

Strangers in the Night: A Critical Analysis of Regulatory Guidelines for Mitigation
Measures Pertaining to Seismic Exploration in the Gulf of Mexico

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Abstract

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The United States fundamentally depends on crude oil and natural gas for energy and production of goods. Subsurface oil in the federal offshore waters of the Gulf of Mexico is a critical resource for the country in this regard, providing 17% of the nation's crude oil production (U.S. Energy Information Department, n.d.). These reserves are detected through the use of geophysical seismic exploration vessels, which use high-powered seismic airgun acoustics to map the substrata of the ocean floor. These seismic airguns operate at very high volume, which pose a threat to the hearing and sonar capabilities of numerous protected marine mammals, as well as endangered sea turtle species, within the Gulf of Mexico. The federal government regulates offshore leases for oil and gas through the Department of the Interior's Bureau of Ocean Energy Management (BOEM) and monitors compliance via the Bureau of Safety and Environmental Enforcement (BSEE). These agencies, in turn, issue a regulatory guidance document, the Joint Notice to Lessees No. 2012-G02 (BOEM, 2012a), which instructs seismic operators how to proceed with

production operations and implement mitigation measures in this region to minimize risk to protected species. The NTL aspires to reduce, to the greatest extent practicable, the impact of seismic surveys on species protected by the Marine Mammal Protection Act and the Endangered Species Act by establishing a protected 500-meter exclusion zone around the seismic airguns and applying mitigation measures relevant to selected species within that zone. However, in some instances the guidelines can both under- and over-mitigate, to the detriment of both the fauna and to the lessee energy companies. Here, I (1) review the basis for, and current state of, the NTL; (2) assess whether the current guidelines meet their goals; and (3) make recommendations for updating the NTL to align with current in-field practices, providing more clarity to seismic operators and aligning the text of the NTL with its goal of protecting marine mammals and sea turtles in the Gulf of Mexico. Regulatory transparency and certainty are staples of good governance, and my recommendations seek to modernize antiquated guidelines to support these goals.

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Chapter 1. Introduction

The United States economy heavily relies on oil and natural gas for energy and, in turn, for production of goods. In 2014, approximately 28 percent of all electricity production in the United States came from natural gas and petroleum (U.S. Energy Information Administration, 2015). In the federal offshore marine environment, energy companies survey for new oil and gas deposits by conducting seismic exploration surveys, which generate high volumes of sound pressure underwater. With approximately 87 percent of all federal offshore acreage closed to oil exploration (American Petroleum Institute, 2015), and 4,807 of the 5,131 total barrels of crude oil recovered from the United States federal offshore lands in 2014 coming from the Gulf of Mexico (U.S. Energy Information Administration, 2014), seismic work is necessarily extensive in this region. In fact, only three of the 15 lease sales from 2012-2017 in the United States were not in the Gulf of Mexico (BOEM, 2012b).

Since the 1970s there has been concern for the potential impacts of anthropogenic sound on marine mammals that use acoustic vocalizations and sonar to communicate with each other, hunt for food, avoid predators, and navigate (Southall et al, 2007). The U.S. government demonstrated its concern for the environment via the creation of several major federal Acts during the 1970's, including the National Environmental Policy Act of 1970 (NEPA) (42 USC §4321 et seq.) which requires federal agencies to take environmental values and potential consequences of their actions into account during their decision making processes. Several environmentally-gearred federal acts followed in the wake of NEPA, including the Marine Mammal Protection Act (MMPA) of 1972 (16 USC § 1361 et seq.) and the Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 et seq.). The Gulf of Mexico contains several species protected by these laws. For example, while all marine

mammals are protected by the MMPA, some species, including sperm whales (*Physeter macrocephalus*), West Indian manatees (*Trichechus manatus*) (BOEM, 2012c, p. 3-156), as well as five sea turtle species (family Cheloniidae; BOEM, 2012c, p. 3-258/3-259) are protected by the ESA. Seismic exploration activity can disturb marine mammals with impacts including, but not limited to, masking their vocalizations, disrupting foraging behaviors, damaging auditory and physical structure, and cetacean stranding (Compton et al, 2007).

Consequently, it is important to balance the social and economic benefit of seismic surveys against the ecological harm and legal liability that those surveys can generate. Moreover, it is important that government actions to strike such a balance are transparent and result in regulatory certainty for the regulated parties. Such regulatory certainty is essential; its absence can greatly diminish the confidence levels of stakeholders and regulated parties in their actions (Hoffmann et al, 2009). A definitive answer (even a negative one) improves certainty and greatly increases the confidence of regulated parties. Seismic mitigation measures to protect marine species do exist, but if these measures are incomplete, out-of-date, or lack transparency and certainty, they stand little chance of accomplishing their goals. Here I assess whether aging governmental guidelines are meeting their goals to protect marine mammals and sea turtles within the Gulf, while adequately guiding the in-field practices of the industry.

1.1 What Are Seismic Surveys?

Seismic surveys are conducted by specialized large vessels (typically 80-110m long) outfitted to tow an array of seismic airgun strings (IACG, 2002). A towed airgun (or “source”) array usually includes six airgun strings with several individual airguns on each string (Figures 1 &2). Airguns produce a low frequency pulse (4-60 Hertz) at broadband

source levels up to 267 dB re 1 μ Pa at 1 meter¹ (all decibels levels [dB] hereafter assume a reference calibration of 1 μ Pa at 1 meter; Compton, R. et. al., 2007). As a point of comparison with seismic airgun noise levels, a 298-meter carrier ship produces ambient noise at 180dB (McKenna et al, 2012) and a jet engine at a distance of 100 feet is approximately 140db (Galen Carol Audio, 2007) in the air, which the International Association of Geophysical Contractors (IAGC) translates to approximately 232dB in water at 1 meter (IAGC, 2014) based on calculated differences in the transmission of sound in water compared to air.

Seismic vessels move along planned routes (“survey lines”), which are set in linear grids or curved in coil-like patterns, and can vary from a few to several hundred kilometers (IAGC, 2002). As they do so, the airgun arrays fire at set intervals (“shotpoints”), typically between 12 and 20 seconds depending on the level of detail desired for the survey (BOEM, n.d., Resource Evaluation Program). Airguns hold highly compressed air, and as the shots are fired pressure waves travel downward towards the ocean floor and are reflected back; different densities of substrata reflect the waves differently (IAGC, 2002). Long hydrophone cables (“streamers”) towed aft of the vessel receive these reflections (Figure 3) and transmit the data to processors on the vessel. The goal is to create a map of the substrata, which oil companies then analyze to determine if oil or natural gas is likely to be present (IAGC, 2002).

¹ A decibel is a logarithmic scale for measuring the amplitude of sound, and hydrophones measure sound pressure in units of micropascals (μ Pa). To be comparable to sound measured in air, a reference level with standardized pressure and distance are used (1 unit of pressure at 1 meter of distance) (NOAA, 2015).

A survey begins by ramping up the airguns. A ramp-up is the gradual increase in emitted sound levels from an airgun array by systematically turning on the full complement of an array's airguns over a period of time (BOEM, 2012a). The vessel approaches the survey line with the airguns firing at full-volume. The streamers collect data for processing while on the survey line. When the line is completed, the airgun array can either shut down completely, or the vessel may choose to engage the use of their minimum sound source (“mitigation gun”)² for the duration of their line change (large turns the vessel must make to return and start the next survey line) (BOEM, 2012a). Full-volume firing is also used for testing the full airgun array before a survey begins to ensure the airguns are functioning and the ship's hydrophone cables are receiving data correctly,

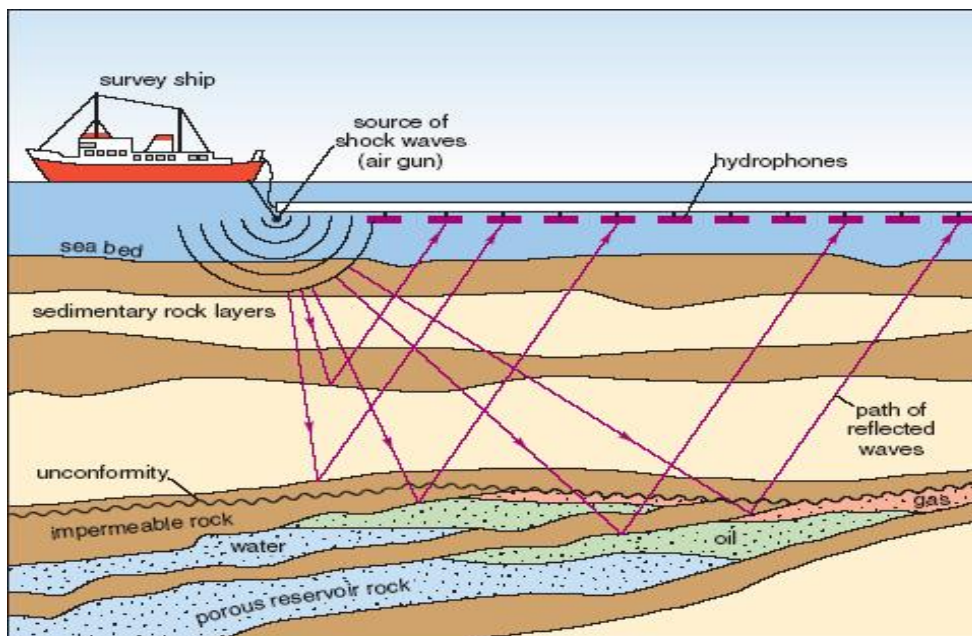


Figure 3: Diagram of airwave reflection off substrata.

http://www.epa.gov/esd/cmb/GeophysicsWebsite/pages/reference/methods/Marine_Geophysical_Methods/Marine_Seismic_Methods.htm

² The minimum source level is the reduction of the airgun array to its lowest volume airgun during specific activities (unavoidable maintenance issues that requires the interruption of a survey to shut down the array, and during line changes between production lines). The minimum sound source must be fired at the same shot-point interval as the survey, and use of it allows vessels to perform a ramp up without the 30 minute pre-watch by PSOs or PAM Operators (BOEM, 2012a).

but on most surveys this is not the only time testing occurs. Airgun arrays are also occasionally fired at partial volume in order to test individual airguns prior to the start of production or, more commonly, mid- survey during line changes (Jessica Mucci, personal communication, 1 May 2015).

1.2 Visual and Acoustic Monitoring of Protected Species

The National Marine Fisheries Service (NMFS) requires observation of marine mammals during seismic operations in accordance with the intent of the ESA and MMPA (BOEM, 2012a). Protected Species Observers (PSOs; formerly known as Marine Mammal Observers) monitor during all daylight hours with two observers on watch at all times and scan (with binoculars) for any marine mammals or sea turtles at the surface of the water. Before any seismic survey can begin, these observers must monitor the exclusion zone for thirty minutes (commonly referred to as a “pre-watch”) without detecting any protected species, at which point they will clear the vessel to begin operating the airguns. The exclusion zone is defined as the area at and below the sea surface within a radius of 500 meters surrounding the center of an airgun array and the area within the immediate vicinity of the survey vessel (BOEM, 2012a).

Observing protected species within the exclusion zone triggers certain mitigation measures: The ramp-up will be delayed until the area has been clear for 30 minutes. Once a ramp-up begins, the operations will only be shut down if a whale³ enters the exclusion zone; if this happens, operations may only resume after the exclusion zone has been cleared by the PSOs for 30 minutes and a 20-40 minute ramp-up has been concluded (BOEM, 2012a).

³ In the United States, operational shut-downs do not occur when dolphin and sea turtle species enter the exclusion zone (Compton et al, 2008). In 2013, operational shut-downs were expanded to include West Indian Manatees as well. This change is discussed in “Current NTL Guidelines and Addenda” in this report.

