

Project: 7239
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Date: 01/22/2016



PDC Energy, Inc.
First Quarter 2013 Groundwater Monitoring Summary

March 25, 2013

Ryan 23-25U & 25BU, 14-25U/ Scott 24-25U/ MVS #1 Tank Battery
SESW Section 25 T5N R68W
Weld County, API # 05-069-06179

This groundwater monitoring summary has been prepared by Tasman Geosciences, LLC for the Ryan 23-25U & 25BU, 14-25U/ Scott 24-25U/ MVS #1 tank battery. On January 28, 2013, groundwater sampling was conducted at three temporary monitoring well locations. Due to insufficient water in BH02, BH03, and BH-04 groundwater samples were not collected from these points. Groundwater samples were 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. Evaluation of first quarter analytical results indicates that benzene concentrations are in exceedance of the COGCC regulatory standards at monitoring well BH04R. However, constituent concentrations in BH04R are significantly lower than what was previously exhibited in neighboring well BH04.

Bi-weekly enhanced fluid recovery (EFR) with air sparge (AS) was initiated on May 29, 2012. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS activities have reduced residual dissolved phase petroleum hydrocarbon impacts and will continue as the selected remedial strategy through second quarter 2013.

Second quarter 2013 groundwater sampling will be conducted during April 2013.

TABLE 1
RYAN 23-25U, 25BU, 14-25U/SCOTT 24-25U/MVS 1
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)
GW01-BH-01	4/13/2012	320	810	44	490	NM
BH01	7/17/2012	<1.0	<1.0	<1.0	<1.0	14.39
BH01	10/1/2012	<1.0	<1.0	<1.0	<1.0	14.67
BH01	1/28/2013	<1.0	<1.0	<1.0	<1.0	14.9
GW02-BH02	4/13/2012	7,100	14,000	420	4,400	NM
BH02	7/17/2012	DRY	DRY	DRY	DRY	DRY
BH02	10/1/2012	DRY	DRY	DRY	DRY	DRY
BH02	1/28/2013	DRY	DRY	DRY	DRY	DRY
GW03-BH03	4/13/2012	11,000	13,000	300	3,500	NM
BH03	7/17/2012	1,400	710	20	250	13.82
BH03	10/1/2012	41	47	3	32	14.20
BH03	1/28/2013	DRY	DRY	DRY	DRY	DRY
GW04-BH04	4/13/2012	3,100	3,900	150	1,700	NM
BH04	7/17/2012	1,500	490	<1.0	1,900	13.21
BH04 ⁽²⁾	10/1/2012	2,400	66	53	1,800	13.58
BH04R	1/28/2013	26	<1.0	<1.0	77	14.53
GW05-BH05	4/13/2012	510	3,400	190	2,200	NM
BH05	7/17/2012	<1.0	<1.0	<1.0	<1.0	13.30
BH05	10/1/2012	<1.0	<1.0	<1.0	<1.0	15.60
BH05	1/28/2013	<1.0	<1.0	<1.0	<1.0	15.74
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.

2). BH04 exhibited insufficient water following installation of BH04R during the fourth quarter 2012.

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.

NM- Not Measured

TABLE 2
RYAN 23-25U, 25BU, 14-25U/SCOTT 24-25U/MVS 1
AIR SPARGE / EFR OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR / AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Injection Pressure (psi)
SECOND QUARTER 2012					
5/29/2012	BH-01, BH-02, BH-03,	6	210	BH-01, BH-02, BH-03,	8
6/13/2012	BH-04, BH-05	6	210	BH-04, BH-05	8
THIRD QUARTER 2012					
7/2/2012	BH-01, BH-02, BH-03, BH-04, BH-05	6	252	BH-01, BH-02, BH-03, BH-04, BH-05	8
7/10/2012		6	210		8
7/25/2012		6	207		8
8/18/2012		7	124.5		7.5
8/21/2012		8	124.5		8
9/4/2012		7	0		8
FOURTH QUARTER 2012					
10/3/2012	BH-01, BH-03, BH-04R, BH-05	7	83	BH-01, BH-03, BH-04R, BH-05	8
10/30/2012		6	11.5		8
11/13/2012		6	23		8
11/29/2012		6.5	14.6		8
12/6/2012		6.5	7.5		8
FIRST QUARTER 2013					
1/7/2013	BH-01, BH-03, BH-04R, BH-05	5	10	BH-01, BH-03, BH-04R, BH-05	8

