

**UNITED STATES DEPARTMENT OF THE INTERIOR  
MINERALS MANAGEMENT SERVICE  
GULF OF MEXICO OCS REGION**

NTL No. 2009-G03

Effective Date: January 27, 2009  
Expiration Date: January 27, 2014

NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL, AND GAS LEASES IN THE  
OUTER CONTINENTAL SHELF (OCS), GULF OF MEXICO OCS REGION

**Synthetic Mooring Systems**

This Notice to Lessees and Operators (NTL) provides guidance on the use of a synthetic mooring system for your permanent production facility or a mobile offshore drilling unit (MODU) and the information you provide to the Minerals Management Service (MMS) Gulf of Mexico OCS Region (GOMR) when you propose the use of a synthetic mooring system.

**Authority**

Pursuant to 30 CFR 250.287, you must submit a deepwater operations plan (DWOP) to the MMS GOMR for each development project for which you will use non-conventional technology, regardless of water depth. In this regard, the MMS GOMR has determined that the use of synthetic mooring systems for permanent production facilities is non-conventional. In such a DWOP, 30 CFR.250.292(c) requires you to provide design, fabrication, and installation information on the mooring system for each surface system; 30 CFR.250.292(n) requires you to provide a discussion of any new technology that affects hydrocarbon recovery; and 30 CFR 250.292(o) requires you to provide a list of any alternate compliance procedures for which you anticipate requesting approval. Furthermore, in accordance with 30 CFR 250.901(a)(8), your plans for platform design must, as appropriate, conform to API RP 2SM, Recommended Practice for Design, Manufacture, Installation, and Maintenance of Synthetic Fiber Ropes for Offshore Mooring, First Edition, and its Addendum dated May 2007.

In accordance with 30 CFR 250.141, MMS requires that “any alternate procedures or equipment that you propose to use must provide a level of safety and environmental protection that equals or surpasses current MMS regulations...to receive approval, you must either submit information or give an oral presentation to the appropriate Supervisor. Your presentation must describe the site-specific application(s), performance characteristics, and safety features of the proposed procedure or equipment.” Synthetic mooring systems for permanent production facilities are considered new technology in the Gulf of Mexico (GOM) and therefore involve the use of alternate procedures and equipment. The pre-setting and/or post-setting of polyester mooring lines on the sea floor for temporary mooring applications is also considered new technology and therefore is subject to approval under 30 CFR 250.141.

In accordance with 30 CFR 250.417(a), you must provide information and data in your Application for Permit to Drill (APD) (Form MMS-123) to demonstrate that a MODU is capable of performing at the proposed drilling location. This includes demonstrating the integrity of the mooring system. In such an APD, 30 CFR 250.414(h) requires you to provide a list and a description of all requests for using alternate procedures or departures from the requirements of 30 CFR 250, Subpart D. Except for this APD, you are not required to make any other requests to the MMS GOMR to pre-/post-lay synthetic mooring lines of a proven design (see definition below) for MODU's.

### **Definition**

***Proven synthetic rope design*** means a complete mooring rope system (splice design, filter barrier, yarn material, construction, jacket, coating, etc.) that has been designed and tested to API RP 2SM or more stringent design criteria and has been previously approved for use in the GOM by the MMS GOMR and the U. S. Coast Guard (USCG). Mooring rope systems that are within 15 percent minimum breaking load (MBL) of a previously tested/installed design approved by the MMS GOMR are considered to be proven.

### **Background**

Pursuant to the Memorandum of Agreement (MOA) between MMS and the USCG (OCS-04: Floating Offshore Facilities), MMS and the USCG have joint responsibility for general mooring and tethering systems for floating production facilities with MMS being the lead agency (Item 4.b of Annex 1). For polyester mooring systems, MMS and the USCG have joint responsibility with the USCG being the lead agency (Item 25.j of Annex 1). Recently, however, MMS and the USCG agreed that MMS would now be responsible for approving synthetic moorings for floating production facilities. A revision to MOA OCS-04, Item 25.j of Annex 1 will be made to reflect this policy change. Nevertheless, be advised that a proposal to use a synthetic mooring system on permanent production facilities will receive a review by both MMS and the USCG.

