

PDC Energy, Inc.
Fourth Quarter 2017 Groundwater Monitoring Summary

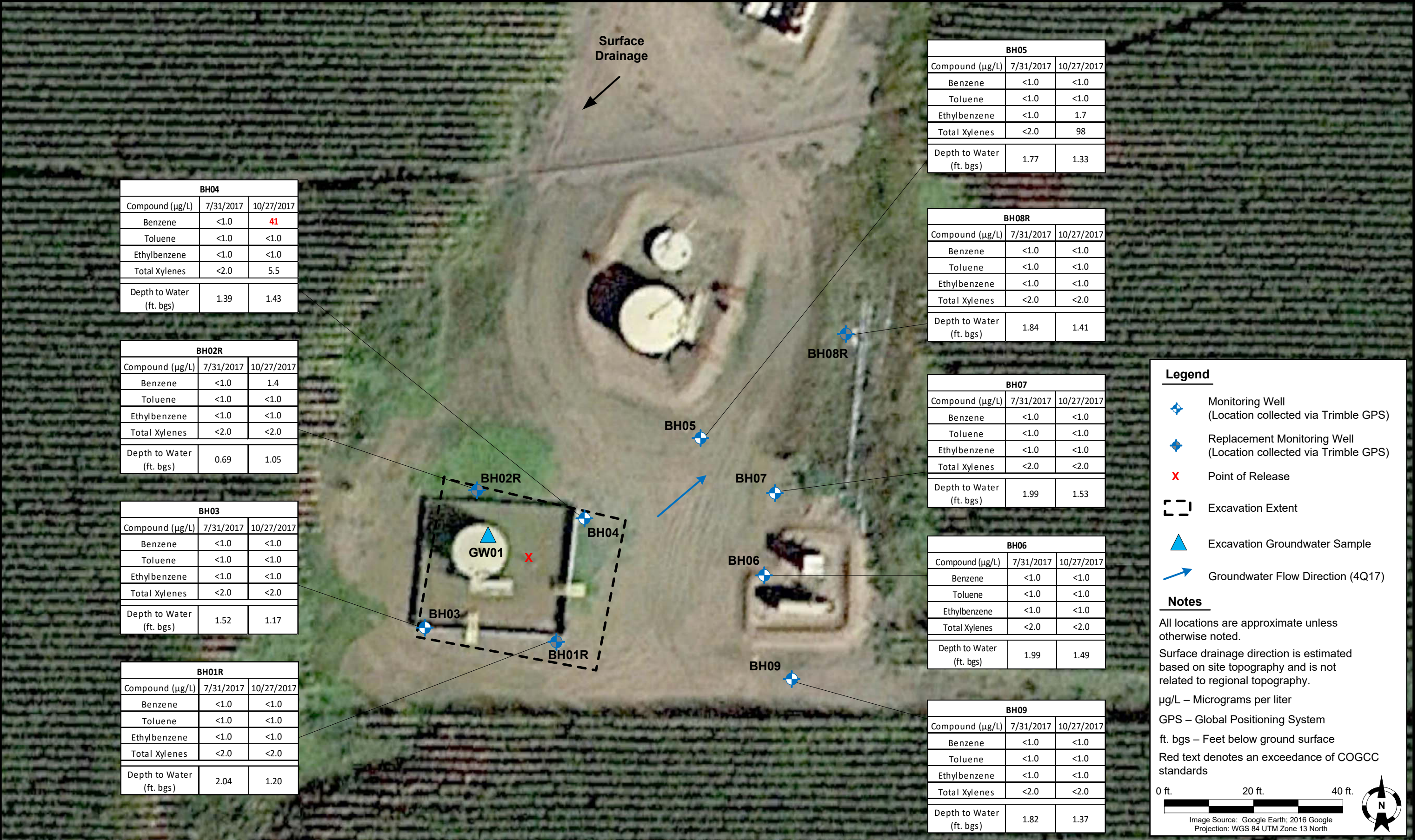
January 23, 2018

Jerke UP 8-7 Tank Battery
SENE S7 T4N R65W
Weld County, API # 05-123-13481
Facility ID # 245686
Remediation # 9300

