

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**
Annie 3-9 Tank Battery
Facility ID: 327364
NENW S9 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 September 17, 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 3.5 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, and electrical conductivity (EC).

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






DRAWN BY: MAP	Facility Diagram PDC Energy – DJ Basin Annie 3-9 Tank Battery NENW S9 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; font-size: small;">All locations are approximate unless otherwise noted</p>	FIGURE 1 SOIL SAMPLE LOCATION MAP
DATE: 12/22/2015				

TABLE 1
ANNIE 3-9 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)	EC (mmhos/cm)	pH
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	23	500	4 or 2x BG	6-9
SS01 @ 3.5'	9/17/2015	3.5	<0.0020	<0.0050	<0.0050	<0.010	<0.010	<50	1.66	8.62

Notes:

- Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective February 1, 2014.
- 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

September 24, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Annie 3-9

Enclosed are the results of analyses for samples received by Summit Scientific on 09/18/15 17:45. 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

Page 1 of 8



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

Project: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

SS01@3.5'
1509168-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 09/17/15 11:09

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509185	09/21/15	09/22/15	8015M	

Date Sampled: 09/17/15 11:09

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		95.3 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 09/17/15 11:09

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1509186	09/21/15	09/22/15	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: 09/17/15 11:09

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		118 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		107 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		109 %	21-167		"	"	"	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 09/17/15 11:09

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	1.66	0.0100	mmhos/cm	1	1509191	09/21/15	09/24/15	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: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

SS01@3.5'
1509168-01 (Soil)

Summit Scientific

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **09/17/15 11:09**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
pH	8.62	0.100	pH Units	1	1509190	09/21/15	09/24/15	EPA 9045	

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

Project: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

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 1509185 - EPA 3550A

Blank (1509185-BLK1)

Prepared & Analyzed: 09/21/15

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 11.6 " 12.2 94.9 30-150

LCS (1509185-BS1)

Prepared & Analyzed: 09/21/15

C10-C28 (DRO) 516 50 mg/kg 499 103 73-134

Surrogate: o-Terphenyl 11.8 " 12.2 96.6 30-150

Matrix Spike (1509185-MS1)

Source: 1509141-01

Prepared: 09/21/15 Analyzed: 09/22/15

C10-C28 (DRO) 453 50 mg/kg 485 8.86 91.6 50-148

Surrogate: o-Terphenyl 11.5 " 11.9 97.1 30-150

Matrix Spike Dup (1509185-MSD1)

Source: 1509141-01

Prepared: 09/21/15 Analyzed: 09/22/15

C10-C28 (DRO) 452 50 mg/kg 463 8.86 95.8 50-148 0.295 13

Surrogate: o-Terphenyl 11.4 " 11.3 101 30-150

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

Project: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

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 1509186 - EPA 5030 Soil MS

Blank (1509186-BLK1)

Prepared & Analyzed: 09/21/15

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	0.0456		"	0.0396	115	23-173				
Surrogate: Toluene-d8	0.0422		"	0.0400	105	20-170				
Surrogate: 4-Bromofluorobenzene	0.0431		"	0.0400	108	21-167				

LCS (1509186-BS1)

Prepared & Analyzed: 09/21/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.104	0.0020	"	0.100	104	58-130				
Toluene	0.0934	0.0050	"	0.100	93.4	61-134				
Ethylbenzene	0.0992	0.0050	"	0.0992	100	74-139				
m,p-Xylene	0.192	0.010	"	0.200	96.1	73-137				
o-Xylene	0.102	0.0050	"	0.0984	104	73-141				
Xylenes (total)	0.294	0.010	"			0-200				
Gasoline Range Hydrocarbons	2.10	0.50	"			30-150				
Surrogate: 1,2-Dichloroethane-d4	0.0445		"	0.0396	112	23-173				
Surrogate: Toluene-d8	0.0448		"	0.0400	112	20-170				
Surrogate: 4-Bromofluorobenzene	0.0437		"	0.0400	109	21-167				

Matrix Spike (1509186-MS1)

Source: 1509141-01

Prepared & Analyzed: 09/21/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.112	0.0020	"	0.100	ND	112	30-131			
Toluene	0.101	0.0050	"	0.100	ND	101	30-134			
Ethylbenzene	0.109	0.0050	"	0.0992	ND	110	22-153			
m,p-Xylene	0.211	0.010	"	0.200	ND	106	10-159			
o-Xylene	0.113	0.0050	"	0.0984	ND	114	31-151			
Xylenes (total)	0.324	0.010	"		0.00		30-160			
Gasoline Range Hydrocarbons	2.27	0.50	"		ND		30-160			
Surrogate: 1,2-Dichloroethane-d4	0.0482		"	0.0396	122	23-173				
Surrogate: Toluene-d8	0.0443		"	0.0400	111	20-170				
Surrogate: 4-Bromofluorobenzene	0.0436		"	0.0400	109	21-167				

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

Project: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

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 1509186 - EPA 5030 Soil MS

Matrix Spike Dup (1509186-MSD1)			Source: 1509141-01		Prepared & Analyzed: 09/21/15					
Naphthalene	ND	0.010	mg/kg		ND		10-158		42	
Benzene	0.116	0.0020	"	0.100	ND	116	30-131	3.61	34	
Toluene	0.105	0.0050	"	0.100	ND	105	30-134	4.12	30	
Ethylbenzene	0.118	0.0050	"	0.0992	ND	119	22-153	7.68	24	
m,p-Xylene	0.225	0.010	"	0.200	ND	113	10-159	6.68	68	
o-Xylene	0.121	0.0050	"	0.0984	ND	123	31-151	6.89	38	
Xylenes (total)	0.346	0.010	"		0.00		30-160	6.76	30	
Gasoline Range Hydrocarbons	2.45	0.50	"		ND		30-160	7.56	30	
Surrogate: 1,2-Dichloroethane-d4	0.0487		"	0.0396		123	23-173			
Surrogate: Toluene-d8	0.0430		"	0.0400		108	20-170			
Surrogate: 4-Bromofluorobenzene	0.0442		"	0.0400		111	21-167			

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PDC Energy
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Project: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

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 1509190 - General Preparation

LCS (1509190-BS1) Prepared: 09/21/15 Analyzed: 09/24/15

pH	7.96	0.100	pH Units	8.00	99.5	95-105
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Duplicate (1509190-DUP1) Source: 1509118-01 Prepared: 09/21/15 Analyzed: 09/24/15

pH	8.61	0.100	pH Units	8.65	0.463	20
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Batch 1509191 - General Preparation

Blank (1509191-BLK1) Prepared: 09/21/15 Analyzed: 09/24/15

Specific Conductance (EC)	ND	0.0100	mmhos/cm
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LCS (1509191-BS1) Prepared: 09/21/15 Analyzed: 09/24/15

Specific Conductance (EC)	502	0.0100	mmhos/cm	500	100	90-110
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Duplicate (1509191-DUP1) Source: 1509118-01 Prepared: 09/21/15 Analyzed: 09/24/15

Specific Conductance (EC)	3.73	0.0100	mmhos/cm	4.03	7.76	20
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PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Annie 3-9
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 08:29

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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A handwritten signature in black ink, appearing to be 'MSM'.