



PDC Energy, Inc.
First Quarter 2016 Groundwater Monitoring Summary

March 25, 2016

H&S (Mineral) #1 Tank Battery
NWSW S6 T4N R65W
Weld County, API # 05-123-11529
Spill Tracking # 2145651
Remediation # 7945

This groundwater summary has been prepared by Tasman Geosciences, Inc. for the H&S (Mineral) #1 tank battery. On January 26, 2016 groundwater monitoring was conducted at 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 and the laboratory analytical report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. First quarter 2016 analytical results indicate that BTEX concentrations are below applicable COGCC Table 910-1 standards in each of the eight monitoring locations.

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 2016 to ensure that constituent concentrations remain below regulatory standards.

The second quarter 2016 groundwater sampling event will be conducted during April 2016.

TABLE 1
H & S (MINERAL) #1 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH01	7/25/2013	6,700	6,200	1,100	19,000	16.53
BH01	10/31/2013	1,700	1,800	170	4,400	15.65
BH01	1/24/2014	6.5	<1.0	<1.0	3,000	17.19
BH01	4/30/2014	290	990	76	2,700	17.35
BH01	7/25/2014	45	100	53	2,100	14.68
BH01	10/27/2014	21	19	21	2,100	13.75
BH01	1/20/2015	9.7	13	<1.0	1,600	15.85
BH01	5/13/2015	4.9	13	5.2	2,600	15.90
BH01	7/30/2015	<1.0	6.5	<1.0	290	14.23
BH01	10/26/2015	1.1	15	5.3	400	13.57
BH01	1/26/2016	3.1	19	<1.0	980	16.04
BH02	7/25/2013	3,300	4,700	2,100	36,000	17.63
BH02	10/31/2013	770	24	39	3,300	16.75
BH02	1/24/2014	730	20	<1.0	2,600	18.25
BH02	4/30/2014	84	12	3.8	410	18.39
BH02	7/25/2014	53	2.3	<1.0	68	15.75
BH02	10/27/2014	4.3	<1.0	<1.0	24	14.91
BH02	1/20/2015	160	<1.0	<1.0	390	17.02
BH02	5/13/2015	93	1.2	<1.0	75	17.14
BH02	7/30/2015	3.4	1.1	<1.0	57	15.61
BH02	10/26/2015	39	16	3.9	450	14.70
BH02	1/26/2016	<1.0	2.5	1.4	18	17.16
BH03	7/25/2013	760	4,400	1,300	23,000	15.98
BH03	10/31/2013	3.6	8.6	2.2	100	15.15
BH03	1/24/2014	2.6	2.0	<1.0	62	16.63
BH03	4/30/2014	1.1	1.6	<1.0	45	16.79
BH03	7/25/2014	33	20	<1.0	480	14.14
BH03	10/27/2014	17	3.3	<1.0	210	13.27
BH03	1/20/2015	<1.0	<1.0	<1.0	8.7	15.35
BH03	5/13/2015	<1.0	<1.0	<1.0	8.2	15.38
BH03	7/30/2015	<1.0	<1.0	<1.0	4.9	13.72
BH03	10/26/2015	<1.0	<1.0	<1.0	12	13.09
BH03	1/26/2016	<1.0	1.4	<1.0	9.7	15.55

