prepare an environmental assessment or environmental impact statement.

Concurrent with the publication of this notice in the **Federal Register**, NMFS is forwarding copies of the application to the Marine Mammal Commission and its Committee of Scientific Advisors.

Dated: August 15, 2013.

P. Michael Payne,

Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XC563

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Marine Seismic Survey in the Chukchi Sea, Alaska

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

ACTION: Notice; issuance of an incidental take 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 TGS–NOPEC Geophysical Company ASA (TGS) to take, by harassment, small numbers of marine mammals incidental to a marine 2-dimensional (2D) seismic survey program in the Chukchi Sea, Alaska, during the 2013 Arctic open-water season.

DATES: Effective August 14, 2013, through October 31, 2013.

ADDRESSES: Inquiry for information on the incidental take authorization should be addressed to P. Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. A copy of the application containing a list of the references used in this document, NMFS' Environmental Assessment (EA), Finding of No Significant Impact (FONSI), and the IHA may be obtained by writing to the address specified above, telephoning the contact listed below (see **FOR FURTHER INFORMATION CONTACT**), or visiting the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.*

Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Shane Guan, Office of Protected Resources, NMFS, (301) 427–8401 or Brad Smith, NMFS, Alaska Region, (907) 271–3023.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of 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

On December 3, 2012, NMFS received an application from TGS requesting an authorization for the harassment of small numbers of marine mammals incidental to conducting an open-water 2D seismic survey in the Chukchi Sea off Alaska. After addressing comments from NMFS, TGS modified its application and submitted a revised application on April 1, 2013, and a revised marine mammal monitoring and mitigation plan on April 15, 2013, with additional clarification on May 7, 2013. TGS' activities discussed here are based on its April 1, 2013, IHA application and April 15, 2013, marine mammal monitoring and mitigation measures.

Description of the Specified Activity

TGS proposes to conduct approximately 9,600 km of marine 2D seismic surveys along pre-determined lines in U.S. waters and international waters of the Chukchi Sea (Figure 1 of TGS' IHA application) during the 2013 open water season. The purpose of the seismic program is to gather geophysical data using a 3,280 in^3 seismic source array and an 8,100-m long hydrophone solid streamer towed by the seismic vessel. Results of the 2D seismic program would be used to identify and map potential hydrocarbon-bearing formations and the geologic structures that surround them.

Approximately 35 days of seismic operations are expected to occur over a period of about 45–60 days in U.S. Chukchi Sea. In addition, up to 33 days of seismic operations may occur in international waters (depending on ice and weather conditions). Seismic operations are proposed to occur along pre-determined track lines at speeds of about four to five knots. Seismic operations would be conducted up to 24 hours per day as possible except as potentially needed for shut-down mitigation for marine mammals. The full 3,280 in^3 airgun array would only be firing during seismic acquisition operations on and near the end and start of survey lines; during turns and transits between seismic lines, a single ''mitigation'' airgun (60 in^3 or smaller) is proposed to be operated.

Two vessels would be used during the survey: (1) a seismic operations vessel that would tow the seismic source array hydrophone solid streamer, and (2) a

smaller vessel that will be used to search for marine mammals and scout for ice and other navigation hazards ahead of the seismic vessel. In the event of an emergency, the scout vessel may be used to support the seismic vessel. In this extraordinary circumstance, all seismic activity will cease since the scout vessel will no longer be devoted to monitoring the exclusion zones.

The seismic vessel will tow a compressed-air seismic source array of 28 Bolt 1900 LLXT airguns with a total discharge volume of 3,280 in^3. The airguns range in volume from 40 in^3 to 300 in^3 and are arranged in a geometric lay-out of three sub-arrays that will be towed approximately 200 m behind the vessel at a depth of 6 m. The seismic source would discharge every 25 m (82 ft) or approximately every 10 seconds. Additional details regarding seismic acquisition parameters are provided in TGS' IHA application. To ascertain whether the seismic source array is operating correctly, the full volume will be enabled for 1 km from the start of every line (i.e., a run in). To ensure full fold data acquisition the vessel will require a 4 km run out at the conclusion of each line. TGS states that gravity and magnetic data will also be passively acquired during the survey by measuring gravity and magnetic variations while traversing the lines (no acoustics are involved with these methods).

The acoustic source level of the proposed 3,280 in^3 seismic source array was predicted using JASCO's airgun array source model (AASM) based on data collected from three sites chosen in the project area by JASCO. Water depths at the three sites were 17, 40, and 100 m. JASCO applied its Marine Operations Noise Model (MONM) to estimate acoustic propagation of the proposed seismic source array and the associated distances to the 190, 180 and 160 dB (rms) re 1 µPa isopleths. The resulting isopleths modeled for the 180 and 190 dB (rms) re 1 µPa exclusion zone distances for cetaceans and pinnipeds, respectively, differed with the three water depths. An additional 10 percent distance buffer was added by JASCO to these originally modeled distances to provide larger, more protective exclusion zone radii distances that will be adhered to during the project (Table 1).

The estimated distances to the 190, 180 and 160 dB re 1µPa (rms) isopleths for the single 60 in^3 airgun (the largest single airgun that would be used as a ''mitigation'' gun) were measured by JASCO during a monitoring sound source verification (SSV) study conducted for Statoil in 2010 in the Chukchi Sea during the open water season of 2010 (Blees *et al.* 2010). Results indicated that the distance to the 190 dB isopleth was 13 m, the 180 dB isopleth distance was 68 m, and the 160 dB isopleth distance was 1,500 m (all dB (rms) re 1 µPa).

TABLE 1—MODELED DISTANCES IN (METERS) TO RECEIVED SOUND LEVELS FOR THE TGS' 3,280 IN^3 AIRGUN ARRAY IN WATERS WITH THREE DIFFERENT DEPTHS IN THE CHUKCHI SEA

Water depths (m)	Received sound level (dB re 1 µPa rms)		
	190	180	160
17–40	930	2,200	8,500
40–100	920	2,500	9,900
>100	430	2,400	15,000

Both vessels would use industry-standard echosounder/fathometer instruments to continuously monitor water depth for navigation purposes while underway. These instruments are the same as those used aboard all large vessels to obtain information on water depths and potential navigation hazards for vessel crews during routine navigation operations. Navigation echosounders direct a single, high-frequency acoustic signal that is focused in a narrow beam directly downward to the sea floor. The reflected sound energy is detected by the echosounder instrument which then calculates and displays water depth to the user. Typical source levels of these types of navigational echosounders are generally 180–200 dB re 1 µPa at 1 m.

One navigational echosounder would be used by the seismic vessel and another one will be used by the scout vessel. The echosounder used by the seismic vessel will consist of a downward-facing single-beam (Kongsberg EA600) that operates at frequencies of 18 to 200 kHz (output power 1–2 kilowatt [kW]). Associated pulse durations are 0.064 and 4.096 milliseconds (ms) long and repetition frequency of the pulse (i.e., the ping rate) is related to water depth. In shallow water, the highest pulse repetition frequency is about 20 pings per second. The scout vessel will use a Furuno 292 echosounder that operates at a frequency of 28 and 88 kHz. The highest ping rate in shallow water is 12 pings per second.

Dates, Duration and Action Area

TGS plans to conduct its 2D seismic surveys in both the U.S. Chukchi Sea and international waters through October 31, 2013. Seismic operations are anticipated to occur for about 35 days over a period of 45–60 days in U.S. waters and up to about 33 days in international waters. Operations in U.S. waters are expected to be complete no later than October 5, 2013. However, poor weather, ice conditions, equipment repair, etc., would likely delay or curtail operations. Thus, this extended period allows flexibility in proposed operational dates, contingent on such conditions. Specific dates and durations of project activities are listed below in chronological order, but are contingent on weather and ice, etc.

The seismic operations are proposed to occur in U.S. and international waters of the Chukchi Sea between about 70–77° N and 154–165° W (Figure 1 of TGS' IHA application). Up to approximately 6,088 km of seismic operations with the full sound source are planned to be conducted in U.S. waters as follows, which include 5,973 km of pre-plot lines plus approximately 115 km for 1-km run-in and 5-km run-out between seismic lines. In addition, approximately 1,556 km with the single 60 in^3 (or smaller) mitigation airgun are planned to be conducted during turns and transits between lines. Approximately 3,691 km of seismic operations with the full seismic source as follows are planned to be conducted in international waters, which include 3,631 km of pre-plot lines plus about 60 km of 1-km run-in and 5-km run-out between pre-plot lines. In addition, approximately 812 km with the single 60 in^3 (or smaller) mitigation airgun are planned to be conducted during turns and transits between seismic lines. Most of the total approximately 9,600 km of seismic lines occur in water 40–100 m deep (82% or 7,890 km), followed by waters >100 m deep (14% or 1,320 km) and waters <40 m deep (4% or 390 km).

Comments and Responses

A notice of NMFS' proposal to issue an IHA to TGS was published in the **Federal Register** on June 12, 2013 (78 FR 35508). That notice described, in

detail, TGS' activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals and the availability of marine mammals for subsistence uses. During the 30-day public comment period, NMFS received three comment letters from the following: the Marine Mammal Commission (Commission); the Alaska Eskimo Whaling Commission (AEWC); the North Slope Borough; the Alaska Wilderness League (AWL), Center for Biological Diversity, Earthjustice, Greenpeace, International Fund for Animal Welfare, Natural Resources Defense Council, Northern Alaska Environmental Center, Ocean Conservation Research, Oceana, Redoil, and Sierra Club (collectively ''AWL''), and two private citizens.

Any comments specific to TGS' application that address the statutory and regulatory requirements or findings NMFS must make to issue an IHA are addressed in this section of the **Federal Register** notice.

Impacts Analysis

Comment 1: A private citizen states that NMFS may not issue the IHA because it kills marine animals.

Response: As discussed in detail in the **Federal Register** notice for the proposed IHA and in this document, the potential effects to marine mammals from TGS' 2D seismic surveys would be Level B behavioral harassment of small numbers of marine mammals in the project vicinity, and no injury, serious injury, or mortality is expected. In addition, no injury, serious injury, or mortality to marine mammal is authorized by NMFS under this IHA.

Comment 2: The AEWC noted that on page 35516 of the **Federal Register** notice for the proposed IHA, NMGS stated that ''though temporary diversions of the swim path of migrating whales have been documented, the whales have generally been observed to resume their initial migratory route.'' The AEWC argues that there is no research support migrating bowhead whales return to their normal migratory path following deflection.

Response: NMFS acknowledges that the above statement made in the **Federal Register** notice was somewhat misleading. NMFS has corrected the statement to read ''though temporary diversions of the swim path of migrating whales have been documented, the whales have generally been observed to continue their migration via a deflected migratory route.''

Comment 3: The AEWC states that NMFS also needs to point out the potential for whales to become skittish—changing their swim speeds, breathing rates, and other migratory behavior—when affected by the proposed open-water seismic surveys and vessel noise, even when they do not deflect from their migratory path.

Response: NMFS is aware of the potential effects of whales becoming skittish when exposed to seismic surveys and vessel noise, and has incorporated this information in this document.

Comment 4: The NSB states that the distances estimated for the 190 and 180 dB zones seem reasonable but the 160 dB zone may be substantially low. The NSB points out that previous sound source verifications (SSV) conducted in the Chukchi Sea measured distances of ~ 8,000 to ~ 13,500 m for the 160 dB zone in similar water depths as proposed by TGS. The NSB requests that NMFS require applicants to provide data from previous SSV tests in future applications, even those conducted by other companies, as a check on the modeled estimates. The NSB further states that NMFS should require TGS to provide some sort of estimate of the possible variability in distances for each of the isopleths.

Response: As stated in the **Federal Register** notice for the proposed IHA, as well as in TGS' IHA application, the acoustic source levels of the seismic source array and mitigation airgun were calculated using JASCO's airgun array source model (AASM) based on data collected from three sites chosen in the project area reported in SSV for Statoil in 2010 by JASCO (see TGS' IHA application Appendix C). Water depths at the these three sites were 17, 40, and 100 m, and the modeled 160 dB zones range from 8,500 to 15,000 m. The possible variability in distances for the isopleths has been considered and the originally modeled exclusion zones were expanded by 10 percent by JASCO to provide larger, more protective exclusion zones.

Comment 5: The Commission requests NMFS provide stronger assurance that the actual numbers of takes would be negligible by revising the estimates to (1) incorporate some measure of uncertainty in that estimate (e.g., upper and lower confidence limits) or (2) use maximum estimated densities. The AWL also claims that NMFS density estimations are arbitrary, and that maximum estimated densities should be used.

Response: As discussed in detail in the **Federal Register** notice for the proposed IHA, TGS' 2D seismic survey areas include the U.S. Chukchi Sea and the international waters north of 72° N, where marine mammal density is less certain, primarily due to lack of systematic scientific surveys. Therefore, density estimates for the proposed seismic survey area were based on two types of sources: (1) Dedicated marine mammal abundance surveys for certain areas and species, and (2) sightings of marine mammals observed from prior seismic surveys when seismic airgun arrays were off. The latter data were used to calculate marine mammal densities for areas with high uncertainties (because of the lack of well designed, dedicated marine mammal surveys). Since these latter data were based on a few opportunistic sightings, it was not possible to perform a rigorous statistical analysis and derive upper and lower confidence limits. In fact, some of these densities in the north of 72° N were actually based on marine mammal densities south of 72° N, which is considered protective because it over-estimates take numbers.

In this case, NMFS has chosen to use the average density data of marine mammal populations to calculate estimated take numbers because these numbers are based on dedicated surveys and monitoring of marine mammals in the vicinity of the proposed project area. ''Maximum densities'' are typically the average densities multiplied by a factor of 4 or 5, and the method of their derivation is not scientifically justified and would likely result in an overestimate. For several species whose average densities are too low to yield a take number due to extra-limital distribution in the vicinity of the proposed Chukchi Sea survey area, but whose chance occurrence has been documented in the past, such as killer whales, narwhales, and harbor porpoises, NMFS allotted a few numbers of these species to allow unexpected takes.

The negligible determination is based on analysis of the potential effects of the specific activities (i.e., airgun impulses from TGS' 2D seismic surveys) on marine mammals, as well as the effectiveness of the required monitoring and mitigation measures to minimize such effects. Although different marine mammal densities used for take calculation may yield different take numbers, the result is not likely to change the nature of potential effects. In addition, an inflated take number based on ''maximum densities'' could lead to more takes being authorized. Finally, based on prior year marine mammal monitoring reports from Arctic seismic surveys, it is well documented that the numbers of marine mammals (modeled and corrected to account for animals not observed) exposed to noise levels above harassment thresholds were always

lower than take numbers calculated based on average densities.

Comment 6: The NSB states that beluga whales from both the Chukchi Sea stock and Beaufort Sea stock will be found in TGS' proposed seismic survey area. The NSB further points out that the Chukchi Sea stock will certainly be there throughout the summer and the Beaufort Sea stock will migrate through the Chukchi Sea during autumn migration in September and October. The NSB states that it is unlikely that PSOs will see belugas from the vessels because the animals are very sensitive to anthropogenic sounds. The NSB states that TGS should be required to have a monitoring technique that will allow them to observe belugas in the far field (i.e., beyond the visual observers view). In addition, citing TGS' IHA application, the NSB points out that although it is true that most observations of belugas tend to be near the shore, the entire Beaufort Sea stock of beluga whales migrates south through the Chukchi Sea. The NSB further states that satellite tagged belugas from the Beaufort Sea stock migrate south through the Chukchi Sea far offshore in some cases.

