the presence of fluorescence) shall be retained and classified as contaminated samples. Treatment and ultimate fate of these samples is not outlined in this SOP.

15.3 For further information on waste management, consult "The Waste Management Manual for Laboratory Personnel," and "Less is Better: Laboratory Chemical Management for Waste Reduction," both available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th Street, NW, Washington, DC 20036.

16.0 REFERENCES

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16.4 Report of the Laboratory Evaluation of Static Sheen Test Replacements—Reverse Phase Extraction (RPE) Method for Detecting Oil Contamination in Synthetic Based Mud (SBM). October 1998. Available from API, 1220 L Street, NW, Washington, DC 20005–4070, 202–682–8000.

[66 FR 6901, Jan. 22, 2001; 66 FR 30811, June 8, 2001]

APPENDIX 7 TO SUBPART A OF PART 435—DETERMINATION OF THE AMOUNT OF NON-AQUEOUS DRILLING FLUID (NAF) BASE FLUID FROM DRILL CUTTINGS BY A RETORT CHAMBER (DERIVED FROM API RECOMMENDED PRACTICE 13B–2) (EPA METHOD 1674)

1. DESCRIPTION

a. This procedure is specifically intended to measure the amount of non-aqueous drilling fluid (NAF) base fluid from cuttings generated during a drilling operation. This procedure is a retort test which measures all oily material (NAF base fluid) and water released from a cuttings sample when heated in a calibrated and properly operating "Retort" instrument.

b. In this retort test a known mass of cuttings is heated in the retort chamber to vaporize the liquids associated with the sample. The NAF base fluid and water vapors are then condensed, collected, and measured in a precision graduated receiver.

NOTE: Obtaining a representative sample requires special attention to the details of sample handling (e.g., location, method, frequency). See Addendum A and B for minimum requirements for collecting representative samples. Additional sampling procedures in a given area may be specified by the NPDES permit controlling authority.

2. EQUIPMENT

a. Retort instrument—The recommended retort instrument has a 50-cm³ volume with an external heating jacket.

Retort Specifications:

1. Retort assembly—retort body, cup and lid.

(a) Material: 303 stainless steel or equivalent.

(b) Volume: Retort cup with lid.

Cup Volume: 50-cm³.

Precision: ±0.25-cm³.

2. Condenser—capable of cooling the oil and water vapors below their liquification temperature.

3. Heating jacket—nominal 350 watts.

4. Temperature control—capable of limiting temperature of retort to at least 930 °F (500 °C) and enough to boil off all NAFs.

b. Liquid receiver (10-cm³, 20-cm³)—the 10-cm³ and 20-cm³ receivers are specially designed cylindrical glassware with rounded bottom to facilitate cleaning and funnel-shaped top to catch falling drops. For compliance monitoring under the NPDES program, the analyst shall use the 10-cm³ liquid receiver with 0.1 ml graduations to achieve greater accuracy.

1. Receiver specifications:

Total volume: 10-cm³, 20-cm³.

Precision (0 to 100%): ±0.05 cm³, ±0.05 cm³.

Outside diameter: 10-mm, 13-mm.

Wall thickness: 1.5 ±0.1mm, 1.2 ±0.1mm.

Frequency of graduation marks (0 to 100%): 0.10-cm³, 0.10-cm³.

Calibration: To contain "TC" @ 20 °C.

Scale: cm³, cm³

2. Material—Pyrex® or equivalent glass.

c. Toploading balance—capable of weighing 2000 g and precision of at least 0.1 g. Unless motion is a problem, the analyst shall use an electronic balance. Where motion is a problem, the analyst may use a triple beam balance.

d. Fine steel wool (No. 000)—for packing retort body.

e. Thread sealant lubricant: high temperature lubricant, e.g. Never-Seez® or equivalent.

f. Pipe cleaners—to clean condenser and retort stem.

g. Brush—to clean receivers.

h. Retort spatula—to clean retort cup.

i. Corkscrew—to remove spent steel wool.

3. PROCEDURE

a. Clean and dry the retort assembly and condenser.

b. Pack the retort body with steel wool.

c. Apply lubricant/sealant to threads of retort cup and retort stem.

d. Weigh and record the total mass of the retort cup, lid, and retort body with steel wool. This is mass (A), grams.

e. Collect a representative cuttings sample (*see* note in section 1 of this appendix).

f. Partially fill the retort cup with cuttings and place the lid on the cup.

g. Screw the retort cup (with lid) onto the retort body, weigh and record the total mass. This is mass (B), grams.

h. Attach the condenser. Place the retort assembly into the heating jacket.

i. Weigh and record the mass of the clean and dry liquid receiver. This is mass (C), grams. Place the receiver below condenser outlet.

j. Turn on the retort. Allow it to run a minimum of 1 hour.

NOTE: If solids boil over into receiver, the test shall be rerun. Pack the retort body with a greater amount of steel wool and repeat the test.

k. Remove the liquid receiver. Allow it to cool. Record the volume of water recovered. This is mass (V), cm³.

