



**PDC Energy, Inc.**  
Second Quarter 2013 Groundwater Monitoring Summary

June 14, 2013

received 01/22/2016  
Project 6926  
Document 2144848

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 3, 2013, groundwater monitoring was conducted at three monitoring wells. BH02 and BH03 were not sampled due to insufficient water. The groundwater sample was submitted for laboratory analysis of BTEX constituents using USEPA Method 8260B. Analytical results are summarized in Table 1 and are illustrated on Figure 2. The laboratory analytical report is included as Attachment A. Benzene concentrations observed in BH01 are in exceedance of COGCC regulatory standards. Due to a decrease in groundwater elevation, BTEX concentrations have not been observed on site since October 2012. However, elevated benzene concentrations detected during the second quarter 2013 indicate there are residual petroleum hydrocarbon concentrations on site.

Bi-weekly enhanced fluid recovery (EFR) with air sparge (AS) was initiated on August 22, 2012. A summary of historic EFR/AS operational data is provided in Table 2. Bi-weekly EFR/AS events have been postponed until groundwater elevations increase at the site.

Third quarter 2013 groundwater sampling will be conducted during July 2013.

**TABLE 1**  
**SEELE 31, 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)
BH01	1/27/2012	<b>5,300</b>	<b>1,200</b>	180	1,300	13.14
BH01	7/17/2012	<b>900</b>	2.2	10	78	12.60
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	<b>3,000</b>	2.3	17	240	13.90
BH02	1/27/2012	<b>7,500</b>	<b>680</b>	240	<b>1,400</b>	11.93
BH02	7/17/2012	<b>10,000</b>	<b>2,200</b>	220	<b>2,140</b>	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
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
<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.

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

Sample locations are shown on Figure 2.

ug/L= Micrograms per liter.

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

<b>Date</b>	<b>EFR Wells</b>	<b>Total EFR / AS Duration (hours)</b>	<b>Approximate Gallons Extracted</b>	<b>AS Wells</b>	<b>Injection Pressure (psi)</b>
<b>THIRD QUARTER 2012</b>					
8/22/2012	BH-01, BH-02, BH-03	7	42	BH-01, BH-02, BH-03	8
9/5/2012	BH-01, BH-02, BH-03	7	42	BH-01, BH-02, BH-03	8
<b>FOURTH QUARTER 2012</b>					
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
<b>FIRST QUARTER 2013</b>					
1/8/2013	BH-01, BH-02, BH-03	5	0	BH-01, BH-02, BH-03	8
1/21/2013	BH-01, BH-02, BH-03	7	6.5	BH-01, BH-02, BH-03	8

Notes:

psi = pounds per square inch

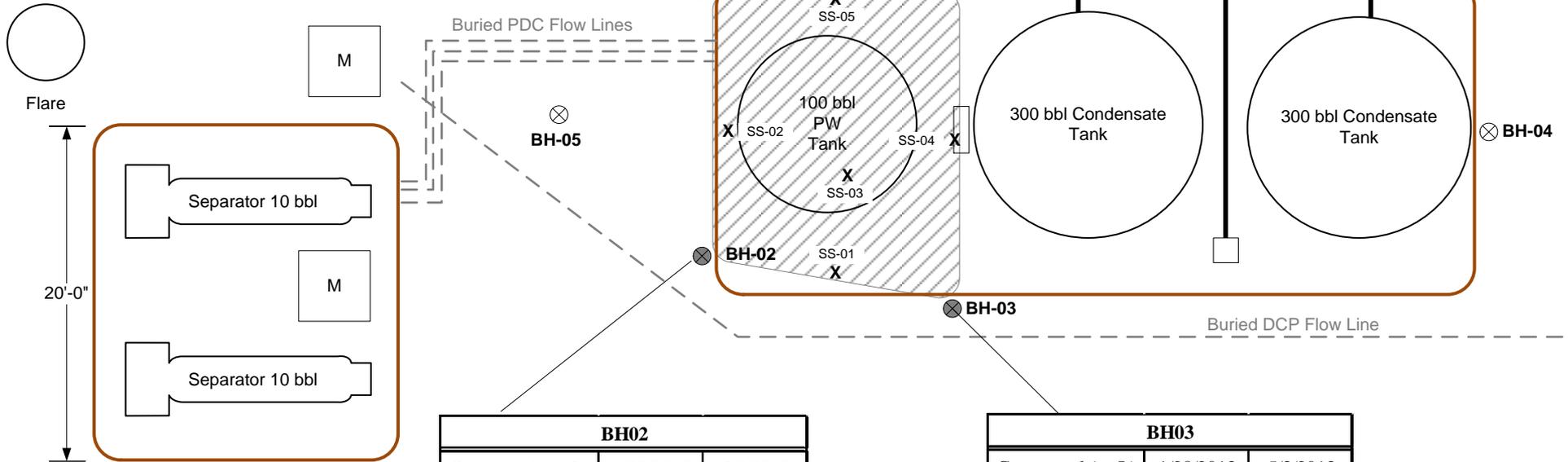


Surface  
Drainage

BH01		
Compound (ug/L)	1/28/2013	5/3/2013
Benzene	DRY	3,000
Toluene	DRY	2.3
Ethylbenzene	DRY	17
Total Xylenes	DRY	240

County Road 40

BH-01



BH02		
Compound (ug/L)	1/28/2013	5/3/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

BH03		
Compound (ug/L)	1/28/2013	5/3/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

Note:  
Surface drainage direction is estimated based on site topography and is not related to regional topography.

