

**PDC Energy, Inc.**  
First Quarter 2016 Groundwater Monitoring Summary

April 4, 2016

Steinwald 1 Tank Battery  
NWNW S3 T1N R64W  
Weld County, API # 05-123-10892  
Spill Tracking # 400615494 / 400612105  
Remediation # 8954

This groundwater summary has been prepared by Tasman Geosciences, Inc. for the Steinwald 1 tank battery. On February 10, 2016, groundwater sampling was conducted at five 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. Groundwater analytical results are summarized in Table 1 and the laboratory analytical report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. First quarter 2016 analytical results indicate benzene concentrations are above applicable COGCC Table 910-1 groundwater standards in four monitoring well locations (BH01, BH02, BH03, and BH04). BTEX concentrations are below COGCC regulatory standards in the remaining sample location (BH05).

Monitored natural attenuation was the selected remedial strategy for the site through the first quarter 2016. Based on the persistent benzene concentrations at the site, additional remedial strategies are being evaluated for implementation during the second quarter 2016.

Second quarter 2016 groundwater sampling will be conducted during May 2016.

**TABLE 1**  
**STEINWALD #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>	
BH01	10/7/2014	4.6	15	<1.0	9.2	NM
BH01	10/20/2014	<1.0	<1.0	<1.0	<1.0	67.08
BH01	2/23/2015	<b>95</b>	3.9	<1.0	5.1	66.90
BH01	5/14/2015	<b>81</b>	<1.0	<1.0	<1.0	66.56
BH01	8/6/2015	<b>160</b>	<1.0	<1.0	2.2	66.53
BH01	11/12/2015	<b>360</b>	3.8	<1.0	10	66.51
BH01	2/10/2016	<b>22</b>	1.0	<1.0	2.3	66.49
BH02	10/7/2014	<1.0	<1.0	<1.0	<1.0	NM
BH02	10/20/2014	<1.0	<1.0	<1.0	<1.0	68.90
BH02	2/23/2015	<1.0	<1.0	<1.0	<1.0	68.61
BH02	5/14/2015	<b>5.2</b>	<1.0	<1.0	<1.0	68.30
BH02	8/6/2015	<b>6.9</b>	<1.0	<1.0	<1.0	68.29
BH02	11/12/2015	<b>21</b>	<1.0	<1.0	<1.0	68.20
BH02	2/10/2016	<b>13</b>	<1.0	<1.0	<1.0	68.17
BH03	10/7/2014	<1.0	2.7	<1.0	5.7	NM
BH03	10/20/2014	<1.0	<1.0	<1.0	<1.0	63.86
BH03	2/23/2015	<1.0	<1.0	<1.0	<1.0	63.69
BH03	5/14/2015	<b>6.1</b>	<1.0	<1.0	<1.0	63.41
BH03	8/6/2015	<b>10</b>	<1.0	<1.0	<1.0	63.39
BH03	11/12/2015	<b>56</b>	<1.0	<1.0	<1.0	63.35
BH03	2/10/2016	<b>24</b>	<1.0	<1.0	<1.0	63.28
BH04	10/7/2014	<b>130</b>	<b>670</b>	29	390	NM
BH04	10/20/2014	<b>91</b>	<b>720</b>	51	1,000	66.58
BH04	10/23/2014	<b>110</b>	320	11	260	66.46
BH04	2/23/2015	<b>260</b>	8.2	<1.0	100	66.32
BH04	5/14/2015	<b>500</b>	10	2.3	41	66.00
BH04	8/6/2015	<b>300</b>	6.1	1.7	47	65.99
BH04	11/12/2015	<b>1,000</b>	4.2	3.2	44	65.96
BH04	2/10/2016	<b>710</b>	<1.0	1.2	5.3	65.81

**TABLE 1**  
**STEINWALD #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>	
BH05	11/26/2014	<1.0	<1.0	<1.0	<1.0	65.68 <sup>(2)</sup>
BH05	2/23/2015	<1.0	<1.0	<1.0	<1.0	65.88
BH05	5/14/2015	<1.0	<1.0	<1.0	<1.0	65.52
BH05	8/6/2015	<1.0	<1.0	<1.0	<1.0	65.56
BH05	11/12/2015	<1.0	<1.0	<1.0	<1.0	65.54
BH05	2/10/2016	<1.0	<1.0	<1.0	<1.0	65.38

