UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

AUG 06 2010

Susan Childs
Regulatory Affairs Manager, Alaska Venture
Shell Exploration and Production
3601 C Street, Suite 1000
Anchorage, Alaska 99503

Dear Ms. Childs:

Enclosed is an Incidental Harassment Authorization (IHA) issued toShell Offshore Inc. under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*), to take, by Level B harassment only, small numbers of beluga whales (*Delphinapterus leucas*); harbor porpoise (*Phocoena phocoena*); bowhead whales (*Balaena mysticetus*); gray whales (*Eschrichtius robustus*); humpback whales (*Megaptera novaeangliae*); bearded seals (*Erignathus barbatus*); spotted seals (*Phoca largha*); and ringed seals (*P. hispida*) incidental to Shell's marine survey program in the Beaufort and Chukchi Sea during the 2010 open water season. The IHA is valid from August 6, 2010 through November 30, 2010.

You are required to comply with the conditions contained in the IHA. In addition, you must cooperate with any Federal, state or local agency authorized to monitor the impacts of your activities. If you have any questions concerning the IHA or its requirements, please contact Shane Guan, Office of Protected Resources, NMFS, at (301) 713-2289.

Sincerely,

James H. Lecky, Director
Office of Protected Resources

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Incidental Harassment Authorization

Shell Offshore Inc. (Shell), 3601 C Street, Suite 1314, Anchorage, Alaska, 99503, is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1371(a)(5)(D)) and 50 CFR 216.107 to take, by Level B harassment only, small numbers of marine mammals incidental to conducting an open water marine survey program in the Beaufort and Chukchi Seas in Arctic Ocean waters under the jurisdiction of the United States, contingent upon the following conditions:

1. This Authorization is valid from August 6, 2010, through November 30, 2010.

2. This Authorization is valid only for activities associated with the site clearance and shallow hazards survey, ice gouge survey, and strudel scour survey in the Beaufort Sea and ice gouge survey in the Chukchi Sea. The specific areas where Shell's marine surveys will be conducted are listed below.

> (a) Beaufort Sea site clearance and shallow hazards survey: Within an area north of Thetis Island more than 3 miles (4.8 km) to approximately 20 miles (33 km) offshore.
>
> (b) Beaufort Sea ice gouge survey: In both State of Alaska waters including Camden Bay, and the Federal waters of the Outer Continental Shelf (OCS) in the Beaufort Sea near Pt. Thomson ranging from near shore to approximately 37 miles (59.5 km) offshore.
>
> (c) Beaufort Sea strudel scour: In State of Alaska waters in Pt. Thomson ranging from near shore to 3 miles (4.8 km) offshore.
>
> (d) Chukchi Sea ice gouge survey: In both State of Alaska waters and the Federal waters of the OCS in the Chukchi Sea

3. (a) The species authorized for incidental harassment takings are: beluga whales (*Delphinapterus leucas*); harbor porpoise (*Phocoena phocoena*); bowhead whales (*Balaena mysticetus*); gray whales (*Eschrichtius robustus*); humpback whales (*Megaptera novaeangliae*); bearded seals (*Erignathus barbatus*); spotted seals (*Phoca largha*); and ringed seals (*P. hispida*).

(b) The authorization for taking by harassment is limited to vessel noise and to the following acoustic sources (or sources with comparable frequency and intensity) without an amendment to this Authorization:

(i) Deep penetration profiler (40 in^3 airgun source with 48-channel streamer) and medium penetration profiler (40 in^3 airgun source with 24-channel streamer) (modeled source level at 217 dB re 1 μPa @ 1 m);

(ii) Dual-frequency side scan sonar (100-400 kHz or 300-600 kHz, source level approximately 225 dB re 1 μPa @ 1 m when operated at 190 and 240 kHz);

(iii) Single beam echo sounder (high: 100-340 kHz, low: 24-50 kHz; source levels in the range of 180-200 dB re 1 μPa @ 1 m);

(iv) Multi-beam echo sounder (240 kHz);

(v) Shallow sub-bottom profiler (2-12 kHz, source level approximately 193.8 dB re 1 μPa @ 1 m at 3.5 kHz);

(vi) Dual-frequency sub-bottom profiler (2-7 kHz or 8-23 kHz, source level up to 184.6 dB re 1 μPa @ 1 m); and

(vii) Multi-beam sounder (240 kHz) and side-scan sonar system (190-210 kHz).