Response: While the Beaufort Sea stock beluga whales do migrate through the Chukchi during their fall migration, NMFS considers it unlikely TGS would encounter this population during its open-water seismic survey because of the temporal and spatial design of the survey. TGS plans on surveying the Alaskan Chukchi first in August when the Beaufort Sea stock beluga whales will be in their Beaufort Sea summer area. Although recent tagging studies showed that Beaufort Sea stock beluga whales migrate through deep water during their fall westward migration, the majority of the animals are expected to stay below 72° N in September (Hauser *et al.* 2013). In October, most Beaufort Sea beluga whales will have moved farther south/west along the Russian Chukchi Sea (Hauser et al. 2013). The TGS survey area during September and October will be moved farther north offshore in international waters above 72° N. Therefore, it is not likely the survey would encounter Beaufort Sea stock beluga whales during the latter portion of the surveys.

Regarding far field monitoring of marine mammals, as stated in the **Federal Register** notice for the proposed IHA, visual monitoring from a scout vessel at the perimeter of the exclusion zone as well as towed passive acoustic monitoring will be implemented.

Comment 7: Citing TGS' IHA application that harbor porpoises are unlikely to occur in significant numbers within the seismic survey area, the NSB argues that this is a misstatement. Citing Industry's Joint Monitoring Program Reports for the Chukchi and Beaufort Seas and 90-day monitoring reports since 2006, the NSB points out that in recent industry surveys, harbor porpoises are one of the most commonly seen cetaceans in the Chukchi Sea. The NSB further points out that harbor porpoises are among the most commonly sighted cetaceans in Table 3 of TGS' IHA application. The NSB states that TGS must consider this cetacean in their assessment of possible impacts to marine mammals from the proposed seismic survey.

Response: While NMFS does not disagree with the NSB assessment regarding the occurrence of harbor porpoises in Chukchi Sea, it is also important to note that the area where harbor porpoise occurrences were recorded in the Industry's Joint Monitoring Program Report for the Chukchi and Beaufort Seas are limited to within the U.S. Beaufort Sea, while much of TGS' proposed 2D seismic survey area is located in international waters farther north and offshore, which is not likely a habitat for the harbor porpoise, which occur more often inshore. Further, while TGS may have inaccurately characterized the abundance of harbor porpoises in the U.S. Chukchi Sea, where part of its 2D seismic surveys would occur, NMFS conducted its own analyses in determine the potential impacts to all marine mammal species within both U.S. Chukchi Sea and international waters. Finally, as the NSB also noticed, the harbor porpoise densities presented in Table 3, which were used to calculate take estimates, actually used information from 90-day monitoring reports submitted in prior years by holders of incidental take authorizations, and took into consideration the high occurrence of this species in the U.S. Chukchi Sea.

Comment 8: Citing TGS' IHA application, the NSB points out that TGS' statement that its activities are ''expected to be temporary and minor, with no long-term impacts to individuals or populations based on available studies'' is misleading. The NSB pointed out that no one has examined the long-term effects from seismic exposure; therefore no data exist to evaluate the long-term effects.

Response: NMFS agrees with the NSB's assessment that the long-term effects on marine mammals from seismic surveys are still largely unknown, therefore, the statement made by TGS in its IHA application needs to be viewed with caution. Nevertheless, in making the determination to issue the IHA to TGS, NMFS conducted its own analyses and evaluation. A more detailed discussion on potential anthropogenic noise impacts on marine mammals and marine mammal habitat can be found in the **Federal Register** notice for the proposed IHA, as well as in this document.

Comment 9: The Commission requests that NMFS require TGS to revise its take estimates such that adjustment factors do not reduce the estimated densities for waters north of 72° N latitude without additional scientific basis for those adjustments. The NSB also pointed out that satellite tagging of beluga whales indicated many of the whales traveled to north of 72° N. The NSB questions how TGS is going to monitor and assess possible impacts to beluga whales.

Response: NMFS believes that this comment is due to the language presented in TGS' original IHA application. The initial IHA application submitted by TGS in November 2012 contained an adjustment factor of 0.01 for gray whales, 0.10 for bowhead and beluga whales, and ringed and bearded seals for areas above 72° N. This IHA application, though not published for public comment as NMFS did not consider it complete, was submitted to a peer review panel, which included members from the Commission and the NSB, for review and comment. After receiving NMFS comments and recommendations, TGS subsequently modified its analysis and submitted a revised IHA application on April 1, 2013. The revised IHA application included ''upper-adjusted density estimates'', which is virtually the same adjustment proposed in TGS' initial IHA application, and ''lower-adjusted density estimates'', which only make an adjustment for gray whales north of 72° N by a factor of 0.2. No adjustments were made for bowhead and beluga whales and bearded and ringed seals north of 72° N.

In NMFS calculation of take estimates, the ''lower-adjusted density estimates'' were used for adjusting the gray whale numbers because reported gray whale distribution in the Chukchi Sea normally does not extend much north of 72° N during summer/fall (Clarke and Ferguson 2010). This northernmost peripheral boundary area is thus expected to have very low gray whale densities. In addition, by fall when TGS enters into the international waters after completing surveys in the U.S. Chukchi Sea, most gray whales will have migrated south of the project area north of 72° N (Rice and Wolman 1971; Allen and Angliss 2011).

Comment 10: The NSB states that Table 4 of TGS' IHA application showed that all adjustments would lower the densities of marine mammals north of 72° N as all the values are ≤1. The NSB also notes that the footnote (*) suggests the densities may increase but because the factors are one or less the densities will all actually decrease. The NSB asks if this is appropriate for all species, especially belugas. The NSB further notes that belugas have a mark for a footnote (**) but there is no corresponding discussion associated with the footnote.

Response: As discussed in the previous response to comment, the adjustment factors under ''high adjustment'' were carried over from TGS' previous IHA application, and were not used in density estimates. Regarding the ''low adjustment'', there is only one adjustment factor (0.2) for gray whales, which is explained in the previous response to comment. Several species such as humpback, fin, minke, and killer whales, harbor porpoises, and ribbon and spotted seals, are not expected to occur north of 72° N, therefore NMFS does not believe they would be taken north of 72° N. For the rest of the marine mammal species, including beluga whales and bowhead whales, no adjustment was made in take calculation. As far as the extra footnote for beluga whale in Table 4 of TGS' IHA application, TGS responded that the corresponding notes to the footnote for beluga should read ''the beluga population estimate for the E Chukchi Sea is based on the minimum population estimate, as this is the only and most current up to date population estimate per the NMFS Stock Assessment Report.'' The note was accidentally omitted.

Comment 11: The NSB notes that TGS should be congratulated for providing a range of estimates of numbers of marine mammals that may be exposed to seismic sounds. The NSB further states that this approach is an improvement over a single point estimate that is typically provided in an IHA application.

Response: NMFS agrees with the NSB assessment that presenting a range of estimates of numbers of marine mammal that may be exposed to anthropogenic sounds is a better approach than a single number estimate.

Comment 12: The NSB states that the approach for calculating the size of the ensonified area could lead to a negative bias in animals exposed to seismic sound because there are areas of overlap. The NSB notes that since most marine mammals will not stay stationary in one location of the Chukchi Sea over extended periods of time, the areas of overlap should be counted twice.

Response: NMFS does not completely agree with the NSB's assessment. While there is a potential for negative bias in calculating animals exposed to seismic sound where the take zones overlap but the calculation is based on multiplying the ensonified area by marine mammal densities, such cases are only applicable to 3D seismic surveys and site clearance and shallow hazard surveys where the survey track lines are much closer together. For TGS' 2D seismic survey, the ensonified areas are established along each track line, which took into consideration areas where track lines crisscross and thus the overlapping areas are accounted for. Therefore, even though marine mammals may move in/out the survey area, the entire ensonified areas along the track lines were included in the calculation of exposures.

Comment 13: The NSB and AWL claims that NMFS underestimated the number of animals that would be harassed from TGS's survey because it calculates harassment from TGS's proposed survey based on the exposure of marine mammals to impulsive sounds at or above 160 dB. The AWL states that this uniform approach to harassment does not take into account known reactions of marine mammals in the Arctic to levels of noise well below 160 dB. The NSB states that bowhead and beluga whales respond to anthropogenic sound at lower levels, as low as or lower than 120 dB. Without citing specific research, the AWL claims that ''for harbor porpoises, behavioral changes, including exclusion from an area, can occur at received levels from 90–110 dB [near ambient level] or lower,'' and beluga whales ''are known to alter their migration paths in response to ice breaker noise at received levels as low as 80 dB [quiet ambient level].'' The AWL further pointed out that NMFS acknowledged the potential for behavioral disturbance to belugas at distances of 10–20 km, and for bowhead whales to react to sound levels lower than 160 dB.

Response: NMFS does not agree with NSB and AWL's assessment on acoustic effects of marine mammals. Even though bowhead and beluga whales have been observed to respond to anthropogenic sound levels as low as 120 dB, as stated by the NSB, most likely those are non-impulse sounds (such as noise from icebreaking) as NSB did not provide specific description of characteristics of the noise. In general, marine mammals tend to respond to short pulses at higher received levels than longer non-pulse sound, hence the difference in NMFS current criteria of different take thresholds.

In regards to the AWL's argument, first, the AWL did not provide a reference on harbor porpoise behavioral responses and exclusion from an area to received levels at 90–110 dB or lower, which is near the ambient noise level. Second, for the beluga whale example at quiet ambient level, although also not supported by a reference, such a deviation could be attributed to noise exposure to continuous sound (icebreaker), rather than exposure to seismic impulses. Additionally, as TGS does not intend to use icebreakers during its operations, statements regarding beluga reactions to icebreaker noise are not relevant to this activity. Concerning the behavioral disturbance by belugas at distances of 10–20 km, there was no mention of received level, so it is irrelevant to the AWL's argument concerning 160 dB received noise levels.

Additionally, as stated in the past, NMFS does not believe that minor course corrections during a migration will always equate to ''take'' under the MMPA. This conclusion is based on controlled exposure experiments conducted on migrating gray whales exposed to the U.S. Navy's low frequency sonar (LFA) sources (Tyack 2009). When the source was placed in the middle of the migratory corridor, the whales were observed deflecting around the source during their migration. However, such minor deflection is considered not to be biologically significant. To show the contextual nature of this minor behavioral modification, recent monitoring studies of Canadian seismic operations indicate that when not migrating, but involved in feeding, bowhead whales do not move away from a noise source at an SPL of 160 dB. Therefore, while bowheads may avoid an area of 20 km (12.4 mi) around a noise source, when that determination requires a post-survey computer analysis to find that bowheads have made a 1 or 2 degree course change, NMFS believes that does not rise to a level of a ''take.'' NMFS therefore continues to estimate ''takings'' under the MMPA from impulse noises, such as seismic, as being at a distance of 160 dB (re 1 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 animals would react in a biologically significant way. According to experts on marine mammal behavior, the degree of reaction which constitutes a ''take,'' i.e.,

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

NMFS is in the process of developing revised acoustic criteria and thresholds for different sources, including seismic sources. The revised acoustic criteria will be peer-reviewed and made available for public comment. Until that process is complete, it is not appropriate to apply the new criteria and thresholds in any incidental take authorization. Instead, NMFS will continue its longstanding practice of considering specific modifications to the acoustic criteria and thresholds currently employed for incidental take authorizations only after providing the public with an opportunity for review and comment and responding to the comments.

Comment 14: The AWL states that uncertainty precludes conclusions regarding take number and potential impacts. The AWL further states that NMFS must consider the extent of missing information about ecosystems in the Chukchi Sea, especially considering the large footprint of TGS' proposed survey.

Response: Although NMFS agrees that it would be desirable to obtain additional information about the Chukchi Sea ecosystem and regional populations of marine mammals, NMFS has sufficient information to support its analysis of the potential impacts of TGS's proposed marine surveys on wildlife. As required by the MMPA implementing regulations at 50 CFR 216.102(a), NMFS has used the best scientific information available in assessing the level of take and whether the impacts would be negligible. The **Federal Register** notice for the proposed IHA, NMFS EA for the issuance of IHAs to take marine mammals incidental to open-water marine and seismic surveys in 2013, and this document all provide detailed analysis using the best available scientific information that enables NMFS to make the required determinations. In addition, the required monitoring and mitigation measures prescribed in the IHA NMFS issued to TGS will further reduce any potential impacts of the proposed marine surveys on marine mammals.

Comment 15: The AWL states that NMFS may not issue the IHA because it has not negated the possibility of serious injury from TGS's airguns. Further, the AWL noted that 18 years ago, NMFS once stated that permanent hearing loss qualifies as serious injury (60 FR 28381, May 31, 1995). A private citizen further states that the marine survey is ''massive deadly'' to marine mammals.

Response: NMFS does not agree with the private citizen and AWL's assessment. NMFS was able to make a preliminary determination in the **Federal Register** for the proposed IHA to TGS to take marine mammals incidental to its open-water marine surveys. In addition, NMFS' preliminary determination states that the potential effects would be Level B behavioral harassment of small numbers of marine mammals in the project vicinity, and no injury, serious injury, or mortality is expected.

Concerning the AWL's comments on NMFS 1995 proposed rule to implement the process to apply for and obtain an IHA, NMFS stated that authorizations for harassment involving the ''potential to injure'' would be limited to only those that may involve non-serious injury (60 FR 28379; May 31, 1995). While the **Federal Register** notice cited by the commenters states that NMFS considered PTS to be a serious injury (60 FR 28379; May 31, 1995), our understanding of anthropogenic sound and the way it impacts marine mammals has evolved since 1995, and NMFS no longer considers PTS to be a serious injury. NMFS has defined ''serious injury'' in 50 CFR 216.3 as ''. . . any injury that will likely result in mortality.'' There are no data that suggest that PTS would be likely to result in mortality, especially the limited degree of PTS that could hypothetically be incurred through exposure of marine mammals to seismic airguns at the level and for the duration that are likely to occur in this action.

Further, as stated several times in this document and previous **Federal Register** notices for seismic activities, there is no empirical evidence that exposure to pulses of airgun sound can cause PTS in any marine mammal, even with large arrays of airguns (see Southall *et al.* 2007). PTS is thought to occur several decibels above that inducing mild temporary threshold shift (TTS), the mildest form of hearing impairment (a non-injurious effect). NMFS concluded that cetaceans and pinnipeds should not be exposed to pulsed underwater noise at received levels exceeding, respectively, 180 and 190 dB re 1 μPa (rms). The established 180- and 190-dB re 1 μPa (rms) criteria are the received levels above which, in the view of a panel of bioacoustics specialists convened by NMFS before TTS measurements for marine mammals started to become available, one could not be certain that there would be no injurious effects, auditory or otherwise, to marine mammals. Additionally, NMFS has required monitoring and mitigation measures to negate the possibility of marine mammals being seriously injured or killed as a result of TGS's activities. In the proposed IHA, NMFS determined that TGS's activities are unlikely to even result in TTS. Based on this determination and the explanation provided here, PTS is also not expected. Therefore, an IHA is appropriate.

