Final Results of Review

We determine that revocation of the antidumping duty order on barium chloride from China would be likely to lead to continuation or recurrence of dumping at the following percentage weighted–average margins:

Manufacturers/Exporters/Producers	Weighted Average Margin Percent
China National Chemicals Import and Export Corporation (SINOCHEM)	155.50
China–wide rate	155.50

This notice also serves as the only reminder to parties subject to administrative protective orders (''APO'') of their responsibility concerning the return or destruction of proprietary information disclosed under APO in accordance with 19 CFR 351.305 of the Department's regulations. Timely notification of the return or destruction of APO materials or conversion to judicial protective order is hereby requested. Failure to comply with the regulations and terms of an APO is a violation which is subject to sanction.

We are issuing and publishing the results and notice in accordance with sections 751(c), 752, and 777(i)(1) of the Act.

Dated: May 28, 2004.

Jeffrey A. May,

Acting Assistant Secretary for Import Administration.

[FR Doc. 04–12807 Filed 6–4–04; 8:45 am]

BILLING CODE 3510–DS–S

DEPARTMENT OF COMMERCE

International Trade Administration

(C–427–819, C–428–829, C–421–809, C–412–821)

Low Enriched Uranium from France, Germany, the Netherlands, and the United Kingdom: Extension of Final Results of Countervailing Duty Administrative Reviews

AGENCY: Import Administration, International Trade Administration, Department of Commerce.

ACTION: Notice of Extension of Time Limit for Final Results of Countervailing Duty Administrative Reviews.

EFFECTIVE DATE: June 7, 2004.

FOR FURTHER INFORMATION CONTACT: Darla Brown, Office of AD/CVD Enforcement VI, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW, Washington, DC 20230; telephone: (202) 482–2786.

Statutory Time Limits

Section 751(a)(3)(A) of the Tariff Act of 1930, as amended (the Act), requires the Department of Commerce (Department) to make a preliminary determination within 245 days after the last day of the anniversary month of an order/finding for which a review is requested and a final determination within 120 days after the date on which the preliminary determination is published. However, if it is not practicable to complete the review within the time period, section 751(a)(3)(A) of the Act allows the Department to extend these deadlines to a maximum of 365 days and 180 days, respectively.

Background

On February 5, 2004, the Department of Commerce (the Department) published in the **Federal Register** its preliminary results of administrative reviews of the countervailing duty (CVD) orders on low enriched uranium from France, Germany, the Netherlands, and the United Kingdom for the period May 14, 2001, through December 31, 2002 (*see Preliminary Results of Countervailing Duty Administrative Reviews: Low Enriched Uranium from Germany, the Netherlands, and the United Kingdom, 69 FR 5498 (February 5, 2004) and Preliminary Results of Countervailing Duty Administrative Review: Low Enriched Uranium from France*, 69 FR 5502 (February 5, 2004)). The final results are currently due no later than June 4, 2004.

Extension of Time Limit for Final Results of Reviews

We determine that these cases are extraordinarily complicated because there are a large number of complex issues which require thorough consideration and analysis by the Department, including numerous existing programs from the original investigation and changes to certain programs found countervailable in the investigation. Therefore, we require more time to properly analyze these issues. As a result, it is not practicable to complete the final results of these reviews within the original time limits. Therefore, the Department is extending the time limits for completion of the final results until no later than June 30, 2004. This date constitutes a 26–day extension for the administrative reviews of low enriched uranium from France, Germany, the Netherlands, and the United Kingdom.

This extension is in accordance with section 751(a)(3)(A) of the Act.

Dated: May 27, 2004.

Thomas F. Futtner,

Acting Deputy Assistant Secretary for Import Administration.

[FR Doc. 04–12805 Filed 6–4–04; 8:45 am]

BILLING CODE 3510–DS–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 031104B]

Small Takes of Marine Mammals Incidental to Specified Activities; Marine Seismic Survey on the Blanco Fracture Zone in the Northeastern Pacific Ocean

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

ACTION: Notice of receipt of application and proposed incidental take authorization; request for comments.

SUMMARY: NMFS has received an application from the Lamont-Doherty Earth Observatory (L-DEO), a part of Columbia University, for an Incidental Harassment Authorization (IHA) to take small numbers of marine mammals, by harassment, incidental to conducting oceanographic seismic surveys on the Blanco Fracture Zone in the Northeastern Pacific Ocean. Under the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an authorization to L-DEO to incidentally take, by harassment, small numbers of several species of cetaceans and pinnipeds for a limited period of time within the next year.

DATES: Comments and information must be received no later than July 7, 2004.

ADDRESSES: Comments on the application should be addressed to P. Michael Payne, Chief, Marine Mammal Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3225, or by telephoning the contact listed here. The mailbox address for providing email comments is *PR2.031104B@noaa.gov* Include in the subject line of the e-mail comment the following document identifier: 031104B. Comments sent via email, including all attachments, must not exceed a 10–megabyte file size. A copy of the application containing a list of the references used in this document may be obtained by writing to this address or by telephoning the contact listed here and is also available at: *http://www.nmfs.noaa.gov/prot__res/PR2/Small__Take/smalltake__info.htm#applications.*

FOR FURTHER INFORMATION CONTACT: Kenneth Hollingshead, Office of Protected Resources, NMFS, (301) 713–2322, ext 128.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of 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 that the permissible methods of taking and requirements pertaining to the monitoring and reporting of such takings are set forth. NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.''

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Under section 3(18)(A), the MMPA defines ''harassment'' as:

> any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild 'Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Section 101(a)(5)(D) establishes a 45–day time limit for NMFS review of an application followed by a 30–day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny issuance of the authorization.

Summary of Request

On March 8, 2004, NMFS received an application from L-DEO for the taking, by harassment, of several species of marine mammals incidental to conducting a seismic survey program. L-DEO plans to conduct a marine seismic survey in the Northeastern Pacific Ocean (NPO), off Oregon, during August, 2004. Up to two seismic surveys are scheduled to take place in the NPO. The main survey is planned to occur near the intersection of the Blanco Transform with the Juan de Fuca Ridge. Time permitting, a second survey may be conducted at Gorda Ridge. The main seismic survey will take place between 44° 20′ and 44° 42′ N. and between 129° 50′ and 130° 30′ W. or at least 450 km (243 nm) offshore and outside the Exclusive Economic Zone (EEZ) of any nation. The Gorda Ridge survey is located between 42° 20′ and 43° N. and between 126° 30′ and 127–157 km, at least 84 nm (155.6 km) offshore, but within the EEZ of the United States.

The purpose of the seismic survey is to obtain information on the structure of the oceanic crust created at the Juan de Fuca Ridge. More specifically, the survey will obtain information on the geologic nature of boundaries of the earth's crust created at the intermediate-spreading Juan de Fuca Ridge. Past studies have mapped those boundaries using manned submersibles, but they have not provided a link between geologic and seismic structure. This study will provide the seismic data to assess the geologic nature of the previously mapped areas.

Description of the Activity

The proposed seismic survey will involve one vessel, the *R/V Maurice Ewing* (*Ewing*). The *Ewing* will deploy a 10– or 12–airgun array as an energy source, with discharge volumes of 3050 in3 and 3705 in^3, respectively. The *Ewing* will also deploy and retrieve 12 Ocean Bottom Seismometers (OBSs), plus tow a 6–km (3.2 nm) streamer containing hydrophones, to receive the returning acoustic signals. As the airguns are towed along the survey lines, these two systems will receive the returning acoustic signals.

A total of approximately 150 kilometers (km) (81 nautical miles (nm)) of OBS surveys using a 12–gun array (24 hours of operation) and approximately 1017 km (549 nm) of Multi-Channel Seismic (MCS) profiles using a 10–gun array (6.5 days of operation) are planned to be conducted during the main survey. These line-kilometer figures include operations associated with start up, line changes of 10 km (5 nm) for the 12–gun array and 90 km (49 nm) for the 10–gun array), equipment testing, contingency profiles, and repeat coverage of any areas where initial data quality is sub-standard. In the unlikely event that there are no weather or equipment delays, additional MCS profiles may be acquired at the northern end of the Gorda Ridge where it intersects the Blanco Transform. The contingency survey would consist of 220 km (119 nm) of survey lines, plus 63 km (34 nm) for turns and connecting lines, for a total of 283 km (153 nm). Water depths within the seismic survey areas are 1600–5000 m (5250–16,405 ft).

During the airgun operations, the vessel will travel at 7.4–9.3 km/hr (4–5 knots), and seismic pulses will be emitted at intervals of 60–90 sec (OBS lines) and approximately 20 sec for the Multi-Channel Seismic profiles (MCS lines). The 20–sec spacing corresponds to a shot interval of about 50 m (164 ft), while the 60–90 sec spacing corresponds to a distance of 150 m (492 ft) to 220 m (722 ft), respectively. The 60–90 sec spacing along OBS lines is to minimize reverberation from previous shot noise during OBS data acquisition, and the exact spacing will depend on water depth.

For the 10– and 12–airgun arrays, the sound pressure fields have been modeled by L-DEO in relation to distance and direction from the airguns, and in relation to depth. Predicted sound levels are depicted in Figures 6 and 7 in L-DEO's application. Empirical data concerning those sound levels have been acquired based on measurements during an acoustic verification study conducted by L-DEO in the northern Gulf of Mexico from 27 May to 3 June 2003. L-DEO's analysis of the acoustic data from that study (Tolstoy *et al.*,

2004) provides limited measurements in deep water, such as found at Blanco Fracture and Gorda Ridge. Those data indicate that, for deep water, L-DEO's model tends to overestimate the received sound levels at a given distance. NMFS and L-DEO, therefore, propose that the 180–dB and 190–dB (re 1 microPascal (root-mean-squared (rms)) sound pressure fields that will correspond to the proposed safety radii (see Mitigation) will be the values predicted by L-DEO's model during airgun operations in deep water, including these planned survey operations.

