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DRAFT NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) ANALYSIS PURSUANT TO EXECUTIVE ORDER 12114

Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the central Pacific Ocean November - December 2011

OCE# 0928270
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Project Title: Collaborative research: structure and composition of oceanic lithosphere and the lithosphere/asthenosphere boundary

This constitutes a draft environmental analysis prepared by the National Science Foundation (NSF) for a marine seismic survey proposed to be conducted in 2011 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, November – December 2011" (Report #TA4949-1) (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 collect a suite of observations that would unambiguously characterize the detailed structure of oceanic lithosphere in an uncomplicated spreading segment far removed from the influence of asthenospheric melt. With these observations and associated analyses the Principal Investigators (PIs) aim to define the detailed structure of oceanic lithosphere and develop a comprehensive theory for its formation and evolution.

Summary of Proposed Action and Alternatives

The procedures to be used for the survey would be similar to those used during previous seismic surveys and would involve conventional seismic methodology. The proposed survey would take place from November to December 2011 within the central Pacific Ocean, in international waters (See Attachment 1, Figure 1). The seismic survey would consist of approximately 2120 km of transect lines (including turns) in water depths of approximately 5000 m. During the survey, a 36 airgun array would be deployed from the R/V *Langseth* as an energy source; it would be

operated as four identical linear arrays consisting of 10 airguns, with a maximum discharge volume of approximately 6600 in^3. Nine airguns in each string will be fired simultaneously, whereas the tenth is kept in reserve as a spare, to be turned on in case of failure of another airgun. The receiving system would consist of one 6-km long hydrophone streamer and/or ocean bottom seismometers (OBSs). A multibeam echosounder (MBES) and a sub-bottom profiler (SBP) would be used continuously throughout the cruise. After completion of seismic operations, 34 short period OBSs will be recovered and 27 broad band OBSs and 5 magneto-telluric (MT) instruments will be deployed. These instruments would remain in the survey area for 1 year and will be recovered after that period of time. Seismic operations would be carried out for approximately 11 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 is 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 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 40-68 and Appendices B-E) 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 6-14; and 56) monitoring and mitigation measures would include: ramp ups; typically two, however a minimum of one dedicated protected species observer maintaining a visual watch during all daytime airgun operations; a minimum of one, but typically 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. As described in Attachment 1, a number of marine mammals and turtles are expected to be found throughout the year within the proposed region of study. Although humpback whales migrate to warmer water in Hawaii during the winter months, few humpback whales are likely to be encountered in the study area south of Hawaii during the proposed study period. 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, and may increase the cost of vessel operations funded by the government due to decreased schedule efficiency.

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.