



**PDC Energy, Inc.**  
Third Quarter 2015 Groundwater Monitoring Summary

October 23, 2015

Cottonwood #1 Tank Battery  
NESE Section 13 T6N R66W  
Weld County, API # 05-123-11801  
Spill Tracking # Not Assigned  
Remediation # Not Assigned

This groundwater summary has been prepared by Tasman Geosciences, Inc. for the Cottonwood #1 tank battery. On September 28, 2015 groundwater sampling was conducted at the seven monitoring well locations at the site. Groundwater samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B. Analytical results are summarized in Table 1 below and the laboratory report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Third quarter 2015 analytical results indicate that benzene concentrations are above COGCC regulatory standards in monitoring wells BH02 and BH03. BTEX concentrations are below regulatory standards in the remaining five sample locations.

Tasman initiated enhanced fluid recovery (EFR) and air sparge (AS) events on site during the fourth quarter 2012. On September 14 and 15, 2015, ten additional remediation wells (EFR01 through EFR10) were installed in order to address remaining dissolved-phase hydrocarbon concentrations in BH02 and BH03. The locations of the new remediation wells are illustrated on Figure 1. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS events will continue as the selected remediation strategy for the site through the fourth quarter 2015.

Fourth quarter 2015 groundwater sampling will be conducted during December 2015.

**TABLE 1**  
**COTTONWOOD #1 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)
<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	8/21/2012	<b>3,000</b>	1.7	320	<b>1,900</b>	NM
BH01	9/24/2012	<b>160</b>	<1.0	40	<1.0	16.31
BH01	12/20/2012	<b>5.0</b>	<1.0	<1.0	6.8	16.13
BH01	3/18/2013	<1.0	<1.0	<1.0	<1.0	16.58
BH01	6/20/2013	<1.0	<1.0	<1.0	<1.0	11.16
BH01	9/25/2013	<1.0	<1.0	<1.0	<1.0	13.61
BH01	12/30/2013	1.8	<1.0	<1.0	<1.0	14.38
BH01	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.03
BH01	6/24/2014	<1.0	<1.0	<1.0	<1.0	11.79
BH01	9/24/2014	<1.0	<1.0	<1.0	<1.0	12.48
BH01	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.16
BH01	3/26/2015	<1.0	<1.0	<1.0	<1.0	12.60
BH01	6/16/2015	<1.0	<1.0	<1.0	<1.0	11.33
BH01	9/28/2015	<1.0	<1.0	<1.0	<1.0	11.31
BH02	9/24/2012	<b>1,300</b>	<1.0	190	1,100	18.42
BH02	12/20/2012	<b>24</b>	<1.0	3.9	8.1	17.35
BH02	3/18/2013	<b>18</b>	<1.0	<1.0	<1.0	17.80
BH02	6/20/2013	<b>15</b>	<1.0	<1.0	<1.0	12.58
BH02	9/25/2013	<b>8.6</b>	<1.0	<1.0	<1.0	14.68
BH02	12/30/2013	<b>16</b>	<1.0	<1.0	<1.0	15.44
BH02	3/28/2014	<1.0	<1.0	<1.0	<1.0	15.15
BH02	6/24/2014	<b>14</b>	<1.0	1.6	<1.0	12.94
BH02	9/24/2014	<b>59</b>	<1.0	2.5	2.7	13.28
BH02	12/17/2014	<b>29</b>	<1.0	<1.0	<1.0	14.19
BH02	3/26/2015	<b>47</b>	<1.0	2.5	<1.0	13.65
BH02	6/16/2015	<b>35</b>	<1.0	<1.0	<1.0	12.55
BH02	9/28/2015	<b>80</b>	<1.0	2.2	<1.0	12.27
BH03	9/24/2012	<b>350</b>	<1.0	120	300	18.28
BH03	12/20/2012	<b>15</b>	<1.0	6.7	7.9	17.04
BH03	3/18/2013	<b>14</b>	<1.0	1.5	<1.0	17.46
BH03	6/20/2013	<b>11</b>	<1.0	2.1	<1.0	12.01
BH03	9/25/2013	<b>39</b>	<1.0	16	<1.0	14.26
BH03	12/30/2013	<b>48</b>	<1.0	3.6	<1.0	15.02
BH03	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.79
BH03	6/24/2014	<b>13</b>	<1.0	1.2	<1.0	12.43
BH03	9/24/2014	<b>45</b>	<1.0	1.8	3.0	12.91
BH03	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.72
BH03	3/26/2015	<b>8.0</b>	<1.0	<1.0	<1.0	13.24
BH03	6/16/2015	<b>19</b>	<1.0	<1.0	<1.0	12.03
BH03	9/28/2015	<b>7.7</b>	<1.0	<1.0	<1.0	11.82