In addition to the operations of the airgun array, the ocean floor will be mapped continuously throughout the entire cruise with an Atlas Hydrosweep DS–2 Multibeam 15.5–kHz bathymetric sonar, and a 3.5–kHz sub-bottom profiler. Both of these sound sources are commonly operated simultaneously with the airgun array, but may, on occasion, be utilized independent of the seismic array.

The Atlas Hydrosweep is mounted on the hull of the *Maurice Ewing*, and it operates in three modes, depending on the water depth. There is one shallow water mode and two deep-water modes: an Omni mode and a Rotational Directional Transmission (RDT) mode. The RDT mode is normally used during deep-water operation and has a 237–dB rms source output. In the RDT mode, each ''ping'' consists of five successive transmissions, each ensonifying a beam that extends 2.67 degrees fore-aft and approximately 30 degrees in the cross-track direction. The five successive transmissions (segments) sweep from port to starboard with minor overlap, spanning an overall cross-track angular extent of about 140 degrees, with small (<1 millisec) gaps between the pulses for successive 30–degree segments. The total duration of the ''ping'' including all five successive segments, varies with water depth, but is 1 millisec in water depths less than 500 m and 10 millisec in the deepest water. For each segment, ping duration is 1/5th of these values or 2/5th for a receiver in the overlap area ensonified by two beam segments. The ''ping'' interval during RDT operations depends on water depth and varies from once per second in less than 500 m (1640.5 ft) water depth to once per 15 seconds in the deepest water.

The sub-bottom profiler is normally operated to provide information about the sedimentary features and the bottom topography that is simultaneously being mapped by the Hydrosweep. The energy from the sub-bottom profiler is directed downward by a 3.5 kHz transducer mounted in the hull of the *Ewing*. The output varies with water depth from 50 watts in shallow water to 800 watts in deep water. Pulse interval is 1 second (s) but a common mode of operation is to broadcast five pulses at 1–s intervals followed by a 5–s pause. The beamwidth is approximately 30o and is directed downward. Maximum source output is 204 dB re 1 microPa, 800 watts, while nominal source output is 200 dB re 1 microPa, 500 watts. Pulse duration will be 4, 2, or 1 ms, and the bandwith of pulses will be 1.0 kHz, 0.5 kHz, or 0.25 kHz, respectively.

Sound levels have not been measured directly for the sub-bottom profiler used by the *Ewing*, but Burgess and Lawson (2000) measured sounds propagating more or less horizontally from a similar unit with similar source output (205 dB re 1 microPa m). The 160 and 180 dB re 1 microPa rms radii in the horizontal direction were estimated to be, respectively, near 20 m (66 ft) and 8 m (26 ft) from the source, as measured in 13 m or 43 ft water depth. The corresponding distances for an animal in the beam below the transducer would be greater, on the order of 180 m (591 ft) and 18 m (59 ft), assuming spherical spreading.

The sub-bottom profiler on the *Ewing* has a stated maximum source level of 204 dB re 1 microPa. Thus the received level would be expected to decrease to 160 and 180 dB about 160 m (525 ft) and 16 m (52 ft) below the transducer, respectively, assuming spherical spreading. Corresponding distances in the horizontal plane would be lower, given the directionality of this source (30° beamwidth) and the measurements of Burgess and Lawson (2000).

Characteristics of Airgun Pulses

Airguns function by venting high-pressure air into the water. The pressure signature of an individual airgun consists of a sharp rise and then fall in pressure, followed by several positive and negative pressure excursions caused by oscillation of the resulting air bubble. The resulting downward-directed pulse has a duration of only 10 to 20 ms, with only one strong positive and one strong negative peak pressure (Caldwell and Dragoset, 2000). Most energy emitted from airguns is at relatively low frequencies. For example, typical high-energy airgun arrays emit most energy at 10–120 Hz. However, the pulses contain some energy up to 500–1000 Hz and above (Goold and Fish, 1998).

The pulsed sounds associated with seismic exploration have higher peak levels than other industrial sounds to which whales and other marine mammals are routinely exposed. The peak-to-peak (P-P) source levels of the 10–gun array and 12–gun arrays that will be used for the Blanco Fracture project are 255 dB re 1 microPa (55 bar-m) and 257 dB dB re 1 microPa (68 bar-m), respectively. These are the nominal source levels applicable to downward propagation. The effective source level for horizontal propagation is lower.

Several important mitigating factors need to be considered when assessing airgun impacts on the marine environment: (1) Airgun arrays produce intermittent sounds, involving emission of a strong sound pulse for a small fraction of a second followed by several seconds of near silence. In contrast, some other acoustic sources produce sounds with lower peak levels, but their sounds are continuous or discontinuous but continuing for much longer durations than seismic pulses. (2) Airgun arrays are designed to transmit strong sounds downward through the seafloor, and the amount of sound transmitted in near-horizontal directions is considerably reduced. Nonetheless, they also emit sounds that travel horizontally toward non-target areas. (3) An airgun array is a distributed source, not a point source. The nominal source level is an estimate of the sound that would be measured from a theoretical point source emitting the same total energy as the airgun array. That figure is useful in calculating the expected received levels in the far field (i.e., at moderate and long distances). Because the airgun array is not a single point source, there is no one location within the near field (or anywhere else) where the received level is as high as the nominal source level.

The strengths of airgun pulses can be measured in different ways, and it is important to know which method is being used when interpreting quoted source or received levels. Geophysicists usually quote P-P levels, in bar-meters or dB re 1 microPa-m. The peak (zero-to-peak) level for the same pulse is typically about 6 dB less. In the biological literature, levels of received airgun pulses are often described based on the ''average'' or ''root-mean-square'' (rms) level over the duration of the pulse. The rms value for a given pulse is typically about 10 dB lower than the peak level, and 16 dB lower than the P-P value (Greene 1997, McCauley *et al.* 1998, 2000). A fourth measure that is being used more frequently is the energy level, in dB re 1 microPa^2-s. Because the pulses are less than 1 sec in duration, the numerical value of the energy is lower than the rms pressure level, but the units are different. Because the level of a given pulse will differ substantially depending on which of these measures is being applied, it is important to be aware which measure is in use when interpreting any quoted pulse level. NMFS commonly references the rms levels when discussing levels of pulsed sounds that might harass marine mammals.

Seismic sound received at any given point will arrive via a direct path, indirect paths that include reflection from the sea surface and bottom, and often indirect paths including segments through the bottom sediments. Sounds propagating via indirect paths travel longer distances and often arrive later than sounds arriving via a direct path. These variations in travel time have the effect of lengthening the duration of the received pulse. At the source, seismic pulses are about 10 to 20 ms in duration. In comparison, the pulse duration as received at long horizontal distances can be much greater.

Another important aspect of sound propagation is that received levels of low-frequency underwater sounds diminish close to the surface because of pressure-release and interference phenomena that occur at and near the surface (Urick 1983, Richardson et al. 1995). Paired measurements of received airgun sounds at depths of 3 m (9.8 ft) vs. 9 or 18 m (29.5 or 59 ft) have shown that received levels are typically several decibels lower at 3 m (9.8. ft)(Greene and Richardson 1988). For a mammal whose auditory organs are within 0.5 or 1 m (1.6 or 3.3 ft) of the surface, the received level of the predominant low-frequency components of the airgun pulses would be further reduced.

Pulses of underwater sound from open-water seismic exploration are often detected 50 to 100 km (30 to 54 nm) from the source location (Greene and Richardson 1988, Burgess and Greene 1999). At those distances, the received levels on an approximate rms basis are low (below 120 dB re 1 microPa). However, faint seismic pulses are sometimes detectable at even greater ranges (e.g., Bowles *et al.*, 1994, Fox *et al.*, 2002). Considerably higher levels can occur at distances out to several kilometers from an operating airgun array. For the Blanco Fracture survey using 10–gun and 12–gun arrays, the distances at which seismic pulses are expected to diminish to received levels of 190 dB, 180 dB, 170 dB and 160 dB re 1 microPa rms are as follows:

TABLE 1. DISTANCES TO WHICH SOUND LEVELS MIGHT BE RECEIVED FROM THE AIRGUN ARRAYS PLANNED FOR USE IN THE BLANCO FRACTURE ZONE.

Airgun Array	*RMS Radii (m/ft)*			
	190 dB	180 dB	170 dB	160 dB
1 airgun	13/43	36/118	110/361	350/1148
10 airguns	200/656	550/1805	2000/6562	6500/21325
12 airguns	200/656	600/1968	2200/1718	7250/23786

Additional information is contained in the L-DEO application, especially in Appendix A.

Description of Habitat and Marine Mammals Affected by the Activity

A detailed description of the NPO in the Blanco Fracture/Gorda Ridge area and its associated marine mammals can be found in the L-DEO application and a number of documents referenced in the L-DEO application, and is not repeated here. The main Blanco Transform survey site, and the Gorda Ridge contingency survey site, are located approximately 450 and 150 km (243 and 81 nm) offshore from Oregon, respectively, over water depths of 1600 to 5000 m (5250 to 16405 ft). Based on their preference for offshore (>2000 m (6560 ft) depth) and/or slope (200–2000 m or 656–6560 ft) waters, 19 of the 39 marine mammal species known for Oregon and Washington waters are considered likely to occur near the survey areas. An additional 14 species could occur, but are unlikely to do so in the project area because they are rare or uncommon in slope and offshore waters or they generally do not occur off Oregon or Washington. While these 14 species are addressed in the L-DEO application it is unlikely that they will occur in the survey area. An additional six species are not expected in the project area because their occurrence off Oregon is limited to coastal/shallow waters (gray whale (*Eschrichtius robustus*) and sea otter (*Enhydra lutris*)) or they are considered extralimital (beluga whale (*Delphinapterus leucas*), ringed seals (*Phoca hispida*), ribbon seal (*Phoca fasciata*), and hooded seal (*Cystophora cristata*)). As it is unlikely that these rare, vagrant mammals would occur during the short time period of this seismic survey, these latter six species are not addressed further as they are unlikely to be impacted by seismic signals from this research operation.