**Notes:**

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

COGCC = Colorado Oil and Gas Conservation Commission

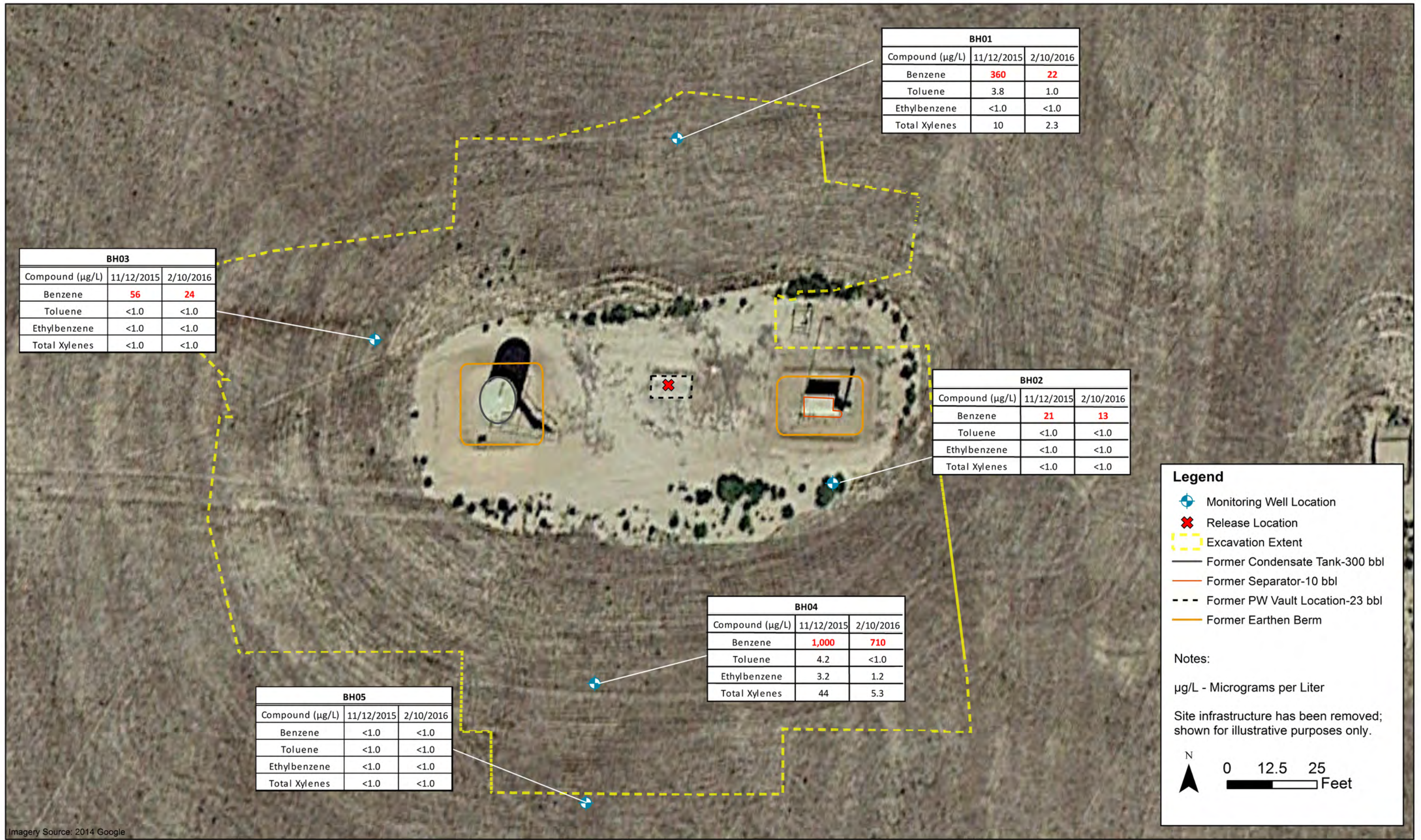
2. Water level measured on 11/24/2014

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.



