization of the equipment to be used, including the drilling rig. Shell is required to report received levels down to 120 dB re 1 μPa. Upon completion of those tests, Shell will then use the new sound radii for estimating take throughout the season. While new take estimates will not be calculated to replace those in the application, Shell will use the new radii for reporting estimated take levels in the 90-day report.

Comment 10: The NSB and AWL state that NMFS must consider whether the increase in vessel presence and vessel noise around the drill sites and during transit across the Arctic have the potential to disturb marine mammals.

Response: Shell's application and NMFS' Notice of Proposed IHA (76 FR 69958, November 9, 2011) outline all of the vessels intended for use to support the exploratory drilling program. While the application and proposed IHA do not include source levels or take estimates for those vessels, their

presence is considered and accounted for in several of the mitigation measures. For example, vessel speed and maneuvering conditions apply to all vessels, not just the drill ship and icebreakers. Therefore, while NMFS contemplated the use of all vessels during activities and has included mitigation measures during operation of these vessels to reduce potentially disturbing marine mammals in the vicinity, NMFS does not consider the transit or operation of these vessels to rise to a level that would result in take.

Comment 11: The NSB (in its 2008 letter) and AWL state that a lack of adequate information precludes NMFS from complying with the MMPA standards. AWL states that NMFS should defer all oil and gas-related IHAs while the necessary information is gathered.

Response: As required by the MMPA implementing regulations at 50 CFR 216.102(a), NMFS has used the best scientific information available in assessing potential impacts and whether the activity will have no more than a negligible impact on the affected marine mammal species or stock (see response to *Comment 7*). However, while NMFS agrees that there may be some uncertainty regarding behavior of animals that have been previously exposed to industrial sounds and how that may impact survival and reproduction, the best available information supports our findings.

Industrial activities have been occurring (at varying rates) in the U.S. Arctic Ocean for decades, and the available measurable indicators do not suggest that these activities are having long-term impacts. For example, bowhead whales continued to increase in abundance during periods of intense seismic activity in the Chukchi Sea in the 1980s (Raftery *et al.,* 1995; Angliss and Outlaw, 2007), even without implementation of current mitigation requirements. Additionally, industry has been collecting data and conducting monitoring in the region for many years and will continue to do so under this IHA. Therefore, NMFS has determined that a negligible impact finding is rational.

Comment 12: AWL and the NSB (in its 2008 letter) note that Shell's activities have the potential to result in serious injury. AWL also states that in the proposed IHA, NMFS conflated two different regulatory provisions governing the issuance of IHAs when it stated that for there to be the potential for serious injury or mortality an activity must be ''reasonably expected or likely'' to result in serious injury or mortality. AWL's letter states: ''There is no indication that NMFS considered the dire consequences of a spill when determining whether the 'potential' for serious harm exists * * * Applying the proper standard, NMFS cannot conclude that Shell may proceed with an IHA.''

Response: As analyzed in the proposed IHA, NMFS has determined that Shell's activities are not likely to result in injury, serious injury, or mortality. The activities for which Shell is authorized to take marine mammals would most likely result in behavioral harassment. The mitigation and monitoring measures analyzed in the proposed IHA and required in the authorization are designed to ensure the least practicable impact on marine mammals and their habitat and the availability of marine mammals for subsistence uses.

AWL cites to NMFS' definition of ''negligible impact'' to argue that the agency has improperly conflated separate regulatory standards. ''Negligible impact is 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'' (50 CFR 216.103).

NMFS believes its decision-making should be informed by whether impacts are actually reasonably likely to occur. This principle is recognized in multiple contexts, and this does not represent the conflation of separate regulatory standards (in this instance, ''negligible impact'' and ''potential to result in serious injury or mortality''). It is well recognized in the cases interpreting NEPA. For example see *Ground Zero Ctr. for Non-Violent Action* v. *United States Dept of the Navy,* 383 F.3d 1082, 1090–91 (9th Cir. 2004) (concluding that where Navy had concluded that risk was extremely remote, ''such remote possibilities do not in law require environmental evaluation.'') As explained later in this document, this interpretation reflects NMFS' longstanding practice of issuing IHAs in cases where the agency found that the potential for serious injury or mortality was ''highly unlikely'' (*See* 73 FR 40512, 40514, July 15, 2008; 73 FR 45969, 45971, August 7, 2008; 73 FR 46774, 46778, August 11, 2008; 73 FR 66106, 66109, November 6, 2008; 74 FR 55368, 55371, October 27, 2009). Interpreting ''potential'' to include impacts with any probability of occurring (*i.e.,* speculative or extremely low probability events) would be administratively unworkable and inconsistent with Congressional intent. NMFS' proposed IHA considered the risks of an oil spill in its analysis and used that analysis to make the final determinations here.

Comment 13: BOEM asks that NMFS clarify how Shell will avoid violating condition 3(b) in the IHA, which specifies that take of any species not listed in the IHA is prohibited and that such take ''may result in the modification, suspension or revocation'' of the IHA, given that Shell will be flying marine mammal monitoring flights below 1,500 ft (457 m) in areas where walrus or polar bears might be present.

Response: NMFS only has the authority to prescribe IHA conditions on species for which it has jurisdiction. Both the walrus and the polar bear are managed by the U.S. Fish and Wildlife Service (USFWS). Therefore, condition 3(b) does not refer to those two species. Moreover, NMFS' requirement to conduct marine mammal monitoring aerial surveys does not preclude Shell from complying with more stringent restrictions and conditions imposed by other Federal agencies. NMFS' IHA states that flights cannot be flown below 1,500 ft (457 m) except in certain circumstances. The IHA does not require that the flights must be flown below 1,500 ft (457 m) in those circumstances.

Comment 14: BOEM notes that the draft IHA does not provide limits of incidental take to species nor require Shell to not exceed those limits. BOEM recommends that NMFS clarify to what extent Shell would or should monitor/report their incidental take on a more regular basis so to not exceed a specified authorized incidental take prior to submission of the draft 90-day report.

Response: Table 8 in the Notice of Proposed IHA (76 FR 69958, November 9, 2011) outlined the levels of proposed take. The final table of the authorized take levels is included as an attachment to the issued IHA. Additionally, the IHA also includes a condition requiring Shell to submit daily marine mammal observation logs to NMFS.

Marine Mammal Impact Concerns

Comment 15: The MMC recommends that NMFS require Shell to collect all new and used drilling muds and cuttings and either reinject them or transport them to an Environmental Protection Agency licensed treatment/disposal site outside the Arctic. The NSB and AWL also note that Shell should be required to have a near zero discharge policy in the Chukchi Sea, similar to what Shell will employ in the Beaufort Sea, in order to ensure the least practicable impact to marine mammals, their habitat, and subsistence hunters.

Response: Shell's collection of drilling mud and cuttings and certain other waste streams is a voluntary decision on the part of the company for its Beaufort Sea exploratory drilling program. Shell will not be conducting such a program in the Chukchi Sea, a practice that is consistent with both the current Arctic Oil and Gas Exploration General Permit and the draft General Permit being considered by the U.S. Environmental Protection Agency. The discharge of drilling related effluents has been extensively studied in both temperate and Arctic regions (Neff, 2010) and, when employing water based muds, is generally considered to be of slight environmental impact. The removal of muds, cuttings, and other effluent streams from exploration drilling requires additional vessels, which results in additional vessel traffic and related noise (which can in turn increase the potential for vessel-marine mammal interactions and vessel-related air emissions). Given the concerns raised with respect to the cumulative impacts of vessel traffic in the Arctic, the speculative benefits of waste stream removal do not warrant imposing such a requirement on Shell in the Chukchi Sea. Shell will, however, collect water and other samples in both seas before, during, and after the drilling programs in order to study sediment and water chemistry, the biotic community, deposition, and bioaccumulation. The collection of these samples will repeat evaluations at the localized drill sites that have been conducted as part of the Joint Industry Monitoring Program for several years. NMFS has determined that even without requiring such a measure, Shell's activities will have a negligible impact on marine mammal species or stocks and will not have an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses.

Comment 16: AWL states that NMFS' uniform marine mammal harassment thresholds do not consider documented reactions of specific species in the Arctic to much lower received levels. The letter notes reactions of bowhead and gray whales to certain activities emitting impulse sounds below 160 dB and of beluga and bowhead whales and harbor porpoise reacting to other sound sources below 120 dB. The letter also states: ''At a minimum, any final IHA cannot apply thresholds that fail to accurately capture potential marine mammal harassment, as required by the standards imposed by the MMPA.'' Similarly, Dr. Bain notes marine mammal reactions, and especially those of beluga whales and harbor porpoises, to sounds below NMFS' 160 dB and 120 dB thresholds.

Response: For continuous sounds, such as those produced by drilling operations and during icebreaking activities, NMFS uses a received level of 120-dB (rms) to indicate the onset of Level B harassment. For impulsive sounds, such as those produced by the airgun array during the ZVSP surveys, NMFS uses a received level of 160-dB (rms) to indicate the onset of Level B harassment. Therefore, while a level of 160-dB was used to estimate take for a portion of the operations that will only occur for a total of 10–56 hours, depending on how many wells are drilled, during the entire 4-month open-water season, a threshold of 120-dB was used to estimate potential takes for all species from the drilling operations and ice management/icebreaking activities.

While some published articles indicate that certain marine mammal species may avoid seismic airguns (an impulsive sound source) at levels below 160 dB, NMFS does not consider that these responses rise to the level of a take, as defined in the MMPA. While studies, such as Miller *et al.* (1999), have indicated that some bowhead whales may have started to deflect from their migratory path 21.7 mi (35 km) from the seismic source vessel, it should be pointed out that these minor course changes are during migration and have not been seen at other times of the year and during other activities. To show the contextual nature of this minor behavioral modification, recent monitoring studies of Canadian seismic operations indicate that feeding, non-migratory bowhead whales do not move away from a noise source at a sound pressure level (SPL) of 160 dB. Therefore, while bowheads may avoid an area of 12.4 mi (20 km) around a noise source, when that determination requires a post-survey computer analysis to find that bowheads have made a 1 or 2 degree course change, NMFS does not consider that deviation to rise to a level of a ''take,'' as the change in bearing is due to animals sensing the noise and avoiding passage through the ensonified area during their migration and should not be considered as being displaced from their habitat. NMFS therefore continues to estimate ''takings'' under the MMPA from impulse noises, such as seismic, as being at a distance of 160 dB (re 1 μPa).

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 reaction would be considered a take. According to experts on marine mammal behavior, whether a particular stressor could potentially disrupt the migration, breathing, nursing, breeding, feeding, or sheltering, etc., of a marine mammal, *i.e.,* whether it would result in a take, 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: 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 120-dB and 160-dB acoustic criteria are generalized thresholds based on the available data that is intended to assist in the accurate assessment of take while acknowledging that sometimes animals will respond at received levels below that and sometimes they will not respond in a manner considered a take at received levels above 120 dB.

Comment 17: AWL notes that there is a lack of information regarding bowhead aggregations and feeding in the area. ''Given the lack of information, the proposed IHA should not simply assume that the 'closest primary feeding ground' is near Point Barrow.'' They state that there is evidence of bowheads frequenting the area around Point Franklin. Dr. Bain also states that excluding whales from feeding areas effectively reduces the carrying capacity, which in turn reduces the rate of population increase and is equivalent to removing individuals from the population; therefore, a shift in feeding locations would not be harmless.

Response: Most bowhead whales will be in the Canadian Beaufort Sea when Shell begins operations in July. The fall westward migration begins in late August/early September through the Beaufort Sea and then into the Chukchi Sea. The Barrow area is commonly used as a feeding area during spring and fall, with a higher proportion of photographed individuals displaying evidence of feeding in fall rather than spring (Mocklin, 2009). A bowhead whale feeding ''hotspot'' (Okkonen *et al.,* 2011) commonly forms on the western Beaufort Sea shelf off Point Barrow in late summer and fall. Favorable conditions concentrate euphausiids and copepods, and bowhead whales congregate to exploit the dense prey (Ashjian *et al.,* 2010,

Moore *et al.,* 2010; Okkonen *et al.,* 2011). Bowheads will reach this feeding ground in the fall prior to entering the area ensonified by Shell's Chukchi Sea operations. Although Shell will be conducting a similar operation in the Camden Bay area of the Beaufort Sea, whales that begin their migration into U.S. waters earlier in the season, will avoid sounds from Shell's operations, as activities will cease in the Beaufort Sea on August 25 until the close of the fall hunts at Kaktovik and Cross Island.

The COMIDA 2008–2010 Final Report (Clarke *et al.,* 2011) notes sightings of bowhead whales in the Chukchi Sea in all months that surveys were flown (June through November), except November. Sighting rates were highest in October; however, there were no specific areas where whales were concentrated each year (Clarke *et al.,* 2011). All feeding was observed close to shore between Point Franklin and Barrow, Alaska, in June, July, and September of 2009 (Clarke *et al.,* 2011), which is more than 65 mi (105 km) from Shell's Burger prospect. There were no observations of feeding in the areas near Shell's proposed drill sites.

Moreover, while some whales may avoid the area around Shell's drilling program because of the increased sound levels while operations are ongoing, there has also been evidence that some bowheads continued feeding in close proximity to seismic sources (*e.g.,* Richardson, 2004). The sounds produced by the drillship are of lower intensity than those produced by seismic airguns. Therefore, if animals remain in ensonified areas to feed, their feeding opportunity would not be missed, and they would be in areas where the sound levels are not high enough to cause injury (as discussed in greater detail later in this document). In accordance with NMFS' implementing regulations at 50 CFR 216.102(a), NMFS used the best available science to make the requisite findings for issuance of the IHA. That information indicates that there will not be concentrated feeding at the Burger prospect and that Shell's activities will not negatively affect bowhead feeding in the vicinity of Shell's proposed activities.

Comment 18: Dr. Bain states that the increase in vessel traffic associated with Shell's project increases the risk of ship strike. AWL also notes that the risk of a vessel strike or the effects of a large oil spill could lead to serious injury. Additionally, missing information precludes full assessment of the effects of a large oil spill on bowheads may alter how NMFS assesses the potential for serious injury or death.

Response: NMFS acknowledges that there is always some risk of a ship strike whenever a vessel transits the ocean. However, the IHA requires Shell to implement several mitigation measures applicable to vessel operation (*e.g.,* speed restrictions in the presence of marine mammals or in inclement weather, avoiding multiple changes in direction when within 300 yards [274 m] of whales) to reduce further the low probability of a ship strike.

Again, in accordance with NMFS implementing regulations, we used the best information available to assess potential impacts from an oil spill in the proposed IHA. NMFS' EA also assesses impacts from a large oil spill and incorporates information by reference from other recently released NEPA documents by BOEM regarding the potential for and impacts of a large oil spill on the marine environment. Also, please see the response to *Comment 12* regarding the ''potential'' impact from activities. NMFS determined that there is not a risk of serious injury or death to occur from Shell's *specified activity* and therefore issuance of an IHA under the MMPA is appropriate.

Comment 19: AWL and Dr. Bain note that potential impacts on females and calves merit ''special consideration,'' as they will migrate through the Chukchi Sea during the fall migration. NMFS must examine whether bowhead cow/calf pairs will suffer from Shell's activities and whether that could result in a greater degree of harm that would warrant specific mitigation measures.

Response: NMFS discussed potential impacts to bowhead whales, including cow/calf pairs in the Notice of Proposed IHA (76 FR 69958, November 9, 2011). In the section that discussed potential impacts to marine mammals from the specified activity, NMFS described data from studies that included observations and reactions (or lack thereof) of cow/calf pairs to different anthropogenic activities. Mitigation measures are required in the IHA during vessel transits (*e.g.,* speed restrictions, avoiding multiple changes in direction when within 300 yards [274 m] of whales) through the Chukchi Sea and from shore to the drill sites. These measures will ensure that potential impacts are reduced to the lowest level practicable. Moreover, Shell will not enter the Chukchi Sea prior to July 1, after the conclusion of the spring bowhead whale migration.

As noted earlier in this document, the fall migration westward through the Beaufort Sea and into the Chukchi Sea does not begin until late August/early September. Koski and Miller (2004) found that mother/calf bowhead pairs were the last to enter the U.S. Beaufort Sea during the fall migration (typically arriving in September and lasting into October). Therefore, if mother/calf pairs are not arriving in the central Beaufort Sea until later in the migration, they would not reach the Chukchi Sea lease sale area until later in the season. Therefore, it is likely that Shell's activities will be nearing completion, if not already completed for the season before the majority of the mother/calf pairs reach that area of the Chukchi Sea.

AWL cites to previous NMFS and BOEM documents, which include mitigation measures specifically applicable to bowhead cow/calf pairs. However, these pertained to seismic surveys or other programs in the Beaufort Sea. As has been noted elsewhere in this document and the proposed IHA, sounds produced during seismic surveys are different than those produced during drilling operations. It was determined that such measures were not necessary for these operations. Additionally, as has been noted for previous actions in the Chukchi Sea lease sale area, conducting such mitigation measures is impracticable for applicant implementation. Based on the fact that few cow/calf pairs are likely to occur within the 120-dB ensonified area of Shell's operations and the protection afforded by the already required mitigation measures, additional measures are not necessary to ensure the least practicable impact on bowhead cow/calf pairs.

Comment 20: AWL states that NMFS must consider potential effects on beluga mothers and calves and must evaluate whether enough is known about beluga habitat use to accurately predict the degree of harm expected from Shell's operations. The proposed IHA's negligible impact assessment provides very little discussion of beluga whales. Moreover, the proposed IHA appears to rely on a population estimate for the Beaufort Sea stock rather than the significantly smaller Chukchi Sea stock even though both stocks are found in the Chukchi Sea during the fall. Dr. Bain also notes that work will be underway while belugas are nursing and caring for calves.

Response: As noted in responses to earlier comments in this document, as required by the MMPA implementing regulations at 50 CFR 216.102(a), NMFS has used the best scientific information available in assessing potential impacts and whether the activity will have no more than a negligible impact on the affected marine mammal species or stock. While NMFS agrees that there may be some uncertainty regarding spatial and temporal habitat needs of

belugas, the best available information supports our findings.

While Shell's exploratory drilling program will overlap temporally with the beluga calving season, it will not overlap spatially. Tagging data from the 1990s indicates that belugas from the eastern Beaufort Sea stock will be in Canadian waters (*i.e.,* Mackenzie Delta and Amundsen Gulf) in the summer (July and August) and do not start migrating through the Beaufort Sea until September but do so far offshore (Richard *et al.,* 2001; DFO, 2000). In the summer months, belugas from the eastern Chukchi Sea stock are typically found in Kasegaluk Lagoon and Kotzebue Sound (Suydam *et al.,* 2001), locations that are approximately 100 mi (161 km) or more south of the Burger prospect. Shell will transit far offshore so as not to disturb the summer beluga hunts conducted in Kasegaluk Lagoon and therefore will avoid interactions with mothers and calves. Tagging data of belugas from this stock have also indicated that they travel far offshore in the Beaufort Sea to Canadian waters later in the summer (Suydam *et al.,* 2001). Based on this information, it is unlikely that many beluga mother/calf pairs will pass within the 120-dB isopleths of Shell's Chukchi Sea exploratory drilling program. Mitigation and monitoring measures will ensure that impacts to any belugas that do occur in the vicinity of the program will be at the lowest level practicable.

Comment 21: AWL states that NMFS must consider whether Shell's ice management efforts have the potential to seriously injure or kill ringed seals resting on pack ice.

Response: NMFS considered the potential impacts of Shell's ice management efforts to ringed seals resting on pack ice in the Notice of Proposed IHA (76 FR 69958, November 9, 2011) in the section regarding anticipated effects on marine mammal habitat. AWL also references the MMS 2008 Draft EIS for the Beaufort Sea and Chukchi Sea Planning Areas Oil and Gas Lease Sales 209, 212, 217, and 221 (MMS, 2008), which includes a reference to Reeves (1998). Reeves (1998) noted that some ringed seals have been killed by icebreakers moving through fast-ice breeding areas. In the proposed IHA analysis, NMFS considered this information and noted that since Shell's use of the icebreakers would occur outside of the ringed seal breeding and pupping seasons in the Chukchi Sea, serious injury or mortality from use of the icebreakers would not occur.

Limited ice breaking might be needed to assist the fleet in accessing/exiting the project area if large amounts of ice pose a navigational hazard. Ice seals have variable responses to ice management activity. Alliston (1980, 1981) reported icebreaking activities did not adversely affect ringed seal abundance in the Northwest Territories and Labrador. Brueggeman *et al.* (1992) reported ringed seals and bearded seals diving into the water when an icebreaker was 0.58 mi (0.93 km) away. However, Kanik *et al.* (1980) reported that ringed seals remained on sea ice when an icebreaker was 0.62–1.24 mi (1–2 km) away.

The drill site is expected to be mostly ice-free during July, August, and September, and the need for ice management should be infrequent. The presence of an icebreaker is primarily a safety precaution to protect the drill ship from damage. Ice seals could be on isolated floes that may need to be managed for safety. Any ice seals on floes approaching the drill ship may be disturbed by ice management activities. Ringed seals on an ice floe are anticipated to enter the water before the icebreaker contacts the ice, remain in the water as the ice moves past the drill ship, and could reoccupy ice after it has moved safely past the drill ship. As was discussed in the proposed IHA, NMFS determined that this activity and these reactions would result in Level B harassment. NMFS did not determine that there was a potential for serious injury or morality to occur from Shell's ice management efforts.

Comment 22: Dr. Bain states that noise exposure can lead to stress, which can impair the immune system and result in an increase in mortality from disease. He also notes that impairing the energy balance can slow growth, delay onset of sexual maturity, and increase the interval between successful births, all of which can cause a reduction in the number of animals recruited to the population.

