

PROPOSED WASTE MANAGEMENT BMPS

Drilling Operations

- A. A closed-loop drilling system will be employed and drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) will be temporarily stored in bermed secondary containment on the pad surface. The cuttings containment will be monitored daily by onsite personnel to prevent accumulation of liquids greater than de minimis amounts. Any liquids removed from this containment will be treated as E&P waste and disposed of in accordance with COGCC rules.
- B. Cuttings will be sampled and assessed for either beneficial reuse at the location and/or offsite disposal at commercial facility. The final decision regarding which option will be utilized will be based on analytics, site characteristics, operations logistics, etc.
- C. After sampling is complete and both the analytical results and the topography of the location support the beneficial reuse option, the cuttings will be amended on the well pad. The cuttings will be amended using native soils and/or commercially available products. After the treatment, the amended cuttings will be sampled again for compliance with Table 910-1 Concentration Levels. If analytical results indicate compliance with Table 910-1 Concentration levels, this material will be treated as non-waste and utilized in onsite interim reclamation activities. If this amended material does not meet the COGCC's Concentration Levels, the material will undergo further treatment to meet Concentration Levels for beneficial reuse or be transported to an authorized waste facility in accordance with all Federal and State regulations.
- D. If analytical results, site characteristics, operations logistics, etc. do not support beneficial reuse of the cuttings on location, the cuttings will be transported and disposed of at an authorized waste facility in accordance with all Federal and State regulations.
- E. The drilling fluids will be recycled and reused at another drilling location or properly disposed of at a commercial facility.

Completion Operations

- A. A completion pit (396' x 63' x 15', approximate capacity of 40,154 bbls) will be utilized to store water for well completion operations. The pit will double-lined with a leak detection system and designed and constructed in accordance with good engineering practices and manufacturer specifications. All field and manufacturer welds will be air lance tested and have non-destructive strength tests performed prior to the pit going into service.
- B. The use of the completion pit will result in the reduction or elimination of heavy truck traffic; allow the reuse and recycling of production water which conserves the use of fresh water sources; allows large, temporary storage volumes of water to expedite the well completion process; reduces the potential for spills or releases; and creates less impact to the working surface of the well pad than large tank farms with the expansive piping systems and surface area that they require.
- C. The completion pit will be located in cut material, inboard of the location along the side of the pad and will be constructed so as to prevent any accidental discharges. Pit walls will be sloped no greater than 1 ^{1/2}:1 and a minimum of 2 feet of freeboard will be maintained in the pit at all times during completion operations. Spoils from the pit construction will be stockpiled within a drainage control berm or other appropriate BMPs and placed along the edge of the pit and adjacent to the edge of the well pad.
- D. Vanguard will install and maintain adequate measures to exclude all types of wildlife (e.g., big game and birds) from all pits with fencing, flagging and other appropriate exclusion measures.

- E. Flowback activities will be performed utilizing green completion practices per NSPS OOOO and COGCC rules. Well effluent containing more than ten (10) barrels per day of condensate or within two(2) hours after first encountering hydrocarbon gas of salable quality would be directed to a combination of sand traps, separators, surge vessels, and tanks or other equipment as needed to ensure safe separation of sand, hydrocarbon liquids, water, and gas and to ensure salable products are efficiently recovered for sale or conserved and that non-salable products are disposed of in a safe and environmentally responsible manner. The gaseous phase of effluent may be directed to a temporary vertical flare or vented from tanks for safety purposes until flammable gas is encountered. A temporary lined surface containment may be placed on the pad to store recovered flowback sands for offsite disposal at a commercial facility.
- F. All flowback water would be initially directed to a series of tanks for additional separation of water, condensate and sand. After flowing through a series of tanks, the flowback water will be discharged to the completions pit. The pit will be monitored throughout the flowback process for accumulations of oil or condensate. Accumulations of oil or condensate observed within the completions pit will be removed in accordance with the requirements of COGCC Rules. The water in the pit will then be pumped into a pipeline system for either re-use and recycling or disposal at one the approved facilities listed below. The pipeline system is part of the existing water management system in use throughout the asset. This pipeline system connects producing locations with any of the four existing injection well facilities. This water management system also allows for treated water stored at these facilities to be pumped to new locations for reuse and recycling during completion operations. The use of this proven process and system eliminates the heavy truck use and traffic to transport the water off the location.
- G. Water not re-used or recycled will be disposed of in one of the facilities below:

Disposal Facilities
1. Circle B Land 33A-35-692SWD, API# 05-045-18493, UIC# 159277 2. GGU Rodreick #21B-31-691 SWD, API# 05-045-13803, UIC# 159176 3. Specialty #13A-28-692 SWD, API# 05-045-14054, UIC# 159212 4. Scott 41D-36-692 SWD, API# 05-045-11169, UIC# 159159

- H. After flowback operations are complete on the location, all water will be removed from the pit via pumps and a buried pipeline system. The liners will then be removed, baled and sent to either a recycler or co-processed. Confirmation soil samples will from the bottom of the pit to confirm compliance with COGCC Concentration Levels.
- I. If it is safe and technically feasible, closed-top tanks would utilize backpressure systems that exert a minimum of four (4) ounces of backpressure and a maximum that does not exceed the pressure rating of the tank to facilitate gathering and combustion of tank vapors. Vent/backpressure values, the combustor, lines to the combustor, and knock-outs would be sized and maintained so as to safely accommodate any surges the system may encounter.

GENERAL

- A. Any spills of oil, gas, salt water or other produced fluids would be remediated and reported as defined by the COGCC.
- B. Any chemicals used in the drilling or completions process will be managed in accordance with EPA, COGCC and CDPHE regulations. Safety Data Sheets (SDS) will be kept on location and will provide chemical and exposure information and response procedures in the event of a spill.
- C. Chemicals on the EPA's Consolidated List of Chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) in quantities over 10,000 pounds that may be used, produced, stored, transported or disposed of annually in association with the drilling, testing or completion of each well include diesel fuel, hydrochloric acid and silica sand. This material would be consumed in the drilling and completion process. No extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported or disposed of in association with the drilling, testing or completion of the well. Diesel will be used on the surface only for fueling equipment and will not be used downhole.