



PDC Energy, Inc.
Second Quarter 2015 Groundwater Monitoring Summary

July 22, 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 June 16, 2015 groundwater sampling was conducted at seven monitoring well locations. 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 and the laboratory report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Second 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. EFR/AS remained the selected remediation strategy for the site during the second quarter 2015. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS activities will continue through the third quarter 2015.

Third quarter 2015 groundwater sampling will be conducted during September 2015.

TABLE 1
COTTONWOOD #1 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Depth to Water (feet)
GW01	8/21/2012	3,000	1.7	320	1,900	NM
BH01	9/24/2012	160	<1.0	40	<1.0	16.31
BH01	12/20/2012	5	<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
BH02	9/24/2012	1,300	<1.0	190	1,100	18.42
BH02	12/20/2012	24	<1.0	3.9	8.1	17.35
BH02	3/18/2013	18	<1.0	<1.0	<1.0	17.80
BH02	6/20/2013	15	<1.0	<1.0	<1.0	12.58
BH02	9/25/2013	8.6	<1.0	<1.0	<1.0	14.68
BH02	12/30/2013	16	<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	14	<1.0	1.6	<1.0	12.94
BH02	9/24/2014	59	<1.0	2.5	2.7	13.28
BH02	12/17/2014	29	<1.0	<1.0	<1.0	14.19
BH02	3/26/2015	47	<1.0	2.5	<1.0	13.65
BH02	6/16/2015	35	<1.0	<1.0	<1.0	12.55
BH03	9/24/2012	350	<1.0	120	300	18.28
BH03	12/20/2012	15	<1.0	6.7	7.9	17.04
BH03	3/18/2013	14	<1.0	1.5	<1.0	17.46
BH03	6/20/2013	11	<1.0	2.1	<1.0	12.01
BH03	9/25/2013	39	<1.0	16	<1.0	14.26
BH03	12/30/2013	48	<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	13	<1.0	1.2	<1.0	12.43
BH03	9/24/2014	45	<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	8.0	<1.0	<1.0	<1.0	13.24
BH03	6/16/2015	19	<1.0	<1.0	<1.0	12.03

**TABLE 1
COTTONWOOD #1 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE**

Sample ID	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Depth to Water (feet)
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
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
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

TABLE 1
COTTONWOOD #1 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Depth to Water (feet)
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
COGCC standards for groundwater (ug/L) ⁽¹⁾		5	560	700	1,400	

Notes:

1). The environmental cleanup standards for groundwater that are applicable to this site are the Colorado Oil and Gas Conservation Commission (COGCC) standards for contaminants in groundwater according to Table 910-1 of the COGCC 900 Series Rule for E&P Waste Management.

Bold red values indicate an exceedance of the COGCC groundwater standards for the site.
 ug/L-Micrograms per liter