NOTE: If an emulsion interface is present between the oil and water phases, heating the interface may break the emulsion. As a suggestion, remove the retort assembly from the heating jacket by grasping the condenser. Carefully heat the receiver along the emulsion band by gently touching the receiver for short intervals with the hot retort assembly. Avoid boiling the liquids. After the emulsion interface is broken, allow the liquid receiver to cool. Read the water volume at the lowest point of the meniscus.

l. Weigh and record the mass of the receiver and its liquid contents (oil plus water). This is mass (D), grams.

m. Turn off the retort. Remove the retort assembly and condenser from the heating jacket and allow them to cool. Remove the condenser.

n. Weigh and record the mass of the cooled retort assembly without the condenser. This is mass (E), grams.

o. Clean the retort assembly and condenser.

4. CALCULATIONS

a. Calculate the mass of oil (NAF base fluid) from the cuttings as follows:

1. Mass of the wet cuttings sample (M_w) equals the mass of the retort assembly with the wet cuttings sample (B) minus the mass of the empty retort assembly (A).

$M_w = B - A$ [1]

2. Mass of the dry retorted cuttings (M_D) equals the mass of the cooled retort assembly (E) minus the mass of the empty retort assembly (A).

$M_D = E - A$ [2]

3. Mass of the NAF base fluid (M_{BF}) equals the mass of the liquid receiver with its contents (D) minus the sum of the mass of the dry receiver (C) and the mass of the water (V).

$M_{BF} = D - (C + V)$ [3]

NOTE: Assuming the density of water is 1 g/cm³, the volume of water is equivalent to the mass of the water.

b. Mass balance requirement:

The sum of M_D, M_{BF}, and V shall be within 5% of the mass of the wet sample.

$(M_D + M_{BF} + V)/M_w = 0.95$ to 1.05 [4]

The procedure shall be repeated if this requirement is not met.

c. Reporting oil from cuttings:

1. Assume that all oil recovered is NAF base fluid.

2. The mass percent NAF base fluid retained on the cuttings ($\%BF_i$) for the sampled discharge ''i'' is equal to 100 times the mass of the NAF base fluid (M_{BF}) divided by the mass of the wet cuttings sample (M_w).

$\%BF_i = (M_{BF}/M_w) \times 100$ [5]

Operators discharging small volume NAF-cuttings discharges which do not occur during a NAF-cuttings discharge sampling interval (*i.e.*, displaced interfaces, accumulated solids in sand traps, pit clean-out solids, or centrifuge discharges while cutting mud weight) shall either: (a) Measure the mass percent NAF base fluid retained on the cuttings ($\%BF_{SVD}$) for each small volume NAF-cuttings discharges; or (b) use a default value of 25% NAF base fluid retained on the cuttings.

3. The mass percent NAF base fluid retained on the cuttings is determined for all cuttings wastestreams and includes fines discharges and any accumulated solids discharged [*see* Section 4.c.6 of this appendix for procedures on measuring or estimating the mass percent NAF base fluid retained on the cuttings (%BF) for dual gradient drilling seafloor discharges performed to ensure proper operation of subsea pumps].

4. A mass NAF-cuttings discharge fraction (X, unitless) is calculated for all NAF-cuttings, fines, or accumulated solids discharges every time a set of retorts is performed (*see* Section 4.c.6 of this appendix for procedures on measuring or estimating the mass NAF-cuttings discharge fraction (X) for dual gradient drilling seafloor discharges performed to ensure proper operation of subsea pumps). The mass NAF-cuttings discharge fraction (X) combines the mass of NAF-cuttings, fines, or accumulated solids discharged from a particular discharge over a set period of time with the total mass of NAF-cuttings, fines, or accumulated solids discharged into the ocean during the same period of time (*see* Addendum A and B of this appendix). The mass NAF-cuttings discharge

fraction (X) for each discharge is calculated by direct measurement as:

$$X_i = (F_i)/(G) \quad [6]$$

where:

X_i = Mass NAF-cuttings discharge fraction for NAF-cuttings, fines, or accumulated solids discharge "i", (unitless)

F_i = Mass of NAF-cuttings discharged from NAF-cuttings, fines, or accumulated solids discharge "i" over a specified period of time (*see* Addendum A and B of this appendix), (kg)

G = Mass of all NAF-cuttings discharges into the ocean during the same period of time as used to calculate F_i, (kg)

If an operator has more than one point of NAF-cuttings discharge, the mass faction (X_i) must be determined by: (a) Direct measurement (*see* Equation 6 of this appendix); (b) using the following default values of 0.85 and 0.15 for the cuttings dryer (e.g., horizontal centrifuge, vertical centrifuge, squeeze press, High-G linear shakers) and fines removal unit (e.g., decanting centrifuges, mud cleaners), respectively, when the operator is only discharging from the cuttings dryer and the fines removal unit; or (c) using direct measurement of "F_i" (*see* Equation 6 of this appendix) for fines and accumulated solids, using Equation 6A of this appendix to calculate "G_{EST}" for use as "G" in Equation 6 of this Appendix, and calculating the mass (kg) of NAF-cuttings discharged from the cuttings dryer (F_i) as the difference between the mass of "G_{EST}" calculated in Equation 6A of this appendix (kg) and the sum of all fines and accumulated solids mass directly measured (kg) (*see* Equation 6 of this appendix).