**TABLE 1**  
**COTTONWOOD #1 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)
<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>	
BH04	9/24/2012	150	<1.0	96	400	16.58
BH04	12/20/2012	38	<1.0	40	170	13.95
BH04	3/18/2013	2.6	<1.0	<1.0	<1.0	14.38
BH04	6/20/2013	1.3	<1.0	5.4	19	8.70
BH04	9/25/2013	1.5	<1.0	2.5	<1.0	11.32
BH04	12/30/2013	<1.0	<1.0	<1.0	<1.0	12.12
BH04	3/28/2014	<1.0	<1.0	<1.0	<1.0	11.80
BH04	6/24/2014	<1.0	<1.0	2.2	<1.0	9.43
BH04	9/24/2014	<1.0	<1.0	1.2	3.1	10.22
BH04	12/17/2014	<1.0	<1.0	<1.0	<1.0	10.96
BH04	3/26/2015	<1.0	<1.0	<1.0	<1.0	10.40
BH04	6/16/2015	1.8	<1.0	3.8	<1.0	9.09
BH04	9/28/2015	<1.0	<1.0	<1.0	<1.0	9.07
BH05	9/24/2012	<1.0	<1.0	<1.0	<1.0	15.42
BH05	12/20/2012	<1.0	<1.0	<1.0	<1.0	16.86
BH05	3/18/2013	<1.0	<1.0	<1.0	<1.0	17.31
BH05	6/20/2013	<1.0	<1.0	<1.0	<1.0	11.42
BH05	9/25/2013	<1.0	<1.0	<1.0	<1.0	14.02
BH05	12/30/2013	<1.0	<1.0	<1.0	<1.0	14.80
BH05	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.45
BH05	6/24/2014	<1.0	<1.0	<1.0	<1.0	12.00
BH05	9/24/2014	<1.0	<1.0	<1.0	<1.0	12.93
BH05	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.69
BH05	3/26/2015	<1.0	<1.0	<1.0	<1.0	13.30
BH05	6/16/2015	<1.0	<1.0	<1.0	<1.0	11.96
BH05	9/28/2015	<1.0	<1.0	<1.0	<1.0	11.98
BH06	9/24/2012	6.7	18	7.5	50	15.35
BH06	12/20/2012	<1.0	<1.0	<1.0	<1.0	16.79
BH06	3/18/2013	3.6	1.2	<1.0	<1.0	14.74
BH06	6/20/2013	<1.0	<1.0	<1.0	<1.0	11.72
BH06	9/25/2013	1.9	<1.0	<1.0	<1.0	14.05
BH06	12/30/2013	<1.0	<1.0	<1.0	<1.0	15.12
BH06	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.78
BH06	6/24/2014	<1.0	<1.0	<1.0	<1.0	12.52
BH06	9/24/2014	<1.0	<1.0	<1.0	<1.0	13.26
BH06	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.94
BH06	3/26/2015	<1.0	<1.0	<1.0	<1.0	13.45
BH06	6/16/2015	<1.0	<1.0	<1.0	<1.0	12.28
BH06	9/28/2015	<1.0	<1.0	<1.0	<1.0	12.09

**TABLE 1**  
**COTTONWOOD #1 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)
<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>	
BH07	9/24/2012	<1.0	<1.0	<1.0	<1.0	16.86
BH07	12/20/2012	<1.0	<1.0	<1.0	<1.0	18.32
BH07	3/18/2013	<1.0	<1.0	<1.0	<1.0	18.77
BH07	6/20/2013	1.6	<1.0	<1.0	<1.0	13.70
BH07	9/25/2013	<1.0	<1.0	<1.0	<1.0	15.95
BH07	12/30/2013	<1.0	<1.0	<1.0	<1.0	16.68
BH07	3/28/2014	<1.0	<1.0	<1.0	<1.0	16.39
BH07	6/24/2014	<1.0	<1.0	<1.0	<1.0	14.30
BH07	9/24/2014	<1.0	<1.0	<1.0	<1.0	14.84
BH07	12/17/2014	<1.0	<1.0	<1.0	<1.0	15.46
BH07	3/26/2015	<1.0	1.2	<1.0	<1.0	14.93
BH07	6/16/2015	<1.0	<1.0	<1.0	<1.0	13.71
BH07	9/28/2015	<1.0	<1.0	<1.0	<1.0	13.38

