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

Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Central Pacific Ocean May 2012

OCE# 1159053
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Project Title: Collaborative research: Coring the Line Islands ridge for paleoceanographic research.

This constitutes a draft environmental analysis prepared by the National Science Foundation (NSF) for a marine seismic survey proposed to be conducted in May 2012 on board the research vessel (R/V) *Marcus G. Langseth* in the Central Pacific 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 central Pacific Ocean, May 2012" (Report #TA8098-1) (Attachment 1). 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 analysis by reference as if fully set forth herein.

Project Objectives and Context

The purpose of the proposed study is to conduct a marine piston coring and seismic survey in the Line Islands, central Pacific Ocean. Multichannel seismic reflection surveys would be used to understand sedimentation patterns in the upper 500–1000 m of the sediment column on the flanks of the Line Islands Ridge. Flanks of ocean ridges and island chains often have complex sedimentation patterns and seismic reflection data are critical to locate areas that have faster than average sedimentation without high variability. Near-real-time analysis of data while underway would allow the selection of optimal locations for piston coring. The seismic surveys would provide a detailed view of the long-term depositional environment that is critical for recognizing locations undesirable for the program needs such as episodic non-deposition attributable to bottom currents, or areas where turbidites or slumps interrupt normal accumulation. Coring sites would be selected from undisturbed sediments where there is potential for higher-than-normal sedimentation rates. The resulting cores would provide data necessary to understand how important climate patterns such as the El Niño/La Niña-Southern Oscillation (ENSO) and position of the Intertropical Convergence Zone (ITCZ) have varied in the late Pleistocene.

Summary of Proposed Action and Alternatives

The procedures to be used for the survey would be similar to those used during previous low energy seismic surveys and would involve conventional seismic methodology. The proposed survey would take place during May 2012 within the central Pacific Ocean, partly in the Exclusive Economic Zone (EEZ) of the Republic of Kiribati and partly in the U.S. EEZ (See Attachment 1, Figure 1). The seismic survey would consist of approximately 1400 km of transect lines (including turns) in water depths ranging from 1100 meters to 5000 meters. During the survey, a 2 airgun array would be deployed from the R/V *Langseth* as an energy source; it would be operated as a single array consisting of two 105 in^3 GI airguns, with a maximum discharge volume of 210 in^3. A towed hydrophone streamer would receive the returning acoustic signals and transfer the data to the on-board processing system. A multibeam echosounder (MBES) and a sub-bottom profiler (SBP) would be used continuously throughout the cruise. Acoustic Doppler current profilers may also be used during the cruise. Seismic operations would be carried out for approximately 6 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 2012 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 complex sedimentation patterns and how important climate patterns have varied during the late Pleistocene periods, 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 35-64 and Appendices A-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 would 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 6-11; and 52) monitoring and mitigation measures would include: ramp ups; typically two, but a minimum of one dedicated observer maintaining a visual watch during all daytime airgun operations; two observers 30 min 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; and shut downs when marine mammals or sea turtles 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. As described in Attachment 1, a number of marine mammal and sea turtle species are expected to occur in the area year-round, so altering the timing of the proposed project likely would result in no net benefits for those species. Other marine mammal species (e.g., humpback whale) are migratory, spending the winter months north of the project area (in Hawaii) and vacating the area in the summer. The proposed timing for this survey is beneficial for those migratory species. Postponing or changing the project period will delay this and potentially other projects scheduled for the R/V *Langseth* during the rest of 2012. 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.

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 would not have a significant impact on the environment.