G_{EST} = Estimated mass of all NAF-cuttings discharges into the ocean during the same period of time as used to calculate F_i (*see* Equation 6 of this appendix), (kg) [6A]

where:

G_{EST} = Hole Volume (bbl) × (396.9 kg/bbl) × (1 + Z/100)

Z = The base fluid retained on cuttings limitation or standard (%) which apply to the NAF being discharge (*see* §§ 435.13. and 435.15).

Hole Volume (bbl) = [Cross-Section Area of NAF interval (in²)] × Average Rate of Penetration (feet/hr) × period of time (min) used to calculate F_i (*see* Equation 6 of this appendix) × (1 hr/60 min) × (1 bbl/ 5.61 ft³) × (1 ft/12 in)²

Cross-Section Area of NAF interval (in²) = (3.14 × [Bit Diameter (in)]²)/4

Bit Diameter (in) = Diameter of drilling bit for the NAF interval producing drilling cuttings during the same period of time as used to calculate F_i (*see* Equation 6 of this appendix)

Average Rate of Penetration (feet/hr) = Arithmetic average of rate of penetra-

tion into the formation during the same period of time as used to calculate F_i (*see* Equation 6 of this appendix)

NOTE: Operators with one NAF-cuttings discharge may set the mass NAF-cuttings discharge fraction (X_i) equal to 1.0.

5. Each NAF-cuttings, fines, or accumulated solids discharge has an associated mass percent NAF base fluid retained on cuttings value (%BF) and mass NAF-cuttings discharge fraction (X) each time a set of retorts is performed. A single total mass percent NAF base fluid retained on cuttings value (%BF$_T$) is calculated every time a set of retorts is performed. The single total mass percent NAF base fluid retained on cuttings value (%BF$_T$) is calculated as:

$$\%BF_{T,j} = \Sigma(X_i) \times (\%BF_i) \quad [7]$$

where:

$\%BF_{T,j}$ = Total mass percent NAF base fluid retained on cuttings value for retort set "j" (unitless as percentage, %)

X_i = Mass NAF-cuttings discharge fraction for NAF-cuttings, fines, or accumulated solids discharge "i", (unitless)

$\%BF_i$ = Mass percent NAF base fluid retained on the cuttings for NAF-cuttings, fines, or accumulated solids discharge "i" , (unitless as percentage, %)

NOTE: $\Sigma X_i = 1$.

Operators with one NAF-cuttings discharge may set %BF$_{T,j}$ equal to %BF$_i$.

6. Operators performing dual gradient drilling operations may require seafloor discharges of large cuttings (>¼′) to ensure the proper operation of subsea pumps (e.g., electrical submersible pumps). Operators performing dual gradient drilling operations which lead to seafloor discharges of large cuttings for the proper operation of subsea pumps shall either: (a) Measure the mass percent NAF base fluid retained on cuttings value (%BF) and mass NAF-cuttings discharge fraction (X) for seafloor discharges each time a set of retorts is performed; (b) use the following set of default values, (%BF=14%; X=0.15); or (c) use a combination of (a) and (b) (e.g., use a default value for %BF and measure X).

Additionally, operators performing dual gradient drilling operations which lead to seafloor discharges of large cuttings for the proper operation of subsea pumps shall also perform the following tasks:

(a) Use side scan sonar or shallow seismic to determine the presence of high density chemosynthetic communities. Chemosynthetic communities are assemblages of tube worms, clams, mussels, and bacterial mats that occur at natural hydrocarbon seeps or vents, generally in water depths of 500 meters or deeper. Seafloor discharges of large cuttings for the proper operation of subsea pumps shall not be permitted

within 1000 feet of a high density chemosynthetic community.

(b) Seafloor discharges of large cuttings for the proper operation of subsea pumps shall be visually monitored and documented by a Remotely Operated Vehicle (ROV) within the tether limit (approximately 300 feet). The visual monitoring shall be conducted prior to each time the discharge point is relocated (cuttings discharge hose) and conducted along the same direction as the discharge hose position. Near-seabed currents shall be obtained at the time of the visual monitoring.

(c) Seafloor discharges of large cuttings for the proper operation of subsea pumps shall be directed within a 150 foot radius of the wellbore.

