



PDC Energy, Inc.
First Quarter 2014 Groundwater Monitoring Summary

February 21, 2014

H&S (Mineral) #1 Tank Battery
NWSW S6 T4N R65W
Weld County, API # 05-123-14802

This groundwater summary has been prepared by Tasman Geosciences, LLC for the H&S (Mineral) #1 tank battery. On January 24, 2014, groundwater monitoring was conducted at the eight monitoring well locations. Groundwater samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B. Analytical results are summarized in Table 1 below and the laboratory report is included as Attachment A. Sample locations and corresponding first quarter 2014 analytical results are illustrated on Figure 1. First quarter analytical results indicate that BTEX concentrations are in exceedance of COGCC Table 910-1 standards at three of the eight monitoring well locations. Constituent concentrations are below laboratory detection limits at the two point of compliance well locations (BH07 and BH08).

Tasman initiated enhanced fluid recovery (EFR) and air sparge (AS) events at the site during the third quarter 2013. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS will remain the selected remediation strategy through the second quarter 2014 to address residual dissolved phase petroleum hydrocarbon impacts on site.

The second quarter 2014 groundwater sampling event will be conducted during April 2014.

TABLE 1
H&S (MINERAL) #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)
BH01	7/25/2013	6700	6200	1100	19000	16.53
BH01	10/31/2013	1700	1800	170	4400	15.65
BH01	1/24/2014	6.5	<1.0	<1.0	3000	17.19
BH02	7/25/2013	3300	4700	2100	36000	17.63
BH02	10/31/2013	770	24	39	3300	16.75
BH02	1/24/2014	730	20	<1.0	2600	18.25
BH03	7/25/2013	760	4400	1300	23000	15.98
BH03	10/31/2013	3.6	8.6	2.2	100	15.15
BH03	1/24/2014	2.6	2	<1.0	62	16.63
BH04	7/25/2013	1700	170	1200	19000	15.91
BH04	10/31/2013	2500	140	620	13000	15.09
BH04	1/24/2014	2100	320	740	14000	16.6
BH05	7/25/2013	17	3300	930	15000	13.07
BH05	10/31/2013	<1.0	<1.0	2	85	12.01
BH05	1/24/2014	<1.0	<1.0	<1.0	<1.0	13.52
BH06	7/25/2013	1.9	12	3100	46000	13.47
BH06	10/31/2013	<1.0	<1.0	1.9	57	12.46
BH06	1/24/2014	<1.0	<1.0	<1.0	2.9	13.95
BH07	7/25/2013	<1.0	<1.0	<1.0	<1.0	15.33
BH07	10/31/2013	<1.0	<1.0	<1.0	<1.0	14.31
BH07	1/24/2014	<1.0	<1.0	<1.0	<1.0	15.81
BH08	7/25/2013	<1.0	<1.0	<1.0	<1.0	13.47
BH08	10/31/2013	<1.0	<1.0	<1.0	<1.0	12.41
BH08	1/24/2014	<1.0	<1.0	<1.0	<1.0	13.91
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
H&S (MINERAL) #1
AIR SPARGE/ EFR OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Injection Pressure (psi)
Third Quarter 2013					
8/6/2013	BH01, BH02, BH03, BH04, BH05, BH06	6	50	BH01, BH02, BH03, BH05, BH06	10
8/19/2013		6	80		10
9/8/2013		6	21		10
9/16/2013		6	80		10
9/30/2013		5	90		15
Quarterly Totals		29	321		-
Fourth Quarter 2013					
10/11/2013	BH01, BH02, BH03, BH04, BH05, BH06	6	80	BH01, BH02, BH03, BH05, BH06	10
10/24/2013		6	110		12
11/26/2013		6	40		10
12/17/2013		6	42		10
Quarterly Totals		24	272		-
First Quarter 2014					
1/7/2014	BH01, BH02, BH03, BH04, BH05, BH06	5.5	90	BH01, BH02, BH03, BH05, BH06	10
1/22/2014		6	230		10
Quarterly Totals		11.5	320		-



BH03		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	3.6	2.6
Toluene	8.6	2
Ethylbenzene	2.2	<1.0
Total Xylenes	100	62

BH02		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	770	730
Toluene	24	20
Ethylbenzene	39	<1.0
Total Xylenes	3300	2600

Surface
Drainage

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

Fence Line

Steep Grade

Immobile Magna Equipment

BH02

Above Ground Gas Line

M

Separator 10 bbl

100 bbl
PW tank

300 bbl Oil
Tank

BH03

BH01

BH04

DCP Buried Gas Line

Flow Line

BH07

BH01		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	1700	6.5
Toluene	1800	<1.0
Ethylbenzene	170	<1.0
Total Xylenes	4400	3000

BH05

BH06

BH04		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	2500	2100
Toluene	140	320
Ethylbenzene	620	740
Total Xylenes	13000	14000

BH05		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	2	<1.0
Total Xylenes	85	<1.0

BH08		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

Wellhead

BH08

BH06		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	1.9	<1.0
Total Xylenes	57	2.9

BH07		
Compound (ug/L)	10/31/2013	1/24/2014
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

