

LEGEND

 Site Location

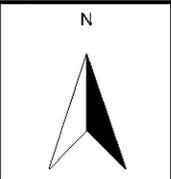


Figure 1
Site Location Map
October 2, 2018 LBK

**Pronghorn 14-8 Water Vault Removal
Facility ID: 282890
SWSW, Sec 8, T5N, R61W, 6th PM
Weld County, Colorado**



Aerial photograph courtesy of Google Earth Pro

LEGEND

● Soil Sample

N



Figure 2
Soil Sample Location Map
October 2, 2018 LBK

**Pronghorn 14-8 Water Vault Removal
Facility ID: 282890
SWSW, Sec 8, T5N, R61W, 6th PM
Weld County, Colorado**

TABLE 1
SOIL ANALYTICAL RESULTS
PRONGHORN 14-8
WELD COUNTY, COLORADO
BONANZA CREEK ENERGY OPERATING COMPANY LLC.

Parameters		COGCC Table 910-1 Concentration Level	SS01
BTEX	Benzene	0.17	<0.002
	Toluene	85	<0.002
	Ethylbenzene	100	<0.002
	Total Xylenes	175	<0.002
TPH	DRO	--	<50
	GRO	--	<50
	Total	500	<50
Inorganics	EC (mmhos/cm)	<4	0.0583
	SAR	<12	0.63
	pH (unitless)	6 - 9	6.97

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.

March 13, 2018

Bonanza Creek Energy, Inc.

Brian Dodek

410 17th St, Suite 1400

Denver CO 80211

Project Name - Pronghorn 14-8

Project Number - [none]

Attached are your analytical results for Pronghorn 14-8 received by Origins Laboratory, Inc. March 06, 2018. This project is associated with Origins project number Y803089-01.

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: Pronghorn 14-8

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01	Y803089-01	Soil	March 2, 2018 10:00	03/06/2018 07:40

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y803089

Client: Bonanza Creek Energy

Client Project ID: Pronghorn 14-8

Checklist Completed by: Da Lee

Shipped Via: HD

Date/time completed: 3-6-12

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Airbill #: NA

Matrix(s) Received: (Check all that apply): Soil/Solid Water Other: _____

Cooler Number/Temperature: 11.0 °C _____ °C _____ °C _____ °C (Describe)

Thermometer ID: 1603

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	<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 ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>			pH
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<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 ⁽¹⁾ ? (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 ₃ , HCL, H ₂ SO ₄) / (pH >10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾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 3/7/18

Origins Laboratory, Inc.

Jefe Pellegrini

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Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

SS01

3/2/2018 10:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y803089-01 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	B8C0805	03/08/2018	03/08/2018	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	105 %	70-130			"	"	"	
Surrogate: Toluene-d8	102 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	103 %	70-130			"	"	"	

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

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8C0806	03/08/2018	03/08/2018	U
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	U

Surrogate: o-Terphenyl	80.6 %	59-131			"	"	"	
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Metals (Saturated Paste Prep)

Calcium	1.12		me/L	1	'[none]'	03/08/2018	03/12/2018	
Magnesium	1.10		"	"	"	"	"	
Sodium	0.66		"	"	"	"	"	

pH in Soil by EPA 9045D

pH	6.97		pH Units	1	B8C0807	03/08/2018	03/08/2018	
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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: Pronghorn 14-8

SS01

3/2/2018 10:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y803089-01 (Soil)

SAR by 20B Saturated Paste

SAR	0.63			1	'[none]'	03/08/2018	03/12/2018	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0583		mmhos/cm	1	B8C0808	03/08/2018	03/08/2018	
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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: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

Blank (B8C0805-BLK1)

Prepared: 03/08/2018 Analyzed: 03/08/2018

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	65		ug/kg	62.5		104	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

Blank (B8C0805-BLK2)

Prepared: 03/08/2018 Analyzed: 03/08/2018

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	64		ug/kg	62.5		102	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	70-130			

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

LCS (B8C0805-BS1)

