

## **Bill Barrett Corporation**

### **Land Application of Water-Based Bentonitic Drilling Fluids & Associated Drill Cuttings Sandy Hill 5-61-29 Spreadfield**

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 6000 yards of cuttings and bentonitic drilling fluids will be applied to the land application facility in 2017.

### **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

**ATTACHMENT 1**

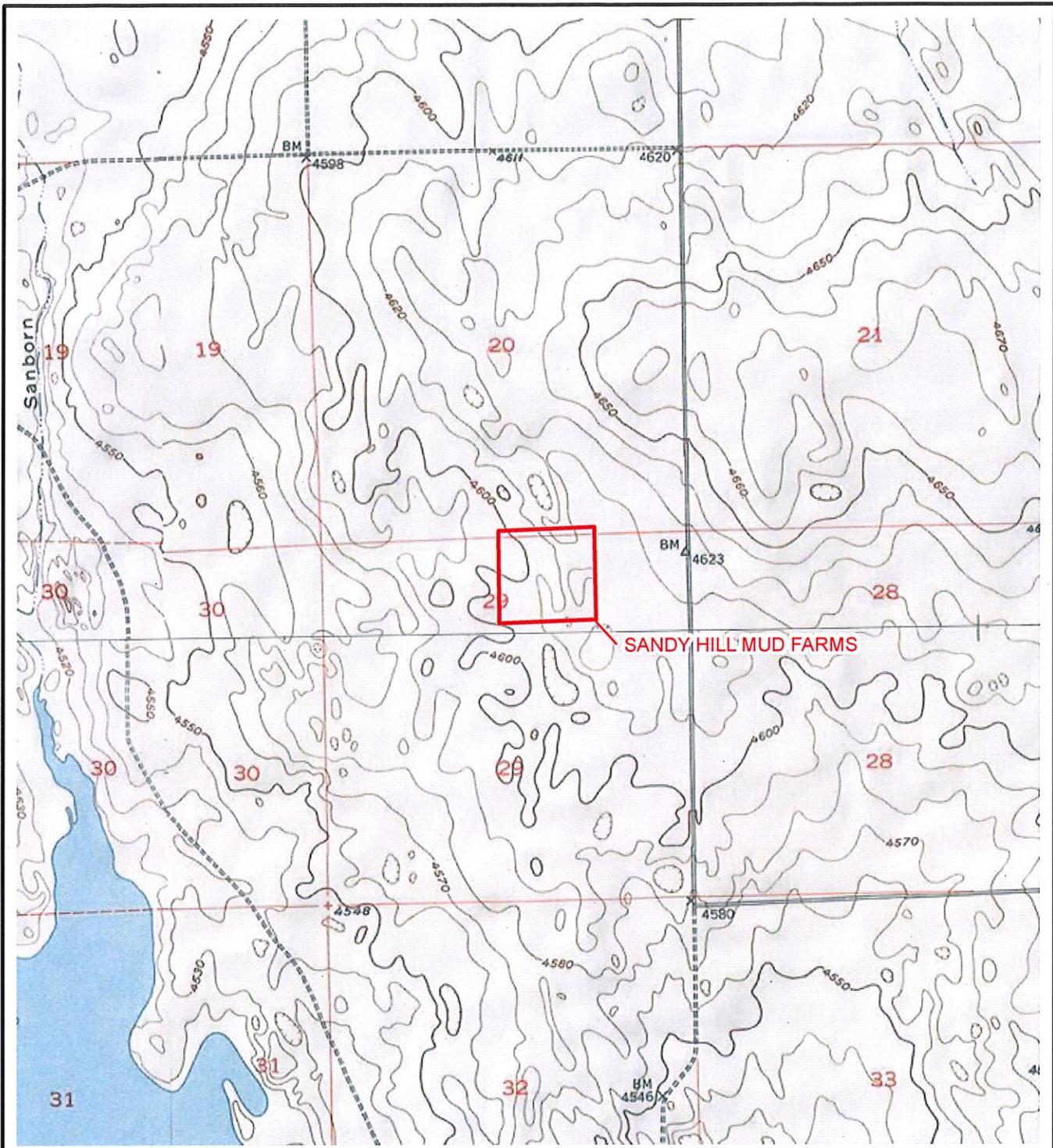
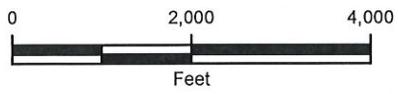


