



**PDC Energy, Inc.**  
**Third Quarter 2014 Groundwater Monitoring Summary**

August 5, 2014

received 01/22/2016 Project 6926 Document 2144853
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Seele 31, 41, 42-31 Tank Battery  
NWNW Section 31 T4N R67W  
Weld County, API # 05-123-20106

This groundwater monitoring summary has been prepared by Tasman Geosciences, LLC for the Seele 31, 41, 42-31 tank battery. On May 15, 2014, four monitoring wells (BH02R, BH07, BH08, BH09) were installed on site, and one monitoring well (BH02) was plugged and abandoned. Third quarter groundwater monitoring was conducted on July 25, 2014 at the six temporary monitoring well (BH01, BH02R, BH03, and BH07-BH09) locations. BH03 contained insufficient water for sample collection. Groundwater samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylene (BTEX) constituents using USEPA Method 8260B. Analytical results are summarized in Table 1 below and are illustrated on Figure 1. The laboratory analytical report is included as Attachment A. Analytical results indicate constituent concentrations were in exceedance of applicable COGCC groundwater regulations at two of the five monitoring locations (BH02R and BH09). The remaining three locations exhibited constituent concentrations below COGCC Table 910-1 soil standards.

Bi-weekly enhanced fluid recovery (EFR) with air sparge (AS) events were initiated on August 22, 2012. A summary of EFR/AS operational data is provided in Table 2. EFR/AS events were discontinued in the second quarter of 2013 due to a site-wide decrease in groundwater elevation. Monitored natural attenuation (MNA) will continue as the remediation strategy through the fourth quarter of 2014. Additional remedial strategies will be evaluated to address residual hydrocarbon impacts in soil and groundwater.

Fourth quarter 2014 groundwater sampling will be conducted during October 2014

**TABLE 1**  
**SEELE 31, 41, 42-31**

**GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE**

<b>Sample ID</b>	<b>Date Sampled</b>	<b>Benzene (ug/L)</b>	<b>Toluene (ug/L)</b>	<b>Ethylbenzene (ug/L)</b>	<b>Total Xylenes (ug/L)</b>	<b>Depth to Water (feet)</b>
BH01	1/27/2012	5,300	1,200	180	1,300	13.14
BH01	7/17/2012	900	2.2	10	78	12.6
BH01	10/1/2012	<1.0	<1.0	<1.0	<1.0	13.82
BH01	1/28/2013	DRY	DRY	DRY	DRY	DRY
BH01	5/3/2013	3,000	2.3	17	240	13.90
BH01	7/25/2013	DRY	DRY	DRY	DRY	DRY
BH01	11/1/2013	<1.0	<1.0	4.2	28	13.09
BH01 <sup>2</sup>	1/29/2014	NS	NS	NS	NS	13.94
BH01 <sup>2</sup>	4/28/2014	NS	NS	NS	NS	14.26
BH01	7/25/2014	<1.0	<1.0	1.6	4.3	12.47
BH02	1/27/2012	7,500	680	240	1,400	11.93
BH02	7/17/2012	10,000	2,200	220	2,140	10.92
BH02	10/1/2012	DRY	DRY	DRY	DRY	DRY
BH02	1/28/2013	DRY	DRY	DRY	DRY	DRY
BH02	5/3/2013	DRY	DRY	DRY	DRY	DRY
BH02	7/25/2013	DRY	DRY	DRY	DRY	DRY
BH02	10/31/2013	DRY	DRY	DRY	DRY	DRY
BH02	1/29/2014	DRY	DRY	DRY	DRY	DRY
BH02 <sup>3</sup>	4/28/2014	DRY	DRY	DRY	DRY	DRY
BH02R <sup>4</sup>	7/25/2014	93	14	89	230	10.12

