

WPX Energy will be using a synthetic based mud to drill the curve and lateral portion of the GM 706-4 HN2 and GM 703-4 HN1 wells 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 will be managed on surface to achieve the standards listed in Table 910-1 of the COGCC Rules. If these standards cannot be met, the cuttings will be hauled to a commercial solid waste disposal facility.

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 needed
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. 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.
6. Drip pans will be placed to catch any potential spills.
7. Drip pans will also be placed in the in the loading and unloading area.
8. Standalone vacuum unit will be deployed to clean up fluids
9. SBM cuttings will be managed separately from cuttings created during the use of water based mud. Testing will take place on surface to determine if cuttings from the synthetic based mud can effectively be managed on surface. If not, the cuttings will be transported to a commercial solid waste disposal facility.
10. Cuttings Management Plans

Plan A

Cuttings generated during drilling with synthetic mud will be run through a vertical dryer that will reduce moisture content to as low as 3-5%. These dry cuttings can be temporarily managed in the same small management area on the MV 28-4 where we are mixing/drying the water-based cuttings, or they can just be hauled down the GM 41-4. At the 41-4, the cuttings from synthetic mud drilling will be stored separately from those generated during water-based mud drilling, and they'll be stored in a bermed area lined with an impervious liner. Cuttings from both types of drilling will be sampled and analyzed for Table 910-1 compliance, and once COGCC confirms compliance with their standards, the two types of cuttings can be combined and will be buried at the 41-4. The liner that was used for storage of the synthetic mud cuttings will be disposed of or recycled separately.

Plan B

Cuttings generated during drilling with synthetic mud will be run through a vertical dryer, and if that process does not reduce mud content enough to dry the cuttings out sufficiently, some cuttings management will occur on the MV 28-4. Cuttings can be temporarily managed in the same small management area on the 28-4 where we were mixing/drying the water-based cuttings, or they can be managed in a cuttings bin if there's potential for recovering additional synthetic mud from the cuttings. Clean fill from the excess stockpile at the pad or another drying agent, such as eco-sponge, may be used to dry cuttings prior to hauling them to the GM 41-4. At the 41-4, the cuttings from synthetic mud drilling will be stored separately from those generated during water-based mud drilling, and they'll be stored in a bermed area lined with an impervious liner. Cuttings from both types of drilling will be sampled and analyzed for Table 910-1 compliance, and additional remediation will take place using treatment products and methods that have previously been approved by BLM CRVFO for soil and cuttings remediation. Once COGCC confirms that all cuttings meet Table 910-1 standards, the two types of cuttings can be combined and will be buried at the 41-4. The liner that was used for storage of the synthetic mud cuttings will be disposed of or recycled separately.

Plan C

Cuttings generated during drilling with synthetic mud will be run through a vertical dryer, and if that process does not reduce mud content enough to dry the cuttings out sufficiently, some cuttings management will occur on the MV 28-4. Cuttings with significant synthetic mud content will be managed in a cuttings bin to facilitate the recovery of as much synthetic mud from the cuttings as possible. If cuttings with significant synthetic mud content must be managed in the same small management area on the 28-4 where we were mixing/drying the water-based cuttings, an 18-24" depression will be excavated in to the pad surface, and it will be filled with a "liner" of cuttings from the water-based mud drilling to protect subsoils from synthetic mud that may leach out of the cuttings during management. Clean fill from the excess stockpile at the pad or another drying agent, such as eco-sponge, may be used to dry cuttings prior to hauling them to the GM 41-4. At the 41-4, the cuttings from synthetic mud drilling will be stored separately from those generated during water-based mud drilling, and they'll be stored in a bermed area lined with an impervious liner. Cuttings from both types of drilling will be sampled and analyzed for Table 910-1 compliance, and cost/feasibility analysis will be conducted to determine whether cuttings generated during drilling with synthetic mud can be remediated and disposed of on site. If they can't be, they'll be hauled to a approved disposal facility, and only cuttings generated during drilling with water-based mud that meet Table 910-1 standards will be buried at the 41-4. The liner that was used for storage of the synthetic mud cuttings will be disposed of or recycled separately.

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 LEVELS¹

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