January 24, 2018

Karen Shanahan Olson
Senior EHS Manager
PDC Energy, Inc.
1775 Sherman Street, Suite 3000
Denver, CO 80203

RE: Produced Water Vessel Closure Report
Guttersen 31, 32, 41, 42-8 & 8C Tank Battery
Facility ID #: 310396
NWNE S8 T3N R63W
Blanket Remediation #: 9440

Dear Mrs. Olson,

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 January 3, 2018, confirmation sampling activities were conducted following the removal of the partially buried produced water vessel. Soil encountered in the excavation was field screened for volatile organic compound (VOC) concentrations in soil 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, and total xylenes (BTEX), naphthalene, and total petroleum hydrocarbons (TPH) – gasoline range organics (GRO) by United States Environmental Protection Agency (USEPA) Method 8260B, TPH – diesel range organics (DRO) by USEPA Method 8015, pH, and electrical conductivity (EC).

Analytical results indicated that organic compound concentrations and physical parameters were in compliance with 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 included as 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 questions regarding this report.

Sincerely,

Tasman Geosciences, Inc.

Christine Hamlin
Program Manager

Enclosures:

Figure 1 – Excavation Site Map
Table 1 – Soil Analytical Results Summary Table
Attachment A – Laboratory Analytical Report

DATE: January 24, 2018 DESIGNED BY: C. Hamlin DRAWN BY: T. Blessing	TASMAN GEOSCIENCES	**Tasman Geosciences, Inc.** 6899 Pecos Street – Unit C Denver, CO 80221	**PDC Energy, Inc. – DJ Basin** **Guttersen 31, 32, 41, 42-8 & 8C Tank Battery** NWNE, Section 8, Township 3 North, Range 63 West Weld County, Colorado	EXCAVATION SITE MAP	FIGURE 1

TABLE 1
GUTTERSEN 31, 32, 41, 42-8 & 8C 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'	1/3/2018	4	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	7.53	0.267

Notes:

1. Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective January 30, 2015.
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 Scientifc

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

January 10, 2018

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

RE: Guttersen 31, 32, 41, 42-8 & 8C

Enclosed are the results of analyses for samples received by Summit Scientific on 01/03/18 14:30. 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: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@4'	1801040-01	Soil	01/03/18 13:07	01/03/18 14:30

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.

S2

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

Summit Scientific

1801040

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

Page 1 of 1

Client:	PDC Energy	Project Manager:	Mark Longhurst
Address:		E-Mail:	Mark.Longhurst@pdce.com
City/State/Zip:		Project Name:	Guttersen 31, 32, 41, 42-8 & 8C
Phone:	Fax:	Project Number:	
Sampler Name:	Chris Armbruster		

				Preservative				Matrix				Analyze For:								
Sample Description	Date Sampled	Time Sampled	Number of Containers	HCl	HNO_3	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	GBTEXN (8260)	DRO (TPH)	EC	PH					Special Instructions
SS01@4'	1/3/2018	1:07	1			X			X			X	X	X	X					

Relinquished by: Chris Armbruster	Date/Time: 1/3/18 2:30	Received by: [illegible] 1-3-18	Date/Time: 14:30
Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Received in Lab by:	Date/Time:

Turn Around Time (Check)

Same Day		72 Hours	
24 Hours		Standard	X
48 Hours			

Sample Integrity:
Temperature Upon Receipt: 1.4
Intact: Yes X No

Notes: on ice

www.s2scientific.com

S2

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

Sample Receipt Checklist

S2 Work Order: 1801040

Client: PDC Client Project ID: Guttersen 31,32,41,42-8&8C

Shipped Via: P.U. (UPS, FedEx, Hand Delivered, Pick-up, etc.) Airbill #: _____

Matrix (check all that apply): _____Air __X__Soil/Solid _____Water _____Other: _____ (Describe)