Response: While deflection may cause animals to expend extra energy, there is no evidence that deflecting around oil and gas exploration activities (or other anthropogenic activities) is causing a significant behavioral change that will adversely impact population growth. In fact, bowhead whales continued to increase in abundance during periods of intense seismic activity in the Chukchi Sea in the 1980s (Raftery *et al.,* 1995; Allen and Angliss, 2011). Additionally, as mentioned in the response to *Comment 17,* all feeding was observed close to shore between Point Franklin and Barrow, Alaska, in June, July, and September of 2009 (Clarke *et al.,* 2011), which is more than 65 mi (105 km) from Shell's Burger prospect. There were no observations of feeding in the areas near Shell's proposed drill sites. Regarding recruitment of calves to the population, the count of 121 calves during the 2001 census was the highest yet recorded and was likely caused by a combination of variable recruitment and the large population size (George *et al.,* 2004). The calf count provides corroborating evidence for a healthy and increasing population. Based on this information, NMFS does not expect Shell's activities to impact annual rates of recruitment or survival within the Western Arctic bowhead stock.

Comment 23: Dr. Bain states that hearing loss or masking from exposure to high levels of noise would impair bowhead whales' ability to hear vocalizations. He also states that hearing loss and masking would increase vulnerability to predation or ship strike, which in turn could increase mortality.

Response: As noted in the proposed IHA, the source level of the *Discoverer* is lower than the thresholds used by NMFS for the onset of auditory injury. Shutdown and power-down measures are required in the IHA when the airguns are in use to help reduce further the extremely low likelihood of temporary threshold shift (a Level B harassment). As noted in the proposed IHA, masking effects are anticipated to be limited. Annual acoustic monitoring near BP's Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (for examples, see Richardson *et al.,* 2007; Aerts and Richardson, 2008). To compensate for and reduce masking, some mysticetes may alter the frequencies of their communication sounds (Richardson *et al.,* 1995a; Parks *et al.,* 2007). Additionally, if some individuals avoid the drilling area, impacts from masking will be even lower. There is no evidence to suggest that any masking would increase the likelihood of death.

Comment 24: Dr. Bain states that even though the bowhead population increased in the face of industry activity in the 1990s, an increase in disturbance now (while it appears close to carrying capacity) could result in slowed growth or a loss of individuals.

Response: Based on information provided in the responses to other comments in this section, NMFS does not agree that population growth would be slowed as a result of Shell's proposed activity or increase the numbers of individuals lost. There are no data indicating that the population cannot continue to grow (as it has for over a decade) in the face of such activities.

Shell's activities will occur in a small portion of the bowheads' range.

Comment 25: Dr. Bain notes that masking of beluga whale echolocation signals by noise, and temporary and permanent threshold shifts will impair the ability of belugas to find food. This mechanism is in addition to impaired abilities to find food due to displacement from high quality feeding areas.

Response: As noted in the proposed IHA, beluga whale echolocation signals have peak frequencies from 40–120 kHz, which are far above the frequency range of the sounds produced by the devices to be used by Shell during the Chukchi Sea exploratory drilling program. Therefore, those industrial sounds are not expected to interfere with echolocation. Additionally, the source level of the drillship is lower than the thresholds used by NMFS for the onset of auditory injury. Shutdown and power-down measures are required in the IHA when the airguns are in use to help reduce further the extremely low likelihood of temporary threshold shift (a Level B harassment). Lastly, there are no data indicating that the area surrounding Shell's Burger prospect is an important feeding area for beluga whales.

Acoustic Issues/Concerns

Comment 26: The MMC states that it is not clear which specific source level was used to model the size of the corrected 120-dB re 1 μPa harassment zone for the *Discoverer,* as the reported source levels for the *Discoverer* ranged from 177–185 re 1 μPa at 1 m. It also is not clear how the source level measurements taken in the South China Sea were incorporated in the model to estimate the 120-dB re 1 μPa harassment zone in the Chukchi Sea.

Response: The modeling analysis considered 1/3-octave band levels to account for frequency-dependent propagation effects that cannot adequately be characterized with broadband analysis. The 1/3-octave band source levels were obtained from dedicated measurements of the *Frontier Discover* (now *Noble Discoverer*) during drilling activities in the South China Sea. A plot showing these levels is provided in the response to *Comment 27,* and the corresponding broadband levels could be computed by summing those if required. The modeling approach applied by JASCO Applied Science was the MONM parabolic equation acoustic propagation model in each 1/3-octave band from 10 Hz to 2 kHz. The resulting received band levels were summed to compute the broadband received levels at many depths, distances and directions from the planned drillship location. Representative sound level threshold radii were determined by calculating the 95th percentile distance, over all azimuths, at which the maximum threshold over all depths was received. This approach considers that animals may sample multiple depths as they pass by the drilling operation.

Comment 27: Dr. Bain notes that sound propagation efficiency depends on conditions and that the modeling used by Shell does not capture the most efficient mode of propagation. He also states that there is great uncertainty with source levels based on single measurement locations, as was done for the *Discoverer.*

Response: The concern raised here about variability of profiles is addressed in the response to *Comment 29*. With regard to the question on which source levels were used for modeling, this study considered 1/3-octave band source levels from the *Discoverer* drillship obtained during dedicated measurements performed in 2009 in the South China Sea (Austin and Warner, 2010). The specific levels are representative of the drilling operation since that activity will occur for the majority of time. The source levels used for the ice management vessel are from surrogate measurements of the *Maersk Rover* transiting at 25% power.

Comment 28: Dr. Bain states that noise sources associated with thruster use may result in a significant increase in the ensonified area; however, it is unclear from the IHA application how often the thrusters would be used.

Response: Shell does not intend to use thrusters as part of its standard operating procedure throughout the drilling season. The *Discoverer* will be anchored in place. The only time thrusters would be used would be in the unlikely event that the *Discoverer* is blown off location and the drillship needs to be repositioned.

Comment 29: Dr. Bain states that the correction factor of 1.5 applied to the distance to the 120 dB contour is inadequate to conservatively account for the variability.

Response: The concern raised here is that the sound speed profile used for acoustic modeling of drill rig noise may not account for changes to the salinity and temperature profile that could influence and create variability in sound propagation, and the resulting variability might lead to conditions in which model estimates would not be conservative. The location-specific sound speed profiles considered for this modeling study were obtained from the GDEM database for conditions in July and October. A modeling study (Johnston *et al.,* 2009) investigated the difference in sound propagation for both months and showed longer-range sound propagation using the October profile. To be precautionary and to avoid underestimating the propagation, the modeling at the Burger prospect that was used for marine mammal effects assessment was conducted using the October profile (see Figure 2). Therefore, a correction factor of 1.5 is appropriate in this circumstance.

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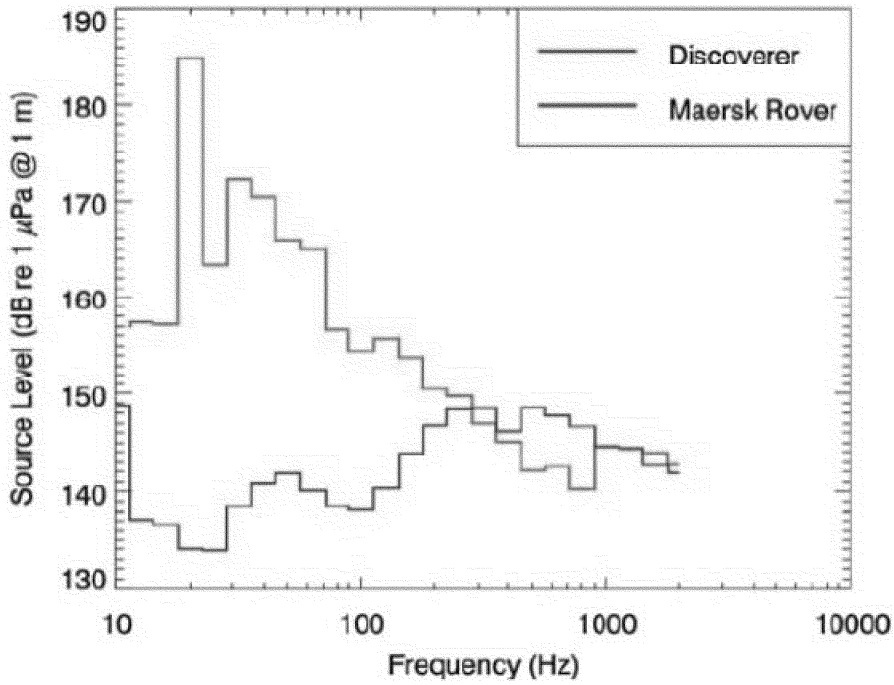

Figure 1. Source levels in 1/3-octave bands for the drillship Discoverer and ice management surrogate vessel (the ice handler Maersk Rover).

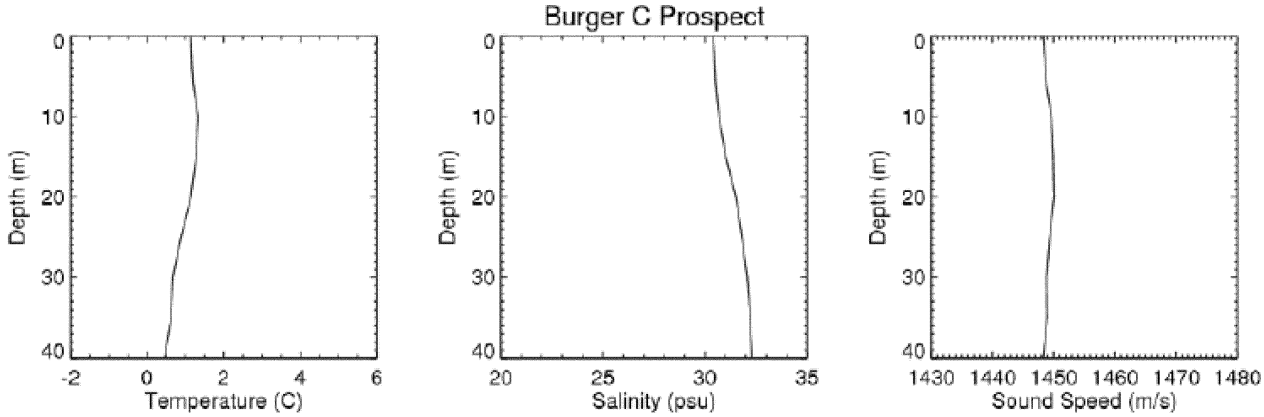

Figure 2. Temperature, salinity, and sound speed profiles at the Burger prospect obtained from the GDEM database for October.

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Comment 30: Dr. Bain notes that when multiple sources are involved, such as an ice management vessel and drillship, accurate characterization of the sound fields will be necessary to determine whether their sound fields overlap and whether marine mammals are likely to deflect around one or both sources. NMFS should perform a sensitivity analysis using a variety of propagation conditions.

Response: NMFS agrees that a modeling sensitivity analysis would provide a measure of expected variability. However, the acoustic modeling study that was performed to estimate Shell's drilling noise effects on marine mammals relied on environmental parameters that were expected to lead to better sound propagation, thereby providing overestimates of the generated noise field. That study considered the combined noise emissions of a support vessel and the drillship, and it would be representative of drilling operations during the vast majority of time while active ice management was not in progress. To better define the true noise levels and variability, Shell designed a field measurement program that monitors actual drilling sounds at several distances and at multiple directions over the full duration of drilling of the first well at Shell's Burger prospect in the Chukchi Sea. This monitoring will continuously sample the temporal variability of noise propagation due to changing oceanographic conditions over approximately one month. NMFS determined that this approach will

provide a better sampling of variability than a modeling sensitivity study.

Unlike the eastern Beaufort Sea, where the fall bowhead migration tends to occur across a relatively narrow depth/distance-from-shore corridor and where feeding concentrations are sometimes apparent, tagged bowhead whales migrate across the Chukchi over a broad area with little indication of concentration aside from offshore Barrow and the Chukotka coast (Quakenbush *et al.,* 2010). Because the 487 active leases in the Chukchi Sea contain only 2% of the total probable habitat used by bowheads in September and only 1% in both October and November, there are very limited indications of significant use of the few lease blocks involved in this exploration drilling program. As such, the number of potential exposures and deflections are expected to be both low in number and of limited biological consequence.

Marine Mammal Biology Concerns

Comment 31: AWL states that the Bering Sea stock of harbor porpoise is based on ''arbitrarily set geographic boundaries.'' AWL and Dr. Bain both note that the stock size is likely smaller than what is currently estimated and that smaller stocks tend to be more vulnerable to harm from human activities.

Response: Currently, there are insufficient samples to draw conclusions about stock structure of harbor porpoise within Alaska. While NMFS acknowledges that perhaps smaller stocks should be recognized in Alaska, the best available science indicates that take from Shell's activities will potentially impact only small numbers of harbor porpoise and will not have a negligible impact on the affected species or stock. Using the current estimated stock size of 48,215 individuals for the Bering Sea stock, only 0.03% is estimated to be taken by harassment. If the number should be 16,271 (as suggested by AWL), this would still represent less than 0.1% of the stock size. NMFS does not agree that just because a stock contains fewer individuals than originally estimated that it is far less able to tolerate takes than expected. Dr. Bain does not provide any scientific evidence for this statement.

Comment 32: AWL and Dr. Bain note that gray whales use Hanna Shoal for feeding and that Shell's operations may block gray whales' access to this habitat or cause them to abandon their feeding. Additionally, they note that since its Endangered Species Act (ESA) delisting in 1994, numbers have declined.

Response: The COMIDA 2008–2010 Final Report (Clarke *et al.,* 2011) notes 504 sightings of 835 gray whales during that time period, which were seen in every month of surveys each of the 3 years (*i.e.,* June to November) between Wainwright and Barrow within 31 mi (50 km) of shore. Clarke *et al.* (2011) note that sightings were also scattered throughout the study area more than 31 mi (50 km) offshore. The relative lack of gray whale sightings (and mud plumes, which are indicative of the presence of feeding gray whales) offshore was markedly different from that documented during surveys conducted from 1982–1991, when gray whales were frequently seen on Hanna Shoal (Moore and Clarke, 1992 cited in Clarke *et al.,* 2011). Gray whale sightings were most common in the survey blocks closer to shore in all months (Clarke *et al.,* 2011). Based on this information, it appears that currently nearshore locations are being used more frequently than Hanna Shoal for feeding by gray whales. Shell's operations (which are located more than 65 mi [105 km] from shore) are not expected to block gray whales' access to feeding grounds closer to shore. Additionally, even though it might require a slight deflection or deviation from the migration path, gray whales wanting to access the Hanna Shoal area would be able to do during Shell's operations.

Since 1994, NMFS has continued to monitor the status of the population consistent with its responsibilities under the ESA and the MMPA. In 1999, a NMFS review of the status of the eastern North Pacific stock of gray whales recommended the continuation of this stock's classification as non-threatened (Rugh *et al.,* 1999). Workshop participants determined the stock was not in danger of extinction, nor was it likely to become so in the foreseeable future.

In 2001, several organizations and individuals petitioned NMFS to re-list the eastern North Pacific gray whale population. NMFS concluded that there were several factors that may be affecting the gray whale population, but there was no information indicating that the population may be in danger of extinction or likely to become so in the foreseeable future. The population size of the Eastern North Pacific (ENP) gray whale stock has been increasing over the past several decades despite an unusual mortality event in 1999 and 2000. The estimated annual rate of increase, based on the unrevised abundance estimates between 1967 and 1988, is 3.3% with a standard error of 0.44% (Buckland *et al.,* 1993); using the revised abundance time series from Laake *et al.* (2009) leads to an annual rate of increase for that same period of 3.2% with a standard error of 0.5% (Punt and Wade, 2010). Prior to the revised abundance estimates of Laake *et al.* (2009), Wade (2002) conducted an assessment of the ENP gray whale stock using survey data through 1995–96. Wade and Perryman (2002) updated the assessment in Wade (2002) to incorporate the abundance estimates from 1997–1998, 2000–2001, and 2001–2002, as well as calf production estimates from the northward migration (1994 to 2001), into a more complete analysis that further increased the precision of the results. All analyses concluded that the population was within the stock's optimum sustainable population level (*i.e.,* there was essentially zero probability that the population was below the stock's maximum net population level), and estimated the population in 2002 was between 71% and 102% of current carrying capacity. NMFS continues to monitor the abundance of the stock through the MMPA stock assessment process, especially as it approaches its carrying capacity. If new information suggests a reevaluation of the ENP gray whales' listing status is warranted, NMFS will complete the appropriate reviews.

Comment 33: AWL states that any final IHA must analyze potential effects of all of Shell's operations on ribbon, ringed, spotted, and bearded seals and must do so considering the distinct habitats and life histories for each. AWL also notes that portions of the ringed and bearded seal populations are proposed for listing under the ESA and that those listings were prompted, in part, by the effects of climate change on ice seal habitat. The added stress of diminishing habitat should be considered in NMFS' analysis here.

Response: NMFS has considered the potential effects of Shell's activities on all four ice seal species in the context of the distinct habitats and life histories for each. In the proposed IHA, NMFS acknowledged the importance of sea ice to various life functions, such as breeding, pupping, and resting. Several of these species perform these functions on sea ice outside of the project area. Shell's activities would occur at a time of year when the ice seal species found in the region are not molting, breeding, or pupping. Therefore, these important life functions would not be impacted by Shell's activities. NMFS' EA for this action considers the impacts of climate change on ice seals in the region.

Comment 34: AWL notes the recent outbreak of skin lesions and sores among ringed seals. The letter states that

NMFS should consider the weakened state of the population as part of the analysis. They also note that some spotted and bearded seals have shown symptoms as well.

Response: NMFS began receiving reports of the outbreak in summer 2011 and declared an unusual mortality event in December 2011. An investigative team was established, and testing has been underway. Testing has ruled out numerous bacteria and viruses known to affect marine mammals, including Phocine distemper, influenza, Leptospirosis, Calicivirus, orthopoxvirus, and poxvirus. Foreign animal diseases and some domestic animal diseases tested for and found negative include foot and mouth disease, VES, pan picornavirus, and Rickettsial agents. Last month, preliminary radiation testing results were announced which indicate radiation exposure is likely not a factor in the illness. Further quantitative radionuclide testing is occurring this spring. Results will be made publicly available as soon as the analyses are completed.

Reports from the NSB indicate that hunters during early winter observed many healthy bearded and ringed seals. The seals behaved normally: They were playful, curious but cautious, and maintained distance from boats. No lesions were observed on any seals. During December 2011 and January 2012, 20–30 adult ringed seals were harvested from leads in the sea ice in the NSB. Based on local reports, these seals had neither hair loss nor lesions. However, during late February 2012, a young ringed seal with nodular and eroded flipper lesions but no hair loss was harvested. Additionally, necropsy results of the internal organs were consistent with animals with this disease that continues to affect ice seals in the NSB and Bering Strait regions. Chukotka hunters did not report any sightings or harvest of sick and/or hairless seals in December 2011 and January 2012.

NMFS has considered this information as part of its analysis in making the final determinations for this IHA. The data available to date do not indicate that this has weakened the population. Moreover, Shell's activities are anticipated to take less than 1% of the population of all of the stocks of all three species noted by the commenter. The sound that will be produced by Shell's activities is of a low level. Therefore, even if the population were weakened from this outbreak it would not change our evaluation of the impacts of this activity at the population level.

Comment 35: Dr. Bain states the population censuses for the eastern Chukchi Sea and Beaufort Sea stocks of belugas have not been conducted in the last 10 years and that population trends are unknown. No evidence of population growth was seen when censuses were still being conducted.

Response: In accordance with NMFS' implementing regulations at 50 CFR 216.102(a), NMFS used the best available science to make the requisite findings for issuance of the IHA. That science indicates that only small numbers of belugas will be taken and that those incidental takings will have no more than a negligible impact on the affected beluga stocks and will not have an unmitigable adverse impact on the availability of those belugas for taking for subsistence uses.

Density and Take Estimate Concerns

Comment 36: The AEWC, NSB, AWL, and Dr. Bain state that using a strict density approach to estimate take is unreasonable, as it does not account for the movement of animals through the drilling area during the time period over which the activities will occur. The NSB states that this approach likely results in take estimates that are biased low. The AEWC and Dr. Bain suggest that NMFS should draw a line across the ensonified area and estimate the number of marine mammals that would be expected to cross that line during Shell's activities.

Response: During migration, there are clear changes in the density of animals that pass through a particular area of ocean, and ''take'' estimates attempt to consider this. In other situations, it is difficult to account for the movements of individuals within a relatively small area of ocean. Using densities provides the best estimate of animals though it assumes that animals are distributed evenly in the environment, which is not correct. This approach has, however, been used for most statistical approaches to dealing with animals in such situations, and NMFS has determined it is the appropriate and most robust approach in this case. In most cases, it overestimates the number of animals actually ''taken'' by the activities because it assumes no avoidance of the area by individuals.

Other approaches to estimate take were explored, mostly notably application of Quakenbush *et al.* (2010), which produced similar low estimates. Application of probability of occurrence within a specific portion of an area as large as the Chukchi Sea over a period of a month is not the equivalent of estimating occurrence distribution along a cross transect of a migration. Quakenbush *et al.* (2010) do indicate that use of the central Chukchi area by bowhead whales during the fall is low (2% of the total probability of occurrence in September and 1% of the total probability of total occurrence in both October and November). Because Shell's exploration drilling would occur in only three of the 487 active leases in the Chukchi Sea, take estimates do not differ appreciably from those based upon density. Unless data from Quakenbush *et al.* (2010) are reanalyzed across narrow bands of the migration corridor, using density estimates provides a reliable method for estimating take.

Comment 37: The NSB and AWL note that the modeled 120-dB isopleths for the *Discoverer* are different in the Beaufort and Chukchi Seas (with the isopleth being slightly smaller in the Chukchi Sea). Additionally, they question if the 120-dB isopleth for the *Discoverer* is correct given its nearly identical source level to the *Kulluk* drill rig (proposed for use in the Beaufort Sea), for which sound propagates out to the 120-dB isopleth at a much farther distance. If the modeled propagation is incorrect for the *Discoverer,* then this would bias the take estimates low.

