

Appendix D

Responses to Comment Topics on the Draft Programmatic Environmental Assessment Arctic Ocean Outer Continental Shelf Seismic Surveys 2006

D. Responses to Comments on the Draft Programmatic Environmental Assessment Arctic Ocean Outer Continental Shelf Seismic Surveys, 2006

The Minerals Management Service received substantive written comments on the draft Programmatic Environmental Assessment (PEA) from the following:

Alaska Eskimo Whaling Commission (AEWC)
Alaska Oil and Gas Association (AOGA)
American Petroleum Institute (API)
ConocoPhillips, Alaska, Inc. (ConocoPhillips)
ExxonMobil
International Association of Geophysical Contractors (IAGC)
Natural Resources Defense Council (NRDC)
North Slope Borough (NSB)
John W. Richardson
Shell Exploration and Production (Shell)
WesternGeco

In addition, MMS received approximately 500 email form letters.

The majority of comments received by MMS addressed similar sweeping issues (e.g., EIS versus EA, significance criteria, potential mitigation measures, reasonable alternatives, data quality, and data gaps), which are identified and responded to below. After careful consideration and evaluation, many of these substantive comments resulted in modifying the text in the PEA. Some comments resulted in amending impact analyses, adding more text, or minor editorial changes. Some comments did not address the substance of the PEA but instead offered an opinion, point of view, and/or a recommendation that decisionmakers adopt or not adopt specific mitigation or other specific actions.

Comments also identified data needs and suggested potential studies for the MMS Environmental Studies Program (ESP) authorized by the Outer Continental Shelf (OCS) Lands Act. These comments will be forwarded for consideration by the ESP staff. The ESP provides high-quality information for addressing environmental, social, and economic concerns used in making decisions about OCS oil and gas activities, including leasing, exploration, development and production, mitigation, and monitoring. The Alaska Region Annual Studies Plan is distributed for review each year. The input from local government leaders; the public; environmental groups; industry; resource specialists from local, State, and Federal governments; and others help MMS to identify environmental issues and information needs and suggest studies to help fulfill those needs. Additional information on the ESP can be found at <http://www.mms.gov/alaska/ess/index.htm>.

All comments received are part of the record of information used in developing the final PEA and are available to the decisionmakers during the deliberation process. The substantive comment letters are available for review on the MMS website at <http://www.mms.gov/alaska>.

General Categories of Comments and Responses.

1. The MMS fails to consider the full range of alternatives, such as limiting the number of seismic operators, data sharing, geographic exclusions, alternative technologies, requiring industry to use the lowest sound level for data collection based on an independent calculation done by MMS, requiring industry to contribute funding for independent research that seeks ways to reduce significant and unnecessary noise from seismic airguns, requiring industry to justify the need to acquire new seismic data instead of reprocessing existing data, requiring on-ice seismic operations, etc. (NRDC, AEWC)

Response: The PEA examined a number of reasonable alternatives with various combinations of mitigation strategies. Many of the alternatives suggested in the comment letters fall under Alternative 1, No Action Alternative, which is essentially not issuing seismic exploration permits for 2006. Encompassed under the No Action Alternative would be alternative technologies, reprocessing existing data, on-ice surveys, and other nonseismic options.

Some of the alternatives suggested in the comment letters already are requirements or are incorporated in the mitigation. The MMS does require permittees to use the lowest sound levels feasible to accomplish their data-collection needs. Geographic and time exclusions are incorporated as mitigation measures under the alternatives analyzed in the PEA; two examples are: (1) no operations will be allowed in the spring lead system in the Chukchi Sea until July 1; and (2) no operations will be allowed in the Ledyard Bay Critical Eider Habitat during the 2006 season. Additional geographic or time restrictions also may be specified in the Conflict Avoidance Agreement (CAA) and the required NMFS and FWS Marine Mammal Protection Act (MMPA) authorizations.

Seismic data currently provide the best predrilling-information source to the industry. Until a new technology is developed, seismic—especially 3D seismic—is the least intrusive and best technology available. On-ice seismic surveys are used in the Beaufort Sea but are restricted to a narrow zone of stable ice along the coast. Ice conditions in the Chukchi Sea are not conducive to on-ice operations. Collecting 3D seismic-survey data improves the success rate of exploration wells and can lead to fewer wells being drilled in the future. There currently are no 3D seismic data in the Chukchi Sea OCS and very little in the Beaufort Sea OCS (less than 1% of the Planning Area).

The oil industry is a highly competitive industry. Currently, there is a restriction on which companies can join together and bid for leases. The major oil and gas companies are prohibited from bidding together, but they are not prohibited from working together beforehand. Because they may have different geographic areas of interest, the major companies generally collect their own data, which requires a seismic vessel dedicated to that company's operation. The three seismic programs currently proposed for 2006 are a good example of why the companies use separate vessels. ConocoPhillips and Shell want to acquire 3D data most likely over specific prospects in the Chukchi Sea. Shell also wants to collect 3D data in the areas of their leases in the Beaufort Sea. If Shell and ConocoPhillips were to combine operations, ConocoPhillips would lose 4-6 weeks of seismic operations in the Chukchi Sea while the vessel acquired data for Shell in the Beaufort Sea. Each company may have different areas, prospects, or plays that they want to image with the new data. GX Technology Corporation is proposing to shoot a regional 2D seismic survey in the Chukchi Sea. The purpose for a regional 2D shoot is totally different from the programs planned by Shell and ConocoPhillips.

Shell and ConocoPhillips have reached an agreement to share data in the Chukchi Sea this season. Each company will survey a separate area. Given the shortened season for Shell in the Beaufort, this allows Shell to maximize the amount of data available to them at the end of the open-water season.

Based on presentations at the Open Water Meeting, industry is funding research that could lead to reduction of noise levels associated with seismic operations and improved monitoring.

The MMS does not have the resources to conduct seismic activities in the OCS. The estimated cost of one of the proposed 2006 seismic programs is in the range of \$20-\$50 million.

2. The actual level of seismic-survey activity in 2006 (three seismic survey operations in the Chukchi Sea and one in the Beaufort Sea) will be less than the original scope of the draft PEA (four seismic-survey operations in both the Chukchi Sea and Beaufort Sea) described in the draft PEA. Therefore, the potential impacts should be less than what was conservatively described in the draft PEA. (ConocoPhillips, IAGC)

Response: The scope of activities used in the scenario for the PEA was based on MMS' projection of the maximum most likely amount of activity that could occur in the Arctic during the 2006 open-water season. The PEA, which MMS started working on in December 2005, is intended to provide a broad look at the

potential impacts from multiple seismic activities, outline possible mitigation measures to prevent impacts from that level of seismic activity, and provide the National Environmental Protection Act (NEPA) coverage for any Geological and Geophysical (G&G) permits received for 2006. Each G&G-permit application will receive an additional review to determine if the proposed seismic survey activities are within the scope of the activities addressed and environmentally evaluated in the PEA. Because it now it appears that there will be only three operations in the Chukchi and one in the Beaufort, there should be less potential impact than what was envisioned in the scenario for the PEA.