7. The weighted mass ratio averaged over all NAF well sections (%BF$_{well}$) is the compliance value that is compared with the "maximum weighted mass ratio averaged over all NAF well sections" BAT discharge limitations (*see* the table in §435.13 and footnote 5 of the table in §435.43) or the "maximum weighted mass ratio averaged over all NAF well sections" NSPS discharge limitations (*see* the table in §435.15 and footnote 5 of the table in §435.45). The weighted mass ratio averaged over all NAF well sections (%BF$_{well}$) is calculated as the arithmetic average of all total mass percent NAF base fluid retained on cuttings values (%BF$_T$) and is given by the following expression:

$$\%BF_{well} = [j=1 \text{ to } j=n \ \Sigma \ (\%BF_{T,j})]/n \quad [8]$$

where:

%BF$_{well}$ = Weighted mass ratio averaged over all NAF well sections (unitless as percentage, %)
%BF$_{T,j}$ = Total mass percent NAF base fluid retained on cuttings value for retort set "j" (unitless as percentage, %)
n = Total number of retort sets performed over all NAF well sections (unitless)

Small volume NAF-cuttings discharges which do not occur during a NAF-cuttings discharge sampling interval (*i.e.*, displaced interfaces, accumulated solids in sand traps, pit clean-out solids, or centrifuge discharges while cutting mud weight) shall be mass averaged with the arithmetic average of all total mass percent NAF base fluid retained

on cuttings values (see Equation 8 of this appendix). An additional sampling interval shall be added to the calculation of the weighted mass ratio averaged over all NAF well sections (%BF$_{well}$). The mass fraction of the small volume NAF-cuttings discharges (X$_{SVD}$) will be determined by dividing the mass of the small volume NAF-cuttings discharges (F$_{SVD}$) by the total mass of NAF-cuttings discharges for the well drilling operation (G$_{WELL}$ + F$_{SVD}$).

$$X_{SVD} = F_{SVD} / (G_{WELL} + F_{SVD}) \quad [9]$$

where:

X$_{SVD}$ = mass fraction of the small volume NAF-cuttings discharges (unitless)
F$_{SVD}$ = mass of the small volume NAF-cuttings discharges (kg)
G$_{WELL}$ = mass of total NAF-cuttings from the well (kg)

The mass of small volume NAF-cuttings discharges (F$_{SVD}$) shall be determined by multiplying the density of the small volume NAF-cuttings discharges (ρ$_{svd}$) times the volume of the small volume NAF-cuttings discharges (V$_{SVD}$).

$$F_{SVD} = \rho_{svd} \times V_{SVD} \quad [10]$$

where:

F$_{SVD}$ = mass of small volume NAF-cuttings discharges (kg)
ρ$_{svd}$ = density of the small volume NAF-cuttings discharges (kg/bbl)
V$_{SVD}$ = volume of the small volume NAF-cuttings discharges (bbl)

The density of the small volume NAF-cuttings discharges shall be measured. The volume of small volume discharges (V$_{SVD}$) shall be either: (a) Be measured or (b) use default values of 10 bbl of SBF for each interface loss and 75 bbl of SBM for pit cleanout per well.

The total mass of NAF-cuttings discharges for the well (G$_{WELL}$) shall be either: (a) Measured; or (b) calculated by multiplying 1.0 plus the arithmetic average of all total mass percent NAF base fluid retained on cuttings values [see Equation 8 of this appendix] times the total hole volume (V$_{WELL}$) for all NAF well sections times a default value for the density the formation of 2.5 g/cm³ (396.9 kg/bbl).

$$G_{WELL} = (1 + ([i=1 \text{ to } j = n \sum(\%BF_{T,j})]/n)) \times V_{WELL}(bbl) \times 396.9(kg/bbl) \quad [11]$$

where:

G$_{WELL}$ = total mass of NAF-cuttings discharges for the well (kg)
[j = 1 to j = n Σ(%BF$_{T,j}$)]/n = see Equation 8 of this appendix (unitless as a percentage)

V$_{WELL}$ = total hole volume (V$_{WELL}$) for all NAF well sections (bbl)

The total hole volume of NAF well sections (V$_{WELL}$) will be calculated as:

$$V_{WELL} \text{ (barrels)} = \sum \frac{\text{Bit diameter (in)}^2}{1029} \times \text{change in measured depth (ft)} \qquad [12]$$

For wells where small volume discharges associated with cuttings are made, $\%BF_{WELL}$ becomes:

$$\%BF_{WELL} = ((1 - X_{SVD}) \times \left[i = 1 \text{ to } j = n \sum \left(\%BF_{T,j} \right) \right] / n \ ] \ ) + X_{SVD} \times \%BF_{SVD} \qquad [13]$$

NOTE: See Addendum A and B to determine the sampling frequency to determine the total number of retort sets required for all NAF well sections.

8. The total number of retort sets (n) is increased by 1 for each sampling interval (*see* Section 2.4, Addendum A of this appendix) when all NAF cuttings, fines, or accumulated solids for that sampling interval are retained for no discharge. A zero discharge interval shall be at least 500 feet up to a maximum of three per day. This action has the effect of setting the total mass percent NAF base fluid retained on cuttings value ($\%BF_T$) at zero for that NAF sampling interval when all NAF cuttings, fines, or accumulated solids are retained for no discharge.

9. Operators that elect to use the Best Management Practices (BMPs) for NAF-cuttings shall use the procedures outlined in Addendum B.

