DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Incidental Harassment Authorization

Shell Offshore, Inc. and WesternGeco, Inc.(SOI/WG) are 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 a marine seismic survey program in the Chukchi and Beaufort seas in Arctic Ocean waters under the jurisdiction of the United States, contingent upon the following conditions:

1. This Authorization is valid from the date of this Authorization through August 1, 2008, or until a new Incidental Harassment Authorization is issued to SOI/WG, whichever is earlier.

2. This Authorization is valid only for activities (including support vessels and aircraft) associated with the *M/V Gilavar* and *M/V Henry Christoffersen* conducting deep and shallow-hazard seismic survey programs in the Chukchi and Beaufort seas, as specified in SOI's November 22, 2006 application.

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

(b) The authorization for taking by harassment is limited to the following acoustic sources without an amendment to this Authorization:

(i) On the *M/V Gilavar*:

(A) A Bolt-seismic airgun array of 3147 in^3 composed of 3 identically tuned 1049-in^3 Bolt-gun sub-arrays operating at an air pressure of 2,000 psi;
(B) a subbottom profiler (1 - 12.0 kHz);
(C) a boomer/sparker/ airgun (400-800 Hz);
(D) a hi-resolution multi-channel seismic system (20-300 Hz);
(E) a multi-beam bathymetric sonar (200-500 kHz) ; and
(F) a side-scan sonar system.

(ii) On the *M/V Henry Christoffersen*:

(A) a dual frequency subbottom profiler, Datasonics CAP6000 Chirp II (2-7kHz

or 8-23kHz)
(B) a medium penetration Subbottom profiler, Datasonics SPR-1200 Bubble Pulser (400 Hz);
(C)a hi-resolution multi-channel seismic system consisting of 2 subarrays of 2-10 in^3 (2X10) airgun array (0-150 Hz);
(D) a multi-beam bathymetric sonar, Seabat 8101 (240 kHz); and
(E) a side-scan sonar system, Datasonics SIS-1500 (190kHz - 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), NMFS and the Chief of the Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, at (301) 713-2289, ext 110, or his designee.

4. The holder of this Authorization is required to cooperate with the National Marine Fisheries Service and any other Federal, state or local agency with authority to monitor the impacts of the activity on marine animals. 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), whenever moving between the Chukchi Sea and the Beaufort Sea, and whenever not conducting seismic for more than 48 hours.

5. Prohibitions

(a) The taking, by incidental harassment only, is limited to the species listed under condition 3(a) above. The taking by serious injury or death of these species or the taking by behavioral 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 whenever the required seismic vessel marine mammal observer (MMO), required by condition 7(a)(i)), is not onboard in conformance with condition 7(a)(i), or the coastal or offshore aerial, and/or the dedicated vessel and passive acoustic monitoring programs have not been fully implemented as required by this Authorization.

(c) The taking of any marine mammals by seismic sounds when the seismic vessel is within 15 miles of another operating seismic vessel.

6. Mitigation.

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

(i) (A) Avoid concentrations or groups of whales by all vessels and aircraft under the direction of SOI or WG. Operators of support vessels and aircraft should, at all times,

conduct their activities at the maximum distance possible from such concentrations of whales. Under no circumstances, other than an emergency, should aircraft operate at an altitude lower than 1,000 feet when within 500 lateral yards of groups of whales. Helicopters may not hover or circle above such areas or within 500 lateral yards of such areas; and (B) When weather conditions do not allow a 1,000-ft flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below the 1,000-ft altitude stipulated above. However, when aircraft are operated at altitudes below 1,000 feet because of weather conditions, the operator must avoid known whale concentration areas and should take precautions to avoid flying directly over or within 500 yards of groups of whales.

(ii) take every precaution to avoid harassment of whale concentrations when a vessel is operated near these animals. Vessels should reduce speed when within 300 yards 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 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) not operate support vessels (including small boats) at a speed that would make collisions with whales likely.

(v) when weather conditions require, such as when visibility drops, vessels should adjust speed accordingly to avoid the likelihood of injury to whales.

(vi) (A) Operate in full compliance with the agreed-upon Conflict Avoidance Agreement; or (B) If the signed Conflict Avoidance Agreement has expired or been nullified by the Holder of this Authorization, the following mitigation measures must be fully implemented:

(I) for the purposes of reducing or eliminating conflicts between subsistence whaling activities and Shell's seismic program, the Holder of this Authorization will establish and operate at least five Communication Centers to be staffed by Inupiat operators. The Com-Centers will be operated 24 hours/day during the 2007 fall subsistence bowhead whale hunt.

