

**UNITED STATES DEPARTMENT OF THE INTERIOR  
MINERALS MANAGEMENT SERVICE (MMS)  
PACIFIC OCS REGION**

NTL No. 06-P03

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**NOTICE TO LESSEES AND OPERATORS (NTL) OF FEDERAL OIL AND GAS LEASES  
IN THE PACIFIC OUTER CONTINENTAL SHELF REGION**

**Archaeological Survey and Report Requirements**

This NTL supersedes NTL 98-05.

**Introduction**

Archaeological resources are any material remains of human life or activities that are at least 50 years of age and that are of archaeological interest. Material remains include physical evidence of human habitation, occupation, use or activity including the site, location, or context in which such evidence is situated. Items of archaeological interest are those that may provide scientific or humanistic understanding of past human behavior, cultural adaptation, and related topics through the application of scientific or scholarly techniques.

The MMS, under various Federal laws and regulations, ensures that regulated Outer Continental Shelf (OCS) activities do not adversely affect significant archaeological resources. The archaeological survey and report primarily determine what actions, if any, are necessary to protect the resource. The archaeological survey identifies potential prehistoric and historic sites. Section 1 presents criteria and considerations for designing and conducting the survey in the Pacific OCS (POCS) Region. The archaeological report presents the analysis and evaluation of the survey data. Section 2 contains standards for the report. The report serves as the basis for determining if potential archaeological resources exist and what actions are necessary to protect the potential resources. Section 3 describes measures to protect the resource.

The MMS POCS Regional Manager determines if detectable historic and prehistoric archaeological resources potentially exist in the area of the proposed operations. If so, we will inform you in writing as to which type of report (historic, prehistoric, or both) to submit and the standards that apply before operations may commence. This NTL describes typical survey parameters and results that can be achieved using currently-available and widely-used state-of-the-art equipment and techniques. The performance required by your survey is dependent on the technology that is in use at the time the Regional Manager determines that a report is required.

Depending on your type of operation, you may need to submit a report after the application to conduct geological and geophysical activities (30 CFR 251 and § 250.210(b)), as part of the Exploration Plan (§ 250.203) or the Development and Production Plan (§§ 250.241 through 250.262), or as part of the application for approval of installation of a lease-term pipeline (§ 250.1007) or granting of a right-of-way (§ 250.1010). Furthermore, if you discover an

archaeological resource during operations, you must immediately halt operations in the area of the discovery and notify the Regional Manager. If investigations determine the resource is significant, the Regional Manager will direct you on how to protect the resource.

This NTL does not impose any additional requirements.

## **Section 1. Archaeological Surveys**

The area of proposed operations must have an archaeological remote sensing survey if MMS determines that OCS activities may affect prehistoric or historic archaeological resources. Prehistoric surveys use side-scan sonar and sub-bottom profilers to locate paleo-landforms submerged by the Holocene sea-level rise that have a high likelihood of containing prehistoric sites. Historic surveys use a magnetometer to detect ferro-magnetic elements commonly associated with shipwrecks and side-scan sonar to detect items that project above the surrounding terrain.

Usually, the archaeological survey takes place concurrently with the shallow hazards survey for maximum efficiency. Please plan your survey to minimize potential conflicts with other OCS users. There are several ways to inform other OCS users that you are conducting a geophysical survey, such as having information included in the U.S. Coast Guard's local Notice to Mariners, coordinating the survey with the Joint Oil/Fisheries Liaison Office, and using two-way radio communication and a scout boat during operations to communicate with commercial fishers in the area. Also, you must notify the MMS POCSR Chief, Office of Facilities, Safety and Enforcement (C/OFSE) at least 72 hours before mobilization of the survey so that MMS observers may make arrangements to be present.

Accurate evaluation of potential archaeological sites starts with obtaining the best survey data possible, using state-of-the-art equipment. Qualified and experienced personnel conduct the field survey, analyze the data, and prepare the report, acknowledging their responsibility by signing appropriate data logs, analyses, and reports. An archaeologist does not have to be present during all field survey activities. A geophysicist should be present to ensure that all the equipment is properly tuned and geophysical data are accurate and of sufficient quality. MMS will not accept poor quality data, and you will have to resurvey if inferior data quality results from equipment problems and poor technique. Also, at the direction of MMS, you may need to resurvey and reassess the potential for archaeological resources using the best survey methods available and state-of-the-art equipment if existing data coverage is inadequate or outdated.

