

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**  
**Pfenning 43, 44-31 Tank Battery**  
**Facility ID: 332495**  
**SESE S31 T7N R64W**  
**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 June 8, 2015, excavation and sampling activities were completed following the removal of the partially buried 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 produced water vessel location at approximately 6 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 were below COGCC Table 910-1 standards in soil sample SS01.

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 in exceedance of regulatory standards were not encountered during the removal of the produced water vessel. Consequently, no further site investigation is recommended at this time. The facility was decommissioned following site assessment activities.

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'.

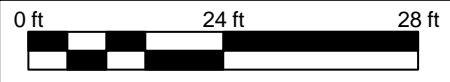
Christine Wasko  
Project Manager  
Tasman Geosciences, Inc.

**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:	MAP
DATE:	12/28/2015

**Facility Diagram**  
 PDC Energy – DJ Basin  
 Pfenning 43, 44-31 Tank Battery  
 SESE S31 T7N R64W  
 Weld County, CO



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

**LEGEND**

-  Excavation Extent
-  Soil Sample Location

All locations are approximate unless otherwise noted

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

**TABLE 1**  
**PFENNING 43, 44-31 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 @ 6'	6/8/2015	6	0.046	0.0094	<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

---

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

June 09, 2015

Mark Longhurst  
PDC Energy  
1775 Sherman St. STE. 3000  
Denver, CO 80203  
RE: Pfenning 43, 44-31

Enclosed are the results of analyses for samples received by Summit Scientific on 06/08/15 17:48. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury For Joseph J Egry IV  
Technical Director



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

Project: Pfenning 43, 44-31

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
06/09/15 06:38

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@6'	1506046-01	Soil	06/08/15 13:40	06/08/15 17:48

# Summit Scientific *1506046*

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/Tasman Project Manager: Mark Longhurst  
 Address: \_\_\_\_\_ E-Mail: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Project Name: Pfenning 43, 44-31  
 Sampler Name: Eric Sigel Project Number: \_\_\_\_\_

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix			Analysis Requested				Special Instructions
					HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air-Canister #	Other (Specify)				
1	SS01@6'	6/8/15	1340	1			X			X			X	X		
2																
3																
4																
5																
6																
7																
8																
9																
10																

Relinquished by: E. A. David Date/Time: 6/8/15 1500 Received by: [Signature] Date/Time: 6/8/15 1500  
 Relinquished by: AO Date/Time: 6/8/15 1748 Received by: [Signature] Date/Time: 6/8 1748  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Turn Around Time (Check)  
 Same Day  72 hours \_\_\_\_\_  
 24 hours \_\_\_\_\_ Standard \_\_\_\_\_  
 48 hours \_\_\_\_\_  
 Sample Integrity: 10.6  
 Temperature Upon Receipt: \_\_\_\_\_  
 Intact:  Yes  No

Notes: From field

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: Pfenning 43, 44-31

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 06/09/15 06:38

**SS01@6'**  
**1506046-01 (Soil)**

**Summit Scientific**

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **06/08/15 13:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1506087	06/08/15	06/08/15	8015M	

Date Sampled: **06/08/15 13:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		104 %	30-150		"	"	"	"	

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

Date Sampled: **06/08/15 13:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1506090	06/08/15	06/08/15	EPA 8260B	
<b>Benzene</b>	<b>0.046</b>	0.0020	"	"	"	"	"	"	
<b>Toluene</b>	<b>0.0094</b>	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **06/08/15 13:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	21-167		"	"	"	"	

