

## DEPARTMENT OF COMMERCE

## National Oceanic and Atmospheric Administration

[I.D. 040799A]

## Taking and Importing of Marine Mammals; Offshore Seismic Activities in the Beaufort Sea

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

**ACTION:** Notice of issuance of an incidental harassment authorization.

**SUMMARY:** In accordance with provisions of the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that an Incidental Harassment Authorization (IHA) to take small numbers of bowhead whales and other marine mammals by harassment incidental to conducting seismic surveys in the Western Beaufort Sea in state and Federal waters has been issued to Western Geophysical/Western Atlas International of Houston, Texas (Western Geophysical).

**DATES:** Effective from July 20, 1999, until November 1, 1999, unless extended.

**ADDRESSES:** The application, authorization, monitoring plan, environmental assessment (EA), and a list of references used in this document are available by writing to Donna Wieting, Chief, Marine Mammal Conservation Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Silver Spring, MD 20910-3225, or by telephoning one of the contacts listed here.

**FOR FURTHER INFORMATION CONTACT:** Kenneth R. Hollingshead, NMFS, (301) 713-2055, Brad Smith, NMFS, (907) 271-5006.

## SUPPLEMENTARY INFORMATION:

## Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Permission may be granted if NMFS finds that the taking will have a negligible impact on the species or

stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses and if the permissible methods of taking and requirements pertaining to the monitoring and reporting of such taking are set forth.

On April 10, 1996 (61 FR 15884), NMFS published an interim rule establishing, among other things, procedures for issuing incidental harassment authorizations under section 101(a)(5)(D) of the MMPA in Arctic waters. For additional information on the procedures to be followed for this authorization, please refer to that document.

## Summary of Request

On March 24, 1999, NMFS received an application from Western Geophysical requesting an authorization for the harassment of small numbers of several species of marine mammals incidental to conducting seismic surveys during the open water season in the Beaufort Sea between western Camden Bay and Harrison Bay off northern Alaska. Weather permitting, the survey is expected to take place between approximately July 1 and mid-to late-October, 1999. However, only a small portion of the area between western Camden Bay and Harrison Bay will be surveyed this year. A detailed description of the work proposed for 1999 is contained in the application (Western Geophysical, 1999) and is available upon request (see **ADDRESSES**).

Disturbance by seismic noise is the principal means of taking by this activity. Support vessels and aircraft will provide a potential secondary source of noise. The physical presence of vessels and aircraft could also lead to non-acoustic effects on marine mammals involving visual or other cues.

Seismic surveys are used to obtain data about geological formations several thousands of feet deep. The proposed seismic operation is an ocean bottom cable (OBC) survey. For this activity, OBC surveys involve dropping cables from a ship to the ocean bottom, forming a patch consisting of 4 parallel cables 8.9 kilometers (km) (4.8 nautical miles (nm)) long, separated by approximately 600 meters (m) (1,968 feet (ft)) from each other. Hydrophones and geophones, attached to the cables, are used to detect seismic energy reflected back from underground rock strata. The source of this energy is a submerged acoustic source, called a seismic airgun array, that releases compressed air into the water, creating an acoustical energy pulse that is directed downward toward the seabed. The source level planned for this project

- a maximum of 247 dB re 1  $\mu$ Pa-m or 22.3 bar-meters (zero to peak), or a maximum of 252 dB re 1  $\mu$ Pa-m or 39 bar-meters (peak-to-peak) - will be from an airgun array with a air discharge volume of 1,210 in<sup>3</sup>. This compares to the 1,500 in<sup>3</sup> array used on Western Geophysical's primary source vessel in 1998 and will be the only airgun array used by Western Geophysical in the Beaufort Sea this year.

It is anticipated that 34 seismic lines will be run for each patch, covering an area 5.0 km by 15.7 km (2.7 nm by 8.1 nm), centered over the patch. Source lines for one patch will overlap with those for adjacent patches.

After sufficient data have been recorded to allow accurate mapping of the rock strata, the cables are lifted onto the deck of a cable-retrieval vessel, moved to a new location (ranging from several hundred to a few thousand feet away), and placed onto the seabed again. For a more detailed description of the seismic operation, please refer to the 1999 application from Western Geophysical.

Depending upon ambient noise conditions and the sensitivity of the receptor, underwater sounds produced by open water seismic operations may be detectable a substantial distance away from the activity. Any sound that is detectable is (at least in theory) capable of eliciting a disturbance reaction by a marine mammal or of masking a signal of comparable frequency (Western Geophysical, 1999). An incidental harassment take is presumed to occur when marine mammals in the vicinity of the seismic source, the seismic vessel, other vessels, or aircraft react to the generated sounds or to visual cues.

Seismic pulses are known to cause strong avoidance reactions by many of the bowhead whales occurring within a distance of several kilometers and may sometimes cause avoidance or other changes in bowhead behavior at considerably greater distances (Richardson *et al.*, 1995; Rexford, 1996; MMS, 1997). It is also possible that seismic pulses may disturb some other marine mammal species occurring in the area.

Although some limited masking of low-frequency sounds (e.g., whale calls) is a possibility, the intermittent nature of seismic source pulses (<1 second in duration every 16 to 24 seconds) will limit the extent of masking. Bowhead whales are known to continue calling in the presence of seismic survey sounds, and their calls can be heard between seismic pulses (LGL and Greeneridge, 1997, 1998, 1999a; Richardson *et al.*, 1986). Masking effects are expected to

be absent in the case of belugas, given that sounds important to them are predominantly at much higher frequencies than are airgun sounds (Western Geophysical, 1999).

Hearing damage is not expected to occur during the project. It is not positively known whether the hearing systems of marine mammals very close to an airgun might be subject to temporary or permanent hearing impairment (Richardson *et al.*, 1995). However, planned monitoring and mitigation measures (described later in this document) are designed to avoid sudden onsets of seismic pulses at full power, to detect marine mammals occurring near the array, and to avoid exposing them to sound pulses that have any possibility of causing hearing impairment.