(c) The taking of any marine mammal in a manner prohibited under this Authorization must be reported within 24 hours of the taking to the Alaska Regional Administrator (907-586-7221) or his designee in Anchorage (907-271-3023), National Marine Fisheries Service (NMFS) and the Chief of the Permits, Conservation and Education Division, Office of Protected Resources, NMFS, at (301) 713-2289, ext. 110, or his designee (301-713-2289 ext. 137).

4. The holder must notify the Chief of the Permits, Conservation and Education Division, Office of Protected Resources, at least 48 hours prior to the start of collecting seismic data (unless constrained by the date of issuance of this Authorization in which case notification shall be made as soon as possible).

5. Prohibitions

(a) The taking, by incidental harassment only, is limited to the species listed under condition 3(a) above. The taking by Level A harassment, injury or death of these species or the taking by harassment, injury or death of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this Authorization.

(b) The taking of any marine mammal is prohibited whenever the required source vessel marine mammal observers (MMOs), required by condition 7(a)(i), are not onboard in conformance with condition 7(a)(i) of this Authorization or the passive acoustic monitoring program described in condition 8 is not fully implemented.

6. Mitigation

(a) General Mitigation: The holder of this Authorization is required to:

(i) Avoid concentrations or groups of whales by all vessels under the direction of Shell. Operators of support vessels should, at all times, conduct their activities at the maximum distance possible from such concentrations of whales.

(ii) Reduce vessel speed to below 10 knots when within 300 yards (274 m) of whales and those vessels capable of steering around such groups should do so. Vessels may not be operated in such a way as to separate members of a group of whales from other members of the group.

(iii) Avoid multiple changes in direction and speed when within 300 yards (274 m) of whales. In addition, operators should check the waters immediately adjacent to a vessel to ensure that no whales will be injured when the vessel's propellers (or screws) are engaged.

(iv) When weather conditions require, such as when visibility drops, adjust vessel speed accordingly to avoid the likelihood of injury to whales.

(vi) Fully implement the following measures, consistent with the 2010 Plan of Cooperation (POC), in order to avoid having an unmitigable adverse impact on the availability of marine mammal species or stocks for taking for subsistence uses:

(A) For the purposes of reducing or eliminating conflicts between subsistence whaling activities and Shell's survey program, the holder of this Authorization will participate with other operators in the Communication and Call Centers (Com-Center) Program. The Com-Centers will be operated 24 hours/day during the 2010 fall subsistence bowhead whale hunt.

(B) Source vessels shall transit through the Chukchi Sea along a route that lies offshore of the polynya zone. In the event the transit outside of the polynya zone results in Shell having to move away from ice, the source vessel may enter into the polynya zone. If it is necessary to move into the polynya zone, Shell shall notify the local communities of the change in the transit route through the Com-Centers.

(C) Shell shall implement the Communication Plan before initiating the 2010 program to coordinate activities with local subsistence users as well as Village Whaling Associations in order to minimize the risk of interfering with subsistence hunting activities, and keep current as to the timing and status of the bowhead whale migration, as well as the timing and status of other subsistence hunts. The Communication Plan shall include procedures for coordination with Com-Centers to be located in coastal villages along the Beaufort and Chukchi Seas during Shell's program in 2010.

(D) Shell shall employ local Subsistence Advisors from the Beaufort and Chukchi Sea villages to provide consultation and guidance regarding the whale migration and subsistence hunt. The subsistence advisor will use local knowledge (Traditional Knowledge) to gather data on subsistence lifestyle within the community and advise as to ways to minimize and mitigate potential impacts to subsistence resources during program activities. Responsibilities include reporting any subsistence concerns or conflicts; coordinating with subsistence users; reporting subsistence-related comments, concerns, and information; and advising how to avoid subsistence conflicts. A subsistence advisor handbook shall be developed prior to the operational season to specify position work tasks in more detail.

(E) Shell shall implement flight restrictions prohibiting aircraft from flying within 1,000 ft (300 m) of marine mammals or below 1,500 ft (457 m) altitude (except during takeoffs and landings or in emergency situations) while over land or sea.

(F) Upon notification by a Com-Center operator of an at-sea emergency, the holder of this Authorization shall provide such assistance as necessary to prevent the loss of life, if conditions allow the holder of this Authorization to safely do so.

