

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**
Buderus 12, 13-23 Tank Battery
Facility ID: 323091
SW S23 T5N R65W
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 February 26, 2014, 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 5 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. The facility was decommissioned following site assessment activities.

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






DRAWN BY: MAP	Facility Diagram PDC Energy – DJ Basin Buderus 12, 13-23 Tank Battery SW S23 T5N R65W Weld County, CO	 TASMAN GEOSCIENCES 6899 Pecos St., Unit C Denver, CO 80221	LEGEND  Excavation Extent  Soil Sample Location <p style="text-align: right;">All locations are approximate unless otherwise noted</p>	FIGURE 1 SOIL SAMPLE LOCATION MAP
DATE: 12/22/2015				

TABLE 1
BUDERUS 12, 13-23 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)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	23	500
SS01 @ 5'	2/26/2014	5	<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

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

February 26, 2014

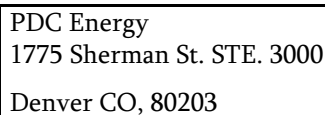
Brandon Bruns
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Buderus 12, 13-23

Enclosed are the results of analyses for samples received by Summit Scientific on 02/26/14 16:45. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to be 'BS' or 'Shrewsbury', written in a cursive style.

Ben Shrewsbury
President / Laboratory Manager



Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/26/14 21:35

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@5'	1402152-01	Soil	02/26/14 08:20	02/26/14 16:45

[illegible]

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: Buderus 12, 13-23

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/26/14 21:35

SS01@5'
1402152-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **02/26/14 08:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1402175	02/26/14	02/26/14	8015M	

Date Sampled: **02/26/14 08:20**

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

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/26/14 08:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1402176	02/26/14	02/26/14	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: **02/26/14 08:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		114 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.5 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.6 %	21-167		"	"	"	"	

Summit Scientific

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Denver CO, 80203

Project: Buderus 12, 13-23

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/26/14 21:35

Extractable Petroleum Hydrocarbons by 8015 - Quality Control
Summit Scientific

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

Batch 1402175 - EPA 3550A

LCS (1402175-BS1)

Prepared & Analyzed: 02/26/14

C10-C28 (DRO)	404	50	mg/kg	481	84.0	73-134
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LCS Dup (1402175-BSD1)

Prepared & Analyzed: 02/26/14

C10-C28 (DRO)	415	50	mg/kg	477	87.0	73-134	2.68	11
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Matrix Spike (1402175-MS1)

Source: 1402152-01

Prepared & Analyzed: 02/26/14

C10-C28 (DRO)	480	50	mg/kg	499	ND	96.1	50-148
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Matrix Spike Dup (1402175-MSD1)

Source: 1402152-01

Prepared & Analyzed: 02/26/14

C10-C28 (DRO)	415	50	mg/kg	479	ND	86.6	50-148	14.5	13
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Summit Scientific

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Project: Buderus 12, 13-23
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
02/26/14 21:35

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 1402176 - EPA 5030 Soil MS

Blank (1402176-BLK1)

Prepared & Analyzed: 02/26/14

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	"							
Surrogate: 1,2-Dichloroethane-d4	0.0352		"	0.0360		97.9	23-173			
Surrogate: Toluene-d8	0.0343		"	0.0362		94.8	20-170			
Surrogate: 4-Bromofluorobenzene	0.0355		"	0.0362		98.0	21-167			

LCS (1402176-BS1)

Prepared & Analyzed: 02/26/14

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0810	0.0020	"	0.0968		83.7	58-130			
Toluene	0.0879	0.0050	"	0.0971		90.5	61-134			
Ethylbenzene	0.0975	0.0050	"	0.0963		101	74-139			
m,p-Xylene	0.195	0.010	"	0.194		100	73-137			
o-Xylene	0.0961	0.0050	"	0.0959		100	73-141			
Surrogate: 1,2-Dichloroethane-d4	0.0381		"	0.0385		98.8	23-173			
Surrogate: Toluene-d8	0.0372		"	0.0388		95.7	20-170			
Surrogate: 4-Bromofluorobenzene	0.0371		"	0.0388		95.6	21-167			

LCS Dup (1402176-BSD1)

Prepared & Analyzed: 02/26/14

Naphthalene	ND	0.010	mg/kg				66-138		12	
Benzene	0.0788	0.0020	"	0.0937		84.1	58-130	2.75	13	
Toluene	0.0858	0.0050	"	0.0940		91.3	61-134	2.39	16	
Ethylbenzene	0.0967	0.0050	"	0.0932		104	74-139	0.798	12	
m,p-Xylene	0.194	0.010	"	0.188		103	73-137	0.376	14	
o-Xylene	0.0950	0.0050	"	0.0929		102	73-141	1.18	12	
Surrogate: 1,2-Dichloroethane-d4	0.0369		"	0.0373		99.0	23-173			
Surrogate: Toluene-d8	0.0363		"	0.0376		96.5	20-170			
Surrogate: 4-Bromofluorobenzene	0.0357		"	0.0376		95.0	21-167			

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Project: Buderus 12, 13-23
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/26/14 21:35

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 1402176 - EPA 5030 Soil MS

Matrix Spike (1402176-MS1)		Source: 1402152-01			Prepared & Analyzed: 02/26/14					
Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0885	0.0020	"	0.101	ND	87.7	30-131			
Toluene	0.0949	0.0050	"	0.101	ND	93.8	30-134			
Ethylbenzene	0.104	0.0050	"	0.100	ND	104	22-153			
m,p-Xylene	0.211	0.010	"	0.202	ND	104	10-159			
o-Xylene	0.105	0.0050	"	0.100	ND	105	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0427		"	0.0402		106	23-173			
Surrogate: Toluene-d8	0.0395		"	0.0405		97.6	20-170			
Surrogate: 4-Bromofluorobenzene	0.0394		"	0.0405		97.3	21-167			

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Project: Buderus 12, 13-23

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
02/26/14 21:35

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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