DRAWN BY: BAM

DATE: 2/5/2014

Facility Diagram
PDC Energy – DJ Basin
H&S (Mineral) #1
NWSW S6 T4N R65W
Weld County, CO



6899 Pecos Street
Unit C
Denver, CO 80221

LEGEND

- Earthmen Berm
- Approximate Area of Excavation
- Temporary Monitoring Well
- Temporary Monitoring Well – SVE Screen
- Horizontal Remediation Pipe
- M Meter House

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

January 31, 2014

Brandon Bruns
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: H&S Mineral #1

Enclosed are the results of analyses for samples received by Summit Scientific on 01/24/14 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 'Ben 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: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
01/31/14 15:31

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1401139-01	Water	01/24/14 09:30	01/24/14 16:30
BH02	1401139-02	Water	01/24/14 09:35	01/24/14 16:30
BH03	1401139-03	Water	01/24/14 09:40	01/24/14 16:30
BH04	1401139-04	Water	01/24/14 09:45	01/24/14 16:30
BH05	1401139-05	Water	01/24/14 09:50	01/24/14 16:30
BH06	1401139-06	Water	01/24/14 10:00	01/24/14 16:30
BH07	1401139-07	Water	01/24/14 10:05	01/24/14 16:30
BH08	1401139-08	Water	01/24/14 10:10	01/24/14 16:30

Summit Scientific

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

Project: H&S Mineral #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
01/31/14 15:31

1401139

Summit Scientific

741 Corporate Circle Suite 1 • Golden, Colorado 80401
303-277-9310 • 303-374-5933 Fax

Client: PDC Energy Project Manager: Brandon Bruns
Address: 1775 Sherman St. STE. 3000
City/State/Zip: Denver, CO E-Mail: Brandon.Brun@pdc.com
Phone: 303-277-9310 Fax: 303-374-5933
Sample Name: H&S Mineral #1 Project Number: 1401139

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:	Special Instructions
				HCl	HNO ₃	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)		
BH01	1/24	9:50	5		X							
BH02	1/24	9:55	1		X							
BH03	1/24	9:40	1									
BH04	1/24	9:45	1									
BH05	1/24	9:50	1									
BH06	1/24	10:00	1									
BH07	1/24	10:05	1									
BH08	1/24	10:10	1									

Relinquished by: John H. [Signature] Date/Time: 1/24/14 16:30
Received by: MD [Signature] Date/Time: 1/24/14 16:30
Relinquished by: MD [Signature] Date/Time: 1/24/14 16:30
Received by: MD [Signature] Date/Time: 1/24/14 16:30

Turn Around Time (Check):
Same Day ☐ 72 Hours ☐
24 Hours ☐ Standard ☒ 48 Hours ☐

Sample Integrity: 4°C
Temperature Upon Receipt: 4°C
Intact: ☒ Yes ☐ No

Notes:

www.s2scientific.com

Summit Scientific

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[Signature]



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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH01
1401139-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 09:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	6.5	1.0		ug/l	1	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	3000	100		"	100	"	"	"	"	

Date Sampled: **01/24/14 09:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		118 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		100 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %		45-146		"	"	"	"	

Summit Scientific

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH02
1401139-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 09:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	730	100		ug/l	100	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	20	1.0		"	1	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	2600	100		"	100	"	"	"	"	

Date Sampled: **01/24/14 09:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		119 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		99.3 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		107 %		45-146		"	"	"	"	

Summit Scientific

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH03
1401139-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 09:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	2.6	1.0		ug/l	1	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	2.0	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	62	1.0		"	"	"	"	"	"	

Date Sampled: **01/24/14 09:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		123 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		106 %		45-146		"	"	"	"	

Summit Scientific

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH04
1401139-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 09:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	2100	100		ug/l	100	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	320	100		"	"	"	"	"	"	
Ethylbenzene	740	100		"	"	"	"	"	"	
Xylenes (total)	14000	100		"	"	"	"	"	"	

Date Sampled: **01/24/14 09:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: 1,2-Dichloroethane-d4</i>		122 %		37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		104 %		45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		104 %		45-146		"	"	"	"	

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH05
1401139-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 09:50**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	1.0		"	"	"	"	"	"	

Date Sampled: **01/24/14 09:50**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		119 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		99.2 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		103 %		45-146		"	"	"	"	

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH06
1401139-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 10:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	2.9	1.0		"	"	"	"	"	"	

Date Sampled: **01/24/14 10:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		118 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		102 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		107 %		45-146		"	"	"	"	

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH07
1401139-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 10:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	1.0		"	"	"	"	"	"	

Date Sampled: **01/24/14 10:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		123 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		99.9 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %		45-146		"	"	"	"	

Summit Scientific

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
01/31/14 15:31

BH08
1401139-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/24/14 10:10**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	ND	1.0	ug/l	1	1401150	01/30/14	01/30/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/24/14 10:10**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4		122 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		104 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		108 %	45-146		"	"	"	"	

Summit Scientific

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
01/31/14 15:31

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

Summit Scientific

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

Project: H&S Mineral #1
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
01/31/14 15:31

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'.