

January 4, 2016

Mr. Randall Ferguson  
EHS Senior Compliance Specialist  
PDC Energy, Inc.  
1775 Sherman Street, Suite 3000  
Denver, CO 80203

Re: **Produced Water Vessel Closure Report**  
**Adams 1, Gerry 3 Tank Battery**  
**Facility ID: 319509**  
**NESE S24 T6N R66W**  
**Blanket Remediation #: 9440**

Dear Mr. Ferguson,

On behalf of PDC Energy, Inc. (PDC), Tasman Geosciences, Inc. (Tasman) has prepared this Produced Water Vessel Closure Report (Report) to document environmental sampling activities performed at the above-referenced site. This Report is being submitted under the Form 27 Management Plan for Closure of Produced Water Vessels, which has been assigned Blanket Remediation #9440 by the Colorado Oil and Gas Conservation Commission (COGCC).

A summary of excavation and environmental sampling activities is provided below.

#### **Site Assessment Activities**

On May 8, 2015, confirmation sampling activities were completed following the removal of the partially buried concrete produced water vessel. Soil encountered in the excavation area was field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). One soil sample (SS01) was collected below the former vessel location at approximately 7 feet below ground surface (bgs). The sample was submitted to Summit Scientific Laboratories in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, and total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by Environmental Protection Agency (EPA) Method 8260B, and TPH - diesel range organics (DRO) by EPA Method 8015.

Analytical results indicated constituent concentrations in soil sample SS01 were below COGCC Table 910-1 soil standards.

The excavation extent and soil sample location are illustrated on Figure 1. Soil analytical data is summarized in Table 1 and the laboratory analytical report is provided in Attachment A.

#### **Conclusions**

Based on the soil analytical data described herein, petroleum hydrocarbon impacts were not encountered during the removal of the produced water vessel. Consequently, no further site investigation is recommended at this time.

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

Sincerely,

A handwritten signature in blue ink that reads "Christine Wasko".

Christine Wasko  
Project Manager  
Tasman Geosciences, Inc.

**Enclosures:**

Figure 1 – Soil Sample Location Map  
Table 1 – Soil Analytical Results Summary Table  
Attachment A – Laboratory Analytical Report



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

DRAWN BY: RJB  
DATE: 11/2/2015

**Facility Diagram**  
PDC Energy – DJ Basin  
Adams 1, Gerry 3 Tank Battery  
NESE S24 T6N R66W  
Weld County, CO

 **TASMAN** GEOSCIENCES  
6899 Pecos St., Unit C  
Denver, CO 80221

**LEGEND**  
 Excavation Extent  
 Soil Sample Location  
 All locations are approximate unless otherwise noted

**FIGURE 1**  
**SOIL SAMPLE LOCATION MAP**

**TABLE 1**  
**ADAMS 1, GERRY 3 TANK BATTERY**  
**SOIL ANALYTICAL RESULTS SUMMARY TABLE**

Sample ID	Date Sampled	Depth (feet bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Naphthalene (mg/kg)	TPH <sup>(2)</sup> (mg/kg)
<b>COGCC standards for soil (mg/kg) <sup>(1)</sup></b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>23</b>	<b>500</b>
SS01 @ 7'	5/8/2015	7	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50

**Notes:**

1. Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective February 1, 2014.
  2. TPH - Total volatile and extractable petroleum hydrocarbons. Value calculated by adding GRO and DRO concentrations.
- COGCC = Colorado Oil and Gas Conservation Commission  
(<) = Analytical result is less than the indicated laboratory reporting limit.  
GRO = Total volatile petroleum hydrocarbons - gasoline range organics  
DRO = Total extractable petroleum hydrocarbons - diesel range organics  
mg/kg = Milligrams per kilogram  
bgs = Below ground surface  
**BOLD** = Analytical result is in exceedance of COGCC soil standards.

**ATTACHMENT A**

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

May 10, 2015

Mark Longhurst  
PDC Energy  
1775 Sherman St. STE. 3000  
Denver, CO 80203  
RE: Adams 1, Gerry 3

Enclosed are the results of analyses for samples received by Summit Scientific on 05/08/15 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 be 'Ben Shrewsbury', with a long, sweeping horizontal line extending to the right.

Ben Shrewsbury For Paul Shrewsbury  
President



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

Project: Adams 1, Gerry 3

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
05/10/15 15:37

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@7'	1505082-01	Soil	05/08/15 10:30	05/08/15 17:00

# Summit Scientific 1505082

S<sub>2</sub>

741 Corporate Circle, Suite J&K ♦ Golden, Colorado 80401  
303-277-9310 ♦ 303-374-5933

Page 1 of 1

Client: PDC ENERGY Project Manager: MARK LONGHURST  
Address: \_\_\_\_\_ E-Mail: MARK.LONGHURST@PDC.COM  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Project Name: Adams 1; Gerry 3  
Sampler Name: DON BAGIUS Project Number: \_\_\_\_\_

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix			Analysis Requested				Special Instructions	
					HCl	HNO3	None	Other (Specify)	Groundwater	Soil	Air-Canister #	Other (Specify)	BTX	NAP	TPH-DRO/GRO		
1	SS01@7'	5/8/2015	1030	1		X			X			X	X	X			
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Relinquished by: <u>[Signature]</u> Date/Time: <u>5/8/2015</u>	Received by: <u>[Signature]</u> Date/Time: <u>5/8/15 1630</u>	<b>Turn Around Time (Check)</b> Same Day <input type="checkbox"/> 72 hours <input checked="" type="checkbox"/> 24 hours <input type="checkbox"/> Standard <input type="checkbox"/> 48 hours <input type="checkbox"/> <b>Sample Integrity:</b> Temperature Upon Receipt: <u>5.7°C</u> Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Notes:</b> <u>on ice</u>
Relinquished by: <u>[Signature]</u> Date/Time: <u>5/8/15 1700</u>	Received by: <u>[Signature]</u> Date/Time: <u>5/8/1 1700</u>		
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: _____		

www.s2scientific.com

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: Adams 1, Gerry 3

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 05/10/15 15:37

**SS01@7'**  
**1505082-01 (Soil)**

**Summit Scientific**

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **05/08/15 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1505091	05/08/15	05/08/15	8015M	