(G) Upon request for emergency assistance made by a subsistence whale hunting organization, or by a member of such an organization, in order to prevent the loss of a whale, the holder of this Authorization shall assist towing of a whale taken in a traditional subsistence whale hunt, if conditions allow the holder of this Authorization to safely do so.

(H) Post-season Review: Following completion of the 2010 Beaufort and Chukchi Seas open water marine survey program, Shell shall conduct a co-management meeting with the

commissioners and committee heads of the Alaska Eskimo Whaling Commission, Eskimo Walrus Commission, Alaska Beluga Whale Committee, Alaska Ice Seal Committee, and the Alaska Nanuuq Commission to discuss results of mitigation measures and outcomes of the preceding season. The goal of the post-season meeting is to build upon the knowledge base, discuss successful or unsuccessful outcomes of mitigation measures, and possibly refine plans or mitigation measures if necessary.

(b) Seismic Vessel Mitigation: The holder of this Authorization is required to:

(i) Whenever a marine mammal is detected outside the exclusion zone radius and based on its position and motion relative to the ship track is likely to enter the safety radius, calculate and implement an alternative ship speed or track or de-energize the airgun array, as described in condition 6(b)(iii)(A) below.

(ii) Exclusion and Monitoring-Safety Zones:

(A) Establish and monitor with trained MMOs a preliminary exclusion zone for cetaceans surrounding the airgun array on the source vessel where the received level would be 180 dB re 1 μPa rms. For purposes of the field verification test, described in condition 7(c), this radius is estimated to be 125 m (410 ft) from the seismic source.

(B) Establish and monitor with trained observers a preliminary exclusion zone for pinnipeds surrounding the airgun array on the source vessel where the received level would be 190 dB re 1 μPa rms. For purposes of the field verification test described in condition 7(c), this radius is estimated to be 35 m (115 ft) from the seismic source.

(C) A 160-dB vessel monitoring zone for bowhead and gray whales will be established and monitored in the Chukchi Sea and after August 25 in the Beaufort Sea during all seismic surveys. Whenever an aggregation of 12 or more bowhead whales or gray whales that appear to be engaged in a non-migratory, significant biological behavior (e.g., feeding, socializing) are observed during an aerial or vessel monitoring program within the 160-dB safety zone around the seismic activity, the seismic operation will not commence or will shut down. For purposes of the field verification test described in condition 7(c), this radius is estimated to be 1,220 m (0.76 mi) from the seismic source.

(D) For seismic activities (including shallow hazards and site clearance and other marine surveys where active acoustic sources will be employed) in the Beaufort Sea after August 25, a 120-dB monitoring (safety) zone for bowhead whales will be established and monitored for the next 24 hours if four or more bowhead whale cow/calf pairs are observed at the surface during an aerial monitoring program within the area where an ensonified 120-dB zone around the vessel's track is projected. To the extent practicable, such monitoring should focus on areas upstream (eastward) of the bowhead migration. For purposes of the field verification test described in condition 7(c), this radius is estimated to be 14,900 m (9.26 mi) from the seismic source.

(E) Immediately upon completion of data analysis of the field verification measurements required under condition 7(c) below, establish and monitor the new 160-dB, 180-dB, and 190-dB marine mammal exclusion zones.

(iii) Power-down/Shutdown:

(A) Immediately power-down the seismic airgun array and/or other acoustic sources, whenever any cetaceans are sighted approaching close to or within the area delineated by the 180 dB re 1 μPa (rms), or pinnipeds are sighted approaching close to or within the area delineated by the 190 dB re 1 μPa (rms) isopleth as established under condition 6(b)(ii) for the authorized seismic airgun array. If the power-down operation cannot reduce the received sound pressure level at the cetacean or pinniped to 180 dB or 190 dB, whichever is appropriate, the holder of this Authorization must immediately shutdown the seismic airgun array and/or other acoustic sources.

(B) Not proceed with powering up the seismic airgun array unless the marine mammal exclusion zones described in conditions 6(b)(ii)(A) through (D) are visible and no marine mammals are detected within the appropriate safety zones; or until 15 minutes (for small odontocetes, pinnipeds) or a minimum of 30 minutes (for mysticetes) after there has been no further visual detection of the animal(s) within the safety zone and the trained MMOs on duty are confident that no marine mammals remain within the appropriate safety zone.