IMAGE COURTESY OF ESRI/USGS

**LEGEND**

 SANDY HILL SPREADFIELD BOUNDARY



**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

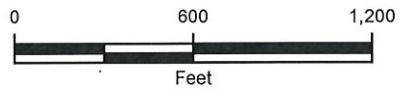


FIGURE 2

SITE MAP

SANDY HILL LAND  
 APPLICATION SITE  
 NWNE SEC 29-T5N-R61W  
 WELD COUNTY, COLORADO  
 BILL BARRETT CORPORATION



**ATTACHMENT 2**

TABLE 1

SOIL ANALYTICAL RESULTS  
 SANDY HILL MUD FARM  
 WELD COUNTY, COLORADO  
 BILL BARRETT CORPORATION

PARAMETER	COGCC Table 910-1 Concentration Levels	UNITS	Sample ID: BG01 1/12/2017 Background	Sample ID: BG02 1/12/2017 Background	Sample ID: BG03 1/12/2017 Background	Sample ID: BG04 1/12/2017 Background
Arsenic	0.39	mg/kg	5.06	3.03	2.37	1.90
Barium	15,000	mg/kg	27.1	30.4	24.6	22.4
Cadmium	70	mg/kg	<0.521	<0.514	<0.551	<0.584
Chromium (III)	120,000	mg/kg	2.96	3.38	3.64	3.82
Chromium (VI)	23	mg/kg	<0.441	<0.407	<0.427	<0.451
Copper	3,100	mg/kg	3.71	2.90	2.62	2.68
Lead	400	mg/kg	4.55	5.35	5.56	5.56
Mercury	23	mg/kg	<0.0129	0.00666	<0.0117	<0.0134
Nickel	1,600	mg/kg	2.63	2.7	2.06	2.13
Selenium	390	mg/kg	0.641	0.863	0.665	0.623
Silver	390	mg/kg	<0.521	<0.514	<0.551	<0.584
Zinc	23,000	mg/kg	11.0	15.2	12.9	13.0
EC	4.0	mmhos/cm	0.0284	0.0405	0.0275	0.0114
pH	6 - 9	SU	6.57	6.70	5.88	6.30
Calcium		mg/kg	0.82	3.46	2.27	0.02
Magnesium		mg/kg	0.49	1.17	1.14	0.02
Sodium		mg/kg	0.80	0.18	0.25	0.33
SAR	12	unitless	0.99	0.12	0.19	2.33

NOTES:

- mg/kg - milligrams per kilogram
- mmhos/cm - millimhos per centimeter in saturated paste extract
- EC - electrical conductivity
- SU - standard unit on saturated paste
- SAR - sodium adsorption ratio
- < - less than the stated reporting limit
- - not analyzed

**BOLD** - indicates result exceeds the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 concentration level.





January 18, 2017

LT Environmental, Inc.

Rob Rebel

4600 West 60th Avenue

Arvada CO 80003

Project Name - Sandy Hill Spread Field

Project Number - 027317001

Attached are your analytical results for Sandy Hill Spread Field received by Origins Laboratory, Inc. January 12, 2017. This project is associated with Origins project number X701120-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Rob Rebel  
Project Number: 027317001  
Project: Sandy Hill Spread Field

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BG01	X701120-01	Soil	January 12, 2017 10:15	01/12/2017 13:17
BG02	X701120-02	Soil	January 12, 2017 10:45	01/12/2017 13:17
BG03	X701120-03	Soil	January 12, 2017 11:15	01/12/2017 13:17
BG04	X701120-04	Soil	January 12, 2017 11:45	01/12/2017 13:17

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Jen Pellegrini For Noelle Doyle Mathis, President



LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

Origins Laboratory

F-012207-01-R1  
 Effective Date: 01/09/12

**Sample Receipt Checklist**

Origins Work Order: X701120

Client: LTE  
 Client Project ID: Sandy Hills Spread Field

Checklist Completed by: Jef Pellegrini  
 Date/time completed: 1-12-17

Shipped Via: HOD  
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)  
 Airbill #: N/A

Matrix(s) Received: (Check all that apply):  Soil/Solid  Water  Other: \_\_\_\_\_ (Describe)

Cooler Number/Temperature: 1 / 4.8 °C 1 °C 1 °C 1 °C

Thermometer ID: T953

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Were all samples received intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked <sup>(1)</sup> ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/pH < 2 for samples preserved with HNO <sub>3</sub> , HCL, H <sub>2</sub> SO <sub>4</sub> / (pH > 10 for samples preserved with NaAsO <sub>2</sub> +NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

<sup>(1)</sup>If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by: Jef Pellegrini Project Manager

Date/Time Reviewed: 1/12/17

Origins Laboratory, Inc.

*Jef Pellegrini*

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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG01**

1/12/2017 10:15:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**AAL, Inc.**  
**X701120-01 (Soil)**

**Metals by 6010**

Calcium	0.82		me/L	1	'[none]'	01/13/2017	01/16/2017	
Magnesium	0.49		"	"	"	"	"	
Sodium	0.80		"	"	"	"	"	

**pH in Soil by EPA 9045D**

pH	6.57		pH Units	1	B7A1206	01/12/2017	01/12/2017	
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**SAR by 20B Saturated Paste**

SAR	0.99			1	'[none]'	01/13/2017	01/16/2017	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0284		mmhos/cm	1	B7A1207	01/12/2017	01/12/2017	
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**Total Metals by 6010C**

Arsenic	5.06	3.13	mg/kg dry	1	1631190	01/16/2017	01/17/2017	
Barium	27.1	0.521	"	"	"	"	"	
Cadmium	ND	0.521	"	"	"	"	"	U
Chromium	2.96	0.521	"	"	"	"	"	
Copper	3.71	1.04	"	"	"	"	"	
Lead	4.55	1.04	"	"	"	"	"	
Nickel	2.63	0.521	"	"	"	"	"	

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG01**

1/12/2017 10:15:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**GEL Laboratories, LLC**  
 X701120-01 (Soil)

**Total Metals by 6010C**

Selenium	0.641	3.13	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Silver	ND	0.521	"	"	"	"	"	U
Zinc	11.0	1.04	"	"	"	"	"	

**Total Metals by 7196A**

Hexavalent Chromium	ND	0.441	mg/kg dry	1	1631234	01/13/2017	01/14/2017	U
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**Total Metals by 7196A/6010**

Trivalent Chromium	2.96	0.521	mg/kg	1	1631235		01/17/2017	
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**Total Metals by 7471A**

Mercury	ND	0.0129	mg/kg dry	1	1631542	01/16/2017	01/17/2017	U
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Origins Laboratory, Inc.



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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG02**

1/12/2017 10:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**AAL, Inc.**  
**X701120-02 (Soil)**

**Metals by 6010**

Calcium	3.46		me/L	1	'[none]'	01/13/2017	01/16/2017	
Magnesium	1.17		"	"	"	"	"	
Sodium	0.18		"	"	"	"	"	

**pH in Soil by EPA 9045D**

pH	6.70		pH Units	1	B7A1206	01/12/2017	01/12/2017	
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**SAR by 20B Saturated Paste**

SAR	0.12			1	'[none]'	01/13/2017	01/16/2017	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0405		mmhos/cm	1	B7A1207	01/12/2017	01/12/2017	
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**Total Metals by 6010C**

Arsenic	3.03	3.08	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Barium	30.4	0.514	"	"	"	"	"	
Cadmium	ND	0.514	"	"	"	"	"	U
Chromium	3.38	0.514	"	"	"	"	"	
Copper	2.90	1.03	"	"	"	"	"	
Lead	5.35	1.03	"	"	"	"	"	
Nickel	2.68	0.514	"	"	"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG02**