Response: The primary reason for the difference in the distance of the 120-dB isopleths for the *Discoverer* in the Beaufort Sea vs. the Chukchi Sea is due to differences in the geoacoustic parameters for the two seas that were input to the model. Water depth, seabed density, and seabed sound speed are generally the most important parameters that influence sound propagation.

Differences in sound propagation from the two rigs are real and are caused by differences in the design of the two vessels. While the broadband source levels for the *Discoverer* and *Kulluk* may be similar, their spectral properties differ considerably. Acoustic modeling considers the source levels in 1/3-octave frequency bands. Figures 3 and 4 show the band levels for both drillships during drilling. Of key importance are the significantly lower levels of the *Discoverer* in the 50 to 500 Hz bands that propagate well in the relatively shallow waters of these drilling operations. While the *Discoverer* apparently has higher band levels below 50 Hz, this energy is more rapidly attenuated than higher frequency sound energy. This characteristic of sound propagation in shallow waters leads to predominantly mid-frequency sounds (50–500 Hz) dominating the acoustic field at distance from the drillships. A further consideration is that the *Kulluk* source levels are known to include contributions from support vessels, and much of the mid-high frequency band

energy in its source levels may not originate entirely from the drillship itself, as acknowledged by Greene (1987). The *Discoverer* source level measurements by Austin and Warner (2010) were made at closer distances and do not include significant contributions from other vessels. Additionally, the IHA requires Shell to conduct sound source verification and characterization tests on all equipment used.

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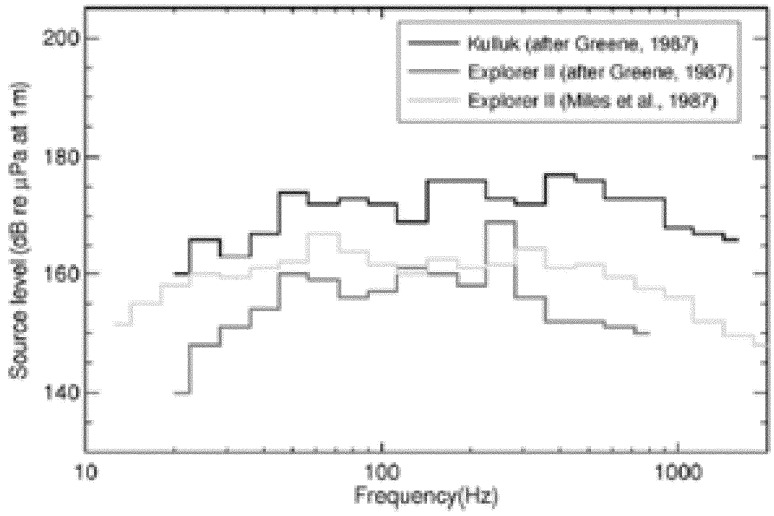

Figure 3. Band levels for the Kulluk during drilling.

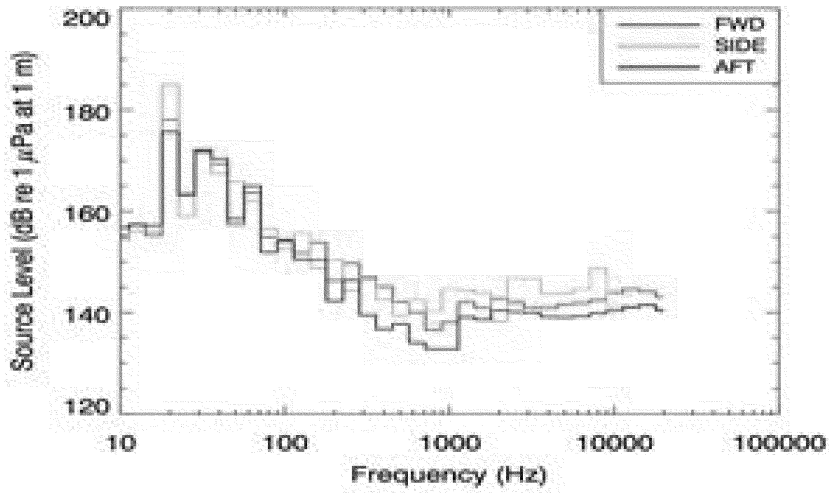

Figure 4. Band levels for the Discoverer during drilling.

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Comment 38: AWL notes that any final IHA must assess exactly when Shell's ice management/icebreaking will occur and also consider the effects of both ice management vessels operating simultaneously but at some distance apart. Because the fall migration through the Chukchi Sea can last late into October, any ice management during the fall could affect a large number of whales.

Response: Because it cannot be predicted with absolute certainty as to when ice may be present in the area that could pose a risk to drilling operations, it is difficult to state with absolute certainty when Shell's ice management/icebreaking will occur. Using data on Arctic sea ice presence from recent years, Shell estimated the most likely times that such activities would be required. Shell will also implement an Ice Management Plan (IMP) to ensure real-time ice and weather forecasting is conducted in order to identify conditions that might put operations at risk and will modify activities accordingly. The description of Shell's activities in the proposed IHA indicated that both ice management vessels could be operating simultaneously at different locations and was considered in the analysis.

Comment 39: Dr. Bain states that density estimates for harbor porpoise may be low since Shell determined densities based on industry vessel-based counts.

Response: No published densities or data on survey efforts or sightings were available for harbor porpoise, but estimates had been calculated from

industry survey data from 2006–2008, so those densities were used. The commenter is correct that the industry vessels did not conduct standard randomized line-transect surveys while operating (except for short periods in 2006). However, this information was considered the best scientific information available to determine a density estimate for harbor porpoise in the Chukchi Sea. NMFS reviewed the COMIDA 2008–2010 Final Report to see if newer data were available, but the report notes that harbor porpoise were not sighted (Clarke *et al.,* 2011), likely due to their small size, making it difficult to positively identify them from the aircraft.

Subsistence Use Concerns

Comment 40: The AEWC and ICAS state that they have expressed concerns about direct impacts to the subsistence hunts resulting from deflection of bowhead whales by vessel traffic and underwater noise, as well as from icebreaking and geophysical exploration. The letters note that concerns about direct and indirect threats to hunting arise from discharge and associated impacts on water quality, the risk of an oil spill, and the cumulative impacts from the sum of all commercial and industrial activities occurring in our waters. Under the MMPA, NMFS has an obligation to ensure that any proposed activities do not have an unmitigable adverse impact on our subsistence activities.

Response: NMFS analyzed the potential impacts from the activities noted here in the proposed IHA and the EA. Potential impacts to the availability of marine mammals for subsistence uses were included in those analyses. Based on the mitigation measures contained in the IHA to ensure the availability of marine mammals for subsistence uses, NMFS determined that Shell's activities would not have an unmitigable adverse impact on the availability of marine mammal species or stocks for taking for subsistence uses. Additionally, Shell worked independently with the AEWC to develop and sign a CAA, which also includes measures to reduce impacts to bowhead whaling from their drilling operations and other activities.

Comment 41: The AEWC states that whaling has resumed in Wainwright, Point Hope, and Point Lay and that these communities have been allocated a quota to use for the fall hunt. The AEWC asks that NMFS correct the information in the notice and carry forward this information into all future analyses. The letter also states that NMFS' ''analysis should consider the specific timing and location of subsistence hunting for each community as compared to the specific timing and location of Shell's proposed operations.'' Lastly, the AEWC states that NMFS did not include a preliminary finding regarding whether or not Shell's activities would have an unmitigable adverse impact on the fall hunt in the Chukchi villages and must publish this preliminary finding for comment.

Response: NMFS used the updated information on fall hunting activities in the communities of Wainwright, Point Hope, and Point Lay in the Draft EA (NMFS, 2012) that was released for public comment and has also updated that information in this analysis and will use it in all future analyses. NMFS' analysis considered both location and timing of subsistence hunting activities, as well as location and timing of Shell's operations. Lastly, NMFS is not required to publish a preliminary finding regarding ''no unmitigable adverse impact to the availability of marine mammals for subsistence uses'' at the proposed IHA stage. The MMPA implementing regulations indicate that NMFS will publish any preliminary finding of ''negligible impact'' or ''no unmitigable adverse impact'' for public comment along with the proposed IHA if preliminary findings have been made at that time. 50 CFR 216.104(c). In this instance, at the proposed IHA stage NMFS was still evaluating the available information and believed it would be beneficial to review information and comments submitted by the public before making determinations regarding whether Shell's proposed action will have a negligible impact on the affected species or stocks of marine mammals and no unmitigable adverse impact on the availability of such species or stocks for taking for subsistence uses. Based on our review, we have made the requisite findings of small numbers, negligible impact, and no unmitigable adverse impact on the availability of the taking of marine mammals for subsistence uses.

Comment 42: The AEWC expressed concern about potential impacts to the subsistence hunt in the Bering Sea communities from end of season transits. Because the proposed IHA noted that Shell's IHA expires on October 31, they believe that this is adequate, at this time, to prevent any conflicts with Bering Sea communities so long as Shell begins transit towards the Bering Strait on October 31. The AEWC requests that NMFS consider late season transits to Bering Sea communities in all future **Federal Register** notices regarding IHAs for oil and gas activities in the Arctic. Shell should have plans in place to communicate with those communities if, for whatever reason, its ships are delayed in the leaving the Chukchi Sea.

Response: Shell signed the 2012 CAA with the AEWC on March 26, 2012. In the signed 2012 CAA, Shell agreed to establish Communication Centers in the Bering Sea communities and will conduct such communications in the manner laid out in the CAA. Shell's IHA is valid for drilling operations through October 31. Therefore, demobilization and transit out of the area must begin by that date. Information shared with NMFS from hunters on St. Lawrence Island in 2011 noted that the fall bowhead whale hunts typically occur the week of Thanksgiving. Shell will begin to demobilize and transit south towards Dutch Harbor beginning on October 31, and will avoid being in the area when hunters from Gambell and Savoonga (on St. Lawrence Island) are actively hunting bowhead whales.

Comment 43: The AEWC states that they are concerned about the potential for cumulative impacts to subsistence activities if Shell transits vessels back and forth between the Chukchi Sea and Beaufort Sea drill sites. The AEWC asks that NMFS specify whether and to what extent vessel traffic between the two locations is predicted, what impact that may have on the hunt at Barrow, and whether this vessel traffic may combine with deflection from the Beaufort Sea drill sites to create a large impact on the bowhead migration.

Response: Shell's Beaufort and Chukchi exploration drilling programs are designed and resourced to be independent and self sufficient. With the exception of the vessels that would be transiting for the purpose of supporting a spill response (in the unlikely event that one occurs), it is not expected that there will be regular transits of vessels related to Chukchi operations into, or out of, the Beaufort theater of operation.

BOEM included the following condition within its approval of Shell's Chukchi Exploration Plan: ''If Shell transits to the Chukchi Sea from the Beaufort Sea during the fall bowhead whale migration and before or during Barrow's fall bowhead whale subsistence hunt, Shell shall meet with the appropriate whaling captains to coordinate vessel transit routes westward through the Beaufort Sea to prevent any deflection of the bowhead whale migration and any conflicts with Barrow's fall whaling season. Emergency operations will take precedence over this condition.''

This condition is consistent with existing commitments made by Shell to

consult with subsistence hunters prior to and during vessel transits and other operations. Vessel transit and communication with subsistence hunters are addressed in the signed 2012 CAA. Shell will fund the operation of communication centers in each of the coastal communities throughout the period of exploration activities in the Chukchi Sea. Vessels will report their position and projected transit route and schedule to these communication centers every 6 hours. Information provided to these communication centers will be available to AEWC and other subsistence co-management organizations and to subsistence hunters within the communities for the purpose of supporting the avoidance or reduction of conflicts between industry and subsistence activities. Shell will also operate a network of Subsistence Advisors within each of the coastal communities. The role of the Subsistence Advisors is to actively consult with local hunters on a daily basis, to be aware of typical patterns of subsistence resource movements and behavior and patterns of subsistence harvest, to inform Shell of any potential for conflicts, and to aid in the adaptive resolution of potential for conflicts. Based on the fact that vessel transit between the two programs would only occur in extreme and unlikely circumstances, it is not anticipated that there will be additional impacts beyond those analyzed here.

Comment 44: The MMC states that negotiating and completing a CAA related to bowhead whales is useful but also prompts the question as to why such agreements are not being developed with subsistence hunters taking other species that might be affected by oil and gas operations. With that in mind, the MMC recommends that NMFS issue the requested IHA but also facilitate the development of CAAs that involve all potentially affected communities and co-management organizations and take into account all potential adverse effects on all marine mammal species taken for subsistence purposes including, but not limited to, bowhead whales.

Response: The signing of a CAA is not a requirement to obtain an IHA. The CAA is a document that is negotiated between and signed by the industry participant, AEWC, and the Village Whaling Captains' Associations. NMFS has no role in the development or execution of this agreement. Although the contents of a CAA may inform NMFS' no unmitigable adverse impact determination for bowhead (and to some extent beluga) whales, the signing of it is not a requirement. Regulations promulgated pursuant to the 1986 MMPA amendments require that for an activity that will take place near a traditional Arctic hunting ground, or may affect the availability of marine mammals for subsistence uses, an applicant for MMPA authorization must either submit a POC or information that identifies the measures that have been taken to minimize adverse impacts on subsistence uses. Shell submitted a POC with its IHA application, which was available during the public comment period. Additionally, as indicated earlier in this document, Shell signed the 2012 CAA with the AEWC on March 26, 2012.

NMFS (or other Federal agencies) has no authority to require agreements between third parties, and NMFS would not be able to enforce the provisions of CAAs because the Federal government is not a party to the agreements. Regarding the CAA signed with the AEWC, NMFS has reviewed that document, as well as Shell's POC. The majority of the conditions are identical between the two documents. NMFS has also included measures from the 2012 CAA between Shell and the AEWC relevant to ensuring no unmitigable adverse impact on the availability of marine mammals for subsistence uses. NMFS has also determined that the measures in the POC related to species other than the bowhead whale are sufficient to ensure no unmitigable adverse impact on the availability of those species for subsistence uses.

In the recently released Draft EIS on the Effects of Oil and Gas Activities in the Arctic Ocean (NMFS, 2011), NMFS began to examine both the CAA and POC processes. There are strengths and weaknesses in how both processes are currently executed. NMFS is committed to working with the AEWC, Alaska Beluga Whale Committee, and Ice Seal Committee and other stakeholders to improve upon and combine these processes, as appropriate.

Comment 45: The NSB appreciates Shell's effort to mitigate impacts to the bowhead hunt; however, Shell's proposed activities may adversely impact subsistence hunting of other species in the Chukchi Sea. Mitigation measures are needed to protect eastern Chukchi Sea belugas and beluga hunters. Restricting transit through the Chukchi Sea until the hunt is completed at Point Lay would be an effective measure. NMFS must also evaluate impacts to seals from the transit of vessels associated with Shell's planned activities and how that may impact seal hunts.

Response: In the proposed IHA, NMFS evaluated potential impacts to subsistence hunts of all species in the project area. Ringed seals are typically hunted from October through June, which is outside the time frame of Shell's operations. Although spotted and bearded seal hunts may overlap temporally with Shell's operations, the hunting grounds are located much closer to shore than where Shell will operate. When Shell conducts supply vessel and other transits between shore and the drill sites, Shell is required to implement mitigation measures to avoid unmitigable adverse impacts to subsistence hunts, including using the Communication Centers to find out about the timing and location of active hunting.

NMFS understands the NSB's concerns regarding vessel transit and how that may affect hunts in the Chukchi Sea communities, especially the summer beluga hunt at Point Lay. Shell has committed to transiting offshore of the hunt and to communicating with Point Lay via the Communication Center regarding vessel transits to ensure that they remain outside of the hunting areas. These measures were part of Shell's POC and are included in the IHA. Therefore, NMFS has determined that there will not be an unmitigable adverse impact on the availability of beluga whales and ice seals for taking for subsistence uses.

Mitigation and Monitoring Concerns

Comment 46: Shell states that the 1,500 ft (457 m) flight altitude restriction mitigation measure applies to all ''non-marine mammal observation'' flights, thus allowing for observer flights to fly lower as needed to afford the best possible marine mammal sightings and identifications.

Response: NMFS concurs. The measure was written in two different ways in several parts of the proposed IHA. One way only exempted takeoffs, landings, and emergency situations from the 1,500 ft (457 m) altitude restriction, while in other parts of the document marine mammal monitoring flights were also exempted. NMFS has eliminated the discrepancy in the final IHA. The exemption now applies to takeoffs, landings, emergency situations, and marine mammal monitoring flights.

Comment 47: The MMC recommends that NMFS require Shell to develop and employ a more effective means to monitor the entire corrected 120-dB re 1 μPa harassment zone for the presence and movements of all marine mammals and for estimating the actual number of takes, including aerial and acoustic surveys of the proposed drilling sites before, during, and after drilling operations. The NSB and AWL also

recommend that NMFS require Shell to fly aerial surveys in the area of the offshore drill sites.

Response: Shell's original monitoring plan included an acoustic component to record both equipment sounds and marine mammal vocalizations. Since submitting that monitoring plan, Shell has modified it to include an offshore aerial component. Shell will conduct a photographic aerial survey in 2012, which will serve as a pilot study for future surveys that could use an Unmanned Aerial System to capture the imagery. The proposed photographic surveys in the Chukchi and Beaufort Seas would collect data that will allow direct comparisons of photographic techniques for data collection with data collected by human observers aboard the aircraft in the Beaufort Sea. Additional details on the photographic survey can be found in Shell's revised monitoring plan (see **ADDRESSES**).

While the 120-dB harassment zone from the drill rig will likely extend beyond what the observers can effectively see from the drill rig, Shell will place Protected Species Observers (PSOs) on all vessels used for the drilling operations. Many of these vessels will be located several kilometers from the drill rig, thus expanding the visual observation zone. Moreover, Shell will supplement its vessel-based operations with marine mammal aerial observations, thus expanding the visual observation zone. PSOs will be stationed on the vessels to observe from the best vantage points available and will be equipped with ''Big-eyes'' and other binoculars to aid in detection. Additionally, NMFS does not contend that PSOs will be able to see every marine mammal within the harassment zone. Using the vessel-based and aerial platforms to detect and count marine mammal sightings and then to use those observations in conjunction with sightings from other surveys such as COMIDA is reasonable for estimating maximum take.

Comment 48: The MMC recommends that NMFS track and enforce Shell's implementation of mitigation and monitoring measures to ensure that they are executed as expected.

Response: During Shell's operating season, NMFS will meet weekly with staff from BOEM, the Bureau of Safety and Environmental Enforcement (BSEE), and the USFWS to review and analyze proprietary operations reports, including PSO logs to ensure environmental and regulatory compliance. Additionally, BSEE will have inspectors on the drilling platform 24 hours a day/7 days a week.

Comment 49: The NSB, MMC, and AWL state that NMFS should require Shell to make monitoring data available to the public. The NSB states that in addition to the monitoring data, locations and activities of drill rigs, icebreakers, and support vessels should also be made publicly available.

Response: In accordance with an agreement between NOAA, Shell, ConocoPhillips, and Statoil, data from Shell sponsored science and monitoring efforts and from those that are jointly funded by the signatory parties will be made available to NOAA and to the public. The manner of release, format of released data, site(s) of data repository, and rights of data use are currently being addressed by a working group. Public access to these data is being addressed through this process and would not be enhanced by conditions imposed through the IHA.

Shell has committed to the support and operation of communication centers in Kaktovik, Nuiqsut, Barrow, Wainwright, Point Lay, Point Hope, Kivalina, Kotzebue, St. Lawrence Island, and Wales. As required by the CAA (which Shell signed on March 26, 2012), all Shell vessels operating in the Beaufort and Chukchi Sea will contact the nearest communication center every 6 hours and provide the following information:

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

(B) Vessel location, speed, and direction; and

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

The vessels will also contact the nearest communications center in the event that operations change significantly from those projected during the prior 6 hour reporting period. The communication centers will be generally open and available to the public and will provide a capability for direct communications between subsistence hunters and Shell vessels. Shell will operate these centers for the entire duration of operations in the Chukchi and Beaufort Seas, rather than limiting operations to the periods of the bowhead subsistence hunt.

Since 2010, NMFS has required operators in the Arctic to provide vessel tracks during the season as a part of the required 90 day report. Given that the potentially impacted public are provided with multiple avenues with which they can acquire vessel location and activity data, and that vessel tracks will be made available to the general public at the end of the season, there is no additional need for real-time public access to vessel location information. Further, given that there are current and legitimate concerns with respect to security of vessels, crew, and operations, public access to vessel locations and activities may not be in the best interest of safe marine operations.

Cumulative Impact Concerns

Comment 50: The MMC noted that it is important to consider that some of the animals may already be in a compromised state as a result of climate disruption, stochastic variation in food resources, or variation in physiological state due to normal life history events (*e.g.,* molting or reproduction in pinnipeds).

Response: In the Notice of Proposed IHA (76 FR 69958, November 9, 2011), NMFS considered others factors, including when pinnipeds and cetaceans conduct varying life history functions and whether or not those activities overlap in time and space with Shell's Chukchi Sea exploratory drilling program. Pupping and breeding for some ice seals do not occur in the Chukchi Sea. Pupping of ringed and bearded seals, which do build subnivean lairs in the Chukchi Sea, occurs outside of Shell's operating timeframe in the Chukchi Sea. Additionally, in the EA for this action, NMFS analyzed impacts of other activities and factors, such as climate disruption. Based on this information, NMFS determined that Shell's activities would have no more than a negligible impact on the affected marine mammal species or stocks.