The MMS GOMR developed an Inspection, Maintenance, Repair, and Replacement Plan (IMRR) in conjunction with the USCG to provide sufficient information to demonstrate that synthetic moorings meet or exceed the safety level necessary for chain/wire rope mooring systems. Effective with this NTL, the IMRR is now referred to as a Supplemental DWOP.

Proposals to use synthetic mooring lines for MODU's do not require you to submit a Supplemental DWOP (formerly IMRR), provided that the lines are not inadvertently dropped to the seafloor. Pre-planned synthetic mooring systems in contact with the seafloor, either pre-laid on top of the seafloor or installed as part of the anchor system below the mudline, are considered new technology and are therefore subject to the alternate compliance requirements of 30 CFR 250.141 which you will address in the APD.

### **Deepwater Operations Plans**

1. If you propose to use a synthetic rope of proven design for a mooring system for a permanent production facility, include the information listed in Appendix A of this NTL as a "synthetic mooring" section in your DWOP for the project.

2. If you propose to use a synthetic rope of unproven design for a mooring system for a permanent production facility, attach a Supplemental DWOP (formally called an IMRR) to the DWOP containing (a) the information listed in Appendix A of this NTL, (b) a discussion of the new technology in accordance with 30 CFR 250.292(n), and (c) a Quality Assurance (QA) Plan statement as information to support your request to use alternate procedures and equipment in accordance with 30 CFR 250.141. Make sure that the new technology discussion provides full details about rope construction and insert testing and that the QA Plan statement certifies that you have developed a QA manual in accordance with API RP 2SM, 2007 Addendum, Section 7.7.2, that you will implement its provisions, and that you will maintain complete records and make them available for review by MMS GOMR personnel. Mooring systems already installed are subject to the provisions and approval conditions of their respective IMRR's.

3. In order to expedite the review process of your DWOP, it would be helpful if the "synthetic mooring" section of the DWOP for proven synthetic rope proposals or the Supplemental DWOP for unproven rope proposals are included as the final section of the DWOP.

4. You may want to consider submitting a hard copy and an electronic version of the "synthetic mooring" section of the DWOP or supplemental DWOP, including any supplements and revisions, to the USCG at the following address to facilitate the review process.

Commanding Officer  
 USCG Marine Safety Center  
 Room JR 10-0525  
 2100 2<sup>nd</sup> Street SW  
 Washington, DC 20593

Do not continue to submit an IMRR as a stand-alone document for proven synthetic mooring system designs to the MMS GOMR.

### **Guidelines for Permanent Production Facilities**

Use of a synthetic mooring system for a permanent production facility in the GOM OCS is subject to the following:

1. Incorporate test inserts at least 45 feet in length into your synthetic mooring system.
  - A. The number of inserts you use is dependent on the design life of the facility. At a minimum, use the following formula to determine the number of inserts:  $\text{Number of inserts} = (\text{Design life} / 5) + 3$ . This allows for one scheduled insert removal every five years plus three inserts reserved for removal after an extreme weather event.
  - B. You may use test inserts of lengths greater than 45 feet. This may allow for better load sharing within the design of the complete mooring system.
  - C. You may cut and re-splice one end of inserts with lengths greater than 45 feet in length for testing purposes.
2. For existing facilities with a currently approved alternate compliance requests, continue to pull and test inserts in accordance with the schedule in your approved DWOP or IMRR

approval letter. However, based on test results, the MMS GOMR may allow you to modify this schedule.