The six species of marine mammals expected to be most common in the deep pelagic or slope waters of the project area include the Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), northern right whale dolphin(*Lissodelphis borealis*), Risso's dolphin (*Grampus griseus*), short-beaked common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), and northern fur seal (*Callorhinus ursinus*)(Green *et al.*, 1992, 1993; Buchanan *et al.*, 2001; Carretta *et al.*, 2002; Barlow, 2003). The sperm whale (*Physeter macrocephalus*), pygmy sperm whale (*Kogia breviceps*), mesoplodont species (Blainville's beaked whale (*Mesoplondon densirostris*), Stejneger's beaked whale (*M. stejnegeri*), and Hubb's beaked whale (*M. carlhubbsi*)), Baird's beaked whale (*Berardius bairdii*), Cuvier's beaked whale (*Ziphius cavirostris*), and northern elephant seals (*Mirounga angustirostris*) are considered pelagic species but are generally uncommon in the waters near the survey area.

Of the five species of pinnipeds known to occur regularly in waters off Oregon, Washington, or northern California, only the northern fur seal and northern elephant seal are likely to be present in the pelagic waters of the proposed project area, located approximately 150–450 km (243–481 nm) offshore. The Steller sea lion (*Eumetopias jubatus*) may also occur there in small numbers. The California sea lion (*Zalophus californianus*)and harbor seal (*Phoca vitulina*) occur in shallow coastal or shelf waters off Oregon and Washington (Bonnell *et al.*, 1992, Green *et al.*, 1993, Buchanan *et al.*, 2001), and are not expected to be seen in the proposed study area. Sea otters were translocated to shallow coastal waters off the Olympic Peninsula of Washington, but are not found in the pelagic waters of the project area off Oregon. More detailed information on these species is contained in the L-DEO application and additional information is contained in Caretta *et al.*, (2002) which are available at: *http://www.nmfs.noaa.gov/prot__res/PR2/Small__Take/smalltake__info.htm#applications*, and *http://www.nmfs.noaa.gov/prot__res/*

PR2/Stock__Assessment__Program/sars.html, respectively.

Potential Effects on Marine Mammals

As outlined in several previous NMFS documents, the effects of noise on marine mammals are highly variable, and can be categorized as follows (based on Richardson et al. 1995):

(1) The noise may be too weak to be heard at the location of the animal (i.e., lower than the prevailing ambient noise level, the hearing threshold of the animal at relevant frequencies, or both);

(2) The noise may be audible but not strong enough to elicit any overt behavioral response;

(3) The noise may elicit reactions of variable conspicuousness and variable relevance to the well being of the marine mammal; these can range from temporary alert responses to active avoidance reactions such as vacating an area at least until the noise event ceases;

(4) Upon repeated exposure, a marine mammal may exhibit diminishing responsiveness (habituation), or disturbance effects may persist; the latter is most likely with sounds that are highly variable in characteristics, infrequent and unpredictable in occurrence, and associated with situations that a marine mammal perceives as a threat;

(5) Any anthropogenic noise that is strong enough to be heard has the potential to reduce (mask) the ability of a marine mammal to hear natural sounds at similar frequencies, including calls from conspecifics, and underwater environmental sounds such as surf noise;

(6) If mammals remain in an area because it is important for feeding, breeding or some other biologically important purpose even though there is chronic exposure to noise, it is possible that there could be noise-induced physiological stress; this might in turn have negative effects on the well-being or reproduction of the animals involved; and

(7) Very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity. In terrestrial mammals, and presumably marine mammals, received sound levels must far exceed the animal's hearing threshold for there to be any temporary threshold shift (TTS). For transient sounds, the sound level necessary to cause TTS is inversely related to the duration of the sound. Received sound levels must be even higher for there to be risk of permanent hearing impairment. In addition, intense acoustic or explosive events may cause trauma to tissues associated with organs vital for hearing, sound production, respiration and other functions. This trauma may include minor to severe hemorrhage.

Effects of Seismic Surveys on Marine Mammals

The L-DEO application provides the following information on what is known about the effects on marine mammals of the types of seismic operations planned by L-DEO. The types of effects considered here are (1) masking, (2) disturbance, and (3) potential hearing impairment and other physical effects. Additional discussion on species specific effects can be found in the L-DEO application for taking marine mammals incidental to this activity.

Masking

Masking effects of pulsed sounds on marine mammal calls and other natural sounds are expected to be limited, although there are very few specific data on this. Seismic sounds are short pulses occurring for less than 1 sec every 20 or 60–90 sec in this project. Sounds from the multibeam sonar are very short pulses, occurring for 1–10 msec once every 1 to 15 sec, depending on water depth. (During operations in deep water, the duration of each pulse from the multibeam sonar as received at any one location would actually be only 1/5th or at most 2/5th of 1–10 msec, given the segmented nature of the pulses.) Some whales are known to continue calling in the presence of seismic pulses. Their calls can be heard between the seismic pulses (Richardson *et al.*, 1986; McDonald *et al.*, 1995; Greene *et al.*, 1999). Although there has been one report that sperm whales cease calling when exposed to pulses from a very distant seismic ship (Bowles *et al.*, 1994), a recent study reports that sperm whales continued calling in the presence of seismic pulses (Madsen *et al.*, 2002). Masking effects of seismic pulses are expected to be negligible in the case of the smaller odontocete cetaceans, given the intermittent nature of seismic pulses and that sounds important to these species are predominantly at much higher frequencies than are airgun sounds.

Most of the energy in the sound pulses emitted by airgun arrays is at low frequencies, with strongest spectrum levels below 200 Hz and considerably lower spectrum levels above 1000 Hz. These frequencies are mainly used by mysticetes, but not by odontocetes or pinnipeds. An industrial sound source will reduce the effective communication or echolocation distance only if its frequency is close to that of the cetacean signal. If little or no overlap occurs between the industrial noise and the frequencies used, as in the case of many marine mammals vs. airgun sounds, communication and echolocation are not expected to be disrupted. Furthermore, the discontinuous nature of seismic pulses makes significant masking effects unlikely even for mysticetes.

A few cetaceans are known to increase the source levels of their calls in the presence of elevated sound levels, or possibly to shift their peak frequencies in response to strong sound signals (Dahlheim, 1987; Au, 1993; Lesage *et al.*, 1999; Terhune, 1999; as reviewed in Richardson *et al.*, 1995). These studies involved exposure to other types of anthropogenic sounds, not seismic pulses, and it is not known whether these types of responses ever occur upon exposure to seismic sounds. If so, these adaptations, along with directional hearing and preadaptation to tolerate some masking by natural sounds (Richardson *et al.*, 1995), would all reduce the importance of masking.

Disturbance by Seismic Surveys

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous dramatic changes in activities, and displacement. However, there are difficulties in defining which marine mammals should be counted as ''taken by harassment''. For many species and situations, scientists do not have detailed information about their reactions to noise, including reactions to seismic (and sonar) pulses. Behavioral reactions of marine mammals to sound are difficult to predict. Reactions to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors. If a marine mammal does react to an underwater sound by changing its behavior or moving a small distance, the impacts of the change may not rise to the level of disruption of a behavioral pattern. However, if a sound source would displace marine mammals from an important feeding or breeding area for a prolonged period, such a disturbance would constitute Level B harassment. Given the many uncertainties in predicting the quantity and types of impacts of noise on marine mammals, scientists often resort to estimating how many mammals may be present within a particular distance of industrial activities or exposed to a particular level of industrial sound. This likely overestimates the numbers of marine mammals that are affected in some biologically important manner. The sound criteria used to estimate how many marine mammals might be harassed behaviorally by the seismic survey are based on behavioral observations during studies of several species. However, information is lacking for many species.

Hearing Impairment and Other Physical Effects

Temporary or permanent hearing impairment is a possibility when marine mammals are exposed to very strong sounds, but there has been no specific documentation of this for marine mammals exposed to airgun pulses. Current NMFS policy regarding exposure of marine mammals to high-level sounds is that cetaceans and pinnipeds should not be exposed to impulsive sounds ≥180 and 190 dB re 1 microPa (rms), respectively (NMFS 2000). Those criteria have been used in defining the safety (shut down) radii for seismic surveys. However, those criteria were established before there were any data on the minimum received levels of sounds necessary to cause auditory impairment in marine mammals. As discussed in the L-DEO application and summarized here,

1. The 180 dB criterion for cetaceans is probably quite precautionary, i.e., lower than necessary to avoid TTS let alone permanent auditory injury, at least for delphinids.

2. The minimum sound level necessary to cause permanent hearing impairment is higher, by a variable and generally unknown amount, than the level that induces barely-detectable TTS.

3. The level associated with the onset of TTS is often considered to be a level below which there is no danger of permanent damage.

Several aspects of the planned monitoring and mitigation measures for this project are designed to detect marine mammals occurring near the airgun array (and multibeam sonar), and to avoid exposing them to sound pulses that might cause hearing impairment. In addition, many cetaceans are likely to show some avoidance of the area with ongoing seismic operations. In these cases, the avoidance responses of the animals themselves will reduce or avoid the possibility of hearing impairment.

Non-auditory physical effects may also occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that theoretically might occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. It is possible that some marine mammal species (i.e., beaked whales) may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds. The following paragraphs discuss the possibility of TTS, permanent threshold shift (PTS), and non-auditory physical effects.

TTS

TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter, 1985). When an animal experiences TTS, its hearing threshold rises and a sound must be stronger in order to be heard. TTS can last from minutes or hours to (in cases of strong TTS) days. Richardson *et al.* (1995) notes that the magnitude of TTS depends on the level and duration of noise exposure, among other considerations. For sound exposures at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the noise ends. Little data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals.

