

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**
Noffsinger 31, 32-D, C, D, R, D, V, D Tank Battery
Facility ID: 333276
NENE S2 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 March 19, 2015, excavation and sampling activities were completed following the removal of a 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 produced water vessel at approximately 4 feet below ground surface (bgs). The soil 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 were below COGCC Table 910-1 standards in soil sample SS01.

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.

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 Noffsinger 31, 32-D, C, D, R, D, V, D Tank Battery NENE S2 T5N R65W Weld County, CO	 TASMAN GEOSCIENCES	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: 12/28/2015				

TABLE 1
NOFFSINGER 31, 32-D, C, D, R, D, V, D 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 @ 4'	3/19/2015	4	<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

March 26, 2015

Brandon Bruns
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Noffsinger 31, 32-20

Enclosed are the results of analyses for samples received by Summit Scientific on 03/19/15 18:00. 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: Noffsinger 31, 32-20

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/26/15 13:57

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@4'	1503168-01	Soil	03/19/15 09:00	03/19/15 18:00

Summit Scientific

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

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: Noffsinger 31, 32-20

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/26/15 13:57

Sample Receipt Checklist

S2 Work Order: 1503168

Client: PDC

Client Project ID: Noffsinger 31, 32-20

Shipped Via: Pick Up
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Airbill #:

Matrix (check all that apply): Air ☒ Soil/Solid Water Other:
(Describe)

Cooler ID	<u>1</u>				
Temp (°C)	<u>4.7</u>				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature just above 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
NOTE: If samples are delivered the same day of sampling, this requirement is waived provided that there is evidence that cooling has begun.				
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
If custody seals are present, are they intact ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, etc.				
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Record the pH in Comments.				
If dissolved metals are requested, were samples field filtered?			<input checked="" type="checkbox"/>	
Additional Comments (if any):				
⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.				

Joseph J. Egan
Custodian Printed Name

Joseph J. Egan
Signature or Initials of Custodian

3/20/15
Date/Time



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

Project: Noffsinger 31, 32-20

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
03/26/15 13:57

SS01@4'
1503168-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 03/19/15 09:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1503269	03/23/15	03/23/15	8015M	

Date Sampled: 03/19/15 09:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		99.1 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 03/19/15 09:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1503270	03/24/15	03/25/15	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: 03/19/15 09:00

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		118 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.0 %	21-167		"	"	"	"	

Summit Scientific

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Denver CO, 80203

Project: Noffsinger 31, 32-20

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/26/15 13:57

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 1503269 - EPA 3550A

Blank (1503269-BLK1)

Prepared & Analyzed: 03/23/15

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 12.4 " 12.2 102 30-150

LCS (1503269-BS1)

Prepared & Analyzed: 03/23/15

C10-C28 (DRO) 472 50 mg/kg 501 94.1 73-134

Surrogate: o-Terphenyl 12.6 " 12.2 103 30-150

Matrix Spike (1503269-MS1)

Source: 1503193-01

Prepared & Analyzed: 03/23/15

C10-C28 (DRO) 462 50 mg/kg 490 ND 94.2 50-148

Surrogate: o-Terphenyl 12.4 " 11.9 104 30-150

Matrix Spike Dup (1503269-MSD1)

Source: 1503193-01

Prepared & Analyzed: 03/23/15

C10-C28 (DRO) 458 50 mg/kg 490 ND 93.5 50-148 0.829 13

Surrogate: o-Terphenyl 12.3 " 11.9 103 30-150

Summit Scientific

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Project: Noffsinger 31, 32-20
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/26/15 13:57

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 1503270 - EPA 5030 Soil MS

Blank (1503270-BLK1)

Prepared: 03/24/15 Analyzed: 03/25/15

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	0.0454		"	0.0396	115	23-173				
Surrogate: Toluene-d8	0.0406		"	0.0400	101	20-170				
Surrogate: 4-Bromofluorobenzene	0.0400		"	0.0400	100	21-167				

LCS (1503270-BS1)

Prepared: 03/24/15 Analyzed: 03/25/15

Naphthalene	0.129	0.010	mg/kg	0.150	86.3	66-138				
Benzene	0.148	0.0020	"	0.150	99.0	58-130				
Toluene	0.149	0.0050	"	0.150	99.1	61-134				
Ethylbenzene	0.146	0.0050	"	0.150	97.4	74-139				
m,p-Xylene	0.292	0.010	"	0.300	97.2	73-137				
o-Xylene	0.145	0.0050	"	0.150	96.5	73-141				
Surrogate: 1,2-Dichloroethane-d4	0.0416		"	0.0396	105	23-173				
Surrogate: Toluene-d8	0.0406		"	0.0400	102	20-170				
Surrogate: 4-Bromofluorobenzene	0.0410		"	0.0400	103	21-167				

Matrix Spike (1503270-MS1)

Source: 1503168-01

Prepared: 03/24/15 Analyzed: 03/25/15

Naphthalene	0.151	0.010	mg/kg	0.150	ND	101	10-158			
Benzene	0.139	0.0020	"	0.150	ND	92.5	30-131			
Toluene	0.142	0.0050	"	0.150	ND	94.8	30-134			
Ethylbenzene	0.139	0.0050	"	0.150	ND	92.4	22-153			
m,p-Xylene	0.279	0.010	"	0.300	ND	92.9	10-159			
o-Xylene	0.140	0.0050	"	0.150	ND	93.3	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0437		"	0.0396	110	23-173				
Surrogate: Toluene-d8	0.0406		"	0.0400	101	20-170				
Surrogate: 4-Bromofluorobenzene	0.0413		"	0.0400	103	21-167				

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Project: Noffsinger 31, 32-20

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/26/15 13:57

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 1503270 - EPA 5030 Soil MS

Matrix Spike Dup (1503270-MSD1)				Source: 1503168-01		Prepared: 03/24/15		Analyzed: 03/25/15		
Naphthalene	0.147	0.010	mg/kg	0.150	ND	97.8	10-158	3.00	42	
Benzene	0.133	0.0020	"	0.150	ND	88.9	30-131	3.97	34	
Toluene	0.135	0.0050	"	0.150	ND	90.1	30-134	5.04	30	
Ethylbenzene	0.131	0.0050	"	0.150	ND	87.5	22-153	5.45	24	
m,p-Xylene	0.264	0.010	"	0.300	ND	87.9	10-159	5.53	68	
o-Xylene	0.131	0.0050	"	0.150	ND	87.3	31-151	6.58	38	
Surrogate: 1,2-Dichloroethane-d4	0.0444		"	0.0396		112	23-173			
Surrogate: Toluene-d8	0.0403		"	0.0400		101	20-170			
Surrogate: 4-Bromofluorobenzene	0.0410		"	0.0400		102	21-167			

Summit Scientific

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Project: Noffsinger 31, 32-20

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/26/15 13:57

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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