

LEGEND

 Site Location

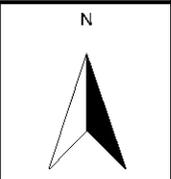


Figure 1  
Site Location Map  
January 16, 2018 LBK

**Alles 41-31 RTB Water Vault Removal  
Facility ID: 447281  
NENE, Sec 31, T5N, R63W, 6<sup>th</sup> PM  
Weld County, Colorado**



Aerial photograph courtesy of Google Earth Pro

LEGEND

● Soil Sample

N



Figure 2  
Soil Sample Location Map  
January 16, 2018 LBK

**Alles 41-31 RTB Water Vault Removal  
Facility ID: 447281  
NENE, Sec 31, T5N, R63W, 6th PM  
Weld County, Colorado**

**TABLE 1**  
**SOIL ANALYTICAL RESULTS**  
**ALLES 41-31 RTB**  
**WELD COUNTY, COLORADO**  
**BONANZA CREEK ENERGY OPERATING COMPANY LLC.**

Parameters		COGCC Table 910-1 Concentration Level	SS01
<b>BTEX</b>	<b>Benzene</b>	<b>0.17</b>	<0.002
	<b>Toluene</b>	<b>85</b>	<0.002
	<b>Ethylbenzene</b>	<b>100</b>	<0.002
	<b>Total Xylenes</b>	<b>175</b>	<0.002
<b>TPH</b>	<b>DRO</b>	--	<50
	<b>GRO</b>	--	<50
	<b>Total</b>	<b>500</b>	<50
<b>Inorganics</b>	<b>EC (mmhos/cm)</b>	<b>&lt;4</b>	0.124
	<b>SAR</b>	<b>&lt;12</b>	3.77
	<b>pH (unitless)</b>	<b>6 - 9</b>	8.62

**Notes:**

-- - no concentration level is available

**BOLD** - analytical result exceeds the COGCC Table 910-1 Concentration Level

BTEX - benzene, toluene, ethylbenzene, xylenes (total)

COGCC - Colorado Oil and Gas Conservation Commission

TPH - total petroleum hydrocarbons

DRO - diesel range organics

GRO - gasoline range organics

EC - electrical conductivity

mmhos/cm - millimhos per centimeter

SAR - sodium adsorption ratio

All results are in mg/kg unless stated otherwise.

January 04, 2018

**Bonanza Creek Energy, Inc.**

**Brian Dodek**

**410 17th St, Suite 1400**

**Denver CO 80211**

**Project Name - Alles 41-31**

**Project Number - [none]**

Attached are your analytical results for Alles 41-31 received by Origins Laboratory, Inc. December 27, 2017. This project is associated with Origins project number Y712450-01.

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



Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Alles 41-31

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01	Y712450-01	Soil	December 27, 2017 9:00	12/27/2017 17:27

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.*

Bonanza Creek Energy, Inc.  
 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

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page 1 of 1

712450

Client: Bonanza Creek Energy  
 Address: 410 17th Street Suite 1700 Denver, CO 80202  
 Telephone Number: 720-225-6653  
 Email Address: \_\_\_\_\_

Project Manager: Brian Dodek/Luke Kelly  
 Project Name: Alles 41-31  
 Project Number: \_\_\_\_\_  
 Samples Collected By: Luke Kelly

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air/Surface		
SS01	12/27/17	9:00	2	X				X			EC, pH, SAR TPH (400-200) BTEX (No)	1
												2
												3
												4
												5
												6
												7
												8
												9
												10

Relinquished By: [Signature] Date: 12/27/17 Time: 5:27  
 Relinquished By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received By: [Signature] Date: 12-27-17 Time: \_\_\_\_\_  
 Received By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Turnaround Time: Same Day  24 Hr  48 Hr  72 Hr  Standard

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

Origins Laboratory, Inc.