3. The draft PEA's NEPA analysis and proposed mitigation measures would set precedent that potentially could impact the management of seismic-survey operations in other areas of the U.S. and worldwide. (WesternGeco, NRDC)

Response: There are two opposing views on the potential precedent set by MMS for future seismic activities. The first view infers that if MMS goes forward with a NEPA analysis at a programmatic EA level and not an EIS, then the cumulative effects from future seismic surveys and other oil and gas activities would be underestimated and the potential long-term, significant impacts would not be addressed, mitigated, or even identified.

The MMS and NMFS believe that a PEA is the appropriate NEPA vehicle for analyzing potential impacts from seismic-survey activities in the Arctic Ocean for 2006 and for determining whether preparation of an EIS is needed. We believe that the PEA discusses all reasonably foreseeable potential impacts and does not underestimate the potential for long-term impacts. The PEA identified mitigation measures designed to prevent significant impacts on the Arctic Ocean's fish and wildlife resources and the subsistence-harvest activities that depend on them. In addition, each G&G-permit application will receive an additional review to determine if the proposed seismic survey is within the scope of the activities addressed and environmentally evaluated in this PEA. Those seismic surveys within the scope of the activities addressed and environmentally evaluated in this PEA will be permitted, and those that do not will receive further NEPA analysis before possibly being permitted. Further analysis also will be conducted if the number of seismic-survey-permit applications exceeds the number of seismic surveys in the Proposed Action evaluated in this PEA.

The second viewpoint is a concern about the ability of industry to conduct operations in the U.S. or anywhere in the world, if adoption of the restrictive 120 dB or 160 dB exclusion zones this season set a precedent for requirements on future seismic surveying activities and other activities that introduce noise into the marine environment. The adoption of the 120-dB and 160-dB exclusion zones could severely impact all commercial-vessel traffic operating in the Arctic Ocean, because most vessels have sound signatures greater than 120 dB and 160 dB. Concern was expressed about how mitigation measures proposed in the PEA could impact industry's ability to conduct seismic surveys in the Gulf of Mexico.

The intent of the PEA was to evaluate potential impacts from exploration seismic surveys specifically in the Chukchi and Beaufort seas during the 2006 open-water season and to identify appropriate mitigation measures and monitoring requirements for those potential impacts. The 120-dB exclusion zone is proposed as a mitigation measure related only to the bowhead whale cow/calf pairs, and the 160-dB exclusion zone only for aggregating (feeding) bowhead and gray whales. These measures are specific to the Arctic in that they were developed either: (1) based on sound scientific information specific to the Arctic Region; or (2) as part of a proactive and cautious approach in analyzing impacts and developing appropriate mitigation where scientific uncertainty existed. The MMS and NMFS have determined through the PEA analysis that requiring a 120-dB exclusion zone is not warranted for seismic operations in most circumstances. Therefore, the 120 dB and 160 dB are required only for specifically defined situations (as outlined in the Selected Alternative in Section V of the PEA) during the 2006 open-water season and are specific only to arctic waters.

The PEA analyses and mitigation measures were developed specifically to address potential impacts from seismic surveying during 2006 in the Chukchi and Beaufort seas. The conclusion and mitigation measures may not be applicable to other areas or other species.

4. The draft PEA cumulative impact analysis is inadequate. The MMS needs to address the cumulative aspect of the planned seismic surveys on fish and other marine resources much more extensively. (NRDC, NSB, AEWG)

Response: The MMS and NMFS determined that the cumulative impact scenario needed to address activities that could affect the analyzed resources during the time and area that seismic surveys would occur (temporally and spatially coincident)—specifically the 2006 open-water season. Past and reasonably foreseeable activities were addressed for individual resources, as needed. The MMS believes the level of detail provided in the PEA cumulative analysis is appropriate.

5. The PEA's significance criteria are neither biologically nor legally justifiable. (NRDC, NSB, ExxonMobil)

Response: The significance thresholds for biological resources are appropriate. The thresholds that MMS uses have been developed over many years based on analysis of scientific information and with multiple opportunities for input from Federal, State, and local resources agencies, other stakeholders, and the public. These thresholds are appropriate for the scope of this PEA. The proposed action for the PEA is temporary and limited spatially and geographically. Through our comprehensive impact analysis, we considered the different populations, their abundance, distribution, population vulnerabilities, robustness, and trends. We identified the range of possible responses to exposures to seismic noise, the likelihood of exposure, and the likelihood of undesirable and adverse impacts. We made a decision to broadly apply (an assumption) the potential adverse behavioral effects to biological resources identified from the relatively limited and context-specific information available on behavioral responses. Our mitigations are supported by the analysis. In addition to our assumption to broadly apply behavioral responses, because of the level of uncertainty and erring on the side of being protective of the resources, we also developed additional measures to further reduce the level of any potential adverse effects. In addition to the measures that define Alternative 6, additional mitigation and monitoring measures are incorporated in the Selected Alternative providing additional protection of the resources and another level of proactive management. We believe such measures are appropriate.

The PEA is clear in its requirements that MMPA authorization must be obtained before seismic operations can commence. This further ensures that the seismic activities must meet the legal mandates of the MMPA, specifically that impacts to marine mammals will be negligible and that there will be no unmitigable impacts to subsistence uses.

In meeting legal requirements and determining whether significant impacts might occur to listed species, the MMS has consulted with NMFS and FWS pursuant to section 7 of the Endangered Species Act. Both consultations resulted in a finding that the Proposed Action (as defined now under the Selected Alternative and associated mitigations) likely would not jeopardize the continued existence of the species or adversely modify any designated critical habitat. The MMS has consulted with NMFS for Essential Fish Habitat, as required under the Magnuson-Stevens Fishery Conservation and Management Act.

In accordance with USDOJ and MMS adaptive management policies, the mitigation measures and monitoring requirements will be reviewed and modified, if needed, based on information provided by the required monitoring during the 2006 seismic operations.

6. The MMS has not analyzed the application of many mitigation measures for the Pacific walrus and other marine mammals, and the mitigation measures that are considered are inadequate. (NRDC)

Response: Pacific walrus are closely associated with sea ice. Because these seismic surveys cannot be performed in sea ice, the impacts to the Pacific walrus are reduced *de facto*. In addition, MMS relied on the biological expertise of FWS biologists who determined that, based on the best available data on walrus response to vessels and aircraft, the mitigation measures proposed were appropriate to protect walrus from harm. The MMS is requiring that MMPA authorizations be obtained from FWS before seismic operations can begin. These authorizations may impose additional and possibly more restrictive mitigation

measures. The combination of the mitigation measures in the Selected Alternative and those, if any, imposed under MMPA authorizations will ensure that there are no more than negligible impacts to marine mammals, and there will be no unmitigable adverse impact to subsistence uses.