For toothed whales exposed to single short pulses, the TTS threshold appears to be, to a first approximation, a function of the energy content of the pulse (Finneran *et al.*, 2002). Given the available data, the received level of a single seismic pulse might need to be on the order of 210 dB re 1 microPa rms (approx. 221 226 dB pk pk) in order to produce brief, mild TTS. Exposure to several seismic pulses at received levels near 200 205 dB (rms) might result in slight TTS in a small odontocete, assuming the TTS threshold is (to a first approximation) a function of the total received pulse energy (Fineran *et al.*, 2002). Seismic pulses with received levels of 200 205 dB or more are usually restricted to a radius of no more than 100 m (328 ft) around a seismic vessel.

There are no data, direct or indirect, on levels or properties of sound that are required to induce TTS in any baleen whale. TTS thresholds for pinnipeds exposed to brief pulses (single or multiple) have not been measured, although exposures up to 183 db re 1 microPa (rms) have been shown to be insufficient to induce TTS in California sea lions (Fineran et al. (2003). However, prolonged exposures show that some pinnipeds may incur TTS at somewhat lower received levels than do small odontocetes exposed for similar durations (Kastak *et al.*, 1999; Ketten *et al.*, 2001, Au *et al.*, 2000).

A marine mammal within a radius of ≤100 m (≤ 328 ft) around a typical array of operating airguns might be exposed to a few seismic pulses with levels of ≥205 dB, and possibly more pulses if the mammal moved with the seismic vessel. As noted previously, most cetacean species tend to avoid operating airguns, although not all individuals do so. In addition, ramping up airgun arrays, which is standard operational protocol for L-DEO and other seismic operators, should allow cetaceans to move away from the seismic source and to avoid being exposed to the full acoustic output of the airgun array. It is unlikely that these cetaceans would be exposed to airgun pulses at a sufficiently high level for a sufficiently long period to cause more than mild TTS, given the relative movement of the vessel and the marine mammal. However, TTS would be more likely in any odontocetes that bow-ride or otherwise linger near the airguns. While bow-riding, odontocetes would be at or above the surface, and thus not exposed to strong sound pulses given the pressure-release effect at the surface. However, bow-riding animals generally dive below the surface intermittently. If they did so while bow-riding near airguns, they would be exposed to strong sound pulses, possibly repeatedly. If some cetaceans did incur TTS through exposure to airgun sounds, this would very likely be a temporary and reversible phenomenon.

Currently, NMFS believes that, whenever possible to avoid Level A harassment, cetaceans should not be exposed to pulsed underwater noise at received levels exceeding 180 dB re 1 microPa (rms). The corresponding limit for pinnipeds has been set at 190 dB. The predicted 180- and 190–dB distances for the airgun arrays operated by L-DEO during this activity are summarized elsewhere in this document. These sound levels are not considered to be the levels at or above which TTS might occur. Rather, they are the received levels above which, in the view of a panel of bioacoustics specialists convened by NMFS (at a time before TTS measurements for marine mammals started to become available), one could not be certain that there would be no injurious effects, auditory or otherwise, to marine mammals. As noted here, TTS data that are now available imply that, at least for dolphins, TTS is unlikely to occur unless the dolphins are exposed to airgun pulses substantially stronger that 180 dB re 1 microPa (rms).

It has also been shown that most whales tend to avoid ships and associated seismic operations. Thus, whales will likely not be exposed to such high levels of airgun sounds. Because of the slow ship speed, any whales close to the trackline could move away before the sounds become sufficiently strong for there to be any potential for hearing impairment.

Therefore, there is little potential for whales being close enough to an array to experience TTS. In addition ramping up airgun arrays, which has become standard operational protocol for many seismic operators including L-DEO, should allow cetaceans to move away from the seismic source and to avoid being exposed to the full acoustic output of the airgun array.

Permanent Threshold Shift (PTS)

When PTS occurs, there is physical damage to the sound receptors in the ear. In some cases, there can be total or partial deafness, while in other cases, the animal has an impaired ability to hear sounds in specific frequency ranges. Physical damage to a mammal's hearing apparatus can occur if it is exposed to sound impulses that have very high peak pressures, especially if they have very short rise times (time required for sound pulse to reach peak pressure from the baseline pressure). Such damage can result in a permanent decrease in functional sensitivity of the hearing system at some or all frequencies.

Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage in terrestrial mammals. However, very prolonged exposure to sound strong enough to elicit TTS, or shorter-term exposure to sound levels well above the TTS threshold, can cause PTS, at least in terrestrial mammals (Kryter 1985). Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals. The low-to-moderate levels of TTS that have been induced in captive odontocetes and pinnipeds during recent controlled studies of TTS have been confirmed to be temporary, with no measurable residual PTS (Kastak *et al.*, 1999; Schlundt *et al.*, 2000, Finneran *et al.*, 2002; Nachtigall *et al.*, 2003). In terrestrial mammals, the received sound level from a single non-impulsive sound exposure must be far above the TTS threshold for any risk of permanent hearing damage (Kryter, 1994; Richardson *et al.*, 1995). For impulse sounds with very rapid rise times (e.g., those associated with explosions or gunfire), a received level not greatly in excess of the TTS threshold may start to elicit PTS. Rise times for airgun pulses are rapid, but less rapid than for explosions.

Some factors that contribute to onset of PTS are as follows: (1) exposure to single very intense noises, (2) repetitive exposure to intense sounds that individually cause TTS but not PTS, and (3) recurrent ear infections or (in captive animals) exposure to certain drugs.

Cavanagh (2000) has reviewed the thresholds used to define TTS and PTS. Based on his review and SACLANT (1998), it is reasonable to assume that PTS might occur at a received sound level 20 dB or more above that which induces mild TTS. However, for PTS to occur at a received level only 20 dB above the TTS threshold, it is probable that the animal would have to be exposed to the strong sound for an extended period.

Sound impulse duration, peak amplitude, rise time, and number of pulses are the main factors thought to determine the onset and extent of PTS. Based on existing data, Ketten (1994) has noted that the criteria for differentiating the sound pressure levels that result in PTS (or TTS) are location and species-specific. PTS effects may also be influenced strongly by the health of the receiver's ear.

Given that marine mammals are unlikely to be exposed to received levels of seismic pulses that could cause TTS, it is highly unlikely that they would sustain permanent hearing impairment. If we assume that the TTS threshold for exposure to a series of seismic pulses may be on the order of 220 dB re 1 microPa (pk-pk) in odontocetes, then the PTS threshold might be about 240 dB re 1 microPa (pk-pk). In the units used by geophysicists, this is 10 bar-m. Such levels are found only in the immediate vicinity of the largest airguns (Richardson *et al.*, 1995: Caldwell and Dragoset, 2000). It is very unlikely that an odontocete would remain within a few meters of a large airgun for sufficiently long to incur PTS. The TTS (and thus PTS) thresholds of baleen whales and pinnipeds may be lower, and thus may extend to a somewhat greater distance. However, baleen whales generally avoid the immediate area around operating seismic vessels, so it is unlikely that a baleen whale could incur PTS from exposure to airgun pulses. Some pinnipeds do not show strong avoidance of operating airguns. However, pinnipeds are expected to be (at most) uncommon in the Blanco Fracture survey area. However, although it is unlikely that the planned seismic surveys could cause PTS in any marine mammals, caution is warranted given the limited knowledge about noise-induced hearing damage in marine mammals, particularly baleen whales.

Strandings and Mortality

Marine mammals close to underwater detonations of high explosives can be killed or severely injured, and the auditory organs are especially susceptible to injury (Ketten *et al.*, 1993; Ketten, 1995). Airgun pulses are less energetic and have slower rise times, and, while there is no documented evidence that airgun arrays can cause serious injury, death, or stranding, the association of mass strandings of beaked whales with naval exercises and, more recently, an L-DEO seismic survey has raised the possibility that beaked whales may be especially susceptible to injury and/or stranding when exposed to strong pulsed sounds.

In March 2000, several beaked whales that had been exposed to repeated pulses from high intensity, mid-frequency military sonars stranded and died in the Providence Channels of the Bahamas Islands, and were subsequently found to have incurred cranial and ear damage (NOAA and USN 2001). Based on post-mortem analyses, it was concluded that an acoustic event caused hemorrhages in and near the auditory region of some beaked whales. These hemorrhages occurred before death. They would not necessarily have caused death or permanent hearing damage, but could have compromised hearing and navigational ability (NOAA and USN 2001). The researchers concluded that acoustic exposure caused this damage and triggered stranding, which resulted in overheating, cardiovascular collapse, and physiological shock that ultimately led to the death of the stranded beaked whales. During the event, five naval vessels used their AN/SQS–53C or -56 hull-mounted active sonars for a period of 16 hours. The sonars produced narrow (<100 Hz) bandwidth signals at center frequencies of 2.6 and 3.3 kHz (-53C), and 6.8 to 8.2 kHz (-56). The respective source levels were usually 235 and 223 dB re 1 μ Pa, but the -53C briefly operated at an unstated but substantially higher source level. The unusual bathymetry and constricted channel where the strandings occurred were conducive to channeling sound. This, and the extended operations by multiple sonars, apparently prevented escape of the animals to the open sea. In addition to the strandings, there are reports that beaked whales were no longer present in the Providence Channel region after the event, suggesting that other beaked whales either abandoned the area or perhaps died at sea (Balcomb and Claridge, 2001).

Other strandings of beaked whales associated with operation of military sonars have also been reported (e.g., Simmonds and Lopez-Jurado, 1991; Frantzis, 1998). In these cases, it was not determined whether there were noise-induced injuries to the ears or other organs. Another stranding of beaked whales (15 whales) happened on 24–25 September 2002 in the Canary Islands, where naval maneuvers were taking place. Jepson et al. (2003) concluded that cetaceans might be subject to decompression injury in some situations. If so, this might occur if the mammals ascend unusually quickly when exposed to aversive sounds. Previously, it was widely assumed that diving marine mammals are not subject to the bends or air embolism.

