

January 4, 2016

Mr. Randall Ferguson  
EHS Senior Compliance Specialist  
PDC Energy, Inc.  
1775 Sherman Street, Suite 3000  
Denver, CO 80203

Re: **Produced Water Vessel Closure Report**  
**Brown-McCarty 5 & 30-43 Tank Battery**  
**Facility ID: 323366**  
**NESE S30 T4N R67W**  
**Blanket Remediation #: 9440**

Dear Mr. Ferguson,

On behalf of PDC Energy, Inc. (PDC), Tasman Geosciences, Inc. (Tasman) has prepared this Produced Water Vessel Closure Report (Report) to document environmental sampling activities performed at the above-referenced site. This Report is being submitted under the Form 27 Management Plan for Closure of Produced Water Vessels, which has been assigned Blanket Remediation #9440 by the Colorado Oil and Gas Conservation Commission (COGCC).

A summary of excavation and environmental sampling activities is provided below.

#### **Site Assessment Activities**

On September 8, 2015, confirmation sampling activities were completed following the removal of the partially buried produced water vessel. Soil encountered in the excavation area was field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Groundwater was encountered in the excavation area at approximately 3 feet below ground surface (bgs). Four soil samples (SS01 – SS04) were collected from the sidewalls of the excavation area at approximately 2 feet bgs. Samples were submitted to Summit Scientific Laboratories in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, and total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by Environmental Protection Agency (EPA) Method 8260B, TPH - diesel range organics (DRO) by EPA Method 8015, electrical conductivity (EC), and pH. In addition, a groundwater sample (GW01) was collected and submitted for laboratory analysis of BTEX.

Analytical results indicated organic compound concentrations and physical parameters were in compliance with COGCC Table 910-1 standards in the four soil sample locations. In addition, BTEX concentrations were below COGCC standards in the groundwater sample.

The excavation extent and soil and groundwater sample locations are illustrated on Figure 1. Soil analytical data is summarized in Table 1 and groundwater analytical data is summarized in Table 2. The laboratory analytical report is provided in Attachment A.

**Conclusions**

Based on the analytical data described herein, petroleum hydrocarbon impacts above regulatory standards were not encountered during the removal of the produced water vessel. Consequently, no further site investigation is recommended at this time.

Please contact me at (720) 409-8791 if you have any questions regarding this report.

Sincerely,







Christine Wasko  
Project Manager  
Tasman Geosciences, Inc.

**Enclosures:**

Figure 1 – Sample Location Map  
Table 1 – Soil Analytical Results Summary Table  
Table 2 – Groundwater Analytical Results Summary Table  
Attachment A – Laboratory Analytical Report



DRAWN BY: MAP	<b>Facility Diagram</b> PDC Energy – DJ Basin Brown-McCarty 5 & 30-43 Tank Battery NESE S30 T4N R67W Weld County, CO	 <b>TASMAN</b> GEOSCIENCES 6899 Pecos St., Unit C Denver, CO 80221	<b>LEGEND</b>  Excavation Extent  Soil Sample Location  Groundwater Sample Location	<b>FIGURE 1</b>  <b>SAMPLE LOCATION MAP</b>
DATE: 12/22/2015			All locations are approximate unless otherwise noted	

**TABLE 1**  
**BROWN-McCARTY 5 30-43 TANK BATTERY**  
**SOIL ANALYTICAL RESULTS SUMMARY TABLE**

Sample ID	Date Sampled	Depth (feet bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Naphthalene (mg/kg)	TPH <sup>(2)</sup> (mg/kg)	EC (mmhos/cm)	pH (units)
COGCC standards for soil (mg/kg) <sup>(1)</sup>			0.17	85	100	175	23	500	<4 or 2x BG	6-9
SS01 @ 2'	9/8/2015	2	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	0.671	8.42
SS02 @ 2'	9/8/2015	2	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	0.742	8.01
SS03 @ 2'	9/8/2015	2	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	0.757	8.22
SS04 @ 2'	9/8/2015	2	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	0.502	8.34

