



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

OCT 16 2015

Sean Higgins
Marine Environmental & Safety Coordinator
Department of Marine Operations
Lamont-Doherty Earth Observatory
P.O. Box 1000
Palisades, New York 10964-8000

Dear Mr. Higgins:

Enclosed is an Incidental Harassment Authorization (Authorization) issued to the Lamont-Doherty Earth Observatory, under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*), to harass small numbers of marine mammals, by Level B harassment, incidental to the R/V *Marcus G. Langseth's* marine seismic survey in the Mediterranean Sea November through December, 2015.

Lamont-Doherty, the National Science Foundation and Oregon State University are required to comply with the conditions contained in the Authorization. The taking of any marine mammal in a manner prohibited under this Authorization must be reported immediately to the Office of Protected Resources, National Marine Fisheries Service (NMFS), at 301-427-8401.

In addition, you must submit a report to the NMFS' Office of Protected Resources within 90 days of the completion of the cruise. The Authorization requires monitoring of marine mammals by qualified individuals before, during, and after seismic activities and reporting of marine mammal observations, including species, numbers, and behavioral modifications potentially resulting from this activity.

If you have any questions concerning the Authorization or its requirements, please contact Jeannine Cody, Office of Protected Resources, NMFS, at 301-427-8401.

Sincerely,

Dr. Perry F. Gayaldo
Deputy Director
Office of Protected Resources

Enclosures





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DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

INCIDENTAL HARASSMENT AUTHORIZATION

We hereby authorize the Lamont-Doherty Earth Observatory (Lamont-Doherty) Columbia University, P.O. Box 1000, 61 Route 9W, Palisades, New York 10964-8000, and/or its designees (*i.e.*, the National Science Foundation and University of Oregon, the Holders of the Authorization) under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*) and 50 CFR 216.107, to take marine mammals, by harassment, incidental to a marine geophysical survey conducted by the R/V *Marcus G. Langseth* (*Langseth*) marine geophysical survey in the Mediterranean Sea, mid-November through December, 2015.

1. Effective Dates

This Authorization is valid from November 19, 2015 through December 31, 2015.

2. Specified Geographic Region

This Authorization is valid only for specified activities associated with the *Langseth's* seismic operations as specified in Lamont-Doherty's Incidental Harassment Authorization (Authorization) application and environmental analysis in the following specified geographic areas outside of Greek territorial waters:

- a. In the Aegean Sea, located approximately between 36.1-36.8°N and 24.7-26.1°E in the eastern Mediterranean Sea, as specified in Lamont-Doherty's application and the National Science Foundation's Environmental Analysis; and
- b. Over the Hellenic subduction zone which starts in the Aegean Sea at approximately 36.4°N, 23.9°E and runs to the southwest, ending at approximately 34.9°N, 22.6°E.

3. Species Authorized and Level of Take

Take coverage is only for the area outside Greek territorial waters. The MMPA does not apply within Greek territorial waters.

- a. This Authorization limits the incidental taking of marine mammals, by harassment only, to the species listed in Table 1.
 - i. During the seismic activities, if the Holder of this Authorization encounters any marine mammal species that are not listed in Condition 3 for authorized taking and are likely to be exposed to sound pressure levels greater than or equal to 160 decibels (dB) re: 1 μ Pa, then the Holder of the Authorization must alter speed or course or shut-down the airguns to avoid take.
- b. This Authorization prohibits the taking by serious injury or mortality of any of the species listed in Condition 3 or the taking of any other kind of species of marine mammal. Thus, if this were to occur, it may result in the modification, suspension, or revocation of this Authorization.



- c. This Authorization limits the methods authorized for taking by harassment to the following acoustic sources without an amendment to this Authorization:
 - i. An airgun array with a total capacity of 6,600 cubic inches (in³) (or smaller).
- d. Lamont-Doherty will not operate the multi-beam echosounder or the sub-bottom profiler during transit to or from the survey areas.

4. Reporting Prohibited Take

The Holder of this Authorization must report the taking of any marine mammal in a manner prohibited under this Authorization immediately to the Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, at 301-427-8401 and/ or by email to Jolie.Harrison@noaa.gov.

5. Cooperation

We require the Holder of this Authorization to cooperate with the Office of Protected Resources, National Marine Fisheries Service, and any other Greek and U.S. Federal agency requirements for monitoring the impacts of the activity on marine mammals.

