

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**
Becker 5-3, 5-12, 12-10I Tank Battery
Facility ID: 329405
NE S5 T3N 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 July 21, 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 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, TPH - diesel range organics (DRO) by EPA Method 8015, pH, electrical conductivity (EC), and sodium adsorption ratio (SAR).

Analytical results indicated organic compound concentrations and physical parameters in soil sample SS01 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 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

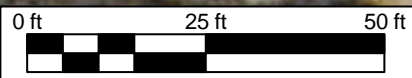


Surface
Drainage

SS01 @ 5'



Note: Surface drainage
direction is estimated based
on site topography and is not
related to regional
topography.



Google earth

(Historical Image 2014)

DRAWN BY: MAP

DATE: 12/21/2015

Facility Diagram
PDC Energy – DJ Basin
Becker 5-3, 5-12, 12-10I Tank Battery
NE S5 T3N R64W
Weld County, CO



TASMAN
GEOSCIENCES

6899 Pecos St., Unit C
Denver, CO 80221

LEGEND

- Excavation Extent
+ Soil Sample Location

All locations are
approximate unless
otherwise noted

FIGURE 1

SOIL SAMPLE
LOCATION MAP

TABLE 1
BECKER 5-3, 5-12, 12-10I 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)	SAR (units)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	23	500	6-9	<4 or 2x BG	12
SS01 @ 5'	7/21/2015	5	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	7.72	0.334	0.184

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

BG = Background

SAR = Sodium adsorption ratio

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

July 28, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Becker 5-3, 5-12, 12-10i

Enclosed are the results of analyses for samples received by Summit Scientific on 07/21/15 17:30. 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: Becker 5-3, 5-12, 12-10i
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

SS01@5
1507238-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1507255	07/22/15	07/23/15	8015M	

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		108 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1507258	07/22/15	07/23/15	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: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		107 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.6 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.1 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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: Becker 5-3, 5-12, 12-10i

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

SS01@5
1507238-01 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	1860	8.64	mg/kg dry	1	1507280	07/24/15	07/24/15	EPA 6020/Mod. USDA60 6(2, 3A)	
Magnesium	364	4.32	"	"	"	"	"	"	
Sodium	35.3	4.32	"	"	"	"	"	"	

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.184		units	"	1507284	07/27/15	07/27/15	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.334	0.0100	mmhos/cm	1	1507288	07/27/15	07/27/15	SM 2510B	

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	7.72	0.100	pH Units	"	1507287	07/27/15	07/27/15	EPA 9045	

Date Sampled: 07/21/15 16:08

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	87.4		%	"	1507281	07/24/15	07/27/15	% calculation	

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

Project: Becker 5-3, 5-12, 12-10i
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

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 1507255 - EPA 3550A

Blank (1507255-BLK1)

Prepared & Analyzed: 07/22/15

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 14.3 " 12.2 117 30-150

LCS (1507255-BS1)

Prepared & Analyzed: 07/22/15

C10-C28 (DRO) 474 50 mg/kg 501 94.7 73-134

Surrogate: o-Terphenyl 13.1 " 12.2 108 30-150

Matrix Spike (1507255-MS1)

Source: 1507217-11

Prepared & Analyzed: 07/22/15

C10-C28 (DRO) 677 50 mg/kg 496 950 NR 50-148 QM-07

Surrogate: o-Terphenyl 20.3 " 12.1 168 30-150 S-02

Matrix Spike Dup (1507255-MSD1)

Source: 1507217-11

Prepared & Analyzed: 07/22/15

C10-C28 (DRO) 468 50 mg/kg 482 950 NR 50-148 36.4 13 QM-07

Surrogate: o-Terphenyl 9.01 " 11.7 76.8 30-150

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

Project: Becker 5-3, 5-12, 12-10i
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

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 1507258 - EPA 5030 Soil MS

Blank (1507258-BLK1)

Prepared: 07/22/15 Analyzed: 07/23/15

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	"							
Surrogate: 1,2-Dichloroethane-d4	0.0427		"	0.0396		108	23-173			
Surrogate: Toluene-d8	0.0392		"	0.0400		98.1	20-170			
Surrogate: 4-Bromofluorobenzene	0.0385		"	0.0400		96.3	21-167			

LCS (1507258-BS1)

Prepared: 07/22/15 Analyzed: 07/23/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0988	0.0020	"	0.100		98.8	58-130			
Toluene	0.103	0.0050	"	0.100		103	61-134			
Ethylbenzene	0.108	0.0050	"	0.0992		109	74-139			
m,p-Xylene	0.219	0.010	"	0.200		110	73-137			
o-Xylene	0.109	0.0050	"	0.0984		111	73-141			
Surrogate: 1,2-Dichloroethane-d4	0.0429		"	0.0396		108	23-173			
Surrogate: Toluene-d8	0.0393		"	0.0400		98.3	20-170			
Surrogate: 4-Bromofluorobenzene	0.0381		"	0.0400		95.2	21-167			

