

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**
Frick 32-18 Tank Battery
Facility ID: 323110
SWNE S18 T4N 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 December 11, 2015, confirmation 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 vessel location at approximately 4 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, TPH - diesel range organics (DRO) by EPA Method 8015, electrical conductivity (EC), and pH.

Analytical results indicated organic compound concentrations and physical parameters were in compliance with 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 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".

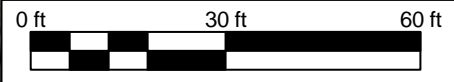
Christine Wasko
Project Manager
Tasman Geosciences, Inc.

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:	12/21/2015

Facility Diagram
 PDC Energy – DJ Basin
 Frick 32-18 Tank Battery
 SWNE S18 T4N 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
FRICK 32-18 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 ⁽²⁾ (mg/kg)	pH (units)	EC (mmhos/cm)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	23	500	6-9	<4
SS01 @ 4'	12/11/2015	4	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	8.19	1.19

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
EC = Electrical conductivity
mmhos/cm = millimhos per centimeter
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

December 13, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Frick 32-18

Enclosed are the results of analyses for samples received by Summit Scientific on 12/11/15 17:00. 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: Frick 32-18

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/13/15 20:13

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@4'	1512099-01	Soil	12/11/15 12:10	12/11/15 17:00

Summit Scientific 1512099

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

Page 1 of 1

Client: PDC Energy
Address: _____
City/State/Zip: _____
Phone: _____ Fax: _____
Sampler Name: *Eric Siegel*

Project Manager: Mark Longhurst
E-Mail: Mark.Longhurst@PDCE.com
Project Name: *Frick 32-18*
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)	pH		EC	SAR (Mod)		
<i>SS01@4'</i>	<i>12/11/15</i>	<i>12:10</i>	<i>1</i>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/> <i>DRO</i>	<input checked="" type="checkbox"/> <i>GBTBW</i>	<input checked="" type="checkbox"/> <i>pH</i>	<input checked="" type="checkbox"/> <i>EC</i>	<input checked="" type="checkbox"/> <i>SAR (Mod)</i>	<i>Hold SAR pending results</i>

Relinquished by: <i>E. A. Aind</i>	Date/Time: <i>12/11/15</i>	Received by: <i>[Signature]</i>	Date/Time: <i>12-11-15 14:00</i>	Turn Around Time (Check) <input checked="" type="checkbox"/> Same Day <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input type="checkbox"/> 72 Hours <input type="checkbox"/> Standard	Notes:
Relinquished by: <i>[Signature]</i>	Date/Time: <i>12-11-15</i>	Received by: <i>[Signature]</i>	Date/Time: <i>17:50</i>		
Relinquished by: _____	Date/Time: _____	Received in Lab by: _____	Date/Time: <i>12-11-15 17:50</i>		

Sample Integrity:
Temperature Upon Receipt: *3.7°C*
Intact: Yes No

www.s2scientific.com

[Signature]



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

Project: Frick 32-18

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/13/15 20:13

SS01@4'
1512099-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 12/11/15 12:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1512114	12/11/15	12/11/15	8015M	

Date Sampled: 12/11/15 12:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		94.4 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 12/11/15 12:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1512113	12/11/15	12/11/15	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: 12/11/15 12:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		85.3 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		92.4 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.3 %	21-167		"	"	"	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 12/11/15 12:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	1.19	0.0100	mmhos/cm	1	1512117	12/11/15	12/11/15	SM 2510B	

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: Frick 32-18

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/13/15 20:13

SS01@4'
1512099-01 (Soil)

Summit Scientific

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **12/11/15 12:10**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
pH	8.19	0.100	pH Units	1	1512116	12/11/15	12/11/15	EPA 9045	

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Project: Frick 32-18

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/13/15 20:13

Extractable Petroleum Hydrocarbons by 8015 - Quality Control
Summit Scientific

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

Batch 1512114 - EPA 3550A

Blank (1512114-BLK1)

Prepared & Analyzed: 12/11/15

C10-C28 (DRO)	ND	50	mg/kg								
<i>Surrogate: o-Terphenyl</i>	11.8		"	12.5		94.3	30-150				

LCS (1512114-BS1)

Prepared & Analyzed: 12/11/15

C10-C28 (DRO)	476	50	mg/kg	499		95.4	73-134				
<i>Surrogate: o-Terphenyl</i>	11.8		"	12.5		94.4	30-150				

Matrix Spike (1512114-MS1)

Source: 1512101-04

Prepared & Analyzed: 12/11/15

C10-C28 (DRO)	436	50	mg/kg	446	29.4	91.3	50-148				
<i>Surrogate: o-Terphenyl</i>	10.6		"	11.2		95.2	30-150				