6. Mitigation and Monitoring Requirements

We require the Holder of this Authorization to implement the following mitigation and monitoring requirements when conducting the specified activities to achieve the least practicable adverse impact on affected marine mammal species or stocks:

Visual Observers

- a. Use two, National Marine Fisheries Service-qualified, vessel-based Protected Species Visual Observers (visual observers) to watch for and monitor marine mammals near the seismic source vessel during daytime airgun operations (from nautical twilight-dawn to nautical twilight-dusk) and before and during start-ups of airguns day or night.
 - i. At least one visual observer will be on watch during meal times and restroom breaks.
 - ii. Visual observer shifts will last no longer than four hours at a time.
 - iii. Visual observers will also conduct monitoring while the *Langseth* crew deploy and recover the airgun array, ocean bottom seismometers, and hydrophone streamer from the water.
 - iv. When feasible, visual observers will conduct observations during daytime periods when the seismic system is not operating for comparison of sighting rates and behavioral reactions during, between, and after airgun operations.
 - v. The *Langseth*'s vessel crew will also assist in detecting marine mammals, when practicable.
 - vi. Visual observers will have access to reticle binoculars (7×50 Steiner), and big-eye binoculars (25×150), optical range finders, and night vision devices.

Exclusion Zones

- b. Establish a 180-decibel (dB) and 190-dB exclusion zone for cetaceans and pinnipeds, respectively, before starting the airgun array (6,600 in³ or smaller); and establish a 180-dB and 190-dB exclusion zone for cetaceans and pinnipeds, respectively, for the single airgun (40 in³). Observers will use the predicted radius distance for the 180-dB and 190-dB exclusion zones for mitigation shown in Table 2 (attached).

Visual Monitoring at the Start of Airgun Operations

- c. Monitor the entire extent of the exclusion zones for at least 30 minutes (day or night) prior to the ramp-up of airgun operations after a shutdown.
- d. Delay airgun operations if the visual observer sees a cetacean within the 180-dB exclusion zone (as defined in Table 2) until the marine mammal(s) has left the area.

Delay airgun operations if the visual observer sees a pinniped within the 190-dB exclusion zone (as defined in Table 2) until the marine mammal(s) has left the area.

- i. If the visual observer sees a marine mammal that surfaces, then dives below the surface, the observer shall wait 30 minutes. If the observer sees no marine mammals during that time, he/she should assume that the animal has moved beyond the relevant exclusion zone (as defined in Table 2).
- ii. If, for any reason the visual observer cannot see the full relevant exclusion zone (as defined in Table 2) for the entire 30 minutes (*i.e.*, rough seas, fog, darkness), or if marine mammals are near, approaching, or within zone, the *Langseth* may not resume airgun operations.
- iii. If one airgun is already running at a source level of at least 180 dB re: 1 μ Pa, the *Langseth* may start the second gun—and subsequent airguns—without observing relevant exclusion zones for 30 minutes, provided that the observers have not seen any marine mammals near the relevant exclusion zones (in accordance with Condition 6(b)).

Passive Acoustic Monitoring

- e. Utilize the passive acoustic monitoring (PAM) system, to the maximum extent practicable, to detect and allow some localization of marine mammals around the *Langseth* during all airgun operations and during most periods when airguns are not operating. One visual observer and/or bioacoustician will monitor the PAM at all times in shifts no longer than 6 hours. A bioacoustician shall design and set up the PAM system and be present to operate or oversee PAM, and available when technical issues occur during the survey.
- f. Do and record the following when an observer detects an animal by the PAM:
 - i. Notify the visual observer immediately of a vocalizing marine mammal so a power-down or shut-down can be initiated, if required;
 - ii. Enter the information regarding the vocalization into a database. The data to be entered include an acoustic encounter identification number, whether it was linked with a visual sighting, date, time when first and last heard and whenever any additional information was recorded, position, and water depth when first detected, bearing if determinable, species or species group (*e.g.*, unidentified dolphin, sperm whale, etc.), types and nature of sounds heard (*e.g.*, clicks, continuous, sporadic,

whistles, creaks, burst pulses, strength of signal, etc.), and any other notable information.

Ramp-Up Procedures

- g. Implement a “ramp-up” procedure when starting the airguns at the beginning of seismic operations or any time after the entire array has shutdown, which means starting the smallest gun first and adding airguns in a sequence such that the source level of the array will increase in steps not exceeding approximately 6 dB per 5-minute period. During ramp-up, the observers will monitor the exclusion zones, and if the observers sight marine mammals, the *Langseth* will implement a course/speed alteration, power-down, or shutdown as though the full array were operational.

