

Bill Barrett Corporation

Land Application of Water-Based Bentonitic Drilling Fluids & Associated Drill Cuttings

Krier #4 Spreadfield COGCC Facility ID 454282

This document outlines the operational practices that will be employed when applying water-based bentonitic drilling fluids and associated drill cuttings via land application at the above referenced location. These practices will be employed to maintain compliance with the Colorado Oil and Gas Conservation Commission (COGCC) Rule 907.d.(3) and COGCC Policy on Drill Cuttings Management dated September 15, 2014. These materials are applied as a beneficial soil amendment.

Only water-based bentonitic drilling fluids and drill cuttings generated by Bill Barrett Corporation (BBC) will be applied at this site. No other E&P waste shall be deposited at this site. The plan detailed below follows the COGCC Land Application Plan Checklist, which is included as Attachment 1.

Disposal Location Information

1. Facility entrance is located at 40.473856, -104.204372. The center of the facility is located at 40.477333, -104.197561
2. Map illustrating section and surface water features is included as an attachment.
3. The land use is crop land - dry land agricultural, and non-crop land - rangeland.
4. Weld County Assessor's data lists the land use as agricultural. Mr. Krier has indicated that he intends to convert the rangeland portion of the acreage to dry land agricultural use. The clay rich properties of the mud and cuttings will benefit the sandy soils through the introduction of the bentonite based clays to help stabilize the soil and increase water retention in the soils. The site will be returned to dry land agriculture use following land application closure.
5. The proposed land application site is not in a sensitive area (determined utilizing COGCC GIS mapping data). Depth to groundwater is estimated to be greater than 74 feet (Water Well Permit # 259305 located north of spreadfield). The soil type is vona loamy sand and ascalon sandy loam (determined utilizing COGCC GIS mapping data). The soil will be incorporated onsite and mixed until soil concentrations are below table 910-1, thus the risk to migration to groundwater is minimal.

6. The land application facility is not in a mapped Sensitive Wildlife Habitat or Restricted Surface Occupancy as defined by mapped areas on COGCC GIS Online map.
7. Background arsenic and COGCC Table 910-1 metals (excluding Boron), pH, electrical conductivity (EC), and sodium adsorption ratio (SAR) soil concentrations were collected and additional background samples will be collected adjacent to the land application site as needed. Ongoing oil and gas activities are occurring at the Carlson #22-1, E2NW of Section 22-T6N-R61W; therefore, baseline hydrocarbon concentrations were collected (see attached).
8. The surface owner is Michael Krier and can be contacted at (970)396-5598. BBC and the surface owner entered into an agreement signed 3/8/2018.
9. When requested by the COGCC, BBC shall arrange access to the site via Michael Krier.
10. The site is located in unincorporated Weld County. Land application is consistent with local zoning land use policy.
11. The site is on private property and no sign preventing access from the public is necessary at this time.
12. The native soil will have the added benefit of increased clay content. When the site is converted back to dry land farming the soil will retain more moisture, which will enhance dry land farming practices.

Material Volume

1. Approximately 30,000 yards of cuttings and 100,000 bbls of bentonitic drilling fluids will be applied to the land application facility in 2018.

Material Handling

1. The cuttings will be stacked and dried as they come off the rig. Sawdust, EcoSponge, or another solidification/drying product will be utilized. The cuttings will be staged at the drill site in a bermed storage area prior to beneficial reuse.
2. The material will be stockpiled onsite in a bermed storage area. The material will be solidified onsite and then trucked to the land application facility. There is no indication that material will need to be separated and disposed of at a different facility.

3. The volume of material will be documented during drilling activities. The volume will be calculated based on drilling plans and saved by BBC in the well files. Manifests will be created for trucking as an additional tracking measure.
4. Solidification will occur as the cuttings and drilling fluids come off the rig. The cuttings will be staged in a bermed area. The cuttings will be transported to the land application site and evenly distributed in a lift not to exceed 3-inches. The soil will be disked to ensure proper incorporation within 10 days of application. A water truck will be utilized if dust suppression is needed. The material shall remain stockpiled at the drilling location in an onsite berm until weather permits incorporation without interruption.
5. The facility will not receive fluids/cuttings for more than three years from the date of first use.

Post Application Sampling and Closure Requirements

1. During closeout, soil samples will be collected from a depth of 0-8 inches bgs. All soil samples will be analyzed for total petroleum hydrocarbons (TPH), including gasoline range organics (GRO) and diesel range organics (DRO). Soil samples will also be analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), electrical conductivity (EC), sodium adsorption ratio (SAR), pH, and arsenic. Soil samples will be collected until compliance with Table 910-1 standards is achieved. The attached Site Map illustrates proposed soil sample locations.
2. To receive closure BBC shall:
 - Submit a Form 4 to the COGCC
 - Submit sample results and sample map.
 - Verify soils comply with Table 910-1.
 - Verify that all cuttings and fluids have been thoroughly incorporated.
 - Verify that sediment controls have been removed.
 - Verify that the surface owner is satisfied with the final condition of the property.
 - Verify that surface reclamation has been performed.