ADDENDUM A TO APPENDIX 7 TO SUBPART A OF PART 435—SAMPLING OF CUTTINGS DISCHARGE STREAMS FOR USE WITH API RECOMMENDED PRACTICE 13B–2

1.0 SAMPLING LOCATIONS

1.1 Each NAF-cuttings waste stream that discharges into the ocean shall be sampled and analyzed as detailed in appendix 7. NAF-cuttings discharges to the ocean may include discharges from primary shakers, secondary shakers, cuttings dryer, fines removal unit, accumulated solids, and any other cuttings separation device whose NAF-cuttings waste is discharged to the ocean. NAF-cuttings wastestreams not directly discharged to the ocean (e.g., NAF-cuttings generated from shake shakers and sent to a cuttings dryer for additional processing) do not require sampling and analysis.

1.2 The collected samples shall be representative of each NAF-cuttings discharge. Operators shall conduct sampling to avoid the serious consequences of error (*i.e.,* bias or inaccuracy). Operators shall collect NAF-cuttings samples near the point of origin and before the solids and liquid fractions of the stream have a chance to separate from one another. For example, operators shall collect shale shaker NAF-cuttings samples at the point where NAF-cuttings are coming off the shale shaker and not from a holding container downstream where separation of larger particles from the liquid can take place.

1.3 Operators shall provide a simple schematic diagram of the solids control system and sample locations to the NPDES permit controlling authority.

2.0 TYPE OF SAMPLE AND SAMPLING FREQUENCY

2.1 Each NAF-cuttings, fines, or accumulated solids discharge has an associated mass percent NAF base fluid retained on cuttings value ($\%BF$) and mass NAF-cuttings discharge fraction (X) for each sampling interval (*see* Section 2.4 of this addendum). Operators shall collect a single discrete NAF-cuttings sample for each NAF-cuttings waste stream discharged to the ocean during every sampling interval.

2.2 Operators shall use measured depth in feet from the Kelly bushing when samples are collected.

2.3 The NAF-cuttings samples collected for the mass fraction analysis (*see* Equation 6, appendix 7 of subpart A of this part) shall also be used for the retort analysis (*see* Equations 1–5, appendix 7 of subpart A of this part).

2.4 Operators shall collect and analyze at least one set of NAF-cuttings samples per day while discharging. Operators engaged in fast drilling (*i.e.,* greater than 500 linear NAF feet advancement of drill bit per day) shall collect and analyze one set of NAF-cuttings samples per 500 linear NAF feet of footage drilled. Operators are not required to collect and analyze more than three sets of NAF-cuttings samples per day (*i.e.,* three sampling intervals). Operators performing zero discharge of all NAF-cuttings (*i.e.,* all NAF cuttings, fines, or accumulated solids retained for no discharge) shall use the following periods to count sampling intervals:

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(1) One sampling interval per day when drilling is less than 500 linear NAF feet advancement of drill bit per day; and (2) one sampling interval per 500 linear NAF feet of footage drilled with a maximum of three sampling intervals per day.

2.5 The operator shall measure the individual masses (F_i, kg) and sum total mass (G, kg) (*see* Equation 6, appendix 7 of subpart A of this part) over a representative period of time (e.g., <10 minutes) during steady-state conditions for each sampling interval (*see* Section 2.4 of this addendum). The operator shall ensure that all NAF-cuttings are capture for mass analysis during the same sampling time period (e.g., <10 minutes) at approximately the same time (*i.e.,* all individual mass samples collected within one hour of each other).

2.6 Operators using Best Management Practices (BMPs) to control NAF-cuttings discharges shall follow the procedures in Addendum B to appendix 7 of subpart A of 40 CFR 435.

3.0 SAMPLE SIZE AND HANDLING

3.1 The volume of each sample depends on the volumetric flow rate (cm³/s) of the NAF-cuttings stream and the sampling time period (e.g., <10 minutes). Consequently, different solids control equipment units producing different NAF-cuttings waste streams at different volumetric flow rates will produce different size samples for the same period of time. Operators shall use appropriately sized sample containers for each NAF-cuttings waste stream to ensure no NAF-cuttings are spilled during sample collection. Operators shall use the same time period (e.g., <10 minutes) to collect NAF-cuttings samples from each NAF-cuttings waste stream. Each NAF-cuttings sample size shall be at least one gallon. Operators shall clearly mark each container to identify each NAF-cuttings sample.

3.2 Operators shall not decant, heat, wash, or towel the NAF-cuttings to remove NAF base fluid before mass and retort analysis.

3.3 Operators shall first calculate the mass of each NAF-cuttings sample and perform the mass ratio analysis (*see* Equation 6, appendix 7 of subpart A of this part). Operators with only one NAF-cuttings discharge may skip this step (*see* Section 4.c.4, appendix 7 of subpart A of this part).

3.4 Operators shall homogenize (e.g., stirring, shaking) each NAF-cuttings sample prior to placing a sub-sample into the retort cup. The bottom of the NAF-cuttings sample container shall be examined to be sure that solids are not sticking to it.

3.5 Operators shall then calculate the NAF base fluid retained on cuttings using the retort procedure (*see* Equations 1–5, appendix 7 of subpart A of this part). Operators shall start the retort analyses no more than two hours after collecting the first individual mass sample for the sampling interval.