**Notes:**

- Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective February 1, 2014.
  - TPH - Total volatile and extractable petroleum hydrocarbons. Value calculated by adding GRO and DRO concentrations.
- COGCC = Colorado Oil and Gas Conservation Commission  
(<) = Analytical result is less than the indicated laboratory reporting limit.  
GRO = Total volatile petroleum hydrocarbons - gasoline range organics  
DRO = Total extractable petroleum hydrocarbons - diesel range organics  
mg/kg = Milligrams per kilogram  
bgs = Below ground surface  
EC = Electrical Conductivity  
mmhos/cm = Millimhos per centimeter  
**BOLD** = Analytical result is in exceedance of COGCC soil standards.



**TABLE 2**  
**BROWN-McCARTY 5 30-43 TANK BATTERY**  
**GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE**

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water (feet bgs)
<b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
GW01	9/8/2015	3.8	<1.0	1.6	4.2	~3

**Notes:**

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective February 1, 2014.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L= Micrograms per liter

bgs = Below ground surface

(<) = Analytical result is less than the indicated laboratory reporting limit.

**BOLD** = Analytical result is in exceedance of COGCC groundwater standards.

## **ATTACHMENT A**

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

September 11, 2015

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Brown McCarty 30-5 + 30-43

Enclosed are the results of analyses for samples received by Summit Scientific on 09/08/15 16:42. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury

President



PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GW01	1509061-01	Water	09/08/15 16:00	09/08/15 16:42
SS01@2'	1509061-02	Soil	09/08/15 15:40	09/08/15 16:42
SS02@2'	1509061-03	Soil	09/08/15 15:45	09/08/15 16:42
SS03@2'	1509061-04	Soil	09/08/15 15:50	09/08/15 16:42
SS04@2'	1509061-05	Soil	09/08/15 15:55	09/08/15 16:42

Summit Scientific

*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.*





PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

# Summit Scientific 1509061

741 Corporate Circle Suite 1 • Golden, Colorado 80401  
303-277-9310 • 303-374-5933 Fax

Page 1 of 1

Client: PDC Energy  
Address:  
City/State/Zip:  
Phone: Fax:  
Sampler Name: Eric Siegel

Project Manager: Mark Longhurst  
E-Mail: Mark.Longhurst@PDCE.com  
Project Name: Brown McCarty 30-5 + 30-43  
Project Number:

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:						Special Instructions	
				HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	8260 BTEX	8260 GAO/Alkyl	8015 DRO	pH	EC		SAR (HOLD)
GW01	9/8/15	1600	3	X				X					X	X	X	X	X	
SS01e2'		1540	1		X			X					X	X	X	X	X	HOLD, pending GW results
SS02e2'		1545	1		X			X					X	X	X	X	X	
SS03e2'		1550	1		X			X					X	X	X	X	X	
SS04e2'		1555	1		X			X					X	X	X	X	X	
Relinquished by: <u>E. A. Azil</u> Date/Time: <u>9/8/15</u>				Received by: <u>[Signature]</u> Date/Time: <u>9-8-15 16:42</u>				Turn Around Time (Check)				Notes:						
Relinquished by: <u>[Signature]</u> Date/Time: <u>9-8-15 17:45</u>				Received by: Date/Time:				Same Day <input checked="" type="checkbox"/> 72 Hours <input type="checkbox"/> 24 Hours <input type="checkbox"/> Standard <input type="checkbox"/> 48 Hours <input type="checkbox"/>				Hold SAR if soil samples run, pending EC results						
Relinquished by: Date/Time:				Received in Lab by: Date/Time:				Sample Integrity: Temperature Upon Receipt: <u>83°C</u> Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>										

www.s2scientific.com

Summit Scientific

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**GW01**  
**1509061-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **09/08/15 16:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>3.8</b>	1.0	ug/l	1	1509065	09/08/15	09/08/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>1.6</b>	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>4.2</b>	1.0	"	"	"	"	"	"	

Date Sampled: **09/08/15 16:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>133 %</i>	<i>37-154</i>		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		<i>103 %</i>	<i>45-149</i>		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>109 %</i>	<i>45-146</i>		"	"	"	"	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

