

**Bill Barrett Corporation**

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

**Sandy Hill 5-61-29 Spreadfield (Facility ID: 448950)**

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. The facility entrance is located at 40.378286, -104.223786. The center of the facility is located at 40.3766194, -104.23077.
2. A map illustrating section and surface water features is included as an attachment.
3. The land use is agricultural per Weld County Assessor's data.
4. Per the enclosed letter, the Surface Owner intends to plant a crop after cuttings application. The beneficial use is to improve soil conditions so that the land can be farmed. The sandy soils are less than ideal for cultivated agriculture. The application of cuttings and mud will positively amend the soil to improve erosion resistance and water retention and allow the planting of crops.
5. The proposed land application site is not in a sensitive area. Depth to groundwater is estimated to be greater than 100 feet based on the nearest water well permit (permit 221096). The soil type is valent sand. 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. No previous oil and gas activities have been conducted onsite, therefore, no baseline hydrocarbon concentrations will be collected.
8. The Surface Owner is Sandy Hill Land, LLC and can be contacted at 303-898-0989. BBC and the Surface Owner entered into an agreement signed December 29, 2016.
9. BBC shall arrange access via Sandy Hill when requested by the COGCC.
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 to crop, the soil will retain more moisture, which will enhance future cultivation 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 being trucked to the land application facility for beneficial reuse.
2. 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.
3. 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. 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.

4. The facility will not receive fluids/cuttings for more than three years from the date of first use.

### **Offset Building Unit Mitigation**

The closest building unit on the east end of the property is owned by Sandy Hill. Sandy Hill intends to make improvements to the home to rent it out. Any occupants will be made aware of the land spreading and rental will be conditioned on their acceptance of the activity.

Various mitigation strategies will none the less be employed. First, the material will be applied to narrow, 10 acre strips to minimize the potential for dust generation. While tilling to incorporate cuttings, as much of the existing vegetation as possible will be left on the surface to reduce the possibility that either the soil or the applied material will be eroded by wind. The application will occur at the far west end of the property to keep activity as far from the building units as possible. The COGCC guidance of incorporating cuttings within 10 days of application will be followed. If it appears that the erosion is occurring, the soil will be mulched by tilling corn stalks into the near surface soils. This practice has been effective in preventing wind erosion even on the slopes of reclaimed locations in the area.

Overall or regionally, the traffic will be reduced as these lands are closer to future drilling operations than those presently used for land application. More locally, the northern gate on the east side of the Sandy Hill property will be used to limit the proximity of the trucks to the southern building unit. The number of trucks that will access the property is also relatively limited. We expect that approximately only three loads of cuttings per week will be off loaded. If multiple loads will arrive one the day under conditions that dust could be generated, water will be applied to road on the property.

We do not expect the cuttings to generate significant odors. They do not produce significant odors as produced and do not bear significant hydrocarbons or other organic matter that would generate odors during decomposition. Further odor mitigation is not necessary.

### **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. As the Surface Owner intends to plant a crop after amending the soil, a reclamation plan is not applicable.
3. 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.

