

PDC Energy, Inc.
First Quarter 2022 Remediation Summary

April 26, 2022

Former Booth 11, 12, 21, 22-31U & 31AU Tank Battery
NWNW Section 31 T4N R63W
Remediation # 4826

This remediation summary has been prepared by Tasman, Inc. (Tasman) on behalf of PDC Energy, Inc. (PDC) to summarize remediation and sampling activities conducted during the first quarter 2022 at the former Booth 11, 12, 21-31U & 31AU tank battery (Site).

Site History and Background

On July 28, 2008, petroleum hydrocarbon impacts were discovered below the dump lines during routine maintenance at the Booth 11, 12, 21, 22-31U & 31AU tank battery. Following the discovery, an estimated 3,800 cubic yards of impacted material was removed from the source area and transported to a licensed disposal facility under PDC waste manifests. The approximate dimensions of the excavation were 40 feet wide by 50 feet long with a depth of 35 feet below ground surface (bgs). Excavation oversight and sampling were conducted by LT Environmental (LTE). Soil sample results indicated that organic compound concentrations were in exceedance of COGCC Table 910-1 standards within the final extent of the excavation.

Following initial excavation activities, a site investigation was conducted by LTE to delineate the extent of remaining hydrocarbon impacts and install a passive soil vapor extraction (SVE) well. The 2008 excavation extent and SVE well location are illustrated on Figure 1. A Form 27 Site Investigation and Remediation Work Plan was submitted to the COGCC on March 3, 2009, and Remediation Number 4826 was issued to the project.

A supplemental site investigation was conducted by Tasman between May 6 and June 4, 2019, to determine the extent of potential hydrocarbon impacts and evaluate lithologic conditions adjacent to the 2008 release. Based on the data collected during the assessment, PDC has selected monitored natural attenuation (MNA) as the remedial strategy for this site.

Current Remediation Strategy

Quarterly vapor samples are collected from the existing SVE well to monitor VOC concentrations and evaluate the passive system operation and efficacy. Vapor samples are submitted for laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX) and total petroleum hydrocarbons (TPH) – Gasoline Range Organics (GRO) by EPA Method TO-15. Analytical results are summarized in Table 1 and the laboratory report is included in Attachment A.



Path Forward

Monitored natural attenuation (MNA) was selected as the remediation strategy during the second quarter 2019 and will continue as the selected remediation strategy through the second quarter 2022.

Second quarter 2022 vapor sampling will be conducted during April 2022.



Legend

-  Excavation Extent (LTE – 2008)
-  8-Inch Passive SVE Well (LTE – 2008)

Notes

All locations are approximate unless otherwise noted.

Excavation extent approximated based on March 31, 2009, LT Environmental, Inc. (LTE) report.

SVE – Soil Vapor Extraction

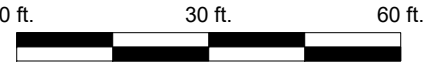


Image Source: Google Earth; 2017 Google
Projection: WGS 84 UTM Zone 13 North



DATE: February 26, 2021

DESIGNED BY: B. Nelson

DRAWN BY: B. Nelson



Tasman Geosciences, Inc.
6899 Pecos Street – Unit C
Denver, CO 80221

PDC Energy, Inc. – DJ Basin
Booth 11, 12, 21, 22-31U & 31AU Tank Battery
NWNW, Section 31, Township 4 North, Range 63 West
Weld County, Colorado

REMEDIATION WELL
LOCATION MAP

FIGURE
1

TABLE 1
BOOTH 11, 12, 21, 22, 31U 31AU
VAPOR ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/m ³)	Toluene (µg/m ³)	Ethylbenzene (µg/m ³)	Total Xylenes (µg/m ³)	TVPH - GRO (µg/m ³)
V001	7/25/2019	<5.66	14.2	<10.1	43.7	3,570
V001	10/17/2019	3,510	2,810	<193	5,040	1,460,000
V001	1/24/2020	163	212	<125	2,195	542,000
V001	4/27/2020	328	1,320	385	4,568	199,000
V001	8/19/2020	57.8	50.9	<10.0	416.3	22,400
V001	11/11/2020	72.7	42.1	10.2	116.0	2,550
V001	2/4/2021	12,800	18,500	<1,250	37,620	3,650,000
V001	4/27/2021	<5.60	<10.0	<10.0	<38.0	4,060
V001	7/19/2021	<5.60	<10.0	31.6	228.4	14,200
V001	10/21/2021	<12.3	<22.0	<22.0	<20.7	881
V001	1/13/2022	<70.0	<125	<125	<118	465,000

Notes:

TVPH - GRO = Total volatile petroleum hydrocarbons - gasoline range organics (C6 - C10)

µg/m³ = Micrograms per cubic meter

(<) = Analytical result is less than the indicated laboratory reporting limit.

Attachment A



January 26, 2022

Tasman Geosciences

Brock Nelson

6855 West 119th Avenue

Broomfield CO 80020

Project Name - PDC - Booth 11,12,21-31U & 31AU Project Number - [none]

Attached are your analytical results for PDC - Booth 11,12,21-31U & 31AU received by Origins Laboratory, Inc. January 13, 2022. This project is associated with Origins project number Y201261-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.
303.433.1322
o-squad@oelabinc.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
V001	Y201261-01	Air	January 13, 2022 13:00	01/13/2022 15:07

Origins Laboratory, Inc.



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.

Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

ORIGINS
LABORATORY, INC

www.originslaboratory.com

197261

page 1 of 1

Client: PDC / Tasman
Address: 6855 W 119th Ave.
Broomfield, CO 80020
Telephone Number: (303) 487-1228
Email Address: bnelson@tasman-geo.com

Project Manager: Brock Nelson
Project Name: Booth 11,12,21,22-31U & 31AU
Project Number:
Samples Collected By: David Moore

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions	
				Unpreserved	HCl	HNO ₃	Other	Groundwater	Soil	Air / Summ #			Other
V001	1-13-22	13:00	2										Hub Second Sample 1
													2
													3
													4
													5
													6
													7
													8
													9
													10

Relinquished By: <i>David Moore</i>	Date: 1-13-22	Time: 15:07	Received By: <i>[Signature]</i>	Date: 1-13-22	Time: 15:07
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Turnaround Time:	Same Day <input type="checkbox"/>	24 Hr <input type="checkbox"/>	48 Hr <input type="checkbox"/>	72 Hr <input type="checkbox"/>	Standard <input checked="" type="checkbox"/>
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Temp Received - Date Results Needed

Origins Laboratory, Inc.

Jordan A. Merrill

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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

Origins Laboratory

F-012207-01-R1
Effective Date: 01/09/12

Sample Receipt Checklist

Origins Work Order: 7201261 Client: Tasman
Client Project ID: Booth 11,12,21,22-31

Checklist Completed by: SG Shipped Via: HA
(UPS, FedEx, Hand Delivered, Pick-up, etc.)
Date/time completed: 1/14/22 Airbill #: N/A

Matrix(s) Received: (Check all that apply): Soil/Solid Water X Other: Air

Cooler Number/Temperature: 1 / - °C / 1 / - °C / 1 / - °C (Describe)

Thermometer ID: T003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Is there ice present (document if blue ice is used)			<input checked="" type="checkbox"/>	
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)			<input checked="" type="checkbox"/>	
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)			<input checked="" type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) 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 with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO ₃ , HCl, H ₂ SO ₄) / (pH >10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) JP Date/Time Reviewed 1/17/22

Origins Laboratory, Inc.

Jordan A. Merrill

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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

V001

1/13/2022 1:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y201261-01 (Air)

GBTEX by TO-15M GC/MS

									T
Gasoline Range Hydrocarbons	465000	50000	ug/m ³ Air	250	B2A2421	EPC	01/24/2022	01/24/2022	
Benzene	ND	70.0	"	25	"	EPC	"	01/24/2022	U
Toluene	ND	125	"	"	"	EPC	"	"	U
Ethylbenzene	ND	125	"	"	"	EPC	"	"	U
m,p-Xylene	ND	475	"	"	"	EPC	"	"	U
o-Xylene	ND	118	"	"	"	EPC	"	"	U
Surrogate: 1,2-Dichloroethane-d4	105 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	116 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	93.1 %	70-130			"	"	"	"	

Origins Laboratory, Inc.



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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

Volatile Organic Compounds by TO-15 in Air - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B2A2421 - Default Prep - Air										
Blank (B2A2421-BLK1)					Prepared: 01/21/2022 Analyzed: 01/21/2022					T
Gasoline Range Hydrocarbons	ND	200	ug/m ³ Air							U
Benzene	ND	2.80	"							U
Toluene	ND	5.00	"							U
Ethylbenzene	ND	5.00	"							U
m,p-Xylene	ND	19.0	"							U
o-Xylene	ND	4.70	"							U
Surrogate: 1,2-Dichloroethane-d4	10.5		ppbv	10.0		105	70-130			
Surrogate: Toluene-d8	10.8		"	10.0		108	70-130			
Surrogate: 4-Bromofluorobenzene	9.07		"	10.0		90.7	70-130			
LCS (B2A2421-BS1)					Prepared: 01/21/2022 Analyzed: 01/21/2022					T
Benzene	32.4	2.80	ug/m ³ Air	31.9		101	70-130			
Toluene	41.8	5.00	"	37.7		111	70-130			
Ethylbenzene	43.9	5.00	"	43.4		101	70-130			
m,p-Xylene	186	19.0	"	174		107	70-130			
o-Xylene	47.1	4.70	"	43.4		108	70-130			
Surrogate: 1,2-Dichloroethane-d4	10.1		ppbv	10.0		101	70-130			
Surrogate: Toluene-d8	9.56		"	10.0		95.6	70-130			
Surrogate: 4-Bromofluorobenzene	9.46		"	10.0		94.6	70-130			
LCS Dup (B2A2421-BSD1)					Prepared: 01/21/2022 Analyzed: 01/22/2022					T
Benzene	32.1	2.80	ug/m ³ Air	31.9		101	70-130	0.792	25	
Toluene	41.5	5.00	"	37.7		110	70-130	0.723	25	
Ethylbenzene	44.8	5.00	"	43.4		103	70-130	1.86	25	
m,p-Xylene	182	19.0	"	174		105	70-130	1.65	25	
o-Xylene	45.8	4.70	"	43.4		105	70-130	2.90	25	
Surrogate: 1,2-Dichloroethane-d4	9.66		ppbv	10.0		96.6	70-130			

Origins Laboratory, Inc.

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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

Volatile Organic Compounds by TO-15 in Air - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B2A2421 - Default Prep - Air

LCS Dup (B2A2421-BSD1)

Prepared: 01/21/2022 Analyzed: 01/22/2022

T

Surrogate: Toluene-d8	8.83		ppbv	10.0		88.3	70-130			
Surrogate: 4-Bromofluorobenzene	9.69		"	10.0		96.9	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Brock Nelson
Project Number: [none]
Project: PDC - Booth 11,12,21-31U & 31AU

Notes and Definitions

U Sample is Non-Detect.

T The TO-15 analysis is not part of the NELAC accreditation

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



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