Comment 16: The AWL claims that NMFS' take estimates of 30,000 ringed seals, close to 1,500 gray whales, 800 bowhead whales, and 400 beluga whales do not meet MMPA's ''small number'' requirement. The AWL further claims that NMFS underestimated the Level B takes in the proposed IHA.

Response: NMFS does not agree with the AWL's assessment. First, as mentioned in the **Federal Register** notice for the proposed IHA and in this document, the estimated takes of the bowhead, gray, and beluga whales and ringed seals represent 7.53%, 7.13%, 11.11%, and 14.36% of their populations, respectively. As described in the Negligible Impact and Small Numbers Analysis and Determination section of this document, NMFS considers the number of authorized takes small. In addition, the percent population of bowhead whale takes is further reduced to 4.70% based on the most recent surveys and on the recommendation by scientists from the NSB (see *Response to Comment 39*).

As discussed in detail in the Negligible Impact and Small Numbers Analysis and Determination section of this document, all takes from TGS' proposed open-water seismic surveys are expected to be Level B behavioral harassment, in the form of startle behavior or vacating the area for the short duration of time when the seismic airgun is firing in the area. Animals could also change their behavior patterns during this short duration, but are expected to resume their normal activities and reoccupy the area as soon

as the vessels move away. Additionally, since a portion of the proposed open-water seismic survey is planned in offshore waters far north above 72° N, it is expected to be outside the gray whale habitat. In addition, the mitigation and monitoring measures (described previously in the **Federal Register** notice for the proposed IHA) included in the IHA are expected to further reduce any potential disturbance to marine mammals.

Comment 17: The AWL claims that NMFS' negligible impact finding is unjustified.

Response: NMFS does not agree with the AWL's assessment. First, as discussed in the Negligible Impact and Small Numbers Analysis and Preliminary Determination section of the **Federal Register** notice for the proposed IHA, based on rigorous analyses, TGS' proposed 2D seismic surveys in the Chukchi Sea are expected to result in takes of small numbers of marine mammals in the form of Level B behavioral harassment. Animals exposed to airgun noises are expected to show brief startle reactions or to temporarily vacate the seismic site. No injury, serious injury, or mortality is expected, and none is authorized. Please also see *Responses to Comments 15 and 16* for additional justification.

Comment 18: The AWL states that NMFS must consider potential effects from masking and stress.

Response: NMFS agree that potential acoustic masking and stress caused by anthropogenic sources could negatively affect marine mammal fitness and survival. The potential impacts from masking and stress by seismic surveys are considered and discussed in detail in the **Federal Register** notice for the proposed IHA. In this case, masking effects of pulsed sounds on marine mammal calls and other natural sounds are expected to be limited. Some whales continue calling in the presence of seismic pulses (e.g., Richardson *et al.* 1986; McDonald *et al.* 1995; Greene *et al.* 1999a, 1999b; Nieukirk *et al.* 2004; Smultea *et al.* 2004; Holst *et al.* 2005a, 2005b, 2006; Dunn and Hernandez 2009). In addition, marine mammals are thought to be able to compensate to some degree for masking by adjusting their acoustic behavior such as shifting call frequencies, and increasing call volume and vocalization rates, as discussed in the **Federal Register** notice for the proposed IHA (e.g., Miller *et al.* 2000; Parks *et al.* 2007; Di Iorio and Clark 2009; Parks *et al.* 2010).

Although not much is known about potential stress to marine mammals from exposure from seismic surveys, the TGS' proposed 2D survey in the Chukchi Sea is short in duration, and will not stay in one area. Therefore, as analyzed in the **Federal Register** notice for the proposed IHA, the potential effects are expected to be negligible.

Mitigation

Comment 19: AEWC requested that NMFS include the following provisions of the 2013 CAA in Section 6(d) of the IHA issued to TGS: Section 202(a) and (c): Com-Center General Communications Scheme; Section 204: Standardized Log Books; Section 302: Barge and Transit Vessel Operations; Section 402: Sound Signature Tests; Section 501: General provisions for Avoiding Interference with Bowhead Whales or Subsistence Whale Hunting Activities; Section 502(b): Limitations on Geophysical Activity in the Chukchi Sea; Section 505: Termination of Operations and Transit Through the Bering Strait; and Title VI, Sections 601 and 602: Late Season Seismic Operations.

Response: NMFS has incorporated the above provisions of the 2013 CAA into the IHA issued to TGS, as these measures will help ensure there is no unmitigable adverse impact on the availability of affected species or stock(s) for subsistence uses.

Comment 20: The Commission requested that NMFS specify reduced vessel speeds of 9 knots or less when weather conditions or darkness reduce visibility.

Response: NMFS worked with TGS and included the speed limitation requested by the Commission in the IHA as a mitigation measure for vessel movement.

Comment 21: A private subsistence user comments that since seals diving to the bottom to feed on benthic organisms in deep water can stay down for an hour or more, NMFS should extend the visual monitoring of the exclusion zone to 30 minutes or longer before ramping up, after a shutdown due to a pinniped entering the zone.

Response: NMFS is aware that pinnipeds are able to dive for long periods. However, in the case of TGS' 2D seismic survey, the required condition for ramping up seismic airguns after a shutdown triggered by pinniped presence is that (1) the pinniped is visually observed to have moved out of the exclusion zone, or (2) 15 minutes have passed since the last time the pinniped is seen. The time duration of 15 minutes is not based on the depth to which the pinniped can dive. Rather, it is based on the relatively small 190-dB exclusion zone for pinnipeds, and the speed of the seismic vessel, which is typically between 4 and 5 knots. As presented in the **Federal Register** notice for the proposed IHA, the modeled 190-dB exclusion zones range from 430–930 m, depending on depth. Assuming that the radius of the zone is 930 m, and the source vessel is moving at a speed of 4 knots (7.4 km/hr), then in 15 minutes, the vessel will be at a location 1.85 km from where the pinniped was initially sighted. Therefore, NMFS believes that 15 minutes is a long enough duration to wait prior to safely ramping up seismic airguns after a shutdown caused by the presence of a pinniped.

Comment 22: The AWL states NMFS should include provisions in the IHA that restrict TGS's operations based on geographic location, and/or time of year, such as restricting activity in certain areas, including subsistence use areas, areas of high productivity or diversity; areas that are important for feeding, migration, or other parts of the life history of species; or areas of biogenic habitat, structure-forming habitat, or habitat for endangered or threatened species.

Response: While processing the proposed IHA, NMFS worked with TGS and conducted extensive analysis on the areas where TGS's proposed open-water marine surveys would occur. The areas TGS proposed to have its proposed marine surveys are analyzed in the proposed IHA process, during the section 7 consultation under the ESA, as well as under the NEPA analysis conducted during preparation of the EA. However, NMFS did not find that further restriction is needed given that no areas of high productivity or diversity, areas that are important for feeding and migration, or critical habitat for endangered or threatened species were found. Nevertheless, certain time and area restrictions are included in the IHA to minimize potential impacts on subsistence activities which are consistent with the CAA TGS has signed. These time and area restrictions are:

- Vessels should remain as far offshore as weather and ice conditions allow, and at least five miles offshore during transit,
- From August 31 to October 31 vessels in the Chukchi Sea or Beaufort Sea shall remain at least 20 miles offshore of the coast of Alaska from Icy Cape in the Chukchi Sea to Pitt Point on the east side of Smith Bay in the Beaufort Sea whether in transit or engaging in activities in support of oil and gas operations unless ice conditions or an emergency that threatens the safety of the vessel or crew prevents compliance with this requirement,

• Beginning September 15, and ending with the close of the fall bowhead whale hunt, if Wainwright, Pt. Lay, or Pt. Hope intend to whale in the Chukchi Sea, no more than two geophysical activities employing geophysical equipment will occur at any one time in the Chukchi Sea. During the fall bowhead whale hunt, geophysical equipment will not be used within 30 miles of any point along the Chukchi Sea coastline. Industry participants will contact the Whaling Captains' Associations of each village to determine if a village is prepared to whale and will notify the AEWC of any response, and

• All Industry participant vessels shall complete operations in time to allow such vessels to complete transit through the Bering Strait to a point south of 59 degrees North latitude no later than November 15, 2013.

Comment 23: The AWL states that NMFS should examine imposing requirements for the use of new technology that could reduce the footprint of seismic exploration. The AWL cited an expert conference in February in Silver Spring, Maryland, by NMFS on alternative technologies for offshore energy production and requested that NMFS consider (1) Mandating the use of marine vibroseis or other technologies in some or all of the survey area; (2) mandating the testing of marine vibroseis in a pilot area, precedent to a decision to permit seismic activity, with an obligation to accrue data on environmental impacts; (3) deferring the permitting of surveys in part or all of the survey area until effective mitigative technologies, such as marine vibroseis, become available; (4) providing incentives for TGS's use of these technologies as was done for passive acoustic monitoring systems; and (5) exacting funds from TGS to support accelerated mitigation research in this area.

Response: First, the February workshop (not an ''expert conference'') in Silver Spring, Maryland, titled Quieting Technologies for Reducing Noise during Seismic Surveying and Pile Driving, was convened by BOEM, not NMFS. The goals of the workshop, as stated in the Web site of the workshop, were to (1) Review and examine recent developments (existing, emerging, and potential) in quieting technologies for seismic surveying, whether proposed or in development; (2) identify the requirements for operation and limitations for using these technologies; (3) evaluate data quality and cost-effectiveness of these technologies as compared to that from existing marine acoustic technologies; (4) identify the acoustic characteristics of new technologies in varying environments compared to that from existing technologies; (5) examine potential environmental impacts from these technologies; (6) identify which technologies, if any, provide the most promise for full or partial traditional use and specify the conditions that might warrant their use (e.g., specific limitations to water depth, use in Marine Protected Areas, etc.); and (7) identify next steps, if appropriate, for the further development of these technologies, including potential incentives for field testing. Most of these technologies are still in research and development stages and have not been field tested. The workshop provided a forum for discussion and evaluation of such technologies, including vibroseis. NMFS supports and encourages both the development and use of technologies that will reduce impacts to marine mammals and other marine species. These alternative technologies will likely be adopted for use to replace some subset of future seismic survey activities once their development is further along and their environmental impacts, especially as compared to seismic airguns, are better understood. However, NMFS does not believe it can currently mandate the use of such technologies.

Monitoring

Comment 24: The Commission requests NMFS only authorize an in-season adjustment in the size of the exclusion and/or disturbance zones if the size(s) of the estimated zones are determined to be too small. The Commission states that the purpose of SSV is to ensure protection of marine mammals, and one way to reduce risk to marine mammals would be to only allow expansion of the exclusion and/or disturbance zones.

Response: NMFS does not agree with the Commission's recommendation. While it may seem to be more protective to increase the size of the exclusion zone, if the effectiveness of visual-based marine mammal monitoring remains the same, the actual result may not be an increase in protection. For example, when the SSV suggests that the exclusion and/or disturbance zones are smaller than the ones modeled and monitoring still focuses on the larger modeled zones, it is likely that the effectiveness of marine mammal monitoring could be reduced as the area to be monitored would be larger than necessary. In addition, larger than realistic exclusion zones would cause unnecessary power-down and shutdowns, which could increase the total duration of the marine surveys, and cause unnecessary impacts to the marine environment.

Comment 25: The Commission requests NMFS require TGS to monitor for marine mammals 30 minutes before, during, and 30 minutes after survey operations and other activities have ceased.

Response: TGS is required to monitor for marine mammals 30 minutes before, during, and 30 minutes after survey operations and other activities have ceased.

Comment 26: The Commission requests NMFS encourage TGS to deploy additional protected species observers to (1) increase the probability of detecting all marine mammals in or approaching the Level A and B harassment zones and (2) assist in the collection of data on activities, behaviors, and movements of marine mammals around the source.

Response: NMFS agrees that an adequate number of PSOs is critical to ensure complete coverage in visual monitoring and implementing mitigation measures. While it is reasonable to conclude that additional PSOs would increase detection capability to a certain degree, the number of PSOs that can be stationed on vessels is limited by the available berth spaces. TGS plans to have 5 PSOs onboard the survey vessel and 4 onboard the scout vessel, and will have 100% monitoring coverage during all periods of survey operations in daylight. In addition, each PSO is limited to maximum of 4 consecutive hours per watch and maximum of 12 hours of watch time per day. NMFS believes that the number of PSOs onboard is adequate given the limited space available on the survey vessel.

Comment 27: The NSB notes that towed PAM will be used for marine mammal monitoring during TGS' 2D seismic survey. The NSB states that PAM is still in the research and development phase, and that it is not clear whether it will provide useful data. In addition, the NSB states that since the PAM will be towed by the scout vessel thus presumably reducing the maneuverability of the scout vessel. The NSB further states that the scout vessel would have a more difficult time visually monitoring the safety and behavioral impact zones with the streaming towed array.

Response: NMFS is aware of the technical challenges involved in towed PAM for marine mammal monitoring. Nevertheless, given the needs for marine mammal monitoring at far-field beyond visual observation, and the technological progresses made in the

past few years regarding towed PAM, it is worth the efforts to require towed PAM as an extra modality to monitor marine mammal presence in the seismic survey area, and to enhance visual monitoring. Towed PAM has been used in past IHAs issued by NMFS for marine mammal monitoring in the Arctic (e.g., open-water seismic survey by StatOil in the Chukchi Sea in 2010), and the results indicated more acoustic detections than visual detections, and acoustic detections have led to visual detections of marine mammals. Regarding towed PAM for TGS' 2D seismic survey, NMFS worked with the applicant and its acoustic contractor and carefully reviewed all technical aspects of the acoustic monitoring design and methods. The reason that PAM will be conducted from the scout vessel is to decouple the PAM array from the seismic streamer and airgun arrays. In addition, because the purpose of the towed PAM is to expand the monitoring to the far-field by positioning them approximately 2 km ahead of the seismic vessel, it makes sense that the PAM array be deployed off the scout vessel. The design will not reduce the maneuverability of the scout vessel since the scout vessel is positioned to be approximately 2 km ahead of the seismic vessel for far-field monitoring. More details of the towed PAM design and discussion are described in TGS' 4MP.

Comment 28: The NSB states that because the towed PAM is not a proven technique for monitoring marine mammals in the vicinity of a seismic survey in the Arctic, NMFS should require TGS to collect acoustic data using bottom mounted instruments. The NSB states that TGS should deploy at least several instruments in the northern areas of their proposed seismic survey area.

Response: As discussed above, NMFS is aware of the technical challenges involved in implementing towed PAM for marine mammal monitoring. The justification and improvement in implementing the towed PAM as an effective tool for marine mammal monitoring is discussed in *Response to Comment 27.* As discussed in the **Federal Register** notice for the proposed IHA, NMFS discussed extensively with TGS ways to improve the far-field marine mammal monitoring. As a result, upon further investigation and conversations with both JASCO and Bio-Waves by TGS, as well as further research into past Arctic marine mammal monitoring results conducted with towed-PAM, NMFS and TGS agree that utilizing a well-designed towed-PAM system would be a better choice under this circumstance to provide enhanced marine mammal monitoring beyond exclusion zones in a real time basis, as well as using acoustic data for limited relative abundance and distribution analysis, and possibly limited insights on impacts to marine mammals.