SEELE31, 41, 42-31

**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)
BH03	1/27/2012	<b>16,000</b>	<b>4,400</b>	420	<b>2,900</b>	15.02
BH03	7/17/2012	<b>18,000</b>	<b>2,700</b>	15	<b>3,590</b>	12.56
BH03	10/1/2012	<b>7,300</b>	<b>1,400</b>	250	<b>2,400</b>	12.69
BH03	1/28/2013	DRY	DRY	DRY	DRY	DRY
BH03	5/3/2013	DRY	DRY	DRY	DRY	DRY
BH03	7/25/2013	DRY	DRY	DRY	DRY	DRY
BH03	10/31/2013	DRY	DRY	DRY	DRY	DRY
BH03	1/29/2014	DRY	DRY	DRY	DRY	DRY
BH03	4/28/2014	DRY	DRY	DRY	DRY	DRY
BH03	7/25/2014	DRY	DRY	DRY	DRY	DRY
BH07 <sup>4</sup>	7/25/2014	<1.0	<1.0	<1.0	<1.0	9.01
BH08 <sup>4</sup>	7/25/2014	3.8	<1.0	6.2	210	9.95
BH09 <sup>4</sup>	7/25/2014	<b>810</b>	<1.0	72	510	11.48
<b>COGCC standards for groundwater (ug/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	

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.

2). Not enough water present to collect a sample.

3). BH02 will no longer be sampled

4). Well drilled on 5/14/2014

**Bold** red values indicate an exceedance of the COGCC groundwater standards for the site.

ug/L- Micrograms per liter NS - Not Sampled

NM - Not Measured

**TABLE 2**  
**SEELE 31, 41, 42-31**  
**AIR SPARGE/ EFR OPERATIONAL SUMMARY TABLE**

Third Quarter 2012					
Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Injection Pressure (psi)
8/22/2012	BH-01, BH-02, BH-03	7	42	BH-01, BH-02, BH-03	8
9/5/2012		7	42		8
Quarterly Totals		14	84		-
Fourth Quarter 2012					
10/2/2012	BH-01, BH-02, BH-03	7	42	BH-01, BH-02, BH-03	8
10/15/2012		7	42		8
10/29/2012		7	0		8
11/12/2012		6.25	0		8
11/26/2012		6	0		8
Quarterly Totals		33.25	84		-
First Quarter 2013					
1/8/2013	BH01, BH02, BH03	5	0	BH01, BH02, BH03	10
1/21/2013		7	6.5		10
2/8/2013		6.5	6		10
3/14/2013		6	3		10
Quarterly Totals		24.5	15.5		-
Second Quarter 2013					
4/2/2013	BH01, BH02, BH03	4.25	6	BH01, BH02, BH03	10
Quarterly Totals		4.25	6		-



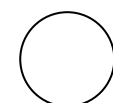
BH07		
Compound (ug/L)	7/25/2014	
Benzene	<1.0	
Toluene	<1.0	
Ethylbenzene	<1.0	
Total Xylenes	<1.0	

BH02R		
Compound (ug/L)	7/25/2014	
Benzene	93	
Toluene	14	
Ethylbenzene	89	
Total Xylenes	230	

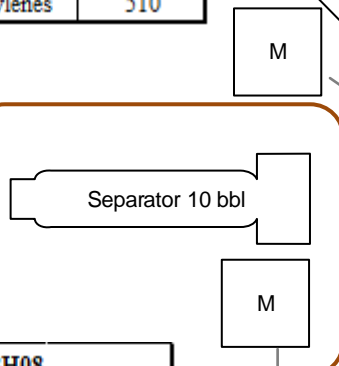
BH01			
Compound (ug/L)	4/28/2014	7/25/2014	
Benzene	NS	<1.0	
Toluene	NS	<1.0	
Ethylbenzene	NS	1.6	
Total Xylenes	NS	4.3	

BH03			
Compound (ug/L)	4/28/2014	7/25/2014	
Benzene	NS	DRY	
Toluene	NS	DRY	
Ethylbenzene	NS	DRY	
Total Xylenes	NS	DRY	

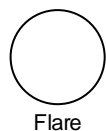
BH09		
Compound (ug/L)	7/25/2014	
Benzene	810	
Toluene	<1.0	
Ethylbenzene	72	
Total Xylenes	510	



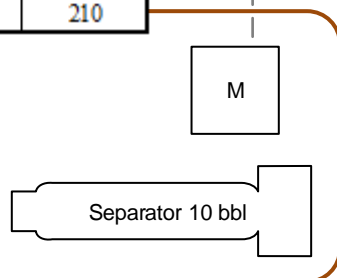
Flare



BH08		
Compound (ug/L)	7/25/2014	
Benzene	3.8	
Toluene	<1.0	
Ethylbenzene	6.2	
Total Xylenes	210	