It is important to note that seismic pulses and mid-frequency sonar pulses are quite different. Sounds produced by the types of airgun arrays used to profile sub-sea geological structures are broadband with most of the energy below 1 kHz. Typical military mid-frequency sonars operate at frequencies of 2 to 10 kHz, generally with a relatively narrow bandwidth at any one time (though the center frequency may change over time). Because seismic and sonar sounds have considerably different characteristics and duty cycles, it is not appropriate to assume that there is a direct connection between the effects of military sonar and seismic surveys on marine mammals. However, evidence that sonar pulses can, in special circumstances, lead to hearing damage and, indirectly, mortality suggests that caution is warranted when dealing with exposure of marine mammals to any high-intensity pulsed sound.

In addition to the sonar-related strandings, there was a September, 2002 stranding of two Cuviers beaked whales in the Gulf of California (Mexico) when a seismic survey by the *Ewing* was underway in the general area (Malakoff, 2002). The airgun array in use during that project was the *Ewing*'s 20–gun 8490–in^3 array. This might be a first indication that seismic surveys can have effects, at least on beaked whales, similar to the suspected effects of naval sonars. However, the evidence linking the Gulf of California strandings to the seismic surveys is inconclusive, and to this date is not based on any physical evidence (Hogarth, 2002; Yoder, 2002). The ship was also operating its multi-beam bathymetric sonar at the same time but this sonar had much less potential than these naval sonars to affect beaked whales. Although the link between the Gulf of California strandings and the seismic (plus multi-beam sonar) survey is inconclusive, this plus the various incidents involving beaked whale strandings associated with naval exercises suggests a need for caution in conducting seismic surveys in areas occupied by beaked whales.

Non-auditory Physiological Effects.

Possible types of non-auditory physiological effects or injuries that might theoretically occur in marine mammals exposed to strong underwater sound might include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. There is no evidence that any of these effects occur in marine mammals exposed to sound from airgun arrays. However, there have been no direct studies of the potential for airgun pulses to elicit any of these effects. If any such effects do occur, they would probably be limited to unusual situations when animals might be exposed at close range for unusually long periods.

Long-term exposure to anthropogenic noise may have the potential to cause physiological stress that could affect the health of individual animals or their reproductive potential, which could theoretically cause effects at the population level (Gisner (ed.), 1999). However, there is essentially no information about the occurrence of noise-induced stress in marine mammals. Also, it is doubtful that any single marine mammal would be exposed to strong seismic sounds for sufficiently long that significant physiological stress would develop. This is particularly so in the case of broad-scale seismic surveys where the tracklines are generally not as closely spaced as in many industry seismic surveys.

Gas-filled structures in marine animals have an inherent fundamental resonance frequency. If stimulated at this frequency, the ensuing resonance could cause damage to the animal. There may also be a possibility that high sound levels could cause bubble formation in th blood of diving mammals that in turn could cause an air embolism, tissue separation, and high, localized pressure in nervous tissue (Gisner [ed], 1999, Houser *et al.*, 2001). In 2002, NMFS held a workshop (Gentry [ed.], 2002) to discuss whether the stranding of beaked whales in the Bahamas in 2000 might have been related to air cavity resonance or bubble formation in tissues caused by exposure to noise from naval sonar. A panel of experts concluded that resonance in air-filled structures was not likely to have caused this stranding. Among other reasons, the air spaces in marine mammals are too large to be susceptible to resonant frequencies emitted by mid- or low-frequency sonar; lung tissue damage has not been observed in any mass, multi-species stranding of beaked whales; and the duration of sonar pings is likely too short to induce vibrations that could damage tissues (Gentry (ed.) 2002). Opinions were less conclusive about the possible role of gas (nitrogen) bubble formation/growth in the Bahamas stranding of beaked whales. Workshop participants did not rule out the possibility that bubble formation/growth played a role in the stranding and participants acknowledged that more research is needed in this area. The only available information on acoustically-mediated bubble growth in marine mammals is modeling that assumes prolonged exposure to sound.

In summary, little is known about the potential for seismic survey sounds to cause either auditory impairment or other non-auditory physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would be limited to short distances from the sound source. However, the available data do not allow for meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in these ways. Marine mammals that show behavioral avoidance of seismic vessels, including most baleen whales, some odontocetes, and some pinnipeds, are unlikely to incur auditory impairment or other physical effects.

Possible Effects of Mid-Frequency Sonar Signals

A multi-beam bathymetric sonar (Atlas Hydrosweep DS–2, 15.5–kHz) and a sub-bottom profiler will be operated from the source vessel during much of the planned survey. Details about these sonars were provided previously in this document.

Navy sonars that have been linked to avoidance reactions and stranding of cetaceans generally (1) are more powerful than the Atlas Hydrosweep, (2) have a longer pulse duration, and (3) are directed close to horizontally (vs. downward for the Hydrosweep). The area of possible influence of the Hydrosweep is much smaller - a narrow band below the source vessel. For the Hydrosweep there is no horizontal propagation as these signals project at an angle of approximately 45 degrees from the ship. For the deep-water mode, under the ship the 160- and 180–dB zones are estimated to be 3200 m (10500 ft) and 610 m (2000 ft), respectively. However, the beam width of the Hydrosweep signal is only 2.67 degrees fore and aft of the vessel, meaning that a marine mammal diving could receive at most 1–2 signals from the Hydrosweep and a marine mammal on the surface would be unaffected. Marine mammals that do encounter the Hydrosweep at close range are unlikely to be subjected to repeated pulses because of the narrow fore-aft width of the beam, and will receive only limited amounts of pulse energy because of the short pulses and vessel speed. Therefore, as harassment or injury from pulsed sound is a function of total energy received, the actual harassment or injury threshold for Hydrosweep signals (approximately 10 ms) such sounds would be at a much higher dB level than that for longer duration pulses such as seismic signals. As a result, NMFS believes that marine mammals are unlikely to be harassed or injured from the multibeam sonar.

Masking by Mid-Frequency Sonar Signals

Marine mammal communications will be not masked appreciably by the multibeam sonar signals or the sub-bottom profiler given the low duty cycle and directionality of the sonars and the brief period when an individual mammal is likely to be within its beam. Furthermore, in the case of baleen whales, the sonar signals do not overlap with the predominant frequencies in the calls, which would avoid significant masking.

Behavioral Responses Resulting from Mid-Frequency Sonar Signals

Behavioral reactions of free-ranging marine mammals to military and other sonars appear to vary by species and circumstance. Observed reactions have included silencing and dispersal by sperm whales (Watkins *et al.*, 1985), increased vocalizations and no dispersal by pilot whales (Rendell and Gordon, 1999), and the previously-mentioned beachings by beaked whales. Also, Navy personnel have described observations of dolphins bow-riding adjacent to bow-mounted mid-frequency sonars during sonar transmissions. However, all of these observations are of limited relevance to the present situation. Pulse durations from these sonars were much longer than those of the L-DEO multibeam sonar, and a given mammal would have received many pulses from the naval sonars. During L-DEO's operations, the individual pulses will be very short, and a given mammal would not receive many of the downward-directed pulses as the vessel passes by.

Captive bottlenose dolphins and a white whale exhibited changes in behavior when exposed to 1–sec pulsed sounds at frequencies similar to those that will be emitted by the multi-beam sonar used by L-DEO and to shorter broadband pulsed signals. Behavioral changes typically involved what appeared to be deliberate attempts to avoid the sound exposure (Schlundt *et al.*, 2000; Finneran *et al.*, 2002). The relevance of these data to free-ranging odontocetes is uncertain and in any case the test sounds were quite different in either duration or bandwidth as compared to those from a bathymetric sonar.

L-DEO and NMFS are not aware of any data on the reactions of pinnipeds to sonar sounds at frequencies similar to those of the 15.5 kHz frequency of the *Ewing*'s multibeam sonar. Based on observed pinniped responses to other types of pulsed sounds, and the likely brevity of exposure to the bathymetric sonar sounds, pinniped reactions are expected to be limited to startle or otherwise brief responses of no lasting consequences to the individual animals. Finally, the pulsed signals from the sub-bottom profiler are much weaker than those from the airgun array and the multibeam sonar. Therefore, behavioral responses are not expected.

Hearing Impairment and Other Physical Effects

Given recent stranding events that have been associated with the operation of naval sonar, there is much concern that sonar noise can cause serious impacts to marine mammals (for discussion see Effects of Seismic Surveys). It is worth noting that the multi-beam sonar proposed for use by L-DEO is quite different than sonars used for navy operations. Pulse duration of the multi-beam sonar is very short relative to the naval sonars. Also, at any given location, an individual marine mammal would be in the beam of the multi-beam sonar for much less time given the generally downward orientation of the beam and its narrow fore-aft beamwidth. (Navy sonars often use near-horizontally-directed sound.) These factors would all reduce the sound energy received from the multi-beam sonar rather drastically relative to that from the sonars used by the Navy. Therefore, hearing impairment by the multi-beam bathymetric sonar is unlikely.

Source levels of the sub-bottom profiler are much lower than those of the airguns and the multi-beam sonar. Sound levels from a sub-bottom profiler similar to the one on the Ewing were estimated to decrease to 180 dB re 1 microPa (rms) at 8 m (26 ft) horizontally from the source (Burgess and Lawson 2000), and at approximately 18 m downward from the source. Furthermore, received levels of pulsed sounds that are necessary to cause temporary or especially permanent hearing impairment in marine mammals appear to be higher than 180 dB (see earlier discussion). Thus, it is unlikely that the sub-bottom profiler produces pulse levels strong enough to cause hearing impairment or other physical injuries even in an animal that is (briefly) in a position near the source.

The sub-bottom profiler is usually operated simultaneously with other higher-power acoustic sources. Many marine mammals will move away in response to the approaching higher-power sources or the vessel itself before the mammals would be close enough for there to be any possibility of effects from the less intense sounds from the sub-bottom profiler. In the case of mammals that do not avoid the approaching vessel and its various sound sources, mitigation measures that would be applied to minimize effects of the higher-power sources would further reduce or eliminate any minor effects of the sub-bottom profiler.