Date Sampled: **05/08/15 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		103 %	30-150		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **05/08/15 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1505090	05/08/15	05/08/15	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **05/08/15 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		126 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %	21-167		"	"	"	"	

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PDC Energy  
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Project: Adams 1, Gerry 3

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 05/10/15 15:37

**Extractable Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

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

**Batch 1505091 - EPA 3550A**

**Blank (1505091-BLK1)**

Prepared & Analyzed: 05/08/15

C10-C28 (DRO)	ND	50	mg/kg								
<i>Surrogate: o-Terphenyl</i>	13.1		"	12.2		107	30-150				

**LCS (1505091-BS1)**

Prepared & Analyzed: 05/08/15

C10-C28 (DRO)	475	50	mg/kg	501		94.9	73-134				
<i>Surrogate: o-Terphenyl</i>	12.9		"	12.2		106	30-150				

**Matrix Spike (1505091-MS1)**

Source: 1505081-01

Prepared & Analyzed: 05/08/15

C10-C28 (DRO)	429	50	mg/kg	471	8.62	89.3	50-148				
<i>Surrogate: o-Terphenyl</i>	11.9		"	11.5		104	30-150				

**Matrix Spike Dup (1505091-MSD1)**

Source: 1505081-01

Prepared & Analyzed: 05/08/15

C10-C28 (DRO)	433	50	mg/kg	471	8.62	90.0	50-148	0.827		13	
<i>Surrogate: o-Terphenyl</i>	12.1		"	11.5		105	30-150				

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Denver CO, 80203

Project: Adams 1, Gerry 3

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
05/10/15 15:37

**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 1505090 - EPA 5030 Soil MS**

**Blank (1505090-BLK1)**

Prepared & Analyzed: 05/08/15

Naphthalene	ND	0.010	mg/kg							
Benzene	ND	0.0020	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0455</i>		<i>"</i>	<i>0.0396</i>		<i>115</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0405</i>		<i>"</i>	<i>0.0400</i>		<i>101</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0430</i>		<i>"</i>	<i>0.0400</i>		<i>107</i>	<i>21-167</i>			

**LCS (1505090-BS1)**

Prepared & Analyzed: 05/08/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0824	0.0020	"	0.100		82.4	58-130			
Toluene	0.0902	0.0050	"	0.100		90.2	61-134			
Ethylbenzene	0.102	0.0050	"	0.0992		102	74-139			
m,p-Xylene	0.212	0.010	"	0.200		106	73-137			
o-Xylene	0.104	0.0050	"	0.0984		106	73-141			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0475</i>		<i>"</i>	<i>0.0396</i>		<i>120</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0370</i>		<i>"</i>	<i>0.0400</i>		<i>92.6</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0400</i>		<i>"</i>	<i>0.0400</i>		<i>100</i>	<i>21-167</i>			

**Matrix Spike (1505090-MS1)**

Source: 1505081-01

Prepared & Analyzed: 05/08/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0782	0.0020	"	0.0978	ND	79.9	30-131			
Toluene	0.0830	0.0050	"	0.0978	ND	84.8	30-134			
Ethylbenzene	0.0887	0.0050	"	0.0971	ND	91.4	22-153			
m,p-Xylene	0.184	0.010	"	0.195	ND	94.2	10-159			
o-Xylene	0.0911	0.0050	"	0.0963	ND	94.6	31-151			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0444</i>		<i>"</i>	<i>0.0387</i>		<i>115</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0365</i>		<i>"</i>	<i>0.0391</i>		<i>93.1</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0347</i>		<i>"</i>	<i>0.0391</i>		<i>88.7</i>	<i>21-167</i>			

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PDC Energy  
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 Denver CO, 80203

Project: Adams 1, Gerry 3

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 05/10/15 15:37

**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 1505090 - EPA 5030 Soil MS**

<b>Matrix Spike Dup (1505090-MSD1)</b>	<b>Source: 1505081-01</b>			<b>Prepared &amp; Analyzed: 05/08/15</b>						
Naphthalene	ND	0.010	mg/kg	ND	ND	10-158			42	
Benzene	0.0774	0.0020	"	0.0969	ND	79.9	30-131	0.974	34	
Toluene	0.0857	0.0050	"	0.0969	ND	88.5	30-134	3.22	30	
Ethylbenzene	0.0961	0.0050	"	0.0961	ND	100	22-153	8.04	24	
m,p-Xylene	0.202	0.010	"	0.193	ND	104	10-159	9.10	68	
o-Xylene	0.0989	0.0050	"	0.0953	ND	104	31-151	8.25	38	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0474</i>		<i>"</i>	<i>0.0384</i>		<i>123</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0374</i>		<i>"</i>	<i>0.0388</i>		<i>96.6</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0378</i>		<i>"</i>	<i>0.0388</i>		<i>97.4</i>	<i>21-167</i>			

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1775 Sherman St. STE. 3000  
Denver CO, 80203

Project: Adams 1, Gerry 3

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
05/10/15 15:37

### 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

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