Environmental Protection Agency

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PAH mass ratio = Mass (g) of PAH (as phenanthrene)/Mass (g) of stock base fluid as determined by EPA Method 1600. PAH Content of Oil by HPLC/UV. December 1992, which is published in Methods for the Determination of Diesel, Mineral, and Crude Oils in Offshore Oil and Gas Industry Discharges, EPA-821-R-92–008. This incorporation by reference was approved by the Director of the Federal Register and is available at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. A copy may also be inspected at EPA’s Water Docket, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

Drilling fluid sediment toxicity ratio = 4-day LC₅₀ of C₆–C₉ internal olefin/10-day LC₅₀ of stock base fluid as determined by ASTM E 1367–92 (specified at §435.11(e)(ix)) method: Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods,” 1992, after preparing the sediment according to the method specified in appendix 3 of subpart A of this part. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. A copy may also be inspected at EPA’s Water Docket, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

Drilling fluid sediment toxicity ratio = Cumulative gas production (ml) of C₆–C₉ internal olefin/Cumulative gas production (ml) of stock base fluid, both at 275 days as determined by ISO 11734:1995 (specified at §435.11(e)) method: "Standard Guide for Conducting the 'ultimate' anaerobic biodegradability of organic compounds in digested sludge—Method by measurement of the biogas production (1995 edition)" as modified for the marine environment (appendix 4 of subpart A of this part). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA, 19428. Copies may be inspected at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. A copy may also be inspected at EPA's Water Docket, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

Drilling fluid sediment toxicity ratio = 4-day LC₅₀ of C₆–C₉ internal olefin drilling fluid/4-day LC₅₀ of drilling fluid removed from drill cuttings at the solids control equipment as determined by ASTM E 1367–92 (specified at §435.11(e)) method: "Standard Guide for Conducting 10-day Static Sediment Toxicity Tests with Marine and Estuarine Amphipods,” 1992, after preparing the sediment according to the method specified in appendix 3 of subpart A of this part. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA, 19428. Copies may be inspected at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. A copy may also be inspected at EPA's Water Docket, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

As determined before drilling fluids are shipped offshore by the GC/MS compliance assurance method (appendix 5 of subpart A of this part), and as determined prior to discharge by the RPE method (appendix 6 of subpart A of this part) applied to reservoir fluid removed from drill cuttings. If the operator wishes to confirm the results of the RPE method (appendix 6 of subpart A of this part), the operator may use the GC/MS compliance assurance method (appendix 5 of subpart A of this part). Results from the GC/MS compliance assurance method (appendix 5 of subpart A of this part) shall supersede the results of the RPE method (appendix 6 of subpart A of this part).

Maximum permissible retention of non-aqueous drilling fluid (NAF) base fluid on wet drill cuttings averaged over drilling intervals using NAFs as determined by the API retort method (appendix 7 of subpart A of this part). This limitation is applicable for NAF base fluids that meet the base fluid sediment toxicity ratio (Footnote 6), biodegradation rate ratio (Footnote 7), PAH, mercury, and cadmium stock limitations (C₆–C₉ internal olefin) defined above in this table.

11 Maximum permissible retention of non-aqueous drilling fluid (NAF) base fluid on wet drill cuttings averaged over drilling intervals using NAFs as determined by the API retort method (appendix 7 of subpart A of this part). This limitation is applicable for NAF base fluids that meet the base fluid sediment toxicity ratio (Footnote 6), biodegradation rate ratio (Footnote 7), PAH, mercury, and cadmium stock limitations (C₆–C₉ internal olefin) defined above in this table.
7. Sample Collection and Handling

7.1 Sampling containers must be thoroughly washed with detergent, rinsed a minimum of three times with fresh water, and allowed to air dry before samples are collected.

7.2 Samples of drilling fluid to be tested shall be taken at the shale shaker after cuttings have been removed. The sample volume should range between 200 mL and 500 mL.

7.3 Samples of drill cuttings will be taken from the shale shaker screens with a clean spatula or similar instrument and placed in a glass beaker. Cuttings samples shall be collected prior to the addition of any washdown water and should range between 200 g and 500 g.

7.4 Samples of produced sand must be obtained from the solids control equipment from which the discharge occurs on any given day and shall be collected prior to the addition of any washdown water; samples should range between 200 g and 500 g.

7.5 Samples of well treatment, completion, and workover fluids must be obtained from the holding facility prior to discharge; the sample volume should range between 200 mL and 500 mL.

7.6 Samples must be tested no later than 1 hour after collection.

7.7 Drilling fluid samples must be mixed in their sampling containers for 5 minutes prior to the test using a magnetic bar stirrer. If predilution is imposed as a permit condition, the sample must be mixed at the same ratio with the same prediluting water as the discharged muds and stirred for 5 minutes.