NMFS also studied other PAM methodologies suggested by the peer-review panel. First, concerning deploying fixed bottom mounted instruments, TGS states that it worked with other operators but was not able to find a collaborator to participate in long-term acoustic monitoring due to the short-term nature of the proposed survey. Regarding real-time acoustic monitoring with a fixed buoy, TGS stated that it conducted an evaluation of this option and discussed the possibility with Cornell University's Bioacoustical Research Program concerning its real-time marine acoustic recording unit (MARU), but decided that the technology is still in the research and development stage. When the fact that the equipment is still in the developmental stages is considered in combination with the increased cost of this technology, TGS believes that the downsides of using fixed buoys outweigh the potential benefits and that towed PAM is a more effective solution. Therefore, NMFS considers in this case that a towed PAM is a reasonable alternative for passive acoustic monitoring.

Comment 29: The AWL claims that NMFS' proposed mitigation measures are ineffective and do not negate the potential for serious injury. Citing the example of ION Geophysical's 90-day monitoring report, the AWL points out the difficulty of monitoring these zones at distances greater than 2.2 miles. The AWL further states that since the very large size of the 180-dB exclusion zone could extend to 2.5 km (1.5 mi) from the sound source, depending on water depth, marine mammals could be injured. The AWL also points out that the proposed monitoring measures for behavioral harassment were also inadequate as the 160 dB zone could extend to 15 km from the source. Further, the AWL states that the Open-water peer review panel reviewing TGS's proposed activities also noted serious limitations of visual monitoring, and that ''PSOs on the scout vessel will only be able to monitor a small portion of the 160 dB zone.'' Finally, the AWL quotes ION's 90-day report as saying ''nights with fog, no ambient light, or heavy seas made observations nearly impossible.''

Response: NMFS recognizes the limitations of visual monitoring as distance increases. However, TGS's proposed open-water seismic survey would employ a scout vessel to supplement the visual monitoring of the exclusion zone at a distance of approximately 2 km in front of the source vessel, to ensure that the exclusion zone is free of marine mammals during the survey. In addition, NMFS recognizes that 2.5 km (1.5 mi) is a large distance for vessel monitoring, however, based on prior marine mammal monitoring reports, this distance is well within the line of sight and can be effectively monitored by experienced PSOs. Furthermore, towed PAM will be implemented to supplement marine mammal monitoring to further increase the chance of detecting marine mammals in the survey vicinity.

Concerning far field monitoring of the 160-dB zone, NMFS recognizes the limitations of visual monitoring, but again, towed PAM will provide information on marine mammals in the vicinity. It is likely that towed PAM designed for TGS' seismic survey will be able to localize marine mammals in the far field beyond exclusion zones, as discussed in detail in the **Federal Register** notice for the proposed IHA.

In addition, NMFS also recognizes the limitations of visual monitoring in darkness and other inclement weather conditions. Therefore, in the IHA issued to TGS, NMFS required that no seismic airgun can be ramped up when the entire exclusion zones are not visible. However, TGS's operations will occur in an area where periods of darkness do not begin until early September. Beginning in early September, there will be approximately 1–3 hours of darkness each day, with periods of darkness increasing by about 30 min each day. By the end of the survey period, there will be approximately 8 hours of darkness each day. These conditions provide PSOs favorable monitoring conditions for most of the time.

Comment 30: The AWL states that the use of PAM does not remedy AWL's perceived flaws in the mitigation regime, and the AWL is not clear whether or how towed PAM will be used to improve implementation of the exclusion zones. The AWL further states NMFS provided less detail about how the PAM system will work by stating that details and specifications of the equipment will be determined at a later date once TGS has identified a contractor for the system.

Response: Concerning the effectiveness of using towed PAM to supplement marine mammal monitoring, and the effectiveness of implementing towed PAM, please refer

to *Response to Comment 27.* The utilization of towed PAM to improve implementation of the exclusion zones is discussed in detail in the **Federal Register** notice for the proposed IHA and in TGS' 4MP. In summary, using towed PAM to supplement marine mammal visual detection has been required by NMFS in the past for various marine seismic and geophysical activities and it has proven to be effective. Specifically, there are far more acoustic detections than visual detection of marine mammals, and many visual detections were based on initial acoustic detection of marine mammals in the project vicinity. In addition, for the TGS' seismic survey, marine mammal localization by towed PAM is also proposed by using target motion analysis. With this method, it is possible with a single towed hydrophone array to obtain a localization to vocalizing animals given certain assumptions. Although due to the linear alignment of hydrophones, there is a left/right ambiguity that cannot be resolved without turning the tow vessel, this ambiguity is not a concern for mitigation during the seismic survey because the exclusion zones are circular and would encompass both sides of the hydrophones. Therefore, the distance to the calling animal is the same on the right and left side of the vessel.

Although at the time when the **Federal Register** notice for the proposed IHA was published NMFS did not have specific information concerning the design of the towed PAM, specific requirements for an effective towed PAM were analyzed and requested. For example, the towed PAM system shall be able to monitor marine mammal occurrence within 160 dB isopleths, and shall minimize the interferences from flow noise by equipping the system with pre-amplifier filters that are ''tuned'' to reduce low-frequency flow and vessel noise. Detailed discussion on these requirements and specifications are provided in the **Federal Register** notice for the proposed IHA and in TGS' 4MP.

Comment 31: Citing ION's error in its initial exclusion zone measurements, the AWL states that sound measurements used to estimate the size of safety radii from which animals should be excluded can easily be miscalculated. The AWL further requests NMFS require sound source verification before any activities commence to ensure no similar errors and resulting takes occur during TGS' proposed activities.

Response: Although NMFS recognizes the error made by ION's contractor during the sound source verification measurement and the radius of the 180-dB exclusion was originally estimated less than it was measured to be, NMFS does not agree with AWL's speculation that sound measurements used to estimate the size of exclusion zones can be ''easily miscalculated.'' The ION incident was not due to miscalculation. It was due to human error in data handling and is preventable. NMFS has subsequently discussed this with ION and its contractor to make sure that rigorous checks and verification are performed to ensure no error in data handling.

NMFS agrees with the AWL that SSV will be conducted before TGS commences its seismic surveys in the Chukchi Sea.

Subsistence Issues

Comment 32: The NSB requests NMFS require TGS to sign the CAA with the Alaska Eskimo Whaling Commission (AEWC).

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. Although the contents of a CAA may inform NMFS' ''no unmitigable adverse impact'' determination for bowhead and beluga whales, the signing of it is not a requirement. Nevertheless, TGS signed the 2013 CAA and NMFS incorporated all relevant measures that will help to ensure no unmitigable adverse impacts to subsistence harvest activities into the IHA issued to TGS.

Comment 33: The Commission recommends that NMFS encourage the development of conflict avoidance agreements that reflect the interests of all potentially affected communities and co-management organizations and account for potential adverse impacts on all marine mammal species taken for subsistence.

Response: TGS signed a Conflict Avoidance Agreement (CAA) with the Alaska native whaling communities to ensure that there is no unmitigable adverse impacts to subsistence whaling activities from its proposed 2D seismic survey in the Chukchi Sea. For marine mammal species other than bowhead whales, TGS developed a POC and engaged with all potentially affected communities and co-management organizations to ensure that the potential effects to subsistence activities can be mitigated. In addition, TGS developed a marine mammal monitoring and mitigation plan to make sure that there will be no unmitigable impacts to subsistence use of all marine mammal species by the native communities. Finally, NMFS has rigorously reviewed TGS' POC and the 4MP and provided additional recommendations (e.g., passive acoustic monitoring) to further reduce any adverse effects. NMFS has subsequently made a determination that TGS' 2013 open-water 2D seismic survey will not have unmitigable adverse impacts to subsistence use of any marine mammal species. Neither the MMPA nor its implementing regulations require an independent legal agreement between TGS and any subsistence use representative. TGS has already ensured there will be no unmitigable adverse impact to subsistence uses.

Comment 34: The AEWC and NSB point out that currently there are 11 villages that take bowhead whales, not 10 as described in the **Federal Register** notice for the proposed IHA. The AEWC further asks NMFS to update the discussion of Barrow whaling to acknowledge the increasing importance of the fall hunt.

Response: NMFS appreciates the additional new information on the current subsistence whaling activities and clarifying the role of the fall bowhead whale hunt. NMFS' analyses provided in the **Federal Register** notice for the proposed IHA was based on historical data as the most recent data from the same season may not be available at the time of analysis. NMFS has incorporated this information into the subsistence impact analysis in this document.

Comment 35: Citing the **Federal Register** notice for the proposed IHA that NMFS states that the provisions in the POC ''should minimize impacts to subsistence hunters,'' the AEWC argues that ''should'' and ''minimize'' simply has no place in the statutory analysis. The AEWC states that NMFS must determine that the proposed activities ''will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses.''

Response: NMFS agrees with the AEWC's point and considers that the sentence in the ''Unmitigable Adverse Impact Analysis and Preliminary Determination'' section of the **Federal Register** notice did not accurately convey NMFS analyses on subsistence affects. NMFS subsequently corrected the sentence to read ''TGS has adopted a spatial and temporal strategy for its Chukchi Sea open-water seismic surveys that will have no unmitigable impacts to subsistence hunters'' under the ''Unmitigable Adverse Impact Analysis and Determination'' section of this document.

NEPA Concern

Comment 36: The AEWC and AWL state that NMFS must address the potential cumulative effects of multiple concurrent seismic operations in the Chukchi and Beaufort Seas.

Response: NMFS prepared an EA to analyze and address cumulative impacts of other oil and gas activities planned for the Arctic Ocean. The oil and gas related activities in the U.S. Arctic in 2013 include this activity and Shell's open-water marine surveys in the Chukchi Sea. Seismic survey activities in the Canadian and Russian Arctic occur in different geophysical areas, therefore, they are not analyzed under the NMFS 2013 EA. Other appropriate factors, such as Arctic warming, military activities, and noise contributions from community and commercial activities were also considered in NMFS' 2013 EA. Please refer to that document for further discussion of cumulative impacts.

Comment 37: The AWL notes that NMFS is in the middle of preparing a programmatic EIS for Arctic Ocean oil and gas exploration, and states that NEPA prohibits piecemeal approvals while a programmatic EIS process is ongoing, except under strictly prescribed circumstances not found here. The AWL further states that if NMFS were to allow TGS' activities to go forward pending completion of the EIS, NMFS risks undermining the overarching aim of the programmatic EIS process to establish appropriate standards for future oil and gas activities that address and mitigate potential cumulative effects of the activities.

Response: NMFS does not agree with the AWL statement. While the analysis contained in the Final EIS will apply more broadly to Arctic oil and gas operations, NMFS' issuance of an IHA to TGS for the taking of several species of marine mammals incidental to conducting its open-water marine survey in the Chukchi Sea in 2013, as analyzed in the EA, is not expected to significantly affect the quality of the human environment. In the 2013 Arctic EA, NMFS included a rigorous analysis on cumulative effects of all activities currently occurring in the Arctic. TGS's surveys are not expected to significantly affect the quality of the human environment because of the limited duration and scope of operations.

ESA Concern

Comment 38: The AWL states that although NMFS has completed a programmatic biological opinion for Arctic oil and gas activities, it must also thoroughly analyze the impacts of the specific activities authorized here including future impacts. The AWL further states that in order to comply with the ESA, this site-specific analysis must include an incidental take statement specifying the number and type of takes expected.

Response: For the issuance of the IHA to TGS, NMFS' Permits and Conservation Division initiated consultation with NMFS Alaska Regional Office (AKRO) Protected Resources Division under section 7 of the ESA on the issuance of an IHA to TGS under section 101(a)(5)(D) of the MMPA for this activity. The consultation took into consideration the specific activities proposed to be authorized and all aspects of current and future impacts to the species. A Biological Opinion was issued on June 19, 2013, which concludes that issuance of the IHA is not likely to jeopardize the continued existence of the ESA-listed marine mammal species. In addition, analysis by NMFS AKRO showed that humpback whale will not be affected, therefore, no take was authorized. NMFS will issue an Incidental Take Statement under this Biological Opinion which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of listed species.

Miscellaneous

Comment 39: The NSB points out that the most recent bowhead population estimates are: 12,631 from 2004 (Koski *et al.* 2010) and 16,892 for 2011 (Givens *et al.* 2013).

Response: NMFS appreciates NSB pointing out the most recent bowhead population estimates and made corrections in the relevant section. With the revised population estimates, the percentage of the Bering-Chukchi-Beaufort Sea population of bowhead whales that could be taken by Level B harassment is changed from 7.53% to 4.70%.

Comment 40: The NSB notes that TGS has proposed to coordinate with state, federal and NSB divisions but has not discussed how they will coordinate with other industry operators. The NSB points out that Shell, ConocoPhillips and Statoil have an extensive monitoring program in the Chukchi Sea, including passive acoustic monitoring (PAM). The NSB points out that results from that PAM could provide useful information about possible impacts from TGS' seismic operations. The NSB requests NMFS require TGS to work with other industry partners who are collecting useful data in the area where they are operating.

Response: As discussed in the **Federal Register** notice for the proposed IHA, NMFS has discussed extensively with TGS on a variety of techniques to improve its far field monitoring, including PAM using ocean bottom mounted acoustic sensors. During the course of discussion, TGS stated that it was in contact with other industry operators but was not able to find a collaborator to participate in long-term acoustic monitoring due to the short-term nature of its proposed survey. Further, NMFS cannot legally require TGS to work with other industry partners under the MMPA. Nevertheless, TGS is able to implement PAM with towed acoustic arrays, as described in detail in the **Federal Register** notice for the proposed IHA and in this document.

Comment 41: The Commission requested that NMFS allow sufficient time between the close of the comment period and the issuance of an IHA for NMFS to analyze, consider, and respond fully to comments received and incorporate recommended changes, as appropriate—the applicable statutory provision, section 101(a)(5)(D)(iii), anticipates that up to 45 days might be required. The Commission points out that the deadline for comments on the proposed IHA is July 12, 2013, yet the IHA was proposed to be issued on July 15, 2013. The Commission states that it is concerned that the time between the close of the comment period and the issuance of the IHA does not provide adequate opportunity for NMFS to consider, provide adequate responses to, and incorporate any changes prompted by comments from the Commission and the public.

Response: NMFS always fully reviews and considers comments submitted by the Commission and the public, and works with the applicant to incorporate such input as appropriate. In the case of the TGS IHA, NMFS is actively working with the applicant on the scheduling issue, and since the publication of the **Federal Register** notice for the proposed IHA, TGS has indicated that its 2D seismic survey would probably start in early August, thus giving NMFS extra time to complete the process.

Description of Marine Mammals in the Area of the Specified Activity

The marine mammal species under NMFS jurisdiction most likely to occur in the seismic survey area include eight cetacean species: beluga whale (*Delphinapterus leucas*), harbor porpoise (*Phocoena phocoena*), killer whale (*Orcinus orca*), bowhead whale (*Balaena mysticetus*), gray whale (*Eschrichtius robustus*), minke whale

(*Balaenoptera acutorostrata*), fin whale (*B. physalus*), and humpback whale (*Megaptera novaeangliae*), and four pinniped species, ringed (*Phoca hispida*), spotted (*P. largha*), bearded (*Erignathus barbatus*), and ribbon seals (*Histriophoca fasciata*).