(II) Plan all vessel and aircraft routes to minimize any potential conflict with bowhead whale subsistence whaling activities. All vessels shall avoid areas of active or anticipated whaling activity.

(III) During the bowhead whaling season, aircraft shall not operate below 1500 ft unless approaching, landing or taking off, or unless engaged in providing assistance to a whaler or in poor weather (low ceilings) or other emergency situations.

(IV) All geophysical activity in the Beaufort Sea and Chukchi seas shall be restricted from conducting seismic as set forth below:

(*1*) *Kaktovik*: No geophysical activity from the Canadian border to the Canning River (~146 deg. 4 min. W) from 25th August to the end of the fall bowhead whale hunt

in Kaktovik and Nuiqsut;

(*2*) *Nuiqsut*: No geophysical activity from the Canning River (~146 deg. 4 min. W) to Point Storkersen (~ 148 deg. 45 min. W) from August 25th to the end of the fall bowhead whale hunt in Nuiqsut;

(3) *Barrow*: No geophysical activity from Pitt Point on the east side of Smith Bay (~ 152 deg. 15 min. W) to a location about half way between Barrow and Peard Bay (~157 deg. 20 min. W) from September 10 to the end of the fall bowhead whale hunt in Barrow.

(*4*) *Chukchi Sea*: Geophysical exploration may occur beginning July 20, but in any case geophysical exploration activities may not occur closer than 60 miles from the Chukchi Sea coast at any point.

(*5*) Seismic vessel transits in the Chukchi Sea spring lead system must not occur prior to July 1, 2008.

(V) Upon notification by Communication Center operator of an at-sea emergency, the Holder of this Authorization shall provide such assistance as necessary to prevent the loss of life.

(VI) 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.

(VII) Geophysical exploration may resume following the close of the fall 2007 bowhead whale subsistence hunt in Barrow, Wainwright, and Point Hope.

(VIII)(*a*) Post-Season Review: No later than 90 days following the end of the fall 2007 bowhead subsistence hunt, Shell will host a joint meeting with all whaling captains of the Villages of Nuiqsut, Kaktovik and Barrow, the Inupiat Communicator(s) and with the Chairman and Executive Director of the AEWC at a mutually agreed upon place on the North Slope to review the results of the 2007 fall season (unless it is agreed by all designated individuals or their representatives that such a meeting should be held at a different location, should be postponed, or is not necessary).

(*b*) No later than 90 days following completion of geophysical operations in the Chukchi Sea, Shell will host a meeting in each of the following villages: Wainwright, Point Hope, and Barrow (or a joint meeting of the whaling captain from all these villages if the whaling captains agree to a joint meeting) to review the results of operations and to discuss any concerns residents of those villages might have regarding the operations.

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

(i) Reduce the volume of the airgun array during vessel turns while running seismic lines.

(ii) To the extent practicable, 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, an alternative ship speed or track will be calculated and implemented.

(iii) Exclusion and Monitoring-Safety Zones:

(A) Establish and monitor with trained observers a preliminary exclusion zone for cetaceans surrounding the seismic airgun array on the *M/V Gilavar* where the received level would be 180 dB re 1 μPa rms. For purposes of the field verification test, described in condition 7(d), this radius is estimated to be 0.75 mi (1.2 km) from the seismic source.

(B) Establish and monitor with trained observers a preliminary exclusion zone for pinnipeds surrounding the seismic airgun array on the *M/V Gilavar* where the received level would be 190 dB re 1 μPa rms. For purposes of the field verification test described in condition 7(d), this radius is estimated to be 0.3 mi (0.5 km) from the seismic source.

(C) Establish and monitor with trained observers a preliminary exclusion zone for cetaceans and pinnipeds surrounding the high-resolution seismic airgun array on the *M/V Henry Christoffersen* where the received level would be 180 dB and 190 dB re 1 μPa rms, respectively.