Recording Visual Detections

- h. Visual observers must record the following information when they detect a marine mammal:
 - i. Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, sighting cue, apparent reaction to the airguns or vessel (e.g., none, avoidance, approach, paralleling, etc., and including responses to ramp-up), and behavioral pace; and
 - ii. Time, location, heading, speed, activity of the vessel (including number of airguns operating and whether in state of ramp-up or shut-down), Beaufort sea state and wind force, visibility, cloud cover, and sun glare; and
 - iii. The data listed under 6(h)(ii) at the start and end of each observation watch and during a watch whenever there is a change in one or more of the variables.

Speed or Course Alteration

- i. Alter speed or course during seismic operations if a marine mammal, based on its position and relative motion, appears likely to enter the relevant exclusion zone. If speed or course alteration is not safe or practicable, or if after alteration the marine mammal still appears likely to enter the relevant exclusion zone, Lamont-Doherty will implement further mitigation measures, such as a power-down or shutdown.

Power-Down Procedures

- j. Power down the airguns if a visual observer detects a marine mammal within, approaching, or entering the relevant exclusion zone (as defined in Table 2). A power-down means reducing the number of operating airguns to a single operating 40 in³ airgun. This would reduce the relevant exclusion zone to the degree that the animal(s) is/are outside of that zone. When appropriate or possible, power-down of the airgun array shall also occur when the vessel is moving from the end of one trackline to the start of the next trackline.

Resuming Airgun Operations after a Power-Down

- k. Following a power-down, if the marine mammal approaches the smaller exclusion zone (as defined in Table 2), then the *Langseth* must completely shut down the airguns. Airgun activity will not resume until the observer has visually observed the marine mammal(s) exiting the exclusion zone and is not likely to return, or the observer has not seen the animal within the relevant exclusion zone for 15 minutes for species with shorter dive

durations (*i.e.*, small odontocetes) or 30 minutes for species with longer dive durations (*i.e.*, mysticetes and large odontocetes, including sperm, pygmy sperm, and dwarf sperm whales) and pinnipeds.

- l. Following a power-down and subsequent animal departure, the *Langseth* may resume airgun operations at full power. Initiation requires that the observers can effectively monitor the full exclusion zones described in Condition 6(b). If the observer sees a marine mammal within or about to enter the relevant zones then the *Langseth* will implement a course/speed alteration, power-down, or shutdown.

Shutdown Procedures

- m. Shutdown the airgun(s) if a visual observer detects a marine mammal within, approaching, or entering the relevant exclusion zone (as defined in Table 2). A shutdown means that the *Langseth* turns off all operating airguns.
- n. If an observer visually detects a pinniped, the *Langseth* will shut-down the airgun array regardless of the distance of the animal(s) to the sound source. The array will not resume firing until 30 minutes after the last documented pinniped visual sighting.

Resuming Airgun Operations after a Shutdown

- o. Following a shutdown, if the observer has visually confirmed that the animal has departed the relevant exclusion zone within a period of less than or equal to 8 minutes after the shutdown, then the *Langseth* may resume airgun operations at full power.
- p. Else, if the observer has not seen the animal depart the relevant exclusion zone (with buffer), the *Langseth* shall not resume airgun activity until 15 minutes has passed for species with shorter dive times (*i.e.*, small odontocetes) or 30 minutes has passed for species with longer dive durations (*i.e.*, mysticetes and large odontocetes, including sperm, pygmy sperm, and dwarf sperm whales) and pinnipeds. The *Langseth* will follow the ramp-up procedures described in Conditions 6(g).

Survey Operations

- q. The *Langseth* may continue marine geophysical surveys into night and low-light hours if the Holder of the Authorization initiates these segment(s) of the survey when the observers can view and effectively monitor the full relevant exclusion zones.
- r. This Authorization does not permit the Holder of this Authorization to initiate airgun array operations from a shut-down position at night or during low-light hours (such as in dense fog or heavy rain) when the visual observers cannot view and effectively monitor the full relevant exclusion zones.
- s. To the maximum extent practicable, the Holder of this Authorization should schedule seismic operations (*i.e.*, firing the airguns) during daylight hours.
- t. To the maximum extent practicable, the *Langseth* will conduct the seismic survey (especially when near land) from the coast (inshore) and proceed towards the sea (offshore) in order to avoid trapping marine mammals in shallow water.

Mitigation Airgun

- u. The *Langseth* may operate a small-volume airgun (*i.e.*, mitigation airgun) during turns, brief transits between seismic tracklines, and maintenance at approximately one shot per minute. The *Langseth* would not operate the small-volume airgun for longer than three hours in duration.

