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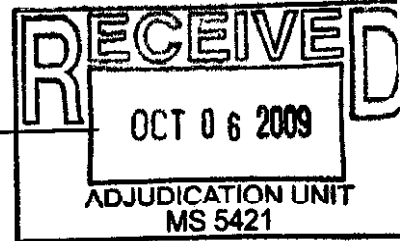
UNITED STATES
DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

LEASE OF SUBMERGED LANDS FOR
ALTERNATIVE ENERGY ACTIVITIES ON THE
OUTER CONTINENTAL SHELF

Office
Washington, DC

Lease Number
OCS-A-0472

Rental Rate
\$3 per acre per year



This lease is made under the authority of Section 43 U.S.C. 1337, subsection 8(p) of the Outer Continental Shelf Lands Act of August 7, 1953 (43 U.S.C. 1331 *et seq.*), as amended, (hereinafter called the "Act"), between the United States of America, (hereinafter called "Lessor") acting through the Minerals Management Service, its authorized officer, and **Deepwater Wind, LLC** (hereinafter, whether one or more, called "Lessee"). In consideration of the promises, terms, conditions, covenants, and stipulations contained herein or attached hereto, the parties mutually agree as follows:

Section 1. Rights of Lessee. Lessor hereby grants and leases to Lessee the exclusive right, subject to the terms and conditions of this lease, to conduct the alternative energy activities described in Exhibit "B" on the area of submerged lands of the Outer Continental Shelf (OCS) described in Exhibit "A" hereof, such area hereinafter referred to as the "leased area." ~~Except for the Initial Survey Activities described below,~~ The rights granted Lessee herein are limited to the activities described in Exhibit "B" hereof and confer no preferential right to acquire, develop or operate commercially any alternative energy project on the OCS.

~~Upon execution of this lease and before submittal of the Project Plan required under Section 8, Lessee is authorized to conduct Initial Survey Activities including geotechnical, geophysical or shallow hazard surveys as Lessee deems necessary to identify the appropriate location on the leased area for placement of any facilities or other structures. The results of such Initial Survey Activities shall be provided to Lessor.~~

Section 2. Designation of Operator. When there is more than one Lessee, Lessees must designate an Operator. The designated Operator will have authority to act on behalf of all Lessees and to fulfill all of Lessees' obligations under this lease. Lessor must approve the designated Operator before the designated Operator may act on the Lessees' behalf.

Section 3. Reservations to Lessor. All rights in the leased area not expressly granted to Lessee by the Act or this lease are hereby reserved to Lessor. Lessor reserves the right to authorize other uses on the leased area that will not unreasonably interfere with activities authorized under this lease.

Section 4. Effective Date and Lease Term. This lease shall be effective on the date that it is signed by both parties (hereinafter "effective date"). Except as otherwise provided in Section 8

below, this lease shall expire five years from the effective date unless the Lessor, acting at its sole discretion upon the written request of Lessee, extends the term of this lease. Any request for an extension of the lease term shall be submitted to Lessor by Lessee not less than 30 days but not more than 90 days prior to the expiration of the lease. The request for extension of the lease term shall demonstrate to Lessor's satisfaction that Lessee reasonably needs more time to conduct the alternative energy activities described in Exhibit "B."

Section 5. Statutes and Regulations. This lease is issued subject to the Act, all applicable regulations, orders, guidelines, and directives issued pursuant to the Act.

Section 6. Rentals. Lessee shall pay Lessor on or before the first day of each lease year a rental as shown on the face hereof.

Section 7. Notice of Commencement or Termination of Activities. Lessee shall notify Lessor at least 72 hours prior to commencing installation of facilities. Lessee shall notify Lessor any time a facility is out of service for a period greater than 7 days and when the facility is returned to service.

Section 8. Project Plan. All activities in the leased area, except the Initial Survey Activities described in Section 1, shall be conducted in accordance with a Project Plan (hereinafter called the "Plan") prepared by Lessee and submitted to Lessor.

(a) ~~Except for the Initial Survey Activities described in Section 1,~~ Lessee may not conduct activities under this lease until Lessor has acknowledged receipt of the Plan and has raised no objections within 60 calendar days of receipt, or Lessor notifies Lessee that subsequent modifications to the plan have satisfied Lessor's initial objections.

(b) This lease shall terminate one year following the effective date if prior to that time, (1) Lessee has not submitted to MMS a Plan as provided in this section, or (2) otherwise notified Lessor of the reasons why a Plan has not been submitted. Lessor, at its sole discretion, may grant Lessee additional time to submit a Plan.

(c) The Plan shall include the following information in form and content satisfactory to Lessor:

- (1) A description of the proposed activities, including the technology intended to be utilized in conducting activities authorized by this lease and all surveys Lessee intends to conduct;
- (2) The surface location and water depth for all proposed facilities to be constructed in the leased area;
- (3) General structural and project installation information;
- (4) A description of the safety, prevention and environmental protection features or measures that Lessee will use;
- (5) A brief description of how facilities on the leased area will be removed and the leased area restored as required by Section 18 below; and
- (6) Any other information reasonably requested by Lessor to ensure Lessee's activities on the OCS are conducted in a safe and environmentally sound manner.

(d) Lessee agrees to conduct periodic reviews and inspections of activities under the lease to ensure compliance with the provisions of the Plan and the terms and conditions of this lease.

(e) Any proposed modifications to the Plan shall be submitted to Lessor and Lessor shall have 30 calendar days to raise any objection to the proposed modification prior to implementation.

Section 9. Compliance. Lessee shall not conduct any activities on the leased area until it has obtained all necessary governmental approvals. Furthermore, Lessee agrees to conduct all activities in the leased area in accordance with all applicable laws, rules and regulations.

Lessee further agrees that no activities authorized by this lease will be carried out in a manner that: (1) could interfere with or endanger activities or operations under any lease issued or maintained pursuant to the Act or under any other license or approval issued by any Federal agency in accordance with applicable law prior to the issuance of this lease; (2) could cause any undue harm or damage to marine life; (3) could create hazardous or unsafe conditions; (4) could unreasonably interfere with or harm other uses of the leased area; or (5) could adversely affect sites, structures, or objects of historical or archaeological significance without notice to and direction from the Lessor on how to proceed.

Section 10. Progress Reports.

(a) Lessee shall submit to Lessor a quarterly progress report that shall include a brief narrative of the overall progress since the beginning of the lease term or since the last progress report.

(b) Lessee shall make available to Lessor upon request all studies, surveys, inspections or test reports compiled or completed during the duration of the lease term and three years thereafter and all raw data; and analyses ~~and computational models~~ used by Lessee to interpret such data.

(c) At the conclusion of the activities covered by this lease, or at the termination of this lease, whichever comes first, Lessee shall submit a final progress report. The final progress report shall include, at a minimum, a comprehensive narrative of Lessee's activities and results from testing, surveys and inspections.

(d) Lessee shall retain copies of all such progress and other reports for the duration of the lease term and three years thereafter.

Section 11. Confidentiality. To the extent permitted by applicable law, in particular the Freedom of Information Act and implementing regulations, Lessor shall keep confidential all information, including but not limited to studies, surveys, or test reports, received from Lessee for the duration of the lease term and three years thereafter, unless disclosure is agreed to by the lessee(s) and all relevant third parties. The Lessor will follow the procedures set forth in 43 CFR § 2.23 with respect to objections to requests for commercial or financial information. Lessor shall be entitled to retain all reports and similar work product delivered to it by Lessee.

Section 12. Inspections. Lessee shall: (1) allow prompt access to any authorized Federal inspector to the site of any activities conducted pursuant to this lease; and (2) provide any

documents and records that are pertinent to occupational or public health, safety, or environmental protection that may be requested by MMS or other authorized Federal inspectors. Lessee shall incorporate these requirements in any contract between Lessee and third parties conducting activities on the leased area.

Section 13. Violations, Suspensions and Cancellations. If Lessee violates any provision of this lease, Lessor may, after giving written notice ordering lessee to cease and remedy all such violations, suspend any further activities of Lessee under this lease. Lessee may continue activities that are necessary to remedy any violation. If Lessee fails to remedy all violations within 30 days after receipt of a suspension notice, Lessor may, by written notice, cancel this lease and take appropriate action to recover all costs incurred by Lessor by reason of such violation(s). Cancellation of this lease due to any violation of the provisions of this lease by Lessee shall not entitle Lessee to compensation. Lessor, by written notice, may also suspend or cancel this lease when it is necessary (1) to comply with judicial decrees; (2) to respond to a serious threat of imminent harm or injury to human life, or natural, historical or archaeological resources; and (3) to respond to national security or defense requirements.

Section 14. Indemnification. Lessee shall indemnify Lessor for, and hold Lessor harmless from, any claim, including claims for loss or damages suffered or costs or expenses incurred by Lessor arising out of any activities conducted by Lessee or its employees, contractors, subcontractors, or their employees, under this lease whenever such damage, cost or expense results from any breach of this lease by Lessee or its employees, contractors, subcontractors, or their employees, or from the wrongful or negligent act or omission of Lessee or its employees, or Lessee's contractors, subcontractors, or their employees, which causes death, personal injury or damage to property. Lessee shall pay Lessor for such damage, cost, or expense attributable to its breach or negligence or that of its employees, contractors, subcontractors, or their employees within 90 days after a written demand therefore by Lessor.

Section 15. Financial Assurance. Lessee shall maintain at all times a surety bond or other form of financial assurance approved by Lessor in the amount of \$300,000 and shall furnish such additional financial assurance as may be required by Lessor if, at any time during the term of this lease, Lessor deems such additional financial assurance to be necessary.

Section 16. Assignment or Transfer of Lease. This lease may not be assigned or transferred in whole or in part without prior written approval of Lessor. Lessor reserves the right, in its sole discretion, to deny approval of any transfer or assignment.

Section 17. Surrender of Lease. Lessee may surrender this lease by filing with Lessor a written relinquishment that shall be effective on the date of filing, subject to the responsibility to remove property and restore the leased area pursuant to section 18.

Section 18. Removal of Property and Restoration of the Leased Area on Termination of Lease. Within a period of 1 year after cancellation, expiration, relinquishment or other termination of this lease, unless Lessor approves a longer period, Lessee shall remove all devices, works and structures from the leased area and restore the leased area to its original condition before issuance of the lease in accordance with the conditions in Exhibit "B." Within 90 days following the removal of property and restoration of the leased area, Lessee shall provide Lessor with a written report summarizing its facility removal and site restoration activities.

Section 19. Debarment Compliance. Lessee shall comply with the Department of the Interior's nonprocurement debarment and suspension regulations as required by 2 CFR Parts 180 and 1400 and shall communicate the requirement to comply with these regulations to persons with whom it does business related to this lease by including this term in its contracts and transactions.