### Design Survey to Maximize Detection

Many factors affect the potential for state-of-the-art equipment to detect and locate the resource. Some of these factors, such as size and composition of the resource, water depth, and depth of burial of the resource, are conditions beyond the control of those conducting the survey. Nonetheless, these factors may affect the design of the survey. Other factors, such as survey line spacing, the types of instruments used, instrument sensitivity, accuracy of navigation and survey

technique, are well within the control of those designing and conducting the survey. Personnel designing and executing the survey must recognize the influence of these factors on detection and plan the survey accordingly.

For example, data resolution directly correlates with line spacing, the horizontal distance between survey transects. Historic resource analysis, prehistoric resource analysis, and analysis along pipeline routes require different line spacing. The MMS notification to you that an archeological resource survey and report are necessary will include line spacing requirements. Typical line spacing requirements for historic and prehistoric resources surveys are:

1. Historic survey in an area highly likely to contain sites (i.e., reported vessel loss in the area, proximity to shipping lanes, hazards to navigation)--40 meters.
2. Historic survey in an area less likely to contain sites--150 meters.
3. Prehistoric survey--300 meters.

The minimum area surveyed is the area of operations, i.e., the geographic area within which direct and indirect effects generated by an operation would cause physical disturbance or long-term magnetic disturbances. This area includes the drilling unit, construction barge, and lay barge anchor pattern when you use these technologies. Since this area varies with each operation, this NTL does not quantitatively specify the minimum survey area. However, typical historic and prehistoric resource surveys usually require parallel grid lines to cover a minimum area of 600 meters in radius around the proposed drill site or platform site. Typical high resolution data coverage for both historic and prehistoric resource surveys of a pipeline route requires five (5) parallel lines plus tie-lines: one line corresponding to the center-line of the proposed route with at least two parallel lines at the specified line spacing on each side of the center-line. Distal lines would correspond to probable sites of anchors. Tie-line spacing is usually 1,200 meters or less, with tie-lines perpendicular to the center-line.

#### Considerations for Planning the Historic Survey

Any anomaly that you cannot correlate with a known source is a potential archaeological resource unless further investigation determines otherwise. Data must be of such quality as to permit detection and evaluation of magnetic anomalies within the survey area.

The analysis of vessel loss reports, environmental factors, and historic use patterns determine the potential for an area to contain historic archaeological resources. In areas that have a high potential for historic archaeological resource sites, a line spacing of 40 meters for the magnetometer survey is appropriate using present day state-of-the-art technology. This line spacing maximizes the detection of potential resources, although discrimination of wreck anomalies from non-wreck anomalies may not be possible.

In areas having a lower potential for historic archaeological sites, a wider line spacing of 150 meters is used for magnetometer surveys conducted with present day state-of-the-art technology. The 150-meter line spacing results in approximately 25 percent coverage of the area for wooden- or composite-hulled vessels. This practice is essentially a sampling procedure.

In areas where there is little or no potential for historic archeological sites, there is no specific line spacing or equipment required for the historic survey. Instead, the shallow hazards survey data is analyzed for indications of potential historic archaeological sites. After meeting with MMS at the pre-survey meeting, MMS will provide you with the grid spacing for the survey.

Other operational and equipment characteristics influence the quality of data acquired and its subsequent interpretation. Use total field instruments to detect the possible presence of historic shipwrecks. To minimize the influence of the survey vessel's hull, tow the magnetometer sensor at a distance behind the vessel of at least two and one-half (2 1/2) times the vessel length. To maximize detection, tow the sensor within 6 meters of the sea floor, as indicated by a depth meter on the sensor. Background noise level in the magnetic data should not exceed plus or minus 3 gammas. Recommended vessel speed is from 4 to 6 knots. The magnetometer should have a sensitivity of at least 1 gamma and be set to cycle at a rate of approximately 1.2 to 1.3 second intervals. This rate improves location accuracy with the one-second updates provided by the global positioning system and allows for increased magnetometer sensitivity.