An auxiliary set of monitors, Passive Acoustic Monitors (PAM Operators) are trained to monitor when visibility is poor, such as at night, or during daytime periods of heavy rain or fog. These operators monitor a specially deployed hydrophone cable aurally (using headphones) as well as with laptops programmed with acoustic monitoring software to detect the presence of vocalizing marine mammals. The same mitigation measures regarding delayed ramp-ups and shut-downs apply whether protected species are detected via visual or passive acoustic means (BOEM, 2012a).

Chapter 2. History and Regulatory Basis of Seismic Mitigation Measures

In 1953, the United States passed the Outer Continental Shelf Lands Act (43 U.S.C. §§ 1331-1356a; the Act). The Act defines the Outer Continental Shelf (OCS) as “all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in section 1301 of this title, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control” (43 U.S.C. §1331). The Act, along with the Submerged Lands Act of 1953 (43 U.S.C. §§ 1301-1356a) grant ownership of the submerged lands beyond state coastal waters to the federal government, including all mineral rights (43 U.S.C. § 1332). The Act as amended (43 U.S.C. §§ 1331-1356a, 1801-1866) gives authority to the Secretary of the Interior to grant leases for oil and gas exploration in the OCS to the “highest qualified responsible bidder” among a number of competitive bidders (BOEM, n.d., Outer Continental Shelf) and to create appropriate regulations to carry out the requirements of the Act. The Secretary of the Interior authorizes two agencies, the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE), to regulate oil, gas, and sulphur exploration in the OCS (30 CFR §§250.101, 550.101; these agencies, collectively, were

previously parts of the Minerals Management Service⁴). One requirement of the Act is for the Secretary of the Interior to periodically create a proposed schedule of OCS oil and gas lease sales (43 U.S.C. §1344); this is done every five years by BOEM, the agency whom issues permits for geological and geophysical exploration in the OCS (30 CFR §§550, 551). The creation of the five-year plan triggers a NEPA analysis, and subsequent development of an environmental impact statement⁵ (BOEM, n.d., Oil and Gas Leasing) (Figure 4).

The Programmatic Environmental Impact Statement (EIS) identifies myriad potential environmental risks, including those associated with normal seismic operations to marine fauna in the Gulf of Mexico (BOEM, 2012c, p 4-319), but it states that its analysis assumes several mitigation measures are in place which, when implemented, will minimize these risks of injury to marine species (BOEM, 2012c, p 4-324). Without effective implementation of these measures, it would then follow that the risks to marine life would be great enough to impede the process of OCS leasing. These mitigation measures are outlined by BSEE in the form of a Notice to Lessees and Operators⁶ (BSEE, n.d., Protected Species Program).

⁴After the tragic explosion of the oil rig *Deepwater Horizon* in April 2010, the Mineral Management Service, who was responsible for all aspects of the nation's offshore natural resources, was subdivided into a financial branch called the Office of Natural Resource Revenue, and a regulatory branch called the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE). In 2011, BOEMRE was further divided into the Bureau of Ocean Energy Management (BOEM), responsible for managing development of the nation's offshore resources in an environmentally and economically responsible way, and the Bureau of Safety and Environmental Enforcement (BSEE), responsible for enforcing safety and environmental regulations (BOEM, 2011).

⁵ A statement required by the NEPA or similar state law in relation to any major action significantly affecting the environment; a NEPA document. (BOEM, 2012C, Appendices A-6)

⁶ Both BOEM and BSEE may issue Notices to Lessees and Operators that clarify, supplement, or provide more detail about certain requirements, and may also outline what the lessee must provide as required information in your various submissions to each agency, respectively (30 CFR §§250.103, 550.103).

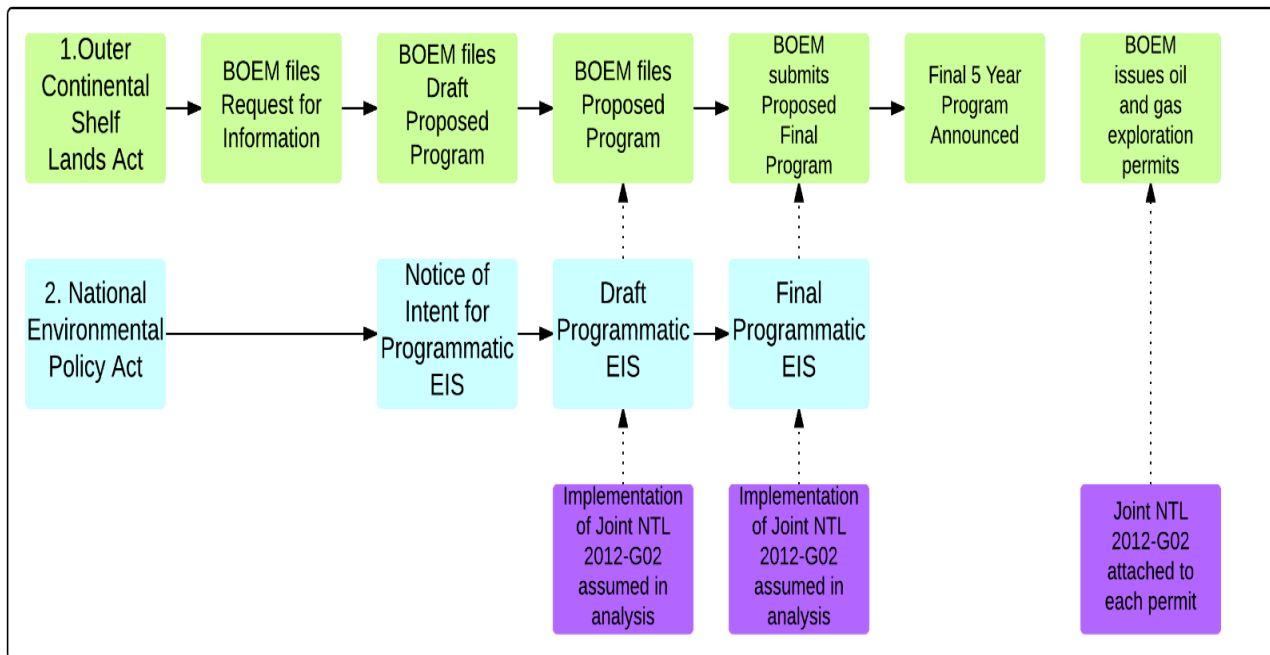


Figure 4: Flowchart of the BOEM process to create a 5 Year Oil and Gas Leasing Program . Green boxes represent the process carried out under the Outer Continental Shelf Lands Act. Blue boxes are the parallel process carried out under the requirements of National Environmental Policy Act. Purple boxes represent points where BSEE mitigation measures, specifically the Joint NTL 2012-G02, are incorporated. Dashed arrows indicate points where one document informs the other. Diagram adapted from the BOEM 2017-2022 Programmatic Environmental Impact Statement flow chart, accessed 11 May 2015 from <http://www.boem.gov/NEPA-OCSLA-Track-Diagram/>.

The Notice to Lessees and Operators intends to provide seismic companies with a guide for implementing seismic mitigation measures (i.e. pre-activity monitoring requirements, ramp-ups, shut-downs, activity exclusion zones) offshore in the Gulf, as well as the monitoring and reporting duties required of trained PSOs and the optional use of PAM Operators (BOEM, 2012a). In 2004, the former Minerals Management Service updated and replaced its existing Gulf of Mexico regulatory guidance document to create the Notice to Lessees No. 2004-G01: Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program (Minerals Management Service, 2004). This document has been renewed several times since 2004, the most recent version being

the Joint NTL No. 2012 G-02 (hereafter called NTL; see Appendix A for full text of the NTL).

When a company obtains a permit for geophysical exploration through BOEM, that permit contains a section for “Standard Environmental Protective Measures” (see Appendix B for 2012 TGS NOPEC permit), the very first provision of which is to comply with the Joint NTL 2012-G02. Therefore, while the BOEM permit is the legally binding agreement between the federal government and the regulated parties, the permit requires seismic operators to refer the NTL provisions concerning protected species mitigation measures, hence making the NTL binding on the lessees. All NTL renewals since 2004 state that the relevant operational procedures and mitigation measures remain unchanged (BOEM, 2007; BOEM, 2012a). It is this lack of updated procedures that motivates this paper, in which I assess whether the current guidance is appropriate given that seismic capabilities and the needs of seismic companies have changed, the technology associated with passive acoustic monitoring has advanced, and the requirement of PAM Operators onboard vessels has changed. I then use the NTL to illustrate larger points about regulatory certainty and the inefficiencies associated with guidance that is outdated or misplaced within the overarching seismic regulatory framework.

2.1 Current NTL Guidelines and Addenda

The current NTL is meant to instruct operators how to conduct their surveys, specifically regarding ramp-up procedures, the use of the minimum sound source, airgun testing, and protected species mitigation, observation, and reporting in waters of 200m depth or greater (BOEM, 2012a). Following a short list of pertinent definitions, the purpose of ramping up airguns is explained and step-by-step instructions follow, including the acceptable uses of the mitigation gun. The document then focuses on the training,

observation methods, reporting requirements of PSOs, and the optional/voluntary inclusion of “Experimental Passive Acoustic Monitoring” (BOEM, 2012a, p. 8).

On June 30, 2010, a lawsuit was filed in the United States District Court for the Eastern District of Louisiana by a number of environmental organizations, namely the National Resource Defense Council (NRDC), against the Secretary of the Department of the Interior and BOEM (*NRDC v. Salazar*, 2010). The plaintiffs claimed that the 2004 Programmatic Environmental Impact Statement and its “Finding of No Significant Impact” (regarding the potential environmental impacts of seismic exploration) were arbitrary and capricious, and thereby in violation of NEPA and the Administrative Procedures Act (*NRDC v. Salazar*, 2010, p 25). On June 18, 2013, the parties signed a settlement agreement (Settlement Agreement, *NRDC v. Jewell*, 2013; hereafter, “the Agreement”). Among other provisions, the Agreement expands certain mitigation requirements for BOEM geological and geophysical permits. Per the Agreement, when companies apply for a permit from BOEM, BOEM will require the following two modifications to the NTL:

- 1.) The shut-down provision shall apply to manatees as well as whales;
- 2.) The mitigation measures, along with the modification described in this paragraph, shall apply to all Deep Penetration Seismic Surveys conducted in Federal waters in the Gulf of Mexico *regardless of water depth* (emphasis added by author). (Settlement Agreement, *NRDC v. Jewell*, 2013, p. 13)

The Agreement also includes additional requirements regarding the use of Passive Acoustic Monitoring:

While engaging in active seismic source operations in water depths of 100 meters or greater during times of reduced visibility (darkness, fog, rain, etc.), the permittee shall include passive acoustic monitoring (“PAM”) as part of its protected species observer program. Applicants

will be required to provide BOEM with a description of the passive acoustic system, the software used, and the monitoring plan prior to its use. After completion of the project, the permittee will provide an assessment of the usefulness and effectiveness of the use of PAM for marine mammal detection, including any problems encountered. (Settlement Agreement, *NRDC v. Jewell*, 2013, pp 14-15)

To summarize, these modifications added mitigation measures to surveys regardless of depth (as opposed to the 200m minimum depth requirement stipulated in the NTL), made shut-downs mandatory for manatees in addition to whale species already included in the NTL, and required continual Passive Acoustic Monitoring (meaning two operators must be on board who can alternate shifts for diligent, uninterrupted monitoring) on any job conducted in greater than 100m of water.

