National Science Foundation
Geosciences Directorate
Division of Ocean Sciences
Arlington, Virginia

ENVIRONMENTAL ASSESSMENT AND DETERMINATION PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA), 42 U.S.C. 4321, *et seq.* AND EXECUTIVE ORDER 12114

Marine Seismic Survey in the Arctic Ocean, September-October 2011

FINDING OF NO SIGNIFICANT IMPACT

OCE# 0909568
Principal Investigators/Institution: Dr. Bernard Coakley, University of Alaska Geophysics Institute
Project Title: Plate boundaries around the Chukchi borderland; An integrated geophysics cruise to test models for the formation of the Canada Basin.

This constitutes an environmental assessment prepared by the National Science Foundation (NSF) for a marine seismic survey proposed to be conducted in September - October 2011 on board the research vessel (R/V) *Marcus G. Langseth* in the Arctic Ocean. This analysis is based, in part, on an Environmental Assessment report prepared by LGL Limited environmental research associates (LGL) on behalf of NSF, entitled, "Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Arctic Ocean, September – October 2011" (Report #TA4882-1) (Attachment 1). NSF posted the draft environmental assessment on the NSF website for public comment from April 12, 2011 to May 12, 2011, but received no direct public comments during (or after) the open comment period.

As a result of consultations with the National Marine Fisheries Service (NMFS), the environmental assessment was revised and updated to include revisions to the listing status of bearded and ringed seals (p. 20, 27-28), removal of maximum estimates and take estimates at 170 dB exposure levels of marine mammal densities (p. 48), inclusion of the impacts on subsistence hunting at additional villages in Chukchi (p.57-60), and the inclusion of information on contacting of the Ice Seal Committee about the proposed survey (p.66). The NSF assisted the NMFS in responding to questions submitted by the Marine Mammal Commission (MMC), and the North Slope Borough in response to the NMFS Federal Register notice related to the proposed issuance of an Incidental Harassment Authorization (IHA) for the survey, but no additional changes were made to the Environmental Assessment. The conclusions from the LGL report were used to inform the Division of Ocean Sciences (OCE) management of potential environmental impacts of the cruise. OCE has reviewed and concurs with the report's findings. Accordingly, the LGL report is incorporated into this environmental assessment by reference as if fully set forth herein.

Project Objectives and Context

The purpose of the proposed study is to collect seismic reflection data across the transition from the Chukchi Shelf to the Chukchi Borderland to image the structures that separate these two large continental blocks. This study will test existing tectonic models and develop new constraints on the development of the Amerasian Basin, and will substantially advance our understanding of the Mesozoic history of this basin. In addition, these data will enable the formulation of new tectonic models for the history of this region, which will improve our understanding of the surrounding continents.

Summary of Proposed Action and Alternatives

The procedures to be used for the survey will be similar to those used during previous seismic surveys and would involve conventional seismic methodology. The proposed survey will take place from September through October 2011 within the Arctic Ocean, in international waters and within the Exclusive Economic Zone of the United States (See Attachment 1, Figure 1). The seismic survey will consist of approximately 5502 km of transect lines (including turns) in water depths ranging from 30 meters to 3800 meters, with the majority being in depths between 100-1000 meters. During the survey, a 10 airgun array will be deployed from the R/V *Langseth* as an energy source; it will be operated as a single array consisting of 10 airguns, with a maximum discharge volume of 1830 in^3. A towed hydrophone streamer would receive the returning acoustic signals and transfer the data to the on-board processing system. In addition, at least 72 sonobuoys will be deployed in order to record seismic refraction data. A multibeam echosounder (MBES) and a sub-bottom profiler (SBP) will be used continuously throughout the cruise. Acoustic Doppler current profilers may also be used during the cruise. Seismic operations will be carried out for approximately 25 days. Some minor deviation from proposed cruise dates may be required, depending on logistics, weather conditions, and the need to repeat some lines if data quality were substandard.

One alternative to the proposed action would be to issue an IHA at an alternative time and conduct the survey at that alternative time. Constraints for vessel operations, especially weather and ice conditions, and availability of equipment (including the vessel) and personnel would need to be considered for alternative cruise times. Limitations on scheduling the vessel include the additional research studies planned on the vessel for 2011 and beyond. Other research activities planned within the region also would need to be considered.