TABLE 1
H & S (MINERAL) #1 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH04	7/25/2013	1,700	170	1,200	19,000	15.91
BH04	10/31/2013	2,500	140	620	13,000	15.09
BH04	1/24/2014	2,100	320	740	14,000	16.60
BH04	4/30/2014	1,700	300	1,100	19,000	16.74
BH04	7/25/2014	410	9.3	36	6,400	14.11
BH04	10/27/2014	37	2.4	<1.0	630	13.22
BH04	1/20/2015	45	<1.0	<1.0	520	15.46
BH04	5/13/2015	2.6	<1.0	<1.0	110	15.40
BH04	7/30/2015	8.8	1.2	2.4	780	13.76
BH04	10/26/2015	3.2	3.9	7.2	450	13.05
BH04	1/26/2016	<1.0	2.2	2.4	43	15.51
<hr/>						
BH05	7/25/2013	17	3,300	930	15,000	13.07
BH05	10/31/2013	<1.0	<1.0	2.0	85	12.01
BH05	1/24/2014	<1.0	<1.0	<1.0	<1.0	13.52
BH05	4/30/2014	<1.0	<1.0	<1.0	4.5	13.65
BH05	7/25/2014	<1.0	<1.0	<1.0	5.8	11.03
BH05	10/27/2014	<1.0	<1.0	<1.0	2.9	10.37
BH05	1/20/2015	<1.0	<1.0	<1.0	<1.0	12.50
BH05	5/13/2015	<1.0	<1.0	<1.0	<1.0	12.41
BH05	7/30/2015	<1.0	<1.0	<1.0	2.3	10.91
BH05	10/26/2015	<1.0	<1.0	<1.0	<1.0	10.17
BH05	1/26/2016	<1.0	<1.0	<1.0	<1.0	12.79
<hr/>						
BH06	7/25/2013	1.9	12	3,100	46,000	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
BH06	4/30/2014	<1.0	<1.0	2.0	49	14.06
BH06	7/25/2014	<1.0	<1.0	<1.0	4.9	11.44
BH06	10/27/2014	<1.0	<1.0	<1.0	2.6	10.81
BH06	1/20/2015	<1.0	<1.0	<1.0	2.3	12.93
BH06	5/13/2015	<1.0	<1.0	750	10,000	12.82
BH06	7/30/2015	<1.0	<1.0	<1.0	<1.0	11.32
BH06	10/26/2015	<1.0	<1.0	<1.0	<1.0	10.59
BH06	1/26/2016	<1.0	<1.0	<1.0	<1.0	13.09

TABLE 1
H & S (MINERAL) #1 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
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
BH07	4/30/2014	<1.0	<1.0	<1.0	<1.0	15.96
BH07	7/25/2014	<1.0	<1.0	<1.0	<1.0	13.27
BH07	10/27/2014	<1.0	<1.0	<1.0	<1.0	10.60
BH07	1/20/2015	<1.0	<1.0	<1.0	<1.0	14.78
BH07	5/13/2015	<1.0	<1.0	<1.0	<1.0	14.53
BH07	7/30/2015	<1.0	<1.0	<1.0	<1.0	13.17
BH07	10/26/2015	<1.0	<1.0	<1.0	<1.0	12.37
BH07	1/26/2016	<1.0	<1.0	<1.0	<1.0	14.92
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
BH08	4/30/2014	<1.0	<1.0	<1.0	<1.0	14.05
BH08	7/25/2014	<1.0	<1.0	<1.0	<1.0	11.42
BH08	10/27/2014	NS	NS	NS	NS	NM
BH08	1/22/2015	<1.0	<1.0	<1.0	<1.0	12.88
BH08	5/13/2015	<1.0	<1.0	<1.0	<1.0	12.90
BH08	7/30/2015	<1.0	<1.0	<1.0	<1.0	11.30
BH08	10/26/2015	<1.0	<1.0	<1.0	<1.0	10.56
BH08	1/26/2016	<1.0	<1.0	<1.0	<1.0	13.04

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

(<) = Analytical result is less than the indicated laboratory reporting limit.

NM = Not measured

NS = Not sampled

BOLD = Analytical result is in exceedance of COGCC groundwater standards.