**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

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

NM = Not Measured

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

**TABLE 2  
COTTONWOOD #1 TANK BATTERY  
EFR / AS OPERATIONAL SUMMARY TABLE**

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
<b>Fourth Quarter 2012</b>					
11/2/2012	BH01, BH02, BH03, BH04	6.75	13.8	BH01, BH02, BH03, BH04	8
11/14/2012		6	110		8
12/12/2012		6	400		8
<b>Quarterly Totals</b>		<b>18.75</b>	<b>523.8</b>		-
<b>First Quarter 2013</b>					
1/4/2013	BH01, BH02, BH03, BH04	6.5	185	BH01, BH02, BH03, BH04	10
1/18/2013		6.25	272		10
2/2/2013		6	278		10
2/15/2013		7	180		9
3/5/2013		6.75	364		10
3/22/2013		4	90		10
<b>Quarterly Totals</b>		<b>36.5</b>	<b>1369</b>		-
<b>Second Quarter 2013</b>					
4/3/2013	BH01, BH02, BH03, BH04	5	275	BH01, BH02, BH03, BH04	10
4/19/2013		6.5	373		10
5/13/2013		6	385		10
5/23/2013		6	151		10
6/6/2013		6	387		10
6/17/2013		5	300		10
<b>Quarterly Totals</b>		<b>34.5</b>	<b>1871</b>		-
<b>Third Quarter 2013</b>					
7/16/2013	BH01, BH02, BH03, BH04, BH07	6	340	BH01, BH02, BH03, BH04, BH07	10
7/30/2013		6	320		10
8/13/2013		6	294		10
8/30/2013		5.5	182		10
9/12/2013		5.5	180		10
9/27/2013		6	80		10
<b>Quarterly Totals</b>		<b>35</b>	<b>1396</b>		-
<b>Fourth Quarter 2013</b>					
10/10/2013	BH01, BH02, BH03, BH04, BH06, BH07	6	132	BH01, BH02, BH03, BH04, BH06, BH07	10
10/22/2013		6	159		11
11/12/2013		6	115		10
11/25/2013		6	65		10
12/13/2013		6	60		10
<b>Quarterly Totals</b>		<b>30</b>	<b>531</b>		-

**TABLE 2**  
**COTTONWOOD #1 TANK BATTERY**  
**EFR / AS OPERATIONAL SUMMARY TABLE**

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
<b>First Quarter 2014</b>					
1/3/2014	BH01, BH02, BH03, BH04	6	10	BH01, BH02, BH03, BH04	10
1/17/2014		6	240		10
2/17/2014		6	180		10
3/5/2014		5.25	270		10
3/14/2014		6	300		10
4/3/2014		6	120		10
<b>Quarterly Totals</b>		<b>35.25</b>	<b>1120</b>		
<b>Second Quarter 2014</b>					
4/3/2014	BH01, BH02, BH03, BH04	6	120	BH01, BH02, BH03, BH04	10
4/18/2014		6	360		20
5/7/2014		6	225		10
5/22/2014		6	400		20
6/7/2014		6	200		10
6/20/2014		6	300		20
<b>Quarterly Totals</b>		<b>36</b>	<b>1605</b>		
<b>Third Quarter 2014</b>					
7/10/2014	BH02, BH03	6	250	BH02, BH03	10
7/25/2014		6	220		10
8/16/2014		6	120		10
9/8/2014		6	450		20
9/19/2014		6	150		20
<b>Quarterly Totals</b>		<b>30</b>	<b>1190</b>		
<b>Fourth Quarter 2014</b>					
10/8/2014	BH02, BH03	6	100	BH02, BH03	20
10/25/2014		6	260		20
11/7/2014		6	112		20
12/2/2014		6	250		20
12/15/2014		6	270		20
<b>Quarterly Totals</b>		<b>30</b>	<b>992</b>		
<b>First Quarter 2015</b>					
1/5/2015	BH02, BH03	6	0	BH02, BH03	20
1/16/2015		6	315		20
2/7/2015		6	410		20
3/2/2015		6	0		20
3/19/2015		6	0		20
<b>Quarterly Totals</b>		<b>30</b>	<b>725</b>		