Section 20. Notices. Except for notices required under Section 7, which Lessee may provide orally, all notices or reports provided under the terms of this lease shall be in writing. Notices shall be delivered to the Lease Representative electronically, by hand, by facsimile, or by United States first class mail, adequate postage prepaid, to the specific persons listed below. Any party's address may be changed from time-to-time by such party giving notice as provided above. Until notice of any change of address is delivered as provided above, the last recorded address of either party shall be deemed the address for all notices required under this lease. For all operational matters, notices shall be provided to the party's Operations Representative as well as the Lease Representative.

(a) Lessor's Contact Information

Lease Representative

Name: Maureen A. Bornholdt
Title: Program Manager
Address: 381 Elden Street
Address: MS 4090
Phone: 703-787-1300
Fax: 703-787-1708
E-mail : Maurccn.Bornholdt@mms.gov

Operations Representative:

Same as Lease Representative

(b) Lessee's Contact Information

Lease Representative

Name: CHRIS WISSEMAN
Title: CHIEF OPERATING OFFICER
Address: 30-42 NEWARK ST #402
Address: HOBOKEN, NJ 07030
Phone: 201-850-1714
Fax: 201-850-1710
E-mail: cwissemann@clwind.com

Operations Representative :

Bill Wall
VICE PRESIDENT
30-42 NEWARK ST, #402
HOBOKEN, NJ 07030
201-850-1713
201-850-1710
bwall@clwind.com

Deepwater Wind, LLC
(Lessee) (15006)

THE UNITED STATES OF
AMERICA, Lessor


(Signature of Authorized Officer)


(Signature of Authorized Officer)

CHRIS WISSEMANN
(Name of Signatory)

CHRIS C. DYNES
(Name of Signatory)

CHIEF OPERATING OFFICER
(Title)

Associate Director, OEMM
(Title)

9/24/2009
(Date)

Nov. 1, 2009
(Date)

36-42 Newark St, Ste 402
HOBOKEN, NJ 07030
(Address of Lessee)

If this lease is executed by a corporation, it must bear the corporate seal.

PAPERWORK REDUCTION ACT OF 1995 (PRA) STATEMENT: The PRA (44 U.S.C. 3501 et seq.) requires us to inform you that we collect this information as part of authorizing respondents to conduct data collection and/or technology testing on the OCS. The MMS uses the information to evaluate and approve or disapprove the adequacy of the equipment and/or procedures to safely perform the proposed activities in an environmentally responsible manner. Responses are required for benefit. Proprietary data are covered under the Freedom of Information Act (5 U.S.C. 552) and its implementing regulations (43 CFR part 2). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB Control Number. Public reporting burden for this form is estimated at 1 hour per response. This includes the time for completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, Mail Stop 5438, Minerals Management Service, 1849 C Street, NW, Washington, DC 20240.

U.S. Department of the Interior
Minerals Management Service

OMB Control Number 1010-0175
OMB Approval Expires 31 July 2011

EXHIBIT "A"
DESCRIPTION OF LEASE AREA

Lease Number OCS-A-0472

U.S. DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

LEASE OF SUBMERGED LANDS FOR
ALTERNATIVE ENERGY ACTIVITIES ON THE
OUTER CONTINENTAL SHELF

The MMS, as Lessor, hereby grants to Lessee the right to conduct the alternative energy data collection activities described in Exhibit "B" for wind resources on the leased area. The MMS is leasing all whole and partial blocks described in (a) below and shown on the attached OCS Official Protraction Diagram (OPD).

(a) Wilmington NJ 18-02 Block 7033

EXHIBIT "B"
DATA COLLECTION ACTIVITIES
WIND RESOURCES

Lease Number OCS-A-0472

U.S. DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

LEASE OF SUBMERGED LANDS FOR
ALTERNATIVE ENERGY ACTIVITIES ON THE
OUTER CONTINENTAL SHELF

The MMS, as Lessor, hereby grants to Lessee the right to conduct the following alternative energy data collection activities for wind resources on the leased area. "Wind resources" means the wind moving across the leased area. These rights include:

- (a) constructing, installing, using, upgrading, maintaining, and removing meteorological towers to study wind speed, wind direction, and other meteorological data in order to determine the potential of the wind resources on the leased area for the production of energy;
- ~~(b) accessing the leased area for permit applications, site analysis, extraction of soil and water samples, and other geotechnical, geophysical and hydrological analyses and tests necessary to determine the feasibility of converting the wind resources to electricity;~~
- (c) any other activities necessary to establish the nature and extent of the wind resources on the leased area and to establish whether the leased area has sufficient wind resources for the commercial production and distribution of electricity; and
- (d) any activities relating to assessing biological resources, including avian, marine mammal, or other living resources identifiable from the leased area.

Lessee's rights to conduct the aforesaid alternative energy activities are subject to the following stipulations:

I. General Stipulations

1. Applicability of MMS Renewable Energy Regulations

Per Section 5 of this lease, upon their effective date, the Lessee shall be fully subject to

MMS Form MMS-0001 (July 2008)

Page B-1

applicable MMS offshore renewable energy and alternate use regulations as published in Title 30 of the Code of Federal Regulations (CFR) on April 29, 2009 to the extent such regulations do not expressly conflict with the terms, conditions and stipulations of the lease. Where the lease terms conflict with the regulations, the Lessee shall be governed by the terms of the lease.

2. Payments

For rent paid during the term of the lease, the Lessee shall make payments in accordance with 30 CFR 218.51. The Lessee shall pay the first year's rent at the time when the lease becomes effective. Subsequent annual rent shall be paid each year on the anniversary date of lease issuance.

3. Submission of Data to the National Data Buoy Center (NDBC)

The Lessee shall coordinate with the National Oceanic and Atmospheric Administration (NOAA) National Data Buoy Center (NDBC) and submit all oceanographic data that is collected (e.g., wave heights and periods, water levels, currents, salinity, temperature) to the NDBC and meet the standards and protocols outlined by the NDBC for data gathering, reporting, dissemination, and quality assurance/quality control. The Lessee also shall coordinate with the NDBC and submit processed meteorological data (e.g., air pressure, air temperature, averaged wind speed) at intervals determined by the Lessee. The Lessee shall ensure that all data is archived. Guidance for submitting information to the NDBC can found at the following web page: <http://www.ndbc.noaa.gov/faq.shtml> under the heading "Observation Data from Other Providers." The NDBC can be contacted at marineobs@noaa.gov.

II. Environmental Stipulations

4. Biological Surveys and Reports

If seafloor characteristics are identified during review of available information that suggest the presence of biologically sensitive habitats near proposed lease activities, a biological survey of the seabed must be conducted and a biological survey report prepared and submitted before conducting lease activities that would disturb the seafloor. Information from all available sources relevant to the region of influence should be analyzed to detect such seafloor characteristics. These sources include the Lessee's geophysical hazard surveys, scientific literature, and all other sources available. Areas of suspected or observed biologically sensitive habitats must be targeted for site-specific surveys. These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; rocky outcrops; surf clam habitat; scallop habitat; or seagrass patches.

A biological survey is designed to determine the presence and extent of biologically sensitive habitats near proposed lease activities. Appendix A provides guidelines for conducting surveys for biologically sensitive habitats and for preparing the survey report. Results of the surveys shall be submitted to the Lessor as part of the Project Plan.

5. Reduction or Elimination of the Potential for Adverse Impact Activities on Protected Species from Construction

- A. **Pre-Construction Briefing:** Prior to the start of construction, a briefing will be held between the construction supervisors and crews, the marine mammal and sea turtle visual observer(s) (see II.5.B.c.), and Lessee. The purpose of the briefing will be to establish responsibilities of each party, define the chains of command, discuss communication procedures, provide an overview of monitoring purposes, and review operational procedures. The Resident Engineer will have the authority to stop or delay any construction activity, if deemed necessary. New personnel will be briefed as they join the work in progress.
- B. **Requirements for Pile Driving:** The following measures will be implemented by the Lessee during the conduct of pile-driving activities related to meteorological towers:
- a. **Establishment of Exclusion Zone:** A preliminary 1,000 meter (1,640.4 feet) radius exclusion zone for listed marine mammals and sea turtles will be established around each pile-driving site in order to reduce the potential for serious injury or mortality of these species. Once pile driving begins, the actual generated sound levels will be measured per requirements provided in II.5.B.b. of this lease and a new reduced or expanded exclusion zone will be established based on the results of these field-verified measurements. This new exclusion zone will be established based on data collected in the field and used to calculate the actual distance from the pile-driving source where underwater sound levels are anticipated to equal 160 dB re 1 microPa root-mean-square (rms) (impulse). Based on the outcome of the field-verified sound levels and the calculated or measured distances as noted above, the Lessee may either: (1) retain the 1,000 meter (1,640.4 feet) zone or (2) establish a new zone based on field-verified measurements demonstrating the distance from the pile-driving source where underwater sound pressure levels (SPLs) are anticipated to equal the received 160 dB re 1 μ Pa rms (impulse). Any new exclusion-zone radius must be based on the most conservative measurement (i.e., the largest safety zone configuration).
 - b. **Field Verification of Exclusion Zone:** Field verification of the exclusion zone will be conducted by the Lessee during the first three pile strikes following completion of the ramp up. The results of the measurements from the first three pile strikes after ramp up can then be used to establish a new exclusion zone which is greater than or less than the 1,000 meters (1,640.4 feet) depending on the results of the field tests.
 - c. **Visual Monitoring of Exclusion Zone:** The Lessee shall conduct visual monitoring of the exclusion zone during driving of all piles. To ensure proper monitoring of the exclusion zone around the entire pile, the protected species observers shall be either on the vessel that is driving the pile or on a vessel that is in close proximity to the pile driving. Should the Lessee decide to use multiple observing locations (e.g., several boats), those locations should be spaced in a manner that ensures observation coverage of the entire exclusion zone. Monitoring of the exclusion zones will be conducted by qualified NMFS-approved observers. Observer qualifications will include direct field experience on a marine mammal/sea turtle observation vessel and/or aerial surveys in the

Atlantic Ocean/Gulf of Mexico. Multiple monitors will be required if pile driving is occurring at multiple locations at the same time.

- d. **Initiation and Duration of Observation:** Observer(s) shall begin monitoring at least 30 minutes prior to soft start of the pile driving. Pile driving will not begin until the zone is clear of all listed marine mammals and sea turtles for at least 30 minutes. Monitoring will continue through the pile-driving period and end approximately 30 minutes after pile driving is completed.
- e. **Recording Observations:** The Lessee shall make visual observations using binoculars or other suitable equipment of sufficient power to monitor the exclusion zone during daylight hours. Data on all observations will be recorded based on standard marine mammal observer collection data. This will include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, age class (if known), numbers, behavior); and details of any observed taking (i.e., behavioral disturbances, injury, mortality). Any observed significant behavioral reactions (e.g., fleeing the area) or injury or mortality to any marine mammals or sea turtles must be communicated to NMFS and the Lessor as listed below within 24 hours.