3.6 Operators shall not discharge any sample before successfully completing the mass and retort analyses [*i.e.,* mass balance requirements (*see* Section 4.b, appendix 7 of subpart A of this part) are satisfied]. Operators shall immediately re-run the retort analyses if the mass balance requirements (*see* Equation 4, appendix 7 of subpart A of this part) are not within a tolerance of 5% (*see* Section 4.b, Equation 4, appendix 7 of subpart A of this part).

4.0 CALCULATIONS

4.1 Operators shall calculate a set of mass percent NAF base fluid retained on cuttings values (%BF) and mass NAF-cuttings discharge fractions (X) for each NAF-cuttings waste stream (*see* Section 1.1 of this addendum) for each sampling interval (*see* Section 2.4 of this addendum) using the procedures outlined in appendix 7 of subpart A of this part.

4.2 Operators shall tabulate the following data for each individual NAF-cuttings sample: (1) Date and time of NAF-cuttings sample collection; (2) time period of NAF-cuttings sample collection (*see* Section 3.1 of this addendum); (3) mass and volume of each NAF-cuttings sample; (4) measured depth (feet) at NAF-cuttings sample collection (*see* Section 2.2 of this addendum); (5) respective linear feet of hole drilled represented by the NAF-cuttings sample (feet); and (6) the drill bit diameter (inches) used to generate the NAF-cuttings sample cuttings.

4.3 Operators shall calculate a single total mass percent NAF base fluid retained on cuttings value (%BF$_T$) for each sampling interval (*see* Section 2.4 of this addendum) using the procedures outlined in appendix 7 of subpart A of this part.

4.4 Operators shall tabulate the following data for each total mass percent NAF base fluid retained on cuttings value (%BF$_T$) for each NAF-cuttings sampling interval: (1) Date and starting and stopping times of NAF-cuttings sample collection and retort analyses; (2) measured depth of well (feet) at start of NAF-cuttings sample collection (*see* Section 2.2 of this addendum); (3) respective linear feet of hole drilled represented by the NAF-cuttings sample (feet); (4) the drill bit diameter (inches) used to generate the NAF-cuttings sample cuttings; and (5) annotation when zero discharge of NAF-cuttings is performed.

4.5 Operators shall calculate the weighted mass ratio averaged over all NAF well sections (%BF$_{well}$) using the procedures outlined in appendix 7 of subpart A of this part.

4.6 Operators shall tabulate the following data for each weighted mass ratio averaged over all NAF well sections (%BF$_{well}$) for each NAF well: (1) Starting and stopping dates of NAF well sections; (2) measured depth (feet)

of all NAF well sections; (3) total number of sampling intervals (*see* Section 2.4 and Section 2.6 of this addendum); (4) number of sampling intervals tabulated during any zero discharge operations; (5) total volume of zero discharged NAF-cuttings over entire NAF well sections; and (6) identification of whether BMPs were employed (*see* Addendum B of appendix 7 of subpart A of this part).

ADDENDUM B TO APPENDIX 7 TO SUBPART A OF PART 435—BEST MANAGEMENT PRACTICES (BMPS) FOR USE WITH API RECOMMENDED PRACTICE 13B–2

1.0 OVERVIEW OF BMPs

1.1 Best Management Practices (BMPs) are inherently pollution prevention practices. BMPs may include the universe of pollution prevention encompassing production modifications, operational changes, material substitution, materials and water conservation, and other such measures. BMPs include methods to prevent toxic and hazardous pollutants from reaching receiving waters. Because BMPs are most effective when organized into a comprehensive facility BMP Plan, operators shall develop a BMP in accordance with the requirements in this addendum.

1.2 The BMP requirements contained in this appendix were compiled from several Regional permits, an EPA guidance document (*i.e.*, Guidance Document for Developing Best Management Practices (BMP)'' (EPA 833–B–93–004, U.S. EPA, 1993)), and draft industry BMPs. These common elements represent the appropriate mix of broad directions needed to complete a BMP Plan along with specific tasks common to all drilling operations.

1.3 Operators are not required to use BMPs if all NAF-cuttings discharges are monitored in accordance with appendix 7 of subpart A of this part.

2.0 BMP PLAN PURPOSE AND OBJECTIVES

2.1 Operators shall design the BMP Plan to prevent or minimize the generation and the potential for the discharge of NAF from the facility to the waters of the United States through normal operations and ancillary activities. The operator shall establish specific objectives for the control of NAF by conducting the following evaluations.

2.2 The operator shall identify and document each NAF well that uses BMPs before starting drilling operations and the anticipated total feet to be drilled with NAF for that particular well.

2.3 Each facility component or system controlled through use of BMPs shall be examined for its NAF-waste minimization opportunities and its potential for causing a discharge of NAF to waters of the United States due to equipment failure, improper operation, natural phenomena (e.g., rain, snowfall).

2.4 For each NAF wastestream controlled through BMPs where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances to result in NAF reaching surface waters, the BMP Plan shall include a prediction of the total quantity of NAF which could be discharged from the facility as a result of each condition or circumstance.