Side-scan sonar survey tow depth and range should be sufficient to provide 100 percent coverage of the search area, with a minimum overlap of 20 percent between lines, and a resolution better than 0.25 to 0.40 meter for objects on the sea floor. Range should not exceed 100 meters. Typically, using present day state-of-the-art side-scan sonar on every fourth line if surveying with a magnetometer at 40-meter line spacing or on every line at 150-meter line spacing satisfies this criterion. Your equipment must automatically correct side-scan sonar data recordings for vessel speed and slant range.

### Considerations for Planning the Prehistoric Survey

You should conduct an archaeological survey for prehistoric sites in all areas delineated as potentially containing sensitive landforms using a sub-bottom profiler, side-scan sonar and recording fathometer--the same instruments required for geohazard surveys. Typically, 300-meter line spacing with crossing tie-lines at 900-meter intervals is appropriate using present day state-of-the-art technology. However, certain areas identified as containing sensitive landforms may require narrower line spacing.

The seismic profiler should provide penetration to the depth of the Pleistocene-Holocene unconformity (as determined by MMS maps, sub-bottom profiles or sediment cores from adjacent or nearby areas) or to a depth of 15 meters sub-bottom with a resolution of better than 0.75 meter. (In some cases, the unconformity may be the seafloor.) To improve data acquisition using present day state-of-the-art equipment, use de-coupling or active compensation for wave height in sea states greater than Beaufort Code 2 to achieve clearly resolved recordings. In deep water, near-bottom towing or a narrow beam sound source usually achieves clearer resolution. Preserve amplitude resolution so that strong reflections are distinguishable from others; vertical exaggeration on records should not exceed 10:1.

You should tow the side-scan sonar at a depth that provides 100 percent coverage, with a minimum overlap between lines of 20 percent, and a resolution better than 1 meter. Typically, present day state-of-the-art side-scan sonar satisfies this criterion when range does not exceed

100 meters at 150-meter line spacing, or 200 meters at 300-meter line spacing. Your equipment must automatically correct side-scan sonar data recordings for vessel speed and slant range.

### Navigation System Accuracy for Surveys

Position the survey vessel using the most accurate method available in a particular geographic setting, to the exclusion of less accurate methods. In any case, 10 meters is the maximum allowable circle of error. Furthermore, survey vessels should maintain steerage of plus or minus 20 meters from the preplotted survey lines. The time interval between navigational fixes must be short enough to allow maintenance of the recommended steerage when dead reckoning between fixes. Finally, log all positioning data onto a computer for later use in the automatic mapping of survey results.

## **Section 2. Standards for Archaeological Reports**

The MMS POCS Regional Manager will notify you in writing if an archaeological report is required (§ 250.194). The letter will inform you of the type of report required (Prehistoric, Historic or both), and specific delivery instructions including format specifications for digital data.

Before commencing any operations, you must prepare and submit three copies of the report to the POCSR to determine the potential existence of any archaeological resource that your operations could affect. One copy must be in a digital form in the appropriate word processing format. Furthermore, you must submit certain large-scale map data in a format compatible with the MMS Geographic Information System. The format, cartographic parameters, and other items will be in the written notice sent to you.

Base your report on an assessment of the data from remote-sensing surveys according to the specifications of this NTL and other pertinent cultural and environmental information.

An archaeologist and a geophysicist must prepare and sign the archaeological report. Professional personnel in these fields must have credentials or experience sufficient to ensure that they are able to adequately perform the necessary work. One qualified individual may fulfill both requirements. As needed, specialists in other pertinent fields may participate in data analysis and report preparation. Instead of requiring that you prepare an archaeological report, the MMS may choose to prepare the archaeological report in-house using qualified personnel. Shallow hazards survey and platform foundation analyses data will generally be sufficient for prehistoric resource reports.

### Contents of Archeological Reports

The Archeological Report includes the following information.

- A. A description of the area surveyed including lease number(s), block number(s), OCS lease area(s), and water depths.