When the received levels of noise exceed some behavioral reaction threshold, cetaceans will show disturbance reactions. The levels, frequencies, and types of noise that will elicit a response vary between and within species, individuals, locations, and seasons. Behavioral changes may be subtle alterations in surface, respiration, and dive cycles. More conspicuous responses include changes in activity or aerial displays, movement away from the sound source, or complete avoidance of the area. The reaction threshold and degree of response are related to the activity of the animal at the time of the disturbance. Whales engaged in active behaviors, such as feeding, socializing, or mating, are less likely than resting animals to show overt behavioral reactions, unless the disturbance is directly threatening.

#### *Bowhead Whales*

Various studies (Reeves *et al.*, 1984, Fraker *et al.*, 1985, Richardson *et al.*, 1986, Ljungblad *et al.*, 1988) have reported that, when an operating seismic vessel approaches within a few kilometers, most bowhead whales exhibit strong avoidance behavior and changes in surfacing, respiration, and dive cycles. In studies prior to 1996, bowheads exposed to seismic pulses from vessels more than 7.5 km (4.0 nm) away rarely showed observable avoidance of the vessel, but their surface, respiration, and dive cycles appeared altered in a manner similar to that observed in whales exposed at a closer distance (Western Geophysical, 1999).

Within a 6- to 99-km (3.2 to 53.5 nm) range, it has not been possible to determine a specific distance at which subtle behavioral changes no longer occur (Richardson and Malme, 1993), given the high variability observed in

bowhead whale behavior (Western Geophysical, 1999). However, in three studies of bowhead whales and one of gray whales, surfacing-dive cycles have been unusually rapid in the presence of seismic noise, with fewer breaths per surfacing and longer intervals between breaths (Richardson *et al.*, 1986; Koski and Johnson, 1987; Ljungblad *et al.*, 1988; Malme *et al.*, 1988). This pattern of subtle effects was evident among bowheads 6 km to at least 73 km (3.2 to 39 nm) from seismic vessels. However, in the pre-1996 studies, active avoidance usually was not apparent unless the seismic vessel was closer than about 6 to 8 km (3.2 to 4.3 nm) (Western Geophysical, 1999).

Inupiat whalers believe that migrating bowheads are sometimes displaced at distances considerably greater than 6 to 8 km (3.3 to 4.3 nm) (Rexford, 1996). Also, whalers have mentioned that bowheads sometimes seem more "skittish" and more difficult to approach when seismic exploration is underway in the area. Results from the 1996-1998 BP Exploration (Alaska) (BP) and Western Geophysical seismic monitoring program indicate that most bowheads avoided an area within about 20 km (12.4 mi) of nearshore seismic operations (Miller *et al.*, 1998, 1999). The received levels of the seismic pulse at 20 km range were about 115-130 dB re 1  $\mu\text{Pa}_{\text{rms}}$  @ 1 m). It is possible that, when additional data are available and analyzed, it may be demonstrated that isolated bowheads avoid seismic vessels at distance beyond 20 km (10.8 nm). Also, the "skittish" behavior may be related to the observed subtle changes in the behavior of bowheads exposed to seismic pulses from distant seismic vessels (Richardson *et al.*, 1986).

#### *Gray Whales*

The reactions of gray whales to seismic pulses are similar to those of bowheads, but apparently are limited to animals exposed to higher levels of seismic pulses. Migrating gray whales along the California coast were noted to slow their speed of swimming, turn away from seismic noise sources, and increase their respiration rates. Malme *et al.* (1983, 1984, 1988) concluded that approximately 50 percent showed avoidance when the average received pulse level was 170 dB (re 1  $\mu\text{Pa}$ ). By some behavioral measures, clear effects were evident at average pulse levels of 160+dB; less consistent results were suspected at levels of 140-160 dB. Recent research on migrating gray whales showed responses similar to those observed in the earlier research when the source was moored in the migration corridor 2 km (1.1 nm) from

shore. However, when the source was placed offshore (4 km (2.2 nm) from shore) of the migration corridor, the avoidance response was not evident on track plots (Tyack and Clark, 1998).

#### *Beluga*

The beluga is the only species of toothed whale (Odontoceti) expected to be encountered in the Beaufort Sea. Because the beluga hearing threshold at frequencies below 100 Hz (where most of the energy from airgun arrays is concentrated) is poor (125 dB re 1  $\mu\text{Pa}$ ) or more depending upon frequency (Johnson *et al.*, 1989; Richardson *et al.*, 1991, 1995), beluga are not predicted to be strongly influenced by seismic noise. However, because of the high source levels of seismic pulses, airgun sounds sometimes may be audible to beluga at distances of 100 km (54 nm) (Richardson and Wursig, 1997). The reaction distance for beluga, although presently unknown, is expected to be less than that for bowheads, given the presumed poorer sensitivity of belugas than that of bowheads for low-frequency sounds (Western Geophysical, 1999).

#### *Ringed, Largha and Bearded Seals*

No detailed studies of reactions by seals to noise from open water seismic exploration have been published (Richardson *et al.*, 1995). However, there are some data on the reactions of seals to various types of impulsive sounds (LGL and Greeneridge, 1997, 1998, 1999a; J. Parsons as quoted in Greene, *et al.* 1985; Anon., 1975; Mate and Harvey, 1985). These studies indicate that ice seals typically either tolerate or habituate to seismic noise produced from open water sources.