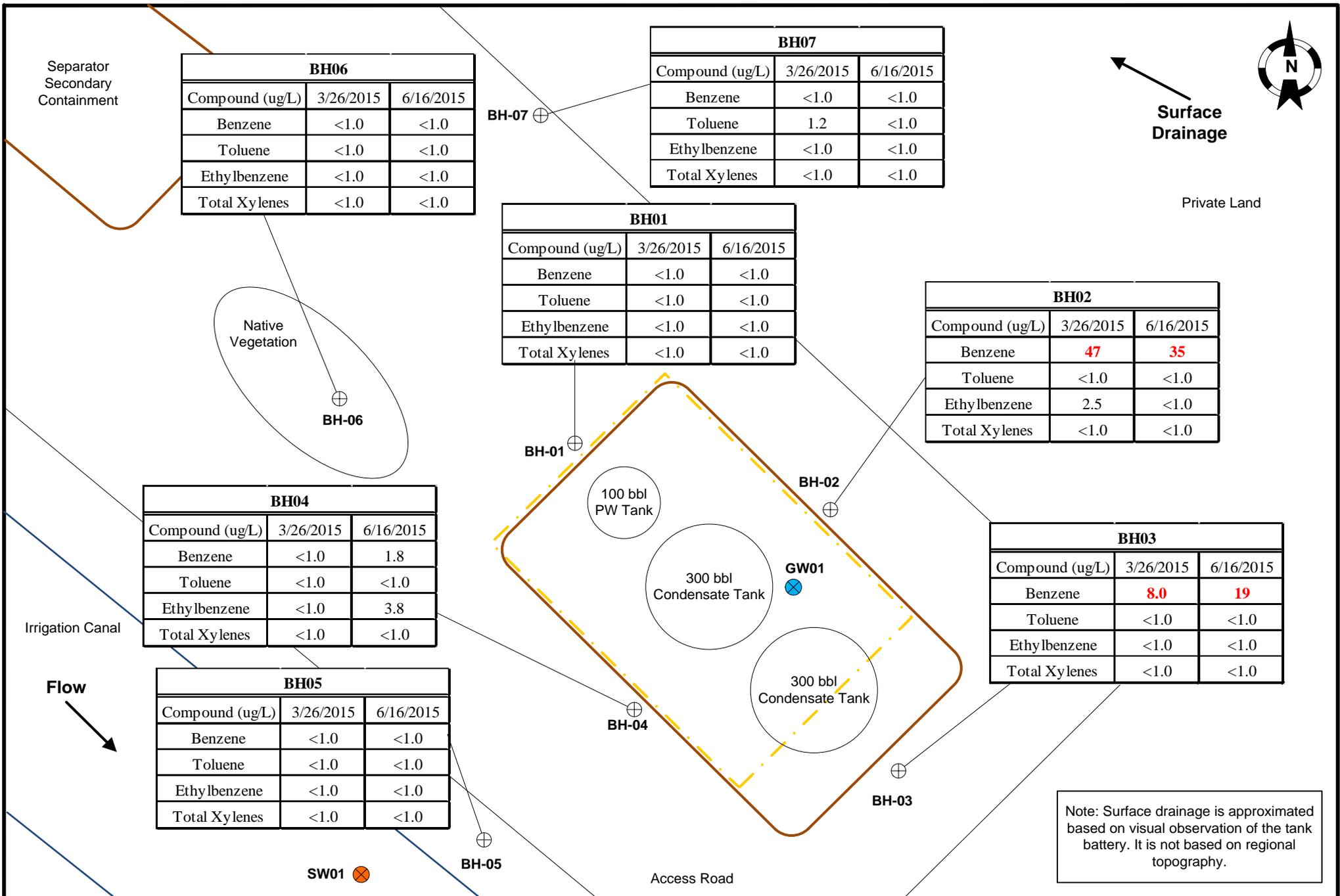
NM - Not Measured

TABLE 2
COTTONWOOD #1 TANK BATTERY
AIR SPARGE / EFR OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
Fourth Quarter 2012						
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	
Quarterly Totals		18.75	523.8		-	
First Quarter 2013						
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	
Quarterly Totals		36.5	1369		-	
Second Quarter 2013						
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	
Quarterly Totals		34.5	1871		-	
Third Quarter 2013						
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	
Quarterly Totals		35	1396		-	
Fourth Quarter 2013						
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	
Quarterly Totals		30	531		-	
First Quarter 2014						
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	42
3/5/2014		5.25	270		10	30.5
3/14/2014		6	300		10	34
4/3/2014		6	120		10	20
Quarterly Totals		35.25	1120		-	

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

Second Quarter 2014						
4/3/2014	BH01, BH02, BH03, BH04	6	120	BH01, BH02, BH03, BH04	10	20
4/18/2014		6	360		20	33
5/7/2014		6	225		10	10
5/22/2014		6	400		20	30
6/7/2014		6	200		10	21.5
6/20/2014		6	300		20	30
Quarterly Totals		36	1605		-	
Third Quarter 2014						
7/10/2014	BH02, BH03	6	250	BH02, BH03	10	12.5
7/25/2014		6	220		10	27.5
8/16/2014		6	120		10	25
9/8/2014		6	450		20	41.6
9/19/2014		6	150		20	40
Quarterly Totals		30	1190		-	
Fourth Quarter 2014						
10/8/2014	BH02, BH03	6	100	BH02, BH03	20	20
10/25/2014		6	260		20	33.5
11/7/2014		6	112		20	20
12/2/2014		6	250		20	37.5
12/15/2014		6	270		20	20
Quarterly Totals		30	992		-	
First Quarter 2015						
1/5/2015	BH02, BH03	6	0	BH02, BH03	20	35
1/16/2015		6	315		20	35
2/7/2015		6	410		20	32.5
3/2/2015		6	0		2	27.5
3/19/2015		6	0		20	30
Quarterly Totals		30	725		-	
Secnd Quarter 2015						
4/8/2015	BH02, BH03	6	0	BH02, BH03	20	17.5
4/15/2015		5.45	0		20	30
4/29/2015		6	320		20	27.5
5/13/2015		6	360		20	25
5/27/2015		6	480		20	27.5
6/10/2015		6	600		20	27.5
6/24/2015		6	480		20	30
Quarterly Totals		41.45	2240		-	