(C) In the unanticipated event that an injured or dead marine mammal is sighted within an area where the holder of this Authorization deployed and utilized seismic airguns within the past

24 hours, immediately shutdown the seismic airgun array and notify the Marine Mammal Stranding Network within 24 hours of the sighting (telephone: 1-800-853-1964).

(I). In the event that the marine mammal has been determined to have been deceased for at least 72 hours, as certified by the lead MMO onboard the source vessel, and no other marine mammals have been reported injured or dead during that same 72 hour period, the airgun array may be restarted (by conducting the necessary ramp-up procedures described in condition 6(b)(iv) below) upon completion of a written certification by the MMO. The certification must include the following: species or description of the animal(s); the condition of the animal(s) (including carcass condition if the animal is dead); location and time of first discovery; observed behaviors (if alive); and photographs or video (if available). Within 24 hours after the event specified herein, the holder of this Authorization must notify the designated staff person (see III below) by telephone or email of the event and ensure that the written certification is provided to the NMFS staff person.

(II). In the event that the marine mammal injury resulted from something other than seismic airgun operations (e.g., gunshot wound, polar bear attack), as certified by the lead MMO onboard the seismic vessel, the airgun array may be restarted (by conducting the necessary ramp-up procedures described in condition 6(b)(iv) below) upon completion of a written certification by the MMO. The certification must include the following: species or description of the animal(s); the condition of the animal(s) (including carcass condition if the animal is dead); location and time of first discovery; observed behaviors (if alive); and photographs or video (if available). Within 24 hours after the event specified herein, the holder of this Authorization must notify the designated staff person (see III below) by telephone or email of the event and ensure that the written certification is provided to the NMFS staff person.

(III). In the event the animal has not been dead for a period greater than 72 hours or the cause of the injury or death cannot be immediately determined by the lead MMO, the holder of this Authorization shall immediately report the incident to either the NMFS staff person designated by the Director, Office of Protected Resources (Shane Guan, Office of Protected Resources, NMFS, 301-713-2289 ext.

137 or Shane.Guan@noaa.gov) or to the staff person designated by the Alaska Regional Administrator (Brad Smith, Alaska Regional Office, NMFS, 907-271-3023 or Brad.Smith@noaa.gov). The lead MMO must complete written certification and provide it to the NMFS staff person. The certification must include the following: species or description of the animal(s); the condition of the animal(s) (including carcass condition if the animal is dead); location and time of first discovery; observed behaviors (if alive); and photographs or video (if available). The airgun array may be restarted (by conducting the necessary ramp-up procedures described in condition 6(b)(iv) below) upon completion of the written certification.

(IV). In the event that the marine mammal death or injury was directly caused by the seismic airgun operations (e.g., struck by a vessel, entangled in gear), the holder of this Authorization shall immediately report the incident to the designated NMFS staff person (see III above) by telephone or email and the Marine Mammal Stranding Network of the event and ensure that written certification is provided to the NMFS staff person. The certification must include the following: species or description of the animal(s); the condition of the animal(s) (including carcass condition if the animal is dead); location and time of first discovery; observed behaviors (if alive); and photographs or video (if available). The airguns may not be restarted until NMFS has had an opportunity to review the written certification and any accompanying documentation, make determinations as to whether modifications to the activities are appropriate and necessary, and has notified the holder that activities may be resumed. Approval to resume operations may be provided via letter, email, or telephone...

(iv). Ramp-up:

(A) Conduct a 30-minute period of marine mammal observations by at least two trained MMOs prior to commencing ramp-up described in condition 6(b)(iv)(C): (I) at the commencement of seismic operations and (II) at any time electrical power to the airgun array has been discontinued for a period of 10 minutes or more and the MMO watch has been suspended;

(B) Not commence ramp-up if the complete safety radii are not visible for at least 30 minutes prior to ramp-up in either daylight or

nighttime and not commence ramp-up at night unless the seismic source has maintained a sound source pressure level at the source of at least 180 dB re 1 μPa rms during the interruption of seismic survey operations. If a sound source of at least 180 dB re 1 μPa rms has been maintained during the interruption of seismic operations, then the 30 minute pre-ramp-up visual survey is waived; and

(C) Ramp-up the airgun arrays at no greater than 6 dB per 5-minute period starting with the smallest airgun in the array and then adding additional guns in sequence until the full array is firing, if no marine mammals are observed while undertaking conditions 6(iv)(A) and (B): (I) at the commencement of seismic operations and (II) anytime after the airgun array has been powered down for more than 10 minutes.