**SS01@2'**  
**1509061-02 (Soil)**

### Summit Scientific

#### Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 09/08/15 15:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509078	09/09/15	09/09/15	8015M	

Date Sampled: 09/08/15 15:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		100 %	30-150		"	"	"	"	

#### Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 09/08/15 15:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1509079	09/09/15	09/09/15	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: 09/08/15 15:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		117 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.9 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.2 %	21-167		"	"	"	"	

#### Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 09/08/15 15:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.671	0.0100	mmhos/cm	1	1509103	09/11/15	09/11/15	SM 2510B	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**SS01@2'**  
**1509061-02 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **09/08/15 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>pH</b>	<b>8.42</b>	0.100	pH Units	1	1509095	09/10/15	09/11/15	EPA 9045	

Date Sampled: **09/08/15 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>81.1</b>		%	"	1509068	09/09/15	09/10/15	% calculation	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

SS02@2'  
1509061-03 (Soil)

### Summit Scientific

#### Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 09/08/15 15:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509078	09/09/15	09/10/15	8015M	

Date Sampled: 09/08/15 15:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		98.1 %	30-150		"	"	"	"	

#### Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 09/08/15 15:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1509079	09/09/15	09/10/15	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: 09/08/15 15:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		129 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		106 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		106 %	21-167		"	"	"	"	

#### Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 09/08/15 15:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.742	0.0100	mmhos/cm	1	1509103	09/11/15	09/11/15	SM 2510B	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**SS02@2'**  
**1509061-03 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **09/08/15 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>pH</b>	<b>8.01</b>	0.100	pH Units	1	1509095	09/10/15	09/11/15	EPA 9045	

Date Sampled: **09/08/15 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>79.8</b>		%	"	1509068	09/09/15	09/10/15	% calculation	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**SS03@2'**  
**1509061-04 (Soil)**

### Summit Scientific

#### Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509078	09/09/15	09/10/15	8015M	

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		97.2 %	30-150		"	"	"	"	

#### Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1509079	09/09/15	09/10/15	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		127 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		104 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		110 %	21-167		"	"	"	"	

#### Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	<b>0.757</b>	0.0100	mmhos/cm	1	1509103	09/11/15	09/11/15	SM 2510B	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**SS03@2'**  
**1509061-04 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>pH</b>	<b>8.22</b>	0.100	pH Units	1	1509095	09/10/15	09/11/15	EPA 9045	

Date Sampled: **09/08/15 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>79.4</b>		%	"	1509068	09/09/15	09/10/15	% calculation	

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1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

**SS04@2'**  
**1509061-05 (Soil)**

### Summit Scientific

#### Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 09/08/15 15:55

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509078	09/09/15	09/10/15	8015M	

Date Sampled: 09/08/15 15:55

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		99.7 %	30-150		"	"	"	"	

#### Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 09/08/15 15:55

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1509079	09/09/15	09/10/15	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: 09/08/15 15:55

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		129 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		103 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		111 %	21-167		"	"	"	"	

#### Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 09/08/15 15:55

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.502	0.0100	mmhos/cm	1	1509103	09/11/15	09/11/15	SM 2510B	

Summit Scientific

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**SS04@2'**  
**1509061-05 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **09/08/15 15:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>pH</b>	<b>8.34</b>	0.100	pH Units	1	1509095	09/10/15	09/11/15	EPA 9045	

Date Sampled: **09/08/15 15:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>80.6</b>		%	"	1509068	09/09/15	09/10/15	% calculation	

