

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**
Bowen #1 Tank Battery
Facility ID: 323266
NESE S25 T4N R67W
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 February 21, 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 7 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 above 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 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



Co Rd 40.5

Surface
Drainage



SS01 @ 7'

0 ft 35 ft 70 ft

Google Earth 2012

25

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

DRAWN BY: MAP
DATE: 12/22/2015

Facility Diagram
PDC Energy – DJ Basin
Bowen #1 Tank Battery
NESE S25 T4N R67W
Weld County, CO

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

LEGEND
— Excavation Extent
+ Soil Sample Location

FIGURE 1
SOIL SAMPLE
LOCATION MAP

All locations are approximate unless otherwise noted

TABLE 1
BOWEN #1 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 @ 7'	2/21/2014	7	<0.0020	<0.0050	<0.0050	<0.010	<0.010	496

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

February 26, 2014

Brandon Bruns
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Bowen #1

Enclosed are the results of analyses for samples received by Summit Scientific on 02/21/14 16:55. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read '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: Bowen #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
02/26/14 16:14

SS01@7'
1402118-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **02/21/14 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	496	50.0	mg/kg	1	1402156	02/21/14	02/22/14	8015M	

Date Sampled: **02/21/14 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: o-Terphenyl</i>		117 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/21/14 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1402155	02/21/14	02/22/14	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: **02/21/14 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		109 %	23-173		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		96.9 %	20-170		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		92.6 %	21-167		"	"	"	"	

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: Bowen #1

Project Number: [none]
 Project Manager: Brandon Brunns

Reported:
 02/26/14 16:14

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 1402156 - EPA 3550A

Blank (1402156-BLK1)				Prepared & Analyzed: 02/21/14						
C10-C28 (DRO)	ND	50.0	mg/kg							
LCS (1402156-BS1)				Prepared & Analyzed: 02/21/14						
C10-C28 (DRO)	410	50.0	mg/kg	501		81.8	73-134			
Matrix Spike (1402156-MS1)				Source: 1402111-01		Prepared & Analyzed: 02/21/14				
C10-C28 (DRO)	428	50.0	mg/kg	501	ND	85.4	50-148			
Matrix Spike Dup (1402156-MSD1)				Source: 1402111-01		Prepared & Analyzed: 02/21/14				
C10-C28 (DRO)	448	50.0	mg/kg	501	ND	89.5	50-148	4.65	13	

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Project: Bowen #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
02/26/14 16:14

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 1402155 - EPA 5030 Soil MS

Blank (1402155-BLK1)

Prepared: 02/21/14 Analyzed: 02/22/14

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	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0413</i>		<i>"</i>	<i>0.0397</i>		<i>104</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0381</i>		<i>"</i>	<i>0.0400</i>		<i>95.2</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0427</i>		<i>"</i>	<i>0.0400</i>		<i>107</i>	<i>21-167</i>			

LCS (1402155-BS1)

Prepared: 02/21/14 Analyzed: 02/22/14

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.102	0.0020	"	0.0997		102	58-130			
Toluene	0.103	0.0050	"	0.100		103	61-134			
Ethylbenzene	0.125	0.0050	"	0.0992		126	74-139			
m,p-Xylene	0.249	0.010	"	0.200		125	73-137			
o-Xylene	0.128	0.0050	"	0.0988		130	73-141			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0447</i>		<i>"</i>	<i>0.0397</i>		<i>113</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0375</i>		<i>"</i>	<i>0.0400</i>		<i>93.8</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0436</i>		<i>"</i>	<i>0.0400</i>		<i>109</i>	<i>21-167</i>			

Matrix Spike (1402155-MS1)

Source: 1402111-01

Prepared: 02/21/14 Analyzed: 02/22/14

Naphthalene	ND	0.010	mg/kg		0.0194		10-158			
Benzene	0.110	0.0020	"	0.0997	ND	110	30-131			
Toluene	0.107	0.0050	"	0.100	ND	107	30-134			
Ethylbenzene	0.123	0.0050	"	0.0992	0.00405	120	22-153			
m,p-Xylene	0.245	0.010	"	0.200	0.0219	111	10-159			
o-Xylene	0.126	0.0050	"	0.0988	0.00975	118	31-151			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0448</i>		<i>"</i>	<i>0.0397</i>		<i>113</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0376</i>		<i>"</i>	<i>0.0400</i>		<i>94.0</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0414</i>		<i>"</i>	<i>0.0400</i>		<i>104</i>	<i>21-167</i>			

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Project: Bowen #1
 Project Number: [none]
 Project Manager: Brandon Bruns

Reported:
 02/26/14 16:14

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 1402155 - EPA 5030 Soil MS

Matrix Spike Dup (1402155-MSD1)	Source: 1402111-01			Prepared: 02/21/14	Analyzed: 02/22/14					
Naphthalene	ND	0.010	mg/kg	0.0194		10-158				42
Benzene	0.106	0.0020	"	0.0997	ND	106	30-131	3.86		34
Toluene	0.113	0.0050	"	0.100	ND	113	30-134	6.00		30
Ethylbenzene	0.121	0.0050	"	0.0992	0.00405	118	22-153	1.18		24
m,p-Xylene	0.241	0.010	"	0.200	0.0219	109	10-159	1.61		68
o-Xylene	0.126	0.0050	"	0.0988	0.00975	118	31-151	0.0475		38
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0440</i>		<i>"</i>	<i>0.0397</i>		<i>111</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0413</i>		<i>"</i>	<i>0.0400</i>		<i>103</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0407</i>		<i>"</i>	<i>0.0400</i>		<i>102</i>	<i>21-167</i>			

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Project: Bowen #1

Project Number: [none]
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Reported:
02/26/14 16:14

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