Comment 51: Dr. Bain states that cumulative effects are of concern and that the drilling in the Chukchi Sea cannot be considered separately from other planned activities, including similar activities by Shell in the Beaufort Sea, as well as work proposed by other companies. Further, if exploratory drilling results in future production, the cumulative effect of production in the core of the migration route needs to be considered.

Response: NMFS analyzed the combination of both of Shell's proposed 2012 drilling programs in its EA, as well as other seismic exploration and vessel transportation in the Beaufort and Chukchi Seas. Additionally, NMFS' response to *Comment 8* explains how other factors were taken into consideration when analyzing this proposal under the MMPA. Because it is unknown if Shell will successfully find

oil during its exploratory drilling program, it is premature and speculative to discuss potential impacts from building a production facility in the Chukchi Sea. If Shell finds oil, it would be several years before construction of a production facility would begin. Additional environmental analyses would be required at that time.

ESA Statutory Concerns

Comment 52: AWL and BOEM note that NMFS should consider ringed and bearded seals in the ESA section 7 consultation.

Response: The Notice of Proposed IHA (76 FR 69958, November 9, 2011) for this action noted that NMFS would initiate ESA section 7 consultation for bowhead, humpback, and fin whales. However, NMFS has included ringed and bearded seals in the Biological Opinion prepared for this action, which analyzes effects to ESA-listed species, as well as species proposed for listing.

Comment 53: AWL states that the conclusions reached in NMFS' 2008 and 2010 Biological Opinions for oil and gas activities in the Arctic regarding effects of oil spills must be reconsidered.

Response: NMFS' Office of Protected Resources Permits and Conservation Division requested consultation under section 7 of the ESA with the NMFS Alaska Regional Office Endangered Species Division. A new Biological Opinion has been prepared for this IHA. In April, 2012, NMFS finished conducting its section 7 consultation and issued a Biological Opinion, and concluded that the issuance of the IHA associated with Shell's 2012 Chukchi Sea drilling program is not likely to jeopardize the continued existence of the endangered bowhead, humpback, and fin whale, the Arctic sub-species of ringed seal, or the Beringia distinct population segment of bearded seal. No critical habitat has been designated for these species, therefore none will be affected.

Comment 54: BOEM recommends that NMFS consult with USFWS regarding the effects of the proposed action on resources under USFWS jurisdiction, including the compatibility of the joint industry research program that NMFS continues to require in IHAs with existing ESA section 7 consultation between BOEM and USFWS.

Response: NMFS has determined that issuance of the IHA to Shell will not affect species under USFWS jurisdiction and that formal consultation is not required. However, NMFS strives to work closely with other Federal agencies and would welcome any specific suggestions from BOEM or USFWS on future IHAs that would help to achieve coordinated and complementary mitigation and monitoring measures.

NEPA Statutory Concerns

Comment 55: The AEWC and NSB states that NMFS must include information regarding upcoming oil and gas activities planned for the Beaufort and Chukchi Seas in 2012 in U.S., Russian, and Canadian waters, as well as reasonably foreseeable future drilling activities. Both letters request that NMFS develop a method for assessing impacts from multiple drilling operations and to ascertain the significance of multiple exposures to underwater noise, ocean discharge, and air pollution and vessel traffic.

Response: NMFS' EA contains information on upcoming activities in U.S., Russian, and Canadian waters for the 2012 season, as well as reasonably foreseeable future drilling activities in the project area. The EA qualitatively describes how marine mammals could be impacted from multiple activities in a given season and what the results of those exposures might be.

Comment 56: NSB states that NMFS should be required to prepare an EIS, not an EA, to adequately consider the potentially significant impacts of the proposed IHAs, including the cumulative impacts of Shell's proposed activities.

Response: NMFS' 2012 EA was prepared to evaluate whether significant environmental impacts may result from the issuance of IHAs to Shell for the take of marine mammals incidental to conducting exploratory drilling programs in the U.S. Beaufort and Chukchi Seas, which is an appropriate application of NEPA. After completing the EA, NMFS determined that there would not be significant impacts to the human environment and accordingly issued a FONSI. Therefore, an EIS is not needed for this action.

Comment 57: The NSB states that NMFS should consider the cumulative impact of discharge and whether bioaccumulation of contaminants could have lethal or sub-lethal effects on bowhead whales and other marine mammals. NMFS should then synthesize that information into a health impact assessment looking at the overall combined effect to the health of the local residents.

Response: As explained by the Council on Environmental Quality, an EA is a concise document and should not contain long descriptions or detailed data which the agency may have gathered. Rather, it should contain a brief discussion of the need for the proposal, alternatives to the proposal, the environmental impacts of the proposed action and alternatives, and a list of agencies and persons consulted. See NEPA's Forty Most Asked Questions, 46 FR 18026 (March 23, 1981); 40 CFR 1508.9(b). The EA prepared for this action contains a discussion of water quality, including contaminants, in sections 3.1.5.2 and 4.2.1.5 and incorporates additional material by reference. It also notes that contaminants have the potential to bioaccumulate in marine mammals, but that monitoring has shown that oil and gas developments in the Alaskan Beaufort Sea ''are not contributing ecologically important amounts of petroleum hydrocarbons and metals to the near-shore marine food web of the area'' (EA at 4.2.2.3). Given that the studies done so far have detected no bioaccumulation of contaminants as a result of oil and gas activity in the Beaufort Sea, it is only a remote and highly speculative possibility that discharges from Shell's exploration drilling program could contribute to cumulative impacts from contaminants that could ultimately result in health impacts to local residents. Agencies are not required to consider such remote or speculative impacts in an EA (see *Ground Zero Ctr. for Non-Violent Action* v. *United States Dept of the Navy,* 383 F.3d 1082, 1090 (9th Cir. 2004)). However, NMFS acknowledges the importance of this issue to residents of the NSB, and has included a more extensive discussion of environmental contamination and its potential effects in the Draft EIS on Effects of Oil and Gas Activities in the Arctic Ocean (NMFS, 2011).

Comment 58: AWL states that it would be illegal for NMFS to approve the IHA without completing the EIS that is in progress. NSB also states that it would be shortsighted to allow Shell to proceed on a 1-year IHA when the impacts could negatively affect arctic resources and preclude options that could be developed in the forthcoming EIS.

Response: While the Final EIS is still being developed, NMFS conducted a thorough analysis of the affected environment and environmental consequences from exploratory drilling in the Arctic in 2012 and prepared an EA specific to the two exploratory drilling programs proposed to be conducted by Shell. The analysis contained in that EA warranted a FONSI.

The analysis contained in the Final EIS will apply more broadly to multiple Arctic oil and gas operations over a period of five years. NMFS' issuance of IHAs to Shell for the taking of several

species of marine mammals incidental to conducting its exploratory drilling operations in the Beaufort and Chukchi Seas in 2012, as analyzed in the EA, is not expected to significantly affect the quality of the human environment. Additionally, the EA contained a full analysis of cumulative impacts.

Comment 59: BOEM requests that NMFS' EA fully evaluate the potential for the NMFS-required, periodic low-level aerial marine mammal surveys and vessel operations to impact marine and coastal resources within the Ledyard Bay Critical Habitat Unit (LBCHU) and adjacent areas. BOEM recommends that NMFS require observation reports to include the location and altitude of the aircraft at the time of each marine mammal observation and that NMFS require observations of marine and coastal birds using a systematic survey protocol during any NMFS-required vessel entries into the LBCHU, as well as requiring that these vessels not approach flocks of eiders and that vessel routing be the shortest distance within the LBCHU.

Response: NMFS' EA analyzes the impacts of all aspects of Shell's activities on all relevant resources in the area. Shell and its representatives maintain frequent communication with the Federal Aviation Administration and USFWS during the period included in the Chukchi aerial surveys program. During this time all notices to aviators are noted and observed, *e.g.* notices related to avoidance of Pacific walrus haul outs. The aerial flights either avoid flying through these areas, or move to a higher altitude when in close proximity to concentrations of sensitive resources. The aircraft also implements mitigation measures, such as changing the flight path or altitude, when the observers on board detect concentrations of sensitive resources or the presence of subsistence hunters.

The altitude and position of the aircraft during survey and transit and from vessels during transit are available from the flight and vessel tracks. Flight altitudes of 1,000 ft (305 m) or greater are of limited value for identification and counting of marine birds. Aerial overflights routinely increase their altitude to 1500 ft (457 m) when flying over the Ledyard Bay area during surveys along the Chukchi Sea coast (rather than the 1000 ft [305 m] altitude flown in other parts of the survey) to avoid disturbance of waterfowl that might be in the area. Any required vessel entries to the LBCHU have included survey protocols to record concentrations of seabirds, particularly eiders and to avoid such areas if concentrations were noted. However, because the IHA is issued pursuant to the MMPA, NMFS does not have the authority to include measures related to non-marine mammal species.

Oil Spill Concerns

Comment 60: The NSB and MMC state that Shell's application and NMFS' Notice of Proposed IHA (76 FR 68974, November 7, 2011) do not contain adequate information regarding effects of a major oil spill. The MMC notes that NMFS is too dismissive of the potential for a large oil spill. The NSB requests clarification on how NMFS considers the risk of an oil spill when issuing MMPA authorizations for exploratory drilling activities, and contends that NMFS must analyze the potential harm to marine mammals and subsistence activities. The NSB also states that Shell's application lacks any information about potential take resulting from a release of oil in any amount.

Response: NMFS' Notice of Proposed IHA contained information regarding measures Shell has instituted to reduce the possibility of a major oil spill during its operations, as well as potential impacts on cetaceans and pinnipeds, their habitats, and subsistence activities (see 76 FR 69976–69980, 69984, 70004, November 7, 2011). NMFS' EA also contains an analysis of the potential effects of an oil spill on marine mammals, their habitats, and subsistence activities. Much of that analysis is incorporated by reference from other NEPA documents prepared for activities in the region. There is no information regarding potential take from a release of oil because an oil spill is not a component of the ''specified activity.''

DOI's BOEM and BSEE are the agencies with expertise in assessing risks of an oil spill. In reviewing Shell's Chukchi Sea Exploration Plan and Regional OSRP, BOEM and BSEE determined that the risk was low and that Shell will implement adequate measures to minimize the risk. Shell's OSRP identifies the company's prevention procedures; estimates the potential discharges and describes the resources and steps that Shell would take to respond in the unlikely event of a spill; and addresses a range of spill volumes, ranging from small operational spills to the worst case discharge calculations required to account for the unlikely event of a blowout. Additionally, NOAA's Office of Response and Restoration reviewed Shell's OSRP and provided input to DOI requesting changes that should be made to the plan before it should be approved. Shell incorporated NOAA's suggested changes, which included updating the trajectory analysis and the worst case discharge scenario. Based on these revisions, NOAA Ocean Service's Office of Response and Restoration believes that Shell's plans to respond to an offshore oil spill in the U.S. Arctic Ocean are satisfactory, as described in a memorandum provided to NMFS by the Office of Response and Restoration. Lastly, in the unlikely event of an oil spill, Shell will conduct response activities in accordance with NOAA's Marine Mammal Oil Spill Response Guidelines.

Comment 61: The MMC notes that the risk of an oil spill is not simply a function of its probability of occurrence; it also must take into account the consequences if such a spill occurs. Those consequences are, in part, a function of the spill's characteristics and the ability of the industry and government to mount an effective response. The MMC states: ''The assertion that Shell would be able to respond adequately to any kind of major spill is simply unsupported by all the available evidence.'' The MMC asserts that the OSRP is still inadequate for addressing a large oil spill in the Arctic.

Response: As noted in the response to *Comment 60,* DOI approved Shell's OSRP on February 17, 2012. That approval came after an extensive review process, and changes were made to the plan based on comments from DOI, NOAA, and other Federal agencies. The plan calls for Shell to have several response assets near the drill sites for immediate response, while also having additional equipment available for quick delivery, if needed. DOI will also continue to provide oversight, with exercises, reviews, and inspections. NMFS' EA and recent BOEM NEPA analyses assess impacts to the environment from an oil spill.

Comment 62: The MMC recommends that NMFS require Shell to cease drilling operations in mid- to late September to reduce the possibility of having to respond to a large oil spill in ice conditions. AWL also states that NMFS should consider restrictions on late-season drilling.

Response: NMFS has not included such a measure in its IHA. In December 2011, BOEM conditionally approved Shell's Chukchi Sea Exploration Plan. One of the conditions of that approval is a measure designed to mitigate the risk of an end-of-season oil spill by requiring Shell to leave sufficient time to implement cap and containment operations as well as significant clean-up before the onset of sea ice, in the event of a loss of well control. Given current technology and weather

forecasting capabilities, Shell must cease drilling into zones capable of flowing liquid hydrocarbons 38 days before the first-date of ice encroachment over the drill site. In a press release issued by BOEM on December 16, 2011, the agency noted that based on a five-year analysis of historic weather patterns, BOEM anticipates November 1 as the earliest anticipated date of ice encroachment. The 38-day period would also provide a window for the drilling of a relief well, should one be required. However, Shell will be permitted to continue other operations, such as ZVSP surveys, after that date.

Comment 63: The MMC recommends that NMFS require Shell to develop and implement a detailed, comprehensive and coordinated Wildlife Protection Plan that includes strategies and sufficient resources for minimizing contamination of sensitive marine mammal habitats and that provides a realistic description of the actions that Shell can take, if any, to respond to oiled or otherwise affected marine mammals. The plan should be developed in consultation with Alaska Native communities (including marine mammal co-management organizations), state and Federal resource agencies, and experienced non-governmental organizations.

Response: As noted in the response to *Comment 60,* Shell will operate any needed oil spill response activities in accordance with NOAA's Marine Mammal Oil Spill Response Guidelines. These guidelines were released to the public as part of NMFS' Programmatic EIS on the Marine Mammal Health and Stranding Response Program and were available for public review at that time. Those guidelines also underwent legal and peer review before being released. Those guidelines are currently being updated based on lessons learned from the Deepwater Horizon spill in the Gulf of Mexico.

Proposed IHA Language Concerns

The comments and concerns contained in this grouping relate to the language that was contained in the Notice of Proposed IHA (76 FR 70004–70007, November 9, 2011) in the section titled ''Proposed Incidental Harassment Authorization.'' The commenters requested clarification or changes to some of the specific wording of the conditions that would be contained in the issued IHA. The referenced condition in the proposed IHA is noted in the comments here. Numbers of the conditions match the proposed IHA and may differ slightly from the issued IHA.

Comment 64: Regarding Condition 1, Shell asks that the IHA become effective on July 1 instead of July 4 since the company will begin transiting into the Chukchi Sea on July 1 (but not before), if weather permits, and could therefore arrive on location at the Burger prospect before July 4.

Response: NMFS has made the requested change. Changing the date from July 4 to July 1 does not alter any of the analyses contained in the proposed IHA.

Comment 65: Regarding Condition 2, Shell asks that the language of the IHA not limit the incidental takings from authorized sound sources to those made while only on Shell lease holdings because ice management activities may occur beyond the lease boundaries and the continuous noise of the drillship may extend beyond the limits of Shell's lease holdings.

Response: NMFS has retained the first sentence of Condition 2, as originally proposed, which states that only activities associated with Shell's 2012 Chukchi Sea exploration plan are covered by the IHA. Because the exploration plan describes the locations of activities, NMFS has determined that language is legally sufficient. NMFS understands, and did analyze, that ice management may at times occur 25 mi (40 km) from the actual drill site. Additionally, NMFS analyzed the propagation and sound isopleths of the drill rig, which may attenuate beyond the actual lease holding itself.

Comment 66: Regarding Condition 3(a), Shell requests that narwhal be included in the list of species for which incidental take is authorized.

Response: As noted in the Notice of Proposed IHA (76 FR 69958, November 9, 2011), NMFS determined that presence of narwhal in the U.S. Chukchi Sea is rare and extralimital. Encounters are unlikely.

Comment 67: Regarding Condition 4, BOEM recommends that aircraft associated with the marine mammal surveys be included in the list of sound sources for which taking is authorized.

Response: NMFS concurs and has added aircraft to the list of sound sources covered by the IHA.

Comment 68: Regarding Condition 7(a), Shell asks whether the response they provided to NMFS on July 29, 2011, for a definition of ''group'' is consistent with the intent meant by NMFS in the **Federal Register** notice. As a general practice, Shell will adopt a definition of a group as being three or more whales observed within a 547-yd (500-m) area and displaying behaviors of directed or coordinated activity (*e.g.,* group feeding).

Response: NMFS agrees with this definition and will add the following sentence to Condition 7(a): ''For purposes of this Authorization, a group is defined as being three or more whales observed within a 547-yd (500-m) area and displaying behaviors of directed or coordinated activity (*e.g.,* group feeding).

Comment 69: Shell requests that Condition 7(d) be modified to match with the language contained in Condition 9(f), which allows marine mammal monitoring flights to also fly below the 1,500-ft (457-m) altitude restriction. In the proposed IHA, those two conditions contradicted one another. BOEM also requested clarification of Condition 7(d).

Response: NMFS agrees that Condition 7(d) should be rewritten to match Condition 9(f). The condition now reads as follows: ''Aircraft shall not fly within 1,000-ft (305-m) of marine mammals or below 1,500-ft (457-m) altitude (except during marine mammal monitoring, takeoffs, landings, or in emergency situations) while over land or sea.''

Comment 70: Regarding Condition 7(e), Shell asks if the length of daily duty restrictions included in the measure apply only to the drillship and ice management vessels or to all vessels, including smaller support vessels. Shell's view is that the remainder of support vessels, not included as ''sound sources,'' will have fewer observers than either the drillship or ice management vessels (mainly due to bunk space), which will be sufficient to cover marine mammal observations.

Response: NMFS concurs that the watch requirements were meant to apply to the drillship and two ice management vessels. PSOs will be required to be stationed on the other support vessels. However, they will not need to be on watch 24 hours a day, as those vessels are not always active 24 hours a day. PSOs will need to be on watch when the smaller support vessels are active, such as for supply transport.

Comment 71: BOEM recommends that Condition 7(f), or a new similar section focusing on aerial observations, require that marine mammal observation reports include the location and altitude of the aircraft at the time of each observation.

Response: Aircraft altitude and location are available from the flight track logs. NMFS has added a requirement to include this information in the marine mammal sighting logs.

Comment 72: Regarding Condition 7(f)(iv), Shell requests that the requirement to measure water temperature be removed as a stipulation under this measure given that it lacks material value to the recording of

marine observations and adherence to other more salient mitigation measures.

Response: NMFS included the recording of water temperature along with other more salient data collection parameters in the proposed IHA because it was included in Shell's original monitoring plan. After further discussion with Shell, NMFS agrees that it is not necessary to record water temperature each time a marine mammal is sighted and has removed the requirement from the IHA.

Comment 73: Regarding Condition 9(a), Shell notes that the condition should mention the Burger Prospect and not the Camden Bay drill sites. BOEM recommends that NMFS provide a definition of the polynya zone so that Shell can effectively comply with this condition.

Response: NMFS has corrected the error and removed mention of the Camden Bay drill sites from the condition. NMFS does not have a definition of the polynya zone and does not believe it is necessary to include one in the IHA.

Comment 74: Regarding Condition 10, BOEM recommends inclusion of a brief description of the 4MP and similar programs as a part of the proposed action.

Response: NMFS has determined that such a description is unnecessary in the IHA, as it is described in this document and the associated Final EA.

Comment 75: Regarding Condition 10(c)(i), as well as Condition 11(a), Shell requests that NMFS include language reflecting the flexibility of providing the drilling sounds on a ''rolling'' basis. Shell states that sound source verifications for the drilling vessel will necessitate that recordings of the various sounds of the drilling program continue throughout the drilling season. Hence, all drilling program sounds will not be available within 5 days of initiating drilling. Instead, Shell volunteers to provide to NMFS a ''rolling'' transmission of recorded drilling program sounds throughout the drilling program.

Response: NMFS concurs that a ''rolling'' transmission of sound signatures is appropriate based on the fact that different activities will be conducted at various times throughout the open-water season. In order to capture all of the different sound signatures and for that data to be transmitted to NMFS, it is not appropriate to do it all in the first 5 days but rather to collect the data on a real-time basis. Spectrograms will be calculated daily, and all information will be included in a weekly report that discusses the drillship and vessel activities that occurred during the week. Language has been included in the IHA to reflect this weekly reporting requirement.

Comment 76: Regarding Condition 10(c)(ii), Shell asks that the phrase ''to the extent practical'' precede the last sentence of the measure. Shell fully intends to deploy and execute the study as designed. However, conditional temporal and spatial factors, such as ice at the locations for deployment of acoustic recorders could cause some recorders to not be deployed or to be deployed at alternate locations.

Response: NMFS has made the requested language change to the condition.

Comment 77: Regarding Condition 11(d), Shell requests that the IHA stipulate that the comprehensive report be due 240 days from the end of the drilling season instead of 240 days from the date of issuance, since the IHA is being issued months before the start of the program.

Response: NMFS agrees and has rewritten the condition to state that the comprehensive report is due 240 days from the date of expiration of the IHA (*i.e.,* 240 days from October 31, 2012).

Description of Marine Mammals in the Area of the Specified Activity

The Chukchi Sea supports a diverse assemblage of marine mammals, including: Bowhead, gray, beluga, killer, minke, humpback, and fin whales; harbor porpoise; ringed, ribbon, spotted, and bearded seals; narwhals; polar bears (*Ursus maritimus*); and walruses (*Odobenus rosmarus divergens;* see Table 4–1 in Shell's application). The bowhead, humpback, and fin whales are listed as ''endangered'' under the ESA and as depleted under the MMPA. Certain stocks or populations of gray, beluga, and killer whales and spotted seals are listed as endangered or are proposed for listing under the ESA; however, none of those stocks or populations occur in the activity area. On December 10, 2010, NMFS published a notice of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notice of proposed threatened and not warranted status for subspecies and distinct population segments of the bearded seal (75 FR 77496) in the **Federal Register**. Neither of these two ice seal species is considered depleted under the MMPA. Additionally, the ribbon seal is considered a ''species of concern'' under the ESA. Both the walrus and the polar bear are managed by the USFWS and are not considered further in this IHA notice.