Cooler ID					
Temp (°C)	1.4				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C [(1)]? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	X			
Were all samples received intact [(1)]?	X			
Was adequate sample volume provided [(1)]?	X			
If custody seals are present, are they intact [(1)]?			X	
Are short holding time analytes or samples with HTs due within 48 hours present?			X	
Is a chain-of-custody (COC) form present and filled out completely [(1)]?	X			
Does the COC agree with the number and type of sample bottles received [(1)]?	X			
Do the sample IDs on the bottle labels match the COC [(1)]?	X			
Is the COC properly relinquished by the client w/ date and time recorded [(1)]?	X			
For volatiles in water – is there headspace present? **If yes, contact client and note in narrative.**			X	
Are samples preserved that require preservation **(excluding cooling)**[(1)]? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			X	
If samples are acid preserved for metals, is the pH ≤ 2[(1)]? Record the pH in Comments.			X	
If dissolved metals are requested, were samples field filtered?			X	
Additional Comments (if any):				

[(1)] If NO, then contact the client before proceeding with analysis and note in case narrative.

Muriel — **Custodian Printed Name**

1-3-18 — **Signature or Initials of Custodian**

18:00 — **Date/Time**

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

SS01@4'
1801040-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **01/03/18 13:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1801069	01/08/18	01/09/18	8015M	

Date Sampled: **01/03/18 13:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		*75.9 %*	*30-150*		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/03/18 13:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1801061	01/05/18	01/06/18	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: **01/03/18 13:07**

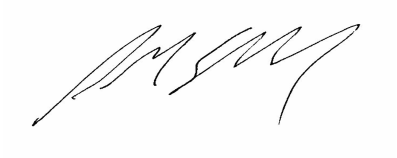
Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		*121 %*	*23-173*		"	"	"	"	
Surrogate: Toluene-d8		*104 %*	*20-170*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*94.3 %*	*21-167*		"	"	"	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **01/03/18 13:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	**7.53**	0.100	pH Units	1	1801057	01/05/18	01/08/18	EPA 9045	

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: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

SS01@4'
1801040-01 (Soil)

Summit Scientific

Physical Parameters by APHA/ASTM/EPA Methods

Specific Conductance by EPA120.1

Date Sampled: **01/03/18 13:07**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	**0.267**	0.0100	mmhos/cm	1	1801058	01/05/18	01/08/18	EPA 120.1	

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

Extractable Petroleum Hydrocarbons by 8015 - Quality Control

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1801069 - EPA 3550A										
Blank (1801069-BLK1)				Prepared: 01/08/18 Analyzed: 01/09/18						
C10-C28 (DRO)	ND	50	mg/kg							
Surrogate: o-Terphenyl	*12.7*		*"*	*12.5*		*102*	*30-150*			
LCS (1801069-BS1)				Prepared: 01/08/18 Analyzed: 01/09/18						
C10-C28 (DRO)	541	50	mg/kg	499		109	73-134			
Surrogate: o-Terphenyl	*14.9*		*"*	*12.5*		*119*	*30-150*			
Matrix Spike (1801069-MS1)	**Source: 1801038-01**			Prepared: 01/08/18 Analyzed: 01/09/18						
C10-C28 (DRO)	503	50	mg/kg	499	7.79	99.3	50-148			
Surrogate: o-Terphenyl	*13.9*		*"*	*12.5*		*111*	*30-150*			
Matrix Spike Dup (1801069-MSD1)	**Source: 1801038-01**			Prepared: 01/08/18 Analyzed: 01/09/18						
C10-C28 (DRO)	516	50	mg/kg	499	7.79	102	50-148	2.52	20	
Surrogate: o-Terphenyl	*12.8*		*"*	*12.5*		*102*	*30-150*			