3. For a facility installed after January 1, 2009, you do not need to remove and test inserts on a set schedule, provided that:

A. Facilities and/or mooring lines are instrumented to provide all data needed to evaluate directly met-ocean conditions, tensile loads, and cyclic fatigue. You may calculate elongation based on indicators on the mooring line jacket or uptake in the platform chain needed to maintain a constant tension. The MMS GOMR will evaluate alternate fitness for service monitoring techniques individually; and

B. The instrumentation has the ability to function (using the best of current technology) during extreme conditions such as hurricanes, 1000-year storms, and loop currents since it is critical to the evaluation process for fatigue life estimations; and

C. You follow the guidance listed in Item No. 4 below; and

D. You re-institute a testing schedule if future testing on the currently installed inserts or future research indicates a need to do so.

If the facility does not meet the monitoring provisions listed above, remove an insert once every five years and follow the guidance listed in Item No. 4 below. If you remove an insert because of an extreme storm event, the next scheduled insert removal is five years from that date.

The MMS GOMR recognizes that improved inspection and monitoring instrumentation/techniques will become available in the future. As this technology develops, the MMS GOMR may allow, with approval, you to use the new technologies in place of current technologies.

4. The MMS GOMR will approve your tension monitoring system as part of your DWOP or Supplemental DWOP for facilities installed after January 1, 2009. If during an extreme weather event, the mooring line tension exceeds 70 percent of the polyester rope design MBL as measured by your tension monitoring system, i.e., not an analysis based solely on hindcast data, follow Items A through E below. Facilities installed before January 1, 2009, may use hindcast data with currently installed monitoring systems.

A. Remove and test an insert,

B. Conduct a remotely operated vehicle (ROV) survey after analyzing the mooring line tensions, but before you re-man the platform.

C. Submit plans for additional inspections (as submitted and approved in the DWOP or the Supplemental DWOP, as applicable) within 14 days of the ROV survey.

D. Contact the MMS GOMR with a proposed removal date and procedure (as submitted and approved in the DWOP or Supplemental DWOP, as applicable) or submit an alternate compliance request for a time extension within 30 days after you conduct the ROV survey in accordance with 30 CFR 250.292(n).

E. If the tension monitoring system was not active for the duration of the storm, you may submit an alternate compliance request in accordance with 30 CFR 250.292(o) to utilize hindcast data in lieu of field data for facilities installed after January 1, 2009.

5. Using an ROV, conduct an external visual examination of each synthetic mooring system as follows:

- A. After installation;
- B. After the first year of service;
- C. After the passing of a major storm or other extreme event as directed by the MMS GOMR; and
- D. Concurrent with insert removals or at five-year intervals.

6. For existing facilities, the schedule in your approved DWOP still applies for routine and extreme event insert removals. As new test methods are developed, you may request approval from the MMS GOMR to change your currently approved subrope test plan provided that you propose a minimum of three break tests, one fatigue test, and a visual inspection of insert subropes removed after extreme events for new facilities. If necessary, retain untested subropes for future testing.

7. Items Nos. 1 through 6 above pertain to proven rope designs only. Unproven rope material or designs are subject to additional insert testing as approved by the MMS GOMR during the Supplemental DWOP review process.

8. You may pre-set and/or post-set a synthetic mooring line for permanent facilities on the seafloor provided you:

- A. Indicate such in your DWOP;
- B. Follow the guidelines in Appendix B of this NTL;
- C. If a line is inadvertently dropped to the seafloor, recover it and replace it with a new line;
- D. In accordance with Section 8 of API RP 2SM, 2007 Addendum, if the rope was inadvertently dropped to the seafloor, do not install it into the mooring system unless you prove, through testing, that it maintains at least 90 percent of its original design strength;
- E. Make an alternate compliance request under 30 CFR 250.141 and receive approval from the MMS GOMR before you install a synthetic mooring line which was inadvertently dropped to the seafloor into a mooring system.
- F. Conduct an ROV survey immediately after installation as provided in Item No. 5A above, and if you find any mechanical damage that extends beyond the jacket layer, you replace the rope.

