

total duration of the “ping”, including all 5 successive segments, varies with water depth but is 1 ms in water depths <500 m (1640.4 ft) and 10 ms 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 <500 m (1640.5 ft) water depth to once per 15 seconds in the deepest water.

If the *R/V Knorr* is used for the ADWBC cruise, the SeaBeam 2100/12 multibeam 12 kHz bathymetric sonar system will be used, with a source output of 237 dB re 1  $\mu$ Pa-m. Operation of this system is similar to that of the Atlas Hydrosweep (described above). The SeaBeam 2100/12 system has a swath width of about 3 times the water depth, so it will provide data over swaths 10–15 km (5–8 n.mi.) wide during most of the survey.

The sub-bottom profiler is normally operated to provide information about the sedimentary features and 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 vessel. The output varies with water depth from 50 watts in shallow water to 800 watts in deep water. Pulse interval is 1 sec. but a common mode of operation is to broadcast five pulses at 1-sec. intervals followed by a 5-sec. pause. The beamwidth is approximately 30° and is directed downward. Maximum source output is 204 dB re 1  $\mu$ Pa, 800 watts, while nominal source output is 200 dB re 1  $\mu$ Pa, 500 watts. Pulse duration will be 4, 2, or 1 ms, and the bandwidth of pulses will be 1.0 kHz, 0.5 kHz, or 0.25 kHz, respectively.

For the ADWBC cruise, the multibeam bathymetry and sub-bottom profiling will be used to define windows where erosion or non-deposition has exposed deeper sequences suitable for piston coring. Coring transects across these windows will provide biostratigraphic

age determinations that can be used to constrain the age of reflections throughout the study area. There will be five days of piston coring following completion of the ADWBC seismic survey.

Additional information on the airgun arrays, bathymetric sonars, and sub-bottom profiler specifications is contained in the application, which is available upon request (see **ADDRESSES**).

#### Description of Habitat and Marine Mammals Affected by the Activity

A detailed description of the Mid-Atlantic Ocean and its associated marine mammals can be found in a number of documents referenced in the LDEO application as well as in the LDEO application itself, and is not repeated here. There will be differences in species composition between the two study sites in the Mid-Atlantic, since the ADWBC cruise will take place at a more northern latitude than the TAG cruise. Therefore, species with more northerly distributions are only likely to be sighted during the ADWBC cruise, and species with more southerly/tropical distributions will only be encountered during the TAG cruise, if at all. The two proposed cruises are also scheduled to occur in different seasons, and that could have an effect on the species and numbers present in the area. Approximately 34 species of cetaceans are known to occur within the proposed study areas in the Mid-Atlantic Ocean, six of which only rarely occur in the areas. These species are the sperm whale (*Physeter macrocephalus*), pygmy sperm whale (*Kogia breviceps*), dwarf sperm whale (*Kogia sima*), Cuvier's beaked whale (*Ziphius cavirostris*), northern bottlenose whale (*Hyperoodon ampullatus*), True's beaked whale (*Mesoplodon mirus*), Gervais' beaked whale (*Mesoplodon europaeus*), Sowerby's beaked whale (*Mesoplodon bidens*), Blainville's beaked whale (*Mesoplodon densirostris*), rough-toothed dolphin (*Steno bredanensis*), bottlenose dolphin (*Tursiops truncatus*), Pantropical spotted dolphin (*Stenella*

*attenuata*), Atlantic spotted dolphin (*Stenella frontalis*), spinner dolphin (*Stenella longirostris*), clymene dolphin (*Stenella clymene*), striped dolphin (*Stenella coeruleoalba*), short-beaked common dolphin (*Delphinus delphis*), Fraser's dolphin (*Lagenodelphis hosei*), white-beaked dolphin (*Lagenorhynchus albirostris*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), Risso's dolphin (*Grampus griseus*), melon-headed whale (*Peponocephala electra*), pygmy killer whale (*Feresa attenuata*), false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), long-finned pilot whale (*Globicephala melas*), short-finned pilot whale (*Globicephala macrorhynchus*), North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), fin whale (*Balaenoptera physalus*), and blue whale (*Balaenoptera musculus*). Also, six species of pinnipeds could potentially be encountered during the proposed seismic surveys, although their occurrence in the study area is unlikely. These include the bearded seal (*Erignathus barbatus*), hooded seal (*Cystophora cristata*), harbor seal (*Phoca vitulina*), ringed seal (*Pusa hispida*), grey seal (*Halichoerus grypus*), and the harp seal (*Pagophilus groenlandicus*). Additional information on most of these species is contained in Caretta *et al.* (2001, 2002) which is available at: [http://www.nmfs.noaa.gov/prot\\_res/PR2/Stock\\_Assessment\\_Program/sars.html](http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html).

#### Potential Effects on Marine Mammals

The sound pressure fields for the 2-GI and 20-gun arrays have been modeled by LDEO, in relation to distance and direction from the airguns. Table 1 in the application (LDEO Mid-Atlantic 2003) shows the maximum distances from the arrays where sound levels of  $\geq 190$ , 180, 170, and 160 dB re 1  $\mu$ Pa (rms) are predicted to be received:

Airgun Array	Predicted RMS Radii in meters/ft			
	190 dB	180 dB	170 dB	160 dB
2 GI guns .....	17/56	54/177	175/574	510/1673
20 airguns .....	275/902	900/2953	2600/8531	9000/29,529

Notice of a previous (LDEO) application and proposed IHA was published in the **Federal Register** on April 14, 2003 (68 FR 17909). That notice described, in detail, the characteristics of the *Ewing's* acoustic

sources and, in general, the anticipated effects on marine mammals including masking, disturbance, and potential hearing impairment and other physical effects. That information is not repeated here. However, possible effects of the

sub-bottom profiler, which was not used in the project described in that notice, are described below. Details on acoustic sources from the 2-GI gun array, which will be installed on the *R/V Knorr* for the ADWBC cruise as part of an LDEO