

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**  
**Hoshiko 2 & 3 Tank Battery**  
**Facility ID: 319529**  
**NE S35 T6N 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 23, 2015, confirmation sampling activities were completed following the removal of the partially buried steel 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 6 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 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. 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	<b>Facility Diagram</b> PDC Energy – DJ Basin Hoshiko 2, 3 Tank Battery NE S35 T6N R65W Weld County, CO	 <b>TASMAN</b> GEOSCIENCES 6899 Pecos St., Unit C Denver, CO 80221	<b>LEGEND</b>  Excavation Extent  Soil Sample Location <p style="text-align: right;">All locations are approximate unless otherwise noted</p>	<b>FIGURE 1</b>  <b>SOIL SAMPLE LOCATION MAP</b>
DATE: 12/22/2015				

**TABLE 1**  
**HOSHIKO 2 3 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 <sup>(2)</sup> (mg/kg)
COGCC standards for soil (mg/kg) <sup>(1)</sup>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>23</b>	<b>500</b>
SS01 @ 6'	3/23/2015	6	<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

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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: Hoshiko 2 & 3

Enclosed are the results of analyses for samples received by Summit Scientific on 03/23/15 18:10. 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: Hoshiko 2 & 3  
Project Number: [none]  
Project Manager: Brandon Bruns

Reported:  
03/26/15 14:41

SS01@6'  
1503197-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 03/23/15 08:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1503276	03/24/15	03/24/15	8015M	

Date Sampled: 03/23/15 08:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		106 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 03/23/15 08:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1503280	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: 03/23/15 08:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		100 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		117 %	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: Hoshiko 2 & 3  
Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
03/26/15 14:41

**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 1503276 - EPA 3550A**

**Blank (1503276-BLK1)**

Prepared & Analyzed: 03/24/15

C10-C28 (DRO)	ND	50	mg/kg							
Surrogate: o-Terphenyl	13.1		"	12.2		107	30-150			

**LCS (1503276-BS1)**

Prepared & Analyzed: 03/24/15

C10-C28 (DRO)	424	50	mg/kg	501		84.6	73-134			
Surrogate: o-Terphenyl	13.7		"	12.2		112	30-150			

**Matrix Spike (1503276-MS1)**

Source: 1503197-01

Prepared & Analyzed: 03/24/15

C10-C28 (DRO)	450	50	mg/kg	486	ND	92.5	50-148			
Surrogate: o-Terphenyl	13.3		"	11.8		112	30-150			

**Matrix Spike Dup (1503276-MSD1)**

Source: 1503197-01

Prepared & Analyzed: 03/24/15

C10-C28 (DRO)	467	50	mg/kg	492	ND	94.9	50-148	3.72	13	
Surrogate: o-Terphenyl	13.4		"	12.0		112	30-150			

Summit Scientific

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

Project: Hoshiko 2 & 3  
Project Number: [none]  
Project Manager: Brandon Brunns

Reported:  
03/26/15 14:41

**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 1503280 - EPA 5030 Soil MS**

**Blank (1503280-BLK1)**

Prepared & Analyzed: 03/24/15

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	0.0377		"	0.0396	95.2	23-173				
Surrogate: Toluene-d8	0.0394		"	0.0400	98.6	20-170				
Surrogate: 4-Bromofluorobenzene	0.0470		"	0.0400	118	21-167				

**LCS (1503280-BS1)**

Prepared & Analyzed: 03/24/15

Naphthalene	ND	0.010	mg/kg			66-138				
Benzene	0.0908	0.0020	"	0.100	90.8	58-130				
Toluene	0.0891	0.0050	"	0.100	89.1	61-134				
Ethylbenzene	0.102	0.0050	"	0.0992	102	74-139				
m,p-Xylene	0.213	0.010	"	0.200	107	73-137				
o-Xylene	0.100	0.0050	"	0.0984	102	73-141				
Surrogate: 1,2-Dichloroethane-d4	0.0360		"	0.0396	91.0	23-173				
Surrogate: Toluene-d8	0.0389		"	0.0400	97.2	20-170				
Surrogate: 4-Bromofluorobenzene	0.0474		"	0.0400	118	21-167				

**Matrix Spike (1503280-MS1)**

Source: 1503197-01

Prepared & Analyzed: 03/24/15

Naphthalene	ND	0.010	mg/kg		ND	10-158				
Benzene	0.0887	0.0020	"	0.0971	ND	91.4	30-131			
Toluene	0.0856	0.0050	"	0.0971	ND	88.2	30-134			
Ethylbenzene	0.0986	0.0050	"	0.0963	ND	102	22-153			
m,p-Xylene	0.204	0.010	"	0.194	ND	105	10-159			
o-Xylene	0.0962	0.0050	"	0.0955	ND	101	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0366		"	0.0384	95.3	23-173				
Surrogate: Toluene-d8	0.0381		"	0.0388	98.1	20-170				
Surrogate: 4-Bromofluorobenzene	0.0433		"	0.0388	111	21-167				

Summit Scientific

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

Project: Hoshiko 2 & 3  
Project Number: [none]  
Project Manager: Brandon Brunns

Reported:  
03/26/15 14:41

**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 1503280 - EPA 5030 Soil MS**

Matrix Spike Dup (1503280-MSD1)	Source: 1503197-01			Prepared & Analyzed: 03/24/15						
Naphthalene	ND	0.010	mg/kg		ND		10-158		42	
Benzene	0.0903	0.0020	"	0.0982	ND	91.9	30-131	1.76	34	
Toluene	0.0898	0.0050	"	0.0982	ND	91.4	30-134	4.78	30	
Ethylbenzene	0.101	0.0050	"	0.0974	ND	103	22-153	2.11	24	
m,p-Xylene	0.207	0.010	"	0.196	ND	105	10-159	1.19	68	
o-Xylene	0.0970	0.0050	"	0.0967	ND	100	31-151	0.838	38	
Surrogate: 1,2-Dichloroethane-d4	0.0357		"	0.0389		91.9	23-173			
Surrogate: Toluene-d8	0.0390		"	0.0393		99.3	20-170			
Surrogate: 4-Bromofluorobenzene	0.0446		"	0.0393		113	21-167			

Summit Scientific

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Project: Hoshiko 2 & 3  
Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
03/26/15 14:41

### 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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