



WPX ENERGY

WASTE MANAGEMENT PLAN

For

GM 21-12 Well Pad

1058 County Road 215
Parachute, CO 81635-0370

April 29, 2014

1.0 Introduction

This Material Management Plan (Plan) provides a description of the management procedures for Exploration and Production Waste (E&P waste) generated at the GM 21-12 well pad during drilling, completion, and production operations conducted by WPX Energy (WPX).

This Plan is being prepared and submitted for COGCC approval to satisfy the COGCC Form 2A COA (document #400400234).

2.0 Management of E&P Waste

E&P waste will be managed in accordance with the 900 Series Rules of the Colorado Oil and Gas Conservation Commission (COGCC), as amended April 1, 2009. Each waste stream generated during operations conducted at the GM 21-12 well pad is described in sections below.

2.1 Drilling Mud

Drilling mud is used to cool the bit, stabilize the sides of the borehole, control downhole pressure, and transport the cuttings from the bit to the surface for removal. This is accomplished as the drilling mud is circulated down through the drill pipe and bit, and then upward through the annular space between the drill pipe and formation wall. Upon return to the surface, the drill cuttings are separated from the drilling mud using solids control equipment (one or more shale shakers, centrifuges, desander/desilters). After passing through solids control equipment located either at the rig site or at a Centralized E&P Waste Management Facility, the drilling mud is stored in mud tanks and then reused at another drilling location.

2.2 Drill cuttings

Cuttings are generated during the drilling process when the drill bit grinds rock into smaller particles. Drill cuttings are continuously produced as downhole drilling advances, therefore, cuttings are continuously carried to the surface and discharged during the drilling process. The drill cuttings range in size from large particles centimeters (cm) in size to small particles less than a millimeter (mm) in size (fines). Drill cuttings generated during drilling of proposed wells will be managed and disposed of on the surface in a cuttings management area as shown on Plat #2 Location Layout.

Cuttings and drilling mud carried to the surface passes through a drying shaker to separate liquids from solids. The cuttings then fall into a catch bin and depending on the moisture content of the cuttings, fill dirt, cut/dry, sawdust, or other drying agent is mixed in to begin the drying process. When the catch bin is filled, the cuttings are transported to a permitted, designated cuttings management area.

When the drilling activities are completed cuttings are tested for contaminants listed in the COGCC Table 910-1 to confirm that they meet the COGCC cleanup thresholds. WPX Energy has several options to treat drill cuttings that exceed Table 910-1 contaminant concentration levels; however, even after treatment most drill cuttings may still exceed the Table 910-1 acceptable concentration levels for arsenic and select inorganic parameters (pH, SAR, and EC).

- (1) **Moisture control for transportation and reclamation.** Cuttings are often blended first with sawdust and/or excess clean soil (not topsoil) excavated and stockpiled during pad/trench construction. Blending has an added benefit of reducing slightly elevated organic contaminant concentrations in the cuttings. Blending with clean soil dilutes and reduces elevated concentrations to acceptable levels before the cuttings/soil mix is disposed of in a cuttings trench at depths below the major rooting zone for plants.¹
- (2) **Arsenic.** Drill cuttings that exceed Table 910-1 concentration levels for arsenic are evaluated by comparison to site-specific background analytical data. Data collection, data analysis, and documentation of cuttings that exceed Table 910-1 concentrations for arsenic are reported to the COGCC environmental staff via Sundry Notice Form 4 prior to the reclamation of the site.
- (3) **Inorganics.** Cuttings that exceed Table 910-1 concentration levels for inorganics (pH, SAR, and EC), which were established to be protective of vegetative growth, are allowed to be buried in cuttings pits or trenches at depths of at least three (3) feet below the ground surface to avoid potential adverse impacts to the growth of vegetation.
- (4) **Organic Compounds.** Organic compounds in cuttings is be treated either by adding clean soil and/or by the use of microorganisms, also known as bioremediation, biological treatment, or biotreatment, which is a natural treatment process whereby microorganisms in or added to the soil breakdown residual petroleum hydrocarbons into

¹Bansal and Sugiarto 1999

carbon dioxide and water. Any residual hydrocarbons that may be detected in the cuttings above Table 910-1 concentration levels are treated by adding or cultivating bacteria to the cuttings to degrade hydrocarbons and reduce TPH concentrations. The objective of biotreatment is to accelerate the natural decomposition process by adding or cultivating bacterial populations and controlling certain parameters such as oxygen, temperature and moisture in the cuttings.

2.3 Frac Sand

Frac sand is generated during completion operations and is managed on the well pad surface inside a bermed containment. The volume of frac sand that comes back during flowback operations is unknown until the actual operations occur. When the completion operations are finished, frac sand is either disposed of at an approved commercial facility or amended with clean soil to treat elevated hydrocarbon concentrations and then screened for total petroleum hydrocarbon to ensure compliance with the COGCC Table 910-1 standards. Frac sand that is in compliance with the COGCC requirements is incorporated into interim reclamation of the well pad.

2.4 Produced Water

Produced water is generated as a byproduct during oil and gas production activities. Produced water is present in the same zones as natural gas and oil. Water is brought to the surface with the natural pressure of a well and flows through separators where it is unloaded into produced water tanks. Produced water tanks are monitored for produced water levels and when they get full, produced water is either piped or trucked off to the following sites:

1. transported to one of WPX's permitted multi-well pits, special purpose pits, or frac tanks where produced water is stored and cleaned for recycling during completion operations,
2. transported to one of WPX's centralized E&P WMF where produced water is further purified and recycled for completion operations, or
3. injected into permitted WPX's Class II UIC wells.
4. Remaining produced water that cannot be injected into WPX Energy owned and operated Class II UIC wells is hauled to an approved third party disposal sites