

## **Summary**

WPX Energy will be using a synthetic based mud to drill the curve and lateral portion of the GM 704-32-9-HMB2 well on the GM 41-4 Pad after setting and cementing intermediate casing. The synthetic based mud will be better suited for the high temperatures that we are seeing in the laterals and will also provide lubricity to reduce torque and drag. The best practices listed below will be used for surface management of the fluid. Cuttings generated while using the synthetic based mud will be temporarily stored on location using cuttings boxes before being transported to the commercial solid waste disposal facility listed below:

Greenleaf Environmental Services LLC  
15655 45 ½ Road  
Debeque, CO 81630  
970-283-8992

### **WPX Horizontal Synthetic Based Mud Best Practices**

1. Regularly scheduled safety meetings with rig and vendor staff to discuss operations around SBM, proper handling of the product and necessary PPE.
2. Place a spill containment liner under the rig pit system. A spill containment liner will also be used under all uprights and mixing tanks.
3. A Katch Kan Zero Spill System or equivalent will be utilized under the sub-structure so that if anything is spilled on connections it can be easily transferred back into the system and cleaned up with floor dry.
4. All transfer hoses will be checked to insure that the cam-lock couplings have gaskets prior to connection.
5. Mud hoses shall be new or like new with hydraulically crimped-on hose ends. King nipples or hose clamps shall not be used.
6. All gates must be closed, chained and locked. They should be sealed with silicone caulking or packed tightly with fresh gel. This is done to insure that no leakage will occur after the SBM is transferred into the active pit system.
7. Drip pans will be placed to catch any potential spills.
8. Drip pans will also be placed in the loading and unloading area.
9. Standalone vacuum unit will be deployed to clean up fluids.
10. Cuttings will be sampled to see if they meet any of the standards set forth in the COGCC Table 910-1 regarding surface management.
11. SBM cuttings will be managed separately from cuttings created during the use of water based mud. The cuttings will be temporarily stored in cuttings boxes before being transported to a commercial solid waste disposal facility.
12. Any cuttings dropped or mud spilled shall be immediately cleaned up and placed in the cuttings boxes.
13. Prior to skidding or moving the rig to another well or well pad, the pumps, pump lines and tanks shall be cleaned to ensure that no SBM is in the system during surface and intermediate drilling operations of a new well.

### **BLM Specific Additional Information**

All spills in excess of one barrel outside the containment devices shall be reported to the BLM within 24 hours.

The BLM shall be notified 24 hours prior to the use of SBM by calling the PET notification phone number (970) 876-9064. For work to commence on a Monday, notice shall be provided to the BLM no later than close of business (COB) on the previous Thursday.

### **COGCC Specific Additional Information**

A closed loop system must be implemented during drilling; or, if a drilling pit is constructed, an amended Form 2A must be submitted and a Form 15 submitted if operator plans on using either oil based mud or high chloride/TDS mud. The pit must be lined. All cuttings generated during drilling with oil based mud or high chloride/TDS mud must be kept in the lined drilling pit (if permitted and constructed), tanks/containers, or placed on a lined/bermed portion of the well pad; prior to disposition. The moisture content of any drill cuttings in a cuttings containment area or pile shall be as low as practicable to prevent accumulation of liquids greater than de minimis amounts. At the time of closure, if the drill cuttings are to be left onsite, they must also meet the applicable standards of table 910-1.

Representative cuttings samples will be analyzed for all Table 910-1 constituents. Any material which does not meet Table 910-1 criteria will either be manifested and disposed offsite at an approved commercial facility, sent to a permitted WPX Cuttings Management Trench for additional amending (Form 4 Sundry must be submitted and approved), or amended further onsite to comply with Table 910-1. If operator determines that long-term onsite management of oil based mud or high chloride/TDS mud cuttings is necessary, an approved Form 27 remediation plan will be required. All liners associated with oil based or high chloride/TDS drilling mud and cuttings must be disposed of offsite per CDPHE rules and regulations.

**Table 910-1  
CONCENTRATION LEVELS<sup>1</sup>**

Contaminant of Concern	Concentrations
<b>Organic Compounds in Soil</b>	
TPH (total volatile and extractable petroleum hydrocarbons)	500 mg/kg
Benzene	0.17 mg/kg <sup>2</sup>
Toluene	85 mg/kg <sup>2</sup>
Ethylbenzene	100 mg/kg <sup>2</sup>
Xylenes (total)	175 mg/kg <sup>2</sup>
Acenaphthene	1,000 mg/kg <sup>2</sup>
Anthracene	1,000 mg/kg <sup>2</sup>
Benzo(A)anthracene	0.22 mg/kg <sup>2</sup>
Benzo(B)fluoranthene	0.22 mg/kg <sup>2</sup>
Benzo(K)fluoranthene	2.2 mg/kg <sup>2</sup>
Benzo(A)pyrene	0.022 mg/kg <sup>2</sup>
Chrysene	22 mg/kg <sup>2</sup>
Dibenzo(A,H)anthracene	0.022 mg/kg <sup>2</sup>
Fluoranthene	1,000 mg/kg <sup>2</sup>
Fluorene	1,000 mg/kg <sup>2</sup>
Indeno(1,2,3,C,D)pyrene	0.22 mg/kg <sup>2</sup>
Napthalene	23 mg/kg <sup>2</sup>
Pyrene	1,000 mg/kg <sup>2</sup>
<b>Organic Compounds in Ground Water</b>	
Benzene	5 µg/l <sup>3</sup>
Toluene	560 to 1,000 µg/l <sup>3</sup>
Ethylbenzene	700 µg/l <sup>3</sup>
Xylenes (Total)	1,400 to 10,000 µg/l <sup>3,4</sup>
<b>Inorganics in Soils</b>	
Electrical Conductivity (EC)	<4 mmhos/cm or 2x background
Sodium Adsorption Ratio (SAR)	<12 <sup>5</sup>
pH	6-9
<b>Inorganics in Ground Water</b>	
Total Dissolved Solids (TDS)	<1.25 x background <sup>3</sup>
Chlorides	<1.25 x background <sup>3</sup>
Sulfates	<1.25 x background <sup>3</sup>
<b>Metals in Soils</b>	
Arsenic	0.39 mg/kg <sup>2</sup>
Barium (LDNR True Total Barium)	15,000 mg/kg <sup>2</sup>
Boron (Hot Water Soluble)	2 mg/l <sup>3</sup>
Cadmium	70 mg/kg <sup>3,6</sup>
Chromium (III)	120,000 mg/kg <sup>2</sup>
Chromium (VI)	23 mg/kg <sup>2,6</sup>
Copper	3,100 mg/kg <sup>2</sup>
Lead (inorganic)	400 mg/kg <sup>2</sup>
Mercury	23 mg/kg <sup>2</sup>
Nickel (soluble salts)	1,600 mg/kg <sup>2,6</sup>
Selenium	390 mg/kg <sup>2,6</sup>
Silver	390 mg/kg <sup>2</sup>
Zinc	23,000 mg/kg <sup>2,6</sup>
<b>Liquid Hydrocarbons in Soils and Ground Water</b>	
Liquid hydrocarbons including condensate and oil	Below detection level