Flare



DRAWN BY: BAM

DATE: 8/5/2014

**Facility Diagram**  
PDC Energy – DJ Basin  
Seele 31, 41, 42-31  
T4N R67W S31  
Weld County, CO



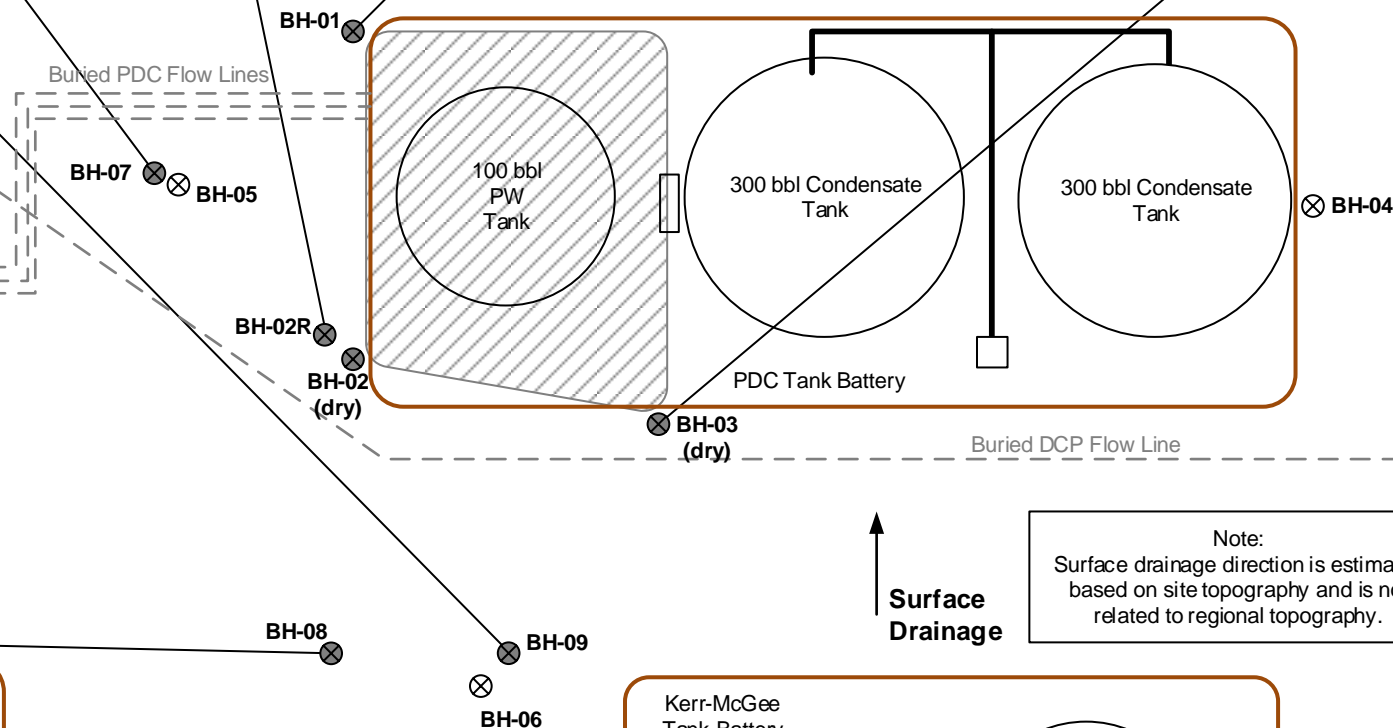
6899 Pecos St., Unit C  
Denver CO 80221

**LEGEND**

- Earthen Berm
- Bore Hole Location, No Well Installed
- Bore Hole Location With Temporary Well Installed
- Approximate Extent of Excavation
- Meter Shed

**FIGURE 1**  
**GROUNDWATER**  
**ANALYTICAL RESULTS**  
Not to Scale

County Road 40



# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

August 04, 2014

Brandon Bruns  
PDC Energy  
1775 Sherman St. STE. 3000  
Denver, CO 80203  
RE: Seele 31, 41, 42-31

Enclosed are the results of analyses for samples received by Summit Scientific on 07/25/14 16:45. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to be 'BS' or 'Shrewsbury', written in a cursive style.