This groundwater summary has been prepared by Tasman Geosciences, Inc. for the Jerke UP 8-7 tank battery. On October 27, 2017, groundwater samples were collected from all nine monitoring well locations (BH01R – BH02R, BH03 – BH07, BH08R, and BH09). Nine groundwater samples were submitted to Summit Scientific Laboratory for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B. Analytical results are summarized in Table 1, and the laboratory report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Fourth quarter 2017 analytical results indicate that the benzene concentration is above the applicable COGCC Table 910-1 groundwater standard in monitoring well BH04. BTEX concentrations are below regulatory standards at eight monitoring well locations.

Enhanced fluid recovery (EFR) and air sparge (AS) was initiated at the site during the first quarter 2014. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS will remain as the selected remediation strategy for this site through the first quarter 2018.

First quarter 2018 groundwater sampling event will be conducted during October 2018.



DATE: November 27, 2017

DESIGNED BY: C. Hamlin

DRAWN BY: C. Armbruster



Tasman Geosciences, Inc.
6899 Pecos Street – Unit C
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PDC Energy, Inc. – DJ Basin
Jerke UP 8-7 Tank Battery
SENE, Section 7, Township 4 North, Range 65 West
Weld County, Colorado

**GROUNDWATER
ANALYTICAL RESULTS
MAP**

**FIGURE
1**

TABLE 1
JERKE UP 8-7 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 ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
GW01	11/12/2013	230	370	160	2,200	~ 5
BH01	1/10/2014	270	2,300	390	5,800	7.41
BH01	4/29/2014	19	130	160	3,100	7.52
BH01	7/29/2014	4.3	<1.0	54	450	5.12
BH01	10/27/2014	1.6	<1.0	9.0	43	4.80
BH01	1/22/2015	2.2	2.4	73.0	690	6.92
BH01	4/20/2015	<1.0	<1.0	<1.0	<1.0	7.49
BH01	7/27/2015	<1.0	<1.0	<1.0	<1.0	4.02
BH01	10/6/2015	1.6	<1.0	56	280	4.67
BH01	1/28/2016	13	1.3	230	1,100	6.68
BH01	4/20/2016	<1.0	<1.0	<1.0	<1.0	6.44
BH01	7/18/2016	<1.0	<1.0	35	130	5.25
BH01	10/11/2016	1.5	<1.0	29	180	0.94
BH01R	1/13/2017	1.1	<1.0	65	2,000	4.47
BH01R	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.15
BH01R	7/31/2017	<1.0	<1.0	<1.0	<2.0	2.04
BH01R	10/27/2017	<1.0	<1.0	<1.0	<2.0	1.20
BH02	1/10/2014	920	4.8	54	2,300	6.98
BH02	4/29/2014	180	<1.0	67	370	7.13
BH02	7/29/2014	27	<1.0	8.0	49	5.07
BH02	10/27/2014	65	<1.0	20	140	4.42
BH02	1/22/2015	14	<1.0	8.8	65	6.20
BH02	4/20/2015	<1.0	<1.0	<1.0	13	5.44
BH02	7/27/2015	1.5	<1.0	1.0	8.3	4.42
BH02	10/6/2015	19	<1.0	1.8	13	4.74
BH02	1/28/2016	1.7	<1.0	<1.0	11	6.79
BH02	4/20/2016	<1.0	<1.0	<1.0	<1.0	6.18
BH02	7/18/2016	15	<1.0	<1.0	2.8	5.18
BH02	10/11/2016	3.4	<1.0	<1.0	<1.0	1.66
BH02R	1/13/2017	72	<1.0	100	430	4.24
BH02R	4/25/2017	82	<1.0	22	290	3.95
BH02R	7/31/2017	<1.0	<1.0	<1.0	<2.0	0.69