The bowhead, fin, and humpback whales are listed as ''endangered'', and the ringed and bearded seals are listed as ''threatened'' under the Endangered Species Act (ESA) and as depleted under the MMPA. Certain stocks or populations of gray and beluga whales and spotted seals are also listed under the ESA, however, none of those stocks or populations occur in the proposed activity area.

TGS' application contains information on the status, distribution, seasonal distribution, and abundance of each of the species under NMFS jurisdiction mentioned in this document. 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 2012 SAR is available at: *http://www.nmfs.noaa.gov/pr/sars/pdf/ak2012.pdf.*

Potential Effects of the Specified Activity on Marine Mammals

Operating active acoustic sources such as airgun arrays, navigational sonars, and vessel activities have the potential for adverse effects on marine mammals. Potential effects from TGS' 2D seismic survey on marine mammals in the Chukchi Sea are discussed in the **Federal Register** (78 FR 35508; June 12, 2013) notice for the proposed IHA. No changes have been made to the discussion contained in this section of the **Federal Register** notice for the proposed IHA.

Anticipated Effects on Habitat

The primary potential impacts to marine mammal habitat are associated with elevated sound levels produced by airguns and vessels and their affects to marine mammal prey species. These potential effects from TGS' 2D seismic survey are discussed in the **Federal Register** (78 FR 35508; June 12, 2013) notice for the proposed IHA. No changes have been made to the discussion contained in this section of the **Federal Register** notice for the proposed IHA.

Potential Impacts on Availability of Affected Species or Stock for Taking for Subsistence Uses

Subsistence hunting is an essential aspect of Inupiat Native life, especially in rural coastal villages. The Inupiat participate in subsistence hunting activities in and around the Chukchi Sea. The animals taken for subsistence provide a significant portion of the food that will last the community through the year. Marine mammals represent on the order of 60–80% of the total subsistence harvest. Along with the nourishment necessary for survival, the subsistence activities strengthen bonds within the culture, provide a means for educating the young, provide supplies for artistic expression, and allow for important celebratory events.

Potential Impacts to Subsistence Uses

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

(1) Bowhead Whales

TGS' planned seismic surveys would have no or negligible effects on bowhead whale harvest activities. Noise and general activity associated with seismic surveys and operation of vessels has the potential to harass bowhead whales. However, though temporary diversions of the swim path of migrating whales have been documented, the whales have generally been observed to continue their migration via a deflected migratory route. The proposed open-water seismic surveys and vessel noise could affect subsistence hunts by placing the animals further offshore or otherwise at a greater distance from villages thereby increasing the difficulty of the hunt or retrieval of the harvest, or creating a safety risk to the whalers. Further, whales have the potential to become skittish—changing their swim speeds, breathing rates, and other migratory behavior—when exposed to seismic and vessel noise, even if they do not deflect, thus make hunting more difficult.

Eleven primary coastal Alaskan villages deploy whaling crews during whale migrations. Around the TGS' proposed project area in the Chukchi Sea, the primary bowhead hunting villages that could be affected are Barrow, Wainwright, and Point Hope. Whaling crews in Barrow hunt in both the spring and the fall (Funk and Galginaitis 2005). The primary bowhead whale hunt in Barrow occurs during spring, while the fall hunt is used to meet the quota and seek strikes that can be transferred from other communities. In the spring, the whales are hunted along leads that occur when the pack ice starts deteriorating. This tends to occur between the first week of April through May in Barrow and the first week of June in Wainwright, well before the proposed 2D seismic surveys would be conducted. The Point Hope bowhead whale hunt occurs from March to June. Whaling camps are established on the ice edge south and southeast of Point Hope, 10 to 11 km (6 to 7 mi) offshore. However, due to extremely dangerous and challenging ice conditions, along with persistent strong westerly and southwesterly winds in 2013, the spring bowhead whale subsistence hunt fell far below the subsistence needs this year. Only four of the villages were able to take any whales: Gambell landed two out of a quota of eight, Savoonga landed four out of a quota of eight, and Pt. Hope landed five out of a quota of 10. Barrow was able to land only one whale out of a quota of 22. The remaining spring villages were unable to take any whales. As a result, the fall hunting will be especially important, not only for Barrow and the Beaufort Sea villages, but also for attempts out of Wainwright, Pt. Lay, and possibly Pt. Hope. Nevertheless, the proposed seismic survey would be conducted in the West of Point Barrow in the Chukchi Sea far offshore.

(2) Beluga Whales

Belugas typically do not represent a large proportion of the subsistence harvests by weight in the communities of Wainwright and Barrow. Barrow residents hunt beluga in the spring (normally after the bowhead hunt) in leads between Point Barrow and Skull Cliffs in the Chukchi Sea primarily in April–June, and later in the summer (July–August) on both sides of the barrier island in Elson Lagoon/Beaufort Sea (MMS 2008), but harvest rates indicate 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. Between 2005 and 2009, the annual beluga subsistence take was 94 whales (Allen and Angliss 2012) among both Wainwright and Barrow.

Belugas typically represent a much greater proportion of the subsistence harvest in Point Lay and Point Hope. Point Lay's primary beluga hunt occurs from mid-June through mid-July, but can sometimes continue into August if

early success is not sufficient. Belugas are harvested in coastal waters near these villages, generally within a few miles from shore. However, the southern extent of TGS' proposed surveys is over 88 m to the north of Point Lay, and much farther away from Point Hope. Therefore NMFS considers that the surveys would have no or negligible effect on beluga hunts.

(3) Seals

Seals are an important subsistence resource and ringed seals make up the bulk of the seal harvest. Most ringed and bearded seals are harvested in the winter or in the spring before TGS' 2013 activities would commence, but some harvest continues during open water and could possibly be affected by TGS' planned activities. Spotted seals are also harvested during the summer. Most seals are harvested in coastal waters, with available maps of recent and past subsistence use areas indicating seal harvests have occurred only within 30–40 mi (48–64 km) off the coastline. TGS does not plan to survey within 88 km (55 mi) of the coast, which means that the proposed activities are not likely to have an impact on subsistence hunting for seals.

As stated earlier, the proposed seismic survey would take place between July and October. The proposed seismic survey activities would be conducted in far offshore waters of the Chukchi Sea and away from any subsistent activities. In addition, the timing of the survey activities that would be conducted between July and October would further avoid any spring hunting activities in Chukchi Sea villages. Therefore, due to the time and spatial separation of TGS' proposed 2D seismic surveys and the subsistence harvest by the local communities, it is anticipated to have no effects on spring harvesting and little or no effects on the occasional summer harvest of beluga whale, subsistence seal hunts (ringed and spotted seals are primarily harvested in winter while bearded seals are hunted during July—September in the Beaufort Sea), or the fall bowhead hunt.

In addition, TGS has developed and proposes to implement a number of mitigation measures (described in the next section) which include a Marine Mammal Monitoring and Mitigation Plan (4MP), employment of subsistence advisors in the villages, and implementation of a Communications Plan (with operation of Communication Centers). TGS has also prepared a Plan of Cooperation (POC) under 50 CFR 216.104 that addresses potential impacts on subsistence seal hunting activities.

Finally, to ensure that there will be no conflict from TGS' proposed open-water seismic surveys to subsistence activities, TGS stated that it will maintain communications with subsistence communities via the communication centers (Com and Call Centers) and signed the Conflict Avoidance Agreement (CAA) with Alaska whaling communities.

Mitigation Measures

In order to issue an incidental take authorization under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse 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.

For the proposed TGS open-water marine 2D seismic surveys in the Chukchi Sea, NMFS is requiring TGS to implement the following mitigation measures to minimize the potential impacts to marine mammals in the project vicinity as a result of its survey activities. The primary purpose of these mitigation measures is to detect marine mammals within, or about to enter designated exclusion zones and to initiate immediate shutdown or power down of the airgun(s).

(1) Establishing Exclusion and Disturbance Zones

Under current NMFS guidelines, the ''exclusion zone'' for marine mammal exposure to impulse sources is customarily defined as the area within which received sound levels are ≥180 dB (rms) re 1 μPa for cetaceans and ≥190 dB (rms) re 1 μPa for pinnipeds. These safety criteria are based on an assumption that SPL received at levels lower than these will not injure these animals or impair their hearing abilities, but that at higher levels might have some such effects. Disturbance or behavioral effects to marine mammals from underwater sound may occur after exposure to sound at distances greater than the exclusion zones (Richardson *et al.* 1995). Currently, NMFS uses 160 dB (rms) re 1 μPa as the threshold for Level B behavioral harassment from impulses noise.

The acoustic source level of the proposed 3,280 in^3 seismic source array was predicted using JASCO's airgun array source model (AASM) based on data collected from three sites chosen in the project area by JASCO. Water depths at the three sites were 17, 40, and 100 m. JASCO applied its Marine Operations Noise Model (MONM) to estimate acoustic propagation of the proposed seismic source array and the associated distances to the 190, 180 and 160 dB (rms) re 1 μPa isopleths relative to standard NMFS mitigation and monitoring requirements for marine mammals. The resulting isopleths modeled for the 180 and 190 dB (rms) re 1 μPa exclusion zone distances for cetaceans and pinnipeds, respectively, differed with the three water depths. An additional 10 percent distance buffer was added by JASCO to these originally modeled distances to provide larger, more protective exclusion zone radii. The modeled exclusion zones and zones of influence are listed in Table 1.

These safety distances will be implemented at the commencement of 2013 airgun operations to establish marine mammal exclusion zones used for mitigation. TGS will conduct sound source measurements of the airgun array at the beginning of survey operations in 2013 to verify the size of the various marine mammal exclusion zones. The acoustic data will be analyzed as quickly as reasonably practicable in the field and used to verify and adjust the marine mammal exclusion zone distances. The mitigation measures to be implemented at the 190 and 180 dB (rms) sound levels will include power downs and shut downs as described below.

(2) Vessel Related Mitigation Measures

These mitigation measures apply to all vessels that are part of the Chukchi Sea seismic survey activities, including the supporting vessel.

- Avoid concentrations or groups of whales by all vessels under the direction of TGS. Operators of vessels should, at all times, conduct their activities at the maximum distance possible from such concentrations of whales.
- Vessels in transit shall be operated at speeds necessary to ensure no physical contact with whales occurs. If any vessel approaches within 1.6 km (1 mi) of observed bowhead whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the bowhead whales by taking one or more of the following actions, as appropriate:
  - Reducing vessel speed to less than 5 knots within 300 yards (900 feet or 274 m) of the whale(s);
  - Steering around the whale(s) if possible;
  - Operating the vessel(s) in such a way as to avoid separating members of

a group of whales from other members of the group;

○ Operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and

○ Checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged.

• Reduce vessel speed to 5 knots when weather conditions require, such as when visibility drops, to avoid the likelihood of injury to whales.

(3) Mitigation Measures for Airgun Operations

The primary role for airgun mitigation during the seismic surveys is to monitor marine mammals near the airgun array during all daylight airgun operations and during any nighttime start-up of the airguns. During the seismic surveys PSOs will monitor the pre-established exclusion zones for the presence of marine mammals. When marine mammals are observed within, or about to enter, designated safety zones, PSOs have the authority to call for immediate power down (or shutdown) of airgun operations as required by the situation. A summary of the procedures associated with each mitigation measure is provided below.

Ramp Up Procedure

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

During the open-water survey program, the seismic operator will ramp up the airgun arrays slowly. Full ramp ups (i.e., from a cold start after a shut down, when no airguns have been firing) will begin by firing a single airgun in the array (i.e., the mitigation airgun). A full ramp up, after a shut down, will not begin until there has been a minimum of 30 min of observation of the safety zone by 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 safety zone during the 30-minute watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the exclusion zone or the animal(s) is not sighted for at least 15–30 minutes: 15 minutes for small odontocetes (harbor porpoise) and pinnipeds, or 30 minutes for baleen whales and large odontocetes (including beluga and killer whales and narwhal).

Use of a Small-Volume Airgun During Turns and Transits

Throughout the seismic survey, particularly during turning movements, and short transits, TGS will employ the use of a small-volume airgun (i.e., 60 in^3 ''mitigation airgun''). The mitigation airgun would be operated at approximately one shot per minute and would not be operated for longer than three hours in duration during daylight hours and good visibility. In cases when the next start-up after the turn is expected to be during lowlight or low visibility, use of the mitigation airgun may be initiated 30 minutes before darkness or low visibility conditions occur and may be operated until the start of the next sail line. The mitigation gun must still be operated at approximately one shot per minute.

During turns or brief transits (e.g., less than three hours) between seismic tracklines, one mitigation airgun will continue operating. The ramp-up procedure will still be followed when increasing the source levels from one airgun to the full airgun array. However, keeping one airgun firing will avoid the prohibition of a ''cold start'' during darkness or other periods of poor visibility. Through use of this approach, seismic surveys using the full array may resume without the 30 minute observation period of the full exclusion zone required for a ''cold start''. PSOs will be on duty whenever the airguns are firing during daylight, during the 30 minute periods prior to ramp-ups.

Power-Down and Shut Down Procedures

A power down is the immediate reduction in the number of operating energy sources from all firing to some smaller number (e.g., single mitigation airgun). A shut down is the immediate cessation of firing of all energy sources. The array will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable safety zone of the full array, but is outside the applicable safety zone of the single mitigation source. If a marine mammal is sighted within or about to enter the applicable safety zone of the single mitigation airgun, the entire array will be shut down (i.e., no sources firing).

Poor Visibility Conditions

TGS plans to conduct 24-hour operations. PSOs will not be on duty during ongoing seismic operations during darkness, given the very limited effectiveness of visual observation at night (there will be no periods of darkness in the survey area until mid-August). The provisions associated with operations at night or in periods of poor visibility include the following:

• If during foggy conditions, heavy snow or rain, or darkness (which may be encountered starting in late August), the full 180 dB exclusion zone is not visible, the airguns cannot commence a ramp-up procedure from a full shut-down.

• If one or more airguns have been operational before nightfall or before the onset of poor visibility conditions, they can remain operational throughout the night or poor visibility conditions. In this case ramp-up procedures can be initiated, even though the exclusion zone may not be visible, on the assumption that marine mammals will be alerted by the sounds from the single airgun and have moved away.

(4) Mitigation Measures for Subsistence Activities

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a Plan of Cooperation (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.

TGS has prepared a POC, which relies upon the Chukchi Sea Communication Plans to identify the measures that TGS has developed in consultation with North Slope subsistence communities and will implement during its planned 2013 activities to minimize any adverse effects on the availability of marine mammals for subsistence uses. The POC describes important subsistence activities near the proposed survey program and summarizes actions TGS has taken to inform subsistence communities of the proposed survey activities; and measures it will take to minimize adverse effects on marine mammals where proposed activities may affect the availability of a species or stock of marine mammals for arctic subsistence uses or near a traditional subsistence hunting area.

TGS began stakeholder engagement by introducing the project to the North Slope Borough (NSB) Planning Commission on October 25, 2012, and it also met with the NSB Planning Director and other Barrow leadership. In

December 2012, TGS met with Chukchi Sea community leaders at the tribal, city, and corporate level in Barrow, Wainwright, Point Hope, Point Lay, and Kotzebue. TGS also introduced the project to the Alaska Eskimo Whaling Commission (AEWC) at their 4th Quarter Meeting on December 13–14, 2012, in Anchorage.