These notable changes are aimed at better protecting marine mammals and sea turtles alike, but they have a shelf life. Unless extended by court order, the Agreement will expire “30 months after the Effective Date or immediately after Final Action is taken, whichever occurs first” (Settlement Agreement, *NRDC v. Jewell*, 2013, p 4). “Final Action” refers to NMFS issuing a permit authorizing “take” of marine mammals after BOEM submits an MMPA application to NMFS. This places the expiration of the Agreement at the end of December 2015.

Chapter 3. Overview and Critique of Existing Guidelines

In the following sections, I provide an overview of some of the existing NTL guidelines by issue, and assess their clarity, certainty, and efficacy in achieving the protective aims of the NTL while providing lessees a useful degree of guidance about required procedures.

3.1 Let's Talk About Tests

3.1.1 Overview of Existing Airgun-Testing Guidelines

Seismic operators are the acting interface between the regulations and in-field implementation and so happens that any regulatory uncertainty or ambiguity falls to them. Therefore it is necessary to examine how these rules work in practice. One area where rules have not always been apparent and clearly defined for operators is in testing the airguns themselves. Like any piece of machinery, seismic airguns will have mechanical failures from time-to-time, meaning they are regularly checked, maintained, and tested. Testing of airguns occurs after any maintenance is performed, and often between survey lines or on approach to a line to ensure that the equipment is in working order. While any combination of issues may arise, testing can be categorized into three main types: Full-volume, partial-volume, or bubble tests. Bubble tests are when a single, individual airgun is fired at a time, while partial-array testing is firing any combination of the airguns less than the whole array simultaneously. This could be all guns on a single string, or even several airgun strings together (Jessica Mucci, personal communication, 1 May 2015).

3.1.2 Analysis and Critique

The NTL gives guidance for how to perform only a single testing scenario—a full-array ramp-up to full volume (just as if on approach to a survey line)—which fails to describe much of the real-world testing vessels require. The NTL simply instructs operators to use the same ramp-up methods for all seismic operations, including airgun testing (BOEM, 2012a). If and when the seismic operator is unclear on how to perform other relevant tests, the operator often consults the PSOs and PAM Operators on how to comply with their BOEM permit requirements. The PSO has to request and receive

approval for the action from BSEE, losing the operator time and money. In situations where the minimum sound source is also firing, such as on a line change, the delay in action can also result in the vessel extending their line change and putting additional hours of sound into the environment that could be avoided. Even in times when the minimum sound source is not engaged, any delay in operation equates to a waste of fuel and more time at sea with the vessel itself emitting sound.

Today there have been enough requests for clarification on these issues that BSEE has approved standard protocols, but these appear neither in the BOEM permit nor in the NTL (see Recommendations, below). One major PSO-contracting company took it upon themselves to create their own documents for their seismic clients explaining, among other things, the best practices for these two additional testing scenarios. This document is reviewed and approved by BSEE for each individual job for which the company is supplying PSOs or PAM Operators, and so has accrued a degree of enforceability. These supplementary documents give clients clarity and certainty as to how they should operate, reducing transaction time (and money) as well as frustration in the field, but they are invisible to the public and appear nowhere in regulation or agency guidance documents.

3.2 Passive Acoustic Monitoring and Allowable Acoustic Silence

3.2.1 Overview of Existing Passive Acoustic Monitoring Guidelines

One of the most straightforward rules in the NTL is that vessels cannot ramp up from silence during low-visibility conditions (dark, heavy rain, fog) when PSOs are unable to visually clear the exclusion zone (BOEM, 2012a). Before the use of PAM Operators, a vessel would be required to fire their mitigation gun for the duration of any line changes that occurred during the night (or when the next start of production was not estimated to

begin until after dark) to act as a warning for marine mammals and sea turtles within the vicinity to stay away (Weir & Dolman, 2007). By using the mitigation gun during a line change, the 30 minute pre-watch would not be required and the vessel could ramp up for their next survey line unimpeded (BOEM, 2012a). However, if a mechanical malfunction occurred during the night and the array was shut down, the vessel would have to wait until first light to let PSOs perform a pre-watch before they could ramp up and resume production. This resulted in significant periods of undesirable down time for the seismic operators. Hence, a primary advantage of having PAM Operators on board is that they can perform a 30 minute acoustic pre-watch and allow vessels to resume production at night when previously this was not an option. There are additional environmental benefits to having PAM Operators on board as well, namely that vessels no longer need to fire the mitigation gun throughout line changes because the PAM Operator can acoustically clear them for ramp-ups, thus reducing the total output hours of sound into the environment. Additionally, protected species are capable of being detected for mitigation measures (shut-downs, ramp-up delays) at all times, not just during daylight. Although the optional use of passive acoustic monitoring has been part of the NTL since 2004 (Mineral Management Service, 2004), the practice is still referred to as “experimental” in the NTL.

3.2.2 Analysis and Critique

Today, the use of PAM Operators has grown from occasional use of a single operator to being a full-time requirement in all deep penetration seismic work at 100m or greater depth as a stipulation of the Agreement. Contrary to the characterization of PAM in the NTL, it would then follow that the use of the term “experimental” is no longer appropriate when the practice is now a mandatory part of normal operations in a large portion of offshore seismic surveys.

There are limits to Passive Acoustic Monitoring. PAM Operators can aurally detect vocalizing marine mammals, and both low- and high-frequency vocalizations can be detected through the PAM computer software programs, but they cannot detect animals that are not vocalizing (and sea turtles do not vocalize at all, so they cannot be detected at any time with this technology). Additionally, the determination of whether an animal is within the exclusion zone or not is often based on the trained judgment of the PAM Operator. While these may be arguments for why Passive Acoustic Monitoring is still considered “experimental”, the limitations of PSOs must also be examined. PSOs can monitor and report on protected species which can be visually detected at the surface of the water, but they cannot see submerged animals, or hear them if they are vocalizing. The ability to detect animals, particularly sea turtles, is also reduced as sea states⁷ and swell heights increase (Weir & Dolman, 2007).

Despite these limitations on both daytime and nighttime monitoring, there is one operation allowed during the day that, until recently, was never allowed at night under any circumstances. During daylight hours a seismic vessel is allowed to silence their airguns for up to 20 minutes during which they may resume full-volume firing at any time without requiring another 20-40 minute ramp-up (BOEM, 2012a, p. 5). Since animals might enter the 500m exclusion zone when airguns are silenced, two PSOs must be on watch and no protected species may enter the exclusion zone during that time. If a sighting of any protected species occurs in the exclusion zone during the silence, a 30 minute pre-watch followed by a 20-40 minute ramp-up is required (BOEM, 2012a, p.5). However, vessels that opted to hire a PAM Operator to monitor through the night (prior to it being required in all waters greater than 100m) were not permitted any night time silence regardless of whether

⁷ Beaufort Sea State scale is used as a measurement of wind waves and swell (Whale and Dolphin Conservation Society, nd, Beaufort Sea State).

the PAM Operator had been on continuous watch with no detections (Jessica Mucci, personal communication, 1 May 2015). Since PSOs and PAM Operators may not legally exceed 4 hours of consecutive work without a 2- hour break (BOEM, 2012a, p.3), some vessels even began voluntarily hiring two PAM Operators to allow for uninterrupted monitoring throughout the night. Seismic operators were particularly unclear and frustrated about why silence was still disallowed at night when they were already hiring PAM Operators to monitor continually, and therefore effectively had the same level of diligent monitoring during both day and night (Jessica Mucci, personal communication, 1 May 2015).

The newly required use of PAM on all surveys in waters greater than 100m has brought about a change to the “no silence at night” rule, and the same 20 minutes of silence at night is now permissible given that, just as with daytime regulations, a PAM Operator continuously monitors throughout the period of silence, and no protected species are detected within the exclusion zone during this period (Jessica Mucci, personal communication, 1 May 2015). However, allowable silence at night with PAM is not expressly written in the Agreement; it is instead a secondary result of the additional PAM requirement. If a new seismic company came to work in the Gulf of Mexico today and were handed the NTL and the added stipulations of the Agreement, the company would still be unaware that nighttime silences are allowed if they (as now required) had PAM Operators on board. This is a prime example of non-transparent regulation leading to confusion and uncertainty in the field, which again results in wasted time and money as the operators go through the appropriate channels to seek clarification, and a reduction in overall efficacy of the mitigation measures.

It may, at first, seem reasonable to prohibit silent periods at night because it appears in the best interest of the marine mammals and sea turtles. Being able to hear underwater is critical for marine mammals to successfully forage for food, navigate, socialize, and avoid predators (Gordon et al, 2003), so it would seem that an operational shut-down requiring a pre-watch and ramp-up for any period of silence would best protect the hearing capabilities of animals which may have entered the exclusion zone during the silence. However, and perhaps counter-intuitively, permitting 20 minutes of monitored nighttime silence can in fact lead to better overall protection, as well as continuity between the allowable operations during daylight and hours of darkness, making guidelines clearer and simpler for the seismic operators.

In practice, requiring a shutdown for any period of silence at night has an unintended perverse protective effect. Prior to the new stipulations of the Agreement, if a vessel was firing their airguns at night and went silent for any reason, even missing a single shot point or two, they were required to shut down completely and have the PAM Operator perform a 30 minute pre-watch after which the vessel would ramp up for 20-40 minutes. At a minimum, the vessel would lose 50 minutes of production time, a substantial amount. When a survey concludes, a fleet will often be instructed to return and reshoot parts of (or whole) survey lines to fill gaps in their data for sections of their survey grid that were not collected effectively or missed entirely. This is where the unintended effect of this rule occurs. A data gap of only a few minutes is much less desirable to return and acquire than a large gap equating to 50 minutes of operational down time. Any time a fleet chooses to return and reshoot sections of survey lines because of a malfunction that caused them to go silent—which they could have quickly reconciled but for the guidance in the NTL—puts far more total hours of noise pollution into the water, and therefore increases the potential

harm to protected species. Therefore, allowing 20 minutes of diligently monitored silence at night by PAM Operators which would still trigger mitigation measures if a protected species were detected during the silence in fact increase overall protection by reducing the total potential hours of sound emitted.

Chapter 4. Recommendations and Conclusion

Regulations and their associated guidelines must be up-to-date with the best available practices, transparent, and have strong regulatory certainty to be effective. Whether it be a nation state considering whether they will back a national climate policy (Tol, 2013), stakeholders investing in the development of modernized hazardous waste disposal sites (Wilson & Smith, 2005), or even a city-wide coalition of businesses trying to spur economic growth in their region (Denver Metro Chamber of Commerce, 2015), regulated parties need to understand the regulations that apply to them. All marine mammals are federally protected by the MMPA, and several species of mammals and sea turtles in the Gulf of Mexico also fall under the protection of the ESA, thus achieving regulatory transparency and certainty regarding seismic mitigation measures is essential in holding operators to federal environmental standards.

Furthermore, the assumed implementation of the environmental mitigation measures within the NTL are part of the regulatory hook that allows BOEM to approve seismic activities in the Gulf of Mexico in their Programmatic EIS, thus comprehensive coverage of—and certainty in—what the measures are is paramount. If the outlined measures are so out-of-date as to be obsolete, then they cannot qualify as the means by which operators reduce their impact on marine fauna. By reflecting outdated practices and

having incomplete instruction for procedures, BOEM may still risk their Programmatic EIS being challenged as arbitrary and capricious, and in violation of NEPA and the Administrative Procedures Act, just as in the case of *NRDC v. Salazar* (2010). Testing procedures which cover only one of three testing categories (full-volume, but not bubble tests or partial-array tests) are insufficient procedural guides. Continuing to call Passive Acoustic Monitoring “experimental” after it has become a requirement for any survey conducted in greater than 100m of water, and having no update to the regulations indicating that the new monitoring requirements now permit 20 minutes of silence at night, lacks regulatory certainty and transparency. The connection from the required PAM monitoring changes via the Amendment to the ultimate change in allowable silence at night is not direct or clear. As a result, regulated parties cannot know the true scope of allowable practices, which wears away at the legitimacy of, and confidence of seismic operators in, the new rule. The guidelines within the NTL need to be updated to align with modern seismic practices in order to best meet its goal of protecting marine whales, dolphins, manatees, and sea turtles. The following recommendations are small changes that would bring this regulatory guideline document up to date with current practices, renewing its usefulness and better shielding BOEM from future legal challenges surrounding the balance of interests that the NTL represents.