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Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH02R	10/27/2017	1.4	<1.0	<1.0	<2.0	1.05
BH03	1/10/2014	1.1	1.1	15	240	7.08
BH03	4/29/2014	<1.0	<1.0	2.0	22	7.37
BH03	7/29/2014	<1.0	<1.0	<1.0	3.9	4.59
BH03	10/27/2014	<1.0	<1.0	<1.0	<1.0	4.42
BH03	1/22/2015	<1.0	<1.0	<1.0	<1.0	6.58
BH03	4/20/2015	<1.0	<1.0	<1.0	<1.0	7.14
BH03	7/27/2015	<1.0	<1.0	<1.0	<1.0	4.00
BH03	10/6/2015	<1.0	<1.0	<1.0	<1.0	4.53
BH03	1/28/2016	<1.0	<1.0	<1.0	<1.0	6.61
BH03	4/20/2016	<1.0	<1.0	<1.0	<1.0	6.35
BH03	7/18/2016	<1.0	<1.0	<1.0	<1.0	5.11
BH03	10/11/2016	<1.0	<1.0	<1.0	<1.0	1.59
BH03	1/13/2017	<1.0	<1.0	<1.0	<1.0	4.48
BH03	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.16
BH03	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.52
BH03	10/27/2017	<1.0	<1.0	<1.0	<2.0	1.17
BH04	1/10/2014	12,000	7,600	940	14,000	4.35
BH04	4/29/2014	150	1.4	33	330	4.64
BH04	7/29/2014	110	4.0	4.8	31	2.03
BH04	10/27/2014	NS	NS	NS	NS	NM
BH04	1/22/2015	9.5	<1.0	24	320	6.63
BH04	4/20/2015	NS	NS	NS	NS	7.09
BH04	7/27/2015	80	<1.0	11	270	4.04
BH04	10/6/2015	150	<1.0	5.8	6.2	4.65
BH04	1/28/2016	2.3	<1.0	<1.0	8.9	6.62
BH04	4/20/2016	<1.0	<1.0	<1.0	<1.0	6.11
BH04	7/18/2016	<1.0	<1.0	<1.0	<1.0	4.81
BH04	10/11/2016	100	<1.0	<1.0	<1.0	1.67
BH04	1/13/2017	380	<1.0	<1.0	<1.0	4.47
BH04	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.23
BH04	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.39
BH04	10/27/2017	41	<1.0	<1.0	5.5	1.43

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Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH05	1/10/2014	1,800	240	230	3,100	4.13
BH05	4/29/2014	1.8	<1.0	<1.0	<1.0	4.47
BH05	7/29/2014	<1.0	<1.0	<1.0	<1.0	1.65
BH05	10/27/2014	5.6	<1.0	<1.0	<1.0	1.52
BH05	1/22/2015	<1.0	<1.0	<1.0	<1.0	3.80
BH05	4/20/2015	<1.0	<1.0	<1.0	<1.0	4.41
BH05	7/27/2015	<1.0	<1.0	<1.0	<1.0	1.30
BH05	10/6/2015	<1.0	<1.0	<1.0	<1.0	1.83
BH05	1/28/2016	180	<1.0	10	64	3.84
BH05	4/20/2016	<1.0	<1.0	<1.0	<1.0	3.67
BH05	7/18/2016	<1.0	<1.0	<1.0	<1.0	2.75
BH05	10/11/2016	<1.0	<1.0	<1.0	<1.0	1.76
BH05	1/13/2017	<1.0	<1.0	<1.0	<1.0	4.58
BH05	4/17/2017	<1.0	<1.0	<1.0	12	5.27
BH05	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.77
BH05	10/27/2017	<1.0	<1.0	1.7	98	1.33
BH06	1/10/2014	<1.0	<1.0	<1.0	<1.0	4.63
BH06	4/29/2014	<1.0	<1.0	<1.0	<1.0	4.66
BH06	7/29/2014	1.3	<1.0	<1.0	<1.0	2.07
BH06	10/27/2014	<1.0	<1.0	<1.0	<1.0	1.95
BH06	1/22/2015	<1.0	<1.0	<1.0	<1.0	3.83
BH06	4/20/2015	<1.0	<1.0	<1.0	<1.0	4.46
BH06	7/27/2015	<1.0	<1.0	<1.0	<1.0	1.35
BH06	10/6/2015	2.2	<1.0	<1.0	<1.0	1.84
BH06	1/28/2016	<1.0	<1.0	<1.0	<1.0	3.88
BH06	4/20/2016	<1.0	<1.0	<1.0	<1.0	3.72
BH06	7/18/2016	<1.0	<1.0	<1.0	<1.0	2.48
BH06	10/11/2016	<1.0	<1.0	<1.0	<1.0	1.90
BH06	1/13/2017	<1.0	1.2	<1.0	260	4.73
BH06	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.38
BH06	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.99
BH06	10/27/2017	<1.0	<1.0	<1.0	<2.0	1.49
BH07	4/29/2014	<1.0	<1.0	<1.0	<1.0	5.51