Minerals Management Service (MMS)
Kimberly Skrupky
Marine Biologist
Branch of Environmental Assessment
Environmental Division
381 Elden Street, MS 4042
Herndon, VA 20147
Phone: 703-787-1807
Fax: 703-787-1026
Email: kimberly.skrupky@mms.gov

Minerals Management Service (MMS)
Program Manager
Office of Offshore Alternative Energy Programs
381 Elden Street, MS 4090
Herndon, VA 20170
Phone: 703-787-1300
Fax: 703-787-1708
Email: ren@mms.gov

National Marine Fisheries Service (NMFS)
Julie Crocker
Fishery Biologist
Northeast Regional Office (NERO)
Protected Resources Division
55 Great Republic Drive
Gloucester MA 01930
Phone: 978-282-8480

Fax: 978-281-9394

Email: julie.crocker@noaa.gov

NOAA Fisheries Service

Protected Resource Division

Marine Mammal and Sea Turtle Stranding and Disentanglement Program

Northeast Region Stranding Hotline (note: this is a 24-hour hotline)

Phone: 978-281-9351

- f. **Required Mitigation Should Listed Marine Mammals or Sea Turtles Enter the Exclusion Zone Before Pile Driving Begins:** The exclusion zone around the pile-driving activity must be monitored for the presence of listed marine mammals or sea turtles before, during and after any pile-driving activity. The exclusion zone will be monitored for 30 minutes prior to the soft start of pile driving. If the safety radius is obscured by fog or poor lighting conditions, pile driving will not be initiated until the entire safety radius is visible for the 30-minute period. If listed marine mammals or sea turtles are observed within the zone during the 30-minute period and before the soft start begins, pile driving of the segment will be delayed until they move out of the area and until at least an additional 30 minutes have passed, without a listed marine mammal or sea turtle sighting. Monitoring of the exclusion zone will continue for 30 minutes following completion of the pile-driving activity.
- g. **Required Mitigation Should Listed Marine Mammals or Sea Turtles Enter the Exclusion Zone After Pile Driving Begins:** If listed marine mammals or sea turtles enter the exclusion zone after pile driving of a segment has begun, pile driving will cease until the listed marine mammal or sea turtle leaves the exclusion zone. Observers will monitor and record listed marine mammal and sea turtle numbers and behavior. Pile driving may not resume until at least 30 minutes have passed without a listed marine mammal or sea turtle siting within the exclusion zone. If pile driving of a segment ceases for 30 minutes or more and a listed marine mammal or sea turtle is sighted within the designated zone prior to commencement of pile driving, the observer(s) must notify the Resident Engineer (or other authorized individual) that an additional 30-minute visual and acoustic observation period will be completed by the Lessee, as described above, before resuming pile-driving activities.
- h. **Dark or Inclement Weather Conditions:** The Lessee shall not begin pile driving during night hours or when the safety radius can not be adequately monitored (e.g., obscured by fog, inclement weather, poor lighting conditions) unless the applicant implements an alternative monitoring method that is agreed to by the Lessor and NMFS. However, if a soft start has been initiated before dark or the onset of inclement weather, the pile driving of that segment may continue through these periods. Once that pile has been driven, the pile driving of the next segment cannot begin until the exclusion zone can be visually or otherwise monitored.
- i. **Implementation of Soft Start:** A soft start will be required at the beginning of each pile installation in order to provide additional protection to listed marine mammals and sea turtles near the project area by allowing them to vacate the area

prior to the commencement of pile driving activities. The soft start requires an initial set of three strikes from the impact hammer at 40-percent energy with a one minute waiting period between subsequent three-strike sets. If listed marine mammals or sea turtles are sighted within the exclusion zone prior to pile-driving or during the soft start, the Resident Engineer (or other authorized individual) will delay pile-driving until the animal has moved outside the exclusion zone.

- j. **Compliance with Equipment Noise Standards:** All construction equipment used by the Lessee will comply with applicable equipment noise standards of the U.S. Environmental Protection Agency (EPA), unless directed otherwise by the Lessor. All construction equipment, even if modified from the original, will have noise-control devices no less effective than those provided on the original equipment.
- C. **Reporting for Construction Activities:** The following reports must be submitted during construction:
- a. **Field Verification Measurements:** After any re-establishment of the exclusion zone, the Lessee shall provide a report to the Lessor and NMFS detailing the field-verification measurements within 7 days. This includes information, such as: a detailed account of the levels, durations, and spectral characteristics of the impact and vibratory pile driving sounds; and the peak, rms, and energy levels of the sound pulses and their durations as a function of distance, water depth, and tidal cycle. MMS should be notified within 24 hours whenever any new exclusion zone is implemented by the Lessee.
 - b. **Weekly Reports:** The Lessee shall provide weekly status reports to the Lessor and NMFS that include a summary of the previous week's monitoring activities and an estimate of the number of listed marine mammals and sea turtles that may have been taken as a result of pile-driving activities. These reports will include: dates and locations of construction operations, details of listed marine mammal or sea turtle sightings (e.g., dates, times, locations, activities, associated construction activities), and estimates of the amount and nature of listed marine mammal or sea turtle takings. NMFS and the Lessor may reduce or increase the frequency of this reporting throughout the time period of pile-driving activities dependent upon the outcome of these initial weekly reports.
 - c. **Observed Injuries or Mortalities:** Any observed injury or mortality to a listed marine mammal or sea turtle must be reported to NMFS or USFWS and the Lessor by the Lessee within 24 hours of observation.
 - d. **Final Technical Report:** A final technical report will be provided by the Lessee to the Lessor, NMFS, and USFWS, as well as the New Jersey Department of Environmental Protection (DEP) or the Delaware Department of Natural Resources and Environmental Control (DNREC) within 120 days after completion of the pile-driving and construction activities. The report will provide full documentation of methods and monitoring protocols, summarize the data recorded during monitoring, estimate the number of listed marine mammals and sea turtles that may have been taken during construction activities, and provide an interpretation of the results and effectiveness of all monitoring tasks.
 - e. **Agency Contact Information:**

Minerals Management Service (MMS)
Program Manager
Office of Offshore Alternative Energy Programs
381 Elden Street, MS 4090
Herndon, VA 20170
Phone: 703-787-1300
Fax: 703-787-1708
Email: ren@mms.gov

National Marine Fisheries Service (NMFS)
Julie Crocker
Fishery Biologist
Northeast Regional Office (NERO)
Protected Resources Division
55 Great Republic Drive
Gloucester MA 01930
Phone: 978-282-8480
Fax: 978-281-9394
Email: julie.crocker@noaa.gov

U.S. Fish and Wildlife Service (FWS)
Region 5 – Northeast
Chief, Division of Endangered Species
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589
Phone: 413-253-8628
Fax: 413-253-8482

New Jersey Department of Environmental Protection (NJ DEP)
Coastal Program Manager
Coastal Management Office
P.O. Box 418
401 E. State Street, 7th Floor
Trenton, NJ 08625
Phone: 609-633-2201
Fax: 609-292-4608
Email: ruth.chinger@dep.state.nj.us

Delaware Department of Natural Resources and Environmental Control (DNREC)
Program Administrator
Delaware Coastal Programs
DNREC Division of Soil & Water Conservation
5 East Reed Street, Suite 201
Dover, DE 19901
Phone: 302-739-9283

Fax: 302-739-2048

Email: sarah.cooksey@state.de.us

6. Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving

- A. The Lessee shall implement the following specific measures to reduce or eliminate the potential for adverse impacts from pile driving:
- a. Use a vibratory hammer when driving piles. Under conditions where impact hammers are required for reasons of seismic stability or substrate type, it is recommended that the pile be driven as deep as possible with a vibratory hammer prior to the use of the impact hammer.
 - b. Monitor peak SPLs during pile driving to ensure that they do not exceed the 160 dB re: 1 μ Pa threshold for injury to marine mammals.
 - c. Implement measures to attenuate the sound should SPLs exceed the 160 dB re: 1 μ Pa threshold. If sound-pressure levels exceed 160 dB re: 1 μ Pa threshold, implement mitigation measures. Methods to reduce the sound pressure levels include, but are not limited to, the following:
 - i. Surround the pile with an air bubble curtain system or air-filled coffer dam.
 - ii. Since the sound produced has a direct relationship to the force used to drive the pile, a smaller hammer should be used to reduce the sound pressures.
 - iii. Use a hydraulic hammer if impact driving cannot be avoided. The force of the hammer blow can be controlled with hydraulic hammers; reducing the impact force will reduce the intensity of the resulting sound.
 - d. Implement a soft start at the beginning of each pile installation allowing marine mammals and sea turtles to leave the area before noise levels reach their maximums. The soft start requires an initial set of three strikes from the impact hammer at 40-percent energy with a one-minute waiting period between subsequent three-strike sets.

7. Vessel Strike Avoidance

- A. The Lessee shall implement the following specific measures meant to reduce the potential for vessel harassments or collisions with ESA-listed marine mammals or sea turtles during all phases of the project.
- a. All vessels and aircraft associated with the construction, operation/maintenance and/or decommissioning of the project will be required to abide by the:
 - (1) NOAA Fisheries Northeast Regional Viewing Guidelines, as updated through the life of the project (http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northeast.pdf); and
 - (2) MMS Gulf of Mexico Region's NTL No. 2007-G04 (<http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf>), or any superseding NTL.

- b. All vessel and aircraft operators must undergo training to ensure they are familiar with the guidance specified in II.7.A.a. above. These training requirements must be written into any contractor agreements.
 - c. Upon receipt of a permit, all companies will instruct all personnel associated with the project construction and operation of the potential presence of manatees and the need to avoid collisions with manatees.
 - d. All personnel and contractors will be advised that there are civil and criminal penalties for harming, harassing, or killing marine mammals and sea turtles, which are protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The company may be held responsible for any manatee or other marine mammal harmed, harassed, or killed as a result of the company's activity.
- B. All vessels associated with the project will operate at idle speed at all times while in shallow waters where the draft of the vessel provides less than a four foot clearance from the bottom.
- C. If manatees are sighting within 100 yards of the project, all appropriate precautions shall be implemented to ensure protection of the manatees. These precautions shall include operating all equipment in such a manner that moving equipment does not come any closer than 50 feet of any manatee. Any collision with any manatee must be reported immediately to the USFWS at 904-731-3103.
- D. Any collision with any other marine mammal must be reported. More information can be found at <http://www.nmfs.noaa.gov/pr/shipstrike/msr/>.
- a. Vessels transiting mandatory ship reporting (MSR) areas are required to report their course, speed, position, destination, and route to the U.S. Coast Guard (USCG) upon entry into the reporting area. Vessels should report via INMARSAT C to one of the following addresses:
Email: rightwhale.msr@noaa.gov; Telex: 236737831
 - b. Vessels not equipped with INMARSAT C should report via alternate satellite communications equipment to one of the following addresses:
Email: rightwhale.msr@noaa.gov; Telex: 236737831. Vessels unable to use satellite communications equipment should contact the USCG Communication Area Master Station, Chesapeake, Virginia via SITOR/NBDP on 8426.3 kHz, 12590.8 kHz, 16817.8 kHz twenty four hours per day, or 6314.3 kHz from 2300 GMT until 1100 GMT and 22387.8 kHz from 1100 GMT until 2300 GMT.
 - c. Vessels unable to use satellite communications or SITOR/NBDP should contact the USCG Communication Area Master Station, Chesapeake, Virginia via published voice frequencies.
 - d. Mariners can learn more about steps to avoid collisions with whales at:
http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/marinersweatherlog_shipstrike.pdf
- E. The Lessee will maintain a log detailing manatee sightings, collisions, or injuries should they occur during operations. Following project completion a report summarizing incidents and sightings of manatees must be submitted to:

U.S. Fish and Wildlife Service (FWS)
Region 5 – Northeast
Chief, Division of Endangered Species

U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589
Phone: 413-253-8628
Fax: 413-253-8482

8. Marine Trash and Debris Awareness and Elimination

All vessel operators, employees and contractors actively engaged in offshore operations must be briefed on marine trash and debris awareness and elimination. The Lessee is required to ensure that its employees, contractors, and any agents acting on behalf of the Lessee are made aware of the environmental and socioeconomic impacts associated with marine trash and debris and their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into the marine environment.

