

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**
Bryce 21-28 & Reis 11-28 Tank Battery
Facility ID: 331679
NESE S30 T4N R67W
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 August 25, 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). Field screening activities indicated that petroleum hydrocarbon impacts in soil were not present on site. Groundwater was encountered in the excavation area at approximately 2 feet below ground surface (bgs). One groundwater sample (GW01) was collected and submitted to Summit Scientific Laboratories in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX).

Analytical results indicated BTEX concentrations were below COGCC Table 910-1 groundwater standards.

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

Conclusions

Based on the groundwater analytical data described herein, petroleum hydrocarbon impacts above regulatory standards 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,



Christine Wasko
Project Manager
Tasman Geosciences, Inc.

Enclosures:

Figure 1 – Sample Location Map

Table 1 – Groundwater 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	Facility Diagram PDC Energy – DJ Basin Bryce 21-28 & Reis 11-28 Tank Battery NENW S28 T2N R64W Weld County, CO	 TASMAN GEOSCIENCES 6899 Pecos St., Unit C Denver, CO 80221	LEGEND  Excavation Extent  Groundwater Sample Location	FIGURE 1 SAMPLE LOCATION MAP
DATE: 12/22/2015			All locations are approximate unless otherwise noted	

TABLE 1
BRYCE 21-28, REIS 11-28 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 (feet bgs)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
GW01	8/25/2015	1.3	1.4	1.8	33	~ 2

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective February 1, 2014.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L= Micrograms per liter

bgs = Below ground surface

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

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

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

August 26, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Bryce 21-28, Reis11-28

Enclosed are the results of analyses for samples received by Summit Scientific on 08/25/15 18:12. 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
President



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

Project: Bryce 21-28, Reis11-28

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
08/26/15 14:46

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GW01	1508184-05	Water	08/25/15 13:00	08/25/15 18:12

Summit Scientific 1508184

S₂

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: Bryce 21-28, Reis 11-28

Sampler Name: Eric Siegel

Project Number:

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix			Analysis Requested							Special Instructions	
					HCl	HNO ₃	None	Other (Specify)	Groundwater	Soil	Air-Canister #	Other (Specify)	BTEX	Naphthalene	GRO	DRO	pH	EC		SAR (Hold)
1	SS01 e1'	8/25/15	11:35	1			X			X				X	X	X	X	X	X	
2	SS02 e1'		11:40	1						X				X	X	X	X	X	X	Hold soil samples pending GW results 24HR TAT on GW01 only
3	SS03 e1'		11:45	1						X				X	X	X	X	X	X	
4	SS04 e1'		11:50	1						X				X	X	X	X	X	X	
5	GW01		13:00	3					X					X						
6																				
7																				
8																				
9																				
10																				

Relinquished by: E.A. Siegel	Date/Time: 8/25/15 14:15	Received by: [Signature]	Date/Time: 8-25-15 14:15	Turn Around Time (Check) Same Day 24 hours 48 hours	72 hours Standard X GW Soil	Notes: Hold SAR analysis pending EC results (if soils run)
Relinquished by: [Signature]	Date/Time: 8-25-15 17:50	Received by: [Signature]	Date/Time: 8/25/15 17:50	Sample Integrity: Temperature Upon Receipt: 38°C	Intact: (Yes) No	
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: Bryce 21-28, Reis11-28
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
08/26/15 14:46

GW01
1508184-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **08/25/15 13:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	1.3	1.0	ug/l	1	1508184	08/25/15	08/25/15	EPA 8260B	
Toluene	1.4	1.0	"	"	"	"	"	"	
Ethylbenzene	1.8	1.0	"	"	"	"	"	"	
Xylenes (total)	33	1.0	"	"	"	"	08/25/15	"	

Date Sampled: **08/25/15 13:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		107 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		101 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.1 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Bryce 21-28, Reis11-28

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
08/26/15 14:46

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 1508184 - EPA 5030 Water MS

Blank (1508184-BLK1)

Prepared & Analyzed: 08/25/15

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	14.0		"	13.2		106	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		98.8	45-149			
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3		102	45-146			

LCS (1508184-BS1)

Prepared & Analyzed: 08/25/15

Benzene	34.6	1.0	ug/l	33.3		104	51-132			
Toluene	30.0	1.0	"	33.3		90.2	51-138			
Ethylbenzene	30.7	1.0	"	33.1		92.9	58-146			
m,p-Xylene	59.5	2.0	"	66.5		89.4	57-144			
o-Xylene	29.8	1.0	"	32.8		90.8	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.2		"	13.2		108	37-154			
Surrogate: Toluene-d8	13.5		"	13.3		101	45-149			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.7	45-146			

Matrix Spike (1508184-MS1)

Source: 1508164-01

Prepared & Analyzed: 08/25/15

Benzene	34.9	1.0	ug/l	33.3	ND	105	34-141			
Toluene	29.8	1.0	"	33.3	ND	89.4	27-151			
Ethylbenzene	31.4	1.0	"	33.1	ND	94.9	29-160			
m,p-Xylene	60.3	2.0	"	66.5	ND	90.7	20-166			
o-Xylene	30.4	1.0	"	32.8	ND	92.7	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.4		"	13.2		109	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		99.2	45-149			
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.3	45-146			

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1775 Sherman St. STE. 3000
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Project: Bryce 21-28, Reis11-28

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
08/26/15 14:46

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 1508184 - EPA 5030 Water MS

Matrix Spike Dup (1508184-MSD1)	Source: 1508164-01			Prepared & Analyzed: 08/25/15						
Benzene	35.1	1.0	ug/l	33.3	ND	105	34-141	0.772	32	
Toluene	29.7	1.0	"	33.3	ND	89.2	27-151	0.235	25	
Ethylbenzene	31.4	1.0	"	33.1	ND	95.0	29-160	0.0956	50	
m,p-Xylene	60.1	2.0	"	66.5	ND	90.3	20-166	0.415	36	
o-Xylene	30.2	1.0	"	32.8	ND	92.2	33-159	0.627	26	
Surrogate: 1,2-Dichloroethane-d4	15.6		"	13.2		118	37-154			
Surrogate: Toluene-d8	13.1		"	13.3		98.3	45-149			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.9	45-146			

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Project: Bryce 21-28, Reis11-28

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
08/26/15 14:46

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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