3.0 BMP PLAN REQUIREMENTS

3.1 The BMP Plan may reflect requirements within the pollution prevention requirements required by the Minerals Management Service (*see* 30 CFR 250.300) or other Federal or State requirements and incorporate any part of such plans into the BMP Plan by reference.

3.2 The operator shall certify that its BMP Plan is complete, on-site, and available upon request to EPA or the NPDES Permit controlling authority. This certification shall identify the NPDES permit number and be signed by an authorized representative of the operator. This certification shall be kept with the BMP Plan. For new or modified NPDES permits, the certification shall be made no later than the effective date of the new or modified permit. For existing NPDES permits, the certification shall be made within one year of permit issuance.

3.3 The BMP Plan shall:

3.3.1 Be documented in narrative form, and shall include any necessary plot plans, drawings or maps, and shall be developed in accordance with good engineering practices. At a minimum, the BMP Plan shall contain the planning, development and implementation, and evaluation/reevaluation components. Examples of these components are contained in ''Guidance Document for Developing Best Management Practices (BMP)'' (EPA 833–B–93–004, U.S. EPA, 1993).

3.3.2 Include the following provisions concerning BMP Plan review.

3.3.2.1 Be reviewed by permittee's drilling engineer and offshore installation manager (OIM) to ensure compliance with the BMP Plan purpose and objectives set forth in Section 2.0.

3.3.2.2 Include a statement that the review has been completed and that the BMP Plan fulfills the BMP Plan purpose and objectives set forth in Section 2.0. This statement shall have dated signatures from the permittee's drilling engineer and offshore installation manager and any other individuals responsible for development and implementation of the BMP Plan.

3.4 Address each component or system capable of generating or causing a release of

significant amounts of NAF and identify specific preventative or remedial measures to be implemented.

4.0 BMP PLAN DOCUMENTATION

4.1 The operator shall maintain a copy of the BMP Plan and related documentation (e.g., training certifications, summary of the monitoring results, records of NAF-equipment spills, repairs, and maintenance) at the facility and shall make the BMP Plan and related documentation available to EPA or the NPDES Permit controlling authority upon request.

5.0 BMP PLAN MODIFICATION

5.1 For those NAF wastestreams controlled through BMPs, the operator shall amend the BMP Plan whenever there is a change in the facility or in the operation of the facility which materially increases the generation of those NAF-wastes or their release or potential release to the receiving waters.

5.2 At a minimum the BMP Plan shall be reviewed once every five years and amended within three months if warranted. Any such changes to the BMP Plan shall be consistent with the objectives and specific requirements listed in this addendum. All changes in the BMP Plan shall be reviewed by the permittee's drilling engineer and offshore installation manager.

5.3 At any time, if the BMP Plan proves to be ineffective in achieving the general objective of preventing and minimizing the generation of NAF-wastes and their release and potential release to the receiving waters and/or the specific requirements in this addendum, the permit and/or the BMP Plan shall be subject to modification to incorporate revised BMP requirements.

6.0 SPECIFIC POLLUTION PREVENTION REQUIREMENTS FOR NAF DISCHARGES ASSOCIATED WITH CUTTINGS

6.1 The following specific pollution prevention activities are required in a BMP Plan when operators elect to control NAF discharges associated with cuttings by a set of BMPs.

6.2 Establishing programs for identifying, documenting, and repairing malfunctioning NAF equipment, tracking NAF equipment repairs, and training personnel to report and evaluate malfunctioning NAF equipment.

6.3 Establishing operating and maintenance procedures for each component in the solids control system in a manner consistent with the manufacturer's design criteria.

6.4 Using the most applicable spacers, flushes, pills, and displacement techniques in order to minimize contamination of drilling fluids when changing from water-based drilling fluids to NAF and vice versa.

6.5 A daily retort analysis shall be performed (in accordance with appendix 7 to subpart A of part 435) during the first 0.33 X feet drilled with NAF where X is the anticipated total feet to be drilled with NAF for that particular well. The retort analyses shall be documented in the well retort log. The operators shall use the calculation procedures detailed in appendix 7 to subpart A of part 435 (*see* Equations 1 through 8) to determine the arithmetic average (%BF$_{well}$) of the retort analyses taken during the first 0.33 X feet drilled with NAF.

6.5.1 When the arithmetic average (%BF$_{well}$) of the retort analyses taken during the first 0.33 X feet drilled with NAF is less than or equal to the base fluid retained on cuttings limitation or standard (*see* §§ 435.13 and 435.15), retort monitoring of cuttings may cease for that particular well. The same BMPs and drilling fluid used during the first 0.33 X feet shall be used for all remaining NAF sections for that particular well.

6.5.2 When the arithmetic average (%BF$_{well}$) of the retort analyses taken during the first 0.33 X feet drilled with NAF is greater the base fluid retained on cuttings limitation or standard (*see* §§ 435.13 and 435.15), retort monitoring shall continue for the following (second) 0.33 X feet drilled with NAF where X is the anticipated total feet to be drilled with NAF for that particular well. The retort analyses for the first and second 0.33 X feet shall be documented in the well retort log.