Marine trash and debris pose a threat to fish, marine mammals, sea turtles, and other marine animals; cause costly delays and repairs for commercial and recreational boating interests; detract from the aesthetic quality of recreational shore fronts; and increase the cost of beach and park maintenance.

Special caution should be carried out when the Lessee or its contractors handle and dispose of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass that can be lost in the marine environment and washed ashore. Increasing the Lessee's individual workers' awareness of the problem and emphasizing their responsibilities will help reduce the litter problem further and control the unintended loss of items such as empty buckets, hard hats, shrink wrap, etc.

9. Oil Spill Response Plan

As part of preparing the Project Plan, the Lessee shall prepare an Oil Spill Response Plan (OSRP) in a manner that demonstrates that the Lessee has planned for and is prepared to conduct an efficient, coordinated, and effective response to an oil spill. In addition, the OSRP must be consistent with the National Response Plan (NRP), the National Incident Management System (NIMS), the National Contingency Plan (NCP), and the appropriate Area Contingency Plans (ACP). The OSRP shall be submitted to the Lessor as part of the Lessee's Project Plan. If the Lessee does not house or use oil or other fuel on the meteorological tower, the Lessee shall indicate this in the Project Plan.

10. Reduction or Elimination of the Potential for Adverse Impacts to Birds and Bats

The Lessee shall implement the following specific measures to reduce or eliminate the potential for adverse impacts to birds and bats:

- A. **Anti-Perching Devices:** The Lessee is required, to the maximum extent possible, to use anti-perching material and/or devices in areas where they are likely to be effective (e.g., horizontal surfaces, diagonal bars).

- B. **Restricted Use of Guy Wires:** Meteorological towers shall be designed so as to preclude the necessity for guy wires.
- C. **Lighting:** Lights shall be installed in compliance with the Federal Aviation Administration (FAA) guidelines and USCG navigational safety lighting requirements. The Lessee shall leave any additional lights (e.g., work lights) on only when necessary and downshield when possible, to reduce upward illumination and illumination of adjacent waters. Downshielding would involve "hooding" the lamps such that the light is shielded to minimize visibility from above. These requirements apply to lighting on the meteorological tower as well as all support vessels.

11. Archeological Resources

As part of preparing the Project Plan, the Lessee shall conduct an archaeological resource survey and submit a report of the findings. Guidelines for the archeological resource survey and report are provided in Appendix B.

If the Lessor's review of Lessee's archaeological report concludes that an archaeological resource may be present, the Lessor will specify a minimum distance by which all proposed seafloor-disturbing activities must avoid the potential archaeological resource, unless the Lessee can demonstrate through further investigations that an archaeological resource either does not exist or will not be adversely affected by the activities covered by this lease proposed seafloor-disturbing activities.

If the Lessee chooses to conduct further archaeological investigations, rather than avoid the potential resource, the Lessor will specify the appropriate personnel, equipment, and techniques to be used. The report of additional investigations must be submitted to the Lessor for review. The Lessor will notify the Lessee if it determines that an archaeological resource exists and may be adversely affected by the proposed activities covered by the lease seafloor-disturbing activities. The Lessee (and all subcontractors or agents acting on behalf of the Lessee) shall keep the location of the discovery confidential and not take any action that may adversely affect the archaeological resource until the Lessor makes an evaluation and notifies the Lessee on how to proceed.

If the Lessee, the Lessee's subcontractors, or any agent acting on the behalf of the Lessee, discover a potential archaeological resource while conducting surveys, construction activities, or any other activity related to the Lessee's project; all must:

- (1) Immediately halt all seafloor-disturbing activities within the area of the discovery;
- (2) Notify the MMS Director of the discovery within 72 hours; and
- (3) Keep the location of the discovery confidential and take no action that may adversely affect the archaeological resource until the Lessor has made an evaluation and notified the Lessee on how to proceed.

The Lessor may require the Lessee to conduct additional investigations to determine: (1) if the resource is eligible for listing on the National Register of Historic Places under 36 CFR 60.4; (2) if the site has been impacted by the Lessee's project activities; or (3) if impacts to the site or to the area of potential effect cannot be avoided. If further investigations indicate that the resource

is potentially eligible for the National Register of Historic Places, the Lessor will notify the Lessee on how to protect the resource, or how to mitigate adverse effects to the site. Section 110(g) of the National Historic Preservation Act authorizes Lessor to charge licensees and permittees reasonable costs for carrying out preservation responsibilities under the OCS Lands Act.

12. Geophysical and Geotechnical Survey Reports

As part of preparing the Project Plan, the Lessee shall conduct geophysical and geotechnical resource surveys and submit reports of the findings. Guidelines for the geophysical and geotechnical resource surveys and reports are provided in Appendix C.

13. Notification of Fishermen

The Lessee shall put a notice in the USCG Local Notice to Mariners, a free publication available to all fishermen, regarding the timeframe and location of construction and decommissioning activities in advance of mobilization. The Lessee shall also send daily updates for broadcast on Marine Channel 16 describing the construction and decommissioning activities for that day as well as upcoming days.

14. Site Clearance

The Lessee shall provide objective evidence that the area used for data collecting facilities and structures is returned to its original state after decommissioning and removal of the facilities and structures from the site. Any trash or bottom debris introduced as a result of the Lessee's operations shall be removed. Objective evidence would normally consist of a photographic bottom survey, site-clearance trawling, or high-resolution sidescan or sector-scanning sonar survey.

15. Decommissioning

- A. **Removal of Foundation:** The Lessee shall remove all facilities/bottom-founded components to a depth of 15 feet (5 meters) below the mudline, unless otherwise authorized by the Lessor, to ensure that nothing is exposed that could interfere with future Lessees and other activities in the area. Site-specific geophysical and geotechnical survey data supplied by the applicant will be used by the Lessor to determine if there are mobile sediments and, if so, to what depth. During its review of the Lessee's Project Plan, the Lessor may require, based on site-specific data, that the Lessee remove the structure deeper than 15 feet (5 meters). Within 60 days after the Lessee has removed the facility, the Lessee shall provide documentation to the Lessor verifying that the Lessee has cleared the site.
- B. **Use of Explosive Severing Methods:** The Lessor assumes the meteorological towers proposed off of Delaware and New Jersey will be removed using non-explosive severing methods. This issuance of a lease does not grant authorization or constitute approval of explosive severing methods for the purposes of decommissioning. However, if the Lessee intends to use explosive severing methods, the Lessee shall submit details of such

methods in a Decommissioning Plan, in addition to other requirements of the lease, to the Lessor for approval. Proposed use of explosives will require supplemental NEPA analysis and re-initiation of relevant consultations as may be required by law. The Decommissioning Plan shall include, but may not be limited to, the following information in form and content satisfactory to the Lessor:

- a. A description of the explosive severing method to be used including: a) type of explosives; b) number and sizes of charges; c) whether using single shot or multiple shots; d) if multiple shots, the sequence and timing of detonations; e) whether using a bulk or shaped charge; f) depth of detonation below the mud line; and g) whether placing the explosives inside or outside of the pilings;
- b. If divers or acoustic devices will be used to conduct a pre-removal survey to detect the presence of turtles and marine mammals, a description of the proposed detection method;
- c. A statement of whether or not transducers will be used to measure the pressure and impulse of the detonations.
- d. A noise analysis derived through appropriate modeling of the proposed decommissioning activities, including a project-specific estimate of the sound levels likely to be generated from the use of explosives as a function of pulse intensity and distance from source at 160dB, 180dB and 190dB.
- e. If available, the results of any recent biological surveys conducted in the vicinity of the structure and recent observations of turtles or marine mammals at the structure site.
- f. Lessee's plans to protect archaeological and sensitive biological features during removal operations, including proposed anchor patterns and sweeps for the requisite lift vessel and a brief assessment of the environmental impacts of the removal operations and procedures and mitigation measures the Lessee will take to minimize such impacts.
- g. Any other information reasonably requested by the Lessor to ensure Lessee's activities on the OCS are conducted in a safe and environmentally sound manner.

16. Scour Prevention and Monitoring

- A. **Scour Information:** As part of preparing the Project Plan, the Lessee shall gather and provide the following information to the Lessor:
 - a. A desktop or computational study to assess the magnitude of potential seabed scour anticipated at the site;
 - b. How scour potential was determined;
 - c. A scour monitoring plan (e.g., methodology, frequency of monitoring and reporting, etc.); and
 - d. The specific devices, if any, that will be installed to address the worst-case anticipated conditions per II.16.B.
- B. **Scour Control System:** If necessary, the Lessee shall install an adequate scour control system during installation of the meteorological tower or later if significant scouring is discovered during monitoring. Prior to installation, the Lessee shall provide, for the Lessor's review, a detailed description of the proposed system including the sea-bottom footprint, composition, and installation and removal methods.

C. **Monitoring and Response:** The Lessee shall monitor the installed structure throughout its life for scour in accordance with the Lessee's Project Plan. If a scour control system is installed, the Lessee also must monitor the scour control system in accordance with the Lessee's Project Plan.

