

Extraction Oil & Gas, LLC E&P Waste Management Plan

In compliance with COGCC Rules 907 and 1000 Series Reclamation Regulations, and the Drill Cuttings Management Policy (9/15/14), the following describes Extraction Oil & Gas, LLC's general plan for handling and disposing of E&P waste, including drilling mud and cuttings.

Water-based Bentonitic Drilling Fluids

Water-based bentonitic drilling fluids will be hauled off site by a licensed third party transporter to be re-used by spreading on COGCC approved land-farms per Rule 907.d., and as previously submitted by plan (attached).

Water-based Bentonitic Drill Cuttings

Water-based bentonitic drill cuttings will either be hauled off site by a licensed third party transporter to be re-used by land application on COGCC approved land-farms, or recycled and re-used on location using Bio-Remediation per Rule 907.a., and as previously submitted by plan (attached).

Oil-based Drilling Fluids

Oil-based drilling fluids will be hauled off site by a licensed third party transporter to be disposed of at a properly permitted commercial waste facility per Rule 907.e.

Oil-based Drill Cuttings

Oil-based drill cuttings will be hauled off site by a licensed third party transporter to be disposed of at a properly permitted commercial waste facility per or recycled and reused on location using Bio-Remediation, per Rules 907.a. and 907.e., and as previously submitted by plan.

Land Application of Water-Based Bentonitic Drilling Fluids

This document outlines the operational requirements to be used when applying water-based Bentonitic drilling fluids and associated drill cuttings to private land application sites to maintain compliance with COGCC Rules 907 and 1000 Series Reclamation Regulations, and the Drill Cuttings Management Policy (9/15/14). These materials are being applied as a beneficial soil amendment.

The land application site covered under this Waste Management Plan is detailed in Table 1. Only water-based Bentonitic drilling fluids and associated drill cuttings generated by Extraction Oil and Gas, LLC (Extraction) will be applied at this site. No other E&P waste shall be deposited at this site. Changes to Table 1 will be provided to the COGCC in a Form 4 Sundry Notice.

Mud Disposal:	Offsite
Method:	Land Application
Transporter:	Wright Choice, Inc. Jeff Wright (970)739-9973

Land Application Site (Private)

1. Extraction shall obtain written authorization from the surface owner prior to land application of water-based Bentonitic drilling fluids and associated drill cuttings. The signed agreement shall state that only Extraction-generated materials will be accepted and that incorporation of the material will occur within 10 days of application
2. A 3-inch maximum lift of water-based Bentonitic drilling fluids and associated drill cuttings will be applied to this site. The volume of material transported to the land application site will be tracked to help ensure the 3-inch maximum lift is not exceeded.
3. Concentrations of contaminants of concern shall not exceed the levels in COGCC Table 910-1 after incorporation into native soil.
4. Daily tracking tickets will be used and will include the following information:
 - a. Name of well where material was generated.
 - b. Date of transfer of the material from the well to the spread Land Application Site.
 - c. Volume of material taken to the Land Application Site.
 - d. Name of transporter.
5. Extraction personnel will ensure the material will be incorporated into the soil within 10 days, site and weather conditions permitting.

Table 1
Land Application Site Location(s)

<u>Facility Name</u>	<u>Facility ID #</u>	<u>Legal Description</u>
Extraction Windsor Land Application	433752	SWSW Sec. 11 T8N R68W

On-site Bio-Remediation for Drill Cuttings

This document outlines the operational requirements to be used when applying bio-remediation techniques to maintain compliance with COGCC Rules 907 and 1000 Series Reclamation Regulations, and the Drill Cuttings Management Policy (9/15/14).

1. Mixing and Treatment:
 - A. All cuttings shall be mixed on location
 - B. Cuttings shall be mixed with additives. The amount of additives shall be determined based on laboratory analysis of untreated cuttings.
 - C. Mixing shall be performed with equipment to ensure contact between the cuttings and additives
 - D. Additives
 - i. CMC – polymer absorbent, non-toxic, non-hazardous
 - ii. Oppenheimer Piranha – bioremediation of hydrocarbons
 - iii. Water soluble calcium – chemical reduction of SAR
2. Stockpile Management:
 - A. Treated, solidified cuttings shall be stored on location in individual well stockpiles. One stockpile per well. Each stockpile shall be marked with the name of the well.
 - B. Stockpiles shall be windrows with a height as tall as practical. Taller windrows aid in the retention of warmth increasing microbial activity
 - C. Leachate shall be managed by absorbent material. The inherent properties of CMC reduces leachate levels of TDS to below standards based on laboratory analysis.
 - D. An earthen berm, one foot in height, shall be constructed around the stockpile(s) to minimize storm water runoff
 - E. As the solidified cuttings dry, a protective crust layer will form on the surface of the stockpile. This crust layer helps retain moisture and heat within the stockpile while also protecting the native landscape from windborne contaminated particulate. Care shall be taken by the Operator and all contractors to minimize stockpile disturbance until a properly trained soil sampling technician visits the site.
3. Sampling & Testing:
 - A. The stockpile of treated cuttings will be sampled and tested according to standard laboratory and sampling protocols and COGCC table 910-1. Stockpiles will be sampled in increments no greater than 100 cubic yards. Ten samples shall be taken from each segment of the stockpile of treated drill cuttings, mixed and then

one composite sample will be used for testing. Samples will be taken from the stockpile in such a way as to preserve any potential volatile organic compounds. Ten random samples shall be taken of the stockpile of subsoil for use as a source for background data.

- B. After the cuttings have achieved the threshold limits specified in table 910-1, the treated material will be thin spread on the well site and incorporated into the reclamation fill material.
- C. A permanent record of the laboratory analysis shall be maintained by the Operator.