



PDC Energy, Inc.
Fourth Quarter 2013 Groundwater Monitoring Summary

January 10, 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 2144850

This groundwater monitoring summary has been prepared by Tasman Geosciences, LLC for the Seele 31, 41, 42-31 tank battery. On November 1, 2013, groundwater monitoring was conducted at three temporary monitoring well locations. However, BH02 and BH03 contained insufficient water for sampling. Historical analytical results are summarized in Table 1 and illustrated on Figure 1. Historical analytical results indicate constituent concentrations were in exceedance of COGCC regulatory standards at all three monitoring locations.

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. EFR/AS events were discontinued in the second quarter of 2013 due to a site-wide decrease in groundwater elevation.

Additional site characterization and well installation is scheduled for first quarter 2014 to delineate residual petroleum hydrocarbon impacts in groundwater.

First quarter 2014 groundwater sampling will be conducted during January 2014.

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
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	11/1/2013	DRY	DRY	DRY	DRY	DRY
BH03	1/27/2012	16,000	4,400	420	2,900	15.02
BH03	7/17/2012	18,000	2,700	15	3,590	12.56
BH03	10/1/2012	7,300	1,400	250	2,400	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	11/1/2013	DRY	DRY	DRY	DRY	DRY
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

NR - Not Recorded

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		-



Surface
Drainage

BH01		
Compound (ug/L)	7/25/2013	11/1/2013
Benzene	DRY	<1.0
Toluene	DRY	<1.0
Ethylbenzene	DRY	4.2
Total Xylenes	DRY	28

County Road 40

BH-01

Buried PDC Flow Lines

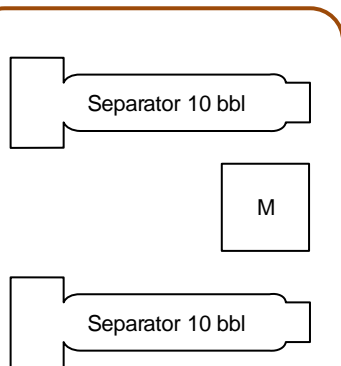
BH-05

BH-02

BH-03

BH-04

Buried DCP Flow Line



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

BH02		
Compound (ug/L)	7/25/2013	11/1/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

BH03		
Compound (ug/L)	7/25/2013	11/1/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY



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

M Meter Shed

FIGURE 1
GROUNDWATER
ANALYTICAL RESULTS
MAP
Not to Scale

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

November 07, 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 11/01/13 16:30. 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', with a long, sweeping horizontal line extending to the right.

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:
11/07/13 18:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	R310332-01	Water	11/01/13 14:40	11/01/13 16:30

Summit Scientific
R310332

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

Client: PDC Tatum Project Manager: Brandon Bruns
Address: _____ E-Mail: _____
City/State/Zip: _____ Project Name: Seale 31, 41, 42-31
Phone: _____ Fax: _____
Sampler Name: Eric Steel Project Number: _____

[illegible]

www.s2scientific.com

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:
11/07/13 18:14

BH01
R310332-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 11/01/13 14:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	3110307	11/03/13	11/06/13	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	11/06/13	"	
Ethylbenzene	4.2	1.0	"	"	"	"	"	"	
Xylenes (total)	28	1.0	"	"	"	"	"	"	

Date Sampled: 11/01/13 14:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		93.3 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		110 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		111 %	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:
11/07/13 18:14

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 3110307 - EPA 5030 Water MS

Blank (3110307-BLK1)

Prepared & Analyzed: 11/05/13

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	110		37-154			
Surrogate: Toluene-d8	13.2		"	13.3	99.2		45-149			
Surrogate: 4-Bromofluorobenzene	13.9		"	13.3	104		45-146			

LCS (3110307-BS1)

Prepared & Analyzed: 11/05/13

Benzene	32.2	1.0	ug/l	33.3	96.7		51-132			
Toluene	38.0	1.0	"	33.3	114		51-138			
Ethylbenzene	41.3	1.0	"	33.3	124		58-146			
m,p-Xylene	79.2	2.0	"	66.7	119		57-144			
o-Xylene	40.3	1.0	"	33.3	121		53-146			
Surrogate: 1,2-Dichloroethane-d4	14.9		"	13.2	113		37-154			
Surrogate: Toluene-d8	13.8		"	13.3	103		45-149			
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3	101		45-146			

LCS (3110307-BS2)