Prepared: 03/08/2018 Analyzed: 03/08/2018

Benzene	0.120	0.002	mg/kg	0.100		120	77.1-124			
Toluene	0.117	0.002	"	0.100		117	74.5-128			
Ethylbenzene	0.112	0.002	"	0.100		112	66.4-127			
m,p-Xylene	0.222	0.004	"	0.200		111	76.6-124			
o-Xylene	0.111	0.002	"	0.100		111	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	56		ug/kg	62.5		90.4	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.1	70-130			

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410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

LCS (B8C0805-BS2)

Prepared: 03/08/2018 Analyzed: 03/08/2018

Benzene	0.119	0.002	mg/kg	0.100		119	77.1-124			
Toluene	0.116	0.002	"	0.100		116	74.5-128			
Ethylbenzene	0.113	0.002	"	0.100		113	66.4-127			
m,p-Xylene	0.220	0.004	"	0.200		110	76.6-124			
o-Xylene	0.107	0.002	"	0.100		107	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	60		ug/kg	62.5		95.3	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

Matrix Spike (B8C0805-MS1)	Source: Y803089-01			Prepared: 03/08/2018 Analyzed: 03/08/2018						
Benzene	0.100	0.002	mg/kg	0.100	ND	100	71.8-126			
Toluene	0.096	0.002	"	0.100	ND	96.3	65.1-130			
Ethylbenzene	0.091	0.002	"	0.100	ND	90.8	62.2-130			
m,p-Xylene	0.181	0.004	"	0.200	0.0009	90.1	46.5-137			
o-Xylene	0.091	0.002	"	0.100	0.0004	90.8	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	59		ug/kg	62.5		94.8	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.9	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

Matrix Spike (B8C0805-MS2)	Source: Y803092-01			Prepared: 03/08/2018 Analyzed: 03/08/2018						
Benzene	0.109	0.002	mg/kg	0.100	0.0006	108	71.8-126			
Toluene	0.109	0.002	"	0.100	0.010	98.3	65.1-130			
Ethylbenzene	0.124	0.002	"	0.100	0.023	101	62.2-130			
m,p-Xylene	0.266	0.004	"	0.200	0.045	111	46.5-137			
o-Xylene	0.133	0.002	"	0.100	0.022	111	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	62		ug/kg	62.5		98.5	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	75		"	62.5		120	70-130			

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Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

Matrix Spike Dup (B8C0805-MSD1)	Source: Y803089-01			Prepared: 03/08/2018 Analyzed: 03/08/2018						
Benzene	0.104	0.002	mg/kg	0.100	ND	104	71.8-126	4.17	11.3	
Toluene	0.101	0.002	"	0.100	ND	101	65.1-130	4.88	15.4	
Ethylbenzene	0.099	0.002	"	0.100	ND	98.7	62.2-130	8.25	19.6	
m,p-Xylene	0.194	0.004	"	0.200	0.0009	96.6	46.5-137	6.93	19.2	
o-Xylene	0.098	0.002	"	0.100	0.0004	98.0	54.2-134	7.62	17.9	
Surrogate: 1,2-Dichloroethane-d4	60		ug/kg	62.5		95.5	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.8	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.5	70-130			

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Bonanza Creek Energy, Inc.

410 17th St, Suite 1400

Denver CO 80211

Brian Dodek

Project Number: [none]

Project: Pronghorn 14-8

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 B8C0805 - EPA 5030 (soil)

Matrix Spike Dup (B8C0805-MSD2)	Source: Y803092-01			Prepared: 03/08/2018 Analyzed: 03/08/2018						
Benzene	0.104	0.002	mg/kg	0.100	0.0006	104	71.8-126	4.48	11.3	
Toluene	0.097	0.002	"	0.100	0.010	86.9	65.1-130	11.1	15.4	
Ethylbenzene	0.100	0.002	"	0.100	0.023	76.8	62.2-130	21.3	19.6	QR-02
m,p-Xylene	0.222	0.004	"	0.200	0.045	88.3	46.5-137	18.3	19.2	
o-Xylene	0.112	0.002	"	0.100	0.022	90.1	54.2-134	17.3	17.9	
Surrogate: 1,2-Dichloroethane-d4	58		ug/kg	62.5		93.5	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.8	70-130			
Surrogate: 4-Bromofluorobenzene	74		"	62.5		119	70-130			

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: Pronghorn 14-8

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 B8C0806 - EPA 3550B

Blank (B8C0806-BLK1)