Matrix Spike Dup (1512114-MSD1)

Source: 1512101-04

Prepared & Analyzed: 12/11/15

C10-C28 (DRO)	432	50	mg/kg	448	29.4	89.9	50-148	0.891	13		
<i>Surrogate: o-Terphenyl</i>	10.6		"	11.2		94.2	30-150				

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Project: Frick 32-18

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/13/15 20:13

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 1512113 - EPA 5030 Soil MS

LCS (1512113-BS1)

Prepared & Analyzed: 12/11/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0941	0.0020	"	0.100		94.1	58-130			
Toluene	0.0928	0.0050	"	0.100		92.8	61-134			
Ethylbenzene	0.105	0.0050	"	0.0992		106	74-139			
m,p-Xylene	0.203	0.010	"	0.200		102	73-137			
o-Xylene	0.0994	0.0050	"	0.0984		101	73-141			
Xylenes (total)	0.303	0.010	"				0-200			
Gasoline Range Hydrocarbons	2.17	0.50	"				30-150			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0328</i>		<i>"</i>	<i>0.0400</i>		<i>82.1</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0374</i>		<i>"</i>	<i>0.0400</i>		<i>93.5</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0357</i>		<i>"</i>	<i>0.0400</i>		<i>89.2</i>	<i>21-167</i>			

Matrix Spike (1512113-MS1)

Source: 1512101-04

Prepared & Analyzed: 12/11/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0864	0.0020	"	0.0923	ND	93.7	30-131			
Toluene	0.0866	0.0050	"	0.0923	ND	93.8	30-134			
Ethylbenzene	0.0992	0.0050	"	0.0915	ND	108	22-153			
m,p-Xylene	0.194	0.010	"	0.184	ND	105	10-159			
o-Xylene	0.0944	0.0050	"	0.0908	ND	104	31-151			
Xylenes (total)	0.288	0.010	"		0.00		30-160			
Gasoline Range Hydrocarbons	2.09	0.50	"		ND		30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0301</i>		<i>"</i>	<i>0.0369</i>		<i>81.4</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0339</i>		<i>"</i>	<i>0.0369</i>		<i>91.9</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0329</i>		<i>"</i>	<i>0.0369</i>		<i>89.2</i>	<i>21-167</i>			

Matrix Spike Dup (1512113-MSD1)

Source: 1512101-04

Prepared & Analyzed: 12/11/15

Naphthalene	ND	0.010	mg/kg		ND		10-158		42	
Benzene	0.0901	0.0020	"	0.0969	ND	93.0	30-131	4.18	34	
Toluene	0.0934	0.0050	"	0.0969	ND	96.4	30-134	7.56	30	
Ethylbenzene	0.105	0.0050	"	0.0961	ND	110	22-153	6.08	24	
m,p-Xylene	0.206	0.010	"	0.193	ND	106	10-159	5.87	68	
o-Xylene	0.0993	0.0050	"	0.0953	ND	104	31-151	5.00	38	
Xylenes (total)	0.305	0.010	"		0.00		30-160	5.58	30	
Gasoline Range Hydrocarbons	2.19	0.50	"		ND		30-160	4.51	30	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0308</i>		<i>"</i>	<i>0.0388</i>		<i>79.3</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0355</i>		<i>"</i>	<i>0.0388</i>		<i>91.5</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0345</i>		<i>"</i>	<i>0.0388</i>		<i>88.9</i>	<i>21-167</i>			

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 Denver CO, 80203

Project: Frick 32-18

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 12/13/15 20:13

Physical Parameters by APHA/ASTM/EPA Methods - Quality Control
Summit Scientific

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

Batch 1512116 - General Preparation

LCS (1512116-BS1)					Prepared & Analyzed: 12/11/15					
pH	6.03	0.100	pH Units	6.00	101	95-105				
Duplicate (1512116-DUP1)					Source: 1512099-01 Prepared & Analyzed: 12/11/15					
pH	8.17	0.100	pH Units	8.19	0.244	20				

Batch 1512117 - General Preparation

Blank (1512117-BLK1)					Prepared & Analyzed: 12/11/15					
Specific Conductance (EC)	ND	0.0100	mmhos/cm							
LCS (1512117-BS1)					Prepared & Analyzed: 12/11/15					
Specific Conductance (EC)	0.979	0.00200	mmhos/cm	1.00	97.9	90-110				
Duplicate (1512117-DUP1)					Source: 1512099-01 Prepared & Analyzed: 12/11/15					
Specific Conductance (EC)	1.19	0.0100	mmhos/cm	1.19	0.378	20				

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

Project: Frick 32-18

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/13/15 20:13

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

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