Estimates of Take by Harassment for the Blanco Fracture Zone Survey

Although information contained in this document indicates that injury to marine mammals from seismic sounds potentially occurs at sound pressure levels higher than 180 and 190 dB, NMFS' current criteria for onset of Level A harassment of cetaceans and pinnipeds from impulse sound are, respectively, 180 and 190 re 1 microPa rms. The rms level of a seismic pulse is typically about 10 dB less than its peak level (Greene, 1997; McCauley *et al.*, 1998, 2000a). The criterion for Level B harassment onset is 160 dB.

Given the proposed mitigation (see Mitigation later in this document), all anticipated takes involve a temporary change in behavior that may constitute Level B harassment. The proposed mitigation measures will minimize or eliminate the possibility of Level A harassment. L-DEO has calculated the ''best estimates'' for the numbers of animals that could be taken by level B harassment during the proposed Blanco Fracture seismic survey using data on marine mammal density and abundance from marine mammal surveys in the region, and estimates of the size of the affected area, as shown in the predicted RMS radii table (Table 1).

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TABLE 2. Estimates of the possible numbers of marine mammal exposures to different sound levels, and the numbers of different individuals that might be exposed, during L-DEO's proposed main Blanco Transform seismic survey and the Gorda Ridge contingency survey (combined) off Oregon in July 2004. The column of numbers in boldface shows the numbers of "takes" for which authorization is requested.[a]

	Number of Exposures to Sound Levels ≥160 dB (≥170 dB, Delphinids/Pinnipeds Only)				Number of Individuals Exposed to Sound Levels ≥160 dB (≥170 dB, Delphinids/Pinnipeds Only)					
					Best Estimate					
Species	Best Estimate		Maximum Estimate		Number		% of Regional Pop'n[b]	Maximum Estimate		Requested Take Authorization
Physeteridae										
Sperm whale	17		27		5		0.0	7		**27**
Pygmy sperm whale	11		29		3		0.1	8		**29**
Dwarf sperm whale	0		0		0		NA	0		**5**
Ziphiidae										
Cuvier's beaked whale	0		0		0		0.0	0		**2**
Baird's beaked whale	5		8		1		0.0	2		**8**
Blainville's beaked whale							NA			**20**
Hubb's beaked whale							NA			**54**
Stejneger's beaked whale							NA			**54**
Mesoplodon sp. (unidentified)	49		128		13		0.1	35		
Delphinidae										
Bottlenose dolphin	0	0	0	0	0	0	0.0	0	0	**10**
Striped dolphin	2	(1)	4	(1)	1	0	0.0	1	0	**10**
Short-beaked common dolphin	225	(69)	370	(114)	61	(25)	0.0	101	(40)	**370**
Pacific white-sided dolphin	564	(173)	641	(197)	154	(62)	0.3	175	(70)	**641**
Northern right-whale dolphin	423	(130)	599	(184)	115	(46)	0.6	163	(65)	**599**
Risso's dolphin	425	(130)	481	(148)	116	(46)	0.7	131	(52)	**481**
False killer whale	0	0	0	0	0	0	0.0	0	0	**10**
Killer whale	43	(13)	69	(21)	12	(5)	0.1	19	(7)	**69**
Short-finned pilot whale	0	0	0	0	0	0	0.0	0	0	**50**
Phocoenidae										
Harbor porpoise	0		0		0		0.0	0		**5**
Dall's porpoise	2021		4511		551		0.5	1230		**4511**
Balaenopteridae										
North Pacific right whale	0		0		0		0.0	0		**2**
Humpback whale	9		21		2		0.0	6		**21**
Minke whale	14		25		4		0.0	7		**25**
Sei whale	0		0		0		0.0	0		**2**
Fin whale	20		23		5		0.1	6		**23**
Blue whale	2		6		1		0.0	2		**6**

TABLE 2. continued

Pinnipeds										
Northern fur seal	288	(88)	1833	(563)	79	(31)	*0.0*	500	(200)	**1833**
California sea lion										**5**
Steller sea lion										***10***
Harbor seal										**5**
Northern elephant seal	53	(16)	53	(16)	15	(6)	*0.0*	15	(6)	**53**

[a] Best estimate and maximum estimates of density are from Table 3.

[b] Regional population size estimates are from Table 2.

[c] NA indicates that regional population estimates are not available.

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These estimates are based on a consideration of the number of marine mammals that might be exposed to sound levels greater than 160 dB, the criterion for the onset of Level B harassment, by operations with the 10- and 12–gun array planned to be used for this project. The anticipated radius of influence of the multi-beam sonar is less than that for the airgun array, so it is assumed that any marine mammals close enough to be affected by the multi-beam sonar would already be affected by the airguns. Therefore, no additional incidental takings are included for animals that might be affected by the multi-beam sonar.

Table 2 explains the corrected density estimates as well as the best estimate of the numbers of each species that would be exposed to seismic sounds greater than 160 dB.

Conclusions—Effects on Cetaceans

Strong avoidance reactions by several species of mysticetes to seismic vessels have been observed at ranges up to 6–8 km (3.2–4.3 nm) and occasionally as far as 20–30 km (10.8–16.2 nm) from the source vessel. However, reactions at the longer distances appear to be atypical of most species and situations. Furthermore, if they are encountered, the numbers of mysticetes estimated to occur within the 160–dB isopleth at the Blanco Fracture and Gorda Ridge survey sites are expected to be low. In addition, the estimated numbers presented in Table 2 are considered overestimates of actual numbers for two primary reasons. First, the number of line kilometers used to estimate the number of exposures and individuals exposed assumes that both the main and contingency surveys will be completed; this is highly unlikely given the likelihood that some inclement weather, equipment malfunction, and/or implementation of mitigative shut downs or power downs will occur. Secondly, the estimated 160–dB radii used here are probably overestimates of the actual 160–dB radii at deep water sites such as the Blanco Fracture and Gorda Ridge sites (Tolstoy *et al.*, 2004).

Odontocete reactions to seismic pulses, or at least the reactions of dolphins, are expected to extend to lesser distances than are those of mysticetes. Odontocete low-frequency hearing is less sensitive than that of mysticetes, and dolphins are often seen from seismic vessels. In fact, there are documented instances of dolphins approaching active seismic vessels. However, dolphins as well as some other types of odontocetes sometimes show avoidance responses and/or other changes in behavior when near operating seismic vessels.

Taking into account the mitigation measures that are planned, effects on cetaceans are generally expected to be limited to avoidance of the area around the seismic operation and short-term changes in behavior, falling within the MMPA definition of Level B harassment. Furthermore, the estimated numbers of animals potentially exposed to sound levels sufficient to cause appreciable disturbance are very low percentages of the population sizes in the NPO generally.

Based on the 160–dB criterion, the best estimates of the numbers of individual cetaceans that may be exposed to sounds ≥160 dB re 1 microPa (rms) represent 0 to 0.7 percent of the populations of each species in the NPO. For species listed as endangered under the Endangered Species Act (ESA), this includes no North Pacific right whales or sei whales; less than 0.02 percent of the NPO populations of sperm, humpback and blue whales; and 0.1 percent of the fin whale population (Table 2). In the cases of mysticetes, beaked whales, and sperm whales, these potential reactions are expected to involve no more than very small numbers (0 to 7) of individual cetaceans. Sperm and fin whales are the endangered species that are most likely to be exposed, and their NPO populations are approximately 26,053 and 8520, respectively (Ohsumi and Wada 1974, Carretta et al. 2002).

It is highly unlikely that any right whales will be exposed to seismic sounds ≥160 dB re 1 microPa (rms). This conclusion is based on the rarity of this species off Oregon/Washington and in the NPO generally (less than 100, Carretta *et al.* 2002), and that the remnant population of this species apparently migrates to more northerly areas during the summer. However, L-DEO has requested an authorization to expose up to two North Pacific right whales to ≤160 dB, given the possibility (however unlikely) of encountering one or more of this endangered species. If a right whale is sighted by the vessel-based observers, the airguns will be shut down (not just powered down) regardless of the distance of the whale from the airgun array.

Larger numbers of delphinids may be affected by the proposed main and contingency seismic studies, but the population sizes of species likely to occur in the operating area are large, and the numbers potentially affected are small relative to the population sizes. As indicated in Table 2, the best estimate of number of individual delphinids that might be exposed to sounds less than or equal to 160 dB re 1 microPa (rms) represents a small percentage of the populations of each species occurring there.

Varying estimates of the numbers of marine mammals that might be exposed to airgun sounds during the August 2004 seismic surveys off Oregon have been presented, depending on the specific exposure criteria, calculation procedures (exposures vs. individuals), and density criteria used (best vs. maximum). The requested ''take authorization'' for each species is based on the estimated maximum number of exposures to ≤160 dB re 1 microPa (rms). That figure likely overestimates (in most cases by a large margin) the actual number of animals that will be exposed to these sounds; the reasons for this are outlined above. Even so, the combined estimates for the main and contingency surveys are quite low percentages of the population sizes. Also, these relatively short-term exposures are unlikely to result in any long-term negative consequences for the individuals or their populations.

The many cases of apparent tolerance by cetaceans of seismic exploration, vessel traffic, and some other human activities show that co-existence is possible. Mitigation measures such as controlled speed, course alternation, look outs, non-pursuit, ramp ups, and power downs or shut downs when marine mammals are seen within defined ranges should further reduce short-term reactions, and minimize any effects on hearing sensitivity. In all cases, the effects are expected to be short-term, with no lasting biological consequence.

In light of the type of take expected and the small percentages of affected stocks, the action is expected to have no more than a negligible impact on the affected species or stocks of marine mammals. In addition, mitigation measures such as controlled vessel speed, course alteration, look-outs, ramp-ups, and power-downs when marine mammals are seen within defined ranges (see Mitigation) should further reduce short-term reactions to disturbance, and minimize any effects on hearing sensitivity.