PROJECT NO:  
DRAWN BY: ESS  
DATE: 5/17/2013

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

**TASMAN GEOSCIENCES**  
6899 Pecos St., Unit C  
Denver CO 80221

**LEGEND**  
 Earthen Berm  
 Bore Hole Location  
 Bore Hole Location With Temporary Well Installed  
 Approximate Extent of Excavation  
 Excavation Soil Sample  
 Meter Shed

**FIGURE 2**  
GROUNDWATER ANALYTICAL RESULTS

**ATTACHMENT A**

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

May 13, 2013

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 05/06/13 19:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Joseph J Egry IV  
Laboratory Director

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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:**  
 05/13/13 12:57

**BH01**  
**R305056-01 (Water)**

**Summit Scientific**

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

Date Sampled: **05/03/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>3000</b>	100	ug/l	100	3051108	05/11/13	05/12/13	EPA 8260B	
<b>Toluene</b>	<b>2.3</b>	1.0	"	1	"	"	05/12/13	"	
<b>Ethylbenzene</b>	<b>17</b>	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>240</b>	1.0	"	"	"	"	"	"	

Date Sampled: **05/03/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		99.4 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		101 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		94.7 %	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:  
05/13/13 12:57

**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 3051108 - EPA 5030 Water MS**

**Blank (3051108-BLK1)**

Prepared & Analyzed: 05/12/13

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>10.9</i>		<i>"</i>	<i>13.2</i>		<i>82.1</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.0</i>		<i>"</i>	<i>13.3</i>		<i>97.5</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.2</i>		<i>"</i>	<i>13.3</i>		<i>91.5</i>	<i>45-146</i>			

**Blank (3051108-BLK2)**

Prepared & Analyzed: 05/12/13

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>10.7</i>		<i>"</i>	<i>13.2</i>		<i>80.7</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.5</i>		<i>"</i>	<i>13.3</i>		<i>94.0</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.5</i>		<i>"</i>	<i>13.3</i>		<i>93.9</i>	<i>45-146</i>			

**LCS (3051108-BS1)**

Prepared & Analyzed: 05/12/13

Benzene	23.0	1.0	ug/l	26.7		86.4	51-132			
Toluene	28.3	1.0	"	26.7		106	51-138			
Ethylbenzene	27.7	1.0	"	26.7		104	58-146			
m,p-Xylene	56.3	2.0	"	53.3		106	57-144			
o-Xylene	26.9	1.0	"	26.7		101	53-146			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>11.0</i>		<i>"</i>	<i>13.2</i>		<i>83.4</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.4</i>		<i>"</i>	<i>13.3</i>		<i>93.3</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>11.9</i>		<i>"</i>	<i>13.3</i>		<i>89.3</i>	<i>45-146</i>			

**LCS (3051108-BS2)**

Prepared & Analyzed: 05/12/13

Benzene	24.7	1.0	ug/l	26.7		92.6	51-132			
Toluene	30.1	1.0	"	26.7		113	51-138			
Ethylbenzene	29.4	1.0	"	26.7		110	58-146			
m,p-Xylene	60.1	2.0	"	53.3		113	57-144			
o-Xylene	28.3	1.0	"	26.7		106	53-146			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>10.9</i>		<i>"</i>	<i>13.2</i>		<i>82.2</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.6</i>		<i>"</i>	<i>13.3</i>		<i>94.4</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.2</i>		<i>"</i>	<i>13.3</i>		<i>91.3</i>	<i>45-146</i>			

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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:  
05/13/13 12:57

**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		

**Batch 3051108 - EPA 5030 Water MS**

**LCS Dup (3051108-BSD1)**

Prepared & Analyzed: 05/12/13

Benzene	25.6	1.0	ug/l	26.7	96.1	51-132	10.7	17
Toluene	26.5	1.0	"	26.7	99.3	51-138	6.57	17
Ethylbenzene	26.6	1.0	"	26.7	99.9	58-146	3.90	16
m,p-Xylene	53.8	2.0	"	53.3	101	57-144	4.58	16
o-Xylene	26.4	1.0	"	26.7	99.0	53-146	1.80	15
Surrogate: 1,2-Dichloroethane-d4	16.1		"	13.2	122	37-154		
Surrogate: Toluene-d8	13.2		"	13.3	99.4	45-149		
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3	101	45-146		