BH06		
Compound (ug/L)	3/26/2015	6/16/2015
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)	3/26/2015	6/16/2015
Benzene	<1.0	<1.0
Toluene	1.2	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH01		
Compound (ug/L)	3/26/2015	6/16/2015
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH02		
Compound (ug/L)	3/26/2015	6/16/2015
Benzene	47	35
Toluene	<1.0	<1.0
Ethylbenzene	2.5	<1.0
Total Xylenes	<1.0	<1.0

BH04		
Compound (ug/L)	3/26/2015	6/16/2015
Benzene	<1.0	1.8
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	3.8
Total Xylenes	<1.0	<1.0

BH03		
Compound (ug/L)	3/26/2015	6/16/2015
Benzene	8.0	19
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH05		
Compound (ug/L)	3/26/2015	6/16/2015
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

DRAWN BY: ESS

DATE: 7/7/2015

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

TASMAN GEOSCIENCES
 6899 Pecos Street
 Unit C
 Denver, CO 80221

LEGEND

- Earthen Berm
- Approximate Extent of Excavation
- Temporary Monitoring Well
- Surface Water Sample Location
- Excavation Groundwater Sample Location

FIGURE 1
 GROUNDWATER ANALYTICAL RESULTS
 Not to Scale

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

June 23, 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 06/16/15 17:50. 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: Cottonwood #1

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/23/15 08:20

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1506146-01	Water	06/16/15 10:43	06/16/15 17:50
BH02	1506146-02	Water	06/16/15 10:53	06/16/15 17:50
BH03	1506146-03	Water	06/16/15 11:01	06/16/15 17:50
BH04	1506146-04	Water	06/16/15 11:07	06/16/15 17:50
BH05	1506146-05	Water	06/16/15 11:14	06/16/15 17:50
BH06	1506146-06	Water	06/16/15 11:20	06/16/15 17:50
BH07	1506146-07	Water	06/16/15 11:27	06/16/15 17:50

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:
06/23/15 08:20

Summit Scientific

1506146

741 Corporate Circle, Suite J&K • Golden, Colorado 80401
303-277-9310 • 303-374-5933

Client: PDC Project Manager: Mark Longhurst Page 1 of 1
Address: _____ E-Mail: mark.longhurst@pdc.com
City/State/Zip: _____
Phone: _____ Fax: _____ Project Name: Cottonwood #1
Sampler Name: Kelt Foxman Project Number: _____

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix			Analysis Requested				Special Instructions
					HCl	HNO3	None	Other (Specify)	Groundwater	Soil	Air-Canister #	Other (Specify)				
1	B101	6/15/15	1043	3	X				X							
2	B102		1053													
3	B103		1101													
4	B104		1107													
5	B105		1114													
6	B106		1120													
7	B107	↓	1127	↓	↓				↓							
8																
9																
10																

Relinquished by: <u>[Signature]</u> Date/Time: <u>6/16/15</u>	Received by: <u>[Signature]</u> Date/Time: <u>6/15/15 1715</u>	Turn Around Time (Check)	Notes: <u>on ice</u>
Relinquished by: <u>[Signature]</u> Date/Time: <u>6/16/15 17:50</u>	Received by: <u>[Signature]</u> Date/Time: <u>6/16 17:50</u>	Same Day _____ 72 hours _____	
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: _____	24 hours _____ Standard <u>X</u>	
		48 hours _____	
		Sample integrity: Temperature Upon Receipt: <u>4.2°C</u>	
		Intact: <u>Yes</u> No _____	

www.s2scientific.com



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

Project: Cottonwood #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 06/23/15 08:20

Sample Receipt Checklist

S2 Work Order: 1506146

Client: PDC Client Project ID: Cottonwood #1

Shipped Via: pick-up (UPS, FedEx, Hand Delivered, Pick-up, etc.) Airbill #: _____

Matrix (check all that apply): Air Soil/Solid Water Other: _____ (Describe)

Cooler ID				
Temp (°C)	<u>4.2</u>			

Thermometer ID:

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature just above 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
NOTE: If samples are delivered the same day of sampling, this requirement is waived provided that there is evidence that cooling has begun.				
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
If custody seals are present, are they intact ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present?			<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form 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 w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		<input checked="" type="checkbox"/>		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, etc.				
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Record the pH in Comments.				
If dissolved metals are requested, were samples field filtered?			<input checked="" type="checkbox"/>	
Additional Comments (if any):				
⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.				