Underwater audiograms have been obtained using behavioral methods for three species of phocinid seals: ringed, harbor, and harp seals (*Pagophilus groenlandicus*). These audiograms were reviewed in Richardson *et al.* (1995) and Kastak and Schusterman (1998). Below 30-50 kHz, the hearing threshold of phocinids is essentially flat down to at least 1 kHz and ranges between 60 and 85 dB (re 1  $\mu\text{Pa}$  @ 1 m). There are few data on hearing sensitivity of phocinid seals below 1 kHz. NMFS considers harbor seals to have a hearing threshold of 70-85 dB at 1 kHz (60 FR 53753, October 17, 1995), and recent measurements for a harbor seal indicate that, below 1 kHz, its thresholds deteriorate gradually to 96 dB (re 1  $\mu\text{Pa}$  @ 1 m) at 100 Hz (Kastak and Schusterman, 1998).

Recent studies have provided some data are available on the reactions of seals to various types of impulsive sounds (see LGL and Greeneridge, 1997,

1998, 1999a; Thompson *et al.* 1998). These references indicate that it is unlikely that pinnipeds would be harassed or injured by low frequency sounds from a seismic source unless they were within relatively close proximity of the seismic array. For permanent injury, pinnipeds would likely need to remain in the high-noise field for extended periods of time. Existing evidence also suggests that, while seals may be capable of hearing sounds from seismic arrays, they appear to tolerate intense pulsatile sounds

without known effect once they learn that there is no danger associated with the noise (see, for example, NMFS/ Washington Department of Wildlife, 1995). In addition, they will apparently not abandon feeding or breeding areas due to exposure to these noise sources (Richardson *et al.*, 1991) and may habituate to certain noises over time. Since seismic work is fairly common in Beaufort Sea waters, pinnipeds have been previously exposed to seismic noise and may not react to it after initial exposure.

For a discussion on the anticipated effects of ships, boats, and aircraft, on marine mammals and their food sources, please refer to the application (Western Geophysical, 1999). Information on these effects is incorporated in this document by citation.

#### Numbers of Marine Mammals Expected to be Taken

Western Geophysical estimates that the following numbers of marine mammals may be subject to Level B harassment, as defined in 50 CFR 216.3:

Species	Population Size	Harassment Takes in 1999	
		Possible	Probable
Bowhead	9,900		
160 dB criterion	-	1,000	<500
20 km criterion	-	2,500	1,250
Gray whale	26,600	<10	0
Beluga	39,258	250	<150
Ringed seal*	1-1.5 million	400	<200
Spotted seal*	>200,000	10	<2
Bearded seal*	>300,000	50	<15

\* Some individual seals may be harassed more than once.

#### Effects of Seismic Noise and Other Activities on Subsistence Needs

The disturbance and potential displacement of marine mammals by sounds from seismic activities are the principle concerns related to subsistence use of the area. The harvest of marine mammals (mainly bowhead whales, ringed seals, and bearded seals) is central to the culture and subsistence economies of the coastal North Slope communities. In particular, if migrating bowhead whales are displaced farther offshore by elevated noise levels, the harvest of these whales could be more difficult and dangerous for hunters. The harvest could also be affected if bowheads become more skittish when exposed to seismic noise.

Nuiqsut is the community closest to the area of the proposed activity, and it harvests bowhead whales only during the fall whaling season. In recent years, Nuiqsut whalers typically take two to four whales each season (Western Geophysical, 1999). Nuiqsut whalers concentrate their efforts on areas north and east of Cross Island, generally in water depths greater than 20 m

(65 ft). Cross Island, the principal field camp location for Nuiqsut whalers, is located within the general area of the proposed seismic area. Thus, the possibility and timing of potential seismic operations in the Cross Island area requires Western Geophysical to provide NMFS with either a Plan of Cooperation with North Slope Borough

residents or to identify measures that have been or will be taken to avoid any unmitigable adverse impact on subsistence needs. Western Geophysical's application has identified those measures that will be taken to minimize any adverse effect on subsistence. In addition, the timing of seismic operations in and east of the Cross Island area has been addressed in a Conflict and Avoidance Agreement (C&AA) with the Nuiqsut whalers and the Alaska Eskimo Whaling Commission (AEWC).

Whalers from the village of Kaktovik search for whales east, north, and west of the village. Kaktovik is located 60 km (32.4 nm) east of the easternmost end of Western Geophysical's planned 1999 seismic exploration area. The westernmost reported harvest location was about 21 km (11.3 nm) west of Kaktovik, near 70°10'N, 144°W (Kaleak, 1996). That site is approximately 40 km (21.6 nm) east of the closest part of Western Geophysical's planned seismic exploration area for 1999 (Western Geophysical, 1999).

Whalers from the village of Barrow search for bowhead whales much further from the planned seismic area, >200 km (>108 nm) west (Western Geophysical, 1999).

The location of the proposed seismic activity is south of the center of the westward migration route of bowhead whales, but there is some overlap. Seismic monitoring results from 1996–1998 indicate that most bowheads avoid

the area within about 20 km (11 nm) around the array when it is operating. In addition, bowheads may be able to hear the sounds emitted by the seismic array out to a distance of 50 km (27 nm) or more, depending on the ambient noise level and the efficiency of sound propagation along the path between the seismic vessel and the whale (Miller *et al.*, 1997). Western Geophysical (1999) believes it is unlikely that changes in migration route will occur at distances greater than 25 km (13 nm) from an array of maximum volume of 1,210 in<sup>3</sup> operating in water less than 30 m (100 ft) deep. However, subtle changes in behavior might occur out to longer distances. Inupiat whalers believe that bowheads begin to divert from their normal migration path more than 35 miles (56 km) away (MMS, 1997).

It is recognized that it is difficult to determine the maximum distance at which reactions occur (Moore and Clark, 1992). As a result, Western Geophysical are participating in a C&AA with the whalers to reduce any potential interference with the hunt. Also, it is believed that the monitoring plan proposed by Western Geophysical (1999; also see LGL Ltd. and Greeneridge Sciences Inc, 1999b) will provide information that will help resolve uncertainties about the effects of seismic exploration on the accessibility of bowheads to hunters.