Ben Shrewsbury  
President / Laboratory Manager



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/04/14 17:00

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1407173-01	Water	07/25/14 10:20	07/25/14 16:45
BH02R	1407173-02	Water	07/25/14 10:25	07/25/14 16:45
BH07	1407173-03	Water	07/25/14 10:30	07/25/14 16:45
BH08	1407173-04	Water	07/25/14 10:35	07/25/14 16:45
BH09	1407173-05	Water	07/25/14 10:40	07/25/14 16:45

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: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/04/14 17:00

**BH01**  
**1407173-01 (Water)**

**Summit Scientific**

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

Date Sampled: **07/25/14 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1407234	07/30/14	07/30/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>1.6</b>	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>4.3</b>	1.0	"	"	"	"	"	"	

Date Sampled: **07/25/14 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>126 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>98.7 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>105 %</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: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/04/14 17:00

**BH02R**  
**1407173-02 (Water)**

**Summit Scientific**

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

Date Sampled: **07/25/14 10:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Benzene</b>	<b>93</b>	1.0		ug/l	1	1407234	07/30/14	07/30/14	EPA 8260B	
<b>Toluene</b>	<b>14</b>	1.0		"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>89</b>	1.0		"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>230</b>	1.0		"	"	"	"	"	"	

Date Sampled: **07/25/14 10:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: 1,2-Dichloroethane-d4</i>		115 %		37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		98.8 %		45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.7 %		45-146		"	"	"	"	

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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/04/14 17:00

**BH07**  
**1407173-03 (Water)**

**Summit Scientific**

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

Date Sampled: **07/25/14 10:30**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	ND	1.0	ug/l	1	1407234	07/30/14	07/30/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **07/25/14 10:30**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4		124 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		86.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		113 %	45-146		"	"	"	"	

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1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/04/14 17:00

**BH08**  
**1407173-04 (Water)**

**Summit Scientific**

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

Date Sampled: **07/25/14 10:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Benzene</b>	<b>3.8</b>	1.0		ug/l	1	1407234	07/30/14	07/30/14	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>6.2</b>	1.0		"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>210</b>	1.0		"	"	"	"	"	"	

Date Sampled: **07/25/14 10:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		117 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		97.5 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %		45-146		"	"	"	"	

Summit Scientific

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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/04/14 17:00

**BH09**  
**1407173-05 (Water)**

**Summit Scientific**

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

Date Sampled: **07/25/14 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>810</b>	10	ug/l	10	1407234	07/30/14	07/30/14	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
<b>Ethylbenzene</b>	<b>72</b>	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>510</b>	1.0	"	"	"	"	"	"	

Date Sampled: **07/25/14 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		120 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		103 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.3 %	45-146		"	"	"	"	

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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Brunns

Reported:  
08/04/14 17:00

## 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 1407234 - EPA 5030 Water MS

##### Blank (1407234-BLK1)

Prepared & Analyzed: 07/30/14

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	16.9		"	13.2	128	37-154				
Surrogate: Toluene-d8	13.2		"	13.3	98.9	45-149				
Surrogate: 4-Bromofluorobenzene	14.3		"	13.3	107	45-146				

##### LCS (1407234-BS1)

Prepared & Analyzed: 07/30/14

Benzene	32.6	1.0	ug/l	33.3	97.8	51-132				
Toluene	33.0	1.0	"	33.3	98.9	51-138				
Ethylbenzene	34.5	1.0	"	33.1	104	58-146				
m,p-Xylene	70.8	2.0	"	66.5	106	57-144				
o-Xylene	35.1	1.0	"	32.8	107	53-146				
Surrogate: 1,2-Dichloroethane-d4	15.4		"	13.2	116	37-154				
Surrogate: Toluene-d8	13.0		"	13.3	97.4	45-149				
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3	100	45-146				