Community POC meetings were held in Barrow, Kotzebue, Point Hope, Point Lay, and Wainwright in January and February 2013. Finally, in February 2013, TGS participated in the AEWC mini-convention and Conflict Avoidance Agreement (CAA) discussion. A final POC that documents all consultations with community leaders and subsistence users was submitted to NMFS in May, 2013.

In addition, TGS signed a CAA with the Alaska whaling communities to further ensure that its proposed open-water seismic survey activities in the Chukchi Sea will not have unmitigable impacts to subsistence activities. NMFS has included appropriate measures identified in the CAA in the IHA.

Mitigation Conclusions

NMFS has carefully evaluated the 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; and
- the practicability of the measure for applicant implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has determined that the required mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting Measures

In order to issue an ITA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must 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 proposed action area.

I. Monitoring Measures

Monitoring will provide information on the numbers of marine mammals potentially affected by the exploration operations and facilitate real time mitigation to prevent injury of marine mammals by industrial sounds or activities. These goals will be accomplished in the Chukchi Sea during 2013 by conducting vessel-based monitoring from both the source vessel and a supporting vessel and an acoustic monitoring program using a towed hydrophone array to document marine mammal presence and distribution in the vicinity of the survey area beyond visual observation distances.

Visual monitoring by Protected Species Observers (PSOs) during seismic operations, and periods when these surveys are not occurring, will provide information on the numbers of marine mammals potentially affected by these activities and facilitate real time mitigation to prevent impacts to marine mammals by industrial sounds or operations. Vessel-based PSOs onboard the survey vessel will record the numbers and species of marine mammals observed in the area and any observable reaction of marine mammals to the survey activities in the Chukchi Sea.

Real-time PAM would be conducted from the supporting vessel to complement the visual monitoring conducted by PSOs during the seismic surveys in the Chukchi Sea. Studies have indicated that towed PAM is a practical and successful application for augmenting visual surveys of low-frequency mysicetes, including blue and fin whales (Clark and Fristrup 1997). Passive acoustics methods, including towed hydrophone arrays, are most effective in remote areas, harsh environments (e.g. the arctic) and when visibility and/or sea conditions are poor, or at nighttime or during low-light conditions when animals cannot be sighted easily. Surveys have collected more acoustic detections than visual observations while using towed PAM in the Arctic during an open-water seismic survey program conducted by Statoil in 2010 (McPherson *et al.* 2012). TGS states that the designed PAM system would provide the possibility of advanced real-time notification of vocalizing marine mammals that are not observed visually (or are observed after acoustic detection) and allow for mitigation actions (i.e., power-down, shut-down) to take place, if necessary.

Visual-Based Protected Species Observers (PSOs)

The visual-based marine mammal monitoring will be implemented by a team of experienced PSOs, including both biologists and Inupiat personnel. PSOs will be stationed aboard the survey and supporting vessels through the duration of the project. The vessel-based marine mammal monitoring will provide the basis for real-time mitigation measures as discussed in the Mitigation Measures section. In addition, monitoring results of the vessel-based monitoring program will include the estimation of the number of ''takes'' as stipulated in the IHA.

(1) Protected Species Observers

Vessel-based monitoring for marine mammals will be done by trained PSOs throughout the period of survey activities. The observers will monitor the occurrence of marine mammals near the survey vessel during all daylight periods during operation, and during most daylight periods when operations are not occurring. PSO duties will include watching for and identifying marine mammals; recording their numbers, distances, and reactions to the survey operations; and documenting ''take by harassment''.

A sufficient number of PSOs will be required onboard the survey vessel to meet the following criteria:

- 100% Monitoring coverage during all periods of survey operations in daylight;
- maximum of 4 consecutive hours on watch per PSO; and
- maximum of 12 hours of watch time per day per PSO.

PSO teams will consist of Inupiat observers and experienced field biologists. Each vessel will have an experienced field crew leader to supervise the PSO team. The total number of PSOs may decrease later in the season as the duration of daylight decreases.

(2) Observer Qualifications and Training

Crew leaders and most PSOs will be individuals with experience as observers during recent seismic, site clearance and shallow hazards, and other monitoring projects in Alaska or other offshore areas in recent years.

Biologist-observers will have previous marine mammal observation experience, and field crew leaders will be highly experienced with previous vessel-based marine mammal monitoring and mitigation projects. Resumes for those individuals will be provided to NMFS

for review and acceptance of their qualifications. Inupiat observers will be experienced in the region and familiar with the marine mammals of the area. All observers will complete a NMFS-approved observer training course designed to familiarize individuals with monitoring and data collection procedures.

PSOs will complete a two or three-day training and refresher session on marine mammal monitoring, to be conducted shortly before the anticipated start of the 2013 open-water season. Any exceptions will have or receive equivalent experience or training. The training session(s) will be conducted by qualified marine mammalogists with extensive crew-leader experience during previous vessel-based seismic monitoring programs.

Marine Mammal Observer Protocol

Vessel-based visual monitoring for marine mammals shall be conducted by NMFS-approved PSOs throughout the period of survey activities, and extends to 30 minutes after the survey is completed. The PSOs will watch for marine mammals from the best available vantage point on the survey vessels, typically the bridge. The PSOs will scan systematically with the unaided eye and 7 x 50 reticle binoculars, supplemented with 20 x 60 image-stabilized Zeiss Binoculars or Fujinon 25 x 150 ''Big-eye'' binoculars, and night-vision equipment when needed. Personnel on the bridge will assist the marine mammal observer(s) in watching for marine mammals.

The observer(s) aboard the survey and support vessels will give particular attention to the areas within the marine mammal exclusion zones around the source vessel. These zones are the maximum distances within which received levels may exceed 180 dB (rms) re 1 μPa (rms) for cetaceans, or 190 dB (rms) re 1 μPa for pinnipeds.

Distances to nearby marine mammals will be estimated with binoculars (Fujinon 7 x 50 binoculars) containing a reticle to measure the vertical angle of the line of sight to the animal relative to the horizon. Observers may use a laser rangefinder to test and improve their abilities for visually estimating distances to objects in the water.

When a marine mammal is seen approaching or within the exclusion zone applicable to that species, the seismic survey crew will be notified immediately so that mitigation measures called for in the applicable authorization(s) can be implemented.

Night-vision equipment (Generation 3 binocular image intensifiers or equivalent units) will be available for use when/if needed. In TGS' Marine Mammal Monitoring and Mitigation Plan submitted in May 2013, TGS stated that it would use the ITT F500 Series Generation 3 binocular image intensifiers or equivalent units. However, TGS later notified NMFS that such technology is restrict for export and thus cannot be carried to high seas. Therefore, Generation 1 night-vision devices (NVDs) will be used instead. Since the low-light hours during TGS' survey period is very limited, and there is strict mitigation measures prohibiting airgun ramp up from cold start when the entire exclusion zones are not visible, NMFS considers that the unavailability of Generation 3 NVDs does not compromise the effectiveness of mitigation measures. Past experience with night-vision devices (NVDs) in the Chukchi Sea and elsewhere has indicated that NVDs are not nearly as effective as visual observation during daylight hours (e.g., Harris et al. 1997, 1998; Moulton and Lawson 2002).

Field Data-Recording

The PSOs aboard the vessels will maintain a digital log of seismic surveys, noting the date and time of all changes in seismic activity (ramp-up, power-down, changes in the active seismic source, shutdowns, etc.) and any corresponding changes in monitoring radii in a project-customized Mysticetus™ observation software spreadsheet. In addition, PSOs will utilize this standardized format to record all marine mammal observations and mitigation actions (seismic source power-downs, shut-downs, and ramp-ups). Information collected during marine mammal observations will include the following:

- Vessel speed, position, and activity
- Date, time, and location of each marine mammal sighting
- Number of marine mammals observed, and group size, sex, and age categories
- Observer's name and contact information
- Weather, visibility, and ice conditions at the time of observation
- Estimated distance of marine mammals at closest approach
- Activity at the time of observation, including possible attractants present
- Animal behavior
- Description of the encounter
- Duration of encounter
- Mitigation action taken

Data will preferentially be recorded directly into handheld computers or as a back-up, transferred from hard-copy data sheets into an electronic database. A system for quality control and verification of data will be facilitated by the pre-season training, supervision by the lead PSOs, in-season data checks, and will be built into the Mysticetus™ software (i.e., Mysticetus™ will recognize and notify the operator if entered data are non-sensical). Computerized data validity checks will also be conducted, and the data will be managed in such a way that it is easily summarized during and after the field program and transferred into statistical, graphical, or other programs for further processing. Mysticetus™ will be used to quickly and accurately summarize and display these data.

Passive Acoustic Monitoring

(1) Sound Source Measurements

Prior to or at the beginning of the seismic survey, sound levels will be measured as a function of distance and direction from the proposed seismic source array (full array and reduced to a single mitigation airgun). Results of the acoustic characterization and SSV will be used to empirically refine the modeled distance estimates of the pre-season 190 dB, 180 dB, and 160 dB isopleths. The refined SSV exclusion zones will be used for the remainder of the seismic survey. Distance estimates for the 120 dB isopleth will also be modeled. The results of the SSV will be submitted to NMFS within five days after completing the measurements, followed by a report in 14 days. A more detailed report will be provided to NMFS as part of the 90-day report following completion of the acoustic program.

(2) Real-Time Passive Acoustic Monitoring

TGS will conduct real-time passive acoustic monitoring using a towed hydrophone array from the support vessel. The towed hydrophone array system consists of two parts: the ''wet end'' and the ''dry end''. The wet end consists of the hydrophone array and tow cable that is towed behind the vessel. The dry end includes the analog-to-digital, computer processing, signal conditioning and filtering system used to process, record and analyze the acoustic data. Specific noise filters will be used to maximize the systems ability to detect low frequency bowhead whales. The towed hydrophone array will be deployed using a winch from the scout vessel. Details and specifications on the equipment will be determined at a later date once TGS has selected an acoustics contractor, as each contractor has different equipment specifications.

Localization of vocalizing animals will be accomplished using target motion analysis. With this method, it is possible with a single towed

hydrophone array to obtain a localization to vocalizing animals given certain assumptions. Due to the linear alignment of hydrophones, there is a left/right ambiguity that cannot be resolved without turning the tow vessel. The left/right ambiguity, however, is not a critical concern for mitigation during the TGS 2D seismic survey because the exclusion zones are circular; therefore, the distance to the calling animal is the same on the right and left side of the vessel. Furthermore, unambiguous localization can be achieved in circumstances where the vessel towing the array can turn and the calling animals call multiple times or continuously.

To ensure the effectiveness of real-time PAM with a towed hydrophone array, the following requirements for PAM design and procedures will be required:

Lowering Interferences From Flow Noise

- Limit towing speeds to 4–6 knots. Reduce speed appropriately if bowhead whales are detected so that bearing can be obtained. If greater speeds are necessary, slow down every 20–30 minutes to listen for animal calls for at least 5–10 minutes.
- Maintain straight track-lines unless right/left ambiguity must be resolved (usually by turning 20–30 degrees at a time, then maintaining a straight course until good bearings can be obtained).
- Maintain a separation distance of at least several hundred meters (preferably more) from the seismic survey vessel.
- Design pre-amplifier filters that are 'tuned' to reduce low-frequency flow and vessel noise.
- If necessary, use a variable high-pass filter before digitizing the signals.

Monitoring Marine Mammal Occurrence Within 160 dB Isopleths

- Design a hydrophone array that is sensitive to frequencies of interest (e.g. marine mammal sounds) but attenuates (via filters) noise.
- Use a processing system that can further signal conditions (i.e. filter and match signal gains) to allow software to effectively estimate bearings and/or localize.
- Use software designed exclusively for monitoring, localizing and plotting marine mammal calls.
- Design the sampling software to optimize overlap between monitoring the 180 and 160 dB isopleths.
- Allow the survey vessel to deviate from designated track-lines by 25–30 degrees (for brief periods) so that left/right ambiguity can be resolved.

Increase Localization Capability

- Start with a simple hydrophone array, and if needed, add additional capabilities (or hydrophones) to supplement this system. For example, a 2-hydrophone array that can do TMA but with an additional array (or inline section) that can be added in front of the primary array would allow crossed-pair localization methods to be used.
- Use a processing and geographic display system that can accommodate at least the TMA localization method, but also, additional methods if needed.
- Provide at least 300 m of cable (for TMA methods), and up to 500 m if crossed-pair or hyperbolic localization methods will be used.

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 to review TGS' mitigation and monitoring plan in its IHA application for taking marine mammals incidental to the proposed open-water seismic survey in the Chukchi Sea during 2013. The panel met on January 8 and 9, 2013, and provided their final report to NMFS in March 2013. The full panel report can be viewed at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.*

NMFS provided the panel with TGS' monitoring and mitigation plan and asked the panel to address the following questions and issues for TGS' plan:

- 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 below? If not, how should the objectives be modified to better accomplish the goals above?
- Can the applicant achieve the stated objectives based on the methods described in the plan?
- 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?
- 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?
- 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)?

The peer review panel report contains recommendations that the panel members felt were applicable to the TGS' monitoring plans. The panel agrees that the objective of vessel-based monitoring to implement mitigation measures to prevent or limit Level A takes is appropriate. In addition, at the time the panel reviewed the TGS' proposed marine mammal monitoring and mitigation plan, TGS only proposed vessel-based visual monitoring (but subsequently added PAM as described above). The panel was particularly concerned that there are considerable limitations to the ability of PSOs to monitor the full extent of the zones of influence, as these zones extend to as far as 15 km beyond the source. In addition, the panel pointed out that TGS did not specify how it planned to operate the scout vessel for marine mammal monitoring.

Specific recommendations provided by the peer review panel to enhance marine mammal monitoring, especially far distance monitoring beyond exclusion zones, include: (1) Implementing passive acoustic monitoring, with bottom mounted passive acoustic recorders probably being the most appropriate method; (2) deploying a real-time, passive acoustic monitoring device that is linked by satellite (i.e., Iridium) phone; (3) collaborating with NMFS to use aerial survey data for assessing marine mammal distribution, relative abundance, behavior, and possible impacts relative to seismic surveys; (4) looking into the possibility of using unmanned aerial systems to survey for marine mammals in offshore areas; and (5) utilizing new technologies, such as underwater vehicles, gliders, satellite monitoring, etc., to conduct far-field monitoring.

NMFS discussed extensively with TGS ways to improve far-field marine mammal monitoring. As a result, upon further investigation and conversations with both JASCO and Bio-Waves by TGS, as well as further research into past Arctic marine mammal monitoring results conducted with towed-PAM, NMFS and TGS agree that utilizing a

well-designed towed-PAM system would meet the need to provide enhanced marine mammal monitoring beyond exclusion zones, as well as using acoustic data for limited relative abundance and distribution analysis, and possibly limited insights on impacts to marine mammals.