Many Nuiqsut hunters hunt seals intermittently year-round. However, during recent years, most seal hunting

has been during the early summer in open water. In summer, boat crews hunt ringed, spotted and bearded seals. The most important sealing area for Nuiqsut hunters is off the Colville delta, extending as far west as Fish Creek and as far east as Pingok Island. This area overlaps with the westernmost portion of the planned seismic area. In this area, during summer, sealing occurs by boat when hunters apparently concentrate on bearded seals. However, these subsistence hunters have not perceived any interference from recent open-water seismic activities in the Alaskan Beaufort Sea. Therefore, because Western Geophysical is proposing similar mitigation and consultation procedures this year, it is unlikely that seismic activities would have more than a negligible impact on Nuiqsut seal hunting.

### Comments and Responses

A notice of receipt of the application and proposed authorization was published on May 28, 1999 (64 FR 28992), and a 30-day public comment period was provided on the application and proposed authorization. During the comment period, comments regarding this application were received from the Marine Mammal Commission (MMC), LGL Ltd. environmental research associates on behalf of the applicant, and Greenpeace Alaska (Greenpeace).

#### MMPA Concerns

*Comment 1:* LGL Ltd provided information updating and correcting the **Federal Register** notice that Western has no intention to use an array larger than 1,210 in<sup>3</sup> during 1999.

*Response:* Thank you for providing this information.

*Comment 2:* LGL Ltd questioned the statement in the **Federal Register** document that the proposed seismic activity occurs in waters generally too shallow and distant from the edge of the pack ice for most marine mammals, and that this statement is not consistent with the IHA Application and the EA. LGL notes that 5 of the 6 marine mammal species requested for taking occur within the seismic area; only the beluga remains (with a few exceptions) far offshore near the ice edge.

*Response:* NMFS agrees.

*Comment 3:* Greenpeace believes that NMFS and Western Geophysical have failed to provide the evidence necessary to justify issuance of the IHA by relying on outdated, incomplete and inaccurate information on the zone of influence of seismic operations on bowhead whales.

*Response:* To make a determination of negligible impact on marine mammal stocks or a finding of not having an

unmitigable adverse impact on subsistence uses of marine mammals, NMFS relies on the best scientific information available. The latest scientific information has been obtained through a 3-year program of data collection and analysis, including aerial surveys and acoustic monitoring. Greenpeace does not identify any additional sources of information not already considered by NMFS or Western Geophysical. Western Geophysical's IHA application and the notice of proposed authorization note that, in addition to the known responses of bowhead whales out to a distance of several kilometers, less conspicuous and/or less frequent effects may extend to greater distances. The draft final monitoring report describing the 1996 through 1998 monitoring results (Richardson [ed.], 1999) shows that (1) 1996, 1997 and 1998 seismic programs did not greatly influence the position of the overall migration corridor; (2) the aerial surveys showed avoidance of the area within 20 km (12 mi) of seismic operations, plus partial avoidance of the area 20–30 km (12–19 mi) away, and (3) based on 1998 research, there is no evidence that bowhead disturbance extended 37 km (23 mi) offshore of the northern edge of the seismic exploration area. For additional information on the estimated zones that seismic airgun noise may have an effect on bowhead whales, please refer to the proposed authorization notice mentioned in this document.

Scientists, at least, recognize that it is difficult (for to determine the maximum distance at which disturbance and avoidance reactions may have an adverse impact on subsistence needs (Moore and Clark, 1992). Inupiat whalers, on the other hand, believe that whales exhibit avoidance reactions as far as 30 miles (48 km) away (MMS, 1997). As a result, Western Geophysical has developed a C&AA with the whalers to reduce any potential interference with the hunt.

Also, it is believed that the monitoring plan proposed by Western Geophysical (LGL Ltd., LGL Alaska Research Associates, and Greeneridge, 1999), revised on the basis of comments received during this public comment period and at the Peer-Review Workshop, will provide information that will help resolve uncertainties about the effects of seismic exploration on the bowhead whales and the accessibility of bowheads to hunters.

*Comment 4:* Greenpeace believes the scientific evidence remains inadequate to determine whether hearing or behavior of marine mammals may be damaged temporarily or permanently by

seismic operations. This makes it impossible to put adequate mitigation measures into place when there is inadequate knowledge about the impacts of seismic operations on cetaceans' hearing and behavior.

*Response:* The impact of airguns on bowhead hearing and behavior has been addressed in several documents, including Western Geophysical's application, the supporting EA, and in LGL Ltd and Greeneridge Sciences (1998) and most recently in LGL Ltd, LGL Alaska Research Associates, and Greeneridge Sciences (1999). Without an ability to collect empirical information on physical impacts from airguns on large marine mammals, scientists must rely on surrogate species and make conservative assumptions based upon findings for those species. For bowhead and beluga whales, NMFS and Western Geophysical use the best scientific information available which indicates that a safety zone set at the 180 dB (re 1  $\mu$ Pa) isopleth will protect bowhead and beluga whales from potential serious injury. Furthermore, the avoidance reactions by bowheads and the offshore migration corridor of belugas minimize the number of bowheads and belugas entering or approaching the 180 dB zone. Only one bowhead and no belugas have been seen in that zone during the 1996, 1997, and 1998 monitoring projects (Richardson *et al.*, 1999). Because there are potential behavioral effects on bowhead whales by seismic activities, an IHA is warranted. Under the IHA, NMFS will require Western Geophysical to incorporate mitigation and monitoring measures approved by the 1999 Peer Review Workshop participants to reduce potential impacts on whales and seals to the lowest level practicable.

*Comment 5:* Greenpeace notes that NMFS fails to place restrictions on seismic operations during times of limited or zero visibility.