- B. A list of personnel and duties for individuals involved in survey planning, survey conduct, and report preparation.
- C. A discussion of the archaeological survey including the following:
- (1) A brief description of the navigation system with a statement of its estimated accuracy for the area surveyed.
  - (2) A brief description of the survey instrumentation including record scales sensitivity settings, sampling rate per second, and tow depths where required.
  - (3) A description of the survey vessel including vessel size, sensor configuration, navigation antenna locations, and cable lengths.
  - (4) Vessel speed and course changes.
  - (5) Sea state and weather conditions.
  - (6) A copy of the daily survey operations log.
  - (7) A description of survey procedures including a statement of survey and record quality, a comparison of survey line crossings, and a discussion of any problems which may affect the ability of the report preparation personnel 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, latitude-longitude reference points, and Universal Transverse Mercator coordinates or X and Y coordinates from an appropriate regional system. This map, or separate maps at the same scale which also show survey lines, shot points, and line direction, and is oriented to true north and delineates 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, the map must:
    - (a) Differentiate between generations of channeling when more than one generation is present.
    - (b) Show any internal channel features such as point bar deposits and terraces.
    - (c) Delineate any channel margin features such as natural levee ridges.
    - (d) Indicate all depths of channel banks and channel axes.

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 side-scan sonar contacts of unknown source. The duration of all magnetic anomalies are plotted on the survey map.
- (4) Sites of proposed operations (e.g., proposed well locations, platform sites, dredge sites, and/or pipeline routes), when available at the time of report preparation.
- (5) Sites of former mineral extraction activities (e.g., abandoned well locations, platform sites, dredge sites, and/or pipeline routes).

- E. If an analysis of the potential for prehistoric sites within the survey area is required, the report must include:
- (1) A review of existing literature on the 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, when available.
  - (2) A discussion of relict geomorphic features within the project area and their archaeological potential including:
    - (a) The type, age, and geomorphic association of the features mapped.
    - (b) The acoustic characteristics of the channels and their fill material.
    - (c) Evidence for preservation or erosion of channel margins.
    - (d) Evidence for more than one generation of fluvial down cutting.
    - (e) The sea level curves used in the assessment.
  - (3) A discussion of the potential for identification and evaluation of buried prehistoric sites based on the capabilities of current sampling technologies in relation to the thickness and composition of sediments overlying the potential site area.
- F. If an analysis of the potential for historic shipwrecks within the survey area is required, the report must include the following:
- (1) A review of existing records for reported shipwreck locations in the survey area and adjacent areas.
  - (2) A list of all magnetic anomalies with the survey line and shot point location (uncorrected and corrected for sensor offset), intensity in gammas, lateral extent (duration), whether the anomaly is characterized by a dipolar or monopolar signature, and magnetometer sensor tow depth at each location.
  - (3) A list of all side-scan sonar contacts with the survey line and shot point location (uncorrected and corrected for sensor offset), size, shape, and height of protrusion above the sea floor of each.
  - (4) A discussion of any magnetic anomalies and side-scan sonar contacts of unknown source in terms of their potential as historic shipwrecks.
  - (5) A discussion of any correlation between magnetic anomalies or side-scan sonar contacts and known or probable sources.
  - (6) A discussion of the potential for shipwreck preservation in terms of the effects of past and present marine processes and bottom sediment type.
  - (7) A discussion of the potential for identification and evaluation of potential shipwrecks based on the capabilities of current technology in relation to the water depth, the probable thickness and composition of sediments overlying the potential shipwreck location, and the preservation potential.
  - (8) A digitally processed seafloor mosaic of all potential historic resource sites.
- G. Representative data samples, as appropriate, are submitted with the survey report for the following:
- (1) Sub-bottom Profiler Data
    - (a) A representative sample of sub-bottom profiler data for each type of relict landform identified. When more than one generation of fluvial channeling is evident, submit a sample depicting each generation.
    - (b) With respect to quality, the copies must be readable, and must include

survey line number, shot point numbers, line direction, and horizontal and vertical scales.

- (c) Place any interpretive highlighting or annotation of the sample data on either a separate overlay or a copy of the representative sample data. In no instance should the original survey data be highlighted.