Imagery Source: 2014 Google

DATE:	March 2016
DESIGNED BY:	C. Wasko
DRAWN BY:	D. Arnold

**TASMAN** Tasman Geosciences, LLC  
6899 Pecos Street - Unit C  
Denver, CO 80221

**PDC Energy**  
**Steinwald #1 Tank Battery**  
NWNW Section 3, Township 1 North, Range 64 West  
Weld County, Colorado

Groundwater Analytical  
Results Map

Figure  
1

**ATTACHMENT A**

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

February 15, 2016

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

Enclosed are the results of analyses for samples received by Summit Scientific on 02/10/16 17:00. 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: Steinwald #1

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
02/15/16 10:24

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1602077-01	Water	02/10/16 12:53	02/10/16 17:00
BH02	1602077-02	Water	02/10/16 12:31	02/10/16 17:00
BH03	1602077-03	Water	02/10/16 12:55	02/10/16 17:00
BH04	1602077-04	Water	02/10/16 12:53	02/10/16 17:00
BH05	1602077-05	Water	02/10/16 12:50	02/10/16 17:00

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

Project: Steinwald #1

Project Number: [none]  
 Project Manager: Mark Longhurst

Reported:  
 02/15/16 10:24

# Summit Scientific

1602077

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

Page 1 of 1

Client: <u>PDC</u>	Project Manager: <u>Mark Longhurst</u>
Address: _____	E-Mail: <u>mark.longhurst@PDCE.com</u>
City/State/Zip: _____	Project Name: <u>Steinwald #1</u>
Phone: _____ Fax: _____	Project Number: _____
Sampler Name: <u>Matt P</u>	

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)	BTEX (B2E0)			
BH01	2/10/2016	12:53	3	X			X				X				
BH02	2/10/2016	12:31	3	X			X				X				
BH03	2/10/2016	12:55	3	X			X				X				
BH04	2/10/2016	12:53	3	X			X				X				
BH05	2/10/2016	12:50	3	X			X				X				
Relinquished by: <u>[Signature]</u>		Date/Time: <u>2/10/16 17:00</u>	Received by: <u>[Signature]</u>		Date/Time: <u>2/10/16 17:00</u>	Turn Around Time (Check)			Notes:						
Relinquished by: <u>[Signature]</u>		Date/Time: <u>2/10/16 17:40</u>	Received by:		Date/Time:	Same Day	<input type="checkbox"/>	72 Hours	<input type="checkbox"/>	Standard <input checked="" type="checkbox"/>					
Relinquished by:		Date/Time:	Received in Lab by:		Date/Time:	24 Hours	<input type="checkbox"/>	48 Hours	<input type="checkbox"/>						
Relinquished by:		Date/Time:	Received in Lab by:		Date/Time:	Sample Integrity:			Temperature Upon Receipt: <u>2.0°C</u>						
		Date/Time:			Date/Time:	Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			on ice						

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

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

**Reported:**  
 02/15/16 10:24

**BH01**  
**1602077-01 (Water)**

**Summit Scientific**

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

Date Sampled: **02/10/16 12:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>22</b>	1.0	ug/l	1	1602120	02/11/16	02/11/16	EPA 8260B	
<b>Toluene</b>	<b>1.0</b>	1.0	"	"	"	"	02/12/16	"	
Ethylbenzene	ND	1.0	"	"	"	"	02/11/16	"	
<b>Xylenes (total)</b>	<b>2.3</b>	1.0	"	"	"	"	02/12/16	"	

Date Sampled: **02/10/16 12:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		97.1 %	37-154		"	"	02/11/16	"	
<i>Surrogate: Toluene-d8</i>		99.5 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.2 %	45-146		"	"	"	"	

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Project: Steinwald #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 02/15/16 10:24

**BH02**  
**1602077-02 (Water)**

**Summit Scientific**

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

Date Sampled: **02/10/16 12:31**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>13</b>	1.0	ug/l	1	1602120	02/11/16	02/11/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **02/10/16 12:31**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		101 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		98.3 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.5 %	45-146		"	"	"	"	