7. The decibel thresholds selected for pinnipeds and cetaceans are based on old data that has since been “superseded by science,” and pinnipeds should be included with cetaceans in the 180-dB level A harassment threshold. (NRDC)

Response: The NMFS states that new acoustic criteria will be implemented upon completion of a Final EIS on Acoustic Guidelines. Considering that the 180/190-dB safety zones were established based on onset TTS (temporary threshold shift), a noninjurious level, MMS and NMFS consider that the current safety zones of 180-dB rms for cetaceans and the Pacific walrus and 190-dB rms for pinnipeds (other than the Pacific walrus) will protect marine mammals from injury (permanent threshold shift (PTS), Level A Harassment).

8. Harassment of marine mammals can occur at levels below the 160-dB threshold for Level B Harassment, and MMS should reassess its harassment thresholds for acoustic impacts. (NRDC)

Response: As stated in the PEA, all seismic operators must obtain MMPA authorization from NMFS and FWS before MMS-permitted seismic operations can commence. This helps ensure that the activities will have no more than a negligible impact on marine mammals and not impose unmitigable adverse impacts on subsistence uses. In addition, the MMS PEA provided mitigation measures (developed in consultation with NMFS and FWS) to limit the amount of Level B Harassment that might occur and avoid Level A Harassment. Therefore, no Level A Harassment of marine mammals is expected, and any Level B Harassment will be legally authorized under the requirements of the MMPA.

The PEA acknowledges that Level B Harassment can occur for some marine mammal species below the 160-dB rms isopleth. Again, legal authorization to take marine mammals with Level B Harassment under the MMPA (and ESA for listed species) will be required. In addition, based on the lack of certain scientific data, MMS took a cautious approach in analyzing impacts to all resource areas where uncertainty existed (i.e., data on distribution). This resulted in the MMS requirement that a 120-dB rms isopleth be implemented in the presence of 4 or more bowhead cow/calf pairs (to further protect important pair bonding, nursing, etc.) and a 160-dB rms isopleth for aggregations of 12 or more bowhead or gray whales (as aggregating whales likely indicate that feeding is taking place). The establishment of these additional isopleth restrictions is based on work by Malme et al. (1984); Clark et al. (2001); and Richardson et al., (1999), as discussed in the PEA. Therefore, MMS believes its requirement for MMPA authorization and its implementation of the specific 120-dB and 160-dB restrictions are scientifically supportable and also provide a cautious approach in avoiding any impacts that may have the potential to result in population level or other significant impacts.

9. The MMS does not describe the potential disturbance that seismic surveys will have on female walrus with dependent young (i.e., the range at which mother/calf pairs detect and avoid seismic operations and the fact that calves may be separated from their mothers). (NRDC)

Response: The potential disturbance from seismic surveys to female walrus with dependent young is discussed in Section III.F.4.b(1) of the PEA. Although, data specific to seismic operations are not available, walrus response to other vessels and aircraft provide an indication on how they may be expected to respond to seismic operations. Marine-streamer surveys require nearly ice-free operating conditions. Based on this information, MMS believes that the 0.5-mile safety radius around walrus groups hauled out on the ice and requiring aircraft to maintain a minimum 1,000-foot altitude AGL within 0.5 miles of hauled out walrus, are fully adequate and sufficient to protect walrus, including females with dependent young, from significant impacts.

10. The MMS does not adequately describe the potential disturbance of polar bears to seismic surveys. (NRDC)

Response: Additional information on this topic has been added to Section III.F4.b(3) of the PEA.

11. The MMS concludes that there may be impacts to belugas, but that the impacts will not be significant. The proposed mitigation measures provide protection to bowheads but not to belugas or other marine mammals, aside from physical harm (i.e., Level A Harassment). Additional information and mitigation measures are needed to provide protection to all marine mammals, as well as the subsistence hunters who depend upon belugas and seals. (NSB)

Response: Belugas are less sensitive to seismic sound than baleen whales, which is why the PEA contains additional mitigation measures for these baleen whale species. Available information indicates that belugas may hear frequencies as low as 40-75 Hz (although poorly) but generally are more sensitive to higher frequency sounds even exceeding 100 kHz. Seismic sounds generally are around the 1-kHz level, although some high energy can be anticipated at higher frequencies. Therefore, although belugas likely will detect some degree of seismic noise, the potential impacts from seismic sounds are expected to be less than those to baleen whale species.

The PEA finds that seismic-survey operations have the potential to displace belugas from important areas. Both the PEA and the MMPA authorization include mitigation measures to lessen the potential for impacts. As stated in the PEA, MMS-permitted seismic surveys cannot begin operations until MMPA authorization is obtained. The MMPA authorization process requires that any takes of belugas have no more than a negligible impact on the stock, and no unmitigable adverse impact on subsistence hunting. (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 addition, the CAA, or similar agreements between industry and Native Alaskan groups, developed in support of MMPA authorization, contains measures to avoid conflicts with subsistence hunting of belugas, which occurs during the time the animals are in coastal waters.

12. The PEA’s significance criterion for threatened and endangered species of birds is neither biologically nor legally justifiable. (NRDC)

Response: A significance threshold under NEPA is defined by the action agency for use as a decision tool in evaluating the magnitude of anticipated impacts. The MMS described the potential impacts the proposed seismic survey program for 2006 would have on threatened spectacled and Steller’s eiders and Kittlitz’s murrelets (a candidate species), and identified mitigation measures to avoid or otherwise minimize the potential impacts to coastal and marine birds. Subsequent discussions with FWS resulted in the decision by MMS to change the mitigation from allowing these activities to occur within the Ledyard Bay critical habitat area prior to July 1 or after October 15 to completely excluding seismic survey activities from the Ledyard Bay critical habitat area for the 2006 season.

The MMS believes every practicable conservation measure has been identified to protect listed and candidate bird species. The FWS concurred with the MMS that, assuming implementation of the revised mitigation measure in the PEA, no adverse effects to listed or candidate species are likely to occur, and no declines are likely to occur, from the proposed seismic surveying activities.

13. The draft PEA and permitting proposed seismic surveys must comply with resource management statutes and conventions. (NRDC, NSB, AOGA)

Response: The NEPA encourages the preparation and integration of environmental analyses with analyses required by other Federal statutes. The PEA contains the necessary information for agencies to fulfill their obligations under the various laws. The coordination between MMS and other agencies required by these statutes is included in Section VI of the PEA, Coordination and Consultation.

The NMFS is a cooperating agency in the preparation of the EA, in part, to fulfill its consultation and permitting obligations under the ESA and MMPA. The MMS has consulted with FWS and NMFS under section 7 of the ESA, and with NMFS on Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act

As explained in PEA Section III.G.5.b, Coastal Management, Alaska's list of Federal licenses and permits that are subject to consistency review does not include geophysical surveys.

14. The MMS should have prepared an environmental impact statement (EIS) instead of an environmental assessment (EA) for the 2006 seismic survey season. (NRDC, NSB, form letters)

Response: The EA is appropriate for the Proposed Action in accordance with USDOJ and MMS directives on implementation of NEPA.