4.1 Recommendations for Testing Procedures

The procedures for bubble tests and partial-array/partial-volume tests have become standardized in practice, and should be clearly outlined and adopted as official procedure.

- From silence, testing a single airgun (performing a bubble test) may be allowed without a ramp up provided that two PSOs (during daylight hours) or the PAM Operator (during times of reduced visibility) have been continually monitoring the exclusion zone for at least 30 minutes and no protected species have entered the exclusion

zone during that time. Upon completion of the test, the airguns should return to silence.

- From silence, a partial-volume/partial-array test does not require the completion of a 20-40 minute ramp up before commencing. Provided that two PSOs (during daylight hours) or a single PAM Operator (during periods of reduced visibility) have been continuously monitoring the exclusion zone for at least 30 minutes and no protected species have entered the exclusion zone during that time, the vessel may proceed to ramp up their airguns to the maximum desired level of the test, perform the test, and then return to silence.

There are a several mechanisms by which these changes could be institutionalized.

The first option is for BSEE to simply require all PSO contracting agencies to create their own comprehensive guideline documents for their clients that better describe these procedures. Essentially, this would require all PSO contractors to have a document approved by BSEE for any job prior to sending out PSOs or PAM Operators. While this would achieve the ultimate goal of delivering clear and comprehensive guidelines to seismic operators, it is redundant and inefficient. A second method would be to make the NTL (along with the suggested additional guidelines herein) part of the U.S. Code of Federal Regulations in the existing sections already pertaining to BSEE regulations for OCS oil and gas leasing (30 CFR §§250, 251). This would increase the clarity and legitimacy of the rules, however this would also require a lengthy rulemaking process including publication in the Federal Register with public comment periods.

A more streamlined approach would be to include the written procedures as part of the BOEM seismic exploration survey permits. With the regularity that these tests have been requested, bubble tests and partial-array tests should be considered normal seismic operations, therefore BOEM should require the addition of the testing procedures in the Standard Environmental Protective Measures section of their permits. As stated previously, this section directs the lessees to the Joint NTL No. 2012-G02, thus the

procedures should also be added to the NTL when it is next renewed. This simple inclusion provides greater regulatory certainty for lessees, which simultaneously decreases the time spent by seismic operators waiting for instruction from BSEE for each request. This reduction equates to less overall time at sea emitting sound, and thus greater protection from potential impacts on marine life, while simultaneously guarding against legal challenges to the NTL.

4.2 Recommendations for Passive Acoustic Monitoring

Requiring continuous Passive Acoustic Monitoring in waters greater than 100m via the Agreement is a step in the right direction towards better protection for marine fauna, but these addendums to the NTL are not yet permanent. There are no downsides to the mitigation measures added to the NTL in the Agreement. Requiring PSO monitoring in all water depths increases the protection for species, helping the NTL better meet its goals of reducing impacts of seismic sound to marine fauna. Full-time PAM requirements benefit both seismic operators and the species that the regulations are trying to protect.

Continuous Passive Acoustic Monitoring means protected species are monitored around the clock, and reduces the need to use the minimum sound source on line changes. This better accomplishes the conservation goals of the MMPA and ESA by reducing overall sound output and expanding observation coverage. It is also beneficial for the seismic operators who are now permitted 20 minutes of silence at night, which is both time and cost effective for the client, and improves the consistency and certainty of their operational procedures between day and night.

Now that the Agreement has made Passive Acoustic Monitoring a requirement in seismic surveys conducted in waters greater than 100m, these changes, too, should be made permanent by the Department of the Interior so that the added mitigation measures within

are continued after the Agreement expires. Subsequently, there are a few things that should follow in its wake. First, Passive Acoustic Monitoring should no longer be deemed “experimental” in the NTL. There may be arguments that the technology is limited or still being developed, but the nature of technology is to continually improve and expand its capabilities. Since the Department of the Interior has conceded (via the Agreement) that it’s best to require it for work in all waters greater than 100m’s, it is clearly a normal part of operations and therefore must be described as such in the NTL. Additionally, the change in protocol regarding nighttime silences should be reflected so that operators can quickly and clearly understand their allowable practices. This update to allow silence at night is a pivotal change in the guidelines, and must be explained in a transparent manner, with the goal of increasing overall seismic efficiency and reducing the overall potential hours of noise pollution into the environment, thus better meeting the NTLs goal of protecting marine life. Mechanisms by which to incorporate the new PAM regulations would be the same as those previously outlined for the additional testing procedures. An example of this guideline could read as follows:

If PAM is required as part of a seismic survey being conducted in waters greater than 100m, an allowable period of no more than 20 minutes of silence during night time operations will be permissible and not require a ramp up for operations to resume provided that a PAM Operator continuously monitors throughout the period of silence, and no protected species are detected within the exclusion zone during that time. A 30 minute pre-watch followed by a 20-40 minute ramp up would be required if a detection occurred in the exclusion zone during the period of silence.

4.3 Conclusion

Seismic exploration of offshore natural resources is an essential component of our nation’s energy production and development, but the present seismic exploration rules

provide insufficient practical guidance and in fact expose marine mammals to greater risk. Despite the lack of updates to its text in the past decade, the NTL is still the first thing that seismic contractors are directed to within the Standards for Environmental Protection section of their BOEM permits, and the process of granting permits for exploration in the Gulf of Mexico under NEPA is contingent upon implementation of the mitigation measures contained in the NTL. In the interest of regulatory transparency and certainty, the proposed clarifications in this analysis should be established as a part of the regulations governing OCS oil and natural gas exploration leasing. By standardizing and publishing BSEE-approved guidelines BOEM and BSEE can make interactions with regulated parties more efficient while simultaneously better meeting environmental conservation goals pertaining to seismic exploration in the Gulf of Mexico.

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- 5 CFR §706 (2)
- 30 CFR §250.101
- 30 CFR §250.103
- 30 CFR §550.103

**UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT (BOEM)
BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT (BSEE)
GULF OF MEXICO OUTER CONTINENTAL SHELF (OCS) REGION**

JOINT NTL No. 2012-G02

Effective Date: January 1, 2012

NOTICE TO LESSEES AND OPERATORS (NTL) OF FEDERAL OIL, GAS, AND
SULPHUR LEASES IN THE OCS, GULF OF MEXICO OCS REGION

**Implementation of Seismic Survey Mitigation Measures and
Protected Species Observer Program**

This NTL supersedes and replaces NTL No. 2007-G02. It does not introduce any new types of mitigation measures; however, it clarifies how you should implement seismic survey mitigation measures, including ramp-up procedures, the use of a minimum sound source, airgun testing and protected species observation and reporting. The measures contained herein apply to all on-lease/ancillary activity surveys you conduct under 30 CFR 550 and all off-lease surveys you conduct under 30 CFR 551.

Background

The use of an airgun or airgun arrays while conducting seismic operations may have an impact on marine wildlife, including marine mammals and sea turtles. Some marine mammals, such as the sperm whale (*Physeter macrocephalus*), and all sea turtles that inhabit the Gulf of Mexico are protected under the Endangered Species Act (ESA). All marine mammals are protected under the Marine Mammal Protection Act (MMPA).

In order to protect marine mammals and sea turtles during seismic operations, the National Marine Fisheries Service (NMFS) requires seismic operators to use ramp-up and visual observation procedures when conducting seismic surveys. Procedures for ramp-up, protected species observer training, visual monitoring and reporting are described in detail in this NTL. These mitigation measures apply to geophysical activities conducted under lease terms, for all seismic survey operations conducted in waters deeper than 200 meters (656 feet) throughout the Gulf of Mexico and, in the Gulf of Mexico waters east of 88.0° W. longitude, for all seismic survey operations conducted regardless of water depth. Performance of these mitigation measures is also a condition of the approval of applications for geophysical permits. You must demonstrate your compliance with these mitigation measures by submitting to BSEE certain reports detailed in this NTL.

Definitions

Terms used in this NTL have the following meanings:

1. Airgun means a device that releases compressed air into the water column, creating an acoustical energy pulse with the purpose of penetrating the seafloor.
2. Ramp-up (sometimes referred to as “soft start”) means the gradual increase in emitted sound levels from an airgun array by systematically turning on the full complement of an array’s airguns over a period of time.
3. Visual monitoring means the use of trained observers to scan the ocean surface visually for the presence of marine mammals and sea turtles. These observers must have successfully completed a visual observer training program as described below. The area to be scanned visually includes, but is not limited to, the exclusion zone. Visual monitoring of an exclusion zone and adjacent waters is intended to establish and, when visual conditions allow, maintain a zone around the sound source and seismic vessel that is clear of marine mammals and sea turtles, thereby reducing or eliminating the potential for injury.
4. Exclusion zone means the area at and below the sea surface within a radius of 500 meters surrounding the center of an airgun array and the area within the immediate vicinity of the survey vessel. Each survey vessel must maintain its own unique exclusion zone.
5. Whales mean all marine mammals in the Gulf of Mexico except dolphins (see definition below) and manatees. This includes all species of baleen whales (Suborder *Mysticeti*), all species of beaked whales (*Ziphius cavirostris* and *Mesoplodon sp.*), sperm whales (*Physeter macrocephalus*), and pygmy and dwarf sperm whales (*Kogia sp.*). Of the baleen whales, only the Bryde’s whale (*Balaenoptera edeni*) is expected to be present in the northern Gulf of Mexico and is considered uncommon. This species has primarily been sighted in water depths less than 200 m in the eastern Gulf of Mexico. Sightings of other baleen whale species are highly unlikely.
6. Dolphins mean all marine mammal species in the Family *Delphinidae*. In the Gulf of Mexico, this includes, among others, killer whales, pilot whales, and all of the “dolphin” species.

Ramp-up Procedures

The intent of ramp-up is to warn marine mammals and sea turtles of pending seismic operations and to allow sufficient time for those animals to leave the immediate vicinity. Under normal conditions, animals sensitive to these activities are expected to move out of the area. For all seismic surveys, including airgun testing, use the ramp-up procedures described below to allow whales, other marine mammals, and sea turtles to depart the exclusion zone before seismic surveying begins.

Measures to conduct ramp-up procedures during all seismic survey, including airgun testing, operations are as follows:

1. Visually monitor the exclusion zone and adjacent waters for the absence of marine mammals and sea turtles for at least 30 minutes before initiating ramp-up procedures. If none are detected, you may initiate ramp-up procedures. Do not initiate ramp-up procedures at night or when you cannot visually monitor the exclusion zone for marine mammals and sea turtles if your minimum source level drops below 160 dB re 1 μ Pa-m (rms) (see measure 5). Altering the vessel’s course to shallower water depths (< 200m in

the Central and Western Planning Areas) to circumvent ramp-up requirements of the 200 meter isobath will be considered noncompliant.