Attachment 1

Figure 1 – Site Location Map

Figure 2 – Site Map

Attachment 2

Soil Samples Analytical Results

Attachment 3

Surface Owner Land Application Agreement

Surface Owner Intent Letter – Land Application

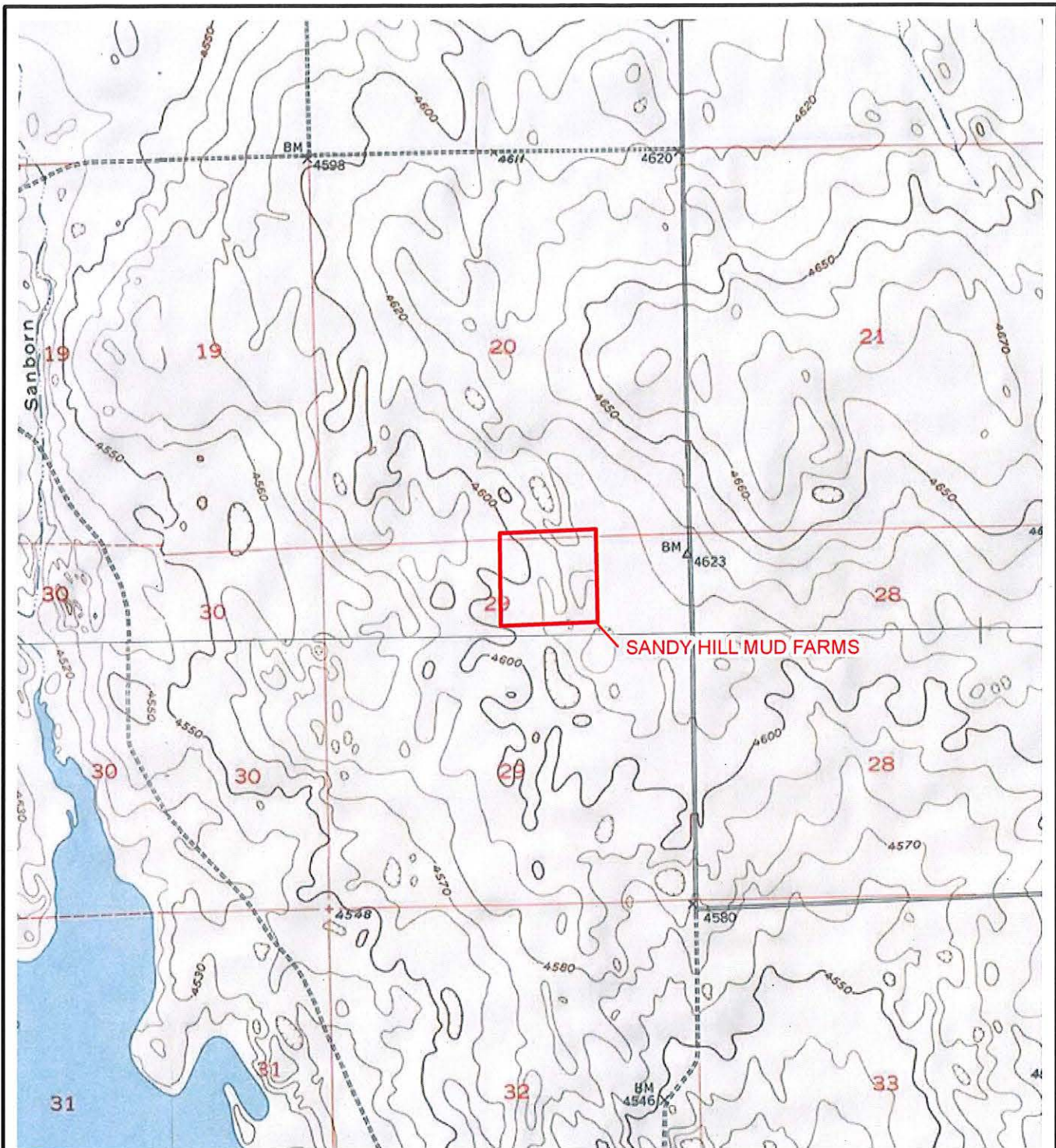


IMAGE COURTESY OF ESRI/USGS

# LEGEND

SANDY HILL SPREADFIELD BOUNDARY



COLORADO

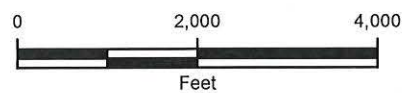


FIGURE 1  
 SITE LOCATION MAP  
 SANDY HILL MUD FARMS  
 NWNE SEC 29-T5N-R61W  
 WELD COUNTY, COLORADO  
 BILL BARRETT CORPORATION



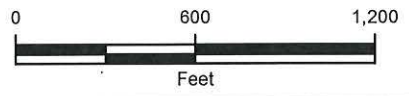




IMAGE COURTESY OF ESRI

**LEGEND**

- BACKGROUND SAMPLE COMPOSITE LOCATION
- SANDY HILL SPREADFIELD BOUNDARY



<p><b>FIGURE 2</b></p>	<p><b>SANDY HILL LAND APPLICATION SITE</b> NWNE SEC 29-T5N-R61W WELD COUNTY, COLORADO BILL BARRETT CORPORATION</p>	<p><b>SITE MAP</b></p>