Of these species, 12 are expected to occur in the area of Shell's operations. These species include: The bowhead, gray, humpback, minke, fin, killer, and beluga whales; harbor porpoise; and the ringed, spotted, bearded, and ribbon seals. Beluga, bowhead, and gray whales, harbor porpoise, and ringed, bearded, and spotted seals are anticipated to be encountered more than the other marine mammal species mentioned here. The marine mammal species that is likely to be encountered most widely (in space and time) throughout the period of the drilling program is the ringed seal. Encounters with bowhead and gray whales are expected to be limited to particular seasons. Additional information about species occurrence in the project area was provided in the Notice of Proposed IHA (76 FR 69958, November 9, 2011). Where available, Shell used density estimates from peer-reviewed literature in the application. In cases where density estimates were not readily available in the peer-reviewed literature, Shell used other methods to derive the estimates. NMFS reviewed the density estimate descriptions and articles from which estimates were derived and requested additional information to better explain the density estimates presented by Shell in its application. This additional information was included in the revised IHA application. The explanation for those derivations and the actual density estimates are described later in this document (see the ''Estimated Take by Incidental Harassment'' section).

Shell's application contains information on the status, distribution, seasonal distribution, abundance, and life history of each of the species under NMFS jurisdiction mentioned in this document. When reviewing the application, NMFS determined that the species descriptions provided by Shell correctly characterized the status, distribution, seasonal distribution, and abundance of each species. Please refer to the application for that information (see **ADDRESSES**). Additional information can also be found in the NMFS Stock Assessment Reports (SAR). The Alaska 2010 and 2011 Draft SARs are available at: *http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2010.pdf* and *http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2011_draft.pdf*, respectively.

Brief Background on Marine Mammal Hearing

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different

frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data. Southall *et al.* (2007) designate ''functional hearing groups'' for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (13 species of mysticetes): Functional hearing is estimated to occur between approximately 7 Hz and 22 kHz (however, a study by Au *et al.* (2006) of humpback whale songs indicate that the range may extend to at least 24 kHz);
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): Functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (eight species of true porpoises, six species of river dolphins, Kogia, the franciscana, and four species of cephalorhynchids): Functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in Water: Functional hearing is estimated to occur between approximately 75 Hz and 75 kHz, with the greatest sensitivity between approximately 700 Hz and 20 kHz.

As mentioned previously in this document, 12 marine mammal species (four pinniped and eight cetacean species) are likely to occur in the exploratory drilling area. Of the eight cetacean species likely to occur in Shell's project area, five are classified as low frequency cetaceans (*i.e.,* bowhead, gray, humpback, minke, and fin whales), two are classified as mid-frequency cetaceans (*i.e.,* beluga and killer whales), and one is classified as a high-frequency cetacean (*i.e.,* harbor porpoise) (Southall *et al.,* 2007). Additional information regarding marine mammal hearing and sound production is contained in the Notice of Proposed IHA (76 FR 69958, November 9, 2011).

Potential Effects of the Specified Activity on Marine Mammals

The likely or possible impacts of the exploratory drilling program in the Chukchi Sea on marine mammals could involve both non-acoustic and acoustic effects. Potential non-acoustic effects could result from the physical presence of the equipment and personnel. Petroleum development and associated activities introduce sound into the marine environment. Impacts to marine mammals are expected to primarily be acoustic in nature. Potential acoustic effects on marine mammals relate to sound produced by drilling activity, vessels, and aircraft, as well as the ZVSP airgun array. The potential effects of sound from the exploratory drilling program might include one or more of the following: Tolerance; masking of natural sounds; behavioral disturbance; non-auditory physical effects; and, at least in theory, temporary or permanent hearing impairment (Richardson *et al.,* 1995a). However, for reasons discussed in the proposed IHA, it is unlikely that there would be any cases of temporary, or especially permanent, hearing impairment resulting from these activities.

In the ''Potential Effects of the Specified Activity on Marine Mammals'' section of the Notice of Proposed IHA (76 FR 69964–69976, November 9, 2011), NMFS included a qualitative discussion of the different ways that Shell's 2012 Chukchi Sea exploratory drilling program may potentially affect marine mammals. That discussion focused on information and data regarding potential acoustic and non-acoustic effects from drilling activities (*i.e.,* use of the drillship, icebreakers, and support vessels and aircraft) and use of airguns during ZVSP surveys. Marine mammals may experience masking and behavioral disturbance. The information contained in the ''Potential Effects of Specified Activities on Marine Mammals'' section from the proposed IHA has not changed. Please refer to the proposed IHA for the full discussion (76 FR 69958, November 9, 2011).

Exploratory Drilling Program and Potential for Oil Spill

As noted above, the specified activity involves the drilling of exploratory wells and associated activities in the Chukchi Sea during the 2012 open-water season. The impacts to marine mammals that are reasonably expected to occur will be acoustic in nature. In response to previous IHA applications submitted by Shell, various entities have asserted that NMFS cannot authorize the take of marine mammals incidental to exploratory drilling under an IHA. Instead, they contend that incidental take can be allowed only with a letter of authorization (LOA) issued under five-year regulations because of the potential that an oil spill will cause serious injury or mortality.

There are two avenues for authorizing incidental take of marine mammals under the MMPA. NMFS may, depending on the nature of the anticipated take, authorize the take of marine mammals incidental to a specified activity through regulations and LOAs or annual IHAs. *See* 16 U.S.C. 1371(a)(5)(A) and (D). In general, regulations (accompanied by LOAs) may be issued for any type of take (*e.g.,* Level B harassment (behavioral disturbance), Level A harassment (injury), serious injury, or mortality), whereas IHAs are limited to activities that result only in harassment (*e.g.,* behavioral disturbance or injury). Following the 1994 MMPA Amendments, NMFS promulgated implementing regulations governing the issuance of IHAs in Arctic waters. See 60 FR 28379 (May 31, 1995) and 61 FR 15884 (April 10, 1996). NMFS stated in the preamble of the proposed rulemaking that the scope of IHAs would be limited to '' * * * those authorizations for harassment involving incidental harassment that may involve *non-serious injury.''* See 60 FR 28380 (May 31, 1995; emphasis added); 50 CFR 216.107(a). (''[e]xcept for activities that have the potential to result in serious injury or mortality, which must be authorized under 216.105, incidental harassment authorizations may be issued, * * * to allowed activities that may result in only the incidental harassment of a small number of marine mammals.'') NMFS explained further that applications would be reviewed to determine whether the activity would result in more than harassment, and, if so, the agency would either (1) attempt to negate the potential for serious injury through mitigation requirements, or (2) deny the incidental harassment authorization and require the applicant to apply for incidental take regulations. See id. at 28380–81.

NMFS' determination of whether the type of incidental take authorization requested is appropriate occurs shortly after the applicant submits an application for an incidental take authorization. The agency evaluates the proposed action and all information contained in the application to determine whether it is adequate and complete and whether the type of taking requested is appropriate. See 50 CFR 216.104; see also 60 FR 28380 (May 31, 1995). Among other things, NMFS considers the specific activity or class of activities that can reasonably be *expected* to result in incidental take; the *type* of incidental take authorization that is being requested; and the *anticipated* impact of the activity upon

the species or stock and its habitat. See *id.* at 216.104(a). (emphasis added). Any application that is determined to be incomplete or inappropriate for the type of taking requested will be returned to the applicant with an explanation of why the application is being returned. See id. Finally, NMFS evaluates the best available science to determine whether a proposed activity is reasonably expected or likely to result in serious injury or mortality.

NMFS evaluated Shell's incidental take application for its proposed 2012 drilling activities in light of the foregoing criteria and has concluded that Shell's request for an IHA is warranted. Shell submitted information with its IHA Application indicating that an oil spill is a highly unlikely event that is not reasonably expected to occur during the course of exploration drilling or ZVSP surveys. *See* Chukchi Sea IHA Application, pp. 3 and Attachment E—Analysis of the Probability of an ''Unspecified Activity'' and Its Impacts: Oil Spill. In addition, Shell's 2012 Exploration Plan indicates there is a ''very low likelihood of a large oil spill event.'' See Shell Offshore, Inc.'s Revised Outer Continental Shelf Lease Exploration Plan, Chukchi Sea, Alaska (May 2011), at p. 8–1; see also, Appendix F to Shell's Revised Outer Continental Shelf Lease Exploration Plan, at p. 4–174.

The likelihood of a large or very large (i.e., ≥1,000 barrels or ≥150,000 barrels, respectively) oil spill occurring during Shell's proposed program has been estimated to be low. A total of 35 exploration wells have been drilled between 1982 and 2003 in the Chukchi and Beaufort seas, and there have been no blowouts. In addition, no blowouts have occurred from the approximately 98 exploration wells drilled within the Alaskan OCS (MMS, 2007a). Attachment E in Shell's IHA Application contains information regarding the probability of an oil spill occurring during the proposed program and the potential impacts should one occur. Based on modeling conducted by Bercha (2008), the predicted frequency of an exploration well oil spill in waters similar to those in the Chukchi Sea, Alaska, is 0.000612 per well for a blowout sized between 10,000 barrels (bbl) to 149,000 bbl and 0.000354 per well for a blowout greater than 150,000 bbl. Please refer to Shell's application for additional information on the model and predicted frequencies (see **ADDRESSES**).

Shell has implemented several design standards and practices to reduce the already low probability of an oil spill occurring as part of its operations. The wells proposed to be drilled in the Arctic are exploratory and will not be converted to production wells; thus, production casing will not be installed, and the well will be permanently plugged and abandoned once exploration drilling is complete. Shell has also developed and will implement the following plans and protocols: Shell's Critical Operations Curtailment Plan; IMP; Well Control Plan; and Fuel Transfer Plan. Many of these safety measures are required by the Department of the Interior's interim final rule implementing certain measures to improve the safety of oil and gas exploration and development on the Outer Continental Shelf in light of the Deepwater Horizon event (see 75 FR 63346, October 14, 2010). Operationally, Shell has committed to the following to help prevent an oil spill from occurring in the Chukchi Sea:

- Shell's Blow Out Preventer (BOP) was inspected and tested by an independent third party specialist;
- Further inspection and testing of the BOP have been performed to ensure the reliability of the BOP and that all functions will be performed as necessary, including shearing the drill pipe;
- Subsea BOP hydrostatic tests will be increased from once every 14 days to once every 7 days;
- A second set of blind/shear rams will be installed in the BOP stack;
- Full string casings will typically not be installed through high pressure zones;
- Liners will be installed and cemented, which allows for installation of a liner top packer;
- Testing of liners prior to installing a tieback string of casing back to the wellhead;
- Utilizing a two-barrier policy; and
- Testing of all casing hangers to ensure that they have two independent, validated barriers at all times.

NMFS has considered Shell's proposed action and has concluded that there is no reasonable likelihood of serious injury or mortality from the 2012 Chukchi Sea exploration drilling program. NMFS has consistently interpreted the term ''potential,'' as used in 50 CFR 216.107(a), to only include impacts that have more than a discountable probability of occurring, that is, impacts must be reasonably expected to occur. Hence, NMFS has regularly issued IHAs in cases where it found that the potential for serious injury or mortality was ''highly unlikely'' (*See* 73 FR 40512, 40514, July 15, 2008; 73 FR 45969, 45971, August 7, 2008; 73 FR 46774, 46778, August 11, 2008; 73 FR 66106, 66109, November 6, 2008; 74 FR 55368, 55371, October 27, 2009).

Interpreting ''potential'' to include impacts with any probability of occurring (*i.e.,* speculative or extremely low probability events) would nearly preclude the issuance of IHAs in every instance. For example, NMFS would be unable to issue an IHA whenever vessels were involved in the marine activity since there is always some, albeit remote, possibility that a vessel could strike and seriously injure or kill a marine mammal. This would also be inconsistent with the dual-permitting scheme Congress created and undesirable from a policy perspective, as limited agency resources would be used to issue regulations that provide no additional benefit to marine mammals beyond what can be achieved with an IHA.

Despite concluding that the risk of serious injury or mortality from an oil spill in this case is extremely remote, NMFS nonetheless evaluated the potential effects of an oil spill on marine mammals. While an oil spill is not a component of Shell's specified activity, potential impacts on marine mammals from an oil spill are discussed in more detail in the Notice of Proposed IHA (76 FR 69958, November 9, 2011) and NMFS' EA. Please refer to those documents for the discussion.

Anticipated Effects on Marine Mammal Habitat

The primary potential impacts to marine mammals and other marine species are associated with elevated sound levels produced by the exploratory drilling program (*i.e.* the drillship and the airguns). However, other potential impacts are also possible to the surrounding habitat from physical disturbance and an oil spill (should one occur). The proposed IHA contains a full discussion of the potential impacts to marine mammal habitat and prey species in the project area. No changes have been made to that discussion. Please refer to the proposed IHA for the full discussion of potential impacts to marine mammal habitat (76 FR 69958, November 9, 2011). NMFS has determined that Shell's exploratory drilling program is not expected to have any habitat-related effects that could cause significant or long-term consequences for marine mammals or on the food sources that they utilize.

Mitigation

In order to issue an incidental take authorization (ITA) under Sections 101(a)(5)(A) and (D) of the MMPA, NMFS must, where applicable, set forth the permissible methods of taking

pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant). This section summarizes the contents of Shell's Marine Mammal Monitoring and Mitigation Plan (4MP).

Operational Mitigation Measures

Shell submitted a 4MP as part of its application (Attachment C; see **ADDRESSES**). Shell submitted a revised 4MP after they made voluntary changes to the plan and after the plan was reviewed by an independent peer review panel (see the ''*Monitoring Plan Peer Review*'' section for additional details). The revised plan is also available to the public (see **ADDRESSES**). The planned offshore drilling program incorporates both design features and operational procedures for minimizing potential impacts on marine mammals and on subsistence hunts. The design features and operational procedures have been described in the IHA and LOA applications submitted to NMFS and USFWS, respectively, and are summarized here. Survey design features include:

- Timing and locating drilling and support activities to avoid interference with the annual subsistence hunts by the peoples of the Chukchi villages;
- Identifying transit routes and timing to avoid other subsistence use areas and communicating with coastal communities before operating in or passing through these areas; and
- Conducting pre-season sound propagation modeling to establish the appropriate exclusion and behavioral radii.

Shell indicates, and we agree, that the potential disturbance of marine mammals during operations will be minimized further through the implementation of several ship-based mitigation measures, which include establishing and monitoring safety and disturbance zones.

Exclusion radii for marine mammals around sound sources are customarily defined as the distances within which received sound levels are greater than or equal to 180 dB re 1 μPa (rms) for cetaceans and greater than or equal to 190 dB re 1 μPa (rms) for pinnipeds. These exclusion criteria are based on an assumption that sounds at lower received levels will not injure these animals or impair their hearing abilities, but that higher received levels might have such effects. It should be understood that marine mammals inside these exclusion zones will not necessarily be injured, as the received sound thresholds which determine these zones were established prior to the current understanding that significantly higher levels of sound would be required before injury would likely occur (see Southall *et al.,* 2007). With respect to Level B harassment, NMFS' practice has been to apply the 120 dB re 1 μPa (rms) received level threshold for underwater continuous sound levels and the 160 dB re 1 μPa (rms) received level threshold for underwater impulsive sound levels.

Shell will monitor the various radii in order to implement necessary mitigation measures. Initial radii for the sound levels produced by the *Discoverer,* the icebreaker, and the airguns have been modeled. Measurements taken by Austin and Warner (2010) indicated broadband source levels between 177 and 185 dB re 1 μPa rms for the *Discoverer.* Measurements of the icebreaking supply ship *Robert Lemeur* pushing and breaking ice during exploration drilling operations in the Beaufort Sea in 1986 resulted in an estimated broadband source level of 193 dB re 1 μPa rms (Greene, 1987a; Richardson *et al.,* 1995a). Based on a similar airgun array used in the shallow waters of the Beaufort Sea in 2008 by BP, the source level of the airgun is predicted to be 241.4 dB re 1 μPa rms. Once on location in the Chukchi Sea, Shell will conduct SSV tests to establish safety zones for the previously mentioned sound level criteria. The objectives of the SSV tests are: (1) to quantify the absolute sound levels produced by drilling and to monitor their variations with time, distance, and direction from the drillship; and (2) to measure the sound levels produced by vessels operating in support of drilling operations, which include crew change vessels, tugs, ice management vessels, and spill response vessels. The methodology for conducting the SSV tests is fully described in Shell's 4MP (see **ADDRESSES**). Please refer to that document for further details. Upon completion of the SSV tests, the new radii will be established and monitored, and mitigation measures will be implemented in accordance with Shell's 4MP.

Based on the best available scientific literature, the source levels noted above for exploration drilling are not high enough to cause a temporary reduction in hearing sensitivity or permanent hearing damage to marine mammals. Consequently, Shell believes that mitigation as described for seismic activities including ramp ups, power downs, and shutdowns should not be necessary for drilling activities. NMFS has also determined that these types of mitigation measures, traditionally required for seismic survey operations, are not practical or necessary for this proposed drilling activity. Seismic airgun arrays can be turned on slowly (*i.e.,* only turning on one or some guns at a time) and powered down quickly. The types of sound sources used for exploratory drilling have different properties and are unable to be ''powered down'' like airgun arrays or shutdown instantaneously without posing other risks to operational and human safety. However, Shell plans to use PSOs (formerly referred to as marine mammal observers) onboard the drillship and the various support vessels to monitor marine mammals and their responses to industry activities and to initiate mitigation measures (for ZVSP activities) should in-field measurements of the operations indicate that such measures are necessary. Additional details on the PSO program are described in the ''Monitoring and Reporting'' section found later in this document. Also, for the ZVSP activities, Shell will implement standard mitigation procedures, such as ramp ups, power downs, and shutdowns.

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

During the ZVSP surveys, Shell will ramp up the airgun arrays slowly. Full ramp ups (*i.e.,* from a cold start when no airguns have been firing) will begin by firing a single airgun in the array. A full ramp up will not begin until there has been a minimum of 30 minutes of observation of the 180-dB and 190-dB exclusion zones for cetaceans and pinnipeds, respectively, by PSOs to assure that no marine mammals are present. The entire exclusion zone must be visible during the 30-minute lead-in to a full ramp up. If the entire exclusion zone is not visible, then ramp up from a cold start cannot begin. If a marine mammal(s) is sighted within the exclusion zone during the 30-minute watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the applicable exclusion zone or the animal(s) is not sighted for at least 15 minutes for small

odontocetes and pinnipeds or 30 minutes for baleen whales.

A power down is the immediate reduction in the number of operating energy sources from all firing to some smaller number. A shutdown is the immediate cessation of firing of all energy sources. The arrays will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable exclusion zone of the full arrays but is outside the applicable exclusion zone of the single source. If a marine mammal is sighted within the applicable exclusion zone of the single energy source, the entire array will be shutdown (*i.e.,* no sources firing). The same 15- and 30-minute sighting times described for ramp up also apply to starting the airguns again after either a power down or shutdown.

Additional mitigation measures include: (1) Reducing speed and/or changing course if a whale is sighted within 300 yards (274 m) from a vessel; (2) reducing speed in inclement weather; (3) checking the water immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged; (4) resuming full activity (*e.g.,* full support vessel speed) only after marine mammals are confirmed to be outside the safety zone; (5) implementing flight restrictions prohibiting aircraft from flying below 1,500 ft (457 m) altitude (except during marine mammal monitoring, takeoffs and landings, or in emergency situations); and (6) keeping vessels anchored when approached by marine mammals to avoid the potential for avoidance reactions by such animals.

Shell will also implement additional mitigation measures to ensure no unmitigable adverse impact on the availability of affected species or stocks for taking for subsistence uses. Those measures are described in the ''Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses'' section found later in this document.

Oil Spill Response Plan

In accordance with BSEE regulations, Shell has developed an OSRP for its Chukchi Sea exploration drilling program. A copy of this document can be found on the Internet at: *http://www.bsee.gov/OSRP/Shell-Chukchi-OSRP.aspx.* Additionally, in its POC, Shell has agreed to several mitigation measures in order to reduce impacts during the response efforts in the unlikely event of an oil spill. Those measures are detailed in the ''*Plan of Cooperation (POC)''* section found later in this document. In the unlikely event of a spill, Shell has also agreed to operate, to the maximum extent practicable, in accordance with NOAA's Marine Mammal Oil Spill Response Guidelines, which are available on the Internet at: *http://www.nmfs.noaa.gov/pr/pdfs/health/eis_appendixl.pdf.* BSEE issued approval of Shell's Chukchi Sea OSRP on February 17, 2012. That approval was issued after review of the plan by BSEE in cooperation with other Federal and state agency partners, including NOAA. Many of the changes to the approved OSRP reflect comments from NOAA, such as revising the worst case discharge scenario and providing trajectories of the worst case discharge over a 30-day period instead of a 72-hour period.

NMFS has carefully evaluated Shell's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Measures to ensure availability of such species or stock for taking for certain subsistence uses are discussed later in this document (see ''Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses'' section).

Monitoring and Reporting

In order to issue an ITA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must, where applicable, set forth ''requirements pertaining to the monitoring and reporting of such taking''. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area.

Monitoring Measures

The monitoring plan proposed by Shell can be found in the 4MP (Attachment C of Shell's application; see **ADDRESSES**). Shell's revised 4MP is also available to the public (see **ADDRESSES**). The plan was modified based on comments received from the peer review panel (see the ''*Monitoring Plan Peer Review''* section later in this document) and based on voluntary changes committed to by Shell. A summary of the primary components of the plan can be found in the Notice of Proposed IHA (76 FR 69958, November 9, 2011). A shorter description is contained here, with only components of the 4MP that have been modified summarized in greater detail here.