7. Monitoring:

(a) Vessel Monitoring:

(i) The holder of this Authorization must designate biologically-trained, on-site individuals (MMOs) to be onboard the source vessel, who are approved in advance by NMFS, to conduct the visual monitoring programs required under this Authorization and to record the effects of seismic surveys and the resulting noise on marine mammals.

(A) MMO teams shall consist of Inupiat observers and experienced field biologists. An experienced field crew leader will supervise the MMO team onboard the survey vessel. New observers shall be paired with experienced observers to avoid situations where lack of experience impairs the quality of observations.

(B) Crew leaders shall be individuals with experience as observers during one or more of the 1996 - 2009 seismic or shallow hazards monitoring projects in Alaska, the Canadian Beaufort, or other offshore areas in recent years.

(C) If there are Alaska Native MMOs, the MMO training that is conducted prior to the start of the survey activities shall be conducted with both Alaska Native MMOs and biologist MMOs being trained at the same time in the same room. There shall not be separate training courses for the different MMOs.

(E) Observers shall understand the importance of classifying marine mammals as "unknown" or "unidentified" if they cannot

identify the animals to species with confidence. In those cases, they shall note any information that might aid in the identification of the marine mammal sighted.

(ii) To the extent possible, MMOs should be on duty for four (4) consecutive hours or less, although more than one four-hour shift per day is acceptable. MMOs will not work more than three (3) shifts in a 24-hour period (i.e., 12 hours total per day).

(iii) Monitoring is to be conducted by the MMOs described in condition 7(a)(i) above, onboard the active seismic vessel, to (A) ensure that no marine mammals enter the appropriate safety zone whenever the seismic acoustic sources are on, and (B) to record marine mammal activity as described in condition 7(a)(vi) below. At least two observers must be on watch during ramp ups and the 30 minutes prior to full ramp ups, and for as large a fraction of the other operating hours as possible. At all other times, at least one observer must be on active watch whenever the seismic acoustic source is operating during all daytime airgun operations, during any nighttime power-ups of the airguns and at night, whenever daytime monitoring resulted in one or more power-down situations due to marine mammal presence.

(iv) At all times, the crew must be instructed to keep watch for marine mammals. If any are sighted, the bridge watch-stander must immediately notify the MMO(s) on-watch. If a marine mammal is within or closely approaching its designated exclusion (safety) zone, the seismic acoustic sources must be immediately powered down or shutdown (in accordance with condition 6(b)(iii)(A) above).

(v) Observations by the MMOs on marine mammal presence and activity will begin a minimum of 30 minutes prior to the estimated time that the seismic source is to be turned on and/or ramped-up.

(vi) Monitoring shall consist of recording: (A) the species, group size, age/size/sex categories (if determinable), the general behavioral activity, heading (if consistent), bearing and distance from seismic vessel, sighting cue, behavioral pace, and apparent reaction of all marine mammals seen near the seismic vessel and/or its airgun array (e.g., none, avoidance, approach, paralleling, etc); (B) the time, location, heading, speed, and activity of the vessel (shooting or not), along with sea state, visibility, cloud cover and sun glare at (I) any time a marine mammal is sighted, (II) at the start and end of each watch, and (III) during a watch (whenever there is a change in one or more variable); and, (C) the identification of all vessels that are visible within 5 km of the seismic vessel whenever a marine mammal is sighted, and the time observed, bearing, distance, heading, speed and activity of the other vessel(s).

(vii) MMOs shall watch for marine mammals from the best available vantage point on the survey vessel, typically the bridge. MMOs shall 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 ("Generation 3") when needed. With two or three observers on watch, the use of big eyes should be paired with searching by naked eye, the latter allowing visual coverage of nearby areas to detect marine mammals.

(viii) MMOs shall attempt to maximize the time spent looking at the water and guarding the safety radii. They shall avoid the tendency to spend too much time evaluating animal behavior or entering data on forms, both of which detract from their primary purpose of monitoring the safety zone.

(ix) MMOs shall use the best possible positions for observing (e.g., outside and as high on the vessel as possible), taking into account weather and other working conditions. MMOs shall carefully document visibility during observation periods so that total estimates of take can be corrected accordingly.