The MMS policy on NEPA implementation notes that an EA may be prepared for the purpose of permitting activities and for the purpose of areawide impact assessment; generic impact assessment; to evaluate the necessity of preparing an EIS (that is, to determine whether significant effects might occur from the proposed action); and so on. The six objectives for the Arctic Ocean Outer Continental Shelf Seismic Surveys – 2006 are clearly indicated in Section I.C of the PEA. Section I.C further states that in addition to the PEA, MMS will conduct a further review of each G&G permit application it receives to ensure it falls within the scope of the PEA. As such, the PEA clearly is appropriate for the purposes of areawide impact assessment, generic impact assessment, identification of appropriate mitigation measures, and evaluation of whether preparation an EIS is indicated. The PEA is intended to inform and streamline the analysis of future specific proposed activities, not to approve them without further consideration.

For permitting activities, the preparation of an EA is considered appropriate for a proposed action that does not normally require an EIS or one that is not categorically excluded. The Department of the Interior Manual (DM) Section 516 DM 3.2, which guides preparation of EA's, directs that an EA will be prepared for all actions, except those covered by a categorical exclusion, those covered sufficiently by an earlier environmental document, or those actions for which a decision has already been made to prepare an EIS. The MMS policy reflects these directives.

The DM Section 516 DM 15.4 guides MMS NEPA implementation. The DM categorically excludes internal program initiatives and permit and regulatory functions for resource-evaluation activities including surveying, mapping, and geophysical surveying that do not use solid or liquid explosives. However, because of a recent proposed change in MMS policy, which in the future may no longer categorically exclude this activity, we decided it would be prudent to proceed with an EA. Because the Proposed Action does not normally require an EIS and because we are treating it as if it is not categorically excluded, an EA is the appropriate NEPA document.

The assessment of seismic effects in the Beaufort Sea and Chukchi Sea is a three-step process. The issue was examined in the *Final EIS for the OCS Oil and Gas Leasing Program, 2002 to 2007*, which included a description of the acoustic environment and examined potential effects of seismic surveys on the resources of the Alaska OCS. In doing so, the agency prepared a broad EIS to cover a number of smaller related activities, including seismic surveys. In the second step, MMS has undertaken a PEA, in part, to concentrate analysis on the Chukchi and Beaufort seas and explore options for mitigating potential effects, tiering from the analyses initiated in the 5-Year Program final EIS and Beaufort Sea multiple-sale NEPA document. In the third step, permitting seismic-survey activities, MMS will conduct a further review of each G&G-permit application it receives to ensure it falls within the scope of the PEA and whether further NEPA analysis is necessary. As such, limiting the Proposed Action of the PEA to the 2006 season retains the chain of tiering, just as the next 5-Year Program EIS for 2007 to 2012 and NEPA analyses will tier from it and will address activities, including seismic surveys, anticipated during that period. Of course, these analyses will be informed by the monitoring that occurs during the 2006 surveys.

15. The MMS failed to properly publicize the PEA and coordinate with the public. The proposed activities addressed in the PEA involve effects of national concern, so MMS must publish a notice of the document in the *Federal Register*. (NRDC, NSB)

Response: The DM Section 516 DM 3.3, which addresses public involvement in the EA process, states that:

- The public must be provided notice of the availability of EAs (40 CFR 1506.6).
- Where appropriate, bureaus and offices, when conducting the EA process, shall provide the opportunity for public participation and shall consider the public comments on the pending plan or program.
- The scoping process may be applied to an EA (40 CFR 1501.7).

The MMS solicited public participation and received input regarding potential effects from seismic activities throughout preparation of the draft PEA. In late 2005, MMS sent letters to the affected North Slope Borough, local and Tribal governments and the Native whaling, beluga, and walrus commissions notifying them of the possibility of seismic surveys in 2006 and soliciting their initial concerns about the proposed activities. In early 2006, MMS conducted outreach and scoping (for the 5-Year Programmatic EIS and Chukchi Sea Lease Sale 193 EIS) in Alaska communities on a range of OCS activities. During the public meetings and Government-to-Government meetings on the North Slope, MMS personnel discussed how seismic surveys are conducted, and work was progressing on the PEA to evaluate the effects of possible seismic-survey activity in summer 2006 in the Beaufort Sea and Chukchi Sea. The presentation highlighted our desire to receive input on the resources, issues, alternatives, and mitigation measures to be included in the environmental analysis. We emphasized that any input received in these meetings would be considered in all analyses, where appropriate, for example, any statements made concerning seismic activities would be considered in the PEA. In April 2006, the public was given the opportunity to comment on the draft PEA. Printed and/or electronic (CD) copies of the draft PEA were sent to appropriate Federal, State, local, and Tribal agencies, and to interested stakeholders. Electronic (e-mail) notices on the availability of the draft PEA were sent to an extensive list of stakeholders. Announcement of the availability of the draft PEA was posted on both the MMS and NMFS websites with links to the PDF-version of the PEA on the MMS website. In April 2006, NMFS received input on the draft PEA and proposed IHA's during the Open Water Meetings. In accordance with MMS policy, a *Federal Register* notice on the availability of the final PEA will be published in the next MMS quarterly *Federal Register* notice on EA's. Stakeholders also will be advised of the availability of the final PEA by the same means used to announce the draft PEA.

The proposed actions addressed in the PEA are specifically seismic surveys during 2006 in the Chukchi and Beaufort seas. These specific activities are not an issue of national concern. They are short term and local in nature, so publishing a notice in the *Federal Register* was not necessary. Notification of the availability of the draft EA as described above is in conformance with Departmental policy and CEQ regulations at 40 CFR 1506.6(b)(3).

16. The PEA's cumulative impact analysis section needs to be improved. For example, missing from the analysis were impacts of oil and gas activities in the Russian Chukchi Sea and the Canadian Beaufort Sea and the nearshore construction at the Oooguruk and Nikaitchuq units. The MMS needs to address potential cumulative effects from Shell's proposed construction of "well cellars" in the Beaufort Sea. (NRDC, NSB, AEW)

Response: In examining cumulative effects, MMS examines the impact on the environment that may result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the actions.

The first step in the evaluation of reasonably foreseeable future actions is to determine the spatial and temporal boundaries of the activity. For the Proposed Actions analyzed in the PEA, the spatial boundaries are the Beaufort and Chukchi seas, and the temporal boundary is the period of the proposed seismic surveys in 2006, approximately July 1 to November 30, 2006.

Section III.C in the draft PEA lists the reasonably foreseeable activities that are projected to occur within the spatial and temporal boundaries of the Proposed Action and are thus considered in the cumulative analysis. These activities include marine seismic surveys, vessel traffic and movements, aircraft traffic, oil and gas exploration in Federal and State waters; and miscellaneous activities and factors. A seismic survey similar to the proposed 2D survey in the Chukchi Sea is expected to be conducted in late summer to early autumn 2006 in the Mackenzie Delta region of the Canadian Beaufort Sea. No additional activities in the Russian Chukchi Sea have been identified that would occur during the time period covered by the PEA.