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Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH07	7/29/2014	<1.0	<1.0	<1.0	<1.0	2.90
BH07	10/27/2014	<1.0	<1.0	<1.0	<1.0	2.73
BH07	1/22/2015	<1.0	<1.0	<1.0	<1.0	4.63
BH07	4/20/2015	<1.0	<1.0	<1.0	<1.0	5.44
BH07	7/27/2015	<1.0	<1.0	<1.0	<1.0	2.36
BH07	10/6/2015	<1.0	<1.0	<1.0	<1.0	2.83
BH07	1/28/2016	<1.0	<1.0	<1.0	<1.0	4.20
BH07	4/20/2016	<1.0	<1.0	<1.0	<1.0	3.96
BH07	7/18/2016	<1.0	<1.0	<1.0	<1.0	2.72
BH07	10/11/2016	<1.0	<1.0	<1.0	<1.0	1.98
BH07	1/13/2017	<1.0	<1.0	<1.0	<1.0	4.79
BH07	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.50
BH07	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.99
BH07	10/27/2017	<1.0	<1.0	<1.0	<2.0	1.53
BH08	4/29/2014	<1.0	<1.0	<1.0	<1.0	7.38
BH08	7/29/2014	<1.0	<1.0	<1.0	<1.0	3.78
BH08	10/27/2014	<1.0	<1.0	<1.0	<1.0	3.04
BH08	1/22/2015	<1.0	<1.0	<1.0	<1.0	5.51
BH08	4/20/2015	<1.0	<1.0	<1.0	<1.0	6.31
BH08	7/27/2015	<1.0	<1.0	<1.0	<1.0	3.24
BH08	10/6/2015	<1.0	<1.0	<1.0	<1.0	3.71
BH08	1/28/2016	<1.0	<1.0	<1.0	<1.0	5.72
BH08	4/20/2016	<1.0	<1.0	<1.0	<1.0	5.54
BH08	7/18/2016	<1.0	<1.0	<1.0	<1.0	4.35
BH08 ⁽³⁾	10/11/2016	<1.0	<1.0	<1.0	<1.0	1.78
BH08R	1/13/2017	<1.0	<1.0	<1.0	<1.0	4.62
BH08R	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.37
BH08R	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.84
BH08R	10/27/2017	<1.0	<1.0	<1.0	<2.0	1.41
BH09	4/29/2014	<1.0	<1.0	<1.0	<1.0	4.59
BH09	7/29/2014	<1.0	<1.0	<1.0	<1.0	2.00
BH09	10/27/2014	<1.0	<1.0	<1.0	<1.0	1.85
BH09	1/22/2015	<1.0	<1.0	<1.0	<1.0	3.76