(x) For monitoring related to deployment of the AUV, MMOs will advise the vehicle operators prior to deployment if aggregations of marine mammals have been observed in the survey area which might increase the likelihood of the vehicle encountering an animal or otherwise disturbing a group of animals.

(b) Aerial Monitoring:

(i) Aerial survey flights will begin around August 20, 2010. Surveys will then be flown daily during the shallow hazards survey operations, weather and flight conditions permitting, and continued for 5 to 7 days after all activities at the site have ended.

(ii) For marine mammal monitoring flights, aircraft shall be flown at approximately 120 knots (138 mph) ground speed and usually at an altitude of 1,000 ft (305 m).

(iii) Two primary observers shall be seated at bubble windows on either side of the aircraft and a third observer shall observe part time and record data the rest of the time. All observers need bubble windows to facilitate downward viewing.

(iv) For each marine mammal sighting, the observer will dictate the species, number, size/age/sex class when determinable, activity, heading,

swimming speed category (if traveling), sighting cue, ice conditions (type and percentage), and inclinometer reading to the marine mammal into a digital recorder. The inclinometer reading will be taken when the animal's location is 90° to the side of the aircraft track, allowing calculation of lateral distance from the aircraft trackline.

(v) Transect information, sighting data and environmental data shall be entered into a GPS-linked computer by the third observer and simultaneously recorded on digital voice recorders for backup and validation.

(vi) At the start of each transect, the observer recording data shall record the transect start time and position, ceiling height (ft), cloud cover (in 10ths), wind speed (knots), wind direction (°T) and outside air temperature (°C). In addition, each observer shall record the time, visibility (subjectively classified as excellent, good, moderately impaired, seriously impaired or impossible), sea state (Beaufort wind force), ice cover (in 10ths) and sun glare (none, moderate, severe) at the start and end of each transect, and at 2-min intervals along the transect. The data logger will automatically record time and aircraft position (latitude and longitude) for sightings and transect waypoints, and at pre-selected intervals along transects.

(vii) Ice observations during aerial surveys will be recorded and satellite imagery may be used, where available, during post-season analysis to determine ice conditions adjacent to the survey area. These are standard practices for surveys of this type and are necessary in order to interpret factors responsible for variations in sighting rates.

(viii) Shell shall assemble the information needed to relate marine mammal observations to the locations of the survey vessel, and to the estimated received levels of industrial sounds at mammal locations. During the aerial surveys, Shell shall record relevant information on other industry vessels, whaling vessels, low-flying aircraft, or any other human activities that are observed in the survey area.

(ix) Shell shall also consult with the National Marine Mammal Laboratory regarding coordination during the survey activities and real-time sharing of data. The aims will be: (A) to ensure aircraft separation when both crews conduct surveys in the same general region; (B) to coordinate the 2010 aerial survey projects in order to maximize consistency and minimize duplication; and (C) to maximize consistency with previous years' efforts insofar as feasible.

(x) To address concerns regarding deflection of bowheads at greater distances, the survey pattern around shallow hazards survey operations

shall be designed to document whale distribution from about 25 mi (40 km) east of Shell's vessel operations to about 37 mi (60 km) west of operations.

(xi) Bowhead whale movements during the late summer/autumn are generally from east to west, and transects shall be designed to intercept rather than parallel whale movements. The transect lines in the grid shall be oriented north-south, equally spaced at 5 mi (8 km) and randomly shifted in the east-west direction for each survey by no more than the transect spacing. The survey grid will total about 808 mi (1,300 km) in length, requiring approximately 6 hours to survey at a speed of 120 knots (138 mph), plus ferry time.

(xii) Weather permitting, transects making up the grid in the Beaufort Sea shall be flown in sequence from west to east. This decreases difficulties associated with double counting of whales that are (predominantly) migrating westward.

(c) Field Source Verification: Using a hydrophone system, the holder of this Authorization is required to conduct sound source verification tests for all seismic sources and source vessels not previously measured and, at a minimum, report the following results within 5 days of completing the test:

(i) Shell shall conduct empirical measurements of the distances in the broadside and endfire directions at which broadband received levels reach 190, 180, 170, 160, and 120 dB re 1 μPa (rms) for the energy source array combinations that may be used during the survey activities. The configurations shall include at least the full array and the operation of a single source that will be used during power downs.

