

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**
Alles 9-22 Tank Battery
Facility ID: 327103
NESE S22 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, 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 4 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.

Please contact me at (720) 409-8791 if you have any questions regarding this report.

Sincerely,

A handwritten signature in blue ink that reads "Christine Wasko".

Christine Wasko
Project Manager
Tasman Geosciences, Inc.

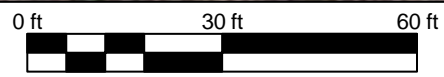
Enclosures:

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



↑
Surface
Drainage

SS01 @ 4'



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

DRAWN BY: RJB

DATE: 11/6/2015

Facility Diagram
PDC Energy – DJ Basin
Alles 9-22 Tank Battery
NESE S22 T5N R65W
Weld County, CO



TASMAN 6899 Pecos St., Unit C
GEOSCIENCES Denver, CO 80221

LEGEND

- Excavation Extent
- ⊕ Soil Sample Location

All locations are approximate unless otherwise noted

FIGURE 1
SOIL SAMPLE
LOCATION MAP

TABLE 1
ALLES 9-22 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'	3/19/2014	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 24, 2014

Brandon Bruns
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Alles 9-22

Enclosed are the results of analyses for samples received by Summit Scientific on 03/19/14 17:35. 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', with a long, sweeping horizontal line extending to the right.

Ben Shrewsbury
President / Laboratory Manager



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

Project: Alles 9-22

Project Number: [none]
 Project Manager: Brandon Bruns

Reported:
 03/24/14 18:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@4'	1403144-01	Soil	03/19/14 15:00	03/19/14 17:35

Page 1 of 1

1403144

Summit Scientific

741 Corporate Circle Suite 1 • Golden, Colorado 80401
 303-277-9310 • 303-374-9333 Fax

Client: PDC Energy
 Address:
 City/State/Zip:
 Phone:
 Fax:
 Project Manager: Brandon Bruns
 E-Mail:
 Project Name: ALLES 9-22
 Project Number:

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix	Analyze For:	Special Instructions
				HCl	HNO ₃	None	Other (Specify)			
SS01@4'	3/19/14	1500	1	X			Soil			
							Groundwater			
							Air - Canister Serial #			
							Other (Specify)			

Requisitioned by: [Signature] Date/Time: 3/19/14 17:35
 Received by: [Signature] Date/Time: 3/19/14 17:35
 Requisitioned by: [Signature] Date/Time: 3/19/14 17:00
 Received by: [Signature] Date/Time: 3/19/14 17:35

Notes:
 Turn Around Time (Check) 72 Hours Standard
 Same Day 24 Hours 48 Hours

Sample Integrity: Intact No Intact

Temperature Upon Receipt: 67

www.summit-sc.com

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: Alles 9-22

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
03/24/14 18:35

SS01@4'
1403144-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **03/19/14 15:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1403166	03/21/14	03/21/14	8015M	

Date Sampled: **03/19/14 15:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		105 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/19/14 15:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1403165	03/20/14	03/23/14	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: **03/19/14 15:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		116 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		92.0 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %	21-167		"	"	"	"	

Summit Scientific

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

Project: Alles 9-22

Project Number: [none]
 Project Manager: Brandon Brunns

Reported:
 03/24/14 18:35

Extractable Petroleum Hydrocarbons by 8015 - Quality Control
Summit Scientific

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

Batch 1403166 - EPA 3550A

Blank (1403166-BLK1)				Prepared & Analyzed: 03/21/14						
C10-C28 (DRO)	ND	50	mg/kg							
LCS (1403166-BS1)				Prepared & Analyzed: 03/21/14						
C10-C28 (DRO)	436	50	mg/kg	497		87.7	73-134			
Matrix Spike (1403166-MS1)				Source: 1403143-01 Prepared & Analyzed: 03/21/14						
C10-C28 (DRO)	1640	50	mg/kg	485	1270	76.4	50-148			
Matrix Spike Dup (1403166-MSD1)				Source: 1403143-01 Prepared & Analyzed: 03/21/14						
C10-C28 (DRO)	1650	50	mg/kg	489	1270	78.5	50-148	0.804	13	