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Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH09	4/20/2015	<1.0	<1.0	<1.0	<1.0	4.53
BH09	7/27/2015	<1.0	<1.0	<1.0	<1.0	1.43
BH09	10/6/2015	<1.0	<1.0	<1.0	<1.0	2.01
BH09	1/28/2016	<1.0	<1.0	<1.0	<1.0	3.96
BH09	4/20/2016	<1.0	<1.0	<1.0	<1.0	3.80
BH09	7/18/2016	<1.0	<1.0	<1.0	<1.0	2.53
BH09	10/11/2016	<1.0	<1.0	<1.0	<1.0	1.84
BH09	1/13/2017	<1.0	<1.0	<1.0	<1.0	4.68
BH09	4/17/2017	<1.0	<1.0	<1.0	<2.0	5.32
BH09	7/31/2017	<1.0	<1.0	<1.0	<2.0	1.82
BH09	10/27/2017	<1.0	<1.0	<1.0	<2.0	1.37

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.
2. Depth to water measurements collected prior to fourth quarter 2016 were measured from top of casing or ground surface for monitoring well samples and excavation samples, respectively. Subsequent monitoring well measurements were collected from top of casing and adjusted using survey data and product thickness to reflect depth of water from ground surface.
3. BH08 fourth quarter 2016 depth to water was measured from top of casing.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

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

NS = Not sampled

NM = Not measured

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

TABLE 2
JERKE UP 8-7 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
First Quarter 2014						
1/30/2014	BH01, BH02, BH04,	6	90	BH01, BH02, BH04,	10	36
2/25/2014	BH05	5	0	BH05	10	8.3
Quarterly Totals		11	90		-	-
Second Quarter 2014						
4/7/2014	BH01, BH02, BH04, BH05	6	120	BH01, BH02, BH04, BH05	10	36.7
4/21/2014	BH01, BH02, BH03, BH04, BH05	6.5	120	BH01, BH02, BH03, BH04, BH05	20	28.4
5/9/2014		8	90		20	35
5/23/2014		6	20		20	24.2
6/9/2014		6	20		20	20
Quarterly Totals		32.5	370		-	-
Third Quarter 2014						
7/2/2014	BH01, BH02, BH03, BH04, BH05	7	150	BH01, BH02, BH03, BH04, BH05	25	42
7/18/2014		6	0		15	13.4
9/25/2014		6	100		20	20
Quarterly Totals		19	250		-	-
Fourth Quarter 2014						
10/17/2014	BH01, BH02, BH03, BH05	6	225	BH01, BH02, BH03, BH05	15	17.5
11/3/2014	BH01, BH02, BH03, BH04, BH05	6	50	BH01, BH02, BH03, BH04, BH05	20	30
11/18/2014		6	80		20	30
12/7/2014		6	100		20	31.2
12/20/2014		6	75		20	26
Quarterly Totals		30	530		-	-
First Quarter 2015						
1/9/2015	BH01, BH02, BH03, BH04, BH05	6	0	BH01, BH02, BH03, BH04, BH05	20	25
1/26/2015		6	0		20	25
2/8/2015		6	30		25	35
3/6/2015		6	36		20	27
3/17/2015		6	100		20	35
Quarterly Totals		30	166		-	-