Another alternative to conducting the proposed activities would be the "No Action" alternative, i.e. do not issue an IHA and do not conduct the operations. If the planned research were not conducted, the "No Action" alternative would result in no disturbance to marine mammals attributable to the proposed activities, but geophysical data of considerable scientific value that would increase our understanding of the geologic structure and history in the region and the formulation of new tectonic models would not be acquired and the project objectives as described above would not be met. The "No Action" alternative would result in a lost opportunity to obtain important scientific data and knowledge and to society in general. The collaboration, involving investigators, students, and technicians, would be lost along with the collection of new data, interpretation of these data, and introduction of new results into the

greater scientific community and applicability of this data to other similar settings. Loss of NSF support often represents a significant negative impact to the academic infrastructure.

Summary of environmental consequences

The potential effects of sounds from airguns on marine species, including mammals and turtles of particular concern, are described in detail in Attachment 1 (pages 31-66 and Appendices B-D) and might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and at least in theory, temporary or permanent hearing impairment, or non-auditory physical or physiological effects. It is unlikely that the project would result in any cases of temporary or especially permanent hearing impairment, or any significant nonauditory physical or physiological effects. Some behavioral disturbance is expected, if animals are in the general area during seismic operations, but this would be localized, short-term, and involve limited numbers of animals.

The proposed activity will include a mitigation program to further minimize potential impacts on marine mammals that may be present during the conduct of the research to a level of insignificance. As detailed in Attachment 1 (pages 6-13; and 45) monitoring and mitigation measures will include: ramp ups; typically two, however a minimum of one dedicated protected species observer maintaining a visual watch during all daytime airgun operations; two observers on watch for 30 minutes before and during ramp ups during the day and at night; no start ups during poor visibility or at night unless at least one airgun has been operating; passive acoustic monitoring (PAM) via towed hydrophones during both day and night to complement visual monitoring (unless the system and back-up systems are damaged during operations); and, power downs (or if necessary shut downs) when marine mammals are detected in or about to enter designated exclusion zones. The fact that the airguns, as a result of their design, direct the majority of the energy downward, and less energy laterally, would also be an inherent mitigation measure.

With the planned monitoring and mitigation measures, unavoidable impacts to each species of marine mammal that could be encountered would be expected to be limited to short-term, localized changes in behavior and distribution near the seismic vessel. At most, effects on marine mammals may be interpreted as falling within the U.S. Marine Mammal Protection Act (MMPA) definition of "Level B Harassment" for those species managed by the National Marine Fisheries Service. No long-term or significant effects would be expected on individual marine mammals, or the populations to which they belong or on their habitats.

A survey at an alternative time would result in few net benefits. Conducting the project at some other time of year outside the summer/fall period could result in impracticalities related to ice conditions. As described in Attachment 1, marine mammals are expected to be found throughout the proposed region of study. Ringed seals are year-round residents in the Arctic Ocean, so altering the timing of the proposed project likely would result in no net benefits for those species. Other marine mammal species (e.g., beluga whale, bowhead whale, gray whale and walrus) are migratory, moving through the area in spring and fall, primarily south of the survey area which minimizes the likelihood of encounters in the survey area. For other marine mammal species (e.g. killer whale, humpback whale, minke whale and fin whale) there are insufficient data to predict when their abundance may be highest. Marine mammal harvests take place year-round,

but subsistence harvest peaks during the bowhead whale hunts in the spring and fall. As the harvests take place primarily within ~30 km of shore, the survey is not expected to have any effects on the subsistence harvest. Conducting the project at some other time of year outside the summer/fall period could result in impracticalities related to ice conditions. In addition, the proposed period for the cruise is the period when the ship and all of the personnel and equipment essential to meet the overall project objectives are available. Postponing or changing the project period will delay this and potentially other projects scheduled for the R/V *Langseth* during the rest of 2011 and in 2012.

The "no action" alternative would remove the potential for disturbance to marine mammals or sea turtles attributable to the proposed activities as described. It would however preclude important scientific research from going forward that has distinct potential to address geological processes of concern.

Conclusions

NSF has reviewed and concurs with the conclusions of the LGL report (Attachment 1) that implementation of the proposed activity will not have a significant impact on the environment. Consequently, implementation of the proposed activity does not have a significant impact on the environment within the meaning of the National Environmental Policy Act (NEPA) or Executive Order 12114. An environmental impact statement will not be prepared. No further action is required for NSF compliance with Executive Order 12114. On behalf of NSF, I authorize the issuance of a Finding of No Significant Impact for the marine seismic survey proposed to be conducted on board the research vessel *Marcus G. Langseth* in the Arctic Ocean in September-October 2011.

Bauke (Bob) Houtman — Date: 18 Aug 11

Integrative Programs Section Head
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