9. When you install synthetic mooring lines, it may be prudent for you to inspect the installation vessel deck for debris which may cause damage to the mooring lines. Follow proper cleaning procedures.

### **Guidance for MODU's**

1. For MODU's, this NTL applies only to pre-setting and/or post setting/contact of synthetic mooring lines on the seafloor. You must obtain approval to drill at a proposed location from the appropriate MMS District Office in accordance with 30 CFR 250.410.

2. Synthetic mooring lines for MODU use may be pre-set and/or post-set on the seafloor provided you follow the guidelines in Appendix B of this NTL and incorporate a proven filter barrier into the rope design.

A. If a synthetic mooring line is inadvertently dropped to the seafloor, recover it to the surface and replace it with a new line for that drilling campaign unless you follow the provisions of Item B below.

B. In accordance with Section 8 of API RP 2SM, 2007 Addendum, do not install a synthetic rope that was inadvertently dropped to the seafloor into the mooring system unless you prove that the rope maintains at least 90 percent of its original design strength. You can satisfy this condition if a thorough visual inspection of the rope is conducted after it is recovered to the surface which shows that no damage extends beyond the filter barrier. If damage does extend beyond the jacket layer, or if you observe other indicators of damage, do not put the rope back into service until you repair the damaged section and restore rope integrity following the conditions of approval in your APD and in accordance with the provisions of NTL No. 2008-G09.

3. In order to demonstrate the integrity of the mooring system in accordance with 30 CFR 250.417 (in addition to the internal rope inspections outlined in Appendix B of this NTL), re-qualify the rope for service using the manufacturer's specifications after no more than 40 handling cycles (one cycle consists of a deployment and retrieval to the surface). For testing purposes, remove a small section of the line (at least 45 feet). This applies to all ropes whether they have been pre-set and/or post-set on the seafloor or not. Fully document each test and retain the records for future reference.

4. You may use synthetic mooring lines with a proven filter barrier designed to be installed below the seafloor as part of an anchor/"mud rope" system provided you meet the following conditions:

A. You obtain approval to drill at the proposed location from the appropriate MMS District Office in accordance with 30 CFR 250.410.

B. After the anchor and mud rope is removed, you visually inspect the rope to ensure that there was no observable damage beyond the jacket layer. Make sure that the anchor/rope supplier documents and maintains records of this visual inspection, including a written report and photographs by a qualified inspector.

C. If damage extends beyond the jacket layer or if you observe other indicators of damage, you do not put the rope back into service until you repair the damaged section and restore rope integrity following the conditions of approval in your APD and in accordance with the provisions of NTL No. 2008-G09.

D. After five years or no more than 20 installations, you re-qualify the "mud rope" for service. In order to re-qualify, remove a representative section from each production run and perform the following tests:

i. A visual examination of the interior of the rope. Emphasis should be on efficiency of the filter barrier. In accordance with API RP 2SM, 2007 Addendum, particles greater than 5 microns should not be observed beyond the filter layer. If particle ingress into the load bearing section is observed, make an alternate compliance request to the appropriate MMS GOMR District Office if you would like to put the synthetic rope back in service. In the alternate compliance request, include any additional testing that may be necessary to prove that the mooring line retains at least 90 percent of the designed MBL.

ii. A minimum of three break tests. In accordance with API RP 2SM, 2007 Addendum, synthetic mooring lines should maintain at least 90 percent of the original MBL in order to be placed in service. If the break strength is less than 90 percent of the designed MBL,

make an alternate compliance request to the appropriate MMS GOMR District Office if you would like to put the synthetic rope back in service.

5. This NTL provides guidance for the use of synthetic MODU mooring lines to make contact with the seafloor, but applies only to rope constructions with a proven filter barrier. Unproven filter barrier designs are subject to approval by the MMS GOMR as new technology via submittal of a Supplemental DWOP.