TABLE 2
H & S (MINERAL) #1 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
Third Quarter 2013					
8/6/2013	BH02, BH03, BH04, BH05, BH06	6	50	BH01, BH02, BH03, BH05, BH06	10
8/19/2013	BH01, BH02, BH03, BH04, BH05, BH06	6	80	BH01, BH02, BH03, BH04, BH05, BH06	10
9/8/2013		6	21		10
9/16/2013		6	80		10
9/30/2013		5	90	BH01, BH02, BH03, BH05, BH06	20
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	BH01, BH02, BH03, BH04, BH06	6	110	BH01, BH02, BH03, BH05, BH06	12
11/26/2013	BH01, BH02, BH03,	6	40		10
12/17/2013	BH04, BH05, BH06	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
2/24/2014		6	180		10
3/11/2014		6	90		10
3/20/2014		6	135		10
Quarterly Totals		29.5	725		-
Second Quarter 2014					
4/10/2014	BH01, BH02, BH03, BH04, BH05	8	230	BH01, BH02, BH03, BH05	10
4/23/2014	BH01, BH02, BH03, BH04, BH05, BH06	6	180	BH01, BH02, BH03, BH04, BH05, BH06	20
5/13/2014		6	220		10
5/28/2014		6	180		20
6/10/2014		8	270		25
6/23/2014		6	185		20
Quarterly Totals		40	1265		-
Third Quarter 2014					
7/11/2014	BH01, BH02, BH03, BH04, BH05, BH06	6	150	BH01, BH02, BH03, BH04, BH05, BH06	20
7/16/2014		6	240		15
8/8/2014		6	250		15
8/25/2014		6	230		20
9/10/2014		6	300		20
9/22/2014		6	350		20
Quarterly Totals		36	1520		-

TABLE 2
H & S (MINERAL) #1 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
Fourth Quarter 2014					
10/10/2014	BH01, BH02, BH03, BH04, BH05, BH06	6	100	BH01, BH02, BH03, BH04, BH05, BH06	20
10/24/2014	Pipe, BH01, BH02, BH03, BH05, BH06	6	50		15
11/7/2014	Pipe, BH01, BH02, BH03, BH05	6	270		20
11/25/2014	BH01, BH02, BH03, BH04, BH05, BH06	6	18		30
12/10/2014					
Quarterly Totals		30	645		-
First Quarter 2015					
1/2/2015	Pipe, BH01, BH02, BH03, BH05, BH06	6	150	BH01, BH02, BH03, BH04, BH05, BH06	15
1/14/2015	Pipe, BH01, BH02, BH03, BH04	5	245	BH01, BH02, BH03, BH04	20
2/3/2015	Pipe, BH01, BH02, BH03, BH05, BH06	6	120	BH01, BH02, BH03, BH04, BH05, BH06	20
2/18/2015	Pipe, BH01, BH02, BH03, BH04, BH05, BH06	6	250		20
3/13/2015		6	100		20
3/25/2015		6	160		20
Quarterly Totals		35	1025		-
Second Quarter 2015					
4/1/2015	Pipe, BH01, BH02, BH03, BH04, BH05, BH06	6	165	BH01, BH02, BH03, BH04, BH05, BH06	20
4/21/2015	Pipe, BH01, BH02, BH03, BH04, BH05	6	180	BH01, BH02, BH03, BH04, BH05	20
5/5/2015	Pipe, BH01, BH02, BH03, BH04, BH05, BH06	6	80	BH01, BH02, BH03, BH04, BH05, BH06	20
5/19/2015		6	250		20
6/2/2015		6	270		20
6/16/2015		6	350		20
6/30/2015		6	340		20
Quarterly Totals		42	1635		-
Third Quarter 2015					
7/14/2015	Pipe, BH01, BH02, BH03, BH04, BH05, BH06	6	375	BH01, BH02, BH03, BH04, BH05, BH06	20
7/28/2015		6	405		20
8/11/2015		6	320	BH01, BH02, BH04, BH05	20
8/25/2015		6	505	BH01, BH02, BH03, BH04, BH05, BH06	20
9/8/2015		6	90		20
9/22/2015		6	700		20
Quarterly Totals		36	2395		-