- a. If artificial scagross mats are used as part of the scour control system, the Lessee shall monitor the fronds for evidence that they are being consumed by sea turtles or marine mammals. If there is evidence that the scour mats are being consumed by sea turtles or marine mammals, the Lessee shall consult NMFS and the Lessor, which will determine further mitigation and monitoring measures.
- b. **Agency Contact Information:**

Minerals Management Service (MMS)
Program Manager
Office of Offshore Alternative Energy Programs
381 Elden Street, MS 4090
Herndon, VA 20170
Phone: 703-787-1300
Fax: 703-787-1708
Email: ren@mms.gov

National Marine Fisheries Service (NMFS)
Julie Crocker
Fishery Biologist
Northeast Regional Office (NERO)
Protected Resources Division
55 Great Republic Drive
Gloucester MA 01930
Phone: 978-282-8480
Fax: 978-281-9394
Email: julie.crocker@noaa.gov

17. Access, Instrumentation, and Data Collection

- A. **Access for Studies:** The Lessee shall provide access to the meteorological tower to the Lessor and/or the Lessor's contractors to collect data and/or deploy instruments for data collection. Data-collection instrumentation deployed by the Lessor and or its contractors shall not interfere with or limit the ability of the Lessee to collect or conduct activities authorized by this lease nor will the instrumentation unduly burden the Lessee's facilities or resource needs (e.g., space, power, structural integrity, health and safety).
- B. **Ecological and Environmental Information:** Upon request by the Lessor, the Lessee shall provide the Lessor and the appropriate State agency listed below, subject to Section 11 of this lease and all other applicable law, with any ecological or environmental information collected in a mutually acceptable digital format once it is collected, assessed and compiled.

Minerals Management Service (MMS)

Program Manager
Office of Offshore Alternative Energy Programs
381 Elden Street, MS 4090
Herndon, VA 20170
Phone: 703-787-1300
Fax: 703-787-1708
Email: ren@mms.gov

Delaware Department of Natural Resources and Environmental Control (DNREC)
Program Administrator
Delaware Coastal Programs
DNREC Division of Soil & Water Conservation
5 East Reed Street, Suite 201
Dover, DE 19901
Phone: 302-739-9283
Fax: 302-739-2048
Email: sarah.cooksey@state.de.us

New Jersey Department of Environmental Protection (NJ DEP)
Coastal Program Manager
Coastal Management Office
P.O. Box 418
401 E. State Street, 7th Floor
Trenton, NJ 08625
Phone: 609-633-2201
Fax: 609-292-4608
Email: ruth.ehinger@dep.state.nj.us

- C. **Coordination:** The Lessee shall coordinate with the Lessor and/or its contractors, as well as the New Jersey Department of Environmental Protection (DEP) and/or the Delaware Department of Natural Resources and Environmental Control (DNREC) on any studies to be conducted or carried out from the meteorological tower.

18. Installation of Visibility Sensor

The Lessee shall install a visibility sensor that provides measures of visibility. Visibility is a meteorological parameter addressed in the Federal Meteorological Handbook No. 1 (FMH-1) – Surface Weather Observations and Reports, September 2005. On a quarterly basis, the Lessee shall provide the Lessor and the FWS, as listed below, with any visibility information collected in a mutually acceptable digital format once it is collected, assessed and compiled.

Minerals Management Service (MMS)
Program Manager
Office of Offshore Alternative Energy Programs
381 Elden Street, MS 4090

Herndon, VA 20170
Phone: 703-787-1300
Fax: 703-787-1708
Email: ren@mms.gov

U.S. Fish and Wildlife Service (FWS)
Julie (Thompson) Slacum
Biologist
177 Admiral Cochrane Drive
Annapolis, MD. 21401
Phone: 410-573-4517
Fax: 410-269-0832
julie_thompson@fws.gov

III. Engineering and Navigation Stipulations

19. Certified Verification Agent (CVA)

- A. Requirement of a CVA:** Following submission of the Lessee's Project Plan, the Lessor may require that a CVA review and approve the Lessee's engineering design, fabrication, and installation plans as outlined in the Project Plan. Should a CVA be required by the Lessor, the Lessee shall nominate a CVA for the Lessor's approval.
- B. Nomination of a CVA:** For each CVA that the Lessee nominates, the Lessee must submit to the Lessor a list of documents used in the Lessee's design that the Lessee will forward to the CVA, and a qualification statement that includes the following:
- a. Previous experience in third-party verification or experience in the design, fabrication, installation, or major modification of offshore energy facilities.
 - b. Technical capabilities of the individual or the primary staff for the specific project.
 - c. Size and type of organization or corporation.
 - d. In-house availability of, or access to, appropriate technology (including computer programs, hardware, and testing materials and equipment).
 - e. Ability to perform the CVA functions for the specific project considering current commitments.
 - f. Previous experience with MMS requirements and procedures, if any.
 - g. The level of work to be performed by the CVA.
- C. Rules Applicable to CVAs:** The following rules apply when using a CVA.
- a. Individuals or organizations acting as CVAs must not function in any capacity that will create a conflict of interest, or the appearance of a conflict of interest.
 - b. The verification must be conducted by or under the direct supervision of registered professional engineers.
 - c. Lessee must nominate a new CVA for the Lessor's approval if the previously approved CVA:
 - i. Is no longer able to serve in a CVA capacity for the project; or
 - ii. No longer meets the requirements for a CVA set forth in this lease.

20. Navigation

- A. **Private Aids to Navigation Application:** Four months prior to the beginning of construction activity, the Lessee shall submit a Private Aids to Navigation Application to the USCG 5th District Aids to Navigation Office for the permanent aids to navigation that will be installed on the meteorological tower. A Private Aid to Navigation is a buoy, light or daybeacon owned and maintained by any individual or organization other than the USCG. These aids are designed to allow individuals or organizations to mark privately owned marine obstructions or other similar hazards to navigation.
- B. **Navigation Lights and Fog Signal:** Lessee shall operate navigation lights and a fog signal with sufficient backup power and redundancy to assure a minimum availability rate of 99.7%. The navigation light shall be seen in a 360-degree arc. Due to the presence of the meteorological tower, two lights must be installed, 180-degrees apart, at an elevation of 20 feet (6.1 meters) mean high water (MHW), each with an operational range of three nautical miles, 90% of the nights. The lights shall display a quick red characteristic and flash synchronously. The fog signal shall have a range of 0.5 nautical miles and shall activate whenever the visibility drops below three nautical miles. The structure shall be color-coded yellow (i.e., Munsell Chip number 2.5Y 8/12), from the water line to the base of the tower.
- C. **Local Notice to Mariners:** Three weeks prior to construction the meteorological tower, the Lessee shall provide the following information to Commander (dpw) 5th USCG District for publication in the Fifth District Local Notice to Mariners:
- Start date of construction;
 - Names of vessels/call signs and VHF-FM channels that will be guarded in addition to Channels 16 and 13;
 - Hours of operation; and
 - A Private Aids to Navigation Application for the crown buoys that may be used during construction activity.
- D. **Crown Buoys:** If crown buoys are employed, Lessee shall paint them Yellow (i.e., Munsell Chip number 2.5Y 8/12) and display a slow flashing amber light with an operational range of one nautical mile.
- E. **Additional Lighting in Lieu of Attendant Vessel:** During construction, no additional lighting is required for the structure as long as an attendant vessel is adjacent to the structure. If the attendant vessel departs or is not immediately adjacent to the structure, the structure shall be lighted with a slow flashing yellow light visible in a 360-degree arc for a distance of three nautical miles.
- F. **FAA Lighting Requirements:** The Lessee shall comply with all lighting requirements specified by the Federal Aviation Administration (FAA) for the meteorological tower.

Appendix A:

GUIDELINES FOR BIOLOGICALLY SENSITIVE HABITAT FIELD SURVEYS AND REPORTS

Pursuant to the provisions set forth in Exhibit “B,” a biological survey of the sea bed must be conducted and a biological survey report prepared and submitted before conducting lease or grant activities that would disturb the seafloor if seafloor characteristics are identified that suggest the presence of biologically sensitive habitats near proposed lease activities. Information indicating biologically sensitive habitats at specific locations may come from geophysical surveys, study of scientific literature, or any other source. Areas of suspected or observed biologically sensitive habitats must be targeted for site-specific surveys. These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; or seagrass patches.

A biological survey is designed to determine the presence and extent of biologically sensitive habitats near proposed activities. Following are guidelines for conducting surveys for biologically sensitive habitats and for preparing the survey report. The survey report should be submitted to MMS as part of a Lessee’s Project Plan.

I. Biological Surveys

A. Survey targeted sites identified by information suggesting the presence of biologically sensitive habitats near lease activities. Targeted sites should be surveyed if they are within 100 m of any proposed site of seafloor disturbance. Targeted sites should also be surveyed if they are within 1,000 m of proposed sites of excavation or other activities that generate similar turbidity plumes. Biological surveys of targeted sites should extend beyond the limits of the biologically sensitive habitat far enough to ensure the habitat is fully delineated. Delineation of biologically sensitive habitats is not required beyond 1,000 m from a turbidity site or 100 m from other seafloor disturbances. Survey coverage of targeted sites should characterize substrate type and the benthic community across the entire area. Small sites should be given near 100 percent survey coverage. Larger sites may separate transect lines as much as 20 m between parallel transects. Professional judgment should be used to ensure thorough characterization of the biologically sensitive habitat.

B. You should extend surveys to the appropriate distance beyond each proposed seafloor disturbance. Surveys should extend outside the lease or grant boundaries if this is necessary to obtain the appropriate survey distances.

C. You should consider all proposed seafloor disturbances of all lease activities for the life of the lease or grant to a minimum distance of 100 m from the disturbance. This includes both site-specific disturbances and areas of proposed widespread seafloor disturbance. The latter refers to areas of proposed seafloor disturbance that are not site-specific but cover a larger area, such as an anchoring area. Areas of proposed sites of

excavation or other activities that generate similar turbidity plumes should be considered to a distance of 1,000 m.

D. Biological surveys consist of underwater color videography and still photography. Operate a video camera in conjunction with a still camera having a resolution of at least eight megapixels. Integrate the video/still imagery with the simultaneous and continuous tracking of Differential GPS positioning, bearing, time, and water depth to be displayed on the video. The geographic positions of imagery should be accurate with less than three meters of error per 100 m of water depth. Add the geographic coordinates of each still photograph to the properties dialog box of each electronic file. Ensure that the biological survey is conducted under the proper conditions (e.g., tow speed, water clarity, height above the bottom) to enhance your ability to determine the presence or absence and characterization of any biologically sensitive habitats. Incorporate a scale into both the video and still imagery, such as using laser lights with a known distance of separation. You should have the ability to actuate the shutter on the still camera as needed during the survey to document benthic communities. Take still photographs of selected areas at a frequency to determine the extent, type, and percent biotic cover of the biologically sensitive habitats you encounter during surveys. Analyze a minimum number of photographs necessary to estimate the percent cover of benthic organisms for each biologically sensitive habitat. For communities of scattered organisms, such as gorgonians or sea pens, you may provide estimates of density, i.e., number of organisms per meter square instead of percent cover. These numbers should be standardized to one meter square. Identify visually dominant epibiota during each survey. When surveying areas devoid of biologically sensitive habitats, provide the MMS with continuous video and with still photographs of the barren seafloor at least every 200 meters (656 feet).

E. Please be advised that if you materially revise the proposed location(s) of activities after you perform a biological survey, you may have to conduct a new survey to provide coverage of the revised location(s).