*Response:* Observers monitor the safety zones and zones of potential harassment around the seismic source whenever visibility permits, and the source is either on or within 30 minutes of powering up. This year observers will be aided by high-intensity lighting for monitoring the safety zone at night. Assessments of takes by harassment will be made based upon the percentage of time spent observing in relation to the total time for seismic operations. Because: (1) relatively few marine mammals are expected in the area during the time of the survey, (2) the vessels are underway at low speeds while conducting seismic surveys, theoretically allowing animals sufficient time to move away from any

annoyances, and (3) documented observations indicate that bowhead whales avoid active seismic survey areas, few marine mammals, and no bowheads, are expected to approach the vessel. Therefore, terminating surveys at night and during inclement weather is not warranted, in part since to do so could extend the seismic season into the peak bowhead migration period resulting in an increased level of harassment of that species.

*Comment 6:* Greenpeace states that the issuance of an IHA will result in significant and unmitigable impacts to subsistence communities and the Arctic marine environment.

*Response:* Section 101(a)(5)(D)(i)(II) of the MMPA requires NMFS to ensure that any taking will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. NMFS relies on two factors in determining if there will be an unmitigable adverse impact on subsistence uses: First, the impact resulting from the specified activity must be likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by (1) causing the marine mammals to abandon or avoid hunting areas, (2) directly displacing subsistence users, or (3) placing physical barriers between the marine mammals and subsistence hunters. Second, it must be an impact that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met (50 CFR 216.103). This standard of determining impact does not require the elimination of adverse impacts, but it does require mitigation sufficient to meet subsistence requirements. However, the MMPA also requires that, where applicable, the measures will ensure the least practicable impact on the availability of marine mammals for taking for subsistence uses. In previous years, these conditions were met through the AEWC/oil industry's C&AA which required seismic operations to move west of Cross Island no later than September 1 or when whalers commenced the bowhead hunting season, whichever was earlier. A signed C&AA allows NMFS to conclude that there will not be an unmitigable adverse impact on the subsistence needs of the Arctic Slope whalers this year due to seismic activities.

*Comment 7:* LGL Limited notes that the mitigation section of the **Federal Register** document does not mention that Western Geophysical plans to participate in a C&AA with the whalers in order to avoid interference with the autumn bowhead hunt. While the C&AA

is mentioned in the previous section (regarding impacts on subsistence uses), Western Geophysical and LGL Ltd view the C&AA as one of the primary mitigation measures, as it addresses the requirement to identify measures to ensure the "least practicable adverse impact on ...availability for subsistence uses."

*Response:* Thank you for the comment.

*Comment 8:* Greenpeace contends that Western Geophysical's proposed marine mammal monitoring program fails to adequately monitor the impact of seismic operations on marine mammals.

*Response:* NMFS disagrees. Section 101(a)(5)(D)(ii)(II) of the MMPA requires authorizations issued under this section to prescribe, where applicable, requirements pertaining to the monitoring and reporting of such taking by harassment, including requirements for independent peer review of proposed monitoring plans or other research proposals where the proposed activity may affect the availability of a species or stock for taking for subsistence purposes.

Western Geophysical's proposed monitoring plan for 1999 and the results from Western Geophysical's 1998 Beaufort Sea research were the subject of a scientific peer-review workshop held in Seattle, WA, on June 30 and July 1, 1999. As a result of that workshop, Western Geophysical is amending its monitoring plan and will submit that plan to NMFS for approval prior to commencement of the bowhead season. Modifications to the original plan for monitoring during the bowhead season (if seismic surveys are continuing at that time) include (1) an extension of the aerial survey grid by an extra 15 km (8 nm) east and west to approximately 65 km (35 nm) westward and 65 km eastward of the seismic survey; this will address the issues (a) how far west of the seismic area do bowhead whales remain farther offshore than usual if bowheads are displaced offshore by seismic and (b) where the bowhead whale deflection from the migration track due to seismic noise begins; (2) an increase in the number of aerial survey track lines from 14 to 18; and (3) commencing the aerial surveys on September 1, rather than September 4; and (4) additional autonomous seafloor acoustic recorders offshore from the area of seismic operations.

*Comment 9:* The MMC recommends that the peer-review group established to review the proposed monitoring and mitigation programs be asked to consider the following questions: (1) Whether continuation of the marine mammal observations in association

with seismic surveys in the nearshore waters of the Alaska Beaufort Sea beyond 1999 is likely to produce significant new information on either the short- or long-term effects of seismic surveys on marine mammals that occur in the area, (2) whether the types of site-specific monitoring programs conducted to date are sufficient to verify that seismic surveys and related activities have negligible effects on the distributions, sizes, and populations, and (3) if the answer to either issue is no, how should the monitoring requirements be revised to better meet the intent and provisions of the MMPA?

*Response:* NMFS believes that at a minimum, shipboard monitoring of the safety zone must continue to implement mitigation measures to protect marine mammals from potential serious injury. The Scientific Peer Review Workshop participants concluded that the current research and monitoring proposed here by Western Geophysical and by BPX for oil development at Northstar (see 64 FR 9965, March 1, 1999), coupled with existing projects to monitor bowhead population abundance (trends in abundance) should provide information necessary to determine overall cumulative impacts on bowhead whales. Existing projects include those by the North Slope Borough (spring bowhead census), the MMS autumn aerial survey, and the MMS-funded photo-identification of bowhead whales being conducted as part of an on-going (1998–2000) bowhead feeding study. Provided trends in bowhead abundance continue to be positive, NMFS presumes industrial development on the North Slope is not adversely affecting the bowhead population. Similar work is underway for ringed seals.

*Comment 10:* Greenpeace believes that NMFS ignores cumulative impacts from oil exploration and development in the Arctic on subsistence communities, the bowhead whale, other marine mammals, and the Arctic marine environment.