Attachments:

- Figure 1 – Site Location Map
- Figure 2 – Site Map
- Figure 3 – Soil Location Map
- Attachment 1 – COGCC Land Application Plan Checklist
- Attachment 2 – Soil Samples Analytical Results

- Attachment 3 – Surface Owner Land Application Agreement

FIGURES

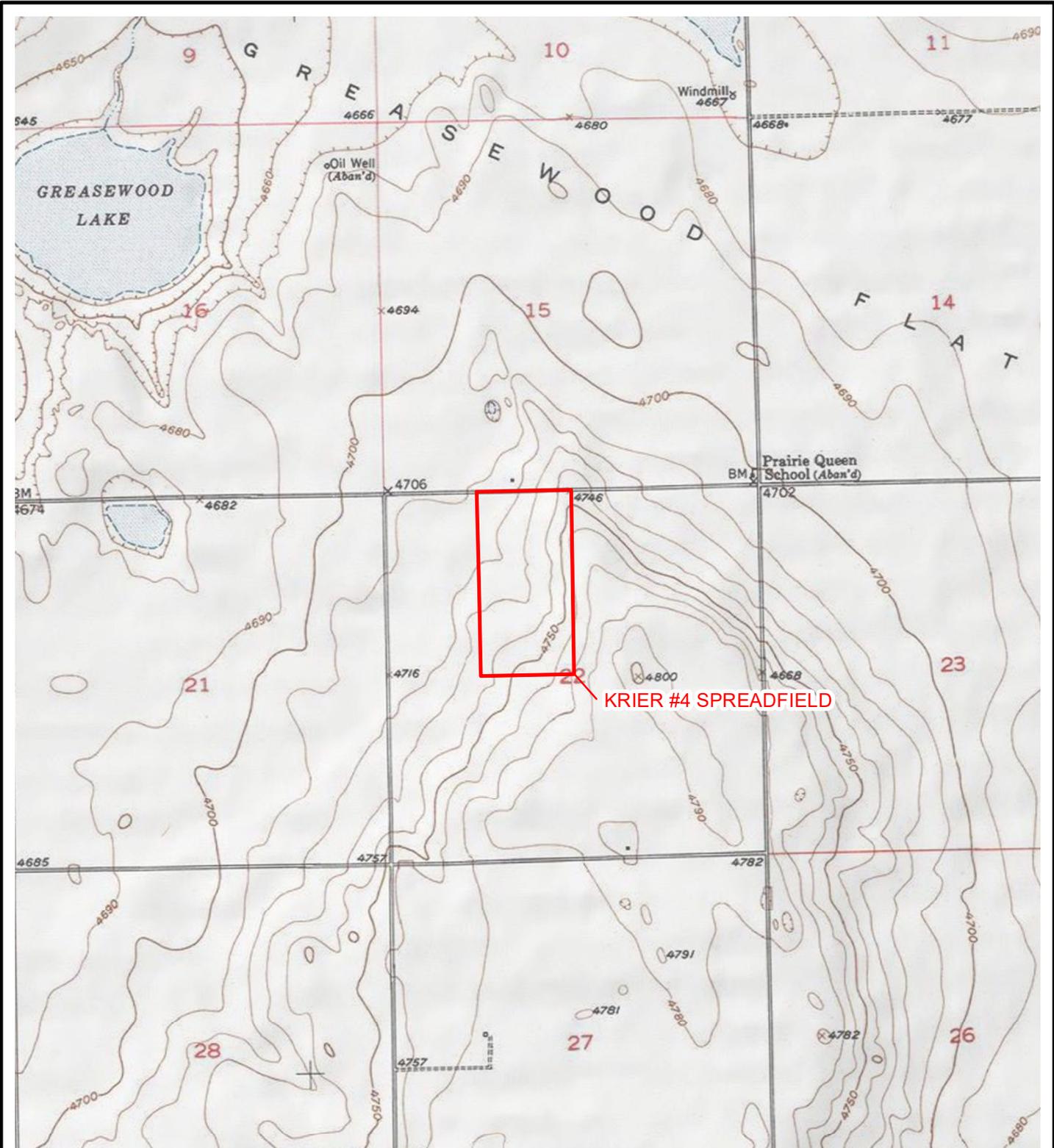
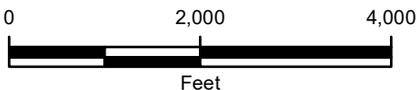


