



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

November 25, 2014

Seele 31, 41, 42-31 Tank Battery  
NWNW Section 31 T4N R67W  
Weld County, API # 05-123-20106

received 01/22/2016  
Project 6926  
Document 2144854

This groundwater monitoring summary has been prepared by Tasman Geosciences, LLC for the Seele 31, 41, 42-31 tank battery. Fourth quarter 2014 groundwater monitoring was conducted on October 27, 2014 at six of the eight temporary monitoring well locations. Two wells (BH01 and BH03) contained insufficient water and were subsequently not sampled. 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 are in exceedance of COGCC groundwater standards at two of the five monitoring locations (BH07 and BH08). The remaining two locations sampled exhibited constituent concentrations below the applicable COGCC Table 910-1 soil standards.

Bi-weekly enhanced fluid recovery (EFR) with air sparge (AS) events were initiated on August 22, 2012. EFR/AS events were discontinued in the second quarter of 2013 due to a site-wide decrease in groundwater elevation, and were reinstated during the third quarter of 2014 following new well installations. A summary of EFR/AS operational data is provided in Table 2. EFR/AS will continue to be the selected remediation method through the first quarter of 2015.

First quarter 2015 groundwater sampling will be conducted during January 2015.

**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	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	1/29/2014	DRY	DRY	DRY	DRY	DRY
BH01	4/28/2014	DRY	DRY	DRY	DRY	DRY
BH01	7/25/2014	<1.0	<1.0	1.6	4.3	12.47
BH01	10/27/2014	DRY	DRY	DRY	DRY	DRY
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	4/28/2014	DRY	DRY	DRY	DRY	DRY
BH02R	7/25/2014	93	14	89	230	10.12
BH02R	10/27/2014	1.4	<1.0	1.5	8.7	10.72

**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)
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
BH03	10/27/2014	DRY	DRY	DRY	DRY	DRY
BH07	7/25/2014	<1.0	<1.0	<1.0	<1.0	9.01
BH07	10/27/2014	<b>160</b>	<1.0	<1.0	<1.0	9.75
BH08	7/25/2014	3.8	<1.0	6.2	210	9.95
BH08	10/27/2014	<b>5.5</b>	<1.0	<1.0	36	10.86
BH09	7/25/2014	<b>810</b>	<1.0	72	510	11.48
BH09	10/27/2014	<1.0	<1.0	<1.0	<1.0	11.73
<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.

ug/L- Micrograms per Liter NM - Not Measured

**TABLE 2**  
**SEELE 31, 41, 42-31**

**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)
Third Quarter 2012						
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		-	
Third Quarter 2014						
9/3/2014	BH02, BH03, BH08	6	0	BH02R, BH09	20	20
9/17/2014		6	75		20	19
Quarterly Totals		6	75		-	-
Fourth Quarter 2014						
10/3/2014	BH03, BH08	6	9	BH02R, BH09	20	21
10/21/2014		6	50		20	15
Quarterly Totals		6	59		-	-



BH07		
Compound (ug/L)	7/25/2014	10/27/2014
Benzene	<1.0	160
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