The Oooguruk development project is included in the list of reasonably foreseeable activities. The Oooguruk project is in construction stage, and settling of the gravel island material is expected to occur during the period of concern. The Nikaitchuq development project is not listed as reasonably foreseeable, because the project has not received permits nor it been sanctioned for construction.

Shell has not submitted a proposal to construct well cellars during the 2006 season covered by the PEA. Shell has advised MMS that such activity is not being proposed for the 2006 season. In the event Shell submits a proposal in the future, the MMS would evaluate that proposal on its own merit, including additional NEPA review.

Given the growing interest of oil and gas companies to explore and develop oil and gas resources on the Arctic Ocean OCS, there is the potential that seismic surveys will continue in the Chukchi and Beaufort seas beyond 2006. Surveys beyond 2006 are dependent on: (1) the amount of data that is collected in 2006; (2) what the data indicate about the subsurface geology; and (3) the results of Beaufort Sea Sale 202 and Chukchi Sea Sale 193. Table III.C-1 in the PEA provides information about the potential level and type of seismic-survey activities that may occur in the Beaufort and Chukchi seas between 2006 and 2010. Potential seismic-survey activity beyond 2006 will be addressed in the draft EIS for the OCS Oil and Gas Leasing Program, 2007 to 2012.

17. The subsistence-harvest significance threshold is unacceptable. (NSB, AEWC, NRDC)

Response: In response to Mayor Edward Itta's comments at the March 6, 2006, public meeting in Barrow, MMS drafted a lengthy reply that was sent to the Mayor and to the AEWC on May 2, 2006, addressing subsistence and sociocultural thresholds.

To avoid having an unmitigable adverse impact on subsistence uses of marine mammals, MMS will condition the start of permitted seismic surveys on the operators obtaining incidental take authorization from NMFS and FWS. In support of their IHA application to NMFS, the seismic operators have all signed a CAA with the AEWC and the affected villages' Whaling Captains Associations. This CAA includes a prohibition on conducting seismic surveys during the bowhead whale-hunting season in the Beaufort Sea, dispute resolution, and emergency assistance to whalers at sea. Implementation of this CAA ensures that there will not be significant social or economic impacts on the coastal inhabitants of the Beaufort and Chukchi seas or an unmitigable adverse impact of the subsistence uses of marine mammals by these residents.

As a point of clarification, MMS' published significance standard for subsistence reads: "One or more important subsistence resources would become unavailable, undesirable for use, or available only in greatly reduce numbers for a period of one to two years." All the subsistence analyses for the last 10 years have adhered to this standard, and all have analyzed to the conservative end of the threshold, or 1 year, meaning more specifically, one subsistence season. Using this threshold, a significant effect occurs if a single important resource (which could be other than bowhead whales) becomes unavailable or undesirable for use or available only in greatly reduce numbers for 1 year. Please note that the use of "or" instead of "and" means that any one of these three conditions *individually* would result in a significant effect. This approach, we believe, results in a fairly broad threshold. For example, the significance threshold would be met, if oil and gas activities resulted in one important resource becoming undesirable for use for a period of 1 year, regardless of how available the resource was.

18. The MMS must factor into its permitting decisions the fact that the conflict avoidance agreement (CAA) can be used to aid MMS, NMFS, and the seismic-survey operators in meeting the MMPA’s “no unmitigable adverse impact” standard. (AEWC)

Response: The MMS agrees that the CAA can be used in this manner.

19. Exclude the area of the Alaska Coastal Current, because it is a source for subsistence resources. (AEWC)

Response: The PEA concludes no significant impacts to subsistence resources if suggested mitigation and a CAA-type agreement is in place. This means that projected seismic activity is not expected to compromise subsistence resources or harvests in the nearshore Alaska Coastal Current of the Chukchi Sea. The “polynya” area is deferred from leasing in the current 5-year oil and gas leasing program and is not included in the proposed Chukchi Sea Lease Sale 195 area. Seismic surveying will not occur in the nearshore areas in the Chukchi Sea during 2006. Based on information in the 2006 seismic-survey permit applications received to date, seismic surveys in the Chukchi Sea will be at least 50 miles from shore and cover less than 2% of the proposed Chukchi Sea Sale 193 area.

20. The MMS must present a reasoned analysis of subsistence harvest and sociocultural impacts similar to that presented for endangered whales. (AEWC)

Response: The MMS believes that the format of the subsistence and sociocultural impacts assessments acknowledges and takes into account the appropriate NEPA-related factors, specifically, unique characteristics of the geographic area; degree of controversy; degree of highly uncertain effects or unique or unknown risks; precedent-setting effects; cumulative effects; adverse effects on scientific sources; and violations of Federal, State, or local environmental law. Please see the response to comment #17 above for more specific discussion on significance criteria definitions.

Operations under the 2006 G&G permits are conditioned upon the operators obtaining IHA’s, and those authorizations are conditioned upon NMFS and FWS finding no unmitigable impacts to subsistence activities. To avoid having an unmitigable adverse impact on subsistence uses of marine mammals, the seismic operators have all signed a CAA with the AEWC and the affected villages’ Whaling Captains Association. This CAA includes a prohibition on conducting seismic surveys during the bowhead whale-hunting season in the Beaufort Sea, dispute resolution, and emergency assistance to whalers at sea. Implementation of this CAA ensures that there will not be a significant social or economic impact on the coastal inhabitants of the Beaufort and Chukchi seas or an unmitigable adverse impact of the subsistence uses of marine mammals by these residents.

21. Difficult to assess significant effects on subsistence-harvest patterns and sociocultural systems. (AEWC)

Response: The last paragraph of Section II.G.3.c (d) concludes:

The more predominant issue associated with potential impacts on sociocultural systems is the potential disruption of seismic survey noise on subsistence-harvest patterns particularly on the bowhead whale, which is a pivotal species to the Inupiat culture. Such disruptions could impact sharing networks, subsistence task groups, and crew structures as well as cause disruptions of the central Inupiat cultural value: subsistence as a way of life. These disruptions also could cause a breakdown in family ties, the community’s sense of well-being, and could damage sharing linkages with other communities. Displacement of ongoing sociocultural systems by seriously curtailing community activities and traditional practices for harvesting, sharing, and processing subsistence resources might occur.

Applying the present sociocultural significance threshold of “chronic disruption of social organization, cultural values, and institutional arrangements for a period two to five years with a tendency toward

displacement of existing social patterns” and analyzing to the conservative end of the threshold (i.e., 2 years), this situation would reach a significant level if it continued for two harvest seasons.

The MMS concludes no significant impacts to subsistence resources if proposed mitigation is implemented, incidental take authorizations are obtained from NMFS and FWS, and a CAA-type agreement is in place, regardless of which alternative is chosen. With no significant impacts to subsistence resources, significant impacts to sociocultural systems are not expected.