**LCS Dup (3051108-BSD2)**

Prepared & Analyzed: 05/12/13

Benzene	27.2	1.0	ug/l	26.7	102	51-132	9.63	17
Toluene	28.2	1.0	"	26.7	106	51-138	6.52	17
Ethylbenzene	28.0	1.0	"	26.7	105	58-146	4.87	16
m,p-Xylene	56.9	2.0	"	53.3	107	57-144	5.54	16
o-Xylene	28.0	1.0	"	26.7	105	53-146	1.24	15
Surrogate: 1,2-Dichloroethane-d4	16.0		"	13.2	121	37-154		
Surrogate: Toluene-d8	13.5		"	13.3	101	45-149		
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3	101	45-146		

**Matrix Spike (3051108-MS1)**

Source: R305053-01

Prepared & Analyzed: 05/12/13

Benzene	18.9	1.0	ug/l	26.7	1.23	66.3	34-141
Toluene	23.0	1.0	"	26.7	ND	86.2	27-151
Ethylbenzene	23.3	1.0	"	26.7	ND	87.2	29-160
m,p-Xylene	47.7	2.0	"	53.3	ND	89.4	20-166
o-Xylene	22.6	1.0	"	26.7	ND	84.6	33-159
Surrogate: 1,2-Dichloroethane-d4	8.80		"	13.2		66.5	37-154
Surrogate: Toluene-d8	12.4		"	13.3		92.8	45-149
Surrogate: 4-Bromofluorobenzene	12.2		"	13.3		91.8	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 Bruns

Reported:  
05/13/13 12:57

**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 3051108 - EPA 5030 Water MS**

<b>Matrix Spike (3051108-MS2)</b>	<b>Source: R305053-01</b>			<b>Prepared &amp; Analyzed: 05/12/13</b>							
Benzene	18.5	1.0	ug/l	26.7	1.23	64.7	34-141				
Toluene	22.5	1.0	"	26.7	ND	84.3	27-151				
Ethylbenzene	22.4	1.0	"	26.7	ND	84.0	29-160				
m,p-Xylene	46.1	2.0	"	53.3	ND	86.5	20-166				
o-Xylene	21.9	1.0	"	26.7	ND	82.0	33-159				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>8.91</i>		<i>"</i>	<i>13.2</i>		<i>67.3</i>	<i>37-154</i>				
<i>Surrogate: Toluene-d8</i>	<i>12.3</i>		<i>"</i>	<i>13.3</i>		<i>92.6</i>	<i>45-149</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.2</i>		<i>"</i>	<i>13.3</i>		<i>91.9</i>	<i>45-146</i>				

<b>Matrix Spike Dup (3051108-MSD1)</b>	<b>Source: R305053-01</b>			<b>Prepared &amp; Analyzed: 05/12/13</b>							
Benzene	18.9	1.0	ug/l	26.7	1.23	66.2	34-141	0.106	32		
Toluene	23.0	1.0	"	26.7	ND	86.2	27-151	0.0435	25		
Ethylbenzene	22.9	1.0	"	26.7	ND	86.0	29-160	1.43	50		
m,p-Xylene	47.1	2.0	"	53.3	ND	88.2	20-166	1.29	36		
o-Xylene	22.2	1.0	"	26.7	ND	83.4	33-159	1.47	26		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>8.97</i>		<i>"</i>	<i>13.2</i>		<i>67.8</i>	<i>37-154</i>				
<i>Surrogate: Toluene-d8</i>	<i>12.7</i>		<i>"</i>	<i>13.3</i>		<i>95.1</i>	<i>45-149</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.2</i>		<i>"</i>	<i>13.3</i>		<i>91.1</i>	<i>45-146</i>				

<b>Matrix Spike Dup (3051108-MSD2)</b>	<b>Source: R305053-01</b>			<b>Prepared &amp; Analyzed: 05/12/13</b>							
Benzene	19.0	1.0	ug/l	26.7	1.23	66.7	34-141	2.93	32		
Toluene	23.0	1.0	"	26.7	ND	86.4	27-151	2.42	25		
Ethylbenzene	23.3	1.0	"	26.7	ND	87.3	29-160	3.85	50		
m,p-Xylene	47.5	2.0	"	53.3	ND	89.0	20-166	2.89	36		
o-Xylene	22.5	1.0	"	26.7	ND	84.3	33-159	2.80	26		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>8.93</i>		<i>"</i>	<i>13.2</i>		<i>67.5</i>	<i>37-154</i>				
<i>Surrogate: Toluene-d8</i>	<i>12.4</i>		<i>"</i>	<i>13.3</i>		<i>93.3</i>	<i>45-149</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.3</i>		<i>"</i>	<i>13.3</i>		<i>92.2</i>	<i>45-146</i>				

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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:**  
05/13/13 12:57

### 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