**TABLE 2**  
**COTTONWOOD #1 TANK BATTERY**  
**EFR / AS OPERATIONAL SUMMARY TABLE**

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
<b>Second Quarter 2015</b>					
4/8/2015	BH02, BH03	6	0	BH02, BH03	20
4/15/2015		5.45	0		20
4/29/2015		6	320		20
5/13/2015		6	360		20
5/27/2015		6	480		20
6/10/2015		6	600		20
6/24/2015		6	480		20
<b>Quarterly Totals</b>		<b>41.45</b>	<b>2240</b>		
<b>Third Quarter 2015</b>					
7/8/2015	BH02, BH03	6	400	BH02, BH03	20
7/22/2015		6	280		20
8/5/2015		6	250		20
8/17/2015		4	375		20
9/2/2015		6	640		20
9/30/2015	BH02, BH03, EFR01, EFR02, EFR03, EFR04, EFR05, EFR06, EFR07, EFR08, EFR09, EFR10	6	800	BH02, BH03, EFR01, EFR02, EFR03, EFR04, EFR05, EFR06, EFR07, EFR08, EFR09, EFR10	20
<b>Quarterly Totals</b>		<b>34</b>	<b>2745</b>		

**Notes:**

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch



BH06		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH01		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH07		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

Irrigation Canal Flow



Surface Drainage



BH04		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	1.8	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	3.8	<1.0
Total Xylenes	<1.0	<1.0

BH02		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	35	80
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	2.2
Total Xylenes	<1.0	<1.0

BH05		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH03		
Compound (ug/L)	6/16/2015	9/28/2015
Benzene	19	7.7
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

SW01



BH07

BH01

EFR05

EFR10

EFR04

BH02

GW01

EFR06

EFR07

EFR02

EFR01

EFR08

EFR09

BH03

LEGEND

- Approximate Area of Excavation
- Monitoring Well Location
- Remediation EFR Well Location
- Excavation Groundwater Sample Location
- Excavation Surface Water Sample Location

DRAWN BY: ESS

DATE: 10/23/2015

**Facility Diagram**  
 PDC Energy, Inc. – DJ Basin  
 Cottonwood #1 Tank Battery  
 NESE S13 T6N R66W  
 Weld County, CO

**TASMAN** GEOSCIENCES  
 6899 Pecos Street, Unit C  
 Denver, CO 80221

FIGURE 1  
 GROUNDWATER  
 ANALYTICAL  
 RESULTS

**ATTACHMENT A**

# Summit Scientific

---

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

October 05, 2015

Mark Longhurst  
PDC Energy  
1775 Sherman St. STE. 3000  
Denver, CO 80203  
RE: Cottonwood #1

Enclosed are the results of analyses for samples received by Summit Scientific on 09/28/15 17:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read "M. Clements", with a stylized flourish at the end.

Michelle Clements For Paul Shrewsbury  
President



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

Project: Cottonwood #1

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
10/05/15 11:30

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1509258-01	Water	09/28/15 11:48	09/28/15 17:00
BH02	1509258-02	Water	09/28/15 11:53	09/28/15 17:00
BH03	1509258-03	Water	09/28/15 11:50	09/28/15 17:00
BH04	1509258-04	Water	09/28/15 11:57	09/28/15 17:00
BH05	1509258-05	Water	09/28/15 11:43	09/28/15 17:00
BH06	1509258-06	Water	09/28/15 11:39	09/28/15 17:00
BH07	1509258-07	Water	09/28/15 11:38	09/28/15 17:00

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: Cottonwood #1

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
10/05/15 11:30

# Summit Scientific

1509258

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: Kate F. Matt

Project Manager: Mark Longhurst  
E-Mail: mark.longhurst@pdce.com  
Project Name: (Cottonwood #)  
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)					
BH01	9/29/15	1145	3	X				X								
BH02		1153														
BH03		1150														
BH04		1157														
BH05		1143														
BH06		1139														
BH07		1138														
Relinquished by: <u>Kate F. Matt</u> Date/Time: <u>9/28/15 1530</u>				Received by: <u>MDA</u> Date/Time: <u>9/28/15 1700</u>				Turn Around Time (Check)				Notes:				
Relinquished by: <u>MDA</u> Date/Time: <u>9/28/15 1735</u>								Same Day <input type="checkbox"/> 72 Hours <input type="checkbox"/> 24 Hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 Hours <input type="checkbox"/>				ON ice				
Relinquished by:				Received in Lab by:				Sample Integrity:								
								Temperature Upon Receipt: <u>9.4°C</u>								
								Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No								