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Bonanza Creek Energy, Inc.  
 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

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

**Sample Receipt Checklist**

Origins Work Order: 4712450 Client: Bonanza Creek  
 Client Project ID: Alles 41-31  
 Checklist Completed by: Don Lee Shipped Via: HD  
 Date/time completed: 12-26-11 (UPS, FedEx, Hand Delivered, Pick-up, etc.)  
 Airbill #: N/A  
 Matrix(s) Received: (Check all that apply):  Soil/Solid  Water  Other: \_\_\_\_\_  
 Cooler Number/Temperature: 1 / 1.4 °C \_\_\_\_\_ °C \_\_\_\_\_ °C (Describe) \_\_\_\_\_ °C  
 Thermometer ID: TOB

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"/>			pH
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? <b>If yes, contact client and note in narrative.</b>			<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 HNO3, HCL, H2SO4) / (pH >10 for samples preserved with NaAsO2+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 (Project Manager) [Signature]

Date/Time Reviewed 12-26-11

Origins Laboratory, Inc.



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Bonanza Creek Energy, Inc.  
 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**SS01**

**12/27/2017 9:00:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y712450-01 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	B7L2902	12/29/2017	12/29/2017	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	116 %	70-130			"	"	"	
Surrogate: Toluene-d8	100 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	107 %	70-130			"	"	"	

**GRO (TVPH)/DRO (TEPH)by EPA 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B7L2903	12/29/2017	12/29/2017	U
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	U

Surrogate: o-Terphenyl	114 %	59-131			"	"	"	
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**Metals (Saturated Paste Prep)**

Calcium	5.55		me/L	1	'[none]'	12/29/2017	01/02/2017	
Magnesium	3.16		"	"	"	"	"	
Sodium	7.86		"	"	"	"	"	

**pH in Soil by EPA 9045D**

pH	8.62		pH Units	1	B7L2904	12/29/2017	12/29/2017	
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Origins Laboratory, Inc.



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Bonanza Creek Energy, Inc.  
 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**SS01**

**12/27/2017 9:00:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y712450-01 (Soil)**

**SAR by 20B Saturated Paste**

SAR	3.77			1	'[none]'	12/29/2017	01/02/2017	
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**Specific Conductance by Modified 9050A**

Specific Conductance (EC)	0.124		mmhos/cm	1	B7L2905	12/29/2017	12/29/2017	
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Origins Laboratory, Inc.



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Bonanza Creek Energy, Inc.  
 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B7L2902 - EPA 5030 (soil)**

**Blank (B7L2902-BLK1)**

Prepared: 12/29/2017 Analyzed: 12/29/2017

Benzene	ND	0.002	mg/kg							U
Toluene	ND	0.002	"							U
Ethylbenzene	ND	0.002	"							U
Xylenes, total	ND	0.002	"							U
Surrogate: 1,2-Dichloroethane-d4	71		ug/kg	62.5		113	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	68		"	62.5		109	70-130			

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 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L2902 - EPA 5030 (soil)

LCS (B7L2902-BS1)

Prepared: 12/29/2017 Analyzed: 12/29/2017

Benzene	0.112	0.002	mg/kg	0.100		112	77.1-124			
Toluene	0.107	0.002	"	0.100		107	74.5-128			
Ethylbenzene	0.099	0.002	"	0.100		99.2	66.4-127			
m,p-Xylene	0.209	0.004	"	0.200		104	76.6-124			
o-Xylene	0.112	0.002	"	0.100		112	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	68		ug/kg	62.5		109	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.1	70-130			

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 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L2902 - EPA 5030 (soil)

Matrix Spike (B7L2902-MS1)	Source: Y712450-01			Prepared: 12/29/2017 Analyzed: 12/29/2017						
Benzene	0.110	0.002	mg/kg	0.100	ND	110	71.8-126			
Toluene	0.109	0.002	"	0.100	ND	109	65.1-130			
Ethylbenzene	0.119	0.002	"	0.100	ND	119	62.2-130			
m,p-Xylene	0.231	0.004	"	0.200	ND	115	46.5-137			
o-Xylene	0.115	0.002	"	0.100	ND	115	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		106	70-130			
Surrogate: Toluene-d8	62		"	62.5		98.7	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		104	70-130			