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

(E) Cetacean Monitor (Safety) Zones:

(I) Whenever the support "chase" vessel monitoring program described in condition 7(b) below detects an aggregation of 12 or more non-migratory balaenopterid whales within an acoustically verified 160-dB rms zone ahead of, or perpendicular to, the seismic vessel track, the holder of this Authorization must: (a) Immediately power-down the seismic airgun array and/or other acoustic sources to ensure that sound pressure levels at the shortest distance to the aggregation do not exceed 160 dB rms; and (b) Not proceed with powering up the seismic airgun array until biological observers on board the support "chase" vessel(s) or survey aircraft confirm that no balaenopterid aggregations have been detected within the 160-dB zone based upon ship course, direction and distance from last sighting and the last aggregation sighting appropriate safety zones;

(II) Whenever the aerial monitoring program described in conditions 7(c) below detects 4 bowhead whale cow/calf pairs within an acoustically-verified 120-dB monitoring zone, the holder of this Authorization must: (a) Immediately power-down the seismic airgun array and/or other acoustic sources to ensure that sound pressure levels are reduced by at least 50 percent ; and (b) not proceed with ramping up the seismic airgun array until two consecutive

aerial surveys confirm that there are no more than 3 bowhead cow/calf pairs within the area to be seismically surveyed within the next 24 hours.

(iv) Power-down/Shut-down.

(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)(iii) 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 shut-down 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 condition 6(b)(iii)(A), (B), and (C) 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/large odontocetes) after there has been no further visual detection of the animal(s) within the safety zone and the trained MMO on duty is confident that no marine mammals remain within the appropriate safety zone.

(C) Emergency shut-down. If observations are made or credible reports are received that one or more marine mammals are within the area of this activity in an injured or mortal state, or are indicating acute distress, the seismic airgun array will be immediately shut down and the Chief of the Permits, Conservation and Education Division, Office of Protected Resources or a staff member contacted. The airgun array will not be restarted until review and approval has been given by the Director, Office of Protected Resources or his designee.

(v) Ramp-up

(A) Prior to commencing ramp-up described in condition 6 (b)(v)(C), conduct a 30-minute period of marine mammal observations by at least one trained MMO (1) at the commencement of seismic operations and (2) at any time electrical power to the airgun array is discontinued for a period of 10 minutes or more and the MMO watch has been suspended;

(B) If the complete safety radii are not visible for at least 30 minutes prior to ramp-up in either daylight or nighttime, do not commence ramp-up unless the seismic source has maintained a sound pressure level at the source of at least 180 dB re 1 μPa rms during the interruption of seismic survey operations.

(C) If no marine mammals are observed while undertaking mitigation conditions 6(v)(A) and (B), ramp-up airgun arrays no greater than approximately 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: (1) At the commencement of seismic operations, and (2), anytime after the airgun array has been powered down for more than 10 minutes;

7. Monitoring.

(a) Vessel Monitoring:

(i) Seismic Vessel: The holder of this Authorization must designate biologically-trained, on-site individuals to be onboard the *M/V Gilavar* and *M/V Henry Christoffersen*, and designated support vessels conducting marine mammal observations or surveys, approved in advance by National Marine Fisheries Service (one may be an Inupiat), 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. The minimum number of observers required are:

(A) Between August 16 and September 15, 2007, there must be at least 4 MMOs onboard each source vessel at any one time during all seismic operations;

(B) Between September 16 and the end of the 2007 survey, there must be at least 3 MMOs onboard each source vessel at any time during all seismic operations.

(C) Between July 20, 2008 and August 1, 2008, there must be at least 5 MMOs onboard each source vessel at any one time during all seismic operations.

(ii) To the extent possible, MMOs should be on duty for 4 consecutive hours or less, although more than one 4-hour shift per day is acceptable.

(iii) Monitoring is to be conducted by the MMOs described in condition 7(a)(i) above, onboard each active seismic vessel, to (A) ensure that no marine mammals enter the appropriate safety zone whenever the seismic array is 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 airgun array 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 biological observer on-watch. If a marine mammal is within, or closely approaching, its designated safety zone, the airgun array must be immediately powered down.

(v) Observations by the biological observers described in condition 7(a)(i) above

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 will consist of recording: (i) 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) and; (ii) the time, location, heading, speed, and activity of the vessel (shooting or not), along with sea state, visibility, cloud cover and sun glare at (1) any time a marine mammal is sighted, (2) at the start and end of each watch, and (3) during a watch (whenever there is a change in one or more variable); and, (iii) 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) All biological observers must be provided with and use appropriate night-vision devices, Big Eyes, and reticulated and/or laser range finding binoculars.

(b) Chase Boat Monitoring:

(i) At least one "chase boat"and/or support vessel will assist in monitoring safety and monitoring zones during active seismic survey operations in the Chukchi and Beaufort Seas. The chase boat and support vessel will have at least two MMOs onboard to collect marine mammal observations.