1/12/2017 10:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**GEL Laboratories, LLC**  
 X701120-02 (Soil)

**Total Metals by 6010C**

Selenium	0.863	3.08	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Silver	ND	0.514	"	"	"	"	"	U
Zinc	15.2	1.03	"	"	"	"	"	

**Total Metals by 7196A**

Hexavalent Chromium	ND	0.407	mg/kg dry	1	1631234	01/13/2017	01/14/2017	U
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**Total Metals by 7196A/6010**

Trivalent Chromium	3.38	0.514	mg/kg	1	1631235		01/17/2017	
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**Total Metals by 7471A**

Mercury	0.00666	0.0126	mg/kg dry	1	1631542	01/16/2017	01/17/2017	J
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Origins Laboratory, Inc.



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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG03**

1/12/2017 11:15:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**AAL, Inc.**  
**X701120-03 (Soil)**

**Metals by 6010**

Calcium	2.27		me/L	1	'[none]'	01/13/2017	01/16/2017	
Magnesium	1.14		"	"	"	"	"	
Sodium	0.25		"	"	"	"	"	

**pH in Soil by EPA 9045D**

pH	5.88		pH Units	1	B7A1206	01/12/2017	01/12/2017	
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**SAR by 20B Saturated Paste**

SAR	0.19			1	'[none]'	01/13/2017	01/16/2017	
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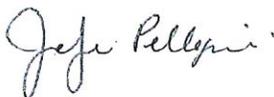
**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0275		mmhos/cm	1	B7A1207	01/12/2017	01/12/2017	
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**Total Metals by 6010C**

Arsenic	2.37	3.31	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Barium	24.6	0.551	"	"	"	"	"	
Cadmium	ND	0.551	"	"	"	"	"	U
Chromium	3.64	0.551	"	"	"	"	"	
Copper	2.62	1.10	"	"	"	"	"	
Lead	5.56	1.10	"	"	"	"	"	
Nickel	2.06	0.551	"	"	"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG03**

1/12/2017 11:15:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**GEL Laboratories, LLC**  
 X701120-03 (Soil)

**Total Metals by 6010C**

Selenium	0.665	3.31	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Silver	ND	0.551	"	"	"	"	"	U
Zinc	12.9	1.10	"	"	"	"	"	

**Total Metals by 7196A**

Hexavalent Chromium	ND	0.427	mg/kg dry	1	1631234	01/13/2017	01/14/2017	U
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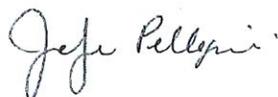
**Total Metals by 7196A/6010**

Trivalent Chromium	3.64	0.551	mg/kg	1	1631235		01/17/2017	
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**Total Metals by 7471A**

Mercury	ND	0.0117	mg/kg dry	1	1631542	01/16/2017	01/17/2017	U
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Origins Laboratory, Inc.



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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG04**

1/12/2017 11:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**AAL, Inc.**  
**X701120-04 (Soil)**

**Metals by 6010**

Calcium	0.02		me/L	1	'[none]'	01/13/2017	01/16/2017	
Magnesium	0.02		"	"	"	"	"	
Sodium	0.33		"	"	"	"	"	

**pH in Soil by EPA 9045D**

pH	6.30		pH Units	1	B7A1206	01/12/2017	01/12/2017	
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**SAR by 20B Saturated Paste**

SAR	2.33			1	'[none]'	01/13/2017	01/16/2017	
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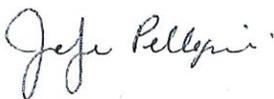
**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.0114		mmhos/cm	1	B7A1207	01/12/2017	01/12/2017	
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**Total Metals by 6010C**

Arsenic	1.90	3.51	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Barium	22.4	0.584	"	"	"	"	"	
Cadmium	ND	0.584	"	"	"	"	"	U
Chromium	3.82	0.584	"	"	"	"	"	
Copper	2.68	1.17	"	"	"	"	"	
Lead	5.56	1.17	"	"	"	"	"	
Nickel	2.13	0.584	"	"	"	"	"	

Origins Laboratory, Inc.