22. The analysis of the alternatives are all lumped into one heading and not analyzed individually. (AEWC)

Response: As stated in PEA Section III.G.2.f Impacts of Alternatives on Subsistence-Harvest Patterns, similar impacts are expected under Alternative 3, 4, 5, and 6. The PEA concludes that no significant impacts to subsistence resources are expected to occur under any of the alternatives. In addition, MMPA authorizations must be obtained from NMFS and FWS before seismic operations can begin. The MMPA authorizations will ensure that there will be no unmitigable adverse impact to subsistence uses. Please also see the responses to comments #20 and #21 above.

23. It is important that the draft PEA clarify, rather than confuse, mitigation measures supported by the best science from conflict avoidance agreement (CAA) conditions accepted in the spirit of cooperation. (AOGA)

Response: None of the mitigation measures in the PEA are cross-referenced to a specific CAA or supported by any particular CAA. Some of the mitigation measures developed in the PEA may no longer be necessary because of timing requirements included in the CAA.

24. Because the bowhead population is healthy and increasing, oil and gas industry activities are not negatively affecting harvest activities (AOGA)

Response: Simply because the bowhead whale harvest has been fairly consistent over the last decade, does not mean that oil and gas activity has not had an effect on subsistence whaling. The whale harvest numbers do not reflect whether there may have been increased effort, difficulty, or danger in years of increased noise disturbance (due to an array of sound producing factors) or other environmental factors.

The MMS *Industry and Other Human Activity (1979-1999) in the Alaskan Beaufort Sea* study, completed in 2002 was initiated to compile detailed information describing the locations, timing, and nature of oil- and gas-related and other human activities in the Alaskan Beaufort Sea for the specific purpose of better defining these relationships. An important objective of this data set was to assess concerns expressed by subsistence hunters and others living within the coastal villages of the Beaufort Sea about the possible effects that oil and gas activities (particularly seismic activity, drilling, and oil and gas support-vessel activities) had on the behavior of marine mammals, especially the bowhead whale. Such an analysis requires an adequate level of detail. Only one oil company authorized access to proprietary information about seismic surveys, and publicly available information lacks adequate detail. Information on these proprietary seismic surveys is presented in this report at a scale that does not compromise the proprietary nature of these data. The Human Activities Database is, however, proprietary, because it includes these proprietary data in full detail. With the exception of ice-management activity, the compiled information for the period 1990-1998 is relatively complete and considered adequate for the investigation of potential effects of disturbance on the fall bowhead whale migration. However, there are significant gaps in the data for the period 1979-1989. To make the data more complete, this initiative continues under the ongoing study *Analysis of Covariance of Human Activities and Sea ice in Relation to Fall Migrations of Bowhead Whales*.

Because there are no long-term data sets that relate whaling success to anthropogenic and environmental factors, it is premature to conclude that such factors (including oil and gas activities) have not had or are not having an effect on whaling harvests. Implementation of CAA-type agreements in which certain oil

and gas activities have been delayed during subsistence hunting have been a successful measure so that the hunts are not negatively affected.

25. Cumulative impacts to the subsistence harvests of Inupiat residents of the North Slope involve a combination of adverse impacts to subsistence resources and to the residents' ability to access these resources. (NRDC, NSB)

Response: Seismic surveys, especially as mitigated in the PEA, are not expected to add significant effects to overall cumulative impacts. The subsistence cumulative analysis defers to the determination of no unmitigable adverse impacts to subsistence activities that must be made for the operators to receive the IHA's necessary for commencement of MMS-permitted seismic surveys. Please also see the responses to comments #20 and #21 above.

26. There is an environmental justice issue of national concern due to the disproportionate impacts to Alaska Native Inupiat communities whose subsistence resources and access, culture, and social impacts from the surveys will be significant. (NRDC)

Response: Seismic surveys, especially as mitigated in the PEA, would not be expected to produce significant environmental justice effects. The environmental justice analysis tiers off the conclusions reached for the subsistence and sociocultural environments. The PEA concludes that no significant impacts to subsistence resources are expected to occur under any of the alternatives. The MMS concludes that no disproportionate high adverse impacts to Alaskan Native Inupiat communities are expected to result from MMS-permitted seismic-surveying activities during the 2006 open-water season. In late 2005, MMS sent letters to the affected Tribal governments and the Native whaling, beluga, and walrus commissions notifying them of the possibility of seismic surveys in 2006 and soliciting their initial concerns about the proposed activities. In early 2006, MMS conducted Government-to-Government meetings with affected Tribal governments to discuss, among other OCS-related issues, the proposed 2006 seismic surveys. Please also see the responses to comments #20 and #21 above.

27. The MMS must solicit traditional and local knowledge and incorporate it into assessments of impacts from oil and gas activities, because the scientific information does not exist. (NSB)

Response: Traditional and local knowledge is a rich source for new information in the Chukchi and Beaufort seas areas, and the PEA references information obtained from such sources. Local knowledge was also obtained during MMS public hearings on the Draft Proposed 5-Year Program (2007-2012) and previous MMS-prepared NEPA documents. The traditional and local knowledge gathered represents some of the best information available to complete the PEA. The MMS welcomes the opportunity to continue to receive and use traditional and local knowledge about the Arctic Ocean and the subsistence resources it supports.

28. Data gaps for marine mammals other than bowhead whales hinder the ability to assess impacts to subsistence. (NSB)

Response: The PEA acknowledges where there is unknown information and has developed its mitigation measures in a cautious manner to address this uncertainty. For this reason, the subsistence analysis section, in its discussion of potential mitigation, particularly mentions the importance of mitigating noise-disturbance effects. All seismic operation also will be required to obtain an IHA under the MMPA, which ensures a finding from NMFS and/or FWS that there will be no more than a negligible impact to marine mammals and no adverse, unmitigable impact on subsistence uses. Part of this process requires that operators demonstrate communication and cooperation with subsistence groups under a CAA or similar process. See Section II.G.2.f(2) of the PEA.

29. The MMS must make sure that the industry agrees to Conflict Avoidance Agreements with the Alaska Eskimo Whaling Commission. (NSB)

Response: The MMS does not have any regulatory authority to require industry to sign a CAA or CAA-type agreement with the AEWC or any other organization. However, MMS policy is to prevent unreasonable conflicts, which can be achieved by a CAA. Similarly for the IHA process, operators must demonstrate that their activities will not cause unmitigable adverse impacts on subsistence, and this can be demonstrated with a CAA. The MMS will condition commencement of any MMS-permitted seismic operations on the operator obtaining an IHA; thus MMS procedurally makes sure industry has such agreements in place to ensure that the harvesting of bowhead whales and other marine mammals is protected. Please also see the responses to comments #20 and #21 above.