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Bonanza Creek Energy, Inc.  
 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B7L2902 - EPA 5030 (soil)

Matrix Spike Dup (B7L2902-MSD1)	Source: Y712450-01			Prepared: 12/29/2017 Analyzed: 12/29/2017						
Benzene	0.107	0.002	mg/kg	0.100	ND	107	71.8-126	2.18	11.3	
Toluene	0.106	0.002	"	0.100	ND	106	65.1-130	2.47	15.4	
Ethylbenzene	0.114	0.002	"	0.100	ND	114	62.2-130	4.25	19.6	
m,p-Xylene	0.223	0.004	"	0.200	ND	111	46.5-137	3.53	19.2	
o-Xylene	0.112	0.002	"	0.100	ND	112	54.2-134	2.45	17.9	
Surrogate: 1,2-Dichloroethane-d4	63		ug/kg	62.5		101	70-130			
Surrogate: Toluene-d8	61		"	62.5		98.0	70-130			
Surrogate: 4-Bromofluorobenzene	66		"	62.5		105	70-130			

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 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Extractable Petroleum Hydrocarbons by 8015C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B7L2903 - EPA 3550B**

**Blank (B7L2903-BLK1)**

Prepared: 12/29/2017 Analyzed: 12/29/2017

Gasoline (C6-C10)	ND	50.0	mg/kg							U
Diesel (C10-C28)	ND	50.0	"							U
Surrogate: o-Terphenyl	64		"	50.0		127	59-131			

**LCS (B7L2903-BS1)**

Prepared: 12/29/2017 Analyzed: 12/29/2017

Gasoline (C6-C10)	1030	50.0	mg/kg	1000		103	59-133			
Diesel (C10-C28)	1110	50.0	"	1000		111	64-121			
Surrogate: o-Terphenyl	59		"	50.0		117	59-131			

**Matrix Spike (B7L2903-MS1)**

Source: Y712450-01

Prepared: 12/29/2017 Analyzed: 12/29/2017

Gasoline (C6-C10)	1150	50.0	mg/kg	1000	ND	115	57-139			
Diesel (C10-C28)	1240	50.0	"	1000	ND	124	53-125			
Surrogate: o-Terphenyl	62		"	50.0		124	59-131			

**Matrix Spike Dup (B7L2903-MSD1)**

Source: Y712450-01

Prepared: 12/29/2017 Analyzed: 12/29/2017

Gasoline (C6-C10)	1040	50.0	mg/kg	1000	ND	104	57-139	10.1	20	
Diesel (C10-C28)	1110	50.0	"	1000	ND	111	53-125	11.1	20	
Surrogate: o-Terphenyl	54		"	50.0		109	59-131			

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 410 17th St, Suite 1400  
 Denver CO 80211

Brian Dodek  
 Project Number: [none]  
 Project: Alles 41-31

**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 B7L2904 - NO PREP</b>										
<b>Duplicate (B7L2904-DUP1)</b>		<b>Source: Y712450-01</b>			Prepared: 12/29/2017 Analyzed: 12/29/2017					
pH	8.61		pH Units		8.62			0.116	25	
<b>Batch B7L2905 - NO PREP</b>										
<b>Blank (B7L2905-BLK1)</b>					Prepared: 12/29/2017 Analyzed: 12/29/2017					
Specific Conductance (EC)	0.00160		mmhos/cm							
<b>Duplicate (B7L2905-DUP1)</b>		<b>Source: Y712450-01</b>			Prepared: 12/29/2017 Analyzed: 12/29/2017					
Specific Conductance (EC)	0.133		mmhos/cm		0.124			6.85	25	

Origins Laboratory, Inc.



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Bonanza Creek Energy, Inc.  
410 17th St, Suite 1400  
Denver CO 80211

Brian Dodek  
Project Number: [none]  
Project: Alles 41-31

**Notes and Definitions**

U Sample is Non-Detect.

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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