2. Initiate ramp-up procedures by firing a single airgun. The preferred airgun to begin with should be the smallest airgun, in terms of energy output (dB) and volume (in³).
3. Continue ramp-up by gradually activating additional airguns over a period of at least 20 minutes, but no longer than 40 minutes, until the desired operating level of the airgun array is obtained.
4. Immediately shut down all airguns ceasing seismic operations at any time a whale is detected entering or within the exclusion zone. You may recommence seismic operations and ramp-up of airguns only when the exclusion zone has been visually inspected for at least 30 minutes to ensure the absence of marine mammals and sea turtles.
5. You may reduce the source level of the airgun array, using the same shot interval as the seismic survey, to maintain a minimum source level of 160 dB re 1 μ Pa-m (rms) for the duration of certain activities. By maintaining the minimum source level, you will not be required to conduct the 30-minute visual clearance of the exclusion zone before ramping back up to full output. Activities appropriate for maintaining the minimum source level are: (1) all turns between transect lines, when a survey using the full array is being conducted immediately prior to the turn and will be resumed immediately after the turn; and (2) unscheduled, unavoidable maintenance of the airgun array that requires the interruption of a survey to shut down the array. The survey should be resumed immediately after the repairs are completed. There may be other occasions when this practice is appropriate, but use of the minimum source level to avoid the 30-minute visual clearance of the exclusion zone is only for events that occur during a survey using the full power array. The minimum sound source level is not to be used to allow a later ramp-up after dark or in conditions when ramp-up would not otherwise be allowed.

Protected Species Observer Program

Visual Observers

Visual observers who have completed a protected species observer training program as described below are required on all seismic vessels conducting operations in water depths greater than 200 meters (656 ft) throughout the Gulf of Mexico. Visual observers are required on all seismic vessels conducting operations in OCS water depths less than 200 meters (656 ft.) in the Gulf of Mexico waters east of 88.0° W. longitude. At least two protected species visual observers will be required on watch aboard seismic vessels at all times during daylight hours (dawn to dusk) when seismic operations are being conducted, unless conditions (fog, rain, darkness) make sea surface observations impossible. If conditions deteriorate during daylight hours such that the sea surface observations are halted, visual observations must resume as soon as conditions permit.

Operators may engage trained third party observers, may utilize crew members after training as observers, or may use a combination of both third party and crew observers. During these observations, the following guidelines shall be followed: (1) other than brief alerts to bridge personnel of maritime hazards, no additional duties may be assigned to the observer during his/her visual observation watch (if conditions warrant more vigilant look-outs when navigating around or near maritime hazards, additional personnel must be used to ensure that watching for protected species remains the primary focus of the on-watch observers), (2) no observer will be allowed more than 4 consecutive hours on watch as a visual observer, (3) a “break” time of no less than 2 hours

must be allowed before an observer begins another visual monitoring watch rotation (break time means no assigned observational duties), and (4) no person (crew or third party) on watch as a visual observer will be assigned a combined watch schedule of more than 12 hours in a 24-hour period. Due to the concentration and diligence required during visual observation watches, operators who choose to use trained crew members in these positions may select only those crew members who demonstrate willingness as well as ability to perform these duties.

Training

All visual observers must have completed a protected species observer training course. BOEM and BSEE will not sanction particular trainers or training programs. However, basic training criteria have been established and must be adhered to by any entity that offers observer training. Operators may utilize observers trained by third parties, may send crew for training conducted by third parties, or may develop their own training program. All training programs offering to fulfill the observer training requirement must: (1) furnish to BSEE, at the address listed in this NTL, a course information packet that includes the name and qualifications (i.e., experience, training completed, or educational background) of the instructor(s), the course outline or syllabus, and course reference material; (2) furnish each trainee with a document stating successful completion of the course; and (3) provide BSEE with names, affiliations, and dates of course completion of trainees.

The training course must include the following elements:

- I. Brief overview of the MMPA and the ESA as they relate to seismic acquisition and protection of marine mammals and sea turtles in the Gulf of Mexico,
- II. Brief overview of seismic acquisition operations in the Gulf of Mexico,
- III. Overview of seismic mitigation measures (NTLs) and the protected species observer program in the Gulf of Mexico,
- IV. Discussion of the role and responsibilities of the protected species observer in the Gulf of Mexico, including:
 - a) Legal requirements (why you are here and what you do),
 - b) Professional behavior (code of conduct),
 - c) Integrity,
 - d) Authority of protected species observer to call for shut-down of seismic acquisition operations,
 - e) Assigned duties,
 - 1) What can be asked of the observer,
 - 2) What cannot be asked of the observer,
 - f) Reporting of violations and coercion,
- V. Identification of Gulf Of Mexico marine mammals and sea turtles, with emphasis on whales,
- VI. Cues and search methods for locating marine mammals, especially whales, and sea turtles,

VII. Data collection and reporting requirements:

- a) Forms and reports to BSEE via email at protectedspecies@bsee.gov on the 1st and 15th of each month,
- b) Whale in exclusion zone/shut-down report within 24 hours.

Visual Monitoring Methods

The observers on duty will look for whales, other marine mammals, and sea turtles using the naked eye and hand-held binoculars provided by the seismic vessel operator. The observers will stand watch in a suitable location that will not interfere with navigation or operation of the vessel and that affords the observers an optimal view of the sea surface. The observers will provide 360° coverage surrounding the seismic vessel and will adjust their positions appropriately to ensure adequate coverage of the entire area. These observations must be consistent, diligent, and free of distractions for the duration of the watch.

Visual monitoring will begin no less than 30 minutes prior to the beginning of ramp-up and continue until seismic operations cease or sighting conditions do not allow observation of the sea surface (e.g., fog, rain, darkness). If a marine mammal or sea turtle is observed, the observer should note and monitor the position (including lat./long. of vessel and relative bearing and estimated distance to the animal) until the animal dives or moves out of visual range of the observer. Make sure you continue to observe for additional animals that may surface in the area, as often there are numerous animals that may surface at varying time intervals. At any time a whale is observed within an estimated 500 meters (1,640 feet) of the sound source array (“exclusion zone”), whether due to the whale’s movement, the vessel’s movement, or because the whale surfaced inside the exclusion zone, the observer will call for the immediate shut-down of the seismic operation, including airgun firing (the vessel may continue on its course but all airgun discharges must cease). The vessel operator must comply immediately with such a call by an on-watch visual observer. Any disagreement or discussion should occur only after shut-down. When no marine mammals or sea turtles are sighted for at least a 30-minute period, ramp- up of the source array may begin. Ramp-up cannot begin unless conditions allow the sea surface to be visually inspected for marine mammals and sea turtles for 30 minutes prior to commencement of ramp-up (unless the method described in the section entitled “Experimental Passive Acoustic Monitoring” is used). Thus, ramp-up cannot begin after dark or in conditions that prohibit visual inspection (fog, rain, etc.) of the exclusion zone. Any shut-down due to a whale(s) sighting within the exclusion zone must be followed by a 30-minute all-clear period and then a standard, full ramp-up. Any shut-down for other reasons, including, but not limited to, mechanical or electronic failure, resulting in the cessation of the sound source for a period greater than 20 minutes, must also be followed by full ramp-up procedures. In recognition of occasional, short periods of the cessation of airgun firing for a variety of reasons, periods of airgun silence **not exceeding 20 minutes** in duration will not require ramp-up for the resumption of seismic operations if: (1) visual surveys are continued diligently throughout the silent period (requiring daylight and reasonable sighting conditions), and (2) no whales, other marine mammals, or sea turtles are observed in the exclusion zone. If whales, other marine mammals, or sea turtles are observed in the exclusion zone during the short silent period, resumption of seismic survey operations must be preceded by ramp-up.

Reporting

The importance of accurate and complete reporting of the results of the mitigation measures cannot be overstated. Only through diligent and careful reporting can BOEM, BSEE, and

subsequently NMFS, determine the need for and effectiveness of mitigation measures. Information on observer effort and seismic operations are as important as animal sighting and behavior data. In order to accommodate various vessels' bridge practices and preferences, vessel operators and observers may design data reporting forms in whatever format they deem convenient and appropriate. Alternatively, observers or vessel operators may adopt the United Kingdom's Joint Nature Conservation Committee forms (available at their website www.jncc.gov.uk). At a minimum, the following items should be recorded and included in reports to the BSEE:

Observer Effort Report: Prepared for each day during which seismic acquisition operations are conducted. Furnish an observer effort report to BSEE on the 1st and the 15th of each month that includes:

- Vessel name,
- Observers' names and affiliations,
- Survey type (e.g., site, 3D, 4D),
- BOEM Permit Number (for "off-lease seismic surveys") or Plan Control Number and OCS Lease Number (for "on-lease/ancillary seismic surveys"),
- Date,
- Time and lat./long. when daily visual survey began,
- Time and lat./long. when daily visual survey ended,
- Average environmental conditions while on visual survey, including
 - Wind speed and direction,
 - Sea state (glassy, slight, choppy, rough or Beaufort scale),
 - Swell (low, medium, high or swell height in meters),
 - Overall visibility (poor, moderate, good).

Survey Report: Prepared for each day during which seismic acquisition operations are conducted and the airguns are being discharged. Furnish a survey report to BSEE on the 1st and the 15th of each month during which operations are being conducted that includes:

- Vessel name,
- Survey type (e.g., site, 3D, 4D),
- BOEM Permit Number (for "off-lease seismic surveys") or Plan Control Number and OCS Lease Number (for "on-lease/ancillary seismic surveys"),
- Date,
- Time pre-ramp-up survey begins,
- What marine mammals and sea turtles were seen during pre-ramp-up survey?
- Time ramp-up begins,
- Were whales seen during ramp-up?
- Time airgun array is operating at the desired intensity,
- What marine mammals and sea turtles were seen during survey?
- If whales were seen, was any action taken (i.e., survey delayed, guns shut down)?
- Reason that whales might not have been seen (e.g., swell, glare, fog),
- Time airgun array stops firing.

Sighting Report: Prepared for each sighting of a marine mammal (whale or dolphin) or sea turtle made during seismic acquisition operations. Furnish a sighting report to BSEE on the 1st and the 15th of each month during which operations are being conducted that includes:

- Vessel name,
- Survey type (e.g., site, 3D, 4D),
- BOEM Permit Number (for “off-lease seismic surveys”) or Plan Control Number and OCS Lease Number (for “on-lease/ancillary seismic surveys”),
- Date,
- Time,
- Watch status (Were you on watch or was this sighting made opportunistically by you or someone else?),
- Observer or person who made the sighting,
- Lat./long. of vessel,
- Bearing of vessel,
- Bearing and estimated range to animal(s) at first sighting,
- Water depth (meters),
- Species (or identification to lowest possible taxonomic level),
- Certainty of identification (sure, most likely, best guess),
- Total number of animals,
- Number of juveniles,
- Description (as many distinguishing features as possible of each individual seen, including length, shape, color and pattern, scars or marks, shape and size of dorsal fin, shape of head, and blow characteristics),
- Direction of animal’s travel – compass direction,
- Direction of animal’s travel – related to the vessel (drawing preferably),
- Behavior (as explicit and detailed as possible; note any observed changes in behavior,)
- Activity of vessel,
- Airguns firing? (yes or no),
- Closest distance (meters) to animals from center of airgun or airgun array (whether firing or not).

Note: If this sighting was of a whale(s) within the exclusion zone that resulted in a shut-down of the airguns, include in the sighting report the observed behavior of the whale(s) before shut-down, the observed behavior following shut-down (specifically noting any change in behavior), and the length of time between shut-down and subsequent ramp-up to resume the seismic survey (note if seismic survey was not resumed as soon as possible following shut-down). Send this report to BOEM **within 24 hours of the shut-down**. These sightings should also be included in the first regular semi-monthly report following the incident.

Additional information, important points, and comments are encouraged. All reports will be submitted to BSEE on the 1st and the 15th of each month (with one exception noted above). Forms should be scanned (or data typed) and sent via email to protectedspecies@bsee.gov.

Please note that these marine mammal and sea turtle reports are in addition to any reports you submit under NTL No. 2005-G07, effective July 1, 2005, and all progress and final reports required as a condition of your geophysical permit.