TABLE 2
H & S (MINERAL) #1 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
Fourth Quarter 2015					
10/6/2015	Pipe, BH01, BH02, BH03, BH04, BH05, BH06	6	550	BH01, BH02, BH03, BH04, BH05, BH06	20
10/20/2015		6	400		20
11/3/2015		6	552		20
11/19/2015	Pipe, BH01, BH03, BH05, BH06	6	320	BH01, BH02, BH03, BH04, BH05	20
12/1/2015		6	142		20
12/22/2015	Pipe, BH01, BH02, BH03	6	260	BH02, BH03, BH04	20
Quarterly Totals		30	1964		-
First Quarter 2016					
1/13/2016	Pipe, BH01, BH03, BH05, BH06	6	20	BH01, BH02, BH03, BH04, BH05	20
2/12/2016		6	200		20
2/25/2016		6	420		20
3/10/2016		6	250		20
Quarterly Totals		12	220		-

Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch



BH02		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	39	<1.0
Toluene	16	2.5
Ethylbenzene	3.9	1.4
Total Xylenes	450	18

BH01		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	1.1	3.1
Toluene	15	19
Ethylbenzene	5.3	<1.0
Total Xylenes	400	980

BH04		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	3.2	<1.0
Toluene	3.9	2.2
Ethylbenzene	7.2	2.4
Total Xylenes	450	43

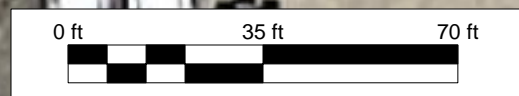
BH03		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	<1.0	<1.0
Toluene	<1.0	1.4
Ethylbenzene	<1.0	<1.0
Total Xylenes	12	9.7

BH07		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH05		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH06		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH08		
Compound (µg/L)	10/26/2015	1/26/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0



Surface
Drainage

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

DRAWN BY: ESS

DATE: 2/29/2016

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



6899 Pecos Street
Unit C
Denver, CO 80221

LEGEND

- Excavation Extent
- Monitoring Well Location
- Monitoring Well Location – SVE Screen
- Horizontal Remediation Well Location
- Point of Release

All locations are approximate unless otherwise noted

FIGURE 1
GROUNDWATER ANALYTICAL RESULTS MAP

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

February 01, 2016

Mark Longhurst
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 01/26/16 16:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury
President



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

Project: H&S Mineral #1

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
02/01/16 09:55

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1601220-01	Water	01/26/16 15:20	01/26/16 16:00
BH02	1601220-02	Water	01/26/16 15:25	01/26/16 16:00
BH03	1601220-03	Water	01/26/16 15:30	01/26/16 16:00
BH04	1601220-04	Water	01/26/16 15:35	01/26/16 16:00
BH05	1601220-05	Water	01/26/16 15:40	01/26/16 16:00
BH06	1601220-06	Water	01/26/16 15:45	01/26/16 16:00
BH07	1601220-07	Water	01/26/16 15:50	01/26/16 16:00
BH08	1601220-08	Water	01/26/16 15:55	01/26/16 16:00

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

Summit Scientific

1601220

741 Corporate Circle Suite I • Golden, Colorado 80401
 303-277-9510 • 303-277-9531 Fax

Client: PDC Page 1 of 1
 Address: _____
 City/State/Zip: _____
 Phone: 970 470 9042 Fax: _____
 Sampler Name: P. Irvia
 Project Manager: Mark Longhurst
 E-Mail: mark.longhurst@pdc.com
 Project Name: H&S Mineral #1
 Project Number: _____

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:				Special Instructions
				HCl	HNO ₃	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)				
BH01	1/26/16	1520	3	X											GRAB #1 ON Hold
BH02		1525													
BH03		1530													
BH04		1535													
BH05		1540													
BH06		1545													
BH07		1550													
BH08		1555													
GRAB #1	✓	1600	✓								✓	HOLD			