Melissa Sherman
 Custodian Printed Name

[Signature]
 Signature or Initials of Custodian

6-16-15
 Date/Time

[Signature]



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

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

Reported:
 06/23/15 08:20

BH01
1506146-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 10:43**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 10:43**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		121 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		95.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	45-146		"	"	"	"	

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:
 06/23/15 08:20

BH02
1506146-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 10:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	35	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 10:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		124 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		104 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		102 %	45-146		"	"	"	"	

Summit Scientific

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 1775 Sherman St. STE. 3000
 Denver CO, 80203

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

Reported:
 06/23/15 08:20

BH03
1506146-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 11:01**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	19	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 11:01**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		123 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		103 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		100 %	45-146		"	"	"	"	

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 1775 Sherman St. STE. 3000
 Denver CO, 80203

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

Reported:
 06/23/15 08:20

BH04
1506146-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 11:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	1.8	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	3.8	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 11:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		122 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		99.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		101 %	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:
 06/23/15 08:20

BH05
1506146-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 11:14**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 11:14**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>120 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>100 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>101 %</i>	<i>45-146</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	

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:
 06/23/15 08:20

BH06
1506146-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 11:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 11:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>121 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>103 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>102 %</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:
 06/23/15 08:20

BH07
1506146-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/16/15 11:27**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1506242	06/19/15	06/19/15	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/16/15 11:27**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>125 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>104 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>103 %</i>	<i>45-146</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	

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:
06/23/15 08:20

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 1506242 - EPA 5030 Water MS

Blank (1506242-BLK1)

Prepared & Analyzed: 06/18/15

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	14.6		"	13.2		111	37-154			
Surrogate: Toluene-d8	13.0		"	13.3		97.3	45-149			
Surrogate: 4-Bromofluorobenzene	14.0		"	13.3		105	45-146			

LCS (1506242-BS1)

Prepared & Analyzed: 06/18/15

Benzene	36.6	1.0	ug/l	33.3		110	51-132			
Toluene	38.3	1.0	"	33.3		115	51-138			
Ethylbenzene	40.6	1.0	"	33.1		123	58-146			
m,p-Xylene	79.8	2.0	"	66.5		120	57-144			
o-Xylene	41.6	1.0	"	32.8		127	53-146			
Surrogate: 1,2-Dichloroethane-d4	15.6		"	13.2		118	37-154			
Surrogate: Toluene-d8	13.5		"	13.3		101	45-149			
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3		101	45-146			

Matrix Spike (1506242-MS1)

Source: 1506132-01

Prepared & Analyzed: 06/18/15

Benzene	37.2	1.0	ug/l	33.3	ND	112	34-141			
Toluene	38.7	1.0	"	33.3	ND	116	27-151			
Ethylbenzene	42.5	1.0	"	33.1	ND	128	29-160			
m,p-Xylene	84.2	2.0	"	66.5	ND	127	20-166			
o-Xylene	44.2	1.0	"	32.8	ND	135	33-159			
Surrogate: 1,2-Dichloroethane-d4	15.1		"	13.2		115	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		99.2	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		101	45-146			

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

Reported:
 06/23/15 08:20

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

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

Batch 1506242 - EPA 5030 Water MS

Matrix Spike Dup (1506242-MSD1)	Source: 1506132-01			Prepared & Analyzed: 06/18/15						
Benzene	36.6	1.0	ug/l	33.3	ND	110	34-141	1.68	32	
Toluene	37.8	1.0	"	33.3	ND	113	27-151	2.35	25	
Ethylbenzene	41.2	1.0	"	33.1	ND	125	29-160	3.01	50	
m,p-Xylene	81.1	2.0	"	66.5	ND	122	20-166	3.84	36	
o-Xylene	42.1	1.0	"	32.8	ND	128	33-159	5.01	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>15.5</i>		<i>"</i>	<i>13.2</i>		<i>118</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.3</i>		<i>"</i>	<i>13.3</i>		<i>100</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.3</i>		<i>"</i>	<i>13.3</i>		<i>99.9</i>	<i>45-146</i>			

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Denver CO, 80203

Project: Cottonwood #1

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/23/15 08:20

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

Summit Scientific

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