

March 1, 2016

Mr. Rick Allison, P.G.  
Environmental Protection Specialist, Northeast Region  
Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, CO 80203

**Re: 2015 Annual Groundwater Monitoring Report  
Cottonwood #1 Tank Battery  
NESE Section 13 T6N R66W  
Weld County, Colorado  
Facility #: 322644  
Spill Tracking #: 2315752  
Remediation #: 9319**

Dear Mr. Allison,

On behalf of PDC Energy, Inc. (PDC), Tasman Geosciences, Inc. (Tasman) is submitting this 2015 Annual Groundwater Monitoring Report for quarterly groundwater monitoring activities conducted at the Cottonwood #1 tank battery (Site). This report documents the results of groundwater gauging, groundwater sampling, and remediation activities conducted at the Site during 2015. As per discussions with COGCC staff, PDC is providing this summary annual report to assist in updating the COGCC on the progress and status of this open remediation Site.

A historic release was discovered at the Site on August 17, 2012, during produced water vault and dump line replacement activities. Following excavation and well installation activities, groundwater monitoring was initiated during the third quarter 2012. The monitoring well network at the Site consists of 7 monitoring and remediation wells (BH01 - BH07), as shown in Figure 1. Historic groundwater monitoring results are presented in Table 1. Groundwater monitoring results for 2015 are summarized below.

Sampling Event	Wells Exceeding COGCC Standards	Maximum Benzene Concentration (µg/L)
1Q 2015	BH02, BH03	47
2Q 2015	BH02, BH03	35
3Q 2015	BH02, BH03	80
4Q 2015	BH02	9.5

Tasman initiated enhanced fluid recovery (EFR) and air sparge (AS) events at the site during the fourth quarter 2012. EFR/AS will remain the selected remediation strategy for this site through the first quarter 2016. Following the completion of remediation activities, four additional quarters of compliance groundwater monitoring will be conducted to confirm that BTEX concentrations remain below applicable COGCC Table 910-1 groundwater standards.








Please contact me at (720) 409-8791 if you have any questions regarding this report.

Sincerely,



Christine Wasko  
Project Manager  
Tasman Geosciences, Inc.



DRAWN BY: ESS	<b>Facility Diagram</b> PDC Energy, Inc. – DJ Basin Cottonwood #1 Tank Battery NESE S13 T6N R66W Weld County, CO	 <b>TASMAN</b> GEOSCIENCES	<b>LEGEND</b>  Excavation Extent  Monitoring Well Location  Remediation EFR Well Location  Excavation Groundwater Sample  Excavation Surface Water Sample  Point of Release	<b>FIGURE 1</b> GROUNDWATER MONITORING SITE MAP
DATE: 2/16/2016				

All locations are approximate unless otherwise noted

**TABLE 1**  
**COTTONWOOD #1 TANK BATTERY**  
**SURFACE WATER AND 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 <sup>(2)</sup> (feet)
<b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
SW01	8/20/2012	<1.0	<1.0	<1.0	<1.0	NM
GW01	8/21/2012	<b>3,000</b>	1.7	320	<b>1,900</b>	~ 14
BH01	9/24/2012	<b>160</b>	<1.0	40	<1.0	16.31
BH01	12/20/2012	<b>5.0</b>	<1.0	<1.0	6.8	16.13
BH01	3/18/2013	<1.0	<1.0	<1.0	<1.0	16.58
BH01	6/20/2013	<1.0	<1.0	<1.0	<1.0	11.16
BH01	9/25/2013	<1.0	<1.0	<1.0	<1.0	13.61
BH01	12/30/2013	1.8	<1.0	<1.0	<1.0	14.38
BH01	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.03
BH01	6/24/2014	<1.0	<1.0	<1.0	<1.0	11.79
BH01	9/24/2014	<1.0	<1.0	<1.0	<1.0	12.48
BH01	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.16
BH01	3/26/2015	<1.0	<1.0	<1.0	<1.0	12.60
BH01	6/16/2015	<1.0	<1.0	<1.0	<1.0	11.33
BH01	9/28/2015	<1.0	<1.0	<1.0	<1.0	11.31
BH01	12/17/2015	3.8	<1.0	<1.0	<1.0	11.99
BH02	9/24/2012	<b>1,300</b>	<1.0	190	1,100	18.42
BH02	12/20/2012	<b>24</b>	<1.0	3.9	8.1	17.35
BH02	3/18/2013	<b>18</b>	<1.0	<1.0	<1.0	17.80
BH02	6/20/2013	<b>15</b>	<1.0	<1.0	<1.0	12.58
BH02	9/25/2013	<b>8.6</b>	<1.0	<1.0	<1.0	14.68
BH02	12/30/2013	<b>16</b>	<1.0	<1.0	<1.0	15.44
BH02	3/28/2014	<1.0	<1.0	<1.0	<1.0	15.15
BH02	6/24/2014	<b>14</b>	<1.0	1.6	<1.0	12.94
BH02	9/24/2014	<b>59</b>	<1.0	2.5	2.7	13.28
BH02	12/17/2014	<b>29</b>	<1.0	<1.0	<1.0	14.19
BH02	3/26/2015	<b>47</b>	<1.0	2.5	<1.0	13.65
BH02	6/16/2015	<b>35</b>	<1.0	<1.0	<1.0	12.55
BH02	9/28/2015	<b>80</b>	<1.0	2.2	<1.0	12.27
BH02	12/17/2015	<b>9.5</b>	<1.0	<1.0	<1.0	13.01
BH03	9/24/2012	<b>350</b>	<1.0	120	300	18.28
BH03	12/20/2012	<b>15</b>	<1.0	6.7	7.9	17.04