NMFS also studied other PAM methodologies suggested by the peer-review panel. First, concerning deploying fixed bottom mounted recorders, TGS states that it has been in contact with other operators but was not able to find a collaborator to participate in long-term acoustic monitoring due to the short-term nature of the proposed survey. Regarding the real-time acoustic monitoring with fixed buoy, TGS stated that it conducted an evaluation of this option and discussed the possibility with the Cornell University's Bioacoustical Research Program concerning its real-time marine acoustic recording unit (MARU), but decided that the technology is still in the research and development stage. TGS also states that it did not consider the technology because the cost is more expensive than other PAM methods. TGS also discussed (with NMFS scientists) the possibility of using NMFS' aerial survey data for assessing marine mammal distribution, relative abundance, and possible impacts relative to seismic surveys. However, most of TGS' survey areas are outside NMFS aerial survey area, which makes it impossible to use these datasets for impact analyses. TGS also did a cost-benefit analysis of manned aerial surveys, and eliminated this as an option due to increased health and safety exposure risk, especially north of 72°N. TGS also investigated the possibility of using unmanned aerial vehicles (UAV) to survey for marine mammals in offshore areas, however, it has also turned out not to be feasible due to the fact that the approach is currently awaiting an FAA permit to operate in the Arctic, and this permit could not be guaranteed to be obtained in time for the TGS monitoring effort. TGS states that it did consider new technologies, but did not feel that they could justify the expense of testing techniques with unknown capabilities in the Arctic environment.

In addition, the panel also recommends that TGS collaborate with other organizations operating in the Chukchi Sea and share visual and acoustic data to improve understanding of impacts from single and multiple operations and efficacy of mitigation measures. Accordingly, TGS plans to share these data via the OBIS–SEAMAP Web site entertaining all appropriate data-sharing agreements, including data obtained using towed PAM.

II. Reporting Measures

1. Sound Source Verification Reports

A report on the preliminary results of the sound source verification measurements, including the measured 190, 180, and 160 dB (rms) radii of the airgun sources, would be submitted within 14 days after collection of those measurements at the start of the field season. This report will specify the distances of the exclusion zones that were adopted for the survey.

2. Field Reports

Throughout the survey program, PSOs will prepare a report each day or at such other intervals, summarizing the recent results of the monitoring program. The reports will summarize the species and numbers of marine mammals sighted. These reports will be provided to NMFS and to the survey operators.

3. Technical Reports

The results of TGS' 2013 vessel-based monitoring, including estimates of ''take'' by harassment, would be presented in the ''90-day'' and Final Technical reports, if the IHA is issued for the proposed open-water 2D seismic surveys. The Technical Reports should be submitted to NMFS within 90 days after the end of the seismic survey. The Technical Reports will include:

(a) Summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);

(b) Analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);

(c) Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;

(d) To better assess impacts to marine mammals, data analysis should be separated into periods when a seismic airgun array (or a single mitigation airgun) is operating and when it is not. Final and comprehensive reports to NMFS should summarize and plot:

- Data for periods when a seismic array is active and when it is not; and
- The respective predicted received sound conditions over fairly large areas (tens of km) around operations;

(e) Sighting rates of marine mammals during periods with and without airgun activities (and other variables that could affect detectability), such as:

- initial sighting distances versus airgun activity state;
- closest point of approach versus airgun activity state;
- observed behaviors and types of movements versus airgun activity state;
- numbers of sightings/individuals seen versus airgun activity state;
- distribution around the survey vessel versus airgun activity state; and
- estimates of take by harassment;

(f) Reported results from all hypothesis tests should include estimates of the associated statistical power when practicable;

(g) Estimate and report uncertainty in all take estimates. Uncertainty could be expressed by the presentation of confidence limits, a minimum-maximum, posterior probability distribution, etc.; the exact approach would be selected based on the sampling method and data available;

(h) The report should clearly compare authorized takes to the level of actual estimated takes; and

(i) Methodology used to estimate marine mammal takes and relative abundance on towed PAM.

4. Notification of Injured or Dead Marine Mammals

In addition, NMFS would require TGS to notify NMFS' Office of Protected Resources and NMFS' Stranding Network within 48 hours of sighting an injured or dead marine mammal in the vicinity of seismic survey operations. TGS shall provide NMFS with the species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In the event that an injured or dead marine mammal is found by TGS that is not in the vicinity of the proposed open-water seismic survey program, TGS would report the same information as listed above as soon as operationally feasible to NMFS.

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 proposed open-water seismic survey program. Anticipated impacts to marine mammals are associated with noise propagation from the survey airgun(s) used in the seismic surveys.

The full suite of potential impacts to marine mammals was described in detail in the ''Potential Effects of the Specified Activity on Marine Mammals'' section found earlier in this document. The potential effects of sound from the proposed open-water seismic survey programs might include one or more of the following: masking of natural sounds; behavioral disturbance; non-auditory physical effects; and, at least in theory, temporary or permanent hearing impairment (Richardson *et al.* 1995). As discussed earlier in this document, the most common impact will likely be from behavioral disturbance, including avoidance of the ensonified area or changes in speed, direction, and/or diving profile of the animal. For reasons discussed previously in this document, hearing impairment (TTS and PTS) is highly unlikely to occur based on the mitigation and monitoring measures that would preclude marine mammals from being exposed to noise levels high enough to cause hearing impairment.

For impulse sounds, such as those produced by airgun(s) used in the 2D seismic surveys, NMFS uses the 160 dB (rms) re 1 μPa isopleth to indicate the onset of Level B harassment. TGS provided calculations for the 160-dB isopleths produced by the proposed seismic surveys and then used those isopleths to estimate takes by harassment. NMFS used the calculations to make the necessary MMPA findings. TGS provided a full description of the methodology used to estimate takes by harassment in its IHA application, which is also provided in the following sections.

Basis for Estimating ''Take by Harassment''

The estimated takes by harassment is calculated in this section by multiplying the expected densities of marine mammals that may occur near the planned activities by the area of water likely to be exposed to impulse sound levels of ≥160 dB (rms) re 1 μPa.

Marine mammal occurrence near the operation is likely to vary by season and habitat, mostly related to the presence or absence of sea ice. Although current NMFS' noise exposure standards state that Level B harassment occurs at exposure levels ≥160 dB (rms) re 1 μPa by impulse sources, there is no evidence that avoidance at these received sound levels would have significant biological effects on individual animals. Any changes in behavior caused by sounds at or near the specified received levels would likely fall within the normal variation in such activities that would occur in the absence of the planned operations. However, these received levels are currently used to set the threshold for Level B behavioral harassment.

Marine Mammal Density Estimates

The first step in estimating the number of marine mammals that might be ''taken by harassment'' was to conduct a review of available data on density estimates for the marine mammal species occurring in the project vicinity and adjacent areas of the Chukchi Sea. While several densities are available for U.S. waters in the Chukchi Sea, no reliable estimates are known for U.S. waters north of 72° N. Furthermore, no systematic surveys are known for the western half of the proposed project area in international waters.

Therefore, densities used to estimate exposures were based on two recent IHA applications and three 90-day reports to NMFS summarizing results of field monitoring surveys. These project areas overlapped the proposed TGS project area to at least some extent as well as TGS' proposed seismic operations period. A map showing the boundaries of these survey areas relative to TGS' proposed seismic line locations is provided in Figure 2 of TGS' IHA application. The surveys consisted of the (1) Two Statoil 90-day reports from the northern Chukchi Sea (Blees *et al.* 2010; Hartin *et al.* 2011), (2) UAGI's IHA (LGL 2011) and 90-day report (Cameron *et al.* 2012), and (3) Shell 2012 IHA (Shell 2011). These data are considered the ''best available'' density estimates and occurrence data currently available for the project area.

All recent density estimates for four different project areas overlapping the TGS project area based on the observed or derived densities reported in other studies (Blees *et al.* 2010; Hartin *et al.* 2011; LGL 2011; Shell 2011; Cameron *et al.* 2012) and are shown in Table 3 of TGS' IHA application. Note that only the Cameron *et al.* (2012) survey occurred north of 72° N in U.S. waters and international waters partially overlapping the TGS project area. Sightings providing data on observed densities were available for the following six species: the bowhead, gray and beluga whale, and the bearded, ringed and spotted seal. The remaining other six species occur so rarely in the project area vicinity that reliable densities are not available for them and/or no sightings were made during the reported surveys: the humpback, minke, fin, and killer whales, the harbor porpoise, and the ribbon seal (Blees *et al.* 2010; Hartin *et al.* 2011; Cameron *et al.* 2012). Thus, certain fractional numbers were assigned to them based on those reported for other IHAs overlapping the proposed TGS project area, to address the rare chance of an encounter (Blees *et al.* 2010; Hartin *et al.* 2011; LGL 2011; Shell 2011; Cameron *et al.* 2012).

Adjustment Factors Applied to Provide Lower and Upper Estimates of Density

A number of habitat parameters have been shown to influence the distribution of marine mammal species occurring in the TGS project area. These parameters were applied to adjust the density of species accordingly, as done by other applicants in previous IHA applications (e.g., Blees *et al.* 2010; Hartin *et al.* 2011; LGL 2011; Shell 2011, Cameron *et al.* 2012). These included (1) open water (i.e., ice-free) vs. ice-edge margin (higher densities of pinnipeds and beluga whales occur near and/or within the ice margin), (2) summer (July–August) vs. fall (September–October), (3) water depth (>200 vs. <200 m deep), and (4) likelihood of occurrence above or below 72° N. Open-water densities were used if available because TGS operations must completely avoid ice to be able to safely and effectively conduct operations.

Densities (Table 3 in TGS' IHA application) used to estimate and calculate the number of exposures to TGS' seismic impulse sound levels ≥160 dB (rms) re1μPa were obtained by (1) averaging the densities from the four previous studies by summer (July–August), fall (September–October), and summer–fall, and then (2) multiplying the resulting averaged densities by adjustment factors for water depth (shallower or deeper than 200 m) and expected occurrence in waters north or south of 72° N. Notably, TGS plans to operate above 72° N for about half (32 days) of the total 45–60-day period in US Federal waters (35 days of which would involve seismic operations), and for all operations in international waters, up to 33 days. These northern waters above 72° N would be accessed sometime between about mid-September and 15 October (when waters are ice-free).

Because few data were available for most of the survey area, particularly north of 72° N and west of Barrow, it is not known how closely the applied average densities reflect the actual densities that will be encountered

during the proposed TGS seismic survey. Thus, lower and upper adjustment factors (Table 4 in TGS' IHA application) were multiplied by the averaged densities to provide a range of density estimates. The latter adjustment was incorporated into a formula to estimate exposures to seismic sounds. The ''lower adjustment factor'' does not apply adjustment factors to densities north of 72° N for the bowhead and beluga whale and the ringed and bearded seal. In contrast, the ''upper adjustment factor'' applies factors to account for the expected lower density of marine mammal species north of 72° N. Adjustment factors differed by species and were based on (1) the reported distribution and occurrence of each species in these waters, and (2) factors applied by ION (LGL 2012) for their 2012 IHA application for the fall period of Oct–Dec 2012 that overlapped the fall period (mid-to-late September–October) and north-easternmost region that TGS expects to operate in international waters during fall.

TGS applied these density data and factors previously applied in an IHA issued to ION to account for expected lower densities above 72° N where waters are predominantly >1,000 m deep. The upper-adjusted (i.e., lower) density estimate was calculated by multiplying reported fall densities for more southern Chukchi waters as follows: (1) by a factor of 0.0 for fin, humpback, minke and killer whales, and harbor porpoise and ribbon and spotted seals as they are not expected in waters above 72° N and thus were assumed not to occur there; (2) by an adjustment factor of 0.01 for gray whales (since the northernmost boundary of their distribution is near 72° N and they are thus considered highly unlikely to occur above 72° N; (3) by a factor of 0.1 for bowhead whales as the area is outside the main migration corridor, and (4) by a factor of 0.1 for beluga whales and bearded and ringed seals as they are closely associated with ice, and thus considered less likely to occur in ice-free waters needed to conduct the TGS seismic operations.

A similar 0.1 adjustment factor was applied in the ION IHA (LGL 2012) for species where the seismic survey area was on the edge of that species' range at the given time of year. ION's adjustment factor of 0.1 was used for TGS density estimates because TGS proposes to be well north and west of ION's westernmost 2012 survey lines no earlier than 15–30 September through 31 October 2013. In comparison, ION proposed their program for 1 October through mid-December, and their actual program occurred in the Chukchi and Beaufort Seas from 20 October–9 November, 2012. These periods overlap the majority of the period that TGS is expected to be operating at or near the westernmost seismic lines (no earlier than 15–30 September through October) between 73°–76° N and 160° W to 160° E. Thus, ION's ''late season'' period coincides with TGS' proposed late fall season both in time and space relative to waters above 72° N.

The upper density estimates consisted of the averaged fall densities for more southern Chukchi waters by only (1) a smaller adjustment factor of 0.20 for gray whales (Table 4 of TGS' IHA application), and (2) by the same factor of 0.0 for fin, humpback, minke and killer whales, and harbor porpoise and ribbon and spotted seals as described above.

Additional Rationale for Adjusting Densities North of 72° N

- No whale sightings have been reported in waters north of 72° N during the few recent vessel-based surveys conducted there that overlapped the southern or eastern part of the proposed TGS project area and season (Blees *et al.* 2010; Hartin *et al.* 2011; Cameron *et al.* 2012).
- The main fall migration corridor for bowheads reportedly occurs south of 72° N (Quakenbush *et al.* 2010). However, satellite-tagging studies indicate that at least some individual bowheads migrate generally west/southwest across the project area in waters above 72° N and west of Barrow during the fall migration from September–November (Quakenbush 2007; LGL 2011; Quakenbush *et al.* 2012).
- The reported gray whale distribution in the Chukchi Sea normally does not extend much north of 72° N during summer/fall (Jefferson *et al.* 2008). This northernmost peripheral boundary area is thus expected to have very low gray whale densities. Furthermore, most gray whales will have migrated south of the project area by fall (Rice and Wolman 1971; Allen and Angliss 2012).

Exposure Calculation Methods

The approach used to calculate the estimated number of individuals of each marine mammal species potentially exposed to received levels of seismic impulse sound levels ≥160 dB (rms) re 1 μPa during the proposed seismic project is described below.

1. The area of water (in km^2) ensonified to ≥160 dB (rms) re 1 μPa around the operating seismic source array on seismic lines as well as turns and transits between seismic lines was calculated for U.S. and international waters for waters shallower and deeper than 200 m, and for waters north and south of 72° N (Table 2). It was assumed for purposes of this estimation that the full seismic source array would be used during all seismic lines and during the 1-km run-in and 5-km run-out between seismic lines. In addition, it was assumed that a single 60 in^3 airgun would be used during turns and transits between seismic lines. Ensonified waters were calculated as follows.

2. A buffer was applied on both sides of the planned survey tracklines equivalent to the distances modeled for the proposed 3,280 in^3 seismic source array by JASCO in 2010 at three locations in the project area (Zykov *et al.* 2013). The buffer width corresponding to this 160 (rms) dB re 1 μPa isopleth varied with three water depth categories. Thus, survey tracklines located over waters 17–40 m deep were buffered by 8.5 km, those over waters 41–100 m deep were buffered by 9.9 km, and those over water depths of >100 m were buffered by 15 km.