6.5.2.1 When the arithmetic average (%BF$_{well}$) of the retort analyses taken during the first 0.66 X feet (*i.e.*, retort analyses taken from first and second 0.33 X feet) drilled with NAF is less than or equal to the base fluid retained on cuttings limitation or standard (*see* §§ 435.13 and 435.15), retort monitoring of cuttings may cease for that particular well. The same BMPs and drilling fluid used during the first 0.66 X feet shall be used for all remaining NAF sections for that particular well.

6.5.2.2 When the arithmetic average (%BF$_{well}$) of the retort analyses taken during the first 0.66 X feet (*i.e.*, retort analyses taken from first and second 0.33 X feet) drilled with NAF is greater than the base fluid retained on cuttings limitation or standard (*see* §§ 435.13 and 435.15), retort monitoring shall continue for all remaining NAF sections for that particular well. The retort analyses for all NAF sections shall be documented in the well retort log.

6.5.3 When the arithmetic average (%BF$_{well}$) of the retort analyses taken over all NAF sections for the entire well is greater that the base fluid retained on cuttings limitation or standard (*see* §§ 435.13 and 435.15), the operator is in violation of the base fluid retained on cuttings limitation or standard and shall submit notification of these monitoring values in accordance with

NPDES permit requirements. Additionally, the operator shall, as part of the BMP Plan, initiate a reevaluation and modification to the BMP Plan in conjunction with equipment vendors and/or industry specialists.

6.5.4 The operator shall include retort monitoring data and dates of retort-monitored and non-retort-monitored NAF-cuttings discharges managed by BMPs in their NPDES permit reports.

6.6 Establishing mud pit and equipment cleaning methods in such a way as to minimize the potential for building-up drill cuttings (including accumulated solids) in the active mud system and solids control equipment system. These cleaning methods shall include but are not limited to the following procedures.

6.6.1 Ensuring proper operation and efficiency of mud pit agitation equipment.

6.6.2 Using mud gun lines during mixing operations to provide agitation in dead spaces.

6.6.3 Pumping drilling fluids off of drill cuttings (including accumulated solids) for use, recycle, or disposal before using wash water to dislodge solids.

[66 FR 6901, Jan. 22, 2001; 66 FR 30811, June 8, 2001]

APPENDIX 8 TO SUBPART A OF PART 435—REFERENCE C_{16}–C_{18} INTERNAL OLEFIN DRILLING FLUID FORMULATION

The reference C_{16}–C_{18} internal olefin drilling fluid used to determine the drilling fluid sediment toxicity ratio and compliance with the BAT sediment toxicity discharge limitation (*see* § 435.13) and NSPS (*see* § 435.15) shall be formulated to meet the specifications in Table 1 of this appendix.

Drilling fluid sediment toxicity ratio = 4-day LC_{50} of C_{16}-C_{18} internal olefin drilling fluid/4-day LC_{50} of drilling fluid removed from drill cuttings at the solids control equipment as determined by EPA Method 1644: ''Method for Conducting a Sediment Toxicity Test with *Leptocheirus plumulosus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds'' after sediment preparation procedures specified in EPA Method 1646, which are published as appendices to Subpart A of this part and in ''Analytic Methods for the Oil and Gas Extraction Point Source Category,'' EPA–821–R–11–004. See § 435.11(ee) and (uu).

TABLE 1—PROPERTIES FOR REFERENCE C_{16}–C_{18} IOS SBF USED IN DISCHARGE SEDIMENT TOXICITY TESTING

Mud weight of SBF discharged with cuttings (pounds per gallon)	Reference C_{16}–C_{18} IOs SBF (pounds per gallon)	Reference C_{16}–C_{18} IOs SBF synthetic to water ratio (%)
8.5–11	9.0	75/25
>11–14	11.5	80/20
>14	14.5	85/15
Plastic Viscosity (PV), centipoise (cP)	12–30	
Yield Point (YP), pounds/100 sq. ft	10–20	
10-second gel, pounds/100 sq. ft	8–15	
10-minute gel, pounds/100 sq. ft	12–30	
Electrical stability, V	>300	

[66 FR 6901, Jan. 22, 2001, as amended at 77 FR 29845, May 18, 2012]

Subpart B [Reserved]

Subpart C—Onshore Subcategory

§ 435.30 Applicability; description of the onshore subcategory.

The provisions of this subpart are applicable to those facilities engaged in the production, field exploration, drilling, well completion and well treatment in the oil and gas extraction industry which are located landward of the inner boundary of the territorial seas as defined in 40 CFR 125.1(gg) and which are not included within subpart D, E, or F, *Provided, however,* That the applicability of this subpart to (a) facilities in existence on April 13, 1979 or thereafter engaged in the production, field exploration, drilling, well completion and well treatment in the oil and gas extraction industry which are located on land and which would have been considered ''coastal'' as defined under the interim final regulations for this industry (40 CFR 435.41, 41 FR 44942, October 13, 1976) or which are (b)