*Response:* Information on the cumulative impacts on the marine environment from Beaufort Sea oil and gas leasing and development activities, including seismic, in the area under discussion has been addressed previously in several environmental impact statements (EIS) prepared by the Minerals Management Service (MMS) (Final EISs for Lease Sale 124 and 144 completed in 1990 and 1996). More recently, cumulative impacts from oil exploration and development were extensively discussed and evaluated in the U.S. Army Corps of Engineer's Final Environmental Impact Statement (FEIS) on the Northstar Oil Development

Project (Corps, 1999). NMFS was a cooperating agency under the National Environmental Policy Act (NEPA) in the preparation of that document. Additional discussion on cumulative impacts from seismic activities in conjunction with offshore oil and gas exploration and development can be found in the EA prepared for this action (NMFS, 1999). NMFS notes that because the Northstar Project construction has been delayed until after the 1999 open water season, other than commercial barge traffic, there are no identified activities that might cause a cumulative impact on the whales, seals or subsistence needs of the North Slope this season.

**Comment 11:** Noting that the activity for which an IHA authorization is requested is part of an effort likely to be continued in subsequent years and to eventually lead to drilling and other activities associated with oil and gas exploration and production, the MMC questions whether there is sufficient basis for concluding that this year's activities, coupled with past and possible future activities will not have a non-negligible cumulative effects on any of the potentially affected marine mammal species or their availability to Alaska Natives for subsistence uses. As a result, the MMC recommends that NMFS, if it has not already done so, assess whether the monitoring required as a condition of this and possible future IHAs will be adequate to detect possible non-negligible cumulative effects and, if not, what needs to be done to ensure that any such effects will be detected before they reach significant levels and could be irreversible.

**Response:** Please see response to comment 9.

**Comment 12:** Greenpeace noted that the results of Western Geophysical's 1998 marine mammal monitoring program are not available for review along with its 1999 IHA application. The results of the 1998 monitoring program should be available for public review prior to the close of the public comment period.

**Response:** The preliminary results of the 1998 monitoring program are contained in the 90-day report, which was issued in January 1999, and in the IHA application. The draft final report for 1998 was due on April 30, 1999. Because the draft final report was expanded to contain an analysis of several previous years' data, the availability of this report was delayed until late May, when it was reviewed by NMFS scientists and participants at the peer review workshop. While monitoring reports are available to the public for review, there is no

requirement for these documents to be made available for formal public review and comment. Reviewers are encouraged to rely on the 90-day report and reports from prior years if they wish to analyze the previous years' data. As noted by Greenpeace in their letter, the 1996 and 1997 monitoring reports have been reviewed by them.

#### *Endangered Species Act (ESA) Concerns*

**Comment 13:** Without clarification, Greenpeace believes that issuance of the IHA would violate the ESA.

**Response:** NMFS disagrees, noting that the issuance of an IHA to Western Geophysical triggers section 7 of the ESA, as the issuance of the IHA is a Federal action (please refer to the section titled ESA later in this document). However, the major Federal agency for offshore oil and gas lease activities is the MMS. Consultation under section 7 for lease sale 144 was concluded on November 16, 1995 with a finding that the action was not likely to jeopardize the continued existence of listed species under the jurisdiction of NMFS. This finding is consistent with the conclusions and recommendations contained within the Arctic Region Biological Opinion issued by MMS under section 7 of the ESA by NMFS on November 23, 1988.

Reinitiation of formal consultation under section 7 is warranted only when there is new scientific information that has the potential to call into question the scientific and commercial data used in the previous biological opinion. At this time, NMFS does not consider the recent findings on impacts to listed marine species from the disturbance from seismic surveys sufficient to reinitiate consultation.

#### *NEPA Concerns*

**Comment 14:** Greenpeace believes that the EA fails to adequately analyze the full scope and cumulative impacts of current and proposed offshore exploration and development activities in the Beaufort Sea. Greenpeace maintains that the impacts from seismic operations cannot be assessed separately from cumulative impacts from offshore exploratory drilling, development and transportation activities that may follow or are already occurring. This includes the impact of global warming on the Arctic environment.

**Response:** Please see response to comment 10.

#### *Mitigation*

This year, Western Geophysical will reduce its airgun array from the 1,500 in<sup>3</sup> used in 1998 to 1,210 in<sup>3</sup> and investigate whether it is practical to

modify the design to reduce horizontal propagation of sound. These changes are expected to result in lower received levels and, therefore, smaller safety ranges and reduced takes by harassment than in 1998. However, because the 1,210 in<sup>3</sup> array is a subset (with some minor variations) of the 1,500 in<sup>3</sup> array (with 4 guns not firing), NMFS is limiting the IHA authorization for a taking by harassment to no more than 12 airguns totaling 1,210 in<sup>3</sup> during the 1999 open water seismic survey. Vessel-based observers will monitor marine mammal presence in the vicinity of the seismic array throughout the seismic program. To avoid the potential for serious injury to marine mammals, Western Geophysical will power down the seismic source if pinnipeds are sighted within the area delineated by the 190 dB isopleth or 240 m (787.4 ft) from the array operating at 5 m (16.4 ft) depth or 80 m (262.5 ft) from the array operating at 2 m (6.6 ft) depth. Western Geophysical will power down the seismic source if bowhead, gray, or beluga whales are sighted within the area delineated by the 180 dB isopleth or within 750 m (2,460.6 ft) of the array operating at 5 m (16.4 ft) depth or 360 m (1,181.1 ft) of the array operating at 2 m (6.6 ft) depth. However, because these safety zones were based on measurements near the 1998 seismic array plus theoretical adjustments for the smaller array size in 1999, within the first 10 days of Beaufort Sea operations in 1999, Western Geophysical will measure and analyze the sounds from Western's 1999 array operating at both 5 m (16.4 ft) and 2 m (6.6 ft) depths. This information will be provided to NMFS, along with the contractor's recommendation as to whether any adjustments in the safety radii are needed to meet the 190 and 180 dB<sub>rms</sub> shutdown criteria.