IMAGE COURTESY OF ESRI/USGS

LEGEND

 SPREADFIELD BOUNDARY



COLORADO

FIGURE 1
SITE LOCATION MAP
KRIER #4 SPREADFIELD
SEC 22-T6N-R61W
WELD COUNTY, COLORADO
BILL BARRETT CORPORATION





IMAGE COURTESY OF ESRI

LEGEND

- ▲ GRAB SOIL SAMPLE
- COMPOSITE SOIL SAMPLE
- SPREADFIELD BOUNDARY

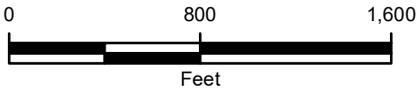


FIGURE 2
SITE MAP
KRIER #4 SPREADFIELD
SEC 22-T6N-R61W
WELD COUNTY, COLORADO
BILL BARRETT CORPORATION



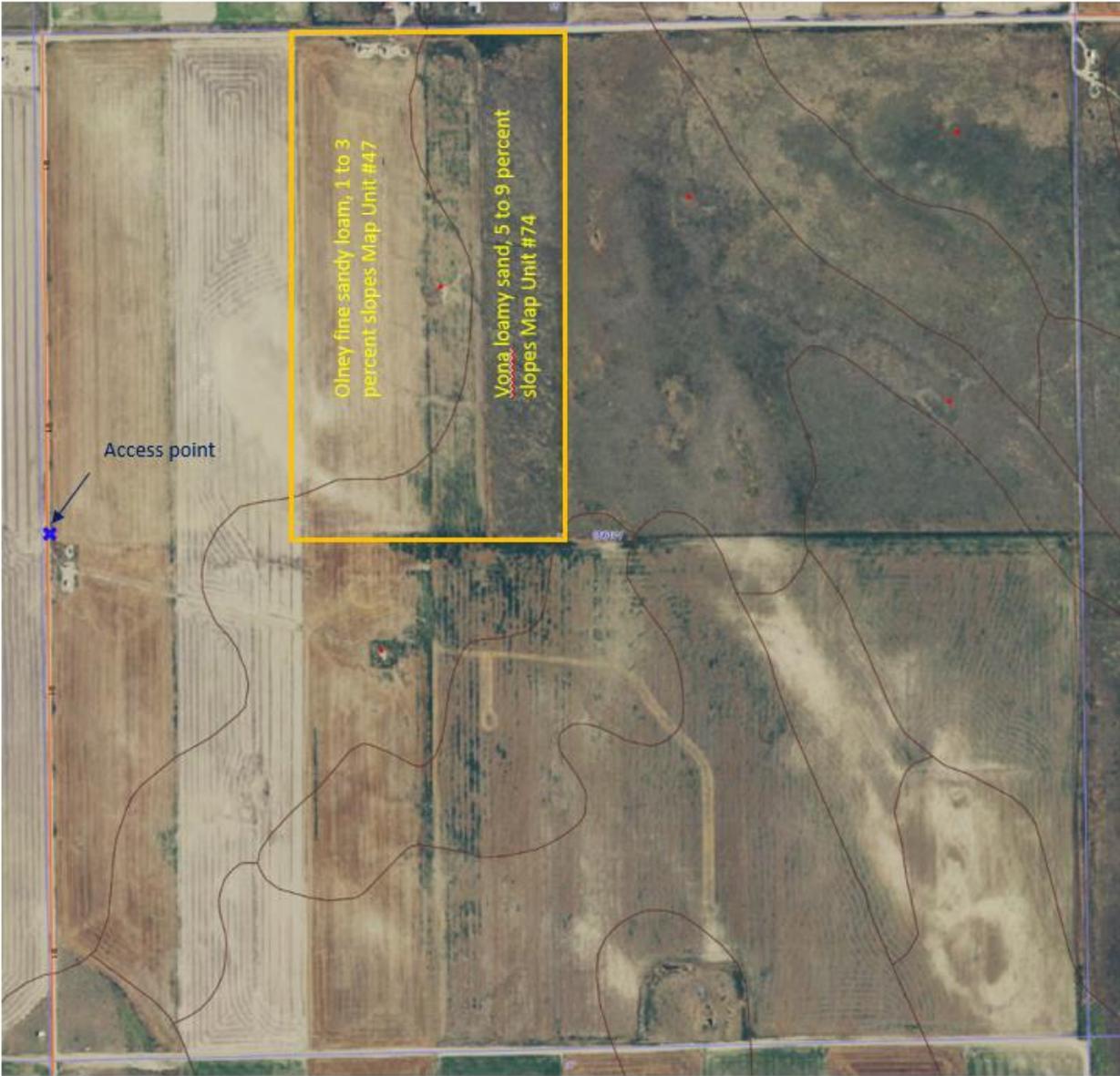


FIGURE 3
SOIL LOCATION MAP
KRIER #4 SPREADFIELD
SEC 22-T6N-R61W
WELD COUNTY, COLORADO