6. When you install synthetic mooring lines (pre-setting and/or post-setting on the seafloor or other methods), it may be prudent for you to inspect the vessel deck for debris that may cause damage to the mooring lines. Follow proper cleaning procedures.

### **Guidance Document Statement**

The MMS issues NTL's as guidance documents in accordance with 30 CFR 250.103 to clarify, supplement, and provide more detail about certain MMS regulatory requirements and to outline the information you provide in your various submittals. Under that authority, this NTL sets forth a policy on and an interpretation of a regulatory requirement that provides a clear and consistent approach to complying with that requirement. However, if you wish to use an alternate approach for compliance, you may do so, after you receive approval from the appropriate MMS office under 30 CFR 250.141.

### **Paperwork Reduction Act of 1995 Statement**

The 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, D, and I. The Office of Management and Budget (OMB) has approved the information collection requirements in these regulations under OMB control numbers 1010-0114 for Subpart A, 1010-0049 for Subpart B, 1010-141 for Subpart D, and 1010-0149 for Subpart I. This NTL does not impose any information collection requirements subject to the Paperwork Reduction Act of 1995.

### **Contact**

Please contact Christy Bohannon of the MMS GOMR Technical Assessment and Operations Support (TAOS) Section by telephone at (281) 987-6841 or by email at [christy.bohannon@mms.gov](mailto:christy.bohannon@mms.gov) if you have any questions regarding this NTL.

[original signed]

Lars T. Herbst  
Regional Director

Appendices

## Appendix A

### Synthetic Mooring Information in a DWOP

1. General mooring description including:
  - a. Number of lines.
  - b. Rope manufacturer.
  - c. Rope construction (number of subropes, torque matched or torque neutral, filter barrier, jacket design, etc.).
  - d. Yarn manufacturer and properties.
  - e. Rope properties (MBL, stiffness, tension-tension cyclic performance, fatigue testing, etc.).
  - f. Splice design (individual or paired).
  
2. Design met-ocean conditions including:
  - a. 10-year and 100-year hurricane wind, wave, current, period, etc.
    - i. Reference point for wind should be 1 hour at 33 feet above the mean water level.
    - ii. The maximum tension at extreme conditions (generally 100-year hurricane and 100-year loop current).
    - iii. The minimum safety factor achieved at extreme conditions.
    - iv. The maximum tension and minimum safety factor for all lines for both intact and one line damaged conditions.
  - b. 100-year loop current.
  - c. Verification that the mooring line response at the above conditions is within the rope design limits.
  
3. A description of the monitoring systems you will install on the mooring lines including an estimate of the time the system can operate on back-up power (during an abandonment situation). Provide the criteria that will trigger an ROV survey or insert removal (70 percent of polyester design MBL or less or a set of met-ocean conditions). Include a list of suggested tests that you may conduct in the event of a severe storm and indicate the pass/fail criteria. Make sure that these extreme event insert tests include, at minimum, a visual inspection, three break tests, and one fatigue test. Obtain either baseline subrope test results from the manufacturer or a spare insert in case future baseline tests are necessary.
  
4. Results of the testing that was used to qualify the production rope.
  
5. List of standards you used for design purposes (API RP 2SM, ABS, etc.)
  
6. Maximum corrosion allowance for chain/wire components.
  
7. Description of the installation method such as mooring lines
  - a. Installed at the same time as the facility;
  - b. Buoyed off in advance of facility arrival; or
  - c. Pre-set and/or post set on the seafloor.

8. Non-invasive inspection criteria.
  - a. Amount of acceptable twist;
  - b. Level of acceptable damage (jacket damage only); and
  - c. Change in diameter/elongation criteria.
  