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<b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
BH03	3/18/2013	14	<1.0	1.5	<1.0	17.46
BH03	6/20/2013	11	<1.0	2.1	<1.0	12.01
BH03	9/25/2013	39	<1.0	16	<1.0	14.26
BH03	12/30/2013	48	<1.0	3.6	<1.0	15.02
BH03	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.79
BH03	6/24/2014	13	<1.0	1.2	<1.0	12.43
BH03	9/24/2014	45	<1.0	1.8	3.0	12.91
BH03	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.72
BH03	3/26/2015	8.0	<1.0	<1.0	<1.0	13.24
BH03	6/16/2015	19	<1.0	<1.0	<1.0	12.03
BH03	9/28/2015	7.7	<1.0	<1.0	<1.0	11.82
BH03	12/17/2015	2.0	<1.0	<1.0	<1.0	12.61
BH04	9/24/2012	150	<1.0	96	400	16.58
BH04	12/20/2012	38	<1.0	40	170	13.95
BH04	3/18/2013	2.6	<1.0	<1.0	<1.0	14.38
BH04	6/20/2013	1.3	<1.0	5.4	19	8.70
BH04	9/25/2013	1.5	<1.0	2.5	<1.0	11.32
BH04	12/30/2013	<1.0	<1.0	<1.0	<1.0	12.12
BH04	3/28/2014	<1.0	<1.0	<1.0	<1.0	11.80
BH04	6/24/2014	<1.0	<1.0	2.2	<1.0	9.43
BH04	9/24/2014	<1.0	<1.0	1.2	3.1	10.22
BH04	12/17/2014	<1.0	<1.0	<1.0	<1.0	10.96
BH04	3/26/2015	<1.0	<1.0	<1.0	<1.0	10.40
BH04	6/16/2015	1.8	<1.0	3.8	<1.0	9.09
BH04	9/28/2015	<1.0	<1.0	<1.0	<1.0	9.07
BH04	12/17/2015	<1.0	<1.0	<1.0	<1.0	9.81
BH05	9/24/2012	<1.0	<1.0	<1.0	<1.0	15.42
BH05	12/20/2012	<1.0	<1.0	<1.0	<1.0	16.86
BH05	3/18/2013	<1.0	<1.0	<1.0	<1.0	17.31
BH05	6/20/2013	<1.0	<1.0	<1.0	<1.0	11.42
BH05	9/25/2013	<1.0	<1.0	<1.0	<1.0	14.02
BH05	12/30/2013	<1.0	<1.0	<1.0	<1.0	14.80

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BH05	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.45
BH05	6/24/2014	<1.0	<1.0	<1.0	<1.0	12.00
BH05	9/24/2014	<1.0	<1.0	<1.0	<1.0	12.93
BH05	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.69
BH05	3/26/2015	<1.0	<1.0	<1.0	<1.0	13.30
BH05	6/16/2015	<1.0	<1.0	<1.0	<1.0	11.96
BH05	9/28/2015	<1.0	<1.0	<1.0	<1.0	11.98
BH05	12/17/2015	<1.0	<1.0	<1.0	<1.0	12.73
BH06	9/24/2012	6.7	18	7.5	50	15.35
BH06	12/20/2012	<1.0	<1.0	<1.0	<1.0	16.79
BH06	3/18/2013	3.6	1.2	<1.0	<1.0	14.74
BH06	6/20/2013	<1.0	<1.0	<1.0	<1.0	11.72
BH06	9/25/2013	1.9	<1.0	<1.0	<1.0	14.05
BH06	12/30/2013	<1.0	<1.0	<1.0	<1.0	15.12
BH06	3/28/2014	<1.0	<1.0	<1.0	<1.0	14.78
BH06	6/24/2014	<1.0	<1.0	<1.0	<1.0	12.52
BH06	9/24/2014	<1.0	<1.0	<1.0	<1.0	13.26
BH06	12/17/2014	<1.0	<1.0	<1.0	<1.0	13.94
BH06	3/26/2015	<1.0	<1.0	<1.0	<1.0	13.45
BH06	6/16/2015	<1.0	<1.0	<1.0	<1.0	12.28
BH06	9/28/2015	<1.0	<1.0	<1.0	<1.0	12.09
BH06	12/17/2015	<1.0	<1.0	<1.0	<1.0	12.78
BH07	9/24/2012	<1.0	<1.0	<1.0	<1.0	16.86
BH07	12/20/2012	<1.0	<1.0	<1.0	<1.0	18.32
BH07	3/18/2013	<1.0	<1.0	<1.0	<1.0	18.77
BH07	6/20/2013	1.6	<1.0	<1.0	<1.0	13.70
BH07	9/25/2013	<1.0	<1.0	<1.0	<1.0	15.95
BH07	12/30/2013	<1.0	<1.0	<1.0	<1.0	16.68
BH07	3/28/2014	<1.0	<1.0	<1.0	<1.0	16.39
BH07	6/24/2014	<1.0	<1.0	<1.0	<1.0	14.30
BH07	9/24/2014	<1.0	<1.0	<1.0	<1.0	14.84
BH07	12/17/2014	<1.0	<1.0	<1.0	<1.0	15.46

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BH07	3/26/2015	<1.0	1.2	<1.0	<1.0	14.93
BH07	6/16/2015	<1.0	<1.0	<1.0	<1.0	13.71
BH07	9/28/2015	<1.0	<1.0	<1.0	<1.0	13.38
BH07	12/17/2015	<1.0	<1.0	<1.0	<1.0	14.03

**Notes:**

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

COGCC = Colorado Oil and Gas Conservation Commission

2. Depth to water measured from top of well casing or ground surface for monitoring well samples and excavation samples, respectively.

µg/L = Micrograms per liter

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

NM = Not measured

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