In addition, Western Geophysical will ramp-up the seismic source to operating levels at a rate no greater than 6 dB/min anytime the array has not been firing for 1–2 minutes (depending upon vessel speed). Ramp-up will begin with an air volume discharge not exceeding 80 in<sup>3</sup> with additional guns added at intervals appropriate to limit the rate of increase to 6 dB/min.

#### *Monitoring*

As part of its application, Western Geophysical provided a monitoring plan for assessing impacts to marine mammals from seismic surveys in the Beaufort Sea. This monitoring plan is described in Western Geophysical (1999) and in LGL Ltd., LGL Alaska Research Associates, and Greeneridge Sciences (1999). This monitoring plan

has been peer-reviewed by NMFS, AEWC and industry scientists and others at a workshop held in Seattle, WA on June 30 and July 1, 1999. Suggested modifications to the monitoring plan as a result of the workshop (most notably those summarized previously in the response to comment 8) will need to be incorporated into the Plan prior to formal acceptance by NMFS. During the 1999 open-water season, Western Geophysical will conduct the following:

#### *Vessel-based Visual Monitoring*

One or two biologist-observers aboard the seismic vessel will search for and observe marine mammals whenever seismic operations are in progress, and for at least 30 minutes prior to planned start of shooting. These observers will scan the area immediately around the vessels with reticle binoculars during the daytime supplemented with night-vision equipment during the night (prior to mid-August, there are no hours of darkness). In addition, Western Geophysical will experiment with illumination of the safety zone with high-intensity lighting.

A total of four observers (three trained biologists and one Inupiat observer/communicator) will be based aboard the seismic vessel. Use of four observers is an increase over 1998 and will allow two observers to be on duty simultaneously for up to 50 percent of the active airgun hours. Use of two observers will increase the probability of detecting marine mammals and two observers will be required to be on duty whenever the seismic array is ramped up. Individual watches will normally be limited to no more than 4 consecutive hours.

When mammals are detected within or about to enter the safety zone designated to prevent injury to the animals (see Mitigation), the geophysical crew leader will be notified so that shutdown procedures can be implemented immediately.

#### *Aerial Surveys*

If the seismic program continues after August 31, Western Geophysical will conduct daily aerial surveys, weather permitting, from September 1, 1999, for a period of 13–14 days, or, if seismic work ends before September 13, until one day after seismic work ends. The primary objective will be to document the occurrence, distribution, and movements of bowhead and (secondarily) beluga and gray whales in and near the area where they might be affected by the seismic pulses. These observations will be used to estimate the level of harassment takes and to assess

the possibility that seismic operations affect the accessibility of bowhead whales for subsistence hunting. Pinnipeds will be recorded when seen. Aerial surveys will be at an altitude of 300 m (1,000 ft) above sea level. Western Geophysical will fly at 457 m (1500 ft) altitude over areas where whaling is occurring on that date to avoid direct overflights of whaleboats and Cross Island, where whalers from Nuiqsut are based during their fall whale hunt.

The daily aerial surveys are proposed to cover a grid of 18 north-south lines spaced 8 km (4.3 nm) apart and will extend seaward to about the 100 m (328 ft) depth contour (typically about 65 km (35 nm) offshore. This grid will extend from about 65 km (35 nm) east to 65 km (35 nm) west of the area in which seismic operations are underway on that date. This design will provide extended coverage to the west to determine the westward extent of the offshore displacement of whales by seismic. In 1999, the additional "intensive" grid survey will not be conducted as in previous years.

Detailed information on the survey program can be found in Western Geophysical (1999) and in LGL Ltd., LGL Alaska Research Associates, and Greeneridge Sciences Inc. (1999), which are incorporated in this document by citation.

#### *Acoustical Measurements*

The acoustic measurement program for 1999 is designed to continue the acoustic work conducted in 1996 through 1998 (see LGL and Greeneridge Sciences Inc., 1997, 1998, 1999). The acoustic measurement program is planned to include (1) vessel-based acoustic measurements, (2) OBC-based acoustic measurements, and, if seismic operations continue into September, (3) use of air-dropped sonobuoys and (4) bottom-mounted acoustical recorders.

(1) A vessel-based acoustical measurement program will be conducted for a few days early in the seismic program. The objectives of this survey will be as follows: (a) to measure the levels and other characteristics of the horizontally propagating seismic survey sounds from the type of airgun array to be used in 1999 as a function of distance and aspect relative to the seismic source vessel and in relation to the operating depth of the airguns, and (b) to measure the levels and frequency composition of the vessel sounds emitted by vessels used regularly during the 1999 program in those cases when these vessels have not previously been measured adequately.

(2) Western Geophysical and Greeneridge Sciences will use recorded signals from Western's OBC system to help document horizontal propagation of the seismic survey pulses.

(3) Sonobuoys will be dropped and monitored from bowhead survey aircraft during September 1 through 13, 1999 (if the seismic operations are continuing at that time). Sonobuoys will provide data on characteristics of seismic pulses (and signal-to-ambient ratios) at offshore locations, including some of those places where bowhead whales are observed.

(4) Autonomous seafloor acoustic recorders will be placed on the sea bottom at two locations offshore of the seismic operation area, and at one location about 40 km (25 mi) to the east, to record low-frequency sounds nearly continuously for up to 3 weeks at a time during September (if seismic operations are continuing at that time). Information includes characteristics of the seismic pulses, ambient noise, and bowhead calls.

For a more detailed description of planned monitoring activities, please refer to the application and supporting document (Western Geophysical, 1999; LGL Ltd., LGL Alaska Research Associates, and Greeneridge Sciences, 1999).

#### *Estimates of Marine Mammal Take*

Estimates of takes by harassment will be made through vessel and, if seismic operations continue into September, aerial surveys. Western Geophysical will estimate the number of (a) marine mammals observed within the area ensonified strongly by the seismic vessel; (b) marine mammals observed showing apparent reactions to seismic pulses (e.g., heading away from the seismic vessel in an atypical direction); (c) marine mammals subject to take by type (a) or (b) when no monitoring observations were possible; and (d) bowheads displaced seaward from the main migration corridor.