9. Conditions for facility shut-in.

## Appendix B

### Conditions for Pre-laying Synthetic Mooring Lines on the Seafloor

1. In accordance with API RP 2SM, 2007 Addendum, use a synthetic rope with a proven filter barrier when you pre-lay synthetic mooring lines. In your DWOP for permanent production facilities, provide new jacket/filter technology along with supporting test data and receive approval from the MMS GOMR before you pre-set and/or post-set mooring lines.
2. In particular, address the recommendations made in Section 8.3.3 of API RP 2SM, 2007 Addendum, including a site survey, damage to the jacket, and filter layer during installation due to abrasion with hard soils and on-bottom stability.
3. For MODU's, use the inspection guidelines for fiber ropes for temporary moorings as discussed in Section 9.3.4 of API RP 2SM, 2007 Addendum.
4. Adhere to the appropriate additional inspection, testing, replacement, and repair guidelines listed in API RP 2SM, 2007 Addendum.
5. Follow the guidance in Section 5.1 of API RP 2I, In-service Inspection of Mooring Hardware for Floating Structures, Third Edition, that states that "individual logs should be kept for each rope which clearly records the history of the rope usage including information such as rope tensions, relevant environmental conditions, and inspection/re-tensioning details on the rope." Make sure that these logs specifically note the job location when synthetic lines are pre-laid (for MODU's), as well as the duration on the seafloor. Keep these logs for at least two years.
6. For MODU's, conduct and record a thorough visual inspection each time the rope is recovered. Compare the inspection results with those from previous inspections and note any discrepancies. For permanent mooring systems, conduct an ROV survey after installation and maintain the records for comparison with future ROV surveys.
7. If damage is found, follow the guidelines set forth in Section 5.3 and Appendix B of API RP 2I. If the damage extends beyond the jacket layer into the load bearing fibers (or major jacket damage is found), cut out and test that section. It is difficult to determine the percent of sub-ropes damaged by visual inspection; therefore, if damage extends beyond the jacket and filter layer, conduct and record testing to prove the rope retains at least 90 percent of the original mean break strength. For MODU's, document all tests and results. For permanent mooring systems, if damage extends beyond the jacket layer into the filter layer or load bearing fibers, replace the damaged rope segment, connector to connector, with a new mooring line. Do not re-use that damaged rope segment at a later date without approval from the MMS GOMR.
8. Conduct a visual rope inspection before you pre-lay the synthetic mooring line (for MODU's and permanent systems) and after recovery (for MODU's). Fully document the inspection and retain the results for future comparison. In addition, take either digital

photographs or make video records of the top, middle, and bottom 20 feet of the mooring line, as well as any other abnormalities you found during the visual inspection before you place it on the seafloor (for MODU's and permanent systems) and after it is recovered (for MODU's). Retain this documentation for at least two years.

9. Adhere to the additional inspection, testing, replacement, and repair guidelines listed in API RP 2I.

10. For temporary mooring systems, perform an internal rope inspection on synthetic mooring lines exposed to the seafloor at least once every five years or after contact with the seafloor 20 times, unless a visual inspection event indicated a need to inspect sooner.

A. Such visual inspection events could be jacket tears or similar visual indicators which would suggest possible damage past the filter barrier.

B. If all ropes of a specific production run exhibit no visual inspection events, three samples from that production run will suffice for the five-year/20-contact internal inspection provided that the MMS GOMR determines that the results are satisfactory. While conducting an internal inspection, place emphasis on the efficiency of the filter barrier. In accordance with API RP 2SM, 2007 Addendum, particles greater than 5 microns should not be observed beyond the filter layer. If particle ingress into the load bearing section is observed, make an alternate compliance request to the appropriate MMS GOMR District Office if you would like to put the synthetic rope back in service. In the alternate compliance request, include any additional testing that may be necessary to prove that the mooring line retains at least 90 percent of the designed MBL.

C. As the rope ages, it may be prudent to test the rope more often. The MMS GOMR may require more frequent testing if future testing shows excessive wear at shorter time durations.

D. As discussed in Item No. 3 in the "Guidance for MODU's" section of this NTL, re-qualify for service one synthetic rope section per production run (pre-/post-set on the seafloor or not) after no more than 40 handling cycles.