(2) Side-scan Sonar Data

- (a) Submit a copy of the side-scan sonar data where contacts representing unidentified objects are recorded. In addition, provide a digitally processed seafloor mosaic of all potential historic resource sites.
- (b) The copies must be readable and include the survey line number, shot point numbers, line direction, and scale.
- (c) Place any highlighting or annotation of the sample on either a separate overlay or a copy of the representative sample data. Do not highlight original survey data.

(3) Magnetometer Data

- (a) For lease surveys and site specific surveys, in order to check survey data quality, submit a clear copy of three complete lines of data with the survey report. Two of these lines are representative data samples of primary survey lines and the third survey line must be a cross-tie line. The primary survey lines are adjacent lines run in opposite directions. Whenever possible, include unidentified magnetic anomalies on the survey lines.
- (b) For pipelines that are three miles in length or longer, submit a clear copy of approximately one-quarter (25 percent) of the magnetometer data (analog strip chart) for the center line of the survey. Whenever possible, include representative samples of unidentified magnetic anomalies (if any) that were recorded on the center line.
- (c) For pipeline surveys less than three miles in length, submit the magnetometer data for the entire center line.
- (d) The survey data may be reduced in size for report preparation, but the quality must remain sufficient to clearly depict both the 1,000-gamma and the 100-gamma scale traces of the analog strip chart recorder and must include the survey line number, shot point numbers, line direction, and scale.

H. A summary of conclusions and recommendations supported by the archaeological survey data and archaeological analysis, including:

- (1) A discussion of known or potential archaeological resources.
- (2) Recommendations for distance to avoid the potential archaeological resource should avoidance be the chosen mitigation.
- (3) Recommendations for strategies to further investigate and identify the potential archaeological resource based on water depth, bottom sediment type, and the suspected nature of the resource.

I. A discussion of the data and results from any additional investigations that may be required by MMS, appended to the archaeological report.



## Review of Archaeological Reports

The MMS determines whether the report meets the requirements contained in the Regional Manager's letter of notification and this NTL. Personnel with archaeological, geophysical, or other appropriate expertise conduct the review. The MMS also determines if the survey was performed properly and evaluates the geophysical interpretations and archeological conclusions.

If the review reveals that the report is not adequate or incomplete, MMS will notify you in writing of the problems and identify what data or information are necessary to correct or complete the report.

## **Section 3. Mitigation Measures and Operational Practices**

Based on the MMS review of the report findings, you will be informed, in writing, of any mitigating measures or operating restrictions which may be required.

### Prior to Commencing Operations

The archaeological survey and report identify if potential archaeological resources are in the proposed area of operation. The report must be prepared before operations may commence. Two strategies may be employed to prevent inadvertent damage to the resource. The most common and preferred strategy is to move or modify operations so there is no effect.

Alternatively, you may conduct additional investigations and submit a report to establish to the satisfaction of the MMS and the State Historic Preservation Office (SHPO) that an archaeological resource is or is not present or will not be adversely affected by operations. The investigation is conducted by an archeologist and geophysicist using survey equipment and techniques identified by the MMS. We will inform you of any mitigating measures necessary to alleviate or minimize the potential effects on significant archaeological resources.

### Discovery After Commencing Operations

If any archeological resource is discovered, immediately halt operations in the area of the discovery and inform the MMS POCSR Regional Manager. If further investigation determines that the resource is significant, MMS will inform you on how to protect the resource.

***Paperwork Reduction Act of 1995 Statement:*** *The collection of information referred to in this NTL is intended to provide clarification, description, or interpretation of requirements contained in 30 CFR part 250, subparts A, B, and J, and 30 CFR part 251. The Office of Management and Budget (OMB) has approved the information collection requirements in these regulations and assigned OMB Control Numbers 1010-0114, 1010-0151, 1010-0050, and 1010-0048, respectively. This NTL does not impose additional information collection requirements subject to the Paperwork Reduction Act of 1995.*

If you have any questions or need clarification regarding this NTL, please contact the Office of Environmental Evaluation at (805) 389-7800.

Original signed by

OCT 16 2006

Nabil F. Masri  
Chief  
Office of Facilities, Safety, and Enforcement

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Date

This NTL can be found on our Website  
at: <http://www.mms.gov>