30. If seismic surveys alter the distribution of bearded seals during breakup, these animals will not be available to hunters. (NSB)

Response: Seismic-survey operations will be prohibited in the Chukchi Sea spring lead system before July 1. Marine-streamer surveys require nearly ice-free operating conditions, so they will only occur after breakup. Generally, this would be after the May-June preferred time for hunting. In the Beaufort Sea, the bearded seal season occurs later—during the period that seismic surveys might occur. The MMS will condition commencement of any MMS-permitted seismic operations on the operators obtaining MMPA authorizations, which require no unmitigable adverse impacts on subsistence uses; thus, MMS procedurally makes sure that the harvesting of marine mammals is protected and that no unmitigable impacts to subsistence activities occur.

31. Concerns were expressed over the suggested requirement for fish-displacement zone of the 160-dB isopleth, citing that it cannot be supported by any current studies that indicate harm to fish resources. The same commenters suggest that if fish displacement is as low as 2 km (citing Gausland, 2003), then the requirement of 160 dB is not supportable. The commenters believe that there are no data indicating harm to arctic fish species that supports a 160-dB safety-zone restriction. (WesternGeco, IAGC)

Response: Review of the literature indicates typical behavioral responses in fish, such as startle responses and subtle changes in swimming speed and swimming direction, occur between 160 and 200 dB re 1 micro Pascal (some measurements were mean squared pressure and some were mean-peak levels). We expect behavioral impacts to be relatively short term and variable among species and individuals.

On review and reconsideration, MMS has determined that the available information at this time does not support establishing a fish-displacement zone based on the 160-dB sound radii, and that the mitigation measure is not warranted.

In addition, none of the G&G permit applications propose operations nearshore, nor will the proposed surveys be conducted in close enough proximity to each other to require a fish-displacement mitigation measure.

32. The previous permits for activities in the vicinity of fragile biocenoses such as the boulder patch have had stipulations for avoidance of such areas. Stipulations for bottom-founded cables or anchoring activities could continue to address these concerns. (WesternGeco)

Response: In the PEA, MMS identifies the known areas of fragile biocenoses in the Chukchi and Beaufort seas (see Section III.F.1.e). Section IV of the PEA provides a mitigation measures requiring that “Seismic cables and airgun arrays may not be towed in the vicinity of fragile biocenoses, nor shall seismic vessels anchor in the vicinity of fragile biocenoses (e.g., the Boulder Patch; kelp beds as identified by MMS or may be discovered by the operator during the course of their operations), unless an emergency situation involving human safety specifically exists and there are no other feasible sites to anchor at the time. Permittees must report to MMS any damage to fragile biocenoses as a result of their operations.” The MMS believes this measure is supportable by the analysis contained within the PEA.

33. There is a lack of data regarding the current status of fishes and other marine wildlife in the Chukchi and Beaufort seas. (NSB)

Response: The PEA analyses are based on a thorough review of the best available information to date regarding the status of fish and other marine wildlife in the Chukchi and Beaufort seas. The PEA also notes where information is nonexistent or lacking for a particular resource. Using the best available information, MMS evaluated the potential impacts and risks to various resources and concluded that impacts to these resources in the Proposed Action area are likely to be adverse but not significant.

34. It is not scientifically supportable to conclude that a decline in the abundance or distribution of a ...fish stock that takes a decade (or three generations) to recover from is not biologically “significant” citing arctic cod (a keystone species of the region) as an example. The PEA’s special provisions for “rare” fish resources do not add much meaningful protection for many of these species. (NRDC)

Response: For NEPA purposes, a significant impact is “found” when the stated significance criteria are met or exceeded contrary to the comment. A review of the literature, the character of likely seismic operations in 2006, and our analyses indicate that any fish behavioral responses would be short term in nature, possibly extending for a short period of time beyond the length of the survey. Any mortality of fish eggs and larvae in the immediate vicinity of the airguns likely would be far below what would be expected to elicit a population level response. The “rare” (uncommon or few in numbers and/or small ranges) characterization does not imply protected status under any law. Mitigation measures are commensurate with anticipated level of impact.

35. The MMS fails to consider key mitigation measures for fish (e.g., expansion of fish-movement corridor; establishment of a coastal-exclusion zone to minimize acoustic emissions in nursery and spawning habitats; establishment of shut-down procedures based on the use of commercially available “fish finders”), and the mitigation measures proposed by the MMS are far from adequate. (NRDC)

Response: Given the available scientific knowledge on potential impacts to fish from seismic activities, and considering that information is limited or lacking for fish in the Arctic region, MMS analyzed potential impacts from the Proposed Action. The MMS concluded that impacts to these resources in the Proposed Action area are likely to be adverse but not significant, and that mitigation measure beyond those defining the alternatives are not warranted in relation to fish resources specifically.

36. The MMS has underestimated the acoustic impacts to fish and fisheries. The PEA’s conclusion that the mitigation proposed will reduce the environmental impact of the proposed seismic surveys to a level below significance is dubious, at best. (NRDC)

Response: The PEA does contain a thorough review of the available information to date regarding acoustic impacts to fish and fisheries. The MMS must assess the quality of the information provided and consider this within its analysis of potential effects and appropriate mitigation. The MMS is also clear in the PEA to acknowledge where scientific uncertainty exists. Where this is the case, MMS took a broadminded approach in its analysis of impacts and selected mitigation it believes is appropriate in reducing the potential for any impacts that could potentially reach population level effects. Therefore, MMS believes its conclusions regarding potential impacts to fish and fisheries are sound.

37. The Magnuson-Stevens Fisheries Conservation and Management Act requires Federal Agencies to consult with the Secretary of Commerce with respect to any action authorized or proposed to be authorized that may adversely affect any EFH identified under the Act. The MMS did not indicate in the PEA whether it plans to consult on EFH. The commenter states that a thorough consultation is required and urges MMS to employ all measures recommended by NMFS to protect fish habitat. (NRDC)

Response: The MMS has consulted with NMFS for EFH, as required under the Magnuson-Stevens Fishery Conservation and Management Act (see Section VI of the final PEA).

38. The MMS has not met the quality standards of the Information Quality Guidelines for Federal Agencies, relative to the draft PEA. The MMS has introduced scientifically unsupported conclusions in the draft PEA. The MMS has not presented the best scientific evidence in a clear, complete, and unbiased manner. (ExxonMobil, IAGC, AOGA, Shell, API)

Response: The MMS agrees that Federal agencies have an obligation to use and disseminate accurate information and, as required by NEPA and the Council on Environmental Quality's implementing regulations, the best available information in preparing NEPA documents. In preparing the draft PEA, MMS reviewed, considered, and cites hundreds of sources. Many of these sources are the same sources used in industry's applications for IHA authorizations. The MMS used best available information. The MMS subject-matter experts prepared the PEA analyses based on the available information and their professional judgment. In addition to "scientific evidence," MMS incorporates consideration of Traditional Knowledge in preparing environmental assessments. The PEA specifically notes when information is lacking and that there is uncertainty in the analyses. In response to comments, MMS is reviewing some of the literature used in the draft PEA, reviewing the additional references cited by commenters, and making revisions to the final PEA as appropriate.