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*M. Clements*

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

Project: Cottonwood #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH01**  
**1509258-01 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:48**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:48**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		94.4 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.1 %	45-146		"	"	"	"	

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

Project: Cottonwood #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH02**  
**1509258-02 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>80</b>	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>2.2</b>	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		112 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		94.6 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		95.2 %	45-146		"	"	"	"	

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

Project: Cottonwood #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH03**  
**1509258-03 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>7.7</b>	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		112 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		95.9 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		92.2 %	45-146		"	"	"	"	

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

Project: Cottonwood #1  
 Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH04**  
**1509258-04 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		112 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.4 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Cottonwood #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH05**  
**1509258-05 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:43**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:43**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		112 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.1 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.4 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Cottonwood #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH06**  
**1509258-06 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:39**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:39**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>110 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>95.3 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>94.7 %</i>	<i>45-146</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	

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

Project: Cottonwood #1  
 Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

**BH07**  
**1509258-07 (Water)**

**Summit Scientific**

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

Date Sampled: **09/28/15 11:38**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1509290	10/01/15	10/01/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **09/28/15 11:38**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		106 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		94.3 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.9 %	45-146		"	"	"	"	

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

Project: Cottonwood #1  
Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
10/05/15 11:30

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

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

**Batch 1509290 - EPA 5030 Water MS**

**Blank (1509290-BLK1)**

Prepared & Analyzed: 10/01/15

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	14.0		"	13.2		106	37-154			
Surrogate: Toluene-d8	12.9		"	13.3		96.8	45-149			
Surrogate: 4-Bromofluorobenzene	12.5		"	13.3		93.8	45-146			

**LCS (1509290-BS1)**

Prepared & Analyzed: 10/01/15

Benzene	28.5	1.0	ug/l	33.3		85.5	51-132			
Toluene	28.1	1.0	"	33.3		84.3	51-138			
Ethylbenzene	35.6	1.0	"	33.1		108	58-146			
m,p-Xylene	69.3	2.0	"	66.5		104	57-144			
o-Xylene	32.5	1.0	"	32.8		99.0	53-146			
Surrogate: 1,2-Dichloroethane-d4	13.7		"	13.2		104	37-154			
Surrogate: Toluene-d8	12.6		"	13.3		94.8	45-149			
Surrogate: 4-Bromofluorobenzene	12.4		"	13.3		93.2	45-146			

**Matrix Spike (1509290-MS1)**

Source: 1509258-01

Prepared & Analyzed: 10/01/15

Benzene	28.5	1.0	ug/l	33.3	ND	85.4	34-141			
Toluene	28.6	1.0	"	33.3	ND	85.9	27-151			
Ethylbenzene	36.1	1.0	"	33.1	ND	109	29-160			
m,p-Xylene	71.9	2.0	"	66.5	ND	108	20-166			
o-Xylene	33.0	1.0	"	32.8	ND	101	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.4		"	13.2		109	37-154			
Surrogate: Toluene-d8	12.7		"	13.3		95.1	45-149			
Surrogate: 4-Bromofluorobenzene	12.4		"	13.3		93.2	45-146			

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

Project: Cottonwood #1  
 Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 10/05/15 11:30

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

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

**Batch 1509290 - EPA 5030 Water MS**

<b>Matrix Spike Dup (1509290-MSD1)</b>	<b>Source: 1509258-01</b>			<b>Prepared &amp; Analyzed: 10/01/15</b>						
Benzene	29.5	1.0	ug/l	33.3	ND	88.6	34-141	3.62	32	
Toluene	29.3	1.0	"	33.3	ND	87.8	27-151	2.25	25	
Ethylbenzene	36.8	1.0	"	33.1	ND	111	29-160	1.78	50	
m,p-Xylene	71.9	2.0	"	66.5	ND	108	20-166	0.0139	36	
o-Xylene	33.7	1.0	"	32.8	ND	103	33-159	1.95	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>14.9</i>		<i>"</i>	<i>13.2</i>		<i>113</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.7</i>		<i>"</i>	<i>13.3</i>		<i>95.0</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.4</i>		<i>"</i>	<i>13.3</i>		<i>93.4</i>	<i>45-146</i>			

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

Project: Cottonwood #1

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
10/05/15 11:30

### 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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