Borehole Seismic Surveys

Borehole seismic surveys differ from surface seismic surveys in a number of ways, including the use of much smaller airgun arrays, having an average survey time of 12-24 hours, utilizing a sound source that is not usually moving at 4-5 knots, and requiring the capability of moving the receiver in the borehole between shots. Due to these differences, the following altered mitigations apply only to borehole seismic surveys:

- During daylight hours, when visual observations of the exclusion zone are being performed as required in this NTL, borehole seismic operations will not be required to ramp-up for shutdowns of 30 minutes or less in duration, as long as no whales, other marine mammals, or sea turtles are observed in the exclusion zone during the shutdown. If a whale, other marine mammal, or sea turtle is sighted in the exclusion zone, ramp-up is required and may begin only after visual surveys confirm that the exclusion zone has been clear for 30 minutes.
- During nighttime or when conditions prohibit visual observation of the exclusion zone, ramp-up will not be required for shutdowns of 20 minutes or less in duration. For borehole seismic surveys that utilize passive acoustics during nighttime and periods of poor visibility, ramp-up is not required for shutdowns of 30 minutes or less.
- Nighttime or poor visibility ramp-up is allowed only when passive acoustics are used to ensure that no whales are present in the exclusion zone (as for all other seismic surveys). Operators are strongly encouraged to acquire the survey in daylight hours when possible.
- Protected species observers must be used during daylight hours, as required in this NTL, and may be stationed either on the source boat or on the associated drilling rig or platform if a clear view of the sea surface in the exclusion zone and adjacent waters is available.
- All other mitigations and provisions for seismic surveys as set forth in this NTL will apply to borehole seismic surveys.
- Reports should reference a Plan Control Number, OCS Lease Number, Area/Block and Borehole Number or BOEM permit number, as applicable.

Experimental Passive Acoustic Monitoring

Whales, especially sperm whales, are very vocal marine mammals, and periods of silence are usually short and most often occur when these animals are at the surface and may be detected using visual observers. However, sperm whales are at the greatest risk of potential injury from seismic airguns when they are submerged and under the airgun array. Passive acoustic monitoring appears to be very effective at detecting submerged and diving sperm whales, and some other marine mammal species, when they are not detectable by visual observation. BOEM and BSEE strongly encourage operators to participate in an experimental program by including passive acoustic monitoring as part of the protected species observer program. Inclusion of passive acoustic monitoring does **not** relieve an operator of any of the mitigations (including visual observations) in this NTL **with the following exception:** Monitoring for whales with a passive acoustic array by an observer proficient in its use will allow ramp-up and the subsequent start of a seismic survey during times of reduced visibility (darkness, fog, rain, etc.) when such ramp-up otherwise would not be permitted using only visual observers. If you use passive acoustic

monitoring, include an assessment of the usefulness, effectiveness, and problems encountered with the use of that method of marine mammal detection in the reports described in this NTL. A description of the passive acoustic system, the software used, and the monitoring plan should also be reported to BSEE at the beginning of its use.

Paperwork Reduction Act of 1995 (PRA) Statement

The PRA (44 U.S.C. Chapter 35) requires us to inform you that we collect the information described in this NTL to ensure that you conduct operations in a manner that will not jeopardize threatened or endangered species or destroy or adversely modify critical habitat that has been designated for those species. We protect all proprietary information submitted according to the Freedom of Information Act, 30 CFR 250.197, and 30 CFR 550.197. An agency may not conduct or sponsor a collection of information unless it displays a currently valid Office of Management and Budget (OMB) control number. You are not obligated to respond until the OMB has approved this collection of information. We estimate the total hour burden to be 751 hours and the total “non-hour cost” burden to be \$1,854,080. Direct comments regarding the burden or any other aspect of this information collection to the: Interior Desk Officer 1010–0151, Office of Management and Budget; 202-395-5806 (fax); email: oiradocket@omb.eop.gov. Depending on the nature of the comment, please also send a copy to either BSEE or BOEM.

In addition, this NTL refers to information collection requirements under 30 CFR 250 subpart B and 30 CFR 550 subpart B. The OMB has approved all of the information collection requirements in these regulations and assigned OMB Control Number 1010-0151.

BSEE and BOEM issue NTLs as guidance documents in accordance with 30 CFR 250.103 and 30 CFR 550.103 to clarify, supplement, and provide more detail about certain BOEM and BSEE regulatory requirements and to outline the information you provide in your various submittals. Under that authority, this NTL sets forth a policy on and an interpretation of a regulatory requirement that provides a clear and consistent approach to complying with that requirement.

Contact

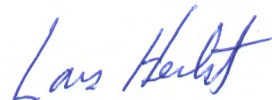
Any questions regarding this NTL should be submitted in writing to: protectedspecies@bsee.gov.

Submittals by mail may be directed to:

Bureau of Safety and Environmental Enforcement
Gulf of Mexico OCS Region
Environmental Enforcement Branch (MS GE466)
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394



John Rodi
Regional Director
BOEM

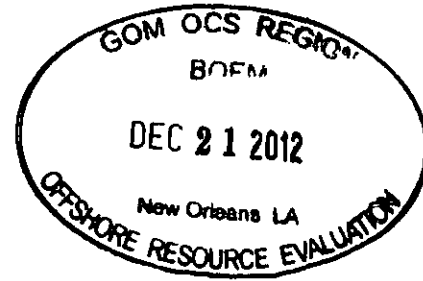


Lars Herbst
Regional Director
BSEE

Appendix B.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

Gulf of Mexico OCS Region
(Insert Appropriate Regional Office)



PERMIT FOR GEOPHYSICAL EXPLORATION
FOR MINERAL RESOURCES OR SCIENTIFIC RESEARCH
ON THE OUTER CONTINENTAL SHELF

In consideration of the terms and conditions contained herein and the authorization granted hereby, this permit is entered into by and between the United States of America (the Government), acting through the Bureau of Ocean Energy Management (BOEM) of the Department of the Interior, and

TGS
(Name of Permittee)
2500 City West Boulevard, Suite 2000
(Number and Street)
Houston, TX 77040
(City, State, and Zip Code)

PERMIT NUMBER: L12-039

DATE: 31-Dec-2012

This permit is issued pursuant to the authority of the Outer Continental Shelf Lands Act, as amended, (43 U.S.C. 1331 et seq.), hereinafter called the "Act," and Title 30 Code of Federal Regulations Parts 251 and 551 (Geological and Geophysical (G&G) Explorations of the Outer Continental Shelf).

Paperwork Reduction Act of 1995 (PRA) Statement: This permit refers to information collection requirements contained in 30 CFR Parts 251 and 551 regulations. The Office of Management and Budget (OMB) has approved those reporting requirements under OMB Control Number 1010-0048.

Section I. Authorization

The Government authorizes the permittee to conduct:

- Geophysical exploration for mineral resources as defined in 30 CFR 551.1.
- Geophysical scientific research as defined in 30 CFR 551.1. A permit is required for any geophysical investigation that involves the use of solid or liquid explosives or developing data and information for proprietary use or sale.

This permit authorizes the permittee to conduct the above geophysical activity during the period from 05-MAR-2013 to 05-MAY-2013 in the following area(s):
MC, LL, AT, GC, LU, WR. Extensions of the time period specified above must be requested in writing. A permit plus extensions for activities will be limited to a period of not more than 1 year from the original issuance date of the permit. Inspection and reporting of geophysical exploration activities, suspension and cancellation of authority to conduct exploration or scientific research activities under permit, and penalties and appeals will be carried out in accordance with 30 CFR 551.8, 551.9, and 551.10.

The authority of the Regional Director may be delegated to the Regional Supervisor for Resource Evaluation for the purposes of this permit.

Section II. Type(s) of Operations and Technique(s)

- A. The permittee will employ the following type(s) of operations:
3D Narrow Azimuth seismic survey. Using 1 streamer Vessel towing 8 streamers and a single source (operation in flip/flop mode) ;
and will utilize the following instruments and/or technique(s) in such operations:
SEAL recording system and SERCEL streamers
- B. The permittee will conduct all activities in compliance with the terms and conditions of this permit, including the "Stipulations," "Special Provisions," and the approved "Application for Permit," which are attached to and incorporated into this permit.
- C. The permittee will conduct all geophysical exploration or scientific research activities in compliance with the Act, the regulations in 30 CFR Parts 251 and 551, and other applicable statutes and regulations whether such statutes and regulations are enacted, promulgated, issued, or amended before or after this permit is issued. Some of the provisions of 30 CFR Parts 251 and 551 are restated in this permit for emphasis. However, all of the provisions of 30 CFR Parts 251 and 551 apply to this permit.

Section III. Reports on Operations

- A. The permittee must submit status reports on a bi-monthly basis in a manner approved or prescribed by the Regional Supervisor, Resource Evaluation (hereinafter referred to as Supervisor). The report must include a daily log of operations and a map (preferably on a scale of 1: 250,000) showing traverse lines according to Bureau of Ocean Energy Management (BOEM) area and block numbers.

- B. The permittee must submit to the Supervisor a final report within 30 days after the completion of operations. The final report must contain the following:
1. A description of the work performed and areal extent including number of line miles for 2-D or high resolution surveys or OCS blocks for 3-D geophysical data acquired;
 2. Chart(s), map(s), or plat(s) depicting the areas and blocks in which any exploration or scientific research activities were conducted. These graphics must clearly indicate the location of the activities so that the data produced from the activities can be accurately located and identified
 3. The dates on which the actual geophysical exploration or scientific research activities were performed;
 4. A narrative summary of any: (a) hydrocarbon occurrences or environmental hazards observed and (b) adverse effects of the geophysical exploration or scientific research activities on the environment, aquatic life, archaeological resources, or other uses of the area in which the activities were conducted;
 5. The estimated date on which the processed or interpreted data or information will be available for inspection by BOEM;
 6. A final edited navigation file on suitable storage medium of all data or sample locations in latitude/longitude degrees including datum used. The navigation for 2D lines should include line name and locations for the first, last and every tenth SP. For 3D surveys, please supply a navigation file for the acquired track lines that includes the location of the first and last SP and/or the corner locations for the area acquired. Contact the G&G permitting office for the specific navigation required for this permitted activity. The digital file is to be formatted in standard SEG-P1, UKOOA P1-90 or other current, standard industry format, coded in ASCII. A printed data listing and a format statement are to be included;
 7. Identification of geocentric ellipsoid (NAD 27 or NAD 83) used as a reference for the data or sample locations; and
 8. Such other descriptions of the activities conducted as may be specified by the Supervisor.
- C. The last status report and the final report can be combined into one report.

Section IV. Submission, Inspection, and Selection of Geophysical Data and Information

- A. The permittee must notify the Supervisor, in writing, when the permittee has completed the initial processing and interpretation of any geophysical data and information collected under an exploration permit or a scientific research permit that involves developing data and information for proprietary use or sale. If the Supervisor asks if the permittee has further processed or interpreted any geophysical data and information collected under a permit, the permittee must respond within 30 days. If further processing of the data and information is conducted, it is the responsibility of the permittee to keep the most current resulting products available in the event the Supervisor requests the current status of data processing. At any time within 10 years after receiving notification of the completion of the acquisition activities conducted under the permit, the Supervisor may request that the permittee submit for inspection and possible retention all or part of the geophysical data, processed geophysical information, and interpreted geophysical information.