TABLE 2—ESTIMATED AREA (KM²) ENSONIFIED TO >160 DB (RMS) RE 1 μPA BY SEISMIC IMPULSES ALONG TGS' 2013 PROPOSED SEISMIC LINES AND TURNS IN U.S. AND INTERNATIONAL WATERS OF THE CHUKCHI SEA. ENSONIFIED AREAS ASSUMED THAT THE FULL 3,280 IN³ ARRAY OPERATED CONTINUOUSLY ON SURVEY LINES AND THAT THE SINGLE MITIGATION AIRGUN (60 IN³) OPERATED CONTINUOUSLY ON TURNS (AND TRANSITS) BETWEEN SURVEY LINES

	Above 72°N		Below 72°N		Water depth < 200m		Water depth > 200m		All lines	All turns	All lines & turns
	Total lines area (km²)	Turns area (km²)	Total lines area (km²)	Turns area (km²)	Total lines area (km²)	Turns area (km²)	Total lines area (km²)	Turns area (km²)	Total lines area (km²)	Total turns area (km²)	Total ensonified area (km²)
US	65477	1294	72974	1442	114858	2770	23594	466	138452	2736	141188
International	115135	4200	0	0	45954	1676	69181	2524	115135	4200	119335
Total	180612	5494	72974	1442	160812	3946	92775	2990	253586	6936	260522

3. A smaller buffer was applied to both sides of turn lines between seismic lines equivalent to the measured distance to the 160 dB (rms) re 1 μPa isopleth of a single 60 in³ array as measured by JASCO. The associated area in km² was calculated using Mysticetus™ software. Mysticetus™ identified water depths at 100-m intervals along the survey trackline using bathymetric data. At each 100-m interval, Mysticetus™ applied one of the three aforementioned 160 dB (rms) re 1 μPa radius isopleths corresponding to that water depth. Overlapping areas were treated separately. The resulting World Geodetic System (WGS) 84 polygons were re-projected into North Pole Stereographic coordinates and the total area was calculated.

4. Averaged densities of marine mammals (Table 3 in TGS' IHA application) were adjusted as applicable (Table 4 in TGS' IHA application) then multiplied by the area predicted to be ensonified to ≥160 dB (rms) re 1 μPa. The procedure is outlined below.

• Because TGS expects to conduct seismic lines in U.S. Federal waters sometime between mid-July and mid-September in late summer and early fall, the proportion of U.S. Federal waters ensonified to >160 dB (rms) re 1 μPa was multiplied by the average of summer and fall densities reported from other studies (Table 3 in TGS' IHA application).

• Because TGS expects to conduct seismic lines in international waters starting in fall from mid-to-late September through October, the proportion of international waters ensonified to >160 dB (rms) re 1 μPa was multiplied by the average of fall densities reported from other studies (based nearly exclusively on surveys south of 72° N since it is considered the best and only systematic data available for the region).

• The proportions of ensonified waters north and south of 72° N were also calculated for U.S. and international waters. Species-specific average summer-fall and fall densities associated with these depth categories were multiplied by the corresponding proportion and season.

• In addition, the proportions of ensonified waters where water depth along the seismic line was <200 m deep or >200 m deep were calculated. Species-specific average summer-fall and fall densities associated with these depth categories were multiplied by the corresponding proportion and season.

• Reported fall density estimates for gray, bowhead and beluga whales, and bearded and ringed seals were adjusted for ice-free waters N of 72° N by multiplying reported fall densities for more southern Chukchi waters by low and high adjustment factors described above to provide a range of potential exposures.

In a summary, estimated species exposures are calculated by multiplying seasonally (summer vs. fall) and spatially (above vs. below 72° N at various water depths) marine mammal density by the total ensonified areas with received levels higher than 160 dB re 1μPa (rms).

Potential Number of ''Take by Harassment''

As stated earlier, the estimates of potential Level B takes of marine mammals by noise exposure are based on a consideration of the number of marine mammals that might be present during operations in the Chukchi Sea and the anticipated area exposed to those sound pressure levels (SPLs) above 160 dB re 1 μPa for impulse sources (seismic airgun during 2D seismic surveys).

Some of the animals estimated to be exposed, particularly migrating bowhead whales, might show avoidance reactions before being exposed to sounds at the specified threshold levels. Thus, these calculations actually estimate the number of individuals potentially exposed to the specified sounds levels that would occur if there were no avoidance of the area ensonified to that level.

Numbers of marine mammals that might be present and potentially taken are summarized in Table 3 based on calculation described above.

TABLE 3—ESTIMATES OF THE POSSIBLE MAXIMUM NUMBERS OF MARINE MAMMALS TAKEN BY LEVEL B HARASSMENT (EXPOSED TO ≥160 DB FROM AIRGUN SOUND) DURING TGS' PROPOSED 2D SEISMIC SURVEY IN THE CHUKCHI SEA, JULY–OCTOBER 2013

Species	Level B takes	Percent population
Bowhead whale	794	4.70
Gray whale	1,363	7.13
Fin whale	5	0.09
Humpback whale	5	0.53
Minke whale	5	0.62
Beluga whale	412	11.11
Killer whale	5	1.59
Harbor porpoise	36	0.07
Ringed seal	30,000	14.36
Bearded seal	6000	0.84
Spotted seal	500	0.84
Ribbon seal	100	0.20

Estimated Take Conclusions

Effects on marine mammals are generally expected to be restricted to avoidance of the area around the planned activities and short-term changes in behavior, falling within the MMPA definition of ''Level B harassment''.

Cetaceans—The take calculation estimates suggest a total of 794 bowhead whales may be exposed to sounds at or above 160 dB (rms) re 1 μPa (Table 3). This number is approximately 7.53% of the Bering–Chukchi–Beaufort (BCB) population of 16,892 assessed in 2011 (Givens *et al.* 2013). The total estimated number of gray and beluga whales that

may be exposed to sounds from the activities ranges up to 1,363 and 412, respectively (Table 3). Fewer harbor porpoises are likely to be exposed to sounds during the activities. The small numbers of other whale species that may occur in the Chukchi Sea are unlikely to be present around the planned operations but chance encounters may occur. The few individuals would represent a very small proportion of their respective populations.

Pinnipeds—Ringed seal is by far the most abundant species expected to be encountered during the planned operations. The best estimate of the numbers of ringed seals exposed to sounds at the specified received levels during the planned activities is 30,000, which represent up to 14.36% of the Alaska population. Fewer individuals of other pinniped species are estimated to be exposed to sounds at Level B behavioral harassment level, also representing small proportions of their populations.

Negligible Impact and Small Numbers Analysis and Determination

As a preliminary matter, we typically include our negligible impact and small numbers analysis and determination under the same section heading of our **Federal Register** Notices. Despite co-locating these terms, we acknowledge that negligible impact and small numbers are distinct standards under the MMPA and treat them as such. The analysis presented below does not conflate the two standards; instead, each has been considered independently and we have applied the relevant factors to inform our negligible impact and small numbers determinations.

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 TGS' proposed 2013 open-water 2D seismic surveys in the Chukchi Sea, and none are being authorized. Additionally, animals in the area are not expected to incur hearing impairment (i.e., TTS or PTS) or non-auditory physiological effects. Takes will be limited to Level B behavioral harassment. Although it is possible that some individuals of marine mammals may be exposed to sounds from seismic survey activities more than once, the expanse of these multi-exposures are expected to be less extensive since both the animals and the survey vessels will be moving constantly in and out of the survey areas.

Most of the bowhead whales encountered will likely show overt disturbance (avoidance) only if they receive airgun sounds with levels ≥ 160 dB re 1 μPa. Odontocete reactions to seismic airgun pulses are usually assumed to be limited to shorter distances from the airgun(s) than are those of mysticetes, probably in part because odontocete low-frequency hearing is assumed to be less sensitive than that of mysticetes. However, at least when in the Canadian Beaufort Sea in summer, belugas appear to be fairly responsive to seismic energy, with few being sighted within 6–12 mi (10–20 km) of seismic vessels during aerial surveys (Miller *et al.* 2005). Belugas will likely occur in small numbers in the Chukchi Sea during the survey period and few will likely be affected by the survey activity.

As noted, elevated background noise level from the seismic airgun reverberant field could cause acoustic masking to marine mammals and reduce their communication space. However, even though the decay of the signal is extended, the fact that pulses are separated by approximately 10 seconds means that overall received levels at distance are expected to be much lower, thus resulting in less acoustic masking.

Taking into account the mitigation measures that are planned, effects on marine mammals are generally expected to be restricted to avoidance of a limited area around TGS' open-water activities and short-term changes in behavior, falling within the MMPA definition of ''Level B harassment''. The many reported cases of apparent tolerance by cetaceans of seismic exploration, vessel traffic, and some other human activities show that co-existence is possible. Mitigation measures such as controlled vessel speed, dedicated marine mammal observers, non-pursuit, and shut downs or power downs when marine mammals are seen within defined ranges will further reduce short-term reactions and minimize any effects on hearing sensitivity. In all cases, the effects are expected to be short-term, with no lasting biological consequence.

Of the thirteen marine mammal species likely to occur in the seismic survey area, bowhead, fin, and humpback whales and ringed and bearded seals are listed as endangered or threatened under the ESA. These species are also designated as ''depleted'' under the MMPA. Despite these designations, the BCB stock of bowheads has been increasing at a rate of 3.4 percent annually for nearly a decade (Allen and Angliss 2010). 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 2010). The occurrence of fin and humpback whales in the seismic survey areas is considered very rare. There is no critical habitat designated in the U.S. Arctic for the bowhead, fin, and humpback whales. The Alaska stock of bearded seals, part of the Beringia distinct population segment (DPS), and the Arctic stock of ringed seals, have recently been listed by NMFS as threatened under the ESA. 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.

Potential impacts to marine mammal habitat were discussed previously in this document (see the ''Anticipated Effects on Habitat'' section). Although some disturbance is possible to food sources of marine mammals, the impacts are anticipated to be minor enough as to not affect rates of recruitment or survival of marine mammals in the area. Based on the vast size of the Arctic Ocean where feeding by marine mammals occurs versus the localized area of the seismic survey activities, any missed feeding opportunities in the direct project area would be minor based on the fact that other feeding areas exist elsewhere.

The authorized take represents 11.11% of the Eastern Chukchi Sea population of approximately 3,710 beluga whales, 1.59% of Aleutian Island and Bering Sea stock of approximately 314 killer whales, 0.07% of Bering Sea stock of approximately 48,215 harbor porpoises, 7.13% of the Eastern North Pacific stock of approximately 19,126 gray whales, 7.53% of the Bering-Chukchi-Beaufort population of 10,545 bowhead whales, 0.53% of the Western North Pacific stock of approximately 938 humpback whales, 0.09% of the Northeast Pacific stock of approximately 5,700 fin whales, and 0.62% of the Alaska stock of approximately 810 minke whales. The take estimates presented for ringed, bearded, spotted, and ribbon seals represent 14.36, 2.47, 0.84, and 0.20% of U.S. Arctic stocks of

each species, respectively. 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.

In addition, no important feeding and reproductive areas are known in the vicinity of the TGS' seismic surveys at the time the surveys are to take place. No critical habitat of ESA-listed marine mammal species occurs in the Chukchi Sea.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that TGS' 2013 open-water 2D seismic surveys in the Chukchi Sea may result in the incidental take of small numbers of marine mammals, by Level B harassment only, and that the total taking from the seismic surveys will have a negligible impact on the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

NMFS has determined that TGS' 2013 open-water 2D seismic surveys in the Chukchi Sea will not have an unmitigable adverse impact on the availability of species or stocks for taking for subsistence uses. This determination is supported by information contained in this document and TGS' POC. TGS has adopted a spatial and temporal strategy for its Chukchi Sea open-water seismic surveys that will help ensure its survey will have no unmitigable impacts to subsistence hunters. Due to the timing of the project and the distance from the surrounding communities, it is anticipated to have no effects on spring harvesting and little or no effects on the occasional summer harvest of beluga whale, subsistence seal hunts (ringed and spotted seals are primarily harvested in winter while bearded seals are hunted during July–September in the Beaufort Sea), or the fall bowhead hunt.

In addition, based on the measures described in TGS' POC, the required mitigation and monitoring measures (described earlier in this document), and the project design itself, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from TGS' 2013 open-water 2D seismic surveys in the Chukchi Sea.

Endangered Species Act (ESA)

The bowhead, fin, and humpback whales and ringed and bearded seals are the only marine mammal species currently listed as endangered or threatened under the ESA that could occur during TGS' 2D seismic surveys during the Arctic open-water season. NMFS' Permits and Conservation Division consulted with NMFS' Alaska Regional Office Division of Protected Resources under section 7 of the ESA on the issuance of an IHA to TGS under section 101(a)(5)(D) of the MMPA for this activity. A Biological Opinion was issued on July 10, 2013, which concludes that issuance of the IHA is not likely to jeopardize the continued existence of the ESA-listed marine mammal species. NMFS will issue an Incidental Take Statement under this Biological Opinion which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of listed species.

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 TGS to take marine mammals incidental to conducting its 2D seismic surveys in the Chukchi Sea during the 2013 open-water season. NMFS has finalized the EA and prepared a FONSI for this action. Therefore, preparation of an EIS is not necessary.

Authorization

As a result of these determinations, NMFS has issued an IHA to TGS to take marine mammals incidental to its 2013 seismic survey in the Chukchi Sea, Alaska, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: August 14, 2013.

Donna S. Wieting,

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

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DEPARTMENT OF DEFENSE

Office of the Secretary

[Docket ID: DoD–2013–OS–0174]

Proposed Collection; Comment Request

AGENCY: Defense Finance and Accounting Service (DFAS), DoD.

ACTION: Notice.

In compliance with Section 3506(c)(2)(A) of the *Paperwork Reduction Act of 1995,* the DFAS announces a proposed public information collection and seeks public comment on the provisions thereof. Comments are invited on: (a) Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; (b) the accuracy of the agency's estimate of the burden of the proposed information collection; (c) ways to enhance the quality, utility, and clarity of the information to be collected; and (d) ways to minimize the burden of the information collection on respondents, including through the use of automated collection techniques or other forms of information technology.

DATES: Consideration will be given to all comments received by October 21, 2013.

ADDRESSES: You may submit comments, identified by docket number and title, by any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *Mail:* Federal Docket Management System Office, 4800 Mark Center Drive, East Tower, Suite 02G09, Alexandria, VA 22350–3100.

Instructions: All submissions received must include the agency name, docket number and title for this **Federal Register** document. The general policy for comments and other submissions from members of the public is to make these submissions available for public viewing on the Internet at *http://www.regulations.gov* as they are received without change, including any personal identifiers or contact information.

FOR FURTHER INFORMATION CONTACT: To request more information on this proposed information collection or to obtain a copy of the proposal and associated collection instruments, please write to the Defense Finance and Accounting Services-Columbus, 3990 East Broad Street, Columbus, OH 43218 or call Ms. Michelle Estep, (614) 701–2100, Christina Haines-Ball, (614) 701–2123 or Phyllis Wolford, (614) 701–2309.

Title; Associated Form; and OMB Number: 1099 Tax Reporting Program, 1099 MISC, OMB 0730–TBD.

Needs and Uses: The information collection requirement allows the government to gather and capture payment data for the Department of Defense (DoD) Purchase Card Program, the following payment systems: Mechanization of Contract Administration Services (MOCAS), Computerized Accounts Payable System (CAPS), Integrated Accounts Payable