7.8 Drill cuttings must be stirred and well mixed by hand in their sampling containers prior to testing, using a stainless steel spatula.

8. Procedure

8.1 Ambient receiving water must be used as the "receiving water" in the test. The temperature of the test water shall be as close as practicable to the ambient conditions in the receiving water, not the room temperature of the observation facility. The test container must have an air-to-liquid interface area of 1000 cm² (155.5 in²), and a depth of at least 13 cm (5 inches) and no more than 30 cm (11.8 inches).

8.2 Plastic liners shall be used, one per test container, and discarded afterwards. Some liners may inhibit spreading of added oil; operators shall determine an appropriate local source of liners that do not inhibit the spreading of the oil film.

8.3 A 15-mL sample of drilling fluid or well treatment, completion, and workover fluids must be introduced by pipette into the test container 1 cm below the water surface. Pipettes must be filled and discharged with
test material prior to the transfer of test material and its introduction into test containers. The test water/test material mixture must be stirred using the pipette to distribute the test material homogeneously throughout the test water. The pipette must be used only once for a test and then discarded.

8.4 Drill cuttings or produced sand should be weighed on plastic weighing boats; 15-g samples must be transferred by scraping test material into the test water with a stainless steel spatula. Drill cuttings shall not be prediluted prior to testing. Also, drilling fluids and cuttings will be tested separately. The weighing boat must be immersed in the test water and scraped with the spatula to transfer any residual material to the test container. The drill cuttings or produced sand must be stirred with the spatula to an even distribution of solids on the bottom of the test container.

8.5 Observations must be made no later than 1 hour after the test material is transferred to the test container. Viewing points above the test container should be made from at least three sides of the test container, at viewing angles of approximately 60° and 30° from the horizontal. Illumination of the test container must be representative of adequate lighting for a working environment to conduct routine laboratory procedures. It is recommended that the water surface of the test container be observed under a fluorescent light source such as a dissecting microscope light. The light source shall be positioned above and directed over the entire surface of the pan.

8.6 Detection of a “silvery” or “metallic” sheen or gloss, increased reflectivity, visual color, iridescence, or an oil slick on the water surface of the test container surface shall constitute a demonstration of “free oil.” These visual observations include patches, streaks, or sheets of such altered surface characteristics. If the free oil content of the sample approaches or exceeds 10%, the water surface of the test container may lack color, a sheen, or iridescence, due to the increased thickness of the film; thus, the observation for an oil slick is required. The surface of the test container shall not be disturbed in any manner that reduces the size of any sheen or slick that may be present.

If an oil sheen or slick occurs on less than one-half of the surface area of the test container after the test material is introduced, discharge of the material shall cease. If the sheen or slick does not increase in size to cover greater than one-half of the test container surface area after one hour of observation, discharge may continue and additional sampling is not required.

If a sheen or slick occurs on greater than one-half of the surface area of the test container after the test material is introduced, discharge of the tested material shall cease. The permittee may retest the material causing the sheen or slick. If subsequent tests do not result in a sheen or slick covering greater than one-half of the surface area of the test container, discharge may continue.

APPENDIX 2 TO SUBPART A OF PART 435—DRILLING FLUIDS TOXICITY TEST

I. Sample Collection

The collection and preservation methods for drilling fluids (muds) and water samples presented here are designed to minimize sample contamination and alteration of the physical or chemical properties of the samples due to freezing, air oxidation, or drying.

I-A. Apparatus

(1) The following items are required for water and drilling mud sampling and storage:
   a. Acid-rinsed linear-polyethylene bottles or other appropriate noncontaminating drilling mud sampler.
   b. Acid-rinsed linear-polyethylene bottles or other appropriate noncontaminating water sampler.
   c. Acid-rinsed linear-polyethylene bottles or other appropriate noncontaminating vessels for water and mud samples.
   d. Ice chests for preservation and shipping of mud and water samples.

I-B. Water Sampling

(1) Collection of water samples shall be made with appropriate acid-rinsed linear-polyethylene bottles or other appropriate non-contaminating water sampling devices. Special care shall be taken to avoid the introduction of contaminants from the sampling devices and containers. Prior to use, the sampling devices and containers should be thoroughly cleaned with a detergent solution, rinsed with tap water, soaked in 10 percent hydrochloric acid (HCl) for 4 hours, and then thoroughly rinsed with glass-distilled water.

I-C. Drilling Mud Sampling

(1) Drilling mud formulations to be tested shall be collected from active field systems. Obtain a well-mixed sample from beneath the shale shaker after the mud has passed through the screens. Samples shall be stored in polyethylene containers or in other appropriate uncontaminated vessels. Prior to sealing the sample containers on the platform, flush as much air out of the container by filling it with drilling fluid sample, leaving a one inch space at the top.