Notes:

psi = pounds per square inch



Surface
Drainage

BH03		
Compound (ug/L)	10/1/2012	1/28/2013
Benzene	41	DRY
Toluene	47	DRY
Ethylbenzene	3	DRY
Total Xylenes	32	DRY

BH-03

BH04R	
Compound (ug/L)	1/28/2013
Benzene	26
Toluene	<1.0
Ethylbenzene	<1.0
Total Xylenes	77

BH-04R

BH-04

BH05		
Compound (ug/L)	10/1/2012	1/28/2013
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH-05

M

M

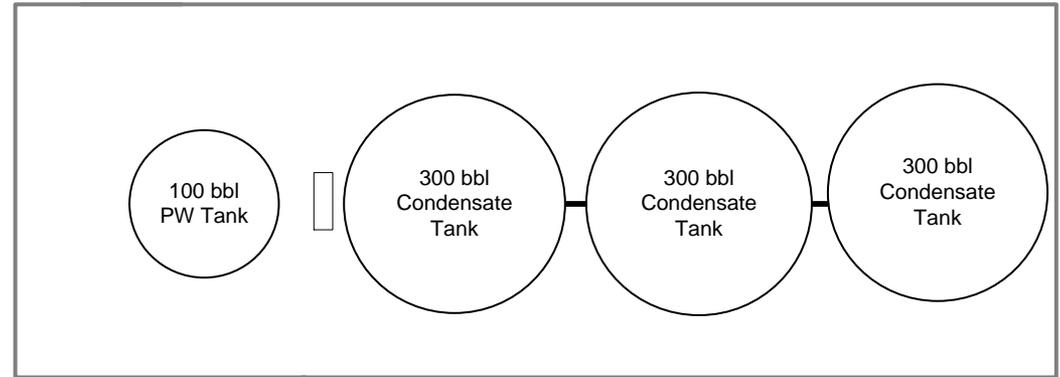
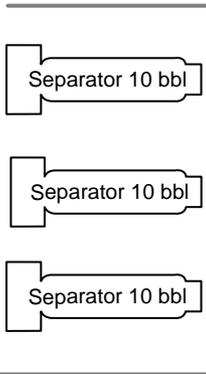
M

BH01

BH01		
Compound (ug/L)	10/1/2012	1/28/2013
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH02

BH02		
Compound (ug/L)	10/1/2012	1/28/2013
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.

DRAWN BY: CAW

DATE: 3/11/2103

Facility Diagram
PDC Energy – DJ Basin
Ryan 23-25U & 25BU, 14-25U/ Scott 24-25U/ MVS #1
SESW T5N R68W S25
Weld County, CO



6899 Pecos St., Unit C
Denver CO 80221

LEGEND

- Corrugated Steel Berm
- ⊗ Monitoring Well Location. Soil and Groundwater Samples Collected
- ⊙ Sampling Discontinued from Monitoring Well Location
- 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

February 01, 2013

Brandon Bruns

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Enclosed are the results of analyses for samples received by Summit Scientific on 01/28/13 18:05. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Joseph J Egry IV For Ben Shrewsbury

President / Laboratory Manager

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
02/01/13 16:13

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH-01	R301175-01	Water	01/28/13 15:15	01/28/13 18:05
BH-04A	R301175-03	Water	01/28/13 15:25	01/28/13 18:05
BH-05	R301175-04	Water	01/28/13 15:25	01/28/13 18:05

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
 Project Manager: Brandon Bruns

Reported:
 02/01/13 16:13

BH-01
R301175-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/28/13 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	3013005	01/30/13	01/31/13	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/28/13 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		115 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		103 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		108 %	45-146		"	"	"	"	

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 1775 Sherman St. STE. 3000
 Denver CO, 80203

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
 Project Manager: Brandon Brunns

Reported:
 02/01/13 16:13

BH-04A
R301175-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/28/13 15:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	26	1.0	ug/l	1	3013005	01/30/13	01/31/13	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	01/31/13	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	77	1.0	"	"	"	"	01/31/13	"	

Date Sampled: **01/28/13 15:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		123 %	37-154		"	"	01/31/13	"	
Surrogate: Toluene-d8		107 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		78.6 %	45-146		"	"	"	"	