39. The imposition of an exclusion zone or other restrictions premised upon the 120-160 decibel (dB) isopleths, which are examined in Alternatives 3 through 5, and the mitigation measures sections of the draft PEA, are scientifically unsupportable and not implementable. (AOGA, IAGC, API, Shell, WesternGeco, ConocoPhillips, ExxonMobil)

Response: We believe that Alternatives 3 through 5 are within the range of reasonable alternatives, and their associated mitigation measures are scientifically supportable and implementable. In the draft PEA, we provided the greatest attention to evaluating the potential impacts of multiple seismic surveys to bowhead whales, especially to bowhead cow/calves and aggregations of whales. We took a hard look at potential impacts, and evaluated several alternatives and mitigations that would allow us to conclude that significant impacts to bowhead whales are unlikely. Sections III.E and III.E.2 discuss how we relate the bowhead whale analysis to significant impacts.

Section III.F.3.f(6) contains discussion on the effects between seismic activities and the whales, including at the 120-dB level. The 160-dB level is used by NMFS to indicate where Level B Harassment begins for impulse sounds, such as seismic, and is based on information from Malme et al. (1983, 1984). Section II.B.2 discusses the effectiveness, efficiency, and acceptability of the various alternatives. We acknowledge that Alternative 3 would be the least efficient for collection of seismic data, most costly, and most difficult to implement.

40. Passive acoustic marine mammal (PAM) monitoring is/is not a viable monitoring technique. (AOGA, NRDC, IAGC)

Response: PAM can complement visual detection techniques. For example, certain types of PAM can provide real-time information about the presence of animals and which species are present if the animals are vocalizing (or making other sounds) in the area. The use of PAM can help in the detection of individuals in cases where visual observations alone would have indicated that the species was not present. However, depending on the PAM project design and the species involved in the project, PAM probably will not be able to tell the absolute number of individuals present, their reproductive status, or many aspects of their behavior. PAM would be most valuable as a complement to a visual technique. For example, PAM could be used in concert with aerial/vessel surveying to attempt to determine if bowhead whales are present within a particular area. While an absence of detection would not be proof that the species was not present, the use of visual monitoring and PAM would likely provide a much improved chance of detection than any one technique alone.

41. The modeling and calculation of the exclusion zones should not be based on isopleths determined from the aggregation of all frequencies emitted by the sound source. The exclusion zone should be based on those frequencies believed to be in the hearing range of the animals of concern. (IAGC)

Response: The modeling and calculations of exclusion zones that MMS used in the development of the PEA represent the current standard for the science. While it is true that the sensitivities of different marine mammals vary, it is also true that the site-specific conditions that influence sound propagation (water depth, salinity, temperatures, bottom conditions, etc.) also vary significantly. The Chukchi and Beaufort seas have numerous and varied types of marine mammals with various ranges of sensitivities to noise. The MMS has selected mitigations with exclusion zones designed specifically for the different types of marine mammals located in the Arctic. If more specific information, related specific marine mammal hearing range frequencies, becomes available, MMS would make every effort to incorporate it into our mitigations. The current methodology is conservative given the information available.

42. The MMS' calculations of permanent threshold shift (PTS) may be based on an improper model (i.e., traditional, linear models underestimate harm), and that MMS should lower its estimate for auditory injury. Kastak et al. (2005) was cited in support of the comment. (NRDC)

Response: Kastak et al., (2005) note the nonlinear growth of temporary threshold shift (TTS) for relatively small magnitude shifts (less than 6 dB) and the inadequacy of a linear model using only these data in predicting the growth of TTS with exposure level for a wider range of exposures. It is well known that the TTS growth function is sigmoidal and, thus, it is misleading to describe it solely based on exposures that generate only small-magnitude TTS (where the slope of the growth function is relatively shallow). For a wide range of exposures, however, there is a steeper, linear portion of the sigmoidal function and a fairly consistent relationship between exposure magnitude and growth of TTS. The slope of this relationship is relatively well-known for humans (on the order of 1.6 dB TTS/dB noise [Ward, Glorig, and Sklar, 1958; 1959]). While it is not well-understood for marine mammals (because studies to date have yet to induce sufficiently large TTS values to properly assess it), the slope of this portion of the function predicted by the Kastak et al. (2005) data fit with the curvilinear approximation (based on Maslen, 1981) was found to be comparable. Therefore, estimations of PTS from TTS onset that use a linear growth function with the steepest slope from a curvilinear function are very likely appropriate and in fact a conservative approximation, based on the information available at this time.

43. The MMS improperly segmented the analysis by only considering one summer of surveys, yet the surveying will be only the first of at least five summers. (NRDC)

The assessment of seismic effects (and effects from other reasonably foreseeable future actions) in the Beaufort Sea and Chukchi Sea is a three-step process. As a first step for those surveys taking place in 2006, the issue was examined initially in the *Final EIS for the OCS Oil and Gas Leasing Program, 2002 to 2007*, which included a description of the acoustic environment and examined potential effects of seismic surveys on the resources of the Alaska OCS. In doing so, the agency prepared a broad EIS to cover a number of smaller related activities, including seismic surveys. In the second step, MMS has undertaken a PEA, in part, to concentrate analysis on the Chukchi and Beaufort seas and explore options for mitigating potential effects, tiering from the analyses initiated in the 5-year program final EIS and Beaufort Sea multiple-sale NEPA documents. In the third step, permitting seismic-survey activities, MMS will conduct a review of each G&G permit application it receives to determine if the proposed activities are within the scope of the PEA analysis and whether further analysis is necessary. As such, the analysis of effects of the seismic surveys in 2006 will have been progressively more focused within the chain of tiered analyses.

The MMS is undertaking a similar process for surveys that may occur in 2007-2011 by first examining the activities in the *Draft EIS for the OCS Oil and Gas Leasing Program, 2007 to 2012*, currently under development. Additional NEPA analyses (lease-sale EIS's and EA's and site-specific environmental analyses) will tier from the programmatic EIS and will more progressively address activities, including effects from seismic surveys, anticipated during that period. Surveys conducted in 2006 will be included, as necessary, as past activities in the evaluating cumulative effects in the analyses conducted under the 2007-2012 program. Certainly, the results of monitoring required for the 2006 surveys will inform the

analysis of the future activities. As such, the cumulative effects of seismic surveys will be comprehensively described for the entire period for which they are anticipated to occur.

Additionally, the PEA serves as the NEPA documentation for NMFS, as a cooperating agency for their consideration of applications for IHA's. The IHA's are issued for specific permitted activities. As the duration of MMS, G&G permits may not exceed 1 year, the IHA's also would be limited to seismic surveying in the Chukchi and Beaufort seas only during the 2006 open-water season.

The MMS queried industry about their potential plans for seismic-surveying activities. Surveys beyond 2006 are dependent on the amount of data that is successfully collected during 2006, what the 2006 data indicate about the subsurface geology, and the results of proposed Beaufort Sea Sale 202 and Chukchi Sea Sale 193. The projected seismic surveys in the PEA were developed for the purpose of cumulative analysis.