#### **Reporting**

Western Geophysical will provide an initial report on 1999 activities to NMFS within 90 days of the completion of the seismic program. This report will provide dates and locations of seismic operations, details of marine mammal sightings, estimates of the amount and nature of all takes by harassment, and any apparent effects on accessibility of marine mammals to subsistence users.

A final technical report will be provided by Western Geophysical within 20 working days of receipt of the document from the contractor, but no later than April 30, 2000. The final



technical report will contain a description of the methods, results, and interpretation of all monitoring tasks. This report will be subject to review and comment by NMFS. Any recommendations made by NMFS will need to be addressed in the final report prior to formal acceptance by NMFS.

### Consultation

Under section 7 of the ESA, NMFS has completed consultation on the issuance of this authorization.

### NEPA

In conjunction with the 1996 notice of proposed authorization (61 FR 26501, May 28, 1996) for open water seismic operations in the Beaufort Sea, NMFS released an EA that addressed the impacts on the human environment from issuance of the authorization and the alternatives to the proposed action. No comments were received on that document and, on July 18, 1996, NMFS concluded that neither implementation of the proposed authorization for the harassment of small numbers of several species of marine mammals incidental to conducting seismic surveys during the open water season in the U.S. Beaufort Sea nor the alternatives to that action would significantly affect the quality of the human environment. As a result, the preparation of an EIS on this action is not required by section 102(2) of NEPA or its implementing regulations.

While this year's activity is a continuation of the seismic work conducted between 1996 and 1998, NMFS determined that a new EA was warranted based on the proposed construction of the Northstar project, the collection of data from 1996 through 1998 on Beaufort Sea marine mammals and the impacts of seismic activities on these mammals, and the analysis of scientific data indicating that bowheads avoid nearshore seismic operations by up to about 20 km (10.8 nm). Accordingly, a review of the impacts expected from the issuance of an IHA has been assessed in detail in the EA and in this document, and NMFS has determined that there will be no more than a negligible impact on marine mammals from the issuance of the harassment authorization and that there will not be any unmitigable impacts to subsistence communities, provided the mitigation measures required under the authorization are implemented. As a result, NMFS has again determined that neither implementation of the authorization for the harassment of small numbers of several species of marine mammals incidental to conducting seismic surveys during the

open water season in the U.S. Beaufort Sea nor the alternatives to that action would significantly affect the quality of the human environment. As a result, the preparation of an EIS on this action is not required by section 102(2) of NEPA or its implementing regulations.

### Conclusions

Based on the evidence provided in the application, the EA, and this document, and taking into consideration the comments submitted on the EA, application, and proposed authorization notice, NMFS has determined that there will be no more than a negligible impact on marine mammals from the issuance of the harassment authorization to Western Geophysical and that there will not be any unmitigable adverse impacts to subsistence communities, provided the mitigation measures required under the authorization are implemented. NMFS has determined that the short-term impact of conducting seismic surveys in the U.S. Beaufort Sea will result, at worst, in a temporary modification in behavior by certain species of cetaceans and possibly pinnipeds. While behavioral and avoidance reactions may be made by these species in response to the resultant noise, this behavioral change is expected to have a negligible impact on the animals.

While the number of potential incidental harassment takes will depend on the distribution and abundance of marine mammals (which vary annually due to variable ice conditions and other factors) in the area of seismic operations, the number of potential harassment takings is estimated to be small. In addition, no take by death and/or serious injury is anticipated, and the potential for temporary or permanent hearing impairment will be avoided through the incorporation of the mitigation measures mentioned in this document and required by the authorization. No rookeries, mating grounds, areas of concentrated feeding, or other areas of special significance for marine mammals occur within or near the planned area of operations during the season of operations.

Because bowhead whales are east of the seismic area in the Canadian Beaufort Sea until late August/early September, seismic activities are not expected to impact bowhead whales or the subsistence hunting of bowhead whales prior to that date. After September 1, 1999, if seismic activities continue beyond that date, aerial survey flights for bowhead whale assessments will be initiated. Depending upon the date of cessation of seismic activities (expected to be no later than September

10, 1999), NMFS estimates that fewer than 750 bowheads will be harassed incidental to seismic-related activities.

Appropriate mitigation measures to avoid an unmitigable adverse impact on the availability of bowhead whales for subsistence needs have been the subject of consultation between Western Geophysical and subsistence users. This C&AA, which consists of three main components: (1) Communications, (2) conflict avoidance, and (3) dispute resolution, has been concluded for the 1999 open-water seismic season.

Also, while open-water seismic exploration in the U.S. Beaufort Sea has some potential to influence seal hunting activities by residents of Nuiqsut, because (1) the peak sealing season is during the winter months, (2) the main summer sealing is off the Colville Delta, and (3) the zone of influence by seismic sources on seals and beluga is fairly small, NMFS believes that Western Geophysical's seismic survey will not have an unmitigable adverse impact on the availability of these stocks for subsistence uses.

Since NMFS is assured that the taking would not result in more than the incidental harassment (as defined by the MMPA Amendments of 1994) of small numbers of certain species of marine mammals, would have only a negligible impact on these stocks, would not have an unmitigable adverse impact on the availability of these stocks for subsistence uses, and would result in the least practicable impact on the stocks, NMFS has determined that the requirements of section 101(a)(5)(D) of the MMPA have been met and the authorization can be issued.

### Authorization

Accordingly, NMFS has issued an IHA to Western Geophysical for the herein described seismic survey during the 1999 open water season provided the mitigation, monitoring, and reporting requirements described in this document and in the IHA are undertaken.

Dated: July 20, 1999.

### Art Jeffers,

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

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