Special Procedures for Large Whale Concentrations

- v. The *Langseth* will avoid concentrations of fin (*Balaenoptera physalus*) and/or sperm whales (*Physeter macrocephalus*) if possible (*i.e.*, exposing concentrations of animals to 160 dB re: 1 μ Pa), and power-down the array. For purposes of the survey, a concentration or group of whales will consist of six or more individuals visually sighted that do not appear to be traveling (*e.g.*, feeding, socializing, etc.). The *Langseth* will follow the procedures described in Conditions 6(k) for resuming operations after a power down.

7. Reporting Requirements

This Authorization requires the Holder of this Authorization to:

- a. Submit a draft report on all activities and monitoring results to the Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, within 90 days of the completion of the *Langseth's* cruise. This report must contain and summarize the following information:
 - i. Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and associated activities during all seismic operations and marine mammal sightings.
 - ii. Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as associated seismic activity (number of shutdowns), observed throughout all monitoring activities.
 - iii. An estimate of the number (by species) of marine mammals with known exposures to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re: 1 μ Pa and/or 180 dB or 190-dB re: 1 μ Pa for cetaceans and pinnipeds, respectively and a discussion of any specific behaviors those individuals exhibited.
 - iv. An estimate of the number (by species) of marine mammals with estimated exposures (based on modeling results) to the seismic activity at received levels greater than or equal to 160 dB re: 1 μ Pa and/or 180 dB or 190-dB re: 1 μ Pa with a discussion of the nature of the probable consequences of that exposure on the individuals.
 - v. A description of the implementation and effectiveness of the: (A) Terms and Conditions of the Biological Opinion's Incidental Take Statement; and (B) mitigation measures of the Incidental Harassment Authorization. For the Biological Opinion, the report will confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness, for minimizing the adverse effects of the action on listed marine mammals under the Endangered Species Act.
- b. Submit a final report to the Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, within 30 days after receiving comments from us on the draft report. If we decide that the draft report needs no comments, we will consider the draft report to be the final report.

8. Reporting Prohibited Take

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner not permitted by the Authorization, such as serious injury or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), Lamont-Doherty shall immediately cease the specified activities and immediately report the take to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov.

Lamont-Doherty must also contact the ARION Cetacean Rescue and Rehabilitation Centre, Greece at +030-6945-531850.

The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound sources used in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Lamont-Doherty shall not resume its activities until we are able to review the circumstances of the prohibited take. We shall work with Lamont-Doherty to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Lamont-Doherty may not resume their activities until notified by us via letter, email, or telephone.

9. Reporting an Injured or Dead Marine Mammal with an Unknown Cause of Death

In the event that Lamont-Doherty discovers an injured or dead marine mammal, and the lead visual observer determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as we describe in the next section), Lamont-Doherty will immediately report the incident to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov.

Lamont-Doherty must also contact the ARION Cetacean Rescue and Rehabilitation Centre, Greece at +030-6945-531850.

The report must include the same information identified in Condition 8. Activities may continue while we review the circumstances of the incident. We would work with Lamont-Doherty to determine whether modifications in the activities are appropriate.

10. Reporting an Injured or Dead Marine Mammal Unrelated to the Activities

In the event that Lamont-Doherty discovers an injured or dead marine mammal, and the lead visual observer determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Lamont-Doherty would report the incident to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov.

Lamont-Doherty must also contact the ARION Cetacean Rescue and Rehabilitation Centre, Greece at +030-6945-531850.

Lamont-Doherty would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS.

11. Endangered Species Act Biological Opinion and Incidental Take Statement

Lamont-Doherty must comply with the Terms and Conditions of the Incidental Take Statement corresponding to the Endangered Species Act Biological Opinion issued to the National Science Foundation and NMFS' Office of Protected Resources, Permits and Conservation Division.

A copy of this Authorization and the Incidental Take Statement must be in the possession of all contractors and protected species observers operating under the authority of this Incidental Harassment Authorization.



Dr. Perry F. Gayaldo
Deputy Director,
Office of Protected Resources
National Marine Fisheries Service

OCT 16 2015

Date

Table 1 – Authorized Level A and Level B harassment take numbers for each marine mammal species during Lamont-Doherty’s marine seismic survey in the eastern Mediterranean Sea, Mid-November through December, 2015.