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Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
Second Quarter 2015						
4/6/2015	BH01, BH02, BH03, BH04, BH05	6	10	BH01, BH02, BH03, BH04, BH05	20	28.6
4/13/2015		6	30		20	20.8
4/30/2015		6	0		20	19
5/14/2015		6	80		20	21.2
5/28/2015		6	15		20	27
6/11/2015	BH02, BH03, BH04, BH05	6	40	BH02, BH03, BH04, BH05	20	27.5
6/22/2015	BH01, BH02, BH03, BH04, BH05	6	35	BH01, BH02, BH03, BH04, BH05	20	22.8
Quarterly Totals		42	210		-	-
Third Quarter 2015						
7/9/2015	BH01, BH02, BH03, BH04, BH05	6	184	BH01, BH02, BH03, BH04, BH05	20	22
7/23/2015		6	45		20	29
8/6/2015	BH02, BH03, BH04, BH05	6	30	BH02, BH03, BH04, BH05	20	27.5
8/20/2015	BH01, BH02, BH03, BH04, BH05	6	80	BH01, BH02, BH03, BH04, BH05	20	21.3
Quarterly Totals		24	339		-	-
Fourth Quarter 2015						
10/13/2015	BH01, BH02, BH03, BH04, BH05	6	42	BH03, BH04, BH05	20	23.3
10/27/2015		6	80	BH01, BH02, BH03, BH04, BH05	20	25
11/9/2015	BH01, BH02, BH03, BH05	6	150	BH04	20	35
11/24/2015	BH01, BH02, BH03, BH04, BH05	6	92	BH02, BH04	20	27.5
12/7/2015		6	184		20	27.5
Quarterly Totals		30	548		-	-

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Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
First Quarter 2016						
1/7/2016	BH01, BH02, BH03, BH04, BH05	6	90	BH02, BH04	20	25
1/26/2016		6	80		20	32.5
1/30/2016	BH01, BH02, BH03, BH05	6	160	None	0	0
2/17/2016	BH01, BH02, BH03, BH04, BH05	6	84	BH02, BH04	20	27.5
3/1/2016	BH01, BH02, BH03, BH04, BH05, Pipe	6	80		20	25
3/17/2016		6	350		25	30
Quarterly Totals		36	844		-	-
Second Quarter 2016						
4/1/2016	BH01, BH02, BH03, BH04, BH05, Pipe	6	240	BH02, BH04	20	40.5
4/15/2016	BH01, BH02, BH03, BH07, Pipe	6	80	BH01, BH02, BH03, BH04, BH05, BH07	20	25
4/28/2016		6	80		20	28.8
5/12/2016		6	45		15	21.9
5/25/2016		6	84		20	30.8
6/9/2016		6	42		20	25.8
6/22/2016		6	92		20	25
Quarterly Totals		42	663		-	-
Third Quarter 2016						
7/7/2016	BH01, BH02, BH03, BH07, Pipe	6	84	BH01, BH02, BH03, BH04, BH05, BH07	15	13
7/20/2016		6	135		17.5	15
8/21/2016		6	80		20	20
8/31/2016		6	42		20	33
9/28/2016		6	152		20	30
Quarterly Totals		30	493			-

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Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
Fourth Quarter 2016						
10/13/2016	BH01, BH02, BH03, BH07, Pipe	6	276	BH01, BH02, BH03, BH04, BH05, BH07	20	25
10/26/2016	BH01, BH02, BH03	6	84	BH01, BH02, BH03, BH04, BH05	20	20
11/9/2016	BH01, BH02, BH03, BH07, Pipe	6	126	BH01, BH02, BH04, BH05, BH07	20	20
12/11/2016		6	100	BH01, BH02, BH03, BH04, BH05, BH07	20	25
Quarterly Totals		24	586		-	-
First Quarter 2017						
1/19/2017	BH01, BH02, BH03, BH07, Pipe	6	140	BH01, BH02, BH03, BH04, BH05, BH07	20	23
2/16/2017	BH02, BH03, BH05, Pipe	6	80	BH01, BH02, BH03, BH04, BH06	20	25
3/1/2017		6	2		20	10
3/14/2017		6	42		20	10
3/31/2017		6	70		20	25
Quarterly Totals		30	334		-	-
Second Quarter 2017						
4/11/2017	BH02, BH03, BH05, Pipe	6	42	BH01, BH02, BH03, BH04, BH06	20	15
4/26/2017		6	10		20	15
5/24/2017		6	15		20	15
6/7/2017		6	84		20	10
6/21/2017		5.5	84		20	15
Quarterly Totals		29.5	235		-	-
Third Quarter 2017						
7/5/2017	BH02, BH03, BH05, Pipe	6	65	BH01, BH02, BH04, BH06	50	9
7/17/2017		6	70	BH01, BH02, BH03, BH04, BH06	20	15
8/2/2017		6	147		15	10
8/16/2017	BH02R, BH03, BH05, Pipe	6	84	BH01R, BH02R, BH03, BH04, BH06	15	15
9/13/2017		6	30		15	17.5
9/27/2017		6	42		20	20.0
Quarterly Totals		36	438		-	-
Fourth Quarter 2017						
10/24/2017	BH02R, BH03, BH05, Pipe	6	84	BH01R, BH02R, BH03, BH04, BH06R	15	12
11/8/2017		6	100		20	20
11/21/2017		6	80		20	15
12/5/2017		6	110		20	16.8
12/20/2017	BH03, BH05, Pipe	6	42		15	12.4
Quarterly Totals		30	416		-	-