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LT Environmental, Inc.  
 4600 West 60th Avenue  
 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**BG04**

1/12/2017 11:45:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**GEL Laboratories, LLC**  
 X701120-04 (Soil)

**Total Metals by 6010C**

Selenium	0.623	3.51	mg/kg dry	1	1631190	01/16/2017	01/17/2017	J
Silver	ND	0.584	"	"	"	"	"	U
Zinc	13.0	1.17	"	"	"	"	"	

**Total Metals by 7196A**

Hexavalent Chromium	ND	0.451	mg/kg dry	1	1631234	01/13/2017	01/14/2017	U
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**Total Metals by 7196A/6010**

Trivalent Chromium	3.82	0.584	mg/kg	1	1631235		01/17/2017	
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**Total Metals by 7471A**

Mercury	ND	0.0134	mg/kg dry	1	1631542	01/16/2017	01/17/2017	U
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LT Environmental, Inc.  
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 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**Classical Chemistry Parameters - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B7A1206 - NO PREP</b>										
<b>Duplicate (B7A1206-DUP1)</b>		<b>Source: X701120-01</b>			<b>Prepared: 01/12/2017 Analyzed: 01/12/2017</b>					
pH	6.74		pH Units		6.57			2.55	25	
<b>Duplicate (B7A1206-DUP2)</b>		<b>Source: X701123-01</b>			<b>Prepared: 01/12/2017 Analyzed: 01/12/2017</b>					
pH	9.15		pH Units		9.22			0.762	25	
<b>Batch B7A1207 - NO PREP</b>										
<b>Blank (B7A1207-BLK1)</b>					<b>Prepared: 01/12/2017 Analyzed: 01/12/2017</b>					
Specific Conductance (EC)	0.00280		mmhos/cm							
<b>Duplicate (B7A1207-DUP1)</b>		<b>Source: X701120-01</b>			<b>Prepared: 01/12/2017 Analyzed: 01/12/2017</b>					
Specific Conductance (EC)	0.0304		mmhos/cm		0.0284			6.80	25	
<b>Duplicate (B7A1207-DUP2)</b>		<b>Source: X701123-01</b>			<b>Prepared: 01/12/2017 Analyzed: 01/12/2017</b>					
Specific Conductance (EC)	0.484		mmhos/cm		0.427			12.5	25	

Origins Laboratory, Inc.



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LT Environmental, Inc.  
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 Arvada CO 80003

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 Project: Sandy Hill Spread Field

**Total Metals by 6010C - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1631190 - SW846 3050B

**BLANK (1203707488-BLK)**

Prepared: 01/16/2017 Analyzed: 01/17/2017

Selenium	ND	2.92	mg/kg				-			U
Silver	ND	0.486	"				-			U
Nickel	ND	0.486	"				-			U
Lead	ND	0.973	"				-			U
Chromium	ND	0.486	"				-			U
Cadmium	ND	0.486	"				-			U
Barium	ND	0.486	"				-			U
Arsenic	ND	2.92	"				-			U
Copper	ND	0.973	"				-			U
Zinc	ND	0.973	"				-			U

**LCS (1203707489-BKS)**

Prepared: 01/16/2017 Analyzed: 01/17/2017

Cadmium	45.8	0.479	mg/kg	47.9		95.6	80-120			
Zinc	45.5	0.958	"	47.9		95.1	80-120			
Silver	47.1	0.479	"	47.9		98.3	80-120			
Selenium	47.4	2.87	"	47.9		99	80-120			
Nickel	47.0	0.479	"	47.9		98.2	80-120			
Lead	45.7	0.958	"	47.9		95.5	80-120			
Chromium	45.2	0.479	"	47.9		94.4	80-120			
Barium	45.4	0.479	"	47.9		94.8	80-120			
Arsenic	45.9	2.87	"	47.9		95.8	80-120			
Copper	47.7	0.958	"	47.9		99.6	80-120			