Relinquished by: <u>[Signature]</u>	Date/Time: <u>1/26/16</u>	Received by: _____	Date/Time: _____	Turn Around Time (Check) Same Day <input type="checkbox"/> 72 Hours <input type="checkbox"/> 24 Hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 Hours <input type="checkbox"/>	Notes: <u>on ice</u>
Relinquished by: _____	Date/Time: _____	Received by: _____	Date/Time: _____		
Relinquished by: _____	Date/Time: _____	Received in Lab by: _____	Date/Time: _____		
				Sample Integrity: Temperature Upon Receipt: _____ Intact: Yes <input type="checkbox"/> No <input type="checkbox"/>	

www.s2scientific.com



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

Project: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH01
1601220-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	3.1	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	19	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	980	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		106 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		102 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.5 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH02
1601220-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	2.5	1.0	"	"	"	"	"	"	
Ethylbenzene	1.4	1.0	"	"	"	"	"	"	
Xylenes (total)	18	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		104 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		97.7 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		97.3 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH03
1601220-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	1.4	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	9.7	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		106 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		97.7 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		100 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH04
1601220-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	2.2	1.0	"	"	"	"	"	"	
Ethylbenzene	2.4	1.0	"	"	"	"	"	"	
Xylenes (total)	43	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		105 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		99.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.0 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH05
1601220-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		103 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		99.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.5 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH06
1601220-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		103 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		97.3 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.9 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH07
1601220-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		106 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		99.6 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.6 %	45-146		"	"	"	"	

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

BH08
1601220-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/26/16 15:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1601262	01/28/16	01/28/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/26/16 15:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		107 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		98.9 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.2 %	45-146		"	"	"	"	

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: H&S Mineral #1
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
02/01/16 09:55

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 1601262 - EPA 5030 Water MS

Blank (1601262-BLK1)

Prepared & Analyzed: 01/28/16

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	14.2		"	13.3		106	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		99.1	45-149			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		98.9	45-146			

LCS (1601262-BS1)

Prepared & Analyzed: 01/28/16

Benzene	43.9	1.0	ug/l	33.3		132	51-132			
Toluene	43.7	1.0	"	33.3		131	51-138			
Ethylbenzene	45.2	1.0	"	33.1		137	58-146			
m,p-Xylene	84.5	2.0	"	66.5		127	57-144			
o-Xylene	41.7	1.0	"	32.8		127	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.4		"	13.3		108	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		98.6	45-146			

Matrix Spike (1601262-MS1)

Source: 1601220-01

Prepared & Analyzed: 01/28/16

Benzene	46.2	1.0	ug/l	33.3	3.14	129	34-141			
Toluene	60.9	1.0	"	33.3	19.0	126	27-151			
Ethylbenzene	50.5	1.0	"	33.1	ND	153	29-160			
m,p-Xylene	830	2.0	"	66.5	778	77.9	20-166			E
o-Xylene	235	1.0	"	32.8	201	105	33-159			
Surrogate: 1,2-Dichloroethane-d4	13.9		"	13.3		104	37-154			
Surrogate: Toluene-d8	13.7		"	13.3		102	45-149			
Surrogate: 4-Bromofluorobenzene	14.0		"	13.3		105	45-146			

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: H&S Mineral #1

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/01/16 09:55

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 1601262 - EPA 5030 Water MS

Matrix Spike Dup (1601262-MSD1)	Source: 1601220-01			Prepared & Analyzed: 01/28/16						
Benzene	44.6	1.0	ug/l	33.3	3.14	125	34-141	3.50	32	
Toluene	58.0	1.0	"	33.3	19.0	117	27-151	4.86	25	
Ethylbenzene	49.1	1.0	"	33.1	ND	148	29-160	2.85	50	
m,p-Xylene	775	2.0	"	66.5	778	NR	20-166	6.79	36	E
o-Xylene	221	1.0	"	32.8	201	62.6	33-159	6.03	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>13.9</i>		<i>"</i>	<i>13.3</i>		<i>104</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.3</i>		<i>"</i>	<i>13.3</i>		<i>99.9</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.8</i>		<i>"</i>	<i>13.3</i>		<i>103</i>	<i>45-146</i>			

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: H&S Mineral #1

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
02/01/16 09:55

Notes and Definitions

- E The concentration indicated for this analyte is an estimated value above the calibration range of the instrument.
- 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

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.