Matrix Spike (1507258-MS1)

Source: 1507226-01

Prepared: 07/22/15 Analyzed: 07/23/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0991	0.0020	"	0.100	ND	99.1	30-131			
Toluene	0.103	0.0050	"	0.100	ND	103	30-134			
Ethylbenzene	0.108	0.0050	"	0.0992	ND	109	22-153			
m,p-Xylene	0.220	0.010	"	0.200	ND	110	10-159			
o-Xylene	0.111	0.0050	"	0.0984	ND	112	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0454		"	0.0396		115	23-173			
Surrogate: Toluene-d8	0.0394		"	0.0400		98.6	20-170			
Surrogate: 4-Bromofluorobenzene	0.0388		"	0.0400		97.0	21-167			

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

Project: Becker 5-3, 5-12, 12-10i
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

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 1507258 - EPA 5030 Soil MS

Matrix Spike Dup (1507258-MSD1)			Source: 1507226-01		Prepared: 07/22/15		Analyzed: 07/23/15			
Naphthalene	ND	0.010	mg/kg		ND		10-158			42
Benzene	0.0926	0.0020	"	0.0919	ND	101	30-131	6.81		34
Toluene	0.0979	0.0050	"	0.0919	ND	107	30-134	5.37		30
Ethylbenzene	0.100	0.0050	"	0.0912	ND	110	22-153	7.63		24
m,p-Xylene	0.205	0.010	"	0.183	ND	112	10-159	7.09		68
o-Xylene	0.104	0.0050	"	0.0904	ND	115	31-151	6.36		38
<hr/>										
Surrogate: 1,2-Dichloroethane-d4	0.0434		"	0.0364		119	23-173			
Surrogate: Toluene-d8	0.0362		"	0.0368		98.5	20-170			
Surrogate: 4-Bromofluorobenzene	0.0360		"	0.0368		97.8	21-167			

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

Project: Becker 5-3, 5-12, 12-10i
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis - Quality Control
Summit Scientific

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

Batch 1507280 - General Preparation

Blank (1507280-BLK1)

Prepared & Analyzed: 07/24/15

Calcium	ND	10.0	mg/kg wet
Magnesium	ND	5.00	"
Sodium	11.0	5.00	"

LCS (1507280-BS1)

Prepared & Analyzed: 07/24/15

Calcium	481	10.0	mg/kg wet	500	96.3	82.9-118
Magnesium	475	5.00	"	500	94.9	77.1-123
Sodium	501	5.00	"	500	100	71-129

Duplicate (1507280-DUP1)

Source: 1507216-04

Prepared & Analyzed: 07/24/15

Calcium	1750	8.82	mg/kg dry	2000	13.4	200
Magnesium	398	4.41	"	443	10.5	200
Sodium	32.6	4.41	"	35.4	8.34	200

Matrix Spike (1507280-MS1)

Source: 1507216-04

Prepared & Analyzed: 07/24/15

Calcium	2350	8.82	mg/kg dry	441	2000	80.3	75-125
Magnesium	838	4.41	"	441	443	89.7	75-125
Sodium	486	4.41	"	441	35.4	102	75-125

Matrix Spike Dup (1507280-MSD1)

Source: 1507216-04

Prepared & Analyzed: 07/24/15

Calcium	2540	8.82	mg/kg dry	441	2000	123	75-125	7.64	25
Magnesium	774	4.41	"	441	443	75.1	75-125	7.98	25
Sodium	461	4.41	"	441	35.4	96.6	75-125	5.18	25

Summit Scientific

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

Project: Becker 5-3, 5-12, 12-10i

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

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

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

Batch 1507281 - General Preparation

Duplicate (1507281-DUP1) **Source: 1507240-01** Prepared: 07/24/15 Analyzed: 07/27/15

% Solids	95.4		%		95.2			0.210	20	
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Batch 1507287 - General Preparation

LCS (1507287-BS1) Prepared & Analyzed: 07/27/15

pH	7.99	0.100	pH Units	8.00		99.9	95-105			
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Duplicate (1507287-DUP1) **Source: 1507216-04** Prepared & Analyzed: 07/27/15

pH	7.42	0.100	pH Units		7.51			1.21	20	
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Batch 1507288 - General Preparation

Blank (1507288-BLK1) Prepared & Analyzed: 07/27/15

Specific Conductance (EC)	ND	0.0100	mmhos/cm							
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LCS (1507288-BS1) Prepared & Analyzed: 07/27/15

Specific Conductance (EC)	4.92	0.0100	mmhos/cm	500		0.984	90-110			
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Duplicate (1507288-DUP1) **Source: 1507216-04** Prepared & Analyzed: 07/27/15

Specific Conductance (EC)	0.283	0.0100	mmhos/cm		0.386			31.0	20	
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PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Becker 5-3, 5-12, 12-10i

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/28/15 10:54

Notes and Definitions

S-02 The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS/LCSD recovery.

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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