

PDC Energy, Inc.
Fourth Quarter 2012 Groundwater Monitoring Summary

November 1, 2012

received 01/22/2016
Project 6926
Document 2144846

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 October 1, 2012, groundwater sampling was conducted at two temporary monitoring well locations. BH02 was observed as dry and a groundwater sample was not collected. Groundwater samples were submitted for laboratory analysis of BTEX constituents using USEPA Method 8260B. Analytical results are summarized in Table 1 below and are illustrated on Figure 2. The laboratory analytical report is included as Attachment A. Evaluation of the fourth quarter analytical results indicates that benzene, toluene, and total xylenes concentrations are in exceedance of the COGCC regulatory standards at monitoring well BH03. However, fourth quarter benzene concentrations observed at BH03 decreased by an order of magnitude from the previous quarter. BTEX concentrations in BH01 reduced significantly and are below laboratory detection limits.

Bi-weekly enhanced fluid recovery (EFR) with air sparge (AS) was initiated on August 22, 2012. A summary of the EFR/AS operational data is provided in Table 2. Evaluation of annual analytical data proves that remedial activities are effective at the site. Bi-weekly EFR/AS events are scheduled to be implemented through December 2012.

First quarter 2013 groundwater sampling will be conducted during January 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	5,300	1,200	180	1,300	13.14
BH01	7/17/2012	900	2.2	10	78	12.60
BH01	10/1/2012	<1.0	<1.0	<1.0	<1.0	13.82
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
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
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 soil 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

Detail Summary					
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
10/2/2012		7	42		8
Activity Totals					
Number of Events		Total Duration (hours)	Total Gallons Extracted - 3Q12	Total Gallons Extracted	Average Flow Rate (gpm)
3		21	126	126	6

Notes:

psi = pounds per square inch

gpm = gallons per minute



Surface
Drainage

BH01		
Compound (ug/L)	7/17/2012	10/1/2012
Benzene	900	<1.0
Toluene	2.2	<1.0
Ethylbenzene	10	<1.0
Total Xylenes	78	<1.0

County Road 40

BH-01

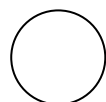
BH-05

BH-05

BH-02

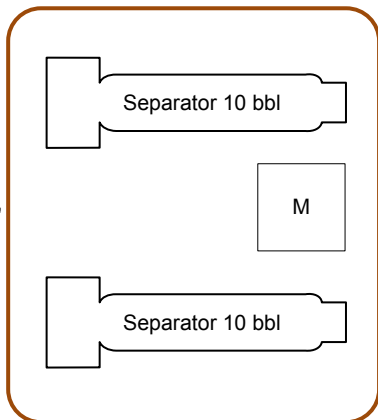
BH-03

BH-04



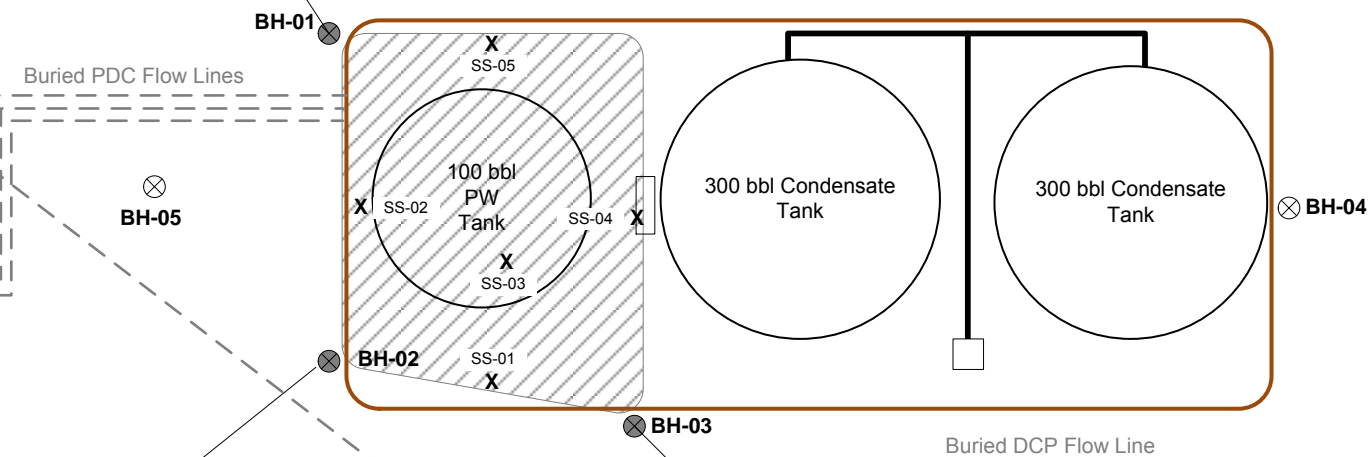
Flare

20'-0"



BH02		
Compound (ug/L)	7/17/2012	10/1/2012
Benzene	10,000	DRY
Toluene	2,200	DRY
Ethylbenzene	220	DRY
Total Xylenes	2,140	DRY

BH03		
Compound (ug/L)	7/17/2012	10/1/2012
Benzene	18,000	7,300
Toluene	2,700	1,400
Ethylbenzene	15	250
Total Xylenes	3,590	2,400



PROJECT
NO:

DRAWN BY: CAW

DATE: 10/19/2012

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



5690 Webster Avenue
Arvada CO 80002

LEGEND
— Earthen Berm
⊗ Bore Hole Location
⊗ Bore Hole Location With
Temporary Well Installed
--- Approximate Extent of Excavation
X Excavation Soil Sample

M Meter Shed

FIGURE 2
GROUNDWATER
ANALYTICAL
RESULTS

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

October 09, 2012

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 10/01/12 16:50. 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". The signature is stylized with a large, sweeping initial "J" and "E".