TABLE 2
JERKE UP 8-7 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
------	-----------	-------------------------------------	-------------------------------------	----------	---------------------------------	-----------------------------------

Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

cfm = Cubic feet per minute

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

November 01, 2017

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Jerke Up 8-7

Enclosed are the results of analyses for samples received by Summit Scientific on 10/27/17 17:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Shrewsbury', with a stylized, cursive script.

Paul Shrewsbury For Ben Shrewsbury
Laboratory Manager



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

Project: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01R	1710308-01	Water	10/27/17 10:40	10/27/17 17:00
BH02R	1710308-02	Water	10/27/17 11:00	10/27/17 17:00
BH03	1710308-03	Water	10/27/17 10:35	10/27/17 17:00
BH04	1710308-04	Water	10/27/17 10:50	10/27/17 17:00
BH05	1710308-05	Water	10/27/17 10:55	10/27/17 17:00
BH06	1710308-06	Water	10/27/17 11:05	10/27/17 17:00
BH07	1710308-07	Water	10/27/17 10:45	10/27/17 17:00
BH08R	1710308-08	Water	10/27/17 10:30	10/27/17 17:00
BH09	1710308-09	Water	10/27/17 11:05	10/27/17 17:00

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.

Summit Scientific

1710308

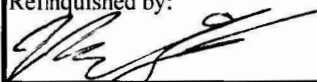
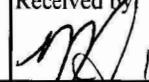
741 Corporate Circle Suite I ♦ Golden, Colorado 80401
303-277-9310 ♦ 303-374-5933 Fax

Page 1 of 1

Client: PDC/Tasman
Address: 6899 N. Pecos St.
City/State/Zip: Denver, CO 80221
Phone: 9704816909 Fax: _____
Sampler Name: Max Garza

Project Manager: ~~Christine Hamlin~~ Christine Hamlin
E-Mail: ~~christine.hamlin@tasman-geo.com~~ chamlin@tasman-geo.com
Project Name: Jerke VP 8-7
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)	BTEX															
BH01R	10/27/2017	1040	3			X		X				X															
BH02R		1100																									
BH03		1035																									
BH04		1050																									
BH05		1055																									
BH06		1105																									
BH07		1045																									
BH08R		1030																									
BH09		1105																									

Relinquished by: 	Date/Time: <u>10/27/2017 1700</u>	Received by: 	Date/Time: <u>10/27/17 1700</u>	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"/> Sample Integrity: Temperature Upon Receipt: <u>4.6°C</u> Intact: Yes <input checked="" type="checkbox"/> No <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:		

1710308

Sample Receipt Checklist

S2 Work Order: _____

Client: PDC/TasmanClient Project ID: Jerke 48-7Shipped Via: FV

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Airbill #: _____

Matrix (check all that apply): ☐ Air ☐ Soil/Solid ☒ Water ☐ Other: _____
(Describe)