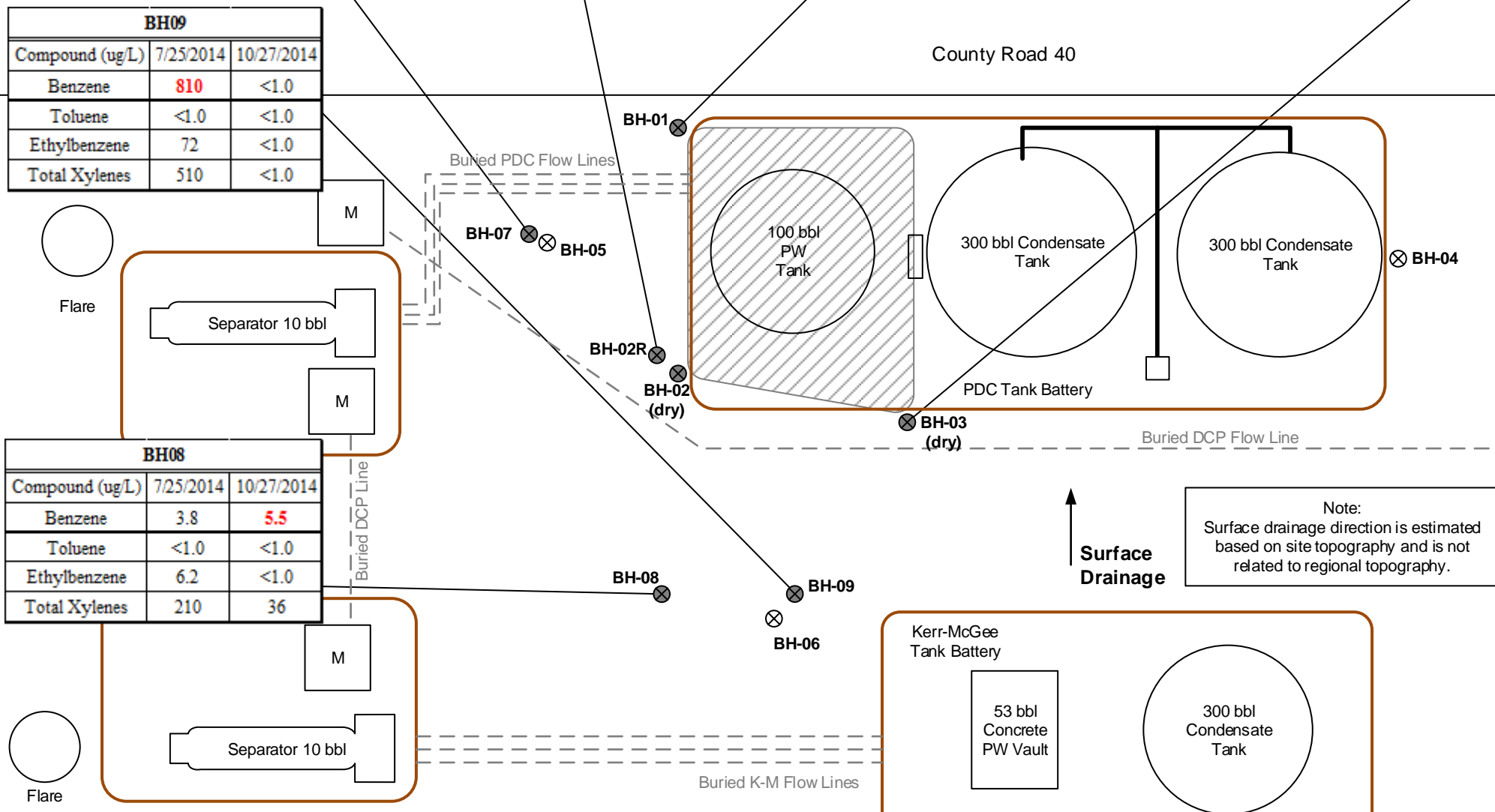
BH02R		
Compound (ug/L)	7/25/2014	10/27/2014
Benzene	93	1.4
Toluene	14	<1.0
Ethylbenzene	89	1.5
Total Xylenes	230	8.7

BH01		
Compound (ug/L)	7/25/2014	10/27/2014
Benzene	<1.0	NS
Toluene	<1.0	NS
Ethylbenzene	1.6	NS
Total Xylenes	4.3	NS

BH03		
Compound (ug/L)	7/25/2014	10/27/2014
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

BH09		
Compound (ug/L)	7/25/2014	10/27/2014
Benzene	810	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	72	<1.0
Total Xylenes	510	<1.0

BH08		
Compound (ug/L)	7/25/2014	10/27/2014
Benzene	3.8	5.5
Toluene	<1.0	<1.0
Ethylbenzene	6.2	<1.0
Total Xylenes	210	36



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

DRAWN BY: BAM

DATE: 11/12/2014

**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
- M Meter Shed

FIGURE 1  
GROUNDWATER  
ANALYTICAL RESULTS  
Not to Scale

## **ATTACHMENT A**

# Summit Scientific

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741 Corporate Circle – Suite J ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.374.5933 - fax

November 03, 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 10/27/14 17:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph J Egry IV".

Joseph J Egry IV  
Laboratory/Technical 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 Bruns

**Reported:**  
11/03/14 10:16

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH02R	1410245-01	Water	10/27/14 10:49	10/27/14 17:15
BH07	1410245-02	Water	10/27/14 10:53	10/27/14 17:15
BH08	1410245-03	Water	10/27/14 10:49	10/27/14 17:15
BH09	1410245-04	Water	10/27/14 10:59	10/27/14 17:15

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Joseph J Egry IV, Laboratory/Technical Director



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
11/03/14 10:16

Summit Scientific

1410245

741 Corporate Circle Suite I ♦ Golden, Colorado 80401  
303-277-9310 ♦ 303-277-9531 Fax

Page 1 of 1

**Client:** PDC Energy

**Address:**

**Project Manager:** Brandon Bruns

City/State/Zip: \_\_\_\_\_

E-Mail: [bbruns@petd.com](mailto:bbruns@petd.com)

Phone:

**Fax:**

Project Name: Seele 31, 41, 42-31

Sampler Name: Elliot Dillion-Hewzong

Project Number:

[illegible]

[www.s2scientific.com](http://www.s2scientific.com)

**Soil samples reported on a wet-weight basis unless otherwise indicated on results page.**

Summit Scientific

*Larry Flynt TV*

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Joseph J Egry IV, Laboratory/Technical Director