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 Denver CO, 80203

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
 Project Manager: Brandon Brunns

Reported:
 02/01/13 16:13

BH-05
R301175-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/28/13 15:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	3013005	01/30/13	01/31/13	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/28/13 15:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		146 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		81.8 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		109 %	45-146		"	"	"	"	

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Denver CO, 80203

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/01/13 16:13

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 3013005 - EPA 5030 Water MS

Blank (3013005-BLK1)

Prepared: 01/30/13 Analyzed: 01/31/13

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>13.2</i>		<i>"</i>	<i>13.2</i>		<i>100</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.2</i>		<i>"</i>	<i>13.3</i>		<i>99.2</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.7</i>		<i>"</i>	<i>13.3</i>		<i>103</i>	<i>45-146</i>			

LCS (3013005-BS1)

Prepared: 01/30/13 Analyzed: 01/31/13

Benzene	19.9	1.0	ug/l	33.3		59.6	51-132			
Toluene	21.2	1.0	"	33.3		63.6	51-138			
Ethylbenzene	21.8	1.0	"	33.3		65.5	58-146			
m,p-Xylene	43.9	2.0	"	66.7		65.8	57-144			
o-Xylene	21.6	1.0	"	33.3		65.0	53-146			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>13.5</i>		<i>"</i>	<i>13.2</i>		<i>102</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.2</i>		<i>"</i>	<i>13.3</i>		<i>98.9</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.4</i>		<i>"</i>	<i>13.3</i>		<i>101</i>	<i>45-146</i>			

LCS Dup (3013005-BSD1)

Prepared: 01/30/13 Analyzed: 01/31/13

Benzene	22.5	1.0	ug/l	33.3		67.4	51-132	12.3	17	
Toluene	23.7	1.0	"	33.3		71.0	51-138	10.9	17	
Ethylbenzene	24.7	1.0	"	33.3		74.0	58-146	12.3	16	
m,p-Xylene	50.5	2.0	"	66.7		75.7	57-144	14.0	16	
o-Xylene	24.9	1.0	"	33.3		74.6	53-146	13.8	15	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>13.6</i>		<i>"</i>	<i>13.2</i>		<i>103</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.7</i>		<i>"</i>	<i>13.3</i>		<i>95.2</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.2</i>		<i>"</i>	<i>13.3</i>		<i>98.9</i>	<i>45-146</i>			

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Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/01/13 16:13

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 3013005 - EPA 5030 Water MS

Matrix Spike (3013005-MS1)	Source: R301177-01			Prepared: 01/30/13		Analyzed: 01/31/13				
Benzene	21.1	1.0	ug/l	33.3	ND	63.3	34-141			
Toluene	22.2	1.0	"	33.3	ND	66.5	27-151			
Ethylbenzene	22.8	1.0	"	33.3	ND	68.5	29-160			
m,p-Xylene	46.4	2.0	"	66.7	ND	69.5	20-166			
o-Xylene	22.7	1.0	"	33.3	ND	68.0	33-159			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>13.9</i>		<i>"</i>	<i>13.2</i>		<i>105</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.4</i>		<i>"</i>	<i>13.3</i>		<i>100</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.3</i>		<i>"</i>	<i>13.3</i>		<i>100</i>	<i>45-146</i>			

Matrix Spike Dup (3013005-MSD1)	Source: R301177-01			Prepared: 01/30/13		Analyzed: 01/31/13				
Benzene	22.1	1.0	ug/l	33.3	ND	66.4	34-141	4.76	32	
Toluene	23.3	1.0	"	33.3	ND	69.9	27-151	4.88	25	
Ethylbenzene	24.6	1.0	"	33.3	ND	73.8	29-160	7.38	50	
m,p-Xylene	50.4	2.0	"	66.7	ND	75.6	20-166	8.33	36	
o-Xylene	24.7	1.0	"	33.3	ND	74.0	33-159	8.49	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>13.2</i>		<i>"</i>	<i>13.2</i>		<i>100</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.8</i>		<i>"</i>	<i>13.3</i>		<i>95.6</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.5</i>		<i>"</i>	<i>13.3</i>		<i>101</i>	<i>45-146</i>			

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Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
02/01/13 16:13

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