Prepared & Analyzed: 11/05/13

Benzene	31.3	1.0	ug/l	33.3	93.8		51-132			
Toluene	37.0	1.0	"	33.3	111		51-138			
Ethylbenzene	42.5	1.0	"	33.3	127		58-146			
m,p-Xylene	81.8	2.0	"	66.7	123		57-144			
o-Xylene	41.9	1.0	"	33.3	126		53-146			
Surrogate: 1,2-Dichloroethane-d4	14.1		"	13.2	106		37-154			
Surrogate: Toluene-d8	13.2		"	13.3	98.9		45-149			
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3	102		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:
11/07/13 18:14

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 3110307 - EPA 5030 Water MS

LCS Dup (3110307-BSD1)

Prepared & Analyzed: 11/05/13

Benzene	32.2	1.0	ug/l	33.3		96.5	51-132	0.124	17	
Toluene	36.6	1.0	"	33.3		110	51-138	3.62	17	
Ethylbenzene	42.1	1.0	"	33.3		126	58-146	1.87	16	
m,p-Xylene	80.5	2.0	"	66.7		121	57-144	1.70	16	
o-Xylene	41.1	1.0	"	33.3		123	53-146	2.14	15	
Surrogate: 1,2-Dichloroethane-d4	14.8		"	13.2		111	37-154			
Surrogate: Toluene-d8	13.1		"	13.3		98.5	45-149			
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3		99.9	45-146			

LCS Dup (3110307-BSD2)

Prepared & Analyzed: 11/05/13

Benzene	30.9	1.0	ug/l	33.3		92.7	51-132	1.25	17	
Toluene	37.3	1.0	"	33.3		112	51-138	0.753	17	
Ethylbenzene	42.9	1.0	"	33.3		129	58-146	1.01	16	
m,p-Xylene	81.9	2.0	"	66.7		123	57-144	0.0977	16	
o-Xylene	41.8	1.0	"	33.3		125	53-146	0.0717	15	
Surrogate: 1,2-Dichloroethane-d4	13.7		"	13.2		103	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		99.5	45-149			
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3		101	45-146			

Matrix Spike (3110307-MS1)

Source: R310329-01

Prepared & Analyzed: 11/05/13

Benzene	32.7	1.0	ug/l	33.3	ND	98.1	34-141			
Toluene	37.2	1.0	"	33.3	ND	112	27-151			
Ethylbenzene	42.6	1.0	"	33.3	ND	128	29-160			
m,p-Xylene	81.5	2.0	"	66.7	ND	122	20-166			
o-Xylene	41.7	1.0	"	33.3	ND	125	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.8		"	13.2		112	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		101	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 Brunns

Reported:
11/07/13 18:14

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 3110307 - EPA 5030 Water MS

Matrix Spike (3110307-MS2)		Source: R310329-02			Prepared & Analyzed: 11/05/13					
Benzene	32.9	1.0	ug/l	33.3	ND	98.7	34-141			
Toluene	37.4	1.0	"	33.3	ND	112	27-151			
Ethylbenzene	42.9	1.0	"	33.3	ND	129	29-160			
m,p-Xylene	82.0	2.0	"	66.7	ND	123	20-166			
o-Xylene	42.1	1.0	"	33.3	ND	126	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.8		"	13.2		112	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		101	45-146			

Matrix Spike Dup (3110307-MSD1)		Source: R310329-01			Prepared & Analyzed: 11/05/13					
Benzene	32.4	1.0	ug/l	33.3	ND	97.2	34-141	0.983	32	
Toluene	37.0	1.0	"	33.3	ND	111	27-151	0.674	25	
Ethylbenzene	43.7	1.0	"	33.3	ND	131	29-160	2.66	50	
m,p-Xylene	83.5	2.0	"	66.7	ND	125	20-166	2.42	36	
o-Xylene	43.1	1.0	"	33.3	ND	129	33-159	3.28	26	
Surrogate: 1,2-Dichloroethane-d4	14.7		"	13.2		111	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.8		"	13.3		104	45-146			

Matrix Spike Dup (3110307-MSD2)		Source: R310329-02			Prepared & Analyzed: 11/05/13					
Benzene	32.8	1.0	ug/l	33.3	ND	98.4	34-141	0.304	32	
Toluene	37.4	1.0	"	33.3	ND	112	27-151	0.0267	25	
Ethylbenzene	42.7	1.0	"	33.3	ND	128	29-160	0.280	50	
m,p-Xylene	82.0	2.0	"	66.7	ND	123	20-166	0.0610	36	
o-Xylene	42.1	1.0	"	33.3	ND	126	33-159	0.119	26	
Surrogate: 1,2-Dichloroethane-d4	14.8		"	13.2		112	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3		102	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:
11/07/13 18:14

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'.