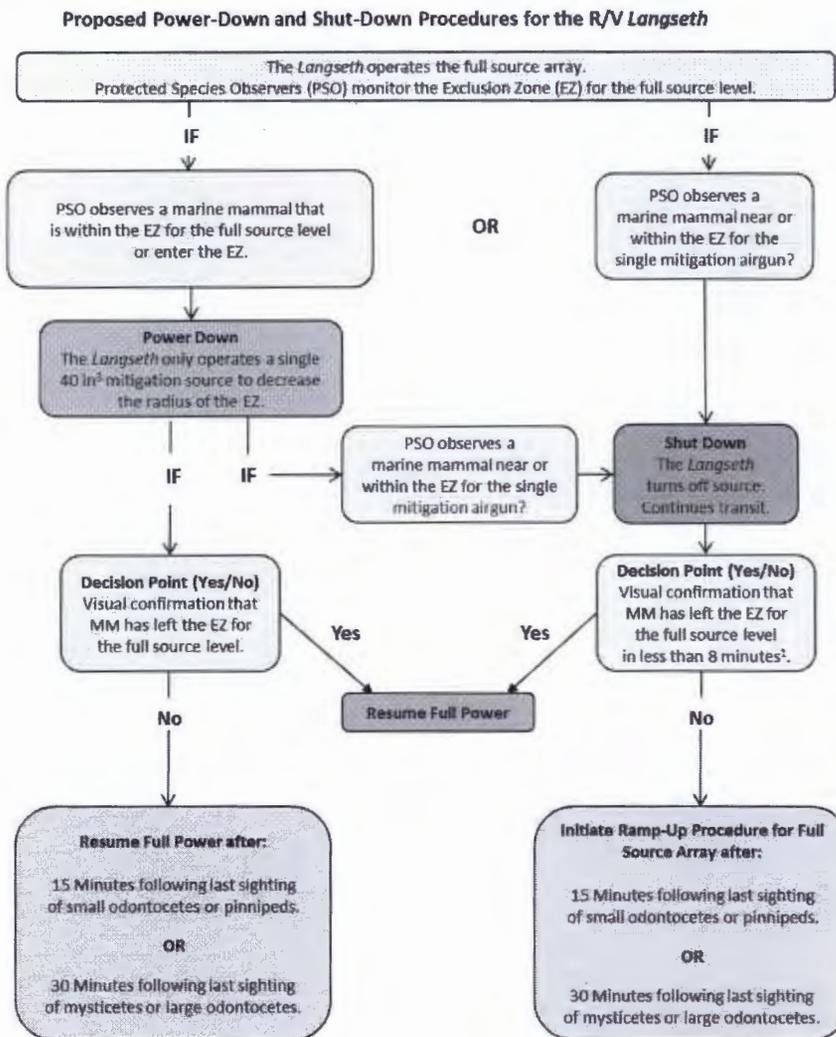
ESA Listed Species	Authorized Take (Level A, Level B)
Fin whale	0, 40
Humpback whale	0, 60
Sei whale	0, 1
Sperm whale	0, 20
Mediterranean monk seal	0, 35
Non-Listed Species	Authorized Take (Level A, Level B)
Gray whale	0, 1
Minke whale	0, 40
Dwarf sperm whale	0, 2
Pygmy sperm whale	0, 2
Cuvier’s beaked whale	0, 40
Blainville’s beaked whale	0, 3
Gervais’ beaked whale	0, 3
Sowerby’s beaked whale	0, 3
Bottlenose dolphin	160, 900
Rough-toothed dolphin	0, 8
Striped dolphin	780, 4,560
Short-beaked common dolphin	100, 620
Risso’s dolphin	60, 320
False killer whale	0, 3
Long-finned pilot whale	0, 33
Harbor porpoise	0, 1
Hooded seal	0, 1

Table 2 – Exclusion and Buffer Zones

Source and Volume (in ³)	Tow Depth (m)	Water Depth (m)	Predicted RMS Distances ¹ (m)		
			190 dB	180 dB	160 dB
Single Bolt airgun (40 in ³)	9 or 12	< 100	100 ²	100 ²	1,041
		100 to 1,000	100	100	647
		> 1,000	100	100	431
36-Airgun Array (6,600 in ³)	9	< 100	591	2,060	22,580
		100 to 1,000	429	1,391	8,670
		> 1,000	286	927	5,780
36-Airgun Array (6,600 in ³)	12	< 100	710	2,480	27,130
		100 to 1,000	522	1,674	10,362
		> 1,000	348	1,116	6,908

¹ Predicted distances based on information presented in Lamont-Doherty’s application.

² NMFS required NSF to expand the exclusion zone for the mitigation airgun to 100 m in shallow water depths.



² Ramp-Up Procedures

For a given survey, Lamont-Doherty would calculate a specified period based on the 180-dB exclusion zone radius in relation to the average planned speed of the *Langseth* while surveying. Lamont-Doherty has used similar periods (8-10 minutes) for previous surveys. Ramp up will not occur if a marine mammal has not cleared the exclusion zone for the full array.

Date: March 10, 2015