

monitoring period of approximately 55 minutes. Also, while some whale species may dive for up to 45 minutes, it is unlikely that the ship's bridge watch would miss a large whale surfacing from its previous dive if it is within a mile or two of the vessel.

**Comment 3:** The **Federal Register** notice for the proposed IHA and the applicant's request notes that there are several species of beaked whales in the proposed survey area, but the notice makes no reference to or requirement for any additional caution with respect to beaked whales or that post-survey monitoring be conducted to search for animals that may have been taken other than by harassment.

**Response:** While NMFS shares the Commission's concern regarding the possible relationship between low-frequency seismic survey transmissions and the beaked whale strandings in the Gulf of California, NMFS believes that additional factors probably also influence whether beaked whales will be affected in ways other than the expected reaction of vacating the immediate vicinity of the noise, similar to the reactions of other marine mammal species. For example, beaked whales in the Gulf of Mexico have been exposed to seismic noise for several decades, yet mass stranding events do not appear in the stranding record. Finally, post-survey monitoring is not being required under this IHA because it is neither practical given the location (mid-ocean) and vessel commitments, nor warranted given the unlikelihood (based on the 2000 Bahamas stranding event) that beaked whales will show distress at the ocean surface. However, NMFS welcomes recommendations regarding additional practical mitigation measures to protect beaked whales from anthropogenic sounds.

### Mitigation

For the TAG seismic survey, LDEO will use a 20-gun array with a total volume of 8575 in<sup>3</sup>. Individual airguns will range in size from 80 to 850 in<sup>3</sup>. For the ADWBC cruise, LDEO will use 2 GI-guns with a total volume of 210 in<sup>3</sup>. The airguns comprising these arrays will be spread out horizontally, so that the energy from the arrays will be directed mostly downward.

The sound pressure fields were modeled by LDEO in relation to distance and direction from the 2 GI-guns and the 20-gun array, as shown in Figures 5 and 6 of the application (LDEO Mid-Atlantic, 2003). The radii around the arrays where the received level would be 180-dB re 1  $\mu$ Pa (rms) (NMFS' threshold level for onset of Level A harassment applicable to

cetaceans) were estimated as 54 m (177 ft) and 900 m (2953 ft), respectively, for the 2-GI and 20-gun array. The radii around the 2 GI-guns and the 20-gun array where the received level would be 190 dB re 1  $\mu$ Pa (rms), (NMFS' threshold level for onset of Level A harassment applicable to pinnipeds), were estimated as 17 m (56 ft) and 275 m (902 ft), respectively. A calibration study was conducted prior to these surveys to determine the actual radii corresponding to each sound level. These actual radii will be used to define the safety radii to be used for this study. Until then, or if those measurements appear defective, LDEO will use a precautionary 1.5 times the modeled 180- (cetaceans) and 190- (pinnipeds) dB radii as the safety radii.

Vessel-based observers will monitor marine mammals in the vicinity of the arrays. LDEO will power-down the airguns if marine mammals are observed approaching or within the safety radii. LDEO will employ a ramp-up procedure when commencing operations using the 20-gun array. Ramp-up will begin with the smallest gun in the array (80 in<sup>3</sup>), and guns will be added in a sequence such that the source level of the array will increase at a rate no greater than 6 dB per 5-minute period over a total duration of about 25 minutes. Ramp-up will not occur for the 2-GI gun array because the total air discharge volume is small (210 in<sup>3</sup>). Please refer to LDEO's application for more detailed information. The directional nature of the 20-airgun array to be used in this project is an important mitigating factor, resulting in lower sound levels at any given horizontal distance than would be 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 (2 or 20 guns) 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.

### Marine Mammal Monitoring

At least two vessel-based observers will be stationed aboard LDEO's seismic survey vessel during seismic operations in the Mid-Atlantic Ocean. One or two marine mammal observers aboard the seismic vessel will search for and observe marine mammals whenever seismic operations are in progress during daylight hours, and if feasible, during periods without seismic activity. Vessel-based observers will monitor for marine mammals near and in the safety radii for at least 30 minutes prior to and during all daylight ramp-up and airgun operations, and during any nighttime

startups of the airguns. Airgun operations will be suspended when marine mammals are observed within, or about to enter, the designated safety radii. Observers will not be required to be on duty during ongoing seismic operations at night; bridge personnel will watch for marine mammals during this period and will call for the airguns to be powered down if marine mammals are observed in or about to enter the safety radii. At least one marine mammal observer will be on "standby" at night, in case bridge personnel see a marine mammal. An image-intensifier night-vision device (NVD) will be available for use at night. If the airguns are started up at night, two marine mammal observers will monitor for marine mammals near the source vessel for 30 minutes prior to start up using NVDs. The 30-minute observation period is only required prior to commencing seismic operations following an extended shut down period (see Ramp-up Procedures below). After 30 minutes of observation, the ramp-up procedure will be followed.

The observers will watch for marine mammals from the highest practical vantage point on the vessel, which is either the flying bridge or the bridge. On the *R/V Maurice Ewing*, the observer's eye level will be approximately 11 m (36 ft) above sea level when stationed on the bridge, 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 proposed monitoring plan is summarized later in this document.

### Mitigation During Operations

The following mitigation measures, as well as marine mammal monitoring, will be adopted during the proposed Mid-Atlantic seismic surveys, provided that doing so will not compromise operational safety requirements: (1) Speed or course alteration; (2) Power-down procedures; (3) Shut-down procedures; and (4) Ramp-up procedures.

### Course Alteration

If a marine mammal is detected outside the appropriate safety radius and, based on its position and the relative bearing, is likely to enter the safety radius, the vessel's speed and/or direct course will be changed in a manner that also minimizes the effect to the planned science objectives. The marine mammal activities and movements relative to the seismic vessel will be closely monitored to ensure that the marine mammal does not approach or enter the safety radius. If the mammal appears likely to enter the safety radius,