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PDC Energy  
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 Denver CO, 80203

Project: Steinwald #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 02/15/16 10:24

**BH03**  
**1602077-03 (Water)**

**Summit Scientific**

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

Date Sampled: **02/10/16 12:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>24</b>	1.0	ug/l	1	1602120	02/11/16	02/12/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **02/10/16 12:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		98.1 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		99.0 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.2 %	45-146		"	"	"	"	

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

Project: Steinwald #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 02/15/16 10:24

**BH04**  
**1602077-04 (Water)**

**Summit Scientific**

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

Date Sampled: **02/10/16 12:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>710</b>	10	ug/l	10	1602120	02/11/16	02/12/16	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
<b>Ethylbenzene</b>	<b>1.2</b>	1.0	"	"	"	"	02/12/16	"	
<b>Xylenes (total)</b>	<b>5.3</b>	1.0	"	"	"	"	"	"	

Date Sampled: **02/10/16 12:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		97.5 %	37-154		"	"	02/12/16	"	
<i>Surrogate: Toluene-d8</i>		100 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.1 %	45-146		"	"	"	"	

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

Project: Steinwald #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 02/15/16 10:24

**BH05**  
**1602077-05 (Water)**

**Summit Scientific**

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

Date Sampled: **02/10/16 12:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1602120	02/12/16	02/12/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **02/10/16 12:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>101 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>97.9 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>99.8 %</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: Steinwald #1

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
02/15/16 10:24

### 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 1602120 - EPA 5030 Water MS

##### Blank (1602120-BLK1)

Prepared & Analyzed: 02/11/16

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.1		"	13.3		98.0	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		99.2	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		100	45-146			

##### LCS (1602120-BS1)

Prepared & Analyzed: 02/11/16

Benzene	42.7	1.0	ug/l	33.3		128	51-132			
Toluene	42.4	1.0	"	33.3		127	51-138			
Ethylbenzene	44.6	1.0	"	33.1		135	58-146			
m,p-Xylene	84.0	2.0	"	66.5		126	57-144			
o-Xylene	40.7	1.0	"	32.8		124	53-146			
Surrogate: 1,2-Dichloroethane-d4	12.7		"	13.3		95.2	37-154			
Surrogate: Toluene-d8	13.6		"	13.3		102	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		100	45-146			

##### Matrix Spike (1602120-MS1)

Source: 1602077-05

Prepared & Analyzed: 02/11/16

Benzene	43.6	1.0	ug/l	33.3	ND	131	34-141			
Toluene	43.0	1.0	"	33.3	ND	129	27-151			
Ethylbenzene	45.7	1.0	"	33.1	ND	138	29-160			
m,p-Xylene	85.7	2.0	"	66.5	ND	129	20-166			
o-Xylene	41.4	1.0	"	32.8	ND	126	33-159			
Surrogate: 1,2-Dichloroethane-d4	13.2		"	13.3		98.9	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		100	45-146			

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 Denver CO, 80203

Project: Steinwald #1

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 02/15/16 10:24

**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 1602120 - EPA 5030 Water MS**

<b>Matrix Spike Dup (1602120-MSD1)</b>	<b>Source: 1602077-05</b>			<b>Prepared &amp; Analyzed: 02/11/16</b>						
Benzene	43.8	1.0	ug/l	33.3	ND	132	34-141	0.480	32	
Toluene	43.5	1.0	"	33.3	ND	131	27-151	1.34	25	
Ethylbenzene	46.5	1.0	"	33.1	ND	141	29-160	1.84	50	
m,p-Xylene	87.8	2.0	"	66.5	ND	132	20-166	2.42	36	
o-Xylene	42.8	1.0	"	32.8	ND	131	33-159	3.28	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>13.1</i>		<i>"</i>	<i>13.3</i>		<i>98.2</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.3</i>		<i>"</i>	<i>13.3</i>		<i>99.9</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.2</i>		<i>"</i>	<i>13.3</i>		<i>99.2</i>	<i>45-146</i>			

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

Project: Steinwald #1

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
02/15/16 10:24

### 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