- B. The Supervisor will have the right to inspect and select the geophysical data, processed geophysical information, or interpreted geophysical information. This inspection will be performed on the permittee's premises unless the Supervisor requests that the permittee submit the data or information to the Supervisor for inspection. Such submission must be within 30 days following the receipt of the Supervisor's request unless the Supervisor authorizes a later delivery date. If the inspection is done on the permittee's premises, the permittee must submit the geophysical data or information selected within 30 days following receipt of the Supervisor's request, unless the Supervisor authorizes a longer period of time for delivery. The data or information requested for inspection or selected by the Supervisor must be submitted regardless of whether the permittee and the Government have or have not concluded an agreement for reimbursement. If the Supervisor decides to retain all or a portion of the geophysical data or information, the Supervisor will notify the permittee, in writing, of this decision.
- C. In the event that a third party obtains geophysical data, processed geophysical information, or interpreted geophysical information from a permittee, or from another third party, by sale, trade, license agreement, or other means:
1. The third party recipient of the data and information assumes the obligations under this section except for notification of initial processing and interpretation of the data and information and is subject to the penalty provisions of 30 CFR Part 550, Subpart N; and
 2. A permittee or third party that sells, trades, licenses, or otherwise provides the data and information to a third party must advise the recipient, in writing, that accepting these obligations is a condition precedent of the sale, trade, license, or other agreement; and
 3. Except for license agreements, a permittee or third party that sells, trades, or otherwise provides data and information to a third party must advise the Supervisor in writing within 30 days of the sale, trade, or other agreement, including the identity of the recipient of the data and information; or
 4. With regard to license agreements, a permittee or third party that licenses data and information to a third party, within 30 days of a request by the Supervisor, must advise the Supervisor, in writing, of the license agreement, including the identity of the recipient of the data and information.
- D. Each submission of geophysical data, processed geophysical information, and interpreted geophysical information must contain, unless otherwise specified by the Supervisor, the following:
1. An accurate and complete record of each geophysical survey conducted under the permit, including digital navigational data and final location maps of all surveys;
 2. All seismic data developed under a permit presented in a format and of a quality suitable for processing;
 3. Processed geophysical information derived from seismic data with extraneous signals and interference removed, presented in a format and of a quality suitable for interpretive evaluation, reflecting state-of-the-art processing techniques; and
 4. Other geophysical data, processed geophysical information, and interpreted geophysical information obtained from, but not limited to, shallow and deep subbottom profiles, bathymetry, side-scan sonar, gravity, magnetic, and electrical surveys, and special studies such as refraction, shear wave, and velocity surveys.

Section V. Reimbursement to Permittees

- A. After the delivery of geophysical data, processed geophysical information, and interpreted geophysical information requested by the Supervisor in accordance with subsection IV of this permit, and upon receipt of a request for reimbursement and a determination by BOEM that the requested reimbursement is proper, BOEM will reimburse the permittee or third party for the reasonable costs of reproducing the submitted data and information at the permittee's or third party's lowest rate or at the lowest commercial rate established in the area, whichever is less.
- B. If the processing was in a form and manner other than that used in the normal conduct of the permittee's business at BOEM's request, BOEM will reimburse the permittee or third party for the reasonable costs of processing or reprocessing such data. Requests for reimbursement must identify processing costs separate from acquisition costs.
- C. The permittee or third party will not be reimbursed for the costs of acquiring or interpreting geophysical information.
- D. Data and information required under section IV.D.1. of this permit are not considered to be geophysical data or processed geophysical information and must be provided by the permittee at no cost to the Government.

Section VI. Disclosure of Data and Information to the Public

- A. BOEM will make data and information submitted by a permittee available in accordance with the requirements and subject to the limitations of the Freedom of Information Act (5 U.S.C. 552) and the implementing regulations (43 CFR Part 2), the requirements of the Act, and the regulations contained in 30 CFR Parts 250 and 550 (Oil and Gas and Sulphur Operations in the Outer Continental Shelf), 30 CFR Parts 251 and 551, and 30 CFR Parts 252 and 552 (Outer Continental Shelf (OCS) Oil and Gas Information Program).
- B. Except as specified in this section, or Section VIII, or in 30 CFR Parts 250, 252, 550, and 552, no data or information determined by BOEM or the Bureau of Safety and Environmental Enforcement to be exempt from public disclosure under subsection A of this section will be provided to any affected State or be made available to the executive of any affected local government or to the public, unless the permittee or third party and all persons to whom such permittee has sold, traded, or licensed the data or information under promise of confidentiality agree to such an action.
- C. Geophysical data and processed or interpreted geophysical information submitted under a permit, and retained by BOEM, will be disclosed as follows:
 - 1. Except for deep stratigraphic tests, BOEM will make available to the public geophysical data 50 years after the date of issuance of the permit under which the data were collected (see 30 CFR 551.12 (a) (b) (c) and (d)).
 - 2. Except for deep stratigraphic tests, BOEM will make available to the public processed geophysical information and interpreted geophysical information 25 years after the date of issuance of the permit under which the original data were collected (see 30 CFR 551.12(a), (b), (c) and (d)).
 - 3. BOEM will make available to the public all geophysical data and information and geophysical interpretations related to a deep stratigraphic test, at the earlier of the following times: (a) 25

years after the completion of the test, or (b) for a lease sale held after the test well is completed, 60 calendar days after the Department of the Interior executes the first lease for a block, any part of which is within 50 geographic miles (92.6 kilometers) of the site of the completed test.

- D. All line-specific preplot or postplot plat(s), and navigation tapes, including but not limited to seismic survey traverses and shotpoint locations, submitted as a requirement of 30 CFR 251.7, 551.7 or 551.12, will be considered as "PROPRIETARY INFORMATION." Such information will not be made available to the public without the consent of the permittee for a period of 25 years from the date of issuance of the permit, unless the Director, BOEM, determines that earlier release is necessary for the proper development of the area permitted.
- E. All other information submitted as a requirement of 30 CFR 551.8 and determined by BOEM to be exempt from public disclosure will be considered as "PROPRIETARY." Such data and information will not be made available to the public without the consent of the permittee for a period of up to 25 years from the date of issuance of the permit as addressed in 30 CFR 551.14, unless the Director, BOEM, determines that earlier release is necessary for the proper development of the area permitted. The executed permit will be considered as "PROPRIETARY" except the public information copy which will be available to the public upon request.
- F. The identities of third party recipients of data and information collected under a permit will be kept confidential. The identities will not be released unless the permittee and the third parties agree to the disclosure.

Section VII. Disclosure to Independent Contractors

BOEM reserves the right to disclose any data or information acquired from a permittee to an independent contractor or agent for the purpose of reproducing, processing, reprocessing, or interpreting such data or information. When practicable, BOEM will advise the permittee who provided the data or information of intent to disclose the data or information to an independent contractor or agent. BOEM's notice of intent will afford the permittee a period of not less than 5 working days within which to comment on the intended action. When BOEM so advises a permittee of the intent to disclose data or information to an independent contractor or agent, all other owners of such data or information will be deemed to have been notified of BOEM's intent. Prior to any such disclosure, the contractor or agent will be required to execute a written commitment not to sell, trade, license, or disclose any data or information to anyone without the express consent of BOEM.

Section VIII. Sharing of Information with Affected States

- A. At the time of soliciting nominations for the leasing of lands within 3 geographic miles of the seaward boundary of any coastal State, BOEM, pursuant to the provisions of 30 CFR Parts 252.7 552.7 and subsections 8(g) and 26(e) (43 U.S.C. 1337(g) and 1352(e)) of the Act, will provide the Governor of the State (or the Governor's designated representative) the following information that has been acquired by BOEM on such lands proposed to be offered for leasing:
 - 1. All information on the geographical, geological, and ecological characteristics of the areas and regions proposed to be offered for leasing;
 - 2. An estimate of the oil and gas reserves in the area proposed for leasing; and

3. An identification of any field, geological structure, or trap located within 3 miles of the seaward boundary of the State.
- B. After the time of receipt of nominations for any area of the OCS within 3 geographic miles of the seaward boundary of any coastal State and Area Identification in accordance with the provisions of Subparts D and E of 30 CFR Part 556, BOEM, in consultation with the Governor of the State (or the Governor's designated representative), will determine whether any tracts being given further consideration for leasing may contain one or more oil or gas reservoirs underlying both the OCS and lands subject to the jurisdiction of the State.
- C. At any time prior to a sale, information acquired by BOEM that pertains to the identification of potential and/or proven common hydrocarbon-bearing areas within 3 geographic miles of the seaward boundary of any such State will be shared, upon request by the Governor and pursuant to the provisions of 30 CFR Parts 252.7 and 552.7 and subsections 8(g) and 26(e) of the Act, with the Governor of such State (or the Governor's designated representative).
- D. Knowledge obtained by a State official who receives information under subsections A, B, and C of this section will be subject to the requirements and limitations of the Act and the regulations contained in 30 CFR Parts 250, 251, 252, 550, 551, and 552.

Section IX. Permit Modifications

The Department will have the right at any time to modify or amend any provisions of this permit, except that the Department will not have such right with respect to the provisions of Sections VI, VII, and VIII hereof, unless required by an Act of Congress.

IN WITNESS WHEREOF the parties have executed this permit and it will be effective as of the date of signature by the Supervisor.

PERMITTEE:

THE UNITED STATES OF AMERICA:

Asif Ali

(Signature of Permittee)

Asif Ali

(Type or Print Name of Permittee)

Project Manager

(Title)

12-19-12

(Date)

David W. Cook

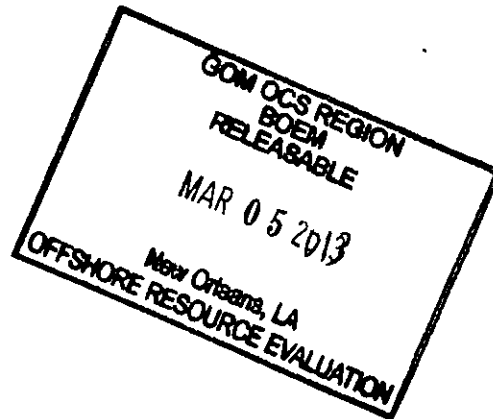
(Signature of Regional Supervisor)

David W. Cook

(Type or Print Name of Regional Supervisor)

3/5/13

(Date)



December 19, 2012

Project Hernando III (Vessel List)

Vessel Name	Registered Owner	Role	Registry Number	Radio Call Sign
Geo Caribbean	Fugro Geo Caribbean	Source/Recording	9401219	V7RA6

STANDARD ENVIRONMENTAL PROTECTIVE MEASURES

1. Comply with the provisions of NTL No. 2012-JOINT-G02, Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program, effective January 1, 2012 (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2012/2012-JOINT-G02-pdf.aspx>).

2. Comply with the provisions of NTL No. 2012-BSEE-G01, Marine Trash and Debris Awareness and Elimination, effective January 1, 2012 (see the BOEM website at: <http://www.bsee.gov/Regulations-and-Guidance/Notices-to-Lessees/2012/2012-BSEE-G01-pdf.aspx>).

3. Comply with the provisions of NTL No. 2012-JOINT-G01, Vessel Strike Avoidance and Injured/Dead Protected Species Reporting, effective January 1, 2012 (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2012/2012-JOINT-G01-pdf.aspx>).

4. Man-made structure(s) such as pipeline(s) or other potential hazard(s) may be located in the permitted work area; therefore, prior to performing operations that involve bottom surface disturbance (e.g., coring), take precautions in accordance with Notice to Lessees and Operators No. 2008-G05, Section VI.B. (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2008/08-g05.aspx>)

5. If you conduct activities that could disturb the seafloor in an Ordnance Dumping Area (see the BOEM website at: at <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/OrdnanceDumpingAreas.aspx> for a map), exercise caution, since this area might contain old ordnance, including unexploded shells and depth charges, dumped before 1970. In addition, the U.S. Air Force has released an undeterminable amount of unexploded ordnance in Water Test Areas 1 through 5 (most of the Eastern Planning Area of the GOM).