Cooler ID					
Temp (°C)	4.6				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ?				
NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	✓			
Were all samples received intact ⁽¹⁾ ?	✓			
Was adequate sample volume provided ⁽¹⁾ ?	✓			
If custody seals are present, are they intact ⁽¹⁾ ?				
Are short holding time analytes or samples with HTs due within 48 hours present?			✓	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?			✓	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	✓			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	✓			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	✓			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		✓		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?				
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			✓	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?			✓	
Record the pH in Comments.			✓	
If dissolved metals are requested, were samples field filtered?			✓	
Additional Comments (if any):				

⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.Custodian Printed Name: NakitaSignature or Initials of Custodian: [Signature]Date/Time: 10/27/17 1745



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

Project: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH01R
1710308-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		115 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.5 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH02R
1710308-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	1.4	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		114 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		97.4 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH03
1710308-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		113 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.7 %	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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH04
1710308-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 10:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	41	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	5.5	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 10:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		121 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		102 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		103 %	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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH05
1710308-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 10:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	1.7	1.0	"	"	"	"	"	"	
Xylenes (total)	98	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 10:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		118 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		102 %	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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH06
1710308-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 11:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 11:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		115 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.1 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH07
1710308-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 10:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 10:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		118 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH08R
1710308-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		116 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		100 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

BH09
1710308-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/27/17 11:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710329	10/31/17	10/31/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/27/17 11:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		116 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.2 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

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 1710329 - EPA 5030 Water MS

Blank (1710329-BLK1)

Prepared & Analyzed: 10/30/17

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
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	13.7		"	13.3		103	45-146			

LCS (1710329-BS1)

Prepared & Analyzed: 10/30/17

Benzene	31.9	1.0	ug/l	33.3		95.6	51-132			
Toluene	30.5	1.0	"	33.3		91.5	51-138			
Ethylbenzene	32.3	1.0	"	33.1		97.6	58-146			
m,p-Xylene	60.6	2.0	"	66.5		91.1	57-144			
o-Xylene	30.3	1.0	"	32.7		92.9	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.7		"	13.3		110	37-154			
Surrogate: Toluene-d8	14.9		"	13.3		112	45-149			
Surrogate: 4-Bromofluorobenzene	14.1		"	13.3		106	45-146			

Matrix Spike (1710329-MS1)

Source: 1710307-01

Prepared & Analyzed: 10/30/17

Benzene	35.7	1.0	ug/l	33.3	ND	107	34-141			
Toluene	33.8	1.0	"	33.3	ND	101	27-151			
Ethylbenzene	38.5	1.0	"	33.1	ND	116	29-160			
m,p-Xylene	72.5	2.0	"	66.5	ND	109	20-166			
o-Xylene	36.2	1.0	"	32.7	ND	111	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.8		"	13.3		111	37-154			
Surrogate: Toluene-d8	13.9		"	13.3		105	45-149			
Surrogate: 4-Bromofluorobenzene	13.8		"	13.3		104	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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

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 1710329 - EPA 5030 Water MS

Matrix Spike Dup (1710329-MSD1)	Source: 1710307-01			Prepared & Analyzed: 10/30/17						
Benzene	38.1	1.0	ug/l	33.3	ND	114	34-141	6.37	32	
Toluene	36.4	1.0	"	33.3	ND	109	27-151	7.51	25	
Ethylbenzene	42.6	1.0	"	33.1	ND	129	29-160	10.2	50	
m,p-Xylene	80.2	2.0	"	66.5	ND	121	20-166	10.1	36	
o-Xylene	40.2	1.0	"	32.7	ND	123	33-159	10.6	26	
Surrogate: 1,2-Dichloroethane-d4	15.5		"	13.3		117	37-154			
Surrogate: Toluene-d8	13.5		"	13.3		101	45-149			
Surrogate: 4-Bromofluorobenzene	14.1		"	13.3		106	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: Jerke Up 8-7
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/01/17 10:24

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