##### LCS (1407234-BS2)

Prepared & Analyzed: 07/30/14

Benzene	34.2	1.0	ug/l	33.3	102	51-132				
Toluene	35.0	1.0	"	33.3	105	51-138				
Ethylbenzene	35.8	1.0	"	33.1	108	58-146				
m,p-Xylene	73.1	2.0	"	66.5	110	57-144				
o-Xylene	36.3	1.0	"	32.8	111	53-146				
Surrogate: 1,2-Dichloroethane-d4	16.3		"	13.2	123	37-154				
Surrogate: Toluene-d8	13.1		"	13.3	98.4	45-149				
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3	101	45-146				

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1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Seele 31, 41, 42-31  
Project Number: [none]  
Project Manager: Brandon Bruns

Reported:  
08/04/14 17:00

**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 1407234 - EPA 5030 Water MS**

Matrix Spike (1407234-MS1)				Source: 1407174-01		Prepared & Analyzed: 07/30/14				
Benzene	33.1	1.0	ug/l	33.3	ND	99.2	34-141			
Toluene	33.5	1.0	"	33.3	ND	100	27-151			
Ethylbenzene	34.5	1.0	"	33.1	ND	104	29-160			
m,p-Xylene	71.5	2.0	"	66.5	ND	107	20-166			
o-Xylene	34.9	1.0	"	32.8	ND	106	33-159			
Surrogate: 1,2-Dichloroethane-d4	15.7		"	13.2		118	37-154			
Surrogate: Toluene-d8	12.9		"	13.3		96.9	45-149			
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3		102	45-146			

Matrix Spike (1407234-MS2)				Source: 1407174-02		Prepared & Analyzed: 07/30/14				
Benzene	31.9	1.0	ug/l	33.3	ND	95.7	34-141			
Toluene	32.7	1.0	"	33.3	ND	98.1	27-151			
Ethylbenzene	34.1	1.0	"	33.1	ND	103	29-160			
m,p-Xylene	69.9	2.0	"	66.5	ND	105	20-166			
o-Xylene	34.0	1.0	"	32.8	ND	104	33-159			
Surrogate: 1,2-Dichloroethane-d4	15.8		"	13.2		119	37-154			
Surrogate: Toluene-d8	13.1		"	13.3		98.1	45-149			
Surrogate: 4-Bromofluorobenzene	13.8		"	13.3		104	45-146			

Matrix Spike Dup (1407234-MSD1)				Source: 1407174-01		Prepared & Analyzed: 07/30/14				
Benzene	35.5	1.0	ug/l	33.3	ND	106	34-141	7.06	32	
Toluene	36.0	1.0	"	33.3	ND	108	27-151	7.31	25	
Ethylbenzene	37.4	1.0	"	33.1	ND	113	29-160	8.06	50	
m,p-Xylene	76.4	2.0	"	66.5	ND	115	20-166	6.64	36	
o-Xylene	38.4	1.0	"	32.8	ND	117	33-159	9.45	26	
Surrogate: 1,2-Dichloroethane-d4	15.2		"	13.2		115	37-154			
Surrogate: Toluene-d8	13.1		"	13.3		98.5	45-149			
Surrogate: 4-Bromofluorobenzene	13.7		"	13.3		103	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: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Brunns

Reported:  
08/04/14 17:00

**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 1407234 - EPA 5030 Water MS**

Matrix Spike Dup (1407234-MSD2)		Source: 1407174-02			Prepared & Analyzed: 07/30/14					
Benzene	34.8	1.0	ug/l	33.3	ND	104	34-141	8.52	32	
Toluene	35.0	1.0	"	33.3	ND	105	27-151	6.74	25	
Ethylbenzene	35.4	1.0	"	33.1	ND	107	29-160	3.74	50	
m,p-Xylene	72.3	2.0	"	66.5	ND	109	20-166	3.33	36	
o-Xylene	36.2	1.0	"	32.8	ND	111	33-159	6.35	26	
Surrogate: 1,2-Dichloroethane-d4	16.6		"	13.2		126	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		99.5	45-149			
Surrogate: 4-Bromofluorobenzene	14.0		"	13.3		105	45-146			

Summit Scientific

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1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/04/14 17:00

### 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

A handwritten signature in black ink, appearing to be 'JMM'.