6. If you discover any site, structure, or object of potential archaeological significance (i.e., cannot be definitively identified as modern debris or refuse) while conducting operations, the provisions of 30 CFR 250.194(c) and NTL 2005-G07 require you to immediately halt operations within 1,000 feet of the area of discovery and report this discovery to the Regional Supervisor of Leasing and Environment (RSLE) within 48 hours. Every reasonable effort must be taken to preserve the archaeological resource from damage until the RSLE has told you how to protect it.

7. If you conduct activities within a military warning or water test area (see the BOEM website at: http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/MWA_boundaries-pdf.aspx for a map), or if the associated boat or aircraft traffic will traverse a military warning or water test area, contact the commander(s) of the appropriate command headquarters having jurisdiction over the respective area(s) before you commence such traffic. You can obtain the names and telephone numbers of the command headquarters for each military warning and water test area by consulting the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/Military-Contacts-pdf.aspx>.

8. Comply with the provisions of NTL 2009-G39, Biologically Sensitive Areas of the Gulf of Mexico, effective January 27, 2010, (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G39.aspx>). If you conduct activities near an identified biologically sensitive topographic feature (see the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topoblocks-pdf.aspx> for a list and <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topomap-pdf.aspx> for a map), make sure that you do not anchor or otherwise disturb the seafloor within 152 meters (500 feet) of its designated “No Activity Zone.” Within 90 calendar days after completing activities that disturbed the seafloor within 305 meters (1,000 feet) of the “No Activity Zone” of a biologically sensitive topographic feature, submit to the BOEM GOMR Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a map at a scale of 1 inch = 1,000 feet with DGPS accuracy, showing the location of the seafloor disturbance relative to these features.

9. Comply with the provisions of NTL 2009-G39, Biologically Sensitive Areas of the Gulf of Mexico, effective January 27, 2010, (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G39.aspx>). If you conduct activities in the Live Bottom “Pinnacle Trend” area (see the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topoblocks-pdf.aspx> for a list and <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topomap-pdf.aspx> for a map), make sure that you do not anchor or otherwise disturb the seafloor within 30 meters (100 feet) of any identified pinnacles or other hard bottoms that have a vertical relief of eight feet or more. Within 90 calendar days after completing an ancillary activity that disturbed the seafloor within 61 meters (200 feet) of pinnacles in the “Pinnacle Trend” area, submit to the BOEM GOMR Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a map at a scale of 1 inch = 1,000 feet with DGPS accuracy, showing the location of the seafloor disturbance relative to these features.

10. Comply with the provisions of NTL 2009-G39, Biologically Sensitive Areas of the Gulf of Mexico, effective January 27, 2010, (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G39.aspx>). If you conduct activities in the Live Bottom “Low Relief” area (see the BOEMRE website at <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/topomap-pdf.aspx> for a map), make sure that you do not anchor or otherwise disturb the seafloor near any identified live bottom low relief features. Within 90 calendar days after completing an ancillary activity that disturbed the seafloor within 30 meters (100 feet) of live bottom low relief features, submit to the BOEM GOMR Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a map at a scale of 1 inch = 1,000 feet with DGPS accuracy, showing the location of the seafloor disturbance relative to these features.

11. If you conduct activities in water depths 400 meters (1,312 feet) or greater, make sure that you do not anchor, use anchor chains wire ropes or cables, or otherwise disturb the seafloor within 76 meters (250 feet) of any features or areas that could support high-density chemosynthetic communities. The known chemosynthetic community sites are listed in Appendix A of NTL No. 2009-G40, Deepwater Chemosynthetic Communities, effective January 27, 2010 (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G40.aspx>). Within 90 calendar days after completing an ancillary activity that disturbed the seafloor within 152 meters (500 feet) of features or areas that could support high-density chemosynthetic communities, submit to the BOEMRE GOMR Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a map at a scale of 1 inch = 1,000 feet with DGPS accuracy, showing the location of the seafloor disturbance relative to these features.

12. Comply with the provisions of NTL 2009-G39, Biologically-Sensitive Underwater Features and Areas of the Gulf of Mexico, effective January 27, 2010, (see the BOEM website at: <http://www.boem.gov/Regulations/Notices-To-Lessees/2009/09-G39.aspx>). If you discover any high-relief topographic feature with a relief greater than eight (8) feet while conducting activities, report the discovery to the BOEM GOMR Regional Director. Make sure you do not anchor on or otherwise disturb such a feature. Within 90 calendar days after completing an ancillary activity that disturbed the seafloor within 30 meters (100 feet) of such a feature, submit to the BOEM GOMR Data Acquisition and Special Project Unit (see page 5 of these “Protective Measures” for the address) a map at a scale of 1 inch = 1,000 feet with DGPS accuracy, showing the location of the seafloor disturbance relative to the feature.

13. Before you conduct activities that could disturb the seafloor within 254 meters (1,000 feet) of a Texas artificial reef site or artificial reef permit area, within 152 meters (500 feet) of a Louisiana artificial reef site or artificial reef permit area, or could disturb the seafloor within a General Permit Area established by the States of Texas, Alabama or Florida for the placement of artificial reef material, contact the appropriate State reef management agency. See the BOEM websites at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/artreefmap.aspx> for a map and <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/artreefcontacts-pdf.aspx> for State contacts.

14. If you conduct activities within the boundaries of the Flower Gardens National Marine Sanctuary (Flower Gardens Banks and Stetson Bank), exercise caution to ensure that such activities do not endanger any other users of the Sanctuary. See the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/FGNMSmap-pdf.aspx> for map. Additionally, if the activities involve moving the marker buoys at the Sanctuary, contact Mr. G. P. Schmahl, the current Sanctuary Manager, for instructions. See the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/FGNMScontacts-pdf.aspx> for Mr. Schmahl's contact information. See the BOEM website at: <http://www.boem.gov/Environmental-Stewardship/Environmental-Studies/Gulf-of-Mexico-Region/FGNMSbuoys-pdf.aspx> for the locations of the Flower Gardens' marker buoys.

15. If your proposed activities will involve using boats from a port located south of the Suwannee River mouth in Florida, make sure that you adhere to the following manatee protection plan:

- a. Advise your personnel of the possibility of the presence of manatees in the inland and coastal waters of Florida in the Eastern GOM.
- b. Advise your personnel that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act, the Marine Mammal Protection Act, and the Florida Manatee Sanctuary Act of 1978.
- c. Advise your vessel operators to (1) use the deeper ship channels to the maximum extent possible; (2) avoid collisions with manatees and to stay within the existing channels; and (3) obey all speed restrictions and travel at "no wake/idle" speeds at all times while operating in shallow water or in channels where the draft of the vessel provides less than four (4) feet of clearance. (Areas of manatee concentrations have been identified and speed limit signs have been erected in accordance with Federal, State, and local regulations.)
- d. While vessels are berthed in port, advise your vessel operators to use fenders between the dock and the vessel and/or between adjacent vessels berthed side-by-side. Make sure that the fenders have a minimum clearance of three feet when compressed between the dock and the vessel.

e. Ensure that your vessel operators keep logs detailing any sighting of, collision with, damage to, or death of manatees that occur while you conduct an ancillary activity. If a mishap involving a manatee should occur, make sure that the vessel operator immediately calls the “Manatee Hotline” ((888) 404-3922), and the U.S. Fish and Wildlife Service, Jacksonville Field Office ((904) 232-2580) for north Florida or the U.S. Fish and Wildlife Service, Vero Beach Ecosystem Office ((772) 562-3909) for south Florida.

f. Within 60 calendar days after completing the ancillary activity, submit a report summarizing all manatee incidents and sightings to the Florida Marine Research Institute, Florida Fish and Wildlife Conservation Commission, 100 Eighth Avenue SE, St. Petersburg, FL 33701-5095; and to the U.S. Fish and Wildlife Service, 6620 Southpoint Drive South, Suite 310, Jacksonville, FL 32216-0958, for north Florida, or to the U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559, for south Florida.

16. The Magnuson-Stevens Fisheries Conservation and Management Act (see 50 CFR 600.725) prohibits the use of explosives to take reef fish in the Exclusive Economic Zone. Therefore, if your activities involve the use of explosives, and the explosions result in stunned or killed fish, do not take such fish on board your vessels. If you do, you could be charged by the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries Service) with a violation of the aforementioned Act. If you have any questions, contact NOAA Fisheries Service, Office for Law Enforcement, Southeast Division, at (727) 824-5344.

17. When operations extend south of approximately 26 degrees north latitude in the Western Gulf of Mexico or 24 degrees to 25 degrees north latitude in the Eastern Gulf (the 200-nautical mile provisional maritime also called the Exclusive Economic Zone Conservation Zone Limit), notify the Department of State: Ms. Liz Tirpak Room 5801, OES/OA, Department of State, Director, Office of Ocean Affairs, Washington, D.C., 20520, at (202) 647-1106.

18. BOEM GOMR Data Acquisition and Special Project Unit Address:

Regional Supervisor, Resource Evaluation
Resource Studies Section
Data Acquisition and Special Project Unit (MS 5123)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Standard Stipulations

In performance of any operations under the Permit and Agreement for Outer Continental Shelf Geophysical or Geological Exploration for Mineral Resources or Scientific Research, the Permittee shall comply with the following Stipulations:

1. As part of the requirements of 30 CFR 551.6(a), if any operation under this Permit and Agreement is to be conducted in a leased area, the Permittee shall take all necessary precautions to avoid interference with operations on the lease and damage of existing structures and facilities. The lessee (or operator) of the leased area will be notified, in writing, before the Permittee enters the leased area, or commences operations, and a copy of the notification will be sent to the Regional Supervisor executing this Permit and Agreement.

2. (a) Solid or liquid explosives shall not be used, except pursuant to written authorization from the Regional Supervisor. Requests of the use of such explosives must be in writing, giving the size of charges to be used, the depth at which they are to be detonated, and the specific precautionary methods proposed for the protection of fish, oysters, shrimp, and other natural resources. The use of explosives represents a may affect situation under Section 7 of the Endangered Species Act of 1973, as amended.

- (b) The following provisions are made applicable when geophysical exploration on the Outer Continental Shelf using explosives is approved:
 - (i) Each explosive charge will be permanently identified by markings so that unexploded charges may be positively traced to the Permittee and to the specific field party of the Permittee responsible for the explosive charge.

- (ii) The placing of explosive charges on the seafloor is prohibited. No explosive charges shall be detonated nearer to the seafloor than five (5) feet (1.52 meters) .
 - (iii) No explosive shall be discharged within 1,000 feet (304.8 meters) of any boat not involved in the survey.
- 3. Any serious accident, personal injury, or loss of property shall be immediately reported to the Regional Supervisor.
- 4. All pipes, buoys, and other markers used in connection with seismic work shall be properly flagged and lighted according to the navigation rules of the U.S. Corps of Engineers and the U.S. Coast Guard .
- 5. In compliance with Section III- B(6) of this permit, digital navigation data shall be recorded on tape or other suitable storage media for seismic reflection surveys. The navigation data shall be in a format according to SEG P1 (Morgan, J.G. , et al, 1983, SEG Standard Exchange Formats for Positional Data, Society of Exploration Geophysicists, Special Report) . For 2-dimensional seismic events, a geographic location shall be reported for every shot point, irrespective of SEG P1 specifications. For 3-dimensional surveys, the first and last binned and centered locations for each line only shall be reported in SEG P1 format. Suitable media include, but are not limited to, CD-ROM coded in ASCII . All formatting are to be in accordance with Exchange Format for Postplot Location Data presented in Notice to Permittees dated August 14,1990 .
- 6. In addition to the Stipulations above, the Environmental Protective Measures attached hereto shall apply.