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
11/03/14 10:16

**BH02R**  
**1410245-01 (Water)**

**Summit Scientific**

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

Date Sampled: **10/27/14 10:49**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>1.4</b>	1.0	ug/l	1	1410324	10/31/14	10/31/14 05:19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>1.5</b>	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>8.7</b>	1.0	"	"	"	"	"	"	

Date Sampled: **10/27/14 10:49**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4	92.5 %	37-154			"	"	"	"	
Surrogate: Toluene-d8	94.2 %	45-149			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	98.0 %	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:  
11/03/14 10:16

**BH07**  
**1410245-02 (Water)**

**Summit Scientific**

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

Date Sampled: **10/27/14 10:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>160</b>	1.0	ug/l	1	1410324	10/31/14	10/31/14 05:43	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/27/14 10:53**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4	89.1 %	37-154			"	"	"	"	
Surrogate: Toluene-d8	97.3 %	45-149			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	98.7 %	45-146			"	"	"	"	

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Joseph J Egry IV, Laboratory/Technical Director



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
11/03/14 10:16

**BH08**  
**1410245-03 (Water)**

**Summit Scientific**

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

Date Sampled: **10/27/14 10:49**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>5.5</b>	1.0	ug/l	1	1410324	10/31/14	10/31/14 06:08	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>36</b>	1.0	"	"	"	"	"	"	

Date Sampled: **10/27/14 10:49**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4	93.8 %	37-154			"	"	"	"	
Surrogate: Toluene-d8	95.7 %	45-149			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	95.0 %	45-146			"	"	"	"	

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Joseph J Egry IV, Laboratory/Technical Director



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
11/03/14 10:16

**BH09**  
**1410245-04 (Water)**

**Summit Scientific**

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

Date Sampled: **10/27/14 10:59**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1410324	10/31/14	10/31/14 06:32	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/27/14 10:59**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4	83.3 %	37-154			"	"	"	"	
Surrogate: Toluene-d8	93.8 %	45-149			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	99.2 %	45-146			"	"	"	"	

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Joseph J Egry IV, Laboratory/Technical Director



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

Reported:  
11/03/14 10:16

**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 1410324 - EPA 5030 Water MS**

**Blank (1410324-BLK1)**

Prepared & Analyzed: 10/30/14

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	11.4		"	13.2		86.5	37-154			
Surrogate: Toluene-d8	12.3		"	13.3		92.3	45-149			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.8	45-146			

**LCS (1410324-BS1)**

Prepared & Analyzed: 10/30/14

Benzene	40.7	1.0	ug/l	33.3		122	51-132			
Toluene	40.3	1.0	"	33.3		121	51-138			
Ethylbenzene	42.1	1.0	"	33.1		127	58-146			
m,p-Xylene	83.4	2.0	"	66.5		125	57-144			
o-Xylene	42.1	1.0	"	32.8		128	53-146			
Surrogate: 1,2-Dichloroethane-d4	11.4		"	13.2		86.0	37-154			
Surrogate: Toluene-d8	13.0		"	13.3		97.1	45-149			
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		96.7	45-146			

**Matrix Spike (1410324-MS1)**

Source: 1410244-01

Prepared & Analyzed: 10/30/14

Benzene	40.0	1.0	ug/l	33.3	ND	120	34-141			
Toluene	39.6	1.0	"	33.3	ND	119	27-151			
Ethylbenzene	40.8	1.0	"	33.1	ND	123	29-160			
m,p-Xylene	81.6	2.0	"	66.5	ND	123	20-166			
o-Xylene	40.6	1.0	"	32.8	ND	124	33-159			
Surrogate: 1,2-Dichloroethane-d4	11.2		"	13.2		84.7	37-154			
Surrogate: Toluene-d8	12.7		"	13.3		95.3	45-149			
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3		94.7	45-146			

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Joseph J Egry IV, Laboratory/Technical Director



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

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

Reported:  
11/03/14 10:16

**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 1410324 - EPA 5030 Water MS**

Matrix Spike Dup (1410324-MSD1)	Source: 1410244-01			Prepared & Analyzed: 10/30/14						
Benzene	41.2	1.0	ug/l	33.3	ND	124	34-141	3.03	32	
Toluene	40.8	1.0	"	33.3	ND	122	27-151	2.99	25	
Ethylbenzene	42.3	1.0	"	33.1	ND	128	29-160	3.63	50	
m,p-Xylene	83.8	2.0	"	66.5	ND	126	20-166	2.71	36	
o-Xylene	41.9	1.0	"	32.8	ND	128	33-159	3.23	26	
Surrogate: 1,2-Dichloroethane-d4	11.6		"	13.2		87.7	37-154			
Surrogate: Toluene-d8	12.7		"	13.3		95.4	45-149			
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		97.0	45-146			

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Joseph J Egry IV, Laboratory/Technical Director



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

Project: Seele 31, 41, 42-31

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
11/03/14 10:16

### 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

A handwritten signature in black ink, reading "Joseph J Egry IV".

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Joseph J Egry IV, Laboratory/Technical Director