(ii) Power density spectra (frequency spectra) of high frequency active acoustic sources (operating frequency > 180 kHz) that will be used in Shell's marine surveys will also be measured against ambient background noise levels and reported in 1/3-octave band and 1-Hz band between 10 Hz and 180 kHz.

8. Research: The holder of the Authorization, in cooperation with other oil company participants, must conduct all monitoring described in the "*Marine Mammal Monitoring and Mitigation Plan for Proposed Open Water Marine Survey Program in the Beaufort and Chukchi Seas, Alaska, During 2010.*" Research will include establishment of: (i) an acoustic program to measure sounds produced by the source vessel (required under condition 7(c) above); and (ii) deployment of arrays of acoustic recorders to localize bowhead whale and other marine mammal vocalization and to further understand, define, and document sound characteristics and propagation resulting from site clearance and shallow hazards surveys that may have the potential to cause deflections of bowhead whales from their migratory pathway.

9. Reporting:

(a) Sound Source Verification and the distances to the various isopleths and power density spectra of high frequency active acoustic sources are to be reported to NMFS within five (5) days of completing the measurements. In addition to reporting the radii of specific regulatory concern, distances to other sound isopleths down to 120 dB rms (if measurable) will be reported in increments of 10 dB.

(b) Seismic Vessel Monitoring Program: A draft report will be submitted to the Director, Office of Protected Resources, NMFS, within 90 days after the end of Shell's 2010 open water marine survey program in the Beaufort and Chukchi Seas. The report will describe in detail: (i) the operations that were conducted; (ii) the results of the acoustical measurements to verify the safety radii; (iii) the methods, results, and interpretation pertaining to all monitoring tasks; (iv) the results of the 2010 shipboard and aerial marine mammal monitoring; (v) a summary of the dates and locations of seismic operations, including summaries of power-downs, shutdowns, and ramp-up delays; (vi) marine mammal sightings (species, numbers, dates, times and locations; age/size/gender, environmental correlates, activities, associated seismic survey activities); (vii) estimates of the amount and nature of potential take (exposure) of marine mammals (by species) by harassment or in other ways to industry sounds; (viii) an analysis of the effects of seismic operations (e.g., on sighting rates, sighting distances, behaviors, movement patterns of marine mammals); (ix) an analysis of factors influencing detectability of marine mammals; (x) all spatial data on charts (including vessel location); (xi) summaries on communications with hunters and potential effects on subsistence uses; and (xii) make all data available in the report or electronically for integration with data from other companies.

(c) The draft report will be subject to review and comment by NMFS. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS. The draft report will be considered the final report for this activity under this Authorization if NMFS has not provided comments and recommendations within 90 days of receipt of the draft report.

(d) A draft comprehensive report describing the acoustic and vessel-based monitoring programs will be prepared and submitted within 240 days of the date of this Authorization. The comprehensive report will describe the methods, results, conclusions and limitations of each of the individual data sets in detail. The report will also integrate (to the extent possible) the studies into a broad based assessment of all industry activities and their impacts on marine mammals in the Arctic Ocean during 2010.

(e) The draft comprehensive report will be subject to review and comment by NMFS, the AEWC, and the North Slope Borough Department of Wildlife

Management. The draft comprehensive report will be accepted by NMFS as the final comprehensive report upon incorporation of comments and recommendations.

(f) Shell shall accommodate specific requests for raw data, including tracks of all vessels and aircraft associated with the operation and activity logs documenting when and what types of sounds are introduced into the environment by the operation.

10. Activities related to the monitoring described in this Authorization do not require a separate scientific research permit issued under section 104 of the Marine Mammal Protection Act.

11. The Plan of Cooperation outlining the steps that will be taken to cooperate and communicate with the native communities to ensure the availability of marine mammals for subsistence uses must be implemented.

12. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein or if the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals, or if there is an unmitigable adverse impact on the availability of such species or stocks for subsistence uses.

13. A copy of this Authorization must be in the possession of each seismic vessel operator taking marine mammals under the authority of this Incidental Harassment Authorization.

14. Shell is required to comply with the Terms and Conditions of the Incidental Take Statement corresponding to NMFS' Biological Opinion.

James H. Lecky
Director, Office of Protected Resources
National Marine Fisheries Service

AUG 0 6 2010
Date