**DUP (1203707490 D)**

Source: 414239002

Prepared: 01/16/2017 Analyzed: 01/17/2017

Chromium	71700	88.9	mg/kg dry		54700	0-20	26.9	20		
Arsenic	ND	533	"		<88.9	0-20	14.3	20		U
Copper	1970	178	"		1280	0-20	42.8	20		

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 Arvada CO 80003

Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**Total Metals by 6010C - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1631190 - SW846 3050B

DUP (1203707490 D)		Source: 414239002			Prepared: 01/16/2017 Analyzed: 01/17/2017					
Lead	ND	178	mg/kg dry		<58.7		0-20	NR	20	U
Nickel	34600	88.9	"		26500		0-20	26.8	20	
Selenium	143	533	"		120		0-20	17.6	20	J
Silver	ND	88.9	"		<17.8		0-20	35.5	20	U
Zinc	356	178	"		265		0-20	29.2	20	
Barium	43.9	88.9	"		38.4		0-20	13.2	20	J
Cadmium	ND	88.9	"		<17.8		0-20	3.67	20	U
MS (1203707491 S)		Source: 414239002			Prepared: 01/16/2017 Analyzed: 01/17/2017					

Lead	76.5	185	mg/kg dry	92.6	<61.1	70.4	75-125			J
Zinc	353	185	"	92.6	265	94.3	75-125			
Silver	101	92.6	"	92.6	<18.5	98.5	75-125			
Nickel	27300	92.6	"	92.6	26500	889	75-125			
Chromium	56500	92.6	"	92.6	54700	NR	75-125			
Cadmium	76.6	92.6	"	92.6	<18.5	82.7	75-125			J
Barium	125	92.6	"	92.6	38.4	93.6	75-125			
Arsenic	ND	556	"	92.6	<92.6	0	75-125			U
Selenium	ND	556	"	92.6	120	0	75-125			U
Copper	1400	185	"	92.6	1280	134	75-125			

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LT Environmental, Inc.  
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Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**Total Metals by 7196A - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1631234 - SW846 3060A										
<b>BLANK (1203707621-BLK)</b>					Prepared: 01/13/2017 Analyzed: 01/14/2017					
Hexavalent Chromium	ND	0.395	mg/kg				-			U
<b>LCS (1203707622-BKS)</b>					Prepared: 01/13/2017 Analyzed: 01/14/2017					
Hexavalent Chromium	3.86	0.397	mg/kg	3.97		97.3	80-120			
<b>ILCS (1203707623-ILCS)</b>					Prepared: 01/13/2017 Analyzed: 01/14/2017					
Hexavalent Chromium	8.55	0.400	mg/kg	8.00		107	80-120			
<b>DUP (1203707624 D)</b>					Prepared: 01/13/2017 Analyzed: 01/14/2017					
Hexavalent Chromium	ND	0.446	mg/kg dry		<0.179		0-50	117	50	U
<b>MS (1203707804 S)</b>					Prepared: 01/13/2017 Analyzed: 01/14/2017					
Hexavalent Chromium	3.31	0.406	mg/kg dry	4.06	<0.162	81.5	75-125			
<b>MSD (1203707808 SD)</b>					Prepared: 01/13/2017 Analyzed: 01/14/2017					
Hexavalent Chromium	3.95	0.406	mg/kg dry	4.06	<0.162	97.3	75-125	29.8	30	

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LT Environmental, Inc.  
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Rob Rebel  
 Project Number: 027317001  
 Project: Sandy Hill Spread Field

**Total Metals by 7471A - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1631542 - SW846 7471A Prep										
<b>BLANK (1203708414-BLK)</b>					Prepared: 01/16/2017 Analyzed: 01/17/2017					
Mercury	ND	0.0119	mg/kg							U
<b>LCS (1203708415-BKS)</b>					Prepared: 01/16/2017 Analyzed: 01/17/2017					
Mercury	0.118	0.0116	mg/kg	0.116		102	80-120			
<b>MS (1203708420 S)</b>					Source: 414176006 Prepared: 01/16/2017 Analyzed: 01/17/2017					
Mercury	0.143	0.0118	mg/kg	0.118	0.0228	102	80-120			
<b>MSD (1203708425 SD)</b>					Source: 414176006 Prepared: 01/16/2017 Analyzed: 01/17/2017					
Mercury	0.139	0.0112	mg/kg	0.112	0.0228	104	80-120	2.75	20	