Conclusions—Effects on Pinnipeds

Two pinniped species, the northern fur seal and the northern elephant seal, are likely to be encountered at the survey sites, as they are associated with pelagic slope and offshore waters off Oregon. In addition, it is possible (although unlikely) that a small number of Steller sea lions, California sea lions, and/or harbor seals may also be encountered, most likely at the Gorda Ridge survey area located closer to shore in continental slope water; these three species tend to inhabit primarily coastal and shelf waters. An estimated 79 individual fur seals and 15 individual elephant seals may be exposed to airgun sounds with received levels ≥160 dB re 1 microPa (rms). It is most likely that no California sea lions, Steller sea lions, or harbor seals will be exposed to such sounds. Similar to cetaceans, the estimated numbers of pinnipeds that may be exposed to received levels ≤160 dB are probably overestimates of the actual numbers that will be significantly affected. This action would therefore have no more than a negligible impact on the affected species or stocks of pinnipeds.

Mitigation

For the proposed Blanco Fracture seismic survey, L-DEO will deploy a 10- or 12–airgun array as an energy source, with discharge volumes of 3050 in3 and 3705 in3, respectively. The airguns in the arrays will be spread out horizontally so the energy from the array will be directed mostly downward. The directional nature of the arrays to be used in this project is an important mitigating factor. This directionality will result in reduced sound levels at any given horizontal distance as compared with the levels expected at that distance if the source were omnidirectional with the stated nominal source level. Because the actual seismic source is a distributed sound source (10–12 airguns) rather than a single point source, the highest sound levels measurable at any location in the water will be less than the nominal source level. Also, the size of the airgun arrays (which are smaller than the 20–gun array used for some other surveys) is another important mitigation measure that will reduce the potential for effects relative to those that might occur with a larger array of airguns. This is in conformance with NMFS' encouraging seismic operators to use the lowest intensity airguns practical to accomplish research objectives. Also, that this project is proposed to occur in deep water is also important as sound levels tend to be lower in deep than in shallow waters at various distances from the airguns.

Proposed Safety Radii

Received sound levels have been modeled by L-DEO in relation to distance and direction from the two arrays. The radii around the 10–airgun array where the received levels would be 180 dB and 190 dB re 1 μPa (rms) were estimated as 550 m (1805 ft) and 200 m (656 ft), respectively. For the 12–airgun array, the radii around the array where the received levels would be 180 dB and 190 dB re 1 μPa (rms) were estimated as 600 m (1969 ft) and 200 m (656 ft), respectively. The 180 and 190 dB shutdown criteria, applicable to cetaceans and pinnipeds, respectively, are specified by NMFS (2000) and, as mentioned previously in this document, are considered conservative for protecting marine mammals from potential injury.

Empirical data concerning these safety radii have been acquired based on measurements during the acoustic verification study conducted by L-DEO in the northern Gulf of Mexico from 27 May to 3 June 2003 (see 68 FR 32460, May 30, 2003). L-DEO's analysis of the acoustic data from that study (Tolstoy *et al.* 2004) provides limited measurements in deep water, the situation relevant here. Those data indicate that, for deep water, the model tends to overestimate the received sound levels at a given distance. Until additional data become available, it is proposed that safety radii during airgun operations in deep water, including the planned operations off Oregon, will be the values predicted by L-DEO's model. Previously, more conservative (larger) safety radii that are 1.5 times the modeled radii have been used for these surveys. However, given that these modeled radii are already conservative (*i.e.*, overestimates) for deep water situations, even without the X 1.5 factor, these larger radii are not being proposed to be used during this seismic survey.

Additional Mitigation Measures

The following mitigation measures, as well as marine mammal visual monitoring (discussed later in this document), are proposed for the subject seismic surveys, provided that they do not compromise operational safety requirements: (1) Speed and course alteration; (2) power-down and shut-down procedures; (3) ramp-up procedures and (4) use of passive acoustics to detect vocalizing marine mammals. In addition, special mitigation measures will be implemented for the North Pacific right whale.

Speed and Course Alteration

If a marine mammal is detected outside the appropriate safety radius and, based on its position and the relative motion, is likely to enter the safety radius, the vessel's speed and/or direct course will be changed if this is practical while minimizing the effects on planned science objectives. Given the presence of the streamer and airgun array behind the vessel, the turning rate of the vessel with trailing streamer and array is no more than five degrees per minute, limiting the maneuverability of the vessel during operations. The marine mammal activities and movements relative to the seismic vessel will be closely monitored to ensure that the marine mammal does not approach within the safety radius. If the mammal appears likely to enter the safety radius, further mitigative actions will be taken, (i.e., either further course alterations or shutdown of the airguns).

Power-down and Shut-down Procedures

A power down involves decreasing the number of airguns in use such that the radius of the 180–dB (or 190–dB) zone is decreased to the extent that marine mammals are not in the safety zone. A power down may also occur when the vessel is moving from one seismic line to another, unless the full airgun array is scheduled to be operated during line changes. During a power down, one 80 in3 airgun will continue to be operated. The continued operation of one airgun is intended to alert marine mammals to the presence of the seismic vessel in the area. In contrast, a shut down occurs when all airgun activity is suspended.

If a marine mammal is detected outside the safety radius but is likely to enter the safety radius, and if the vessels speed and/or course cannot be changed to avoid having the mammal enter the safety radius, the airguns will be powered down before the mammal is within the safety radius. Likewise, if a mammal is already within the safety zone when first detected, the airguns will be powered down immediately. During a power down, at least one airgun (e.g., 80 in^3) will be operated. If a marine mammal is detected within or near the smaller safety radius around that single airgun (Table 1), all airguns will be shut down.

Following a power down, airgun activity will not resume until the marine mammal has cleared the safety zone. The animal will be considered to have cleared the safety zone if it (1) is visually observed to have left the safety zone, or (2) has not been seen within the zone for 15 min in the case of small odontocetes and pinnipeds, or (3) has not been seen within the zone for 30 min in the case of mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, and beaked whales.

During a power down, the operating airgun will be shut down if a marine mammal approaches within the modeled safety radius for the then-operating source, typically a single gun of 80 in3. Because no calibration measurements have been done to confirm the modeled safety radii for the single gun, conservative radii may be used (1.5 times the modeled safety radius). For an 80 in3 airgun, the predicted 180–dB distance applicable to cetaceans is 36 m (118 ft) and the x1.5 conservative radius is 54 m (177 ft). The corresponding 190–dB radius applicable to pinnipeds is 13 m (43 ft), with the x1.5 conservative radius being 20 m (66 ft). If a marine mammal is detected within or about to enter the appropriate safety radius around the small source in use during a power down, airgun operations will be entirely shut down. In addition, the airguns will be shut down if a North Pacific right whale is sighted anywhere near the vessel, even if it is located outside the safety radius, because of the rarity and sensitive status of this species. Resumption of airgun activity will follow procedures described for power-down operations.

Ramp-up Procedure

When airgun operations commence after a certain period without airgun operations, the number of guns firing will be increased gradually, or ''ramped up'' (also described as a ''soft start''). Operations will begin with the smallest gun in the array (80 in3). Guns will be added in sequence such that the source level of the array will increase in steps not exceeding 6 dB per 5–min period over a total duration of approximately 18–20 minutes. Throughout the ramp-up procedure, the safety zone for the full 10- or 12–gun array will be maintained.

The ''ramp-up'' procedure will be required under the following circumstances. Under normal operational conditions (vessel speed 4 knots (7.4 km/hr)), a ramp-up would be required after a power-down or shut-down period lasting more than 4 minutes if the Ewing was towing the 10- or 12–gun array. At 4 knots, the Ewing would travel 600 m (1969 ft) during a 5–minute period. The 600–m (1969 ft) distance is the calculated 180–dB safety radius.

If the towing speed is reduced to 3 knots (5.6 km/hr) or less, as sometimes required when maneuvering in shallow water (not a factor here), it is proposed that a ramp-up would be required after a ''no shooting'' period lasting greater than 7 minutes. At towing speeds not exceeding 3 knots (5.6 km/hr), the source vessel would travel no more than 600 m (1969 ft) in about 7 minutes. Based on the same calculation, a ramp-up procedure would be required after a 4–minute period if the speed of the source vessel was 5 knots (9.3 km/hr).

Ramp-up will not occur if the safety radius has not been visible for at least 30 minutes prior to the start of ramp-up operations in either daylight or nighttime. If the safety radius has not been visible for that 30–minute period (e.g., during darkness or fog), ramp-up will not commence unless at least one airgun has been firing continuously during the interruption of seismic activity. That airgun will have a source level of at least 180 dB re 1 microPa m (rms). It is likely that the airgun arrays will not be ramped up from a complete shut down at night or in thick fog, because the outer part of the safety zone for those arrays will not be visible during those conditions. If one airgun has operated during a power down period, ramp up to full power will be permissible at night or in poor visibility, on the assumption that marine mammals will be alerted to the approaching seismic vessel by the sounds from the single airgun and could move away if they choose. Ramp up of the airguns will not be initiated if a marine mammal is sighted within or near the applicable safety radii during the day or close to the vessel at night.

Comments on past proposed IHAs raised the issue of prohibiting night-time operations as mitigation. However, this is not practicable due to cost considerations. The daily cost to the Federal Government to operate vessels such as *Ewing* is approximately $33,000 to $35,000/day (Ljunngren, pers. comm. May 28, 2003). If the vessels were prohibited from operating during nighttime, it is possible that each trip would require an additional three to five days, or up to $175,000 more, depending on average daylight at the time of work.

Taking into consideration the additional costs of prohibiting night-time operations and the likely impact of the activity (including all mitigation and monitoring), NMFS has preliminarily determined that the proposed mitigation and monitoring ensures that the activity will have the least practicable impact on the affected species or stocks. Marine mammals will have sufficient notice of a vessel approaching with operating seismic airguns (at least 1 hour in advance), thereby giving them an opportunity to avoid the approaching array; if ramp-up is required after an extended power-down, two marine mammal observers will be required to monitor the safety radii using night vision devices for 30 minutes before ramp-up begins and verify that no marine mammals are in or approaching the safety radii; ramp-up may not begin unless the entire safety radii are visible; and ramp-up may occur at night only if one airgun with a sound pressure level of at least 180 dB has been maintained during interruption of seismic activity. Therefore it is likely that the 10–12–airgun array will not be ramped-up from a shut-down at night.