(ii) During all active seismic survey activity, the chase boat will conduct marine mammal surveys no less than every 48 hours or 3 times per 7 days, and at all other times except during re-supply operations, of the 160-dB area to be seismically surveyed over the next 24 hours. MMOs will search for aggregations of bowhead and gray whale feeding utilizing a survey designed approved in advance by the National Marine Fisheries Service.

(iii) The MMOs on the chase boat will immediately contact the seismic survey ship if marine mammals are sited within the 180/190-dB safety zone or aggregations of 12 or more non-migratory bowhead whales or gray whales are sited within the surveyed 160-dB zone.

(iv) MMOs onboard chase boats will be limited to 4 hrs in length and 12 hrs total in a 24 hr period.

(c) Aerial Surveys: Beaufort Sea:

(i) In accordance with the survey design described in Shell's revised Beaufort Sea monitoring plan, the holder of this Authorization must conduct aerial surveys of the seismic area and nearby waters (A) biweekly through August 31, 2007, and (B) daily, weather permitting, from September 1, 2007, until 3 days after the conclusion of the seismic program.

(ii) Using standard aerial survey procedures for marine mammal surveys, monitoring is to be conducted by 2 primary biological observer(s) and a third observer for part-time observations and data logging.

(iii) Aerial monitoring will consist of noting the marine mammal species, number, age/size/sex class (if determinable), general activity, heading (if consistent), swimming speed category (if traveling), sighting cue, ice conditions, and inclinometer reading.

(iv) As proposed by SOI, after September 1, 2007, the aerial survey will look for migratory cow/calf pairs during normal survey activity. If the biological observers onboard the aircraft see 4 or more migratory bowhead whale cow/calf pairs within the surveyed portion of the 120-dB isopleth from the seismic survey vessel, the lead observer or his/her designee will contact the MMO on watch onboard the seismic vessel of the observation. The location, bearing and approximate speed of the migratory bowhead whales will be recorded.

(d) Field Source Verification Using a bottom founded hydrophone system, the holder of this Authorization is required to measure and report within 5 days of completing the test:

(i)(A) the empirical distances from the airgun array to broadband received levels of 190, 180, 170, 160, and 120 dB(rms) re 1 microPa, and

(i)(B) the radiated sounds vs. distance from the primary seismic vessels supporting the survey.

(ii) Measurements are to be made at the beginning of the survey for locations not previously modeled in the Chukchi Sea and Beaufort Sea in water depths shallower than 200 m (656 ft) and water depths greater than 200 m (656 ft).

8. Research

(a) The holder of the Authorization, in cooperation with other oil company participants must conduct all research described in the "Marine Mammal Monitoring and Mitigation Plan for Seismic Exploration in the Alaskan Chukchi and Beaufort Seas, 2007." Research will include establishment of:(i) an acoustic program to measure sounds produced by seismic vessels (required under condition 7(d); (ii) an aerial monitoring and reconnaissance of marine mammals available for subsistence harvest along the Chukchi Sea coast; (iii) deployment, and later analysis of data from, bottom-founded autonomous acoustic recorder arrays along the coast of the Chukchi Sea to record ambient sound levels, vocalizations of marine mammals, and received levels of seismic operations should they be detectable and, (iv) an acoustic study of bowhead deflections in the Beaufort Sea.

9. Reporting.

(a) Field Source Verification and the distances to the various radii are to be reported to the National Marine Fisheries Service within 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 National Marine Fisheries Service within 90 days after the end of Shell's seismic survey program in the Arctic Ocean. 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 2007 shipboard marine mammal monitoring;; (v), a summary of the dates and locations of seismic operations, including summaries of power downs, shut downs, 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) provide an analysis of factors influencing detectability of marine mammals; and (x) provide summaries on communications with hunters and potential effects on subsistence uses.

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

(d) A draft comprehensive report describing the acoustic, vessel-based, and aerial 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 2007.

(e) The draft comprehensive report will be reviewed by participants at the 2008 Open Water Scientific Meeting to be held in Anchorage AK in the spring of 2008. The draft comprehensive report will be accepted by the National Marine Fisheries Service as the final comprehensive report upon incorporation of recommendations by the workshop participants.

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 and the Conflict Avoidance Agreement 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 to the extent one exists.

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 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.

8/20/07

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

Date