(1) Vessel-Based PSOs

Vessel-based monitoring for marine mammals will be done by trained PSOs throughout the period of drilling operations on all vessels. PSOs will monitor the occurrence and behavior of marine mammals near the drillship during all daylight periods during operation and during most daylight periods when drilling operations are not occurring. PSO duties will include watching for and identifying marine mammals, recording their numbers, distances, and reactions to the drilling operations. A sufficient number of PSOs will be required onboard each vessel and specifically onboard the drillship and ice management vessels to meet the following criteria: (1) 100% monitoring coverage during all periods of drilling operations in daylight; (2) maximum of 4 consecutive hours on watch per PSO; and (3) maximum of 12 hours of watch time per day per PSO. Shell anticipates that there will be provision for crew rotation at least every 3–6 weeks to avoid observer fatigue.

PSOs will watch for marine mammals from the best available vantage point on the drillship and support vessels. Maximizing time with eyes on the water is strongly promoted during training and is a goal of the PSO program. Each ship will have voice recorders available to PSOs. This will allow PSOs to remain focused on the water in situations where a number of sightings occur together. Additionally, Shell has transitioned entirely to real-time electronic data recording and automated as much of the process as possible to minimize time spent recording data as opposed to focusing eyes on the water.

PSOs are instructed to identify animals as unknown when appropriate rather than strive to identify an animal when there is significant uncertainty. Shell also asks that they provide any sightings cues they used and any distinguishable features of the animal even if they are not able to identify the animal and record it as unidentified. Emphasis is also placed on recording

what was not seen, such as dorsal features.

PSOs will be able to plot sightings in near real-time for their vessel. Significant sightings from key vessels (drill rigs, ice management, anchor handlers and aircraft) will be relayed between platforms to keep observers aware of animals that may be in or near the area but may not be visible to the observer at any one time. Emphasis will be placed on relaying sightings with the greatest potential to involve mitigation or reconsideration of a vessel's course (*e.g.,* large group of bowheads, walruses on ice). Data will also be collected to further evaluate night vision equipment.

(2) Coastal and Offshore Aerial Survey Programs

In its original 4MP, Shell proposed conducting a coastal aerial survey program. Since drafting that original 4MP, Shell has agreed to conduct an offshore aerial photographic survey program. Slight changes to the originally proposed coastal aerial program are noted here, along with details on the newly included offshore photographic survey.

Coastal Aerial Survey—Recent aerial surveys of marine mammals in the Chukchi Sea were conducted over coastal areas to approximately 23 mi (37 km) offshore in 2006–2008 and 2010 in support of Shell's summer seismic exploration activities. These surveys were designed to provide data on the distribution and abundance of marine mammals in nearshore waters of the Chukchi Sea. Shell proposes to conduct an aerial survey program in the Chukchi Sea in 2012 that would be similar to the previous programs.

The current aerial survey program will be designed to collect data on cetaceans but will be limited in its ability to collect similar data on pinnipeds because they are difficult to identify at higher altitudes. Shell's objectives for this program include:

- To collect data on the distribution and abundance of marine mammals in coastal areas of the eastern Chukchi Sea;
- To collect and report data on the distribution, numbers, orientation and behavior of marine mammals, particularly beluga whales, near traditional hunting areas in the eastern Chukchi Sea; and
- To collect marine mammal sighting data using PSOs and digital media and to compare the data recorded by the two methods.

With agreement from hunters in the coastal villages, manned aerial surveys of coastal areas to approximately 23 mi (37 km) offshore between Point Hope and Point Barrow will begin in late June and will continue until drilling operations in the Chukchi Sea are completed. In past years, it has been required that no surveys be conducted in the southern part of the survey area until after the beluga hunt is confirmed to be over, which has been about mid-July. Weather and equipment permitting, nearshore surveys will be conducted once per week during this time period or more often, depending on Shell's ability to fly offshore (which is their first priority). A full description of Shell's survey procedures can be found in the 4MP of Shell's application (see **ADDRESSES**), with only pertinent changes noted next.

Five PSOs will be aboard the aircraft during surveys. Two primary observers will be looking for marine mammals within 1.6 mi (2.5 km) of the survey track line; one at a bubble window on each side of the aircraft. A third person will record data, and a fourth person will rest and alternate with the other PSOs throughout the flight so that none of the primary observers are on duty for more than 2 hrs at a time. The fifth observer will serve as an ice observer and will record data pertinent to Shell's ice observation program. The sighting information and additional data on each sighting will be entered into a digital voice recorder and entered into the database after the survey and will be used to check the data entry during the survey.

Offshore Aerial Photographic Survey—As an addition to the original May 2011 4MP, Shell will conducted an unmanned aerial photographic survey around the offshore drilling operations. During the 2012 field season, Shell will mount two cameras on the aircraft to record marine mammals around the Chukchi Sea drill sites. This survey will serve as a pilot study for future unmanned aerial systems (UAS). The photographic surveys in the Chukchi and Beaufort Seas would collect data that will allow direct comparisons of photographic techniques for data collection with data collected by human observers aboard the aircraft. The aerial survey program in the Beaufort Sea will provide side-by-side comparisons of data collected by PSOs on the survey aircraft with digital imagery collected at the same time by still and video cameras. Surveys in the Chukchi Sea will use only digital cameras when flying offshore but will have observers and digital data collection when the nearshore and coastline surveys are conducted.

These surveys would start as soon as the ice management, anchor handler, and drillship are at or near the first drilling location and would continue throughout the drilling period until the drilling-related vessels have left the drilling area. Therefore, surveys are anticipated to begin around July 3. The offshore photographic surveys will be flown twice a week, weather permitting. Additional details on the camera specifications, survey design, and data analyses can be found in Shell's revised April 2012 4MP (see **ADDRESSES**).

(3) Acoustic Monitoring

Shell will conduct SSV tests to establish the isopleths for the applicable exclusion radii, mostly to be employed during the ZVSP surveys. In addition, Shell will deploy an acoustic ''net'' array.

Drilling Sound Measurements—Drilling sounds are expected to vary significantly with time due to variations in the level of operations and the different types of equipment used at different times onboard the *Discoverer.* The objectives of these measurements are:

(1) To quantify the absolute sound levels produced by drilling and to monitor their variations with time, distance, and direction from the drilling vessel;

(2) To measure the sound levels produced by vessels operating in support of exploration drilling operations. These vessels will include crew change vessels, tugs, icebreakers, and OSRVs; and

(3) To measure the sound levels produced by an end-of-hole ZVSP survey, using a stationary sound source.

The *Discoverer,* support vessels, and ZVSP sound measurements will be performed using one of two methods, both of which involve real-time monitoring. Since drafting the original 4MP in 2011, Shell and NMFS have agreed that spectrograms will be calculated daily, and all information will be included in a weekly report that discusses drillship and vessel activities that occurred during the week.

Vessel sound characterizations will be performed using dedicated recorders deployed at sufficient distance from drilling operations so that sound produced by those activities does not interfere. Three AMAR autonomous acoustic recorders will be deployed on and perpendicular to a sail track on which all Shell vessels will transit. The deployment geometry will be as shown in Figure 3 in Shell's April 2012 4MP. This geometry is designed to obtain sound level measurements as a function of distance and direction. The fore and aft directions are sampled continuously over longer distances to 3.1 and 6.2 mi (5 and 10 km) respectively, while broadside and other directions are

sampled as the vessels pass closer to the recorders. Additional details can be found in Shell's 4MP.

Acoustic ''Net'' Array—The acoustic ''net'' array used by Shell during the 2006–2011 field seasons will be deployed in 2012. The array was designed to accomplish two main objectives:

- To collect information on the occurrence and distribution of marine mammals that may be available to subsistence hunters near villages located on the Chukchi Sea coast and to document their relative abundance, habitat use, and migratory patterns; and
- To measure the ambient soundscape throughout the eastern Chukchi Sea and to record received levels of sound from industry and other activities further offshore in the Chukchi Sea.

A net array configuration similar to that deployed in 2007–2011 is again proposed for 2012. The basic components of this effort consist of autonomous acoustic recorders deployed widely across the U.S. Chukchi Sea through the open-water and then winter seasons. The net array configuration will include a regional array of 24 AMAR recorders deployed from July-October off the four main transect locations: Cape Lisburne; Point Hope; Wainwright; and Barrow (as shown in Figure 8 of Shell's April 2012 4MP). These will be augmented by six AMAR recorders deployed from August 2012–August 2013 at Hanna Shoal. Six additional AMAR recorders will be deployed in a hexagonal geometry at 10 mi (16 km) from the nominal drillship location to monitor directional variations of drilling-related sounds and to examine marine mammal vocalization patterns in vicinity of drilling activities. One new recorder will be placed 20 mi (32 km) northwest of the drillship to monitor for drilling sound propagation toward the south side of Hanna Shoal, which acoustic and satellite tag monitoring has identified as frequented by walrus in August.

Additional details on data analysis for the types of monitoring described here (*i.e.,* vessel-based, aerial, and acoustic) can be found in the April 2012 4MP (see **ADDRESSES**).

Monitoring Plan Peer Review

The MMPA requires that monitoring plans be independently peer reviewed ''where the proposed activity may affect the availability of a species or stock for taking for subsistence uses'' (16 U.S.C. 1371(a)(5)(D)(ii)(III)). Regarding this requirement, NMFS' implementing regulations state, ''Upon receipt of a complete monitoring plan, and at its discretion, [NMFS] will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan'' (50 CFR 216.108(d)).

NMFS convened an independent peer review panel, comprised of experts in the fields of marine mammal ecology and underwater acoustics, to review Shell's 4MP for Exploration Drilling of Selected Lease Areas in the Alaskan Chukchi Sea in 2012. The panel met on January 5–6, 2012, and provided their final report to NMFS on January 27, 2012. The full panel report can be viewed on the Internet at: *http://www.nmfs.noaa.gov/pr/pdfs/permits/openwater/peer_review_report_shell_chukchi.pdf*.

NMFS provided the panel with Shell's 4MP and asked the panel to answer the following questions regarding the plan:

(1) Will the applicant's stated objectives effectively further the understanding of the impacts of their activities on marine mammals and otherwise accomplish the goals stated above? If not, how should the objectives be modified to better accomplish the goals above?

(2) Can the applicant achieve the stated objectives based on the methods described in the plan?

(3) Are there technical modifications to the proposed monitoring techniques and methodologies proposed by the applicant that should be considered to better accomplish their stated objectives?

(4) Are there techniques not proposed by the applicant (*i.e.,* additional monitoring techniques or methodologies) that should be considered for inclusion in the applicant's monitoring program to better accomplish their stated objectives?

(5) What is the best way for an applicant to present their data and results (formatting, metrics, graphics, etc.) in the required reports that are to be submitted to NMFS (*i.e.,* 90-day report and comprehensive report)?

Prior to meeting with the panel, Shell reviewed the final reports of the 2010 and 2011 peer review panels, as Shell's 2010 proposed drilling activities were reviewed by the 2010 panel before the program was ultimately cancelled, and both reports contained general recommendations. In its presentation to the 2012 panel, Shell discussed suggested modifications and revisions to the 4MP submitted to NMFS in September 2011 and provided to the panel for review. The panel's final report includes recommendations both on the contents of the September 2011 4MP and the modifications presented at the meeting in January 2012.

NMFS has reviewed the report and evaluated all recommendations made by the panel and has determined there are several measures that Shell can incorporate into its 2012 Chukchi Sea exploratory drilling program 4MP to improve it. The panel recommendations determined by NMFS that are appropriate for inclusion in the 2012 program have been discussed with Shell and are included in the IHA, as appropriate. A summary of the recommendations that have been incorporated into Shell's revised Chukchi Sea 4MP is provided next.

(1) Vessel-Based Monitoring Measures

- Within safe limits, the PSOs should be stationed where they have the best possible viewing. Viewing may not always be best from the ship bridge, and in some cases may be best from higher positions with less visual obstructions (*e.g.,* flying bridge).
- The PSOs should be instructed to identify animals as unknown where appropriate rather than strive to identify a species if there is significant uncertainty.
- Sampling of the relative near-field around operations must be corrected for effort to provide the best possible estimates of marine mammals in safety and exposure zones.
- The PSOs should maximize their time with eyes on the water. This may require new means of recording data (*e.g.,* audio recorder) or the presence of a data recorder so that the observers can simply relay information to them.
- It would be useful if the PSOs or recorders have GIS software available to plot marine mammals sighted and vessel position on a real-time basis.
- Shell should develop a plan for real-time, inter-vessel communication of animal positions when multiple vessels are operating in an area.
- Continued testing and development to improve marine mammal detection capabilities when sighting conditions are poor is needed (*e.g.,* nighttime, high sea states, inclement weather).
- Apply appropriate statistical procedures for probability estimation of marine mammals missed based on observational data acquired during some period of time before and after night and fog events.
- Panel members made a recommendation regarding independence in the hiring, training, and debriefing of PSOs. In support of that recommendation, NMFS recommends that Shell provide its daily

PSO logs to NMFS throughout the operating season.

(2) Acoustic Monitoring

• If a mitigation gun is used during the stationary zero-offset vertical seismic surveys around the drilling sites, a reduced duty cycle (*e.g.,* 1 shot/min) would be appropriate.

• Once source characterization and verification measurements are obtained (including better resolution on directionality, as discussed below), propagation models should be rerun to provide better spatial footprints on which to base mitigation zones.

• Shell should consider the potential integration of visual and acoustic data from the Beaufort and Chukchi Seas monitoring programs and the Joint Science Program to produce estimates of bowhead, beluga, and walrus density using methods developed in the DECAF project by the Center for Research into Ecological and Environmental Modeling (CREEM) at the University of St. Andrews in Scotland.

(3) Presentation of Data in Reports

• It is important that the required reports are useful summaries and interpretations of the results of the various elements of the monitoring plans as opposed to merely regurgitations of all of the raw results. They should thus represent a first derivative level of summary/interpretation of the efficacy, measurements, and observations rather than raw data or fully processed analysis. A clear summary timeline and spatial (map) representation/summary of operations and important observations should be given. Any and all mitigation measures (*e.g.,* vessel course deviations for animal avoidance, operational shutdown) should be summarized. Additionally, an assessment of the efficacy of monitoring methods should be provided.

(4) Additional Monitoring Techniques or Methodologies

• The panel noted the concern over discharges and the impacts that discharges may have on marine mammals and their habitats. While NMFS acknowledges that there may be some challenges in designing techniques and methodologies to study the potential impacts from discharges on marine mammals for the 2012 season, because Shell's Chukchi Sea exploratory drilling program is proposed to be a multi-year operation, NMFS recommends that Shell investigate ways to conduct such studies during the proposed operations. Perhaps there are ways to work with other efforts such as the Joint Industry Monitoring Program funded by several of the oil and gas operators in the Beaufort and Chukchi Seas to collect the information and data.

Reporting Measures

The Notice of Proposed IHA (76 FR 69958, November 9, 2011) described the reporting requirements that would be required of Shell, including an SSV report, technical reports, a comprehensive report, and reports of sightings of injured or dead marine mammals. Please refer to that notice for the full description. Slight changes have been made to the submission of the SSV report, as described in the response to *Comment 75* earlier in this document. Because of the nature of the sounds that will be produced during Shell's operations, it is more appropriate to have a ''rolling'' schedule of submission of sound signatures. Additionally, in response to a recommendation from the peer review panel, NMFS will receive the daily PSO sighting logs.

Estimated Take by Incidental 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]. Only take by Level B behavioral harassment is anticipated as a result of the drilling program. Noise propagation from the drillship, associated support vessels (including during ice management/icebreaking if needed), and the airgun array are expected to harass, through behavioral disturbance, affected marine mammal species or stocks. Additional disturbance to marine mammals may result from aircraft overflights and visual disturbance of the drillship or support vessels. However, based on the flight paths and altitude, impacts from aircraft operations are anticipated to be localized and minimal in nature.

The full suite of potential impacts to marine mammals from various industrial activities was described in detail in the ''Potential Effects of the Specified Activity on Marine Mammals'' section in the proposed IHA. The potential effects of sound from the exploratory drilling program might include one or more of the following: Tolerance; masking of natural sounds; behavioral disturbance; non-auditory physical effects; and, at least in theory, temporary or permanent hearing impairment (Richardson *et al.,* 1995a). NMFS estimates that Shell's activities will most likely result in behavioral disturbance, including avoidance of the ensonified area or changes in speed, direction, and/or diving profile of one or more marine mammals. For reasons discussed in the proposed IHA, hearing impairment (TTS and PTS) is highly unlikely to occur based on the fact that most of the equipment to be used during Shell's drilling program does not have source levels high enough to elicit even mild TTS and/or the fact that certain species are expected to avoid the ensonified areas close to the operations. Additionally, non-auditory physiological effects are anticipated to be minor, if any would occur at all. Finally, based on the required mitigation and monitoring measures described earlier in this document and the fact that the back-propagated source level for the drillship is estimated to be between 177 and 185 dB re 1 μPa (rms), no injury or mortality of marine mammals is anticipated as a result of Shell's exploratory drilling program.

For continuous sounds, such as those produced by drilling operations and during icebreaking activities, NMFS uses a received level of 120=dB (rms) to indicate the onset of Level B harassment. For impulsive sounds, such as those produced by the airgun array during the ZVSP surveys, NMFS uses a received level of 160=dB (rms) to indicate the onset of Level B harassment. Shell provided calculations for the 120=dB isopleths produced by the *Discoverer* and by the icebreaker during icebreaking activities and then used those isopleths to estimate takes by harassment. Additionally, Shell provided calculations for the 160=dB isopleth produced by the airgun array and then used that isopleth to estimate takes by harassment. Shell provides a full description of the methodology used to estimate takes by harassment in its IHA application (see **ADDRESSES**), which is also provided in the Notice of Proposed IHA (76 FR 69958, November 9, 2011). Please refer to those documents for the full explanation, as only a short summary is provided here.

Shell requested authorization to take bowhead, gray, fin, humpback, minke, killer, and beluga whales, harbor porpoise, and ringed, spotted, bearded, and ribbon seals incidental to exploration drilling, ice management/icebreaking, and ZVSP activities. Additionally, Shell provided exposure estimates and requested takes of

narwhal. However, as stated previously in this document, sightings of this species are rare, and the likelihood of occurrence of narwhals in the drilling area is minimal. Therefore, NMFS has not authorized take for narwhals.

Basis for Estimating ''Take by Harassment''

''Take by Harassment'' is described in this section and was calculated in Shell's application by multiplying the expected densities of marine mammals that may occur near the exploratory drilling operations by the area of water likely to be exposed to continuous, non-pulse sounds ≥120 dB re 1 μPa (rms) during drillship operations or icebreaking activities and impulse sounds ≥160 dB re 1 μPa (rms) created by seismic airguns during ZVSP activities. NMFS evaluated and critiqued the methods provided in Shell's application and determined that they were appropriate to conduct the requisite MMPA analyses.

Marine mammal densities near the operation are likely to vary by season and habitat, mostly related to the presence or absence of sea ice. Marine mammal density estimates in the Chukchi Sea have been derived for two time periods, the summer period covering July and August, and the fall period including September and October. Animal densities encountered in the Chukchi Sea during both of these time periods will further depend on the habitat zone within which the operations are occurring: open water or ice margin. More ice is likely to be present in the area of operations during the summer period, so summer ice-margin densities have been applied to 50 percent of the area that may be exposed to sounds from exploration drilling and ZVSP activities in those months. Open water densities in the summer were applied to the remaining 50 percent of the area. Less ice is likely to be present during the fall season, so fall ice-margin densities have been applied to only 20 percent of the area that may be exposed to sounds from exploration drilling and ZVSP activities in those months. Fall open-water densities were applied to the remaining 80 percent of the area. Since ice management/icebreaking activities would only occur within ice-margin habitat, the entire area potentially ensonified by ice management/icebreaking activities has been multiplied by the ice-margin densities in both seasons.

Shell notes that there is some uncertainty about the representativeness of the data and assumptions used in the calculations. To provide some allowance for the uncertainties, ''maximum estimates'' as well as ''average estimates'' of the numbers of marine mammals potentially affected have been derived. For a few marine mammal species, several density estimates were available, and in those cases the mean and maximum estimates were determined from the survey data. In other cases, no applicable estimate (or perhaps a single estimate) was available, so correction factors were used to arrive at ''average'' and ''maximum'' estimates. These are described in detail in Shell's application and the proposed IHA. Table 6–7 in Shell's application indicates that the ''average estimate'' for killer, fin, humpback, and minke whales, harbor porpoise, and ribbon seal is either zero or one. Therefore, to account for the fact that these species listed as being potentially taken by harassment in this document may occur in Shell's drilling sites during active operations, NMFS either used the ''maximum estimates'' or made an estimate based on typical group size for a particular species.

Detectability bias, quantified in part by $f(0)$, is associated with diminishing sightability with increasing lateral distance from the trackline. Availability bias [$g(0)$] refers to the fact that there is <100 percent probability of sighting an animal that is present along the survey trackline. Some sources of densities used below included these correction factors in their reported densities (*e.g.,* ringed seals in Bengtson *et al.,* 2005). In other cases the best available correction factors were applied to reported results when they had not been included in the reported data (*e.g.,* Moore *et al.,* 2000).