Joseph J Egry IV For 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:
10/09/12 15:46

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	R210012-01	Water	10/01/12 14:05	10/01/12 16:50
BH03	R210012-02	Water	10/01/12 14:00	10/01/12 16:50

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:
10/09/12 15:46

BH01
R210012-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/01/12 14:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2100410	10/04/12	10/06/12	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	1.0		"	"	"	"	"	"	

Date Sampled: **10/01/12 14:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		104 %		49.7-150		"	"	"	"	
Surrogate: Toluene-d8		95.5 %		51-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %		50.1-150		"	"	"	"	

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:
10/09/12 15:46

BH03
R210012-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/01/12 14:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	7300	100		ug/l	100	2100410	10/04/12	10/06/12	EPA 8260B	
Toluene	1400	100		"	"	"	"	"	"	
Ethylbenzene	250	100		"	"	"	"	"	"	
Xylenes (total)	2400	100		"	"	"	"	"	"	

Date Sampled: **10/01/12 14:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: 1,2-Dichloroethane-d4</i>		101 %		49.7-150		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		98.2 %		51-150		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		103 %		50.1-150		"	"	"	"	

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Denver CO, 80203

Project: Seele 31, 41, 42-31

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
10/09/12 15:46

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

Reporting				Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 2100410 - EPA 5030 Water MS

Blank (2100410-BLK1)

Prepared: 10/04/12 Analyzed: 10/05/12

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.4		"	13.2	101	49.7-150				
Surrogate: Toluene-d8	13.0		"	13.3	97.7	51-150				
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3	101	50.1-150				

LCS (2100410-BS1)

Prepared: 10/04/12 Analyzed: 10/05/12

Benzene	26.0	1.0	ug/l	33.3	78.0	51-132				
Toluene	29.9	1.0	"	33.3	89.6	51-138				
Ethylbenzene	35.3	1.0	"	33.3	106	58-146				
m,p-Xylene	68.6	2.0	"	66.7	103	57-144				
o-Xylene	37.0	1.0	"	33.3	111	53-146				
Surrogate: 1,2-Dichloroethane-d4	12.6		"	13.2	95.0	49.7-150				
Surrogate: Toluene-d8	12.9		"	13.3	96.8	51-150				
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3	98.0	50.1-150				

LCS Dup (2100410-BSD1)

Prepared: 10/04/12 Analyzed: 10/05/12

Benzene	27.3	1.0	ug/l	33.3	82.0	51-132	4.99	17		
Toluene	32.0	1.0	"	33.3	96.1	51-138	6.98	17		
Ethylbenzene	37.5	1.0	"	33.3	113	58-146	6.13	16		
m,p-Xylene	72.6	2.0	"	66.7	109	57-144	5.59	16		
o-Xylene	38.1	1.0	"	33.3	114	53-146	2.93	15		
Surrogate: 1,2-Dichloroethane-d4	13.0		"	13.2	98.2	49.7-150				
Surrogate: Toluene-d8	13.2		"	13.3	98.6	51-150				
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3	96.4	50.1-150				

Summit Scientific

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Denver CO, 80203

Project: Seele 31, 41, 42-31

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
10/09/12 15:46

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 2100410 - EPA 5030 Water MS

Matrix Spike (2100410-MS1)		Source: R210008-01			Prepared: 10/04/12		Analyzed: 10/05/12			
Benzene	25.7	1.0	ug/l	33.3	ND	77.2	34-141			
Toluene	29.9	1.0	"	33.3	ND	89.6	27-151			
Ethylbenzene	35.9	1.0	"	33.3	ND	108	29-160			
m,p-Xylene	70.1	2.0	"	66.7	ND	105	20-166			
o-Xylene	37.3	1.0	"	33.3	ND	112	33-159			
Surrogate: 1,2-Dichloroethane-d4	12.6		"	13.2		94.8	49.7-150			
Surrogate: Toluene-d8	13.0		"	13.3		97.4	51-150			
Surrogate: 4-Bromofluorobenzene	12.5		"	13.3		93.8	50.1-150			
Matrix Spike Dup (2100410-MSD1)		Source: R210008-01			Prepared: 10/04/12		Analyzed: 10/05/12			
Benzene	26.5	1.0	ug/l	33.3	ND	79.5	34-141	2.91	32	
Toluene	30.4	1.0	"	33.3	ND	91.1	27-151	1.59	25	
Ethylbenzene	36.4	1.0	"	33.3	ND	109	29-160	1.44	50	
m,p-Xylene	70.6	2.0	"	66.7	ND	106	20-166	0.725	36	
o-Xylene	36.8	1.0	"	33.3	ND	111	33-159	1.35	26	
Surrogate: 1,2-Dichloroethane-d4	12.8		"	13.2		96.6	49.7-150			
Surrogate: Toluene-d8	13.2		"	13.3		98.6	51-150			
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3		94.4	50.1-150			

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1775 Sherman St. STE. 3000
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Project: Seele 31, 41, 42-31

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
10/09/12 15:46

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 read 'Daniel A. Bruns IV'.