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1801061 - EPA 5030 Soil MS										
Blank (1801061-BLK1)				Prepared: 01/05/18 Analyzed: 01/06/18						
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	*0.0448*		"	*0.0400*		*112*	*23-173*			
Surrogate: Toluene-d8	*0.0416*		"	*0.0400*		*104*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*0.0391*		"	*0.0400*		*97.6*	*21-167*			
LCS (1801061-BS1)				Prepared: 01/05/18 Analyzed: 01/06/18						
Naphthalene	0.159	0.010	mg/kg	0.150		106	66-138			
Benzene	0.140	0.0020	"	0.150		93.5	58-130			
Toluene	0.137	0.0050	"	0.150		91.2	61-134			
Ethylbenzene	0.137	0.0050	"	0.150		91.6	74-139			
m,p-Xylene	0.264	0.010	"	0.300		88.0	73-137			
o-Xylene	0.138	0.0050	"	0.150		91.8	73-141			
Xylenes (total)	0.402	0.010	"				0-200			
Gasoline Range Hydrocarbons	34.0	0.50	"				30-150			
Surrogate: 1,2-Dichloroethane-d4	*0.0450*		"	*0.0400*		*112*	*23-173*			
Surrogate: Toluene-d8	*0.0404*		"	*0.0400*		*101*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*0.0392*		"	*0.0400*		*98.0*	*21-167*			
Matrix Spike (1801061-MS1)		**Source: 1801022-01**		Prepared: 01/05/18 Analyzed: 01/06/18						
Naphthalene	0.129	0.010	mg/kg	0.150	ND	85.9	10-158			
Benzene	0.127	0.0020	"	0.150	ND	84.5	30-131			
Toluene	0.122	0.0050	"	0.150	ND	81.1	30-134			
Ethylbenzene	0.118	0.0050	"	0.150	ND	79.0	22-153			
m,p-Xylene	0.222	0.010	"	0.300	ND	74.1	10-159			
o-Xylene	0.116	0.0050	"	0.150	ND	77.7	31-151			
Xylenes (total)	0.339	0.010	"		ND		30-160			
Gasoline Range Hydrocarbons	29.6	0.50	"		ND		30-160			
Surrogate: 1,2-Dichloroethane-d4	*0.0452*		"	*0.0400*		*113*	*23-173*			
Surrogate: Toluene-d8	*0.0404*		"	*0.0400*		*101*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*0.0398*		"	*0.0400*		*99.6*	*21-167*			

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1801061 - EPA 5030 Soil MS										
Matrix Spike Dup (1801061-MSD1)	**Source: 1801022-01**			Prepared: 01/05/18 Analyzed: 01/06/18						
Naphthalene	0.137	0.010	mg/kg	0.150	ND	91.1	10-158	5.88	42	
Benzene	0.137	0.0020	"	0.150	ND	91.5	30-131	8.00	34	
Toluene	0.132	0.0050	"	0.150	ND	87.7	30-134	7.75	30	
Ethylbenzene	0.128	0.0050	"	0.150	ND	85.4	22-153	7.76	24	
m,p-Xylene	0.243	0.010	"	0.300	ND	81.0	10-159	8.94	68	
o-Xylene	0.126	0.0050	"	0.150	ND	83.7	31-151	7.49	38	
Xylenes (total)	0.369	0.010	"		ND		30-160	8.44	30	
Gasoline Range Hydrocarbons	31.0	0.50	"		ND		30-160	4.63	30	
Surrogate: 1,2-Dichloroethane-d4	*0.0449*		*"*	*0.0400*		*112*	*23-173*			
Surrogate: Toluene-d8	*0.0411*		*"*	*0.0400*		*103*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*0.0396*		*"*	*0.0400*		*99.1*	*21-167*			

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

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1801057 - General Preparation										
LCS (1801057-BS1)				Prepared: 01/05/18 Analyzed: 01/08/18						
pH	9.28	0.100	pH Units	9.16		101	95-105			
Duplicate (1801057-DUP1)		**Source: 1801024-01**		Prepared: 01/05/18 Analyzed: 01/08/18						
pH	8.11	0.100	pH Units		8.08			0.371	20	

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

Specific Conductance by EPA120.1 - Quality Control

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1801058 - General Preparation										
Blank (1801058-BLK1)				Prepared: 01/05/18 Analyzed: 01/08/18						
Specific Conductance (EC)	ND	0.0100	mmhos/cm							
LCS (1801058-BS1)				Prepared: 01/05/18 Analyzed: 01/08/18						
Specific Conductance (EC)	0.750	0.0100	mmhos/cm	0.750		100	90-110			
Duplicate (1801058-DUP1)		**Source: 1801024-01**		Prepared: 01/05/18 Analyzed: 01/08/18						
Specific Conductance (EC)	9.58	0.0100	mmhos/cm		9.55			0.261	20	

PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Guttersen 31, 32, 41, 42-8 & 8C Project Number: [none] Project Manager: Mark Longhurst	**Reported:** 01/10/18 13:34

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