Estimated Area Exposed to Sounds >120 dB or >160 dB re 1 μPa rms

(1) Estimated Area Exposed to Continuous Sounds >120 dB rms From the Drillship

Sounds from the *Discoverer* have not previously been measured in the Arctic. However, measurements of sounds produced by the *Discoverer* were made in the South China Sea in 2009 (Austin and Warner, 2010). The results of those measurements were used to model the sound propagation from the *Discoverer* (including a nearby support vessel) at planned exploration drilling locations in the Chukchi and Beaufort seas (Warner and Hannay, 2011). Broadband source levels of sounds produced by the *Discoverer* varied by activity and direction from the ship but were generally between 177 and 185 dB re 1 μPa · m rms (Austin and Warner, 2010). Propagation modeling at the Burger Prospect resulted in an estimated distance of 0.81 mi (1.31 km) to the point at which exploration drilling sounds would likely fall below 120 dB. The estimated 0.81 mi (1.31 km) distance was multiplied by 1.5 (= 1.22 mi [1.97 km]) as a further precautionary measure before calculating the total area that may be exposed to continuous sounds ≥120 dB re 1 μPa rms by the *Discoverer* at each drill site on the Burger Prospect (Table 6–3 in Shell's application and Table 1 here). Given this distance or radius, the total area of water ensonified to ≥120 dB rms during exploration drilling at each drill site was estimated to be 4.6 mi^2 (12 km^2). The 160-dB radius for the *Discoverer* was estimated to be approximately 33 ft (10 m). Again, because the source level for the drillship was measured to be between 177 and 185 dB, the 180 and 190-dB radii were not needed.

The acoustic propagation model used to estimate the sound propagation from the *Discoverer* in the Chukchi Sea is JASCO Research's Marine Operations Noise Model (MONM). MONM computes received sound levels in rms units when source levels are specified also in those units. MONM treats sound propagation in range-varying acoustic environments through a wide-angled parabolic equation solution to the acoustic wave equation. The specific parabolic equation code in MONM is based on the Naval Research Laboratory's Range-dependent Acoustic Model. This code has been extensively benchmarked for accuracy and is widely employed in the underwater acoustics community (Collins, 1993).

Changes in the water column of the Chukchi Sea through the course of the exploration drilling season will likely affect the propagation of sounds produced by exploration drilling activities, so the modeling of exploration drilling sounds was run using expected oceanographic conditions in October which are expected to support greater sound propagation (Warner and Hannay, 2011). Results of sound propagation modeling that were used in the calculations of areas exposed to various levels of received sounds are summarized in Table 6–3 in Shell's application and Table 1 here.

Distances shown in Table 6–3 in Shell's application and Table 1 here were used to estimate the area ensonified to ≥120 dB rms around the drillship. All exploration drilling activities will occur at the Burger Prospect. The exploration drill sites assumed for summer 2012 at the Burger Prospect (Burger A, F, J, and V) are 3.4 to 13 mi (5.5 km to 21 km) from each other, and wells will not be drilled

simultaneously. Therefore, the area exposed to continuous sounds ≥120 dB at each drill site is not expected to overlap with any other drill site. The total area of water potentially exposed to received sound levels ≥120 dB rms by exploration drilling operations during July–August at two locations is therefore estimated to be 9.42 mi² (24.4 km²). Activities at two additional locations in September–October may expose an additional 9.42 mi² (24.4 km²) to continuous sounds ≥120 dB rms.

Table 1. Sound Propagation Modeling Results of Exploration Drilling, Icebreaking, and ZVSP Activities at the Burger Prospect in the Alaskan Chukchi Sea.

Source	Received Level (dB re 1 μPa)	Modeling Results (km)	Used in Calculations (km)
Discoverer	120	1.31	1.97
Icebreaking	120	7.63	9.50
ZVSP	160	3.67	5.51

(2) Estimated Area Exposed to Continuous Sounds >120 dB rms From Ice Management/Icebreaking Activities

Measurements of the icebreaking supply ship *Robert Lemeur* pushing and breaking ice during exploration drilling operations in the Beaufort Sea in 1986 resulted in an estimated broadband source level of 193 dB re 1 μPa · m (Greene, 1987a; Richardson *et al.,* 1995a). Measurements of the icebreaking sounds were made at five different distances and those were used to generate a propagation loss equation [RL=141.4–1.65R–10Log(R) where R is range in kilometers (Greene, 1987a); converting R to meters results in the following equation: R=171.4–10log(R)–0.00165R]. Using that equation, the estimated distance to the 120 dB threshold for continuous sounds from icebreaking is 4.74 mi (7.63 km). Since the measurements of the *Robert Lemeur* were taken in the Beaufort Sea under presumably similar conditions as would be encountered in the Chukchi Sea in 2012, an inflation factor of 1.25 was selected to arrive at a precautionary 120 dB distance of 5.9 mi (9.5 km) for icebreaking sounds (see Table 6–3 in Shell's application and Table 1 here). Additionally, measurements of identical sound sources at the Burger and Camden Bay prospects in 2008 yielded similar results, suggesting that sound propagation at the two locations is likely to be similar (Hannay and Warner, 2009).

If ice is present, ice management/icebreaking activities may be necessary in early July and towards the end of operations in late October, but it is not expected to be needed throughout the proposed exploration drilling season. Icebreaking activities would likely occur in a 40° arc up to 3.1 mi (5 km) upwind of the *Discoverer* (see Figure 1–3 and Attachment B in Shell's application for additional details). This activity area plus a 5.9 mi (9.5 km) buffer around it results in an estimated total area of 162 mi² (420 km2) that may be exposed to sounds ≥120 dB from ice management/icebreaking activities in each season.

(3) Estimated Area Exposed to Impulsive Sounds >160 dB rms From Airguns

Shell proposes to use the ITAGA eight-airgun array for the ZVSP surveys in 2012, which consists of four 150-in³ airguns and four 40-in³ airguns for a total discharge volume of 760 in³. The ≥160 dB re 1 μPa rms radius for this source was estimated from measurements of a similar seismic source used during the 2008 BP Liberty seismic survey (Aerts *et al.,* 2008). The BP liberty source was also an eight-airgun array but had a slightly larger total volume of 880 in³. Because the number of airguns is the same, and the difference in total volume only results in an estimated 0.4 dB decrease in the source level of the ZVSP source, the 100th percentile propagation model from the measurements of the BP Liberty source is almost directly applicable. However, the BP Liberty source was towed at a depth of 5.9 ft (1.8 m), while Shell's ZVSP source would be lowered to a target depth of 13 ft (4 m) (from 10–23 ft [3–7 m]). The deeper depth of the ZVSP source has the potential to increase the source strength by as much as 6 dB. Thus, the constant term in the propagation equation from the BP Liberty source was increased from 235.4 to 241.4 while the remainder of the equation (–18*LogR—0.0047*R) was left unchanged. NMFS reviewed the use of this equation and the similarities between the 2008 BP Liberty project and Shell's proposed drilling sites and determined that it is appropriate to base the sound isopleths on those results. This equation results in the following estimated distances to maximum received levels: 190 dB = 0.33 mi (524 m); 180 dB = 0.77 mi (1,240 m); 160 dB = 2.28 mi (3,670 m); 120 dB = 6.52 mi (10,500 m). The ≥160 dB distance was multiplied by 1.5 (see Table 6–3 in Shell's application and Table 4 here) for use in estimating the area ensonified to ≥160 dB rms around the drilling vessel during ZVSP activities. Therefore, the total area of water potentially exposed to received sound levels ≥160 dB rms by ZVSP operations at two exploration well sites during each season (*i.e.,* summer and fall) is estimated to be 73.7 mi² (190.8 km²).

Shell intends to conduct sound propagation measurements on the *Discoverer* and the airgun source in 2012 once they are on location in the Chukchi Sea. The results of those measurements would then be used during the season to implement mitigation measures.

Potential Number of Takes by Harassment

Although a marine mammal may be exposed to drilling or icebreaking sounds ≥120 dB (rms) or airgun sounds ≥160 dB (rms), not all animals react to sounds at this low level, and many will not show strong reactions (and in some cases any reaction) until sounds are much stronger. There are several variables that determine whether or not an individual animal will exhibit a response to the sound, such as the age of the animal, previous exposure to this type of anthropogenic sound, habituation, etc.

Numbers of marine mammals that might be present and potentially disturbed (*i.e.,* Level B harassment) are estimated below based on available data about mammal distribution and densities at different locations and times

of the year as described previously. Exposure estimates are based on a single drillship (*Discoverer*) drilling up to four wells in the Chukchi Sea from July 1–October 31, 2012. Shell assumes an average of 32 days at each drill site (including the partial well drill site, including 7.5 days of MLC excavation at all four drill sites). Shell also assumes that ZVSP activities may occur at each well drilled. Additionally, Shell assumed that more ice is likely to be present in the area of operations during the July-August period, so summer ice-margin densities have been applied to 50 percent of the area that may be exposed to sounds from exploration drilling and ZVSP activities in those months. Open-water densities in the summer were applied to the remaining 50 percent of the area. Less ice is likely to be present during the September-October period, so fall ice-margin densities have been applied to only 20 percent of the area that may be exposed to sounds from exploration drilling and ZVSP activities in those months. Fall open-water densities were applied to the remaining 80 percent of the area. Since ice management/icebreaking activities would only occur within ice-margin habitat, the entire area potentially ensonified by ice management/icebreaking activities has been multiplied by the ice-margin densities in both seasons.

The number of different individuals of each species potentially exposed to received levels of continuous drilling-related sounds ≥120 dB re 1 μPa or to pulsed airgun sounds ≥120 dB re 1 μPa within each season and habitat zone was estimated by multiplying:

- The anticipated area to be ensonified to the specified level in the time period and habitat zone to which a density applies, by
- The expected species density.

The numbers of exposures were then summed for each species across the seasons and habitat zones.

Estimated Take Conclusions

As stated previously, NMFS' practice has been to apply the 120 dB re 1 μPa (rms) received level threshold for underwater continuous sound levels and the 160 dB re 1 μPa (rms) received level threshold for underwater impulsive sound levels to determine whether take by Level B harassment occurs. However, not all animals react to sounds at these low levels, and many will not show strong reactions (and in some cases any reaction) until sounds are much stronger.

Although the 120-dB isopleth for the drillship may seem slightly expansive (*i.e.,* 1.22 mi [1.97 km], which includes the 50% inflation factor), the zone of ensonification begins to shrink dramatically with each 10-dB increase in received sound level to where the 160-dB isopleth is only about 33 ft (10 m) from the drillship. As stated previously, source levels are expected to be between 177 and 185 dB (rms). For an animal to be exposed to received levels between 177 and 185 dB, it would have to be within several meters of the vessel, which is unlikely, especially given the fact that certain species are likely to avoid the area.

For impulsive sounds, such as those produced by the airguns, studies reveal that baleen whales show avoidance responses, which would reduce the likelihood of them being exposed to higher received sound levels. The 180-dB zone (0.77 mi [1.24 km]) is one-third the size of the 160-dB zone (2.28 mi [3.67 km], which is the modeled distance before the 1.5 inflation factor is included). In the limited studies that have been conducted on pinniped responses to pulsed sound sources, they seem to be more tolerant and do not exhibit strong behavioral reactions (see Southall *et al.,* 2007).

NMFS has authorized the maximum take estimates provided in Table 6–7 of Shell's application and Table 2 here. With the exception of killer and minke whales (which are still less than 2.5%), less than 1% of each species or stock would potentially be exposed to sounds above the Level B harassment thresholds. The take estimates presented here do not take any of the mitigation measures presented earlier in this document into consideration. These take numbers also do not consider how many of the exposed animals may *actually* respond or react to the exploration drilling program. Instead, the take estimates are based on the presence of animals, regardless of whether or not they react or respond to the activities.

TABLE 2—POPULATION ABUNDANCE ESTIMATES, TOTAL AUTHORIZED LEVEL B TAKE (WHEN COMBINING TAKES FROM DRILLSHIP OPERATIONS, ICE MANAGEMENT/ICEBREAKING, AND ZVSP SURVEYS), AND PERCENTAGE OF STOCK OR POPULATION THAT MAY BE TAKEN FOR THE POTENTIALLY AFFECTED SPECIES THAT MAY OCCUR IN SHELL'S CHUKCHI SEA DRILLING AREA

Species	Abundance [1]	Total authorized take	Percentage of stock or population
Beluga Whale	[2] 3,710 [3] 39,258	15	0.04–0.4
Killer Whale	656	15	2.3
Harbor Porpoise	48,215	15	0.03
Bowhead Whale	[4] 15,232	53	0.35
Fin Whale	5,700	15	0.26
Gray Whale	18,017	46	0.26
Humpback Whale	2,845	15	0.53
Minke Whale	810–1,233	15	1.22–1.85
Bearded Seal	[5] 155,000	36	0.02
Ribbon Seal	49,000	15	0.03
Ringed Seal	208,000–252,000	814	0.32–0.39
Spotted Seal	59,214	21	0.04

[1] Unless stated otherwise, abundance estimates are taken from Allen and Angliss (2011).
[2] Eastern Chukchi Sea stock population estimate.
[3] Beaufort Sea stock population estimate.
[4] Estimate from George *et al.* (2004) with an annual growth rate of 3.4%.
[5] Beringia Distinct Population Segment (NMFS, 2010).

Negligible Impact and Small Numbers Analysis and Determination

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.'' In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) The number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the takes occur.

No injuries or mortalities are anticipated to occur as a result of Shell's Chukchi Sea exploratory drilling program, and none are authorized. Injury, serious injury, or mortality could occur if there were a large or very large oil spill. However, as discussed previously in this document, the likelihood of a spill is extremely remote. Shell has implemented many design and operational standards to minimize the potential for an oil spill of any size. NMFS has not authorized take from an oil spill, as it is not part of the specified activity. Additionally, animals in the area are not expected to incur hearing impairment (*i.e.,* TTS or PTS) or non-auditory physiological effects. Instead, any impact that could result from Shell's activities is most likely to be behavioral harassment and is expected to be of limited duration. Although it is possible that some individuals may be exposed to sounds from drilling operations more than once, during the migratory periods it is less likely that this will occur since animals will continue to move across the Chukchi Sea towards their wintering grounds.

Bowhead and beluga whales are less likely to occur in the project area in July and August, as they are found mostly in the Canadian Beaufort Sea at this time. The animals are more likely to occur later in the season (mid-September through October), as they head west towards Russia or south towards the Bering Sea. Additionally, while bowhead whale tagging studies revealed that animals occurred in the LS 193 area, a higher percentage of animals were found outside of the LS 193 area in the fall (Quakenbush *et al.,* 2010). Bowhead whales are not known to feed in areas near Shell's leases in the Chukchi Sea. The closest primary feeding ground is near Point Barrow, which is more than 150 mi (241 km) east of Shell's Burger prospect, with additional evidence of feeding in recent years off Point Franklin close to shore (Clarke *et al.,* 2011), which is more than 65 mi (105 km) from Shell's Burger prospect. There were no observations of feeding in the areas near Shell's proposed Burger prospect drill sites. Therefore, if bowhead whales stop to feed near Point Barrow on their fall westward migration (or off Point Franklin during the summer and fall months) during Shell's operations, the animals would not be exposed to continuous sounds from the drillship or icebreaker above 120 dB or to impulsive sounds from the airguns above 160 dB, as those sound levels only propagate 1.22 mi (1.97 km), 5.9 mi (9.5 km), and 3.42 mi (5.51 km), respectively, which includes the inflation factor. Additionally, the 120-dB radius for the airgun array has been modeled to propagate 6.5 mi (10.5 km) from the source (and would still be less than 10 mi [16.1 km] if an inflation factor of 1.5 were applied). Therefore, sounds from the operations would not reach the feeding grounds near Point Barrow or Point Franklin.

Gray whales occur in the northeastern Chukchi Sea during the summer and early fall to feed. The COMIDA 2008–2010 Final Report (Clarke *et al.,* 2011) notes 504 sightings of 835 gray whales during that time period, which were seen in every month of surveys each of the 3 years (*i.e.,* June to November) between Wainwright and Barrow within 31 mi (50 km) of shore. Clarke *et al.* (2011) note that sightings were also scattered throughout the study area more than 31 mi (50 km) offshore. The relative lack of gray whale sightings (and mud plumes, which are indicative of the presence of feeding gray whales) offshore was markedly different from that documented during surveys conducted from 1982–1991, when gray whales were frequently seen on Hanna Shoal (Moore and Clarke, 1992 cited in Clarke *et al.,* 2011). Gray whale sightings were most common in the survey blocks closer to shore in all months (Clarke *et al.,* 2011). Based on this information, it appears that currently nearshore locations are being used more frequently than Hanna Shoal for feeding by gray whales. Both Hanna Shoals and the nearshore feeding grounds lie outside of the 120-dB and 160-dB ensonified areas from Shell's activities. While some individuals may swim through the area of active drilling, it is not anticipated to interfere with their feeding at Hanna Shoals or other Chukchi Sea feeding grounds. Other cetacean species (such as humpback and fin whales) are much rarer in the project area. The exposure of cetaceans to sounds produced by exploratory drilling operations (*i.e.,* drillship, ice management/icebreaking, and airgun operations) is not expected to result in more than Level B harassment.

Few seals are expected to occur in the project area, as several of the species prefer more nearshore waters. Additionally, as stated previously in this document, pinnipeds appear to be more tolerant of anthropogenic sound, especially at lower received levels, than other marine mammals, such as mysticetes. Shell's activities would occur at a time of year when the ice seal species found in the region are not molting, breeding, or pupping. Therefore, these important life functions would not be impacted by Shell's activities.

NMFS began receiving reports of an outbreak of skin lesions and sores for certain ice seal species in summer 2011 and declared an unusual mortality event in December 2011. An investigative team was established, and testing has been underway. As noted in the response to *Comment 34* earlier in this document, testing has ruled out numerous bacteria and viruses known to affect marine mammals. Reports from the NSB indicate that hunters during early winter observed many healthy bearded and ringed seals. The seals behaved normally: they were playful, curious but cautious, and maintained distance from boats. No lesions were observed on any seals. Chukotka hunters did not report any sightings or harvest of sick and/or hairless seals in December 2011 and January 2012. The data available to date do not indicate that this outbreak has weakened the population. Moreover, Shell's activities are anticipated to take less than 1% of the population of all of the stocks of all three species observed to have the sores and lesions (*i.e.,* ringed, bearded, and spotted seals). The sound that will be produced by Shell's activities is of a low level. Therefore, even if the population were weakened from this outbreak it would not change our evaluation of the impacts of this activity at the population level. The exposure of pinnipeds to sounds produced by Shell's exploratory drilling operations in the Chukchi Sea is not expected to result in more than Level B harassment of the affected species or stock.

Of the 12 marine mammal species likely to occur in the drilling area, three are listed as endangered under the ESA: The bowhead, humpback, and fin whales. All three species are also designated as ''depleted'' under the MMPA. Despite these designations, the Bering-Chukchi-Beaufort stock of bowheads has been increasing at a rate

of 3.4% annually for nearly a decade (Allen and Angliss, 2011), even in the face of ongoing industrial activity. Additionally, during the 2001 census, 121 calves were counted, which was the highest yet recorded. The calf count provides corroborating evidence for a healthy and increasing population (Allen and Angliss, 2011). An annual increase of 4.8% was estimated for the period 1987–2003 for North Pacific fin whales. While this estimate is consistent with growth estimates for other large whale populations, it should be used with caution due to uncertainties in the initial population estimate and about population stock structure in the area (Allen and Angliss, 2011). Zeribini *et al.* (2006, cited in Allen and Angliss, 2011) noted an increase of 6.6% for the Central North Pacific stock of humpback whales in Alaska waters. Certain stocks or populations of gray and beluga whales and spotted seals are listed as endangered or are proposed for listing under the ESA; however, none of those stocks or populations occur in the activity area. On December 10, 2010, NMFS published a notice of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notice of proposed threatened and not warranted status for subspecies and distinct population segments of the bearded seal (75 FR 77496) in the **Federal Register.** Neither of these two ice seal species is currently considered depleted under the MMPA. The ribbon seal is a ''species of concern.'' None of the other species that may occur in the project area are listed as threatened or endangered under the ESA or designated as depleted under the MMPA. There is currently no established critical habitat in the project area for any of these 12 species.

Potential impacts to marine mammal habitat were discussed in detail in the Notice of Proposed IHA (76 FR 69958, November 9, 2011; see the ''Anticipated Effects on Habitat'' section). Although some disturbance is possible to food sources of marine mammals, any impacts to affected marine mammal stocks or species are anticipated to be minor. Based on the vast size of the Arctic Ocean where feeding by marine mammals occurs versus the localized area of the drilling program, any missed feeding opportunities in the direct project area would be of little consequence, as marine mammals would have access to other feeding grounds.

The estimated takes authorized represent less than 1% of the affected population or stock for 10 of the species and less than 2.5% for two of the species. These estimates represent the percentage of each species or stock that could be taken by Level B behavioral harassment if each animal is taken only once.

The estimated take numbers are likely an overestimate for several reasons. First, these take numbers were calculated using a 50% inflation factor of the 120-dB radius from the drillship and of the 160-dB radius for the airguns and using a 25% inflation factor of the 120-dB radius from the icebreaker during active ice management/icebreaking activities, which is a precautionary approach recommended by some acousticians when modeling a new sound source in a new location and because the radii were based on results from measurements of the *Discoverer* in another location and of the icebreaker and airguns in the Arctic Ocean. SSV tests may reveal that the Level B harassment zone is either smaller or larger than that used to estimate take. If the SSV tests reveal that the Level B harassment zone is slightly larger than those modeled or measured elsewhere, the inflation factors should cover the discrepancy, however, based on recent SSV tests of seismic airguns (which showed that the measured 160-dB isopleth was in the area of the modeled value), the 50% correction factor likely results in an overestimate of takes. Moreover, the mitigation and monitoring measures (described previously in this document) included in the IHA are expected to reduce even further any potential disturbance to marine mammals. Last, some marine mammal individuals, including mysticetes, have been shown to avoid the ensonified area around airguns at certain distances (Richardson *et al.,* 1999), and, therefore, some individuals would not likely enter into the Level B harassment zones for the various types of activities. Based on the best available information, the mitigation and monitoring protocols that will be implemented by Shell, and the extremely low likelihood of a major oil spill occurring, NMFS has determined that the take, by Level B harassment, from Shell's activities would have no more than a negligible impact on the affected marine mammal species and stocks.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

Relevant Subsistence Uses

The disturbance and potential displacement of marine mammals by sounds from drilling activities are the principal concerns related to subsistence use of the area. Subsistence remains the basis for Alaska Native culture and community. Marine mammals are legally hunted in Alaskan waters by coastal Alaska Natives. In rural Alaska, subsistence activities are often central to many aspects of human existence, including patterns of family life, artistic expression, and community religious and celebratory activities. Additionally, the animals taken for subsistence provide a significant portion of the food that will last the community throughout the year. The main species that are hunted include bowhead and beluga whales, ringed, spotted, and bearded seals, walruses, and polar bears. (As mentioned previously in this document, both the walrus and the polar bear are under the USFWS' jurisdiction.) The importance of each of these species varies among the communities and is largely based on availability.