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: Pfenning 43, 44-31

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 06/09/15 06:38

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

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

**Batch 1506087 - EPA 3550A**

<b>Blank (1506087-BLK1)</b>				Prepared & Analyzed: 06/08/15						
C10-C28 (DRO)	ND	50	mg/kg							
Surrogate: <i>o</i> -Terphenyl	12.0		"	12.2		98.3	30-150			
<b>LCS (1506087-BS1)</b>				Prepared & Analyzed: 06/08/15						
C10-C28 (DRO)	453	50	mg/kg	501		90.4	73-134			
Surrogate: <i>o</i> -Terphenyl	12.2		"	12.2		100	30-150			
<b>Matrix Spike (1506087-MS1)</b>				<b>Source: 1506037-01</b>		Prepared & Analyzed: 06/08/15				
C10-C28 (DRO)	512	50	mg/kg	465	11.8	108	50-148			
Surrogate: <i>o</i> -Terphenyl	11.5		"	11.3		101	30-150			
<b>Matrix Spike Dup (1506087-MSD1)</b>				<b>Source: 1506037-01</b>		Prepared & Analyzed: 06/08/15				
C10-C28 (DRO)	508	50	mg/kg	471	11.8	105	50-148	0.815	13	
Surrogate: <i>o</i> -Terphenyl	11.3		"	11.5		98.5	30-150			

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: Pfenning 43, 44-31

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
06/09/15 06:38

**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 1506090 - EPA 5030 Soil MS**

**Blank (1506090-BLK1)**

Prepared & Analyzed: 06/08/15

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>0.0427</i>		<i>"</i>	<i>0.0396</i>		<i>108</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0396</i>		<i>"</i>	<i>0.0400</i>		<i>99.1</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0412</i>		<i>"</i>	<i>0.0400</i>		<i>103</i>	<i>21-167</i>			

**LCS (1506090-BS1)**

Prepared & Analyzed: 06/08/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0927	0.0020	"	0.100		92.7	58-130			
Toluene	0.0972	0.0050	"	0.100		97.2	61-134			
Ethylbenzene	0.103	0.0050	"	0.0992		103	74-139			
m,p-Xylene	0.198	0.010	"	0.200		99.0	73-137			
o-Xylene	0.104	0.0050	"	0.0984		106	73-141			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0410</i>		<i>"</i>	<i>0.0396</i>		<i>104</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0438</i>		<i>"</i>	<i>0.0400</i>		<i>109</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0417</i>		<i>"</i>	<i>0.0400</i>		<i>104</i>	<i>21-167</i>			

**Matrix Spike (1506090-MS1)**

Source: 1506046-01

Prepared & Analyzed: 06/08/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.101	0.0020	"	0.0973	0.0463	55.9	30-131			
Toluene	0.107	0.0050	"	0.0973	0.00941	101	30-134			
Ethylbenzene	0.109	0.0050	"	0.0965	ND	113	22-153			
m,p-Xylene	0.214	0.010	"	0.194	ND	110	10-159			
o-Xylene	0.112	0.0050	"	0.0957	ND	117	31-151			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0451</i>		<i>"</i>	<i>0.0385</i>		<i>117</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0416</i>		<i>"</i>	<i>0.0389</i>		<i>107</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0401</i>		<i>"</i>	<i>0.0389</i>		<i>103</i>	<i>21-167</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: Pfenning 43, 44-31

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
06/09/15 06:38

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

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

**Batch 1506090 - EPA 5030 Soil MS**

<b>Matrix Spike Dup (1506090-MSD1)</b>	<b>Source: 1506046-01</b>			<b>Prepared &amp; Analyzed: 06/08/15</b>						
Naphthalene	ND	0.010	mg/kg	ND			10-158		42	
Benzene	0.101	0.0020	"	0.0973	0.0463	56.4	30-131	0.463	34	
Toluene	0.107	0.0050	"	0.0973	0.00941	101	30-134	0.218	30	
Ethylbenzene	0.116	0.0050	"	0.0965	ND	121	22-153	6.25	24	
m,p-Xylene	0.228	0.010	"	0.194	ND	117	10-159	6.00	68	
o-Xylene	0.120	0.0050	"	0.0957	ND	126	31-151	6.70	38	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0467</i>		<i>"</i>	<i>0.0385</i>		<i>121</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0398</i>		<i>"</i>	<i>0.0389</i>		<i>102</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0407</i>		<i>"</i>	<i>0.0389</i>		<i>104</i>	<i>21-167</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: Pfenning 43, 44-31

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
06/09/15 06:38

### 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

---

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.*