Marine Mammal Monitoring

L-DEO must have at least three visual observers and two passive acoustic system biological monitors on board the vessels, and at least two must be an experienced marine mammal observer that NMFS approves. These observers will be on duty in shifts of no longer than 4 hours.

The visual observers will monitor marine mammals and sea turtles near the seismic source vessel during all daytime airgun operations, during any nighttime start-ups of the airguns and at night, whenever daytime monitoring resulted in one or more power-down situations due to marine mammal presence. During daylight, vessel-based observers will watch for marine mammals and sea turtles near the seismic vessel during periods with shooting (including ramp-ups), and for 30 minutes prior to the planned start of airgun operations after an extended power-down or shut-down.

Use of multiple observers will increase the likelihood that marine mammals near the source vessel are detected. L-DEO bridge personnel will also assist in detecting marine mammals and implementing mitigation requirements whenever possible (they will be given instruction on how to do so), especially during ongoing operations at night when the designated observers are on stand-by and not required to be on watch at all times.

The observer(s) will watch for marine mammals from the highest practical vantage point on the vessel, which is either the bridge or the flying bridge. On the bridge of the *Maurice Ewing*, the observer's eye level will be 11 m (36 ft) above sea level, allowing for good visibility within a 210 arc. If observers are stationed on the flying bridge, the eye level will be 14.4 m (47.2 ft) above sea level. The observer(s) will systematically scan the area around the vessel with Big Eyes binoculars, reticle binoculars (e.g., 7 X 50 Fujinon) and with the naked eye during the daytime. Laser range-finding binoculars (Leica L.F. 1200 laser rangefinder or equivalent) will be available to assist with distance estimation. The observers will be used to determine when a marine mammal or sea turtle is in or near the safety radii so that the required mitigation measures, such as course alteration and power-down or shut-down, can be implemented. If the airguns are powered or shut down, observers will maintain watch to determine when the animal is outside the safety radius.

Observers will not be on duty during ongoing seismic operations at night; bridge personnel will watch for marine mammals during this time and will call for the airguns to be powered-down if marine mammals are observed in or about to enter the safety radii. However, an observer must be on standby at night and available to assist the bridge watch if marine mammals are detected. If the airguns are ramped-up at night from a power-down situation, two marine mammal observers will monitor for marine mammals for 30 minutes prior to ramp-up and during the ramp-up using night vision equipment that will be available (ITT F500 Series Generation 3 binocular image intensifier or equivalent). All observer activity will be assisted by the passive acoustic monitoring (PAM) system where its use is feasible.

Passive (Acoustic) Monitoring

L-DEO will use the PAM system whenever the vessel is operating in waters deep enough for the PAM hydrophone array to be towed. Passive acoustic equipment was first used on the *Ewing* during the 2003 Sperm Whale Seismic Study conducted in the Gulf of Mexico and subsequently was evaluated by L-DEO to determine whether it was practical to incorporate it into future seismic research cruises. The SEAMAP system has been used successfully in L-DEO's SE Caribbean study (69 FR 24571, May 4, 2004). The SEAMAP PAM system has four hydrophones, which allow the SEAMAP system to derive the bearing toward the a vocalizing marine mammal. In order to operate the SEAMAP system, the marine mammal monitoring contingent onboard the *Ewing* will be increased by 2 to 3 additional biologists who will monitor the SEAMAP system. Verification of acoustic contacts will then be attempted through visual observation by the marine mammal observers. However, the PAM system by itself usually does not determine the distance that the vocalizing mammal might be from the seismic vessel. It can be used as a cue by the visual observers as to the presence of an animal and to its approximate bearing (with some ambiguity). At this time, however, it is doubtful if PAM can be used as a trigger to initiate power-down of the array. Perhaps with continued studies the relationship between a signal on a passive acoustic array and distance from the array can be determined with sufficient accuracy to be used for this purpose without complementary visual observations.

Reporting

L-DEO will submit a report to NMFS within 90 days after the end of the cruise, which is currently predicted to occur during August, 2004. The report will describe the operations that were conducted and the marine mammals that were detected. The report must provide full documentation of methods, results, and interpretation pertaining to all monitoring tasks. The report will summarize the dates and locations of seismic operations, marine mammal sightings (dates, times, locations, activities, associated seismic survey activities), and estimates of the amount and nature of potential take of marine mammals by harassment or in other ways.

ESA

Under section 7 of the ESA, the National Science Foundation (NSF), the agency funding L-DEO, has begun consultation on the proposed seismic survey. NMFS will also consult on the issuance of an IHA under section 101(a)(5)(D) of the MMPA for this activity. Consultation will be concluded prior to a determination on the issuance of an IHA.

National Environmental Policy Act (NEPA)

The NSF has prepared an EA for the Blanco Fracture Zone oceanographic seismic surveys. NMFS is reviewing this EA and will either adopt it or prepare its own NEPA document before making a determination on the issuance of an IHA. A copy of the NSF EA for this activity is available upon request (see **ADDRESSES**).

Preliminary Conclusions

NMFS has preliminarily determined that the impact of conducting the seismic survey on the Blanco Fracture Zone in the NPO. will result, at worst, in a temporary modification in behavior by certain species of marine mammals. This activity is expected to result in no more than a negligible impact on the affected species or stocks.

For reasons stated previously in this document, this preliminary determination is supported by (1) the likelihood that, given sufficient notice through slow ship speed and ramp-up, marine mammals are expected to move away from a noise source that it finds annoying prior to its becoming potentially injurious; (2) recent research that indicates that TTS is unlikely (at least in delphinids) at until levels closer to 200–205 dB re 1 microPa are reached rather than 180 dB re 1 microPa; (3) the fact that 200–205 dB isopleths would be within 100 m (328 ft) of the vessel; and (4) the likelihood that marine mammal detection ability by trained observers is close to 100 percent during daytime and remains high at night to that distance from the seismic vessel. As a result, no take by injury and/or death is anticipated, and the potential for temporary or permanent hearing impairment is very low and will be avoided through the incorporation of the mitigation measures mentioned in this document.

While the number of potential incidental harassment takes will depend on the distribution and abundance of marine mammals in the vicinity of the survey activity, the number of potential harassment takings is estimated to be small. In addition, the proposed seismic program is not expected to interfere with any subsistence hunts, since seismic operations will not take place in subsistence whaling and sealing areas and will not affect marine mammals used for subsistence purposes.

Proposed Authorization

NMFS proposes to issue an IHA to L-DEO for conducting a oceanographic seismic surveys on the Blanco Fracture Zone in the NPO, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. NMFS has preliminarily determined that the proposed activity would result in the harassment of small numbers of marine mammals; would have no more than a negligible impact on the affected marine mammal stocks; and would not have an unmitigable adverse impact on the availability of species or stocks for subsistence uses.

Information Solicited

NMFS requests interested persons to submit comments and information concerning this request (see **ADDRESSES**).

Dated: May 25, 2004.

Laurie K. Allen,

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

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D.031204E]

Small Takes of Marine Mammals Incidental to Specified Activities; Oceanographic Surveys in the Southern Gulf of California

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

ACTION: Notice of issuance of an incidental take authorization.

SUMMARY: In accordance with provisions of the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to take marine mammals by harassment incidental to conducting oceanographic surveys in the southern Gulf of California to Scripps Institution of Oceanography (Scripps).

DATES: Effective from May 12, 2004, through May 11, 2005.

ADDRESSES: A copy of the IHA and the application are available by writing to Mr. P. Michael Payne, Chief, Marine Mammal Conservation Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Silver Spring, MD 20910–3225, or by telephoning the contact listed here. A copy of the application containing a list of the references used in this document may be obtained by writing to this address or by telephoning the contact listed here and is also available at: *http://www.nmfs.noaa.gov/prot__res/PR2/Small__Take/smalltake__info.htm#applications.*

FOR FURTHER INFORMATION CONTACT: Kenneth Hollingshead, Office of Protected Resources, NMFS, (301) 713–2322, ext 128.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of 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 that the permissible methods of taking and requirements pertaining to the monitoring and reporting of such takings are set forth. NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.''

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Under section 3(18)(A), the MMPA defines ''harassment'' as:

any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

The term ''Level A harassment'' means harassment described in subparagraph (A)(i). The term ''Level B harassment'' means harassment described in subparagraph (A)(ii).

Section 101(a)(5)(D) establishes a 45–day time limit for NMFS review of an application followed by a 30–day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny issuance of the authorization.

Summary of Request

On December 8, 2003, NMFS received an application from Scripps for the taking, by harassment, of several species of marine mammals incidental to conducting a seismic survey program. As presently scheduled, a seismic survey will be conducted in the Gulf of California. The Gulf of California research cruise will be in an area extending between 22o to 26.5o N and 106o to 111o W. The operations will partly take place in the Exclusive Economic Zone (EEZ) of Mexico.

The purpose of the seismic survey is to improve the understanding of the tectonic history of the Gulf of California, and especially of how the transition from continental rifting to seafloor spreading occurred. This includes understanding the relationship between seafloor structures in the deep water of the Gulf and structures that have been mapped on land (mostly in Baja California Sur) and in shallow coastal waters. The data will be used to test alternative tectonic models of how continental rifting and shearing during the initial separation of the Baja California peninsula from the rest of Mexico determined the present pattern of seismically active faults and volcanically-active spreading centers. The Gulf was selected for this work because it is adjacent to the field areas previously studied and because the seafloor sediment is generally thinner than further north, allowing for better resolution of seabed structure.

Description of the Activity

The seismic survey will involve one vessel, the *R/V Roger Revelle* (under a cooperative agreement with the U.S. Navy, owner of the vessel). The *Roger Revelle* will deploy two airguns as an energy source, plus a single (450 m or 1,476.4 ft) towed streamer of hydrophones to receive the returning acoustic signals, that can be retrieved.