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Alles 9-22

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
03/24/14 18:35

Volatile Organic Compounds by EPA Method 8260B - Quality Control
Summit Scientific

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

Batch 1403165 - EPA 5030 Soil MS

Blank (1403165-BLK1)

Prepared: 03/20/14 Analyzed: 03/21/14

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	0.0482		"	0.0388		124	23-173			
Surrogate: Toluene-d8	0.0393		"	0.0391		101	20-170			
Surrogate: 4-Bromofluorobenzene	0.0369		"	0.0391		94.6	21-167			

LCS (1403165-BS1)

Prepared: 03/20/14 Analyzed: 03/21/14

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0979	0.0020	"	0.0994		98.5	58-130			
Toluene	0.100	0.0050	"	0.0994		101	61-134			
Ethylbenzene	0.106	0.0050	"	0.0994		106	74-139			
m,p-Xylene	0.221	0.010	"	0.199		111	73-137			
o-Xylene	0.112	0.0050	"	0.0994		112	73-141			
Surrogate: 1,2-Dichloroethane-d4	0.0431		"	0.0395		109	23-173			
Surrogate: Toluene-d8	0.0392		"	0.0398		98.6	20-170			
Surrogate: 4-Bromofluorobenzene	0.0400		"	0.0398		101	21-167			

Matrix Spike (1403165-MS1)

Source: 1403143-01

Prepared: 03/20/14 Analyzed: 03/21/14

Naphthalene	0.0670	0.010	mg/kg		0.147		10-158			
Benzene	0.102	0.0020	"	0.0994	ND	103	30-131			
Toluene	0.0847	0.0050	"	0.0994	ND	85.2	30-134			
Ethylbenzene	0.113	0.0050	"	0.0994	0.168	NR	22-153			QM-07
m,p-Xylene	0.488	0.010	"	0.199	1.01	NR	10-159			QM-07
o-Xylene	0.0707	0.0050	"	0.0994	0.00340	67.7	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0473		"	0.0395		120	23-173			
Surrogate: Toluene-d8	0.0399		"	0.0398		100	20-170			
Surrogate: 4-Bromofluorobenzene	0.0737		"	0.0398		185	21-167			S-02

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PDC Energy
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Project: Alles 9-22

Project Number: [none]
 Project Manager: Brandon Brunns

Reported:
 03/24/14 18:35

Volatile Organic Compounds by EPA Method 8260B - Quality Control
Summit Scientific

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

Batch 1403165 - EPA 5030 Soil MS

Matrix Spike Dup (1403165-MSD1)	Source: 1403143-01			Prepared: 03/20/14		Analyzed: 03/21/14				
Naphthalene	0.137	0.010	mg/kg		0.147		10-158	68.5	42	QM-07
Benzene	0.0935	0.0020	"	0.0977	ND	95.8	30-131	9.08	34	
Toluene	0.0734	0.0050	"	0.0977	ND	75.2	30-134	14.2	30	
Ethylbenzene	0.187	0.0050	"	0.0977	0.168	19.2	22-153	49.5	24	QM-07
m,p-Xylene	0.914	0.010	"	0.195	1.01	NR	10-159	60.8	68	QM-07
o-Xylene	0.0596	0.0050	"	0.0977	0.00340	57.6	31-151	17.1	38	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0464</i>		"	<i>0.0388</i>		<i>120</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0369</i>		"	<i>0.0391</i>		<i>94.6</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.121</i>		"	<i>0.0391</i>		<i>309</i>	<i>21-167</i>			<i>S-02</i>

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Project: Alles 9-22

Project Number: [none]
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Reported:
03/24/14 18:35

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