Summit Scientific

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

**Extractable Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1509078 - EPA 3550A**

**Blank (1509078-BLK1)**

Prepared & Analyzed: 09/09/15

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 12.8 " 12.2 105 30-150

**LCS (1509078-BS1)**

Prepared & Analyzed: 09/09/15

C10-C28 (DRO) 453 50 mg/kg 499 90.8 73-134

Surrogate: o-Terphenyl 12.1 " 12.2 98.9 30-150

**Matrix Spike (1509078-MS1)**

Source: 1509061-02

Prepared & Analyzed: 09/09/15

C10-C28 (DRO) 446 50 mg/kg 487 ND 91.5 50-148

Surrogate: o-Terphenyl 11.5 " 11.9 96.4 30-150

**Matrix Spike Dup (1509078-MSD1)**

Source: 1509061-02

Prepared & Analyzed: 09/09/15

C10-C28 (DRO) 431 50 mg/kg 466 ND 92.3 50-148 3.54 13

Surrogate: o-Terphenyl 11.4 " 11.4 100 30-150

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1509065 - EPA 5030 Water MS**

**Blank (1509065-BLK1)**

Prepared & Analyzed: 09/08/15

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	16.5		"	13.2		125	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	14.9		"	13.3		112	45-146			

**LCS (1509065-BS1)**

Prepared & Analyzed: 09/08/15

Benzene	36.5	1.0	ug/l	33.3		110	51-132			
Toluene	31.8	1.0	"	33.3		95.5	51-138			
Ethylbenzene	35.7	1.0	"	33.1		108	58-146			
m,p-Xylene	67.9	2.0	"	66.5		102	57-144			
o-Xylene	38.5	1.0	"	32.8		117	53-146			
Surrogate: 1,2-Dichloroethane-d4	17.4		"	13.2		132	37-154			
Surrogate: Toluene-d8	13.9		"	13.3		104	45-149			
Surrogate: 4-Bromofluorobenzene	15.0		"	13.3		113	45-146			

**Matrix Spike (1509065-MS1)**

Source: 1509055-01

Prepared & Analyzed: 09/08/15

Benzene	36.7	1.0	ug/l	33.3	ND	110	34-141			
Toluene	31.7	1.0	"	33.3	ND	95.2	27-151			
Ethylbenzene	59.9	1.0	"	33.1	28.4	95.3	29-160			
m,p-Xylene	92.5	2.0	"	66.5	29.1	95.3	20-166			
o-Xylene	38.9	1.0	"	32.8	ND	119	33-159			
Surrogate: 1,2-Dichloroethane-d4	17.0		"	13.2		129	37-154			
Surrogate: Toluene-d8	13.6		"	13.3		102	45-149			
Surrogate: 4-Bromofluorobenzene	14.3		"	13.3		107	45-146			

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1509065 - EPA 5030 Water MS**

Matrix Spike Dup (1509065-MSD1)				Source: 1509055-01		Prepared & Analyzed: 09/08/15				
Benzene	35.9	1.0	ug/l	33.3	ND	108	34-141	2.09	32	
Toluene	31.2	1.0	"	33.3	ND	93.5	27-151	1.75	25	
Ethylbenzene	56.3	1.0	"	33.1	28.4	84.5	29-160	6.14	50	
m,p-Xylene	87.8	2.0	"	66.5	29.1	88.3	20-166	5.16	36	
o-Xylene	38.5	1.0	"	32.8	ND	117	33-159	0.956	26	
Surrogate: 1,2-Dichloroethane-d4	17.2		"	13.2		130	37-154			
Surrogate: Toluene-d8	13.8		"	13.3		103	45-149			
Surrogate: 4-Bromofluorobenzene	14.6		"	13.3		110	45-146			

**Batch 1509079 - EPA 5030 Soil MS**

Blank (1509079-BLK1)				Prepared & Analyzed: 09/09/15						
Naphthalene	ND	0.010	mg/kg							
Benzene	ND	0.0020	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	50	"							
Surrogate: 1,2-Dichloroethane-d4	0.0426		"	0.0396		108	23-173			
Surrogate: Toluene-d8	0.0398		"	0.0400		99.5	20-170			
Surrogate: 4-Bromofluorobenzene	0.0392		"	0.0400		98.0	21-167			