The subsistence communities in the Chukchi Sea that have the potential to be impacted by Shell's offshore drilling program include Point Hope, Point Lay, Wainwright, Barrow, and possibly Kotzebue and Kivalina (however, these two communities are much farther to the south of the proposed project area). Wainwright is the coastal village closest to the proposed drill site and is located approximately 78 mi (125.5 km) from Shell's Burger prospect. Point Lay, Barrow, and Point Hope are all approximately 92, 140, and 206 mi (148, 225.3, and 332 km), respectively, from Shell's Burger prospect.

(1) Bowhead Whales

Bowhead whale hunting is a key activity in the subsistence economies of northwest Arctic communities. The whale harvests have a great influence on social relations by strengthening the sense of Inupiat culture and heritage in addition to reinforcing family and community ties.

An overall quota system for the hunting of bowhead whales was established by the International Whaling Commission (IWC) in 1977. The quota is now regulated through an agreement between NMFS and the AEWC. The AEWC allots the number of bowhead whales that each whaling community may harvest annually (USDOI/BLM, 2005). The annual take of bowhead whales has varied due to (a) changes in the allowable quota level and (b) year-to-year variability in ice and weather conditions, which strongly influence the success of the hunt.

Bowhead whales migrate around northern Alaska twice each year, during the spring and autumn, and are hunted in both seasons. Bowhead whales are hunted from Barrow during the spring

and the fall migration. The spring hunt along Chukchi villages and at Barrow occurs after leads open due to the deterioration of pack ice; the spring hunt typically occurs from early April until the first week of June. From 1984–2009, bowhead harvests by the villages of Wainwright, Point Hope, and Point Lay occurred only between April 14 and June 24 and only between April 23 and June 15 in Barrow (George and Tarpley, 1986; George *et al.,* 1987, 1988, 1990, 1992, 1995, 1998, 1999, 2000; Philo *et al.,* 1994; Suydam *et al.,* 1995b, 1996, 1997, 2001b, 2002, 2003, 2004, 2005b, 2006, 2007, 2008, 2009, 2010). Shell will not mobilize and move into the Chukchi Sea prior to July 1.

The fall migration of bowhead whales that summer in the eastern Beaufort Sea typically begins in late August or September. Fall migration into Alaskan waters is primarily during September and October. In the fall, subsistence hunters use aluminum or fiberglass boats with outboards. Hunters prefer to take bowheads close to shore to avoid a long tow during which the meat can spoil, but Braund and Moorehead (1995) report that crews may (rarely) pursue whales as far as 50 mi (80 km). The autumn bowhead hunt usually begins in Barrow in mid-September and mainly occurs in the waters east and northeast of Point Barrow. Fall bowhead whaling has not typically occurred in the villages of Wainwright, Point Hope, and Point Lay. However, Wainwright whaling crews harvested one bowhead whale on October 7, 2010, and one bowhead whale on October 28, 2011. Because of changing ice conditions, there is the potential for these villages to resume a fall bowhead harvest. Additionally, residents of Point Lay have not hunted bowhead whales in the recent past but were selected by the IWC to receive a bowhead whale quota in 2009, and began bowhead hunting again in 2009 and harvested a bowhead on May 5, 2009, during the spring hunt. In the more distant past, Point Lay hunters traveled to Barrow, Wainwright, or Point Hope to participate in the bowhead whale harvest activities.

Barrow participates in a fall hunt each year. From 1984–2009, Barrow whalers harvested bowhead whales between August 31 and October 29. While this time period overlaps with that of Shell's proposed operations, the drill sites are located more than 140 mi (225 km) west of Barrow, so the whales would reach the Barrow hunting grounds before entering the sound field of Shell's operations. Shell will be flying helicopters out to the drillship for resupply missions. However, Shell will communicate with the communities about helicopter routes and has agreed to conditions in the signed 2012 CAA to avoid conflicts with helicopter flights. In the past 35 years, however, Barrow whaling crews have harvested almost all whales in the Beaufort Sea to the east of Point Barrow (Suydam *et al.,* 2008), indicating that relatively little fall hunting occurs to the west where the flight corridor is located.

(2) Beluga Whales

Beluga whales are available to subsistence hunters along the coast of Alaska in the spring when pack-ice conditions deteriorate and leads open up. Belugas may remain in coastal areas or lagoons through June and sometimes into July and August. The community of Point Lay is heavily dependent on the hunting of belugas in Kasegaluk Lagoon for subsistence meat. From 1983–1992 the average annual harvest was approximately 40 whales (Fuller and George, 1997). Point Hope residents hunt beluga primarily in the lead system during the spring (late March to early June) bowhead hunt but also in open-water along the coastline in July and August. Belugas are harvested in coastal waters near these villages, generally within a few miles from shore.

In Wainwright and Barrow, hunters usually wait until after the spring bowhead whale hunt is finished before turning their attention to hunting belugas. The average annual harvest of beluga whales taken by Barrow for 1962–1982 was five (MMS, 1996). The Alaska Beluga Whale Committee (ABWC) recorded that 23 beluga whales had been harvested by Barrow hunters from 1987 to 2002, ranging from 0 in 1987, 1988 and 1995 to the high of 8 in 1997 (Fuller and George, 1997; ABWC, 2002 cited in USDOI/BLM, 2005). Barrow residents typically hunt for belugas between Point Barrow and Skull Cliffs in the Chukchi Sea (primarily April-June) and later in the summer (July-August) on both sides of the barrier island in Elson Lagoon/Beaufort Sea (MMS, 2008). Harvest rates indicate that the hunts are not frequent. Wainwright residents hunt beluga in April-June in the spring lead system, but this hunt typically occurs only if there are no bowheads in the area. Communal hunts for beluga are conducted along the coastal lagoon system later in July-August. Shell's exploration drilling activities take place well offshore, far away from areas that are used for beluga hunting by the Chukchi Sea communities.

(3) Ringed Seals

Ringed seals are hunted mainly from October through June. Hunting for these smaller mammals is concentrated during winter (November through March) because bowhead whales, bearded seals, and caribou are available through other seasons. In winter, leads and cracks in the ice off points of land and along the barrier islands are used for hunting ringed seals. The average annual ringed seal harvest was 49 seals in Point Lay, 86 in Wainwright, and 394 in Barrow (Braund *et al.,* 1993; USDOI/BLM, 2003, 2005). Although ringed seals are available year-round, the planned activities will not occur during the primary period when these seals are typically harvested (November-March). Also, the activities will be largely in offshore waters where they will not influence ringed seals in the nearshore areas where they are hunted.

(4) Spotted Seals

The spotted seal subsistence hunt peaks in July and August along the shore where the seals haul out, but usually involves relatively few animals. Available maps of recent and past subsistence use areas for spotted seals indicate harvest of this species within 30–40 mi (48–64 km) of the coastline. Spotted seals typically migrate south by October to overwinter in the Bering Sea. During the fall migration, spotted seals are hunted by the Wainwright and Point Lay communities as the seals move south along the coast (USDOI/BLM, 2003). Spotted seals are also occasionally hunted in the area off Point Barrow and along the barrier islands of Elson Lagoon to the east (USDOI/BLM, 2005). The planned activities will remain offshore of the coastal harvest area of these seals and should not conflict with harvest activities.

(5) Bearded Seals

Bearded seals, although generally not favored for their meat, are important to subsistence activities in Barrow and Wainwright because of their skins. Six to nine bearded seal hides are used by whalers to cover each of the skin-covered boats traditionally used for spring whaling. Because of their valuable hides and large size, bearded seals are specifically sought. Bearded seals are harvested during the spring and summer months in the Chukchi Sea (USDOI/BLM, 2003, 2005). The animals inhabit the environment around the ice floes in the drifting nearshore ice pack, so hunting usually occurs from boats in the drift ice. Most bearded seals are harvested in coastal areas inshore of the proposed exploration drilling area, so no conflicts with the harvest of bearded seals are expected.

Potential Impacts to Subsistence Uses

NMFS has defined ''unmitigable adverse impact'' in 50 CFR 216.103 as an impact resulting from the specified activity that is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by causing the marine mammals to abandon or avoid hunting areas; directly displacing subsistence users; or placing physical barriers between the marine mammals and the subsistence hunters; and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Noise and general activity during Shell's drilling program have the potential to impact marine mammals hunted by Native Alaskans. In the case of cetaceans, the most common reaction to anthropogenic sounds (as noted previously) is avoidance of the ensonified area. In the case of bowhead whales, this often means that the animals divert from their normal migratory path by several kilometers. Helicopter activity also has the potential to disturb cetaceans and pinnipeds by causing them to vacate the area. Additionally, general vessel presence in the vicinity of traditional hunting areas could negatively impact a hunt. Native knowledge indicates that bowhead whales become increasingly ''skittish'' in the presence of seismic noise. Whales are more wary around the hunters and tend to expose a much smaller portion of their back when surfacing (which makes harvesting more difficult). Additionally, natives report that bowheads exhibit angry behaviors in the presence of seismic activity, such as tail-slapping, which translate to danger for nearby subsistence harvesters.

In the unlikely event of an oil spill, marine mammals could become contaminated and therefore unavailable to subsistence users. Additionally, perception could also affect availability of marine mammals for subsistence uses. Even if whales or seals are not oiled or contaminated by an oil spill, the mere perception that they could be contaminated could reduce the availability of marine mammals for subsistence uses.

Plan of Cooperation (POC)

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a POC or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes. Shell developed a POC for its 2012 Chukchi Sea, Alaska, exploration drilling program to minimize any adverse impacts on the availability of marine mammals for subsistence uses. A copy of the Draft POC was provided to NMFS with the IHA Application as Attachment D (see **ADDRESSES** for availability). Meetings with potentially affected subsistence users began in 2009 and continued into 2010 and 2011 (see Table 4.2–1 in Shell's POC for a list of all meetings conducted through April 2011). During these meetings, Shell focused on lessons learned from prior years' activities and presented mitigation measures for avoiding potential conflicts, which are outlined in the 2012 POC and this document. Shell's POC addresses vessel transit, drilling, and associated activities. Communities that were consulted regarding Shell's 2012 Arctic Ocean operations include: Barrow, Kaktovik, Wainwright, Kotzebue, Kivalina, Point Lay, Point Hope, Kiana, Gambell, Savoonga, and Shishmaref.

Beginning in early January 2009 and continuing into 2011, Shell held one-on-one meetings with representatives from the NSB and Northwest Arctic Borough (NWAB), subsistence-user group leadership, and Village Whaling Captain Association representatives. Shell's primary purpose in holding individual meetings was to inform and prepare key leaders, prior to the public meetings, so that they would be prepared to give appropriate feedback on planned activities.

Shell presented the proposed project to the NWAB Assembly on January 27, 2009, to the NSB Assembly on February 2, 2009, and to the NSB and NWAB Planning Commissions in a joint meeting on March 25, 2009. Meetings were also scheduled with representatives from the AEWC, and presentations on proposed activities were given to the Inupiat Community of the Arctic Slope, and the Native Village of Barrow. On December 8, 2009, Shell held consultation meetings with representatives from the various marine mammal commissions. Prior to drilling in 2012, Shell will also hold additional consultation meetings with the affected communities and subsistence user groups, NSB, and NWAB to discuss the mitigation measures included in the POC. Shell presented information regarding the proposed operations and marine mammal monitoring plans at the 2012 Arctic Open Water Meeting in Anchorage, Alaska, which was held March 6–8, 2012. Shell also attended the 2011 CAA negotiation meetings in support of a limited program of marine environmental baseline activities in 2011 taking place in the Beaufort and Chukchi seas. Shell has stated that it is committed to a CAA process and will demonstrate this by making a good-faith effort to negotiate a CAA every year it has planned activities. To that end, Shell attended the 2012 CAA negotiation meetings and signed the 2012 CAA on March 26, 2012.

The following mitigation measures, plans and programs, are integral to the POC and were developed during consultation with potentially affected subsistence groups and communities. These measures, plans, and programs will be implemented by Shell during its 2012 exploration drilling operations in both the Beaufort and Chukchi Seas to monitor and mitigate potential impacts to subsistence users and resources. The mitigation measures Shell has adopted and will implement during its 2012 Chukchi Sea offshore exploration drilling operations are listed and discussed below. This most recent version of Shell's planned mitigation measures was presented to community leaders and subsistence user groups starting in January of 2009 and has evolved since in response to information learned during the consultation process.

To minimize any cultural or resource impacts to subsistence activities from its exploration operations, Shell will implement the following additional measures to ensure coordination of its activities with local subsistence users to minimize further the risk of impacting marine mammals and interfering with the subsistence hunts for marine mammals:

(1) The drillship and support vessels will not enter the Chukchi Sea before July 1;

(2) To minimize impacts on marine mammals and subsistence hunting activities, vessels that can safely travel outside of the polynya zone will do so. In the event the transit outside of the polynya zone results in Shell having to break ice (as opposed to managing ice by pushing it out of the way), the drillship and support vessels will enter into the polynya zone far enough so that ice breaking is not necessary. If it is necessary to move into the polynya zone, Shell will notify the local communities of the change in the transit route through the Communication Centers (Com Centers);

(3) Shell has developed a Communication Plan and will implement the plan before initiating exploration drilling operations to coordinate activities with local subsistence users as well as Village Whaling Associations in order to minimize the risk of interfering with subsistence hunting activities and keep

current as to the timing and status of the bowhead whale migration, as well as the timing and status of other subsistence hunts. The Communication Plan includes procedures for coordination with Com and Call Centers to be located in coastal villages along the Chukchi and Beaufort Seas during Shell's proposed activities in 2012;

(4) Shell will employ local Subsistence Advisors from the Beaufort and Chukchi Sea villages to provide consultation and guidance regarding the whale migration and subsistence hunt. There will be a total of nine subsistence advisor-liaison positions (one per village), to work approximately 8 hours per day and 40-hour weeks through Shell's 2012 exploration project. The subsistence advisor will use local knowledge (Traditional Knowledge) to gather data on subsistence lifestyle within the community and advise on ways to minimize and mitigate potential impacts to subsistence resources during the drilling season. Responsibilities include reporting any subsistence concerns or conflicts; coordinating with subsistence users; reporting subsistence-related comments, concerns, and information; and advising how to avoid subsistence conflicts. A subsistence advisor handbook will be developed prior to the operational season to specify position work tasks in more detail;

(5) Shell will recycle drilling muds (*e.g.,* use those muds on multiple wells), to the extent practicable based on operational considerations (*e.g.,* whether mud properties have deteriorated to the point where they cannot be used further), to reduce discharges from its operations. At the end of the season excess water base fluid will be pre-diluted to a 30:1 ratio with seawater and then discharged;

(6) Shell will implement flight restrictions prohibiting aircraft from flying within 1,000 ft (305 m) of marine mammals or below 1,500 ft (457 m) altitude (except during marine mammal monitoring, takeoffs and landings, or in emergency situations) while over land or sea;

(7) Vessels within 900 ft (274 m) of marine mammals will reduce speed, avoid separating members from a group, and avoid multiple changes in direction;

(8) Vessels underway will alter course to avoid impacts to marine mammals, including collisions;

(9) The drilling support fleet will avoid known fragile ecosystems, including the Ledyard Bay Critical Habitat Unit and will include coordination through the Com Centers; and

(10) Vessel speeds will be reduced during inclement weather conditions in order to reduce the potential for collisions with marine mammals.

Aircraft and vessel traffic between the drill sites and support facilities in Wainwright, and aircraft traffic between the drill sites and air support facilities in Barrow would traverse areas that are sometimes used for subsistence hunting of belugas. Disturbance associated with vessel and aircraft traffic could therefore potentially affect beluga hunts. Vessel and aircraft traffic associated with Shell's proposed drilling program will be restricted under normal conditions to designated corridors that remain onshore or proceed directly offshore thereby minimizing the amount of traffic in coastal waters where beluga hunts take place. The designated traffic corridors do not traverse areas indicated in recent mapping as utilized by Barrow, Point Lay, or Point Hope for beluga hunts. The corridor avoids important beluga hunting areas in Kasegaluk Lagoon.

The POC also contains measures regarding ice management procedures, critical operations procedures, the blowout prevention program, and oil spill response. Some of the oil spill response measures to reduce impacts to subsistence hunts include: having the primary OSRV on standby at all times so that it is available within 1 hour if needed; the remainder of the OSR fleet will be available within 72 hours if needed and will be capable of collecting oil on the water up to the calculated Worst Case Discharge; oil spill containment equipment will be available in the unlikely event of a blowout; capping stack equipment will be stored aboard one of the ice management vessels and will be available for immediate deployment in the unlikely event of a blowout; and pre-booming will be required for all fuel transfers between vessels.

Unmitigable Adverse Impact Analysis and Determination

Shell has adopted a spatial and temporal strategy for its Chukchi Sea operations that should minimize impacts to subsistence hunters. Shell will enter the Chukchi Sea far offshore, so as to not interfere with July hunts in the Chukchi Sea villages and will communicate with the Com Centers to notify local communities of any changes in the transit route. After the close of the July beluga whale hunts in the Chukchi Sea villages, very little whaling occurs in Wainwright, Point Hope, and Point Lay. Although the fall bowhead whale hunt in Barrow will occur while Shell is still operating (mid- to late September to October), Barrow is located 140 mi (225 km) east of the proposed drill sites. Based on these factors, Shell's Chukchi Sea operations are not expected to interfere with the fall bowhead harvest in Barrow. In recent years, bowhead whales have occasionally been taken in the fall by coastal villages along the Chukchi coast, but the total number of these animals has been small. Wainwright landed its first fall whale in more than 90 years in October 2010 and landed a second whale in October 2011. Hunters from the northwest Arctic villages prefer to harvest whales within 50 mi (80 km) so as to avoid long tows back to shore.

Adverse impacts are not anticipated on sealing activities since the majority of hunts for seals occur in the winter and spring, when Shell will not be operating. Additionally, most sealing activities occur much closer to shore than Shell's proposed drill sites.

Shell will also support the village Com Centers in the Arctic communities and employ local Subsistence Advisors from the Beaufort and Chukchi Sea villages to provide consultation and guidance regarding the whale migration and subsistence hunt. The Subsistence Advisors will provide advice to Shell on ways to minimize and mitigate potential impacts to subsistence resources during the drilling season. Support activities, such as helicopter flights, could impact nearshore subsistence hunts. However, Shell will use flight paths and agreed upon flight altitudes to avoid adverse impacts to hunts and will communicate regularly with the Com Centers.

In the unlikely event of a major oil spill in the Chukchi Sea, there could be major impacts on the availability of marine mammals for subsistence uses (such as displacement from traditional hunting grounds and contaminated animals taken for harvests). As discussed earlier in this document, the probability of a major oil spill occurring over the life of the project is low (Bercha, 2008). As a condition of the 2012 CAA that Shell signed on March 26, 2012, any company engaged in drilling operations agrees to enter into a binding oil spill mitigation agreement with the AEWC, NSB, and ICAS to provide for hunter transport to alternate hunting locations in the unlikely event of an oil spill. Additionally, Shell developed an OSRP, which was recently approved by BSEE after review and comment by DOI and several Federal agencies and the public. Shell has also incorporated several mitigation measures into its operational design to reduce further the risk of an oil spill. Based on the information available, the mitigation measures that Shell will

implement, and the extremely low likelihood of a major oil spill occurring, NMFS has determined that Shell's activities will not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses.

Endangered Species Act (ESA)

There are three marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area: the bowhead, humpback, and fin whales. There are two marine mammal species proposed for listing as threatened with confirmed or possible occurrence in the project area: ringed and bearded seals. NMFS' Permits and Conservation Division conducted consultation with NMFS' Endangered Species Division under section 7 of the ESA on the issuance of an IHA to Shell under section 101(a)(5)(D) of the MMPA for this activity. In April, 2012, NMFS finished conducting its section 7 consultation and issued a Biological Opinion, and concluded that the issuance of the IHA associated with Shell's 2012 Chukchi Sea drilling program is not likely to jeopardize the continued existence of the endangered bowhead, humpback, and fin whale, the Arctic sub-species of ringed seal, or the Beringia distinct population segment of bearded seal. No critical habitat has been designated for these species, therefore none will be affected.

National Environmental Policy Act (NEPA)

NMFS prepared an EA that includes an analysis of potential environmental effects associated with NMFS' issuance of an IHA to Shell to take marine mammals incidental to conducting an exploratory drilling program in the Chukchi Sea, Alaska. NMFS has finalized the EA and prepared a FONSI for this action. Therefore, preparation of an Environmental Impact Statement is not necessary. NMFS' EA was available to the public for a 30-day comment period before it was finalized.

Authorization

As a result of these determinations, NMFS has issued an IHA to Shell for the take of marine mammals, by Level B harassment, incidental to conducting an offshore exploratory drilling program in the Chukchi Sea during the 2012 open-water season, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: May 2, 2012.

Helen M. Golde,

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

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