F. In the event you feel that an alternative sampling methodology may be just as sufficient to collect the identified data please contact MMS at:

Minerals Management Service
Program Manager
Office of Offshore Alternative Energy Programs (OAEP)
381 Elden Street, MS 4090
Herndon, VA 20170
(703) 787-1300

II. Biological Survey Reports

- A. Include the following information in your biological survey report:
- i. Introduction describing sources and information gathered before the work to characterize bottom types and benthic communities. Summarize information collected.

- ii. Equipment Section providing a detailed description of the equipment you used, including camera settings; recording media, lighting, platform (ROV, sled, drop camera, etc.) differential GPS (with datum, settings, etc.), compass, gyroscopic compensation, USBL, sonar, and all other pertinent equipment (these components are not necessarily all required; describe what was used);
- iii. Summary of Work Section describing the work performed. Give dates and times of field efforts, weather conditions, sea state, currents, light, visibility, etc. Explain any methods or techniques that need clarification in addition to the requirements of this document to support reproducibility of the work.
- iv. Results Section that: (1) Provides a large format map showing bathymetry, the tracks of video/still camera transects, the indexed locations of still images, the extent and position of biologically sensitive habitats as determined from the biological survey, and the locations of proposed seafloor disturbances (including pilings, excavations, scour protection, anchors, chains, cables, wire ropes, etc). Also include a smaller format copy (letter size) of the map in the report pages. (2) Provides a large format map showing the extent and position of biologically sensitive habitats as determined from the biological survey and the locations of proposed seafloor disturbances. Also include a smaller format copy (letter size) of the map in the report pages. (3) Discusses the substrate types observed throughout the survey area. (4) Describes biologically sensitive habitat assemblages in each area identified. (5) Discusses the interpretation of the geophysical data as it relates to the actual benthic characteristics determined through the biological survey, including: a) sediment types and thickness; b) evidence of hard-bottom signature(s); and c) correlation of geophysical data with biological data.
- v. Conclusions Section
- vi. References
- vii. Appendix. Provide representative photographs of biologically sensitive habitats and substrate types encountered.

B. Submit your original data, including video and still photographs following the protocols set out in "Establishing best practice for the collection, processing, quality assurance and dissemination of marine biological data" found at:
http://www.offshorewind.co.uk/assets/data_14_11_08_finalreport.pdf

C. Submit GIS files for separate layers representing bathymetry, the tracks of video/still camera transects, the indexed locations of still images with links to electronic photo files, the extent and position of biologically sensitive habitats as determined from the biological survey, and the locations of proposed seafloor disturbances.

D. If requested by MMS, deliver a formal presentation of your biological survey report.

Appendix B:

GUIDELINES FOR FIELD SURVEYS AND REPORTING OF ARCHAEOLOGICAL RESOURCES

GUIDELINES FOR FIELD SURVEYS

I. Introduction

MMS recommends that you perform your archaeological resource field surveys using the navigation systems, line-spacing patterns, and instrumentation described below. Since archaeological resource field surveys are often similar to other required remote-sensing surveys (e.g., shallow hazards surveys and live-bottom surveys), MMS encourages you to conduct these surveys concurrently. The survey report should be submitted to MMS as part of a Lessee's Project Plan.

II. Archaeological Resource Survey Navigation

Use a state-of-the-art navigation system that can continuously determine the surface position of the survey vessel. Ensure that the precision of the navigation system is \pm five meters (16.4 feet) for surveys in water depths less than 200 meters (656 feet) and \pm 15 meters (49 feet) for surveys in water depths 200 meters or greater. Log position fixes digitally at least every 12.5 meters (41 feet) along the vessel track and annotate them on all records at intervals no greater than 152 meters (500 feet). Show fixes on the final shot point chart at intervals no greater than 152 meters (500 feet).

Use acoustic positioning of towed sensors for archaeological resource surveys conducted in water depths greater than 91 meters (300 feet) to facilitate accurate mapping of any recorded contacts.

III. Archaeological Resource Survey Patterns

For OCS blocks in water depths 200 meters (656 ft) or less, the survey line-spacing interval is no greater than 30 meters (98 feet). For OCS blocks in water depths greater than 200 meters (656 feet), the survey line-spacing interval is no greater than 200 meters (656 feet). It is recommended that you contact MMS at (703) 787-1300 for specific guidance on survey line spacing should you have questions.

A. Comprehensive Surveys

A comprehensive survey covers the entire area of a lease or grant, as well as outside areas that could be physically disturbed by your activities. The area of physical disturbances includes, but is not limited to, the area within which construction vessel or work-barge anchors may be placed, but does not include

the area within which work-boat anchors may be placed or the area within which similar minimal disturbances may occur. A lease survey should be run along parallel primary lines spaced at a maximum of either 30 or 200 meters (depending on water depth as outlined above in Section II) with cross-tie lines spaced at a maximum of 900 meters (2,953 feet). The MMS may request that you use a tighter line-spacing pattern in areas of known significant or potentially significant archaeological resources.

B. Site-Specific Surveys for Alternative Energy Installations

A site-specific survey covers an area approximately 900 meters (5,906 feet) around a proposed alternative energy site, as well as any areas outside this area that could be physically disturbed by your activities. The area of physical disturbances includes, but is not limited to, the area within which a construction vessel or work-barge anchors may be placed, but does not include the area within which work-boat anchors may be placed or the area within which similar minimal disturbances may occur. Run a lease survey along parallel primary lines spaced at a maximum of either 30 or 200 meters (depending on water depth as outlined above in Section II), with three equidistant cross-tie lines. The MMS may request that you use a tighter line spacing pattern in areas of known significant or potentially significant archaeological resources. You do not need to conduct a site-specific survey in any area that is sufficiently covered by an already approved comprehensive survey.

C. Project Easement and Right-of-Way Cable Surveys

The survey pattern for all cables consists of a line run along the proposed cable route (centerline), an offset parallel line on one side of the centerline (for 200-meter line-spacing surveys only) located approximately 30 meters (98 feet) from the centerline, and a minimum of two additional offset parallel lines (on either side of the centerline) spaced at a maximum of either 30 or 200 meters (98 or 656 feet) (depending on the water depth as outlined above) of the OCS blocks to be traversed by the cable. The number of offset parallel lines should be sufficient to provide coverage of the entire area that could be physically disturbed by your cable-laying construction activities. The area of physical disturbances includes, but is not limited to, the area where cable lay barge anchors will be placed. It is recommended that you contact MMS for specific guidance on how to proceed.

IV. Archaeological Resource Survey Data Acquisition Instrumentation

Make sure that geophysical instrumentation for your archaeological resource field surveys is state-of-the-art in technological development and is deployed in a manner that minimizes interference among the instrumentation systems. Interface all data recorders into the navigation system to ensure proper integration of information. Ensure that all instrumentation is adequately tuned and that all recorded data are readable, accurate, and

properly annotated. Poor quality data resulting from inadequate acquisition, poor locational control, or processing technique are not acceptable and may result in a MMS request to resurvey the effected area. Use the following instrumentation to conduct an archaeological resource field survey:

A. Magnetometer

For all archaeological resource surveys you conduct in water depths less than 200 meters (656 feet), use a proton precession, overhauser, or Cesium total field magnetometer to detect ferrous and other magnetically susceptible metals. Tow the magnetometer sensor as near as possible (but no more than 6 meters [20 feet] above the seafloor) and in a way that minimizes interference from the vessel hull and the other survey instruments.

Attach a depth sensor to the magnetometer sensor and annotate each survey line with tow sensor height off seafloor and with start of the line (SOL) and end of the line (EOL) times. Ensure that magnetometer sensitivity is one gamma (γ) or one nano-Tesla (nT) or less, and that the data sampling interval does not exceed one (1) second. Ensure also that the background noise level does not exceed a total of 3 gammas peak to peak.

Record data on a digital medium in such a way that they can be linked electronically to the positioning data. Make sure that the recording scales are set no higher than 1,000-gamma and 100-gamma full scale, respectively. Annotate shot points and recorder speed.

B. Dual Channel Sidescan Sonar

Use a towed, dual-channel, dual-frequency, side-scan sonar system to provide continuous planimetric images of the seafloor. For archaeological resource surveys run at a line spacing of 200 meters (656 feet), use a system that operates at no less than 100 kHz to provide sufficient resolution of seafloor conditions. For archaeological resource surveys run at a line spacing of 30 meters (98 feet), use a system that operates in the 300- to 500-kHz range.

Design the line spacing and display range to ensure 100 percent of the proposed survey area in the prime survey line direction is covered. This may require running tighter survey transects than what is specified previously in this document. Tow the side-scan sonar sensor above the seafloor at a distance that is 10 to 20 percent of the range of the instrument. As needed, run extra lines with the sidescan sonar operating at a frequency of 300- to 500 kHz or greater for detailed inspection of seafloor contacts. Ensure that the line spacing and display range you use are appropriate for the water depth. See Section V of this document for suggested coverage areas. Display the side-scan sonar data on a graphic recorder capable of adjusting the data for slant range effects and variable

speed along line to give a true plan view of the seabed conditions as the survey progresses.

Record the data digitally to allow signal processing to improve data quality further and allow export to a workstation for integrated interpretation and mapping of the data. For all surveys, image process and output the recorded data in mosaic form. Output such mosaics as a geo-referenced digital model of the seabed for use in interpretation and reporting.

C. Sub-bottom Profiler

Use a very high-frequency sub-bottom acoustic profiler operating within the 1.5- to 4.5-kHz bandwidth to provide continuous and very high-resolution information of near-surface geological features within the uppermost 15 meters (50 feet) of sediment. Run the sub-bottom profiler system to provide penetration that exceeds the depth of disturbance. Make sure that the sub-bottom profiler system is capable of achieving a resolution of vertical bed separation of at least one foot in the uppermost 15 meters (50 feet) below the mudline. Record the data digitally to allow signal processing to improve data quality further and allow export to a workstation for integrated interpretation and mapping of the data.

D. Depth Sounder

Use a hull mounted, high-frequency, narrow beam hydrographic echo sounder to obtain bathymetric data. Display the data on a graphic recorder and log it digitally and continuously. Set up the depth sounder system to record with a sweep appropriate to the range of water depths expected in the survey area. Use a heave compensator in conjunction with the system to remove the effects of vessel movement from the data.

Calibrate water column sound velocity at the start and end of the survey by using a conductivity temperature depth (CTD) sensor or velocity probe capable of recording in the maximum water depth expected in the survey area.

E. Additional Investigations

Under certain conditions, you may want to use, or the MMS may request you to use, additional instrumentation and methods such as underwater television; still, video, or movie cameras; divers; remote or manned submersibles; coring; and additional survey lines.

IV. Suggested Sidescan Sonar Coverage Areas

Height Above Seafloor	Range at 10% of Fish Altitude	Range at 20% of Fish Altitude
5 meters	50 meters/channel	25 meters/channel
10 meters	100 meters/channel	50 meters/channel
15 meters	150 meters/channel	75 meters/channel
20 meters	200 meters/channel	100 meters/channel

GUIDELINES FOR REPORTS

I. Introduction

Include an evaluation and synthesis of the data you gathered during the archaeological resource survey in an archaeological resource report prepared, signed, and dated by a marine archaeologist and a geophysicist. Ensure that these professional personnel have the credentials and experience sufficient to qualify them to perform the necessary work (qualifications for professional archaeologists can be found at 36 CFR part 61). As needed, specialists in other fields may participate in data analysis and report preparation.