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

Rob Rebel  
Project Number: 027317001  
Project: Sandy Hill Spread Field

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**Notes and Definitions**

- U Result not detected above the detection limit
- J Greater than the detection limit but less than the reporting limit
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

**ATTACHMENT 3**

LAND APPLICATION AGREEMENT

This Land Application Agreement ("Agreement") is entered into on December 29<sup>th</sup>, 2016 by and between Mark McNamee, General Manager of Sandy Hills Land, LLC, Surface Owner, whose address is 216 16<sup>th</sup> street, suite 1200, Denver, CO 80202 and Bill Barrett Corporation ("BBC"), whose address is 1099 19<sup>th</sup> Street, Suite 2300, Denver, Colorado, 80202. Surface Owner consents to the land application of drilling mud and cuttings on the below-described lands, as follows:

Lot A of Recorded Exemption No. 0969-29-1-RE2386 according to the map recorded August 5, 1999 at Reception No. 2711745, being located in the N/2NE/4 of Section 29, Township 5 North, Range 61 West of the 6th P.M., Weld County, Colorado, limited to the specific tract as described below:

BBC shall conduct the land application operations; or

Surface Owner agrees to conduct the land application operations on behalf of BBC.

Qtr/Qtr	Section	Township	Range	Total Acreage
NWNE	29	5N	61W	40

Land application of the water-based bentonitic drilling mud and cuttings will be conducted in compliance with Colorado Oil and Gas Conservation Commission ("COGCC") Rule 907.d(3)B and the COGCC Policy on Drill Cuttings Management, dated September 15, 2014 (attached hereto), which rule and policy include limits on the depth of drilling mud and cuttings applied, the timely incorporation of such materials into the native soil, and the control of drainage or runoff.

This Agreement shall become effective upon execution and shall remain in full force and effect for a period not to exceed three consecutive years from the date of first land application as reported to COGCC.



Sandy Hill Land LLC

Mark McNamee

By: Mark McNamee

Title: General Manager

Bill Barrett Corporation

Troy Schindler

By: Troy Schindler

Title: Sr. VP Operations

ACKNOWLEDGMENTS

STATE OF COLORADO )  
City of ) ss.  
COUNTY OF DENVER )

The foregoing instrument was acknowledged before me this 11<sup>th</sup> day of January, 2017 by Mark McNamee as General Manager of Sandy Hills Land, LLC, a Colorado limited liability company.

My commission expires May 17, 2019



*Patricia Flanigan*

Notary Public

STATE OF COLORADO )  
 ) ss.  
CITY AND COUNTY OF DENVER )

The foregoing instrument was acknowledged before me this 11<sup>th</sup> day of January, 2017 by Troy Schindler, as Sr VP Operations of Bill Barrett Corporation, a Delaware corporation, on behalf of the corporation.

My commission expires May 17, 2019



*Patricia Flanigan*

Notary Public

## Sandy Hill Land, LLC

April 21, 2017

Troy Schindler

Bill Barrett Corporation

1099 19<sup>th</sup> Street, Suite 2300

Denver, CO 80202

Ref: Land Application of Drill Mud

Mr. Schindler,

Sandy Hill Land, LLC will accept Bill Barrett Corporation's spent drilling mud and cuttings and use the material to incorporate into the soil during our farming operation. The land will be farmed both during and after the mud and cuttings have been applied. The clay rich properties of the mud and cuttings will benefit the sandy soil through the introduction of the bentonite based clays to help stabilize the soil and increase water retention in the crop land.

Please don't hesitate to call if you have any questions.

Sincerely,



Mark McNamee

Sandy Hill Land, LLC

Cc: Doug Dennison – BBC