LCS (1509079-BS1)				Prepared & Analyzed: 09/09/15						
Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0881	0.0020	"	0.100		88.1	58-130			
Toluene	0.0861	0.0050	"	0.100		86.1	61-134			
Ethylbenzene	0.109	0.0050	"	0.0992		110	74-139			
m,p-Xylene	0.207	0.010	"	0.200		104	73-137			
o-Xylene	0.0978	0.0050	"	0.0984		99.4	73-141			
Surrogate: 1,2-Dichloroethane-d4	0.0424		"	0.0396		107	23-173			
Surrogate: Toluene-d8	0.0391		"	0.0400		97.8	20-170			
Surrogate: 4-Bromofluorobenzene	0.0388		"	0.0400		97.1	21-167			

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1509079 - EPA 5030 Soil MS**

**Matrix Spike (1509079-MS1)**

**Source: 1509061-02**

Prepared & Analyzed: 09/09/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0894	0.0020	"	0.100	ND	89.4	30-131			
Toluene	0.0876	0.0050	"	0.100	ND	87.6	30-134			
Ethylbenzene	0.110	0.0050	"	0.0992	ND	111	22-153			
m,p-Xylene	0.209	0.010	"	0.200	ND	105	10-159			
o-Xylene	0.0983	0.0050	"	0.0984	ND	99.9	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0441		"	0.0396		111	23-173			
Surrogate: Toluene-d8	0.0394		"	0.0400		98.4	20-170			
Surrogate: 4-Bromofluorobenzene	0.0384		"	0.0400		95.9	21-167			

**Matrix Spike Dup (1509079-MSD1)**

**Source: 1509061-02**

Prepared & Analyzed: 09/09/15

Naphthalene	ND	0.010	mg/kg		ND		10-158		42	
Benzene	0.0879	0.0020	"	0.100	ND	87.9	30-131	1.69	34	
Toluene	0.0861	0.0050	"	0.100	ND	86.1	30-134	1.76	30	
Ethylbenzene	0.111	0.0050	"	0.0992	ND	112	22-153	1.09	24	
m,p-Xylene	0.213	0.010	"	0.200	ND	107	10-159	1.86	68	
o-Xylene	0.101	0.0050	"	0.0984	ND	103	31-151	2.95	38	
Surrogate: 1,2-Dichloroethane-d4	0.0462		"	0.0396		117	23-173			
Surrogate: Toluene-d8	0.0385		"	0.0400		96.2	20-170			
Surrogate: 4-Bromofluorobenzene	0.0386		"	0.0400		96.4	21-167			

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
09/11/15 16:39

**Physical Parameters by APHA/ASTM/EPA Methods - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC		RPD		
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1509068 - General Preparation**

<b>Duplicate (1509068-DUP1)</b>		<b>Source: 1509040-01</b>		Prepared: 09/09/15 Analyzed: 09/10/15	
% Solids	98.0	%		97.8	0.204 20
<b>Duplicate (1509068-DUP2)</b>		<b>Source: 1509061-02</b>		Prepared: 09/09/15 Analyzed: 09/10/15	
% Solids	81.2	%		81.1	0.123 20

**Batch 1509095 - General Preparation**

<b>LCS (1509095-BS1)</b>				Prepared: 09/10/15 Analyzed: 09/11/15		
pH	7.98	0.100	pH Units	8.00	99.8	95-105
<b>Duplicate (1509095-DUP1)</b>				Prepared: 09/10/15 Analyzed: 09/11/15		
pH	6.92	0.100	pH Units	6.92	0.00	20

**Batch 1509103 - General Preparation**

<b>Blank (1509103-BLK1)</b>			Prepared & Analyzed: 09/11/15			
Specific Conductance (EC)	ND	0.0100 mmhos/cm				
<b>LCS (1509103-BS1)</b>			Prepared & Analyzed: 09/11/15			
Specific Conductance (EC)	0.506	0.0100 mmhos/cm	0.500	101	90-110	
<b>Duplicate (1509103-DUP1)</b>		<b>Source: 1509053-01</b>	Prepared & Analyzed: 09/11/15			
Specific Conductance (EC)	0.470	0.0100 mmhos/cm	0.461	1.97	20	

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PDC Energy  
1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Brown McCarty 30-5 + 30-43

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
09/11/15 16:39

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

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