If your archaeological assessment is submitted with your shallow hazards report, include this assessment as a separate appendix. If you submit your report on CD-ROM's, ensure that they are in a separate portable document format (PDF) file and that you also prepare a digital copy of all survey maps addressed in paragraph II.D below as DWG files oriented to the North American Datum of 1983 (NAD 83) coordinate system.

II. Contents of Archaeological Resource Reports

Include the following information in the archaeological resource report:

- A.** A description of the area that you surveyed, including lease number(s), block numbers(s), OCS lease area(s), and minimum and maximum water depths for each lease block covered in the report.
- B.** A list of the individuals involved in survey planning, fieldwork, and report preparation, and a description of their duties.
- C.** A discussion of the archaeological resource field survey, including the following:
 - 1) A brief description of the navigation system, including a statement of its estimated accuracy for the area you surveyed.
 - 2) A brief description of survey instrumentation, including scale, sensitivity settings, sampling rates, and tow heights off seafloor, as appropriate for each instrument.
 - 3) A description of the survey vessel, including its size, sensor configuration, instrument set-backs, and navigation antennae locations.
 - 4) Vessel speed and course changes.
 - 5) Sea state and weather conditions.

- 6) A copy of the *original* daily survey operations log. Include sensor height off seafloor for the magnetometer and sidescan sonar for the beginning and end of each survey line.
 - 7) A description of survey procedures, including a statement of survey and record quality, a comparison of survey line crossings, and discussion of any problems that may affect the ability of the report preparers to determine the potential for archaeological resources in the survey area.
- D. A navigation post plot map of the survey area at a scale of 1:12,000 showing survey lines, shot points at 152-meter (500-foot) intervals, line direction in the grid projection in which the lease is described (e.g., UTM, Lambert, or geographic coordinates) with tics placed every five inches thereon, and with geodetic graticules every 60 seconds. For each copy of the report, submit one hardcopy and two digital copies (one in PDF format and one DWG format) of this map. Orient this map, or separate maps at the same scale that also show survey lines, shot points, and line direction, to true north and delineate the following, as appropriate:
- 1) The horizontal and vertical extent of all relict geomorphic features having potential for associated prehistoric sites. Such areas include, but are not limited to, tidal estuaries, embayments, barrier islands, beach ridge sequences, spits, alluvial terraces, and stream channels. When relict fluvial systems are recorded, make sure that the map:
 - a. differentiates between generations of channeling when more than one generation is present;
 - b. shows any internal channel features such as point bar deposits and terraces;
 - c. delineates any channel margin features such as natural levee ridges;
 - d. indicates all depths of channel banks and channel axes (thalwegs); and
 - e. delineates all areas recommended by your archaeologist for avoidance for potential archaeological resources.

Note: An isopach map of channel fill sediments is often the most efficient means of conveying the above information, but this method alone will not allow differentiation between more than one generation of channeling.

- 2) Bathymetry.
- 3) All magnetic anomalies and seafloor sidescan sonar contacts of unknown source (for magnetic anomalies use map symbol: ▲; for sidescan sonar contacts use map symbol: ☒). Identify these magnetic anomalies and sidescan sonar contacts using only the aforementioned symbols and a unique number keyed to the listings in the unidentified magnetic anomaly and sidescan sonar tables in the text (see paragraph F below) In congested areas with numerous unidentified magnetic anomalies, you may use a map(s) at a scale of 1:6,000 to depict the anomalies. If you do, tie

this congested area map(s) into the 1:12,000 survey area map. Plot all recommended potential archaeological avoidance areas on the survey area map.

- 4) A separate, color-filled contour map of the survey area at a 1:12,000 scale of magnetic data with magnetic anomalies identified by the same unique number keyed to the listings in the unidentified magnetic anomaly table. Magnetic contours should be plotted at 10-gamma intervals and labeled at 50-gamma intervals. A graduated color scale should also be included on the map. Ensure that all anomaly numbers and any other labeled features are clearly visible by utilizing contrasting font colors as necessary. In congested areas with numerous unidentified magnetic anomalies, you may use a map(s) at a scale of 1:6,000 to depict the anomalies. If you do, tie this congested area map(s) into the 1:12,000 survey area map. Plot all recommended potential archaeological avoidance areas on the magnetic contour map.
- 5) Sites of proposed alternative energy operations (e.g., met tower, wind turbine generator, cables, platforms), when available at the time of report preparation.
- 6) Sites of former alternative energy, oil and gas, mineral, or other operations of interest (e.g., abandoned well locations, platform sites, and/or pipelines).

E. An analysis of the potential for prehistoric sites within the survey area that includes:

- 1) A review of current literature on late Pleistocene and Holocene geology, paleogeography, and sea level change in the area; marine and coastal prehistory; and previous archaeological resource reports in the area, if available.
- 2) A discussion of relict geomorphic features and their archaeological potential that includes the type, age, and association of the mapped features; the acoustic characteristics of channels and their fill material; evidence for preservation or erosion of channel margins; evidence for more than one generation of fluvial downcutting; and the sea level curves you used in the assessment.
- 3) A discussion, based on the capabilities of current technology in relation to the thickness and composition of sediments overlying the area of a potential site, of the potential for identification and evaluation of buried prehistoric sites.

F. A current review of existing records for reported shipwreck locations in the survey area and adjacent areas, and the following, as appropriate:

- 1) A table of the unidentified magnetic anomalies with the OCS block, shot point, and survey line location (corrected for sensor offset); gamma intensity; lateral extent (duration); whether the anomaly is characterized

by a dipolar, monopolar, or complex signature; the magnetometer sensor tow height off seafloor; the NAD 83 decimal degree and State Plane coordinates of the center of each unidentified anomaly; and the recommended avoidance zone. A suggested format for this unidentified magnetic anomaly table is included at the end of this document.

- 2) A table of sidescan sonar contacts with the lease block, shot point, and survey line location (corrected for sensor offset); size; shape; height of protrusion above the seafloor; the NAD 83 decimal degree coordinates; State Plane coordinates and recommended avoidance distance of each. A suggested format for this unidentified sidescan sonar contact table is included in the archaeological survey guidelines.
- 3) A discussion of any magnetic anomalies and sidescan sonar contacts of unknown source in terms of their potential as historic shipwrecks (include an analysis of reported nearby wrecks and their potential association with these contacts on the basis of vessel size and anomaly characterization);
- 4) A discussion of any correlation between magnetic anomalies or sidescan sonar contacts and known or probable sources;
- 5) For any archaeological resources that can be positively identified from remote-sensing records, an analysis of their possible significance and recommendations for any further research or special precautions that may be necessary. You may also be required to complete a National Register of Historic Places nomination form.
- 6) A discussion of the potential for shipwreck preservation in terms of bottom sediment type and thickness, and the effects of past and present marine processes in the survey area; and
- 7) A discussion of the potential for identification and evaluation of potential shipwrecks considering the capabilities of current technology in relation to the water depth, probable thickness and composition of sediments overlying the potential shipwreck location, and the preservation potential.

G. Representative data samples from each survey instrument to demonstrate the quality of the records. If appropriate, include the following data samples, which you may use in lieu of the representative data samples:

- 1) A sample of subbottom profiler data for each type of relict landform that you identify. When more than one generation of fluvial channeling is evident, include a sample that depicts each generation. Make sure that each sample is readable and includes horizontal and vertical scales. If you want to provide any interpretive highlighting or annotation of the sample data, do so on either a separate overlay or a copy of the sample data. Do not highlight original survey data.
- 2) Copies of all sidescan sonar data where contacts representing unidentified objects are recorded. Make sure that the copies are readable and include the scale. If you want to provide any interpretive highlighting or annotation of the sample sidescan sonar data, do so on either a separate overlay or a copy of the sample data. Do not highlight original survey

data. For all surveys, include a digital copy of the computer-generated mosaics as a geo-referenced Tagged Image Format (TIF) file.

- H. A summary of conclusions and recommendations supported by the archaeological resource field survey data and archaeological analyses including:
 - 1) A discussion of known or potential archaeological resources;
 - 2) Recommendations for avoidance or for further archaeological investigations; and
 - 3) For any archaeological sites identified that MMS determines are potentially eligible for listing on the National Register of Historic Places (NRHP), an NRHP Registration Form may be requested

- I. A discussion of the data and results from any additional investigations that may have been conducted.

III. Listing Unidentified Magnetic Anomalies and Sidescan Sonar Contacts

The following are suggested tables, including sample information, for listing unidentified magnetic anomalies and sidescan sonar contacts in archaeological resource reports.

A. Magnetic Anomalies

Anomaly Number	Area/Block	Line no.	Shot Pt.	Tow Height (feet)	Signature	Intensity (gammas)	Duration (feet)	NAD 83 Coordinates (in decimal degrees)	State Plane Coordinates	Minimum avoidance distance (feet)
1	MP 100	0020	11.4	20	Dipole	15	75			100

B. Sidescan Sonar Contacts

Anomaly Number	Area/Block	Magnometer Association	Dimensions LxWxH	Shape	NAD 83 Coordinates (in decimal degrees)	State Plane Coordinates	Minimum avoidance distance (feet)
1	MP 100	Mag. Anomaly 1, Line 0020, Shot Point 11.4	100x50x5	Linear			100

Appendix C:

GUIDELINES FOR GEOLOGICAL, GEOPHYSICAL, & GEOTECHNICAL SITE-SURVEYS FOR METEOROLOGICAL TOWERS AND OTHER SEAFLOOR-FOUNDED STRUCTURES AND DEVICES ON THE OUTER CONTINENTAL SHELF (OCS)

I. Introduction

Renewable energy construction projects are similar to oil and gas construction projects in that they require a detailed knowledge of seafloor surface and shallow subsurface geological and geotechnical conditions at the project site to support a plethora of activities associated with the design, fabrication, installation, operation, and removal of the structure. As part of any lease issuance for renewable energy development on the OCS, the results of archeological, geological and geophysical (G&G) surveys and geotechnical sampling and testing in the project area will be needed. This guidance document provides minimum guidelines for use in planning and conducting these activities. Since G&G surveys are often similar to other required remote-sensing surveys (e.g., archaeological resource field surveys), MMS encourages you to conduct these surveys concurrently. The survey reports should be submitted to MMS as part of a Lessee's Project Plan.

II. Preliminary Activities

Prior to conducting the site-surveys addressed in this guidance document, MMS recommends you conduct a comprehensive literature study of the project area for use in planning and executing your survey(s). At a minimum, we recommend you research all available information on seafloor surface and subsurface geologic features and conditions, bathymetry, hydrography, man-made structures (abandoned wells, cables, and pipelines), historic shipwrecks, endangered and threatened species, shipping lanes and ship traffic, navigational hazards, marine sanctuaries, biological and archaeological resources, and military, fisheries, and other uses of the area.