Prepared: 03/08/2018 Analyzed: 03/08/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							U
Diesel (C10-C28)	ND	50.0	"							U
Surrogate: o-Terphenyl	50		"	50.0		100	59-131			

Blank (B8C0806-BLK2)

Prepared: 03/08/2018 Analyzed: 03/09/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							U
Diesel (C10-C28)	ND	50.0	"							U
Surrogate: o-Terphenyl	44		"	50.0		88.9	59-131			

LCS (B8C0806-BS1)

Prepared: 03/08/2018 Analyzed: 03/08/2018

Gasoline (C6-C10)	953	50.0	mg/kg	1000		95.3	59-133			
Diesel (C10-C28)	993	50.0	"	1000		99.3	64-121			
Surrogate: o-Terphenyl	49		"	50.0		98.0	59-131			

LCS (B8C0806-BS2)

Prepared: 03/08/2018 Analyzed: 03/09/2018

Gasoline (C6-C10)	854	50.0	mg/kg	1000		85.4	59-133			
Diesel (C10-C28)	864	50.0	"	1000		86.4	64-121			
Surrogate: o-Terphenyl	48		"	50.0		95.8	59-131			

Matrix Spike (B8C0806-MS1)

Source: Y803089-01

Prepared: 03/08/2018 Analyzed: 03/08/2018

Gasoline (C6-C10)	948	50.0	mg/kg	1000	ND	94.8	57-139			
Diesel (C10-C28)	953	50.0	"	1000	31.4	92.1	53-125			

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: Pronghorn 14-8

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
Batch B8C0806 - EPA 3550B										
Matrix Spike (B8C0806-MS1)		Source: Y803089-01			Prepared: 03/08/2018 Analyzed: 03/08/2018					
Surrogate: o-Terphenyl	46		mg/kg	50.0		92.5	59-131			
Matrix Spike (B8C0806-MS2)		Source: Y803092-01			Prepared: 03/08/2018 Analyzed: 03/09/2018					
Gasoline (C6-C10)	901	50.0	mg/kg	1000	26.0	87.5	57-139			
Diesel (C10-C28)	1170	50.0	"	1000	505	66.9	53-125			
Surrogate: o-Terphenyl	47		"	50.0		94.3	59-131			
Matrix Spike Dup (B8C0806-MSD1)		Source: Y803089-01			Prepared: 03/08/2018 Analyzed: 03/08/2018					
Gasoline (C6-C10)	916	50.0	mg/kg	1000	ND	91.6	57-139	3.51	20	
Diesel (C10-C28)	902	50.0	"	1000	31.4	87.1	53-125	5.44	20	
Surrogate: o-Terphenyl	47		"	50.0		93.3	59-131			
Matrix Spike Dup (B8C0806-MSD2)		Source: Y803092-01			Prepared: 03/08/2018 Analyzed: 03/09/2018					
Gasoline (C6-C10)	946	50.0	mg/kg	1000	26.0	92.0	57-139	4.89	20	
Diesel (C10-C28)	1220	50.0	"	1000	505	71.4	53-125	3.70	20	
Surrogate: o-Terphenyl	47		"	50.0		93.9	59-131			

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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: Pronghorn 14-8

Classical Chemistry Parameters - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8C0807 - NO PREP										
Duplicate (B8C0807-DUP1)		Source: Y803089-01			Prepared: 03/08/2018 Analyzed: 03/08/2018					
pH	7.17		pH Units		6.97			2.83	25	
Batch B8C0808 - NO PREP										
Blank (B8C0808-BLK1)		Prepared: 03/08/2018 Analyzed: 03/08/2018								
Specific Conductance (EC)	0.00430		mmhos/cm							
Duplicate (B8C0808-DUP1)		Source: Y803089-01			Prepared: 03/08/2018 Analyzed: 03/08/2018					
Specific Conductance (EC)	0.0576		mmhos/cm		0.0583			1.21	25	

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410 17th St, Suite 1400
Denver CO 80211

Brian Dodek
Project Number: [none]
Project: Pronghorn 14-8

Notes and Definitions

U Sample is Non-Detect.

QR-02 The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

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Jen Pellegrini For Noelle Doyle Mathis, President