Survey activities should be conducted in accordance with all laws and regulations, including the Rivers and Harbors Act, the Endangered Species Act (ESA) of 1973, as amended, and the Marine Mammal Protection Act (MMPA) of 1972. We encourage you to contact stakeholders early in the application process to discuss your conceptual plans. If marine mammals may be incidentally taken by the proposed activities, an Incidental Harassment Authorization (IHA) or a small take authorization under MMPA may be required. We recommend you contact Fish and Wildlife Service (FWS) and/or National Marine Fisheries Service (NMFS) to discuss authorization for the incidental take of marine mammals and any marine mammal mitigation and monitoring requirements that may be required. We further recommend that you contact the U.S. Coast Guard, Office of Aids to Navigation, for requirements on timely publication of your survey in the Notice to Mariners.

III. Site-Survey Plan

MMS recommends that, prior to conducting geological, geophysical, and geotechnical survey(s) to assess shallow geologic hazards and foundation engineering conditions at the project site, you should develop and submit a comprehensive survey plan for MMS review. The plan should address all relevant survey parameters described here and in the appropriate Regional guidance document (see section VIII, "Guidance Documents") including, but not limited to, proposed survey data acquisition systems and specifications, survey logistics, vessel characteristics, and geologic and man-made hazards and conditions expected at the site based on available information. In addition, a 1:12,000 scale navigation pre-plot should be provided to MMS showing, at a minimum, the location(s) of proposed meteorological tower(s) and any other seafloor founded structures and devices, geophysical track lines (including geophysical data acquired for archaeological resources assessment), geologic cores, geotechnical soil borings, etc., and the operations footprint of all anticipated bottom-disturbing activities, including anchorage areas.

IV. Geophysical Survey Grid and Line-Spacing

The survey area for each meteorological tower or other seafloor founded structure or device should include, at a minimum:

- A 1,800-meter x 1,800-meter rectilinear grid centered on the proposed structure or device, and
- The footprint of all potential bottom-disturbing activities from construction, installation, inspection and maintenance, and decommissioning activities (including anchorage areas), if any of these are expected to occur outside a 900 meter radius of the proposed structure or device.

The rectilinear survey grid should be oriented roughly parallel or subparallel to the bathymetry (or shallow structure) with primary grid lines oriented perpendicular to bathymetric contours. Line spacing should not exceed 150 meters on primary lines and 300 meters on tie-lines. Alternative grid orientations and line spacing will be considered on a case-by-case basis.

V. Navigation and Geophysical Data Acquisition Systems

The following navigation and data acquisition systems should be included in the survey and operated on all track lines:

- **Navigation systems:** The primary navigation system for the survey vessel should include a survey-grade differential global positioning system (GPS) with an accuracy of two meters. An ultra-short baseline (USBL) navigation system, incorporating a survey-grade gyroscope, may be required for deep water/long tow sensors and integrated with the primary navigation system. If necessary, towed sensor accuracy should be five meters or better.

- **Bathymetric mapping system:** A digital, high-resolution single beam or multi-beam depth recording system may be used to record water depth in areas where the seafloor is relatively smooth and featureless. Multi-beam swath bathymetry is preferred in areas of irregular topography, steep slopes or deep water (depths in excess of 150 meters). Bathymetric data should be accurate to 1% of water depth and include all standard corrections for waves, tides, sound velocity, etc. At a minimum, sound velocity in the water column should be determined at the start and end of the survey.
- **Seafloor imaging:** A dual-channel, dual-frequency (100/500 kHz) digital high-resolution side scan sonar (SSS) system should be used to record true planimetric images of the seafloor. The acquisition strategy (at 100 kHz frequency) should facilitate reliable detection of targets measuring 0.5 meters or smaller and provide a minimum of 100% coverage of the seafloor along the 150 meter-spaced grid lines without any data holidays between adjacent lines. Sonographs should be recorded and processed to enhance data quality and provide a fully-corrected (spatially and amplitude corrected) digital mosaic of the seafloor over the survey area. When appropriate, additional SSS lines should be run at 500 kHz frequency for detailed inspection of anomalous seafloor features and unidentified targets.
- **Shallow subbottom (“Chirp”) profiler:** A broad band swept FM piezoelectric source with dominant energy in the 2 to 16 kHz spectrum (“Chirp” pulse) should be used to provide maximum resolution (0.3 meters) to a depth of 15 meters below the seafloor.
- **Intermediate penetration (IP) profiler:** A mini-sparker, boomer, mini-sleeve exploder or small air gun, are common IP systems used to produce acoustic energy in the 0.5 to 1.5 kHz spectrum. An IP system should be used in combination within the shallow subbottom profiler to provide continuous vertical resolution of geologic structures and features of interest (e.g., faults, shallow gas) within the foundation zone of the proposed structure. Acoustic penetration of sedimentary units underlying the seabed should include a target depth of at least 20 feet (6 meters) below the base of foundation piles for meteorological tower installations.
- **Deep penetration profiler:** If necessary, data acquisition and processing specifications for this system should be discussed with MMS.
- **Magnetometer:** For a shallow hazard survey you conduct in a water depth less than 200 meters (656 feet), a total field intensity magnetometer should be run to determine the presence of pipelines and other magnetically susceptible objects.

VI. Geotechnical Subsurface Investigation and Testing

The primary objective of the subsurface investigation and testing program should be the attainment of reliable geotechnical data concerning the stratigraphy and engineering soil properties at the location of the meteorological tower. This data is to be used to design the foundation system for the meteorological tower and to assess whether the desired structural safety level can be obtained as well as to assess the feasibility of the proposed method of installation. The following guidance applies:

- **Geotechnical Program:** The subsurface investigation and soil-testing program should consist of adequate borings, sampling intervals, and in situ and laboratory

testing to identify and sample all important soil and rock strata at the designated site so as to determine the necessary soil properties and performance parameters for the design of the pile foundation. This should include, but not be limited to, the determination of soil strengths, classification, and deformational properties of the soils as well as any dynamic-response characteristics required for assessing the cyclic behavior of the soils.

- **Borings:** A minimum of one bore hole should be drilled for a pile-supported meteorological tower structure to a minimum depth as determined by the anticipated length of pile depth plus a zone of influence. The zone of influence should have a minimum depth of 20 feet (6 meters) or a greater depth as necessary to ensure that a punch through failure will not occur in a sub-stratum below the pile tip. The bore hole(s) should be located within a minimum distance of 500 feet (152.4 meters) from the center line of the foundation of the meteorological tower.
- **Additional Borings:** If the bore hole(s) are not located at the center line of the proposed meteorological tower foundation but falls within the 500 foot radius as noted in the item above, additional in situ soil testing should be required at the center of the foundation location to verify the soil profile and properties. For this condition, a new soil boring or a cone penetrometer test (CPT), per ASTM Standard D 3441, should be conducted at the center line location of the proposed meteorological tower foundation and taken to a depth as noted above to assess the actual soil profile and properties. The data from the new boring or CPT should be assessed by the structural and geotechnical engineer to see if the soil strata and engineering properties at the actual site are within the ranges as predicted by the off-location soil boring. Should sufficient differences exist, as determined by the structural and geotechnical engineers, then the new soil data and strata should be assessed relative to how the new soil parameters will affect the design and integrity of the pile foundation and the pile-foundation design modified accordingly.
- **Geotechnical Report:** A detailed geotechnical report should be prepared and may be submitted for review by the MMS. The report should contain sufficient information about the site and the soil strata in terms of strength and deformation properties to allow for the design of the meteorological tower pile foundation. The results of both laboratory and in-situ test should be evaluated and corrected as relevant on the basis of standard recognized engineering practices. At a minimum the geotechnical report should contain, but may not necessarily be limited to the following information:
 - A brief description of the purpose of the investigation.
 - A detailed scaled map showing the proposed met-tower location, water depth and location of soil borings and/or CPT sites.
 - A description of the field boring/CPT, sampling and testing program.
 - A detail soil profile of the foundation site noting the engineering properties for each soil strata.
 - A description of the various field and laboratory tests employed to determine the soil properties and the application of the tests as they relate to the quality of the samples taken, the type of soils strata found and their anticipated application for the pile design.

- Detailed p-y and t-z curves for each soil strata generated according to standard accepted practices to account for cyclic loading conditions for use in the lateral and axial analysis of the pile.
- An assessment of the risk of scour about the pile foundation and its effects on the soil properties provided for the design.

VII. Survey Report, Maps, and Data Submittals

Please refer to the Regional guidance documents (NTLs) for report content, maps, and data submittals in Section VIII. At a minimum the following should be included for all G&G survey submittals:

- A comprehensive report integrating the results of all site-survey investigations (geological, geophysical, geotechnical and perhaps other surveys) and identifying all seafloor surface and shallow subsurface geologic and man-made features and conditions (including potential earthquake hazards) in the survey area.
- Interpreted maps including a navigation post plot of survey vessel position, bathymetry, shallow structure, sediment thickness, seafloor features, and shallow (subsurface) hazards and conditions generated at a common scale of 1:12,000.
- Annotated digital seafloor mosaic of the survey area (consult MMS for determining the scale of the mosaic).
- A complete set of all geophysical data acquired during the survey and submitted in a format (paper or electronic) recommended by MMS. Vertical exaggeration should not exceed 10:1 on all geophysical records.
- One complete set of original sonographs or enhanced copies generated from the playback of digitally recorded data. Original data should be returned to the operator.
- A description of the frequency, source level, tow-depth, and sound propagation calculations for all use of the sub-bottom profiler and the side-scan sonar.
- An itemized invoice of all data may be submitted including data type, line number, and inclusive fix points.

VIII. Guidance Documents

The following Regional guidance documents should be consulted for planning and executing a comprehensive geophysical shallow hazards survey for meteorological towers and any other bottom-founded structures and devices. As there are important differences in data acquisition and reporting requirements between MMS OCS Regions. Note that these documents were developed for use in siting oil & gas structures and drilling wells and may contain some data acquisition and processing requirements that may not be applicable to your project.

- Pacific OCS Region: NTL No. 06-P01, Notice to Lessees and Operators (NTL) of Federal Oil and Gas Leases in the Pacific Outer Continental Shelf Region: "Shallow Hazards Survey and Report Requirements for OCS Development Operations"

- Gulf of Mexico Region: NTL No. 2008-G05, Notice to Lessees and Operators of Federal Oil, Gas, and Sulfur Leases and Pipeline Right-of-way Holders in the Outer Continental Shelf, Gulf of Mexico OCS Region: “Shallow Hazards Program”
- Alaska OCS Region: NTL No. 05-A01, Notice to Lessees and Operators of Federal Oil and Gas Leases in the Alaska Outer Continental Shelf Region (OCS): “Shallow Hazards Survey and Evaluation for OCS Exploration and Development Drilling.”