

Methane Mitigation System  
Quarterly Operations and Monitoring (O&M)  
Summary

**DWR WATER WELL  
PERMIT # 137465**

13646 WCR 2 ½  
Brighton, Colorado  
NWSE S32 T1N R66W

COGCC Remediation # 15469

Prepared by:



6855 WEST 119<sup>TH</sup> AVENUE  
BROOMFIELD, COLORADO 80020

**April 11, 2022**

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## 1.0 Introduction

Tasman Geosciences, Inc. (Tasman) has prepared this operations and monitoring (O&M) summary on behalf of PDC Energy, Inc. (PDC) and Great Western Operating Company, LLC (collectively referred to as the Operators) for the methane mitigation system (System) installed at the property (Property) associated with the Colorado Division of Water Resources (DWR) Well Permit Number 137465 (Well). The System was designed to mitigate methane concentrations in the Well water.

## 2.0 Location and Background

The Property is located at 13646 West County Road (WCR) 2 ½ in Brighton, Colorado, within the NWSE Quarter of Section 32, Township 1 North, Range 66 West. The Property coordinates are approximately 40.007168 degrees north latitude and -104.798050 degrees west longitude.

The Well is permitted for domestic use and is completed within the Laramie Fox Hills aquifer. The Well is constructed with a screened interval between 825 and 1,056 feet below ground surface (bgs), with a static water level of 374 feet bgs, according to the Pump Installation Report filed with the DWR in September 1985. Water from the Well is pumped and conveyed to an outdoor hydrant and the residential water system, located within an exterior cellar.

In response to a landowner request, PDC retained Olsson Associates (Olsson) on March 11, 2020, to collect a preliminary baseline water sample from the Well in accordance with the Colorado Oil and Gas Conservation Commission (COGCC) Baseline Water Quality Sampling Program, Rule 318A. Laboratory results indicated that the sample exhibited a methane concentration of 26 milligrams per liter (mg/L) [Table 1]. Notification was provided to the COGCC, as the concentration exceeded the maximum reporting threshold of 10 mg/L. Subsequent isotopic and gas compositional analysis indicated that the methane exhibited properties of both thermogenic and biogenic origin.

Based on the results of the preliminary water sample, the COGCC directed the Operators to conduct an area water well study. In accordance with this study, PDC retained Tasman to collect a supplemental baseline water sample from the Well on May 6, 2020. Laboratory and isotopic analyses confirmed an elevated methane concentration of 22.7 mg/L, with properties of thermogenic and biogenic origin.

As a result of the elevated methane concentration and properties of thermogenic origin, the Operators obtained consent from the landowners to install the System.

## 3.0 System Design

The System was designed to mitigate methane concentrations detected in the Well using a two-phased approach. The following sections summarize the design and installation for each component of the

System. A System process and instrumentation diagram (P&ID) is provided as Figure 1. A photographic overview of the System is provided as Attachment B.

### 3.1 Well Ventilation

The ventilation portion of the System is designed to allow for passive ventilation of methane from the Well casing. A schedule-80 polyvinyl chloride (PVC) pipe stack is constructed directly over the Well, and is sealed with an aluminum screened vent cap (Figure 1).

The Well ventilation stack was installed on July 10, 2020. Following installation, approximately ½-gallon of Clorox® bleach was poured into the Well as a precautionary measure to ensure that no foreign elements were introduced during construction.

### 3.2 Water Treatment System

The water treatment portion of the System is designed to remove methane dissolved in the Well water using a combination of aeration technology and carbon filtration (Figure 1). All System equipment is housed within a custom shed constructed above the existing cellar (Figure 2). The water is conveyed from the Well through the existing residential pressure tanks, into the System for treatment.

Once water enters the System, it is conveyed via 1-inch schedule-40 PVC piping through a screen filter and into an aeration tank equipped with enclosed misters. The process water is sprayed, or atomized, within the tank, thereby volatilizing the dissolved methane. Methane vapors are then transferred from the tank via a small blower through a 3-inch PVC vent stack for discharge to atmosphere. The vent stack is installed above the shed roof and away from the windows of the residence. Vapor collection and conveyance operate as a closed system to prevent methane accumulation within the shed.

Once treated, process water collects at the bottom of the aeration tank. When the water level in the tank falls below the low liquid level switch (LSL), the switch is engaged thereby opening the solenoid valve and initiating Well pump operation. When the water level in the tank reaches the maximum fill level, the high liquid level switch (LSH) is engaged and the solenoid valve closes.

As water is consumed within the residence, process water is transferred from the aeration tank using an enclosed submersible pump into a small pressure tank. Prior to entering the residential supply stream, process water is conveyed through a granular activated carbon (GAC) filter as a polishing measure.

The shed and water treatment equipment were installed at the Property between July 21 and August 5, 2020. The System became operational on August 6, 2020.

## 4.0 System Sampling Program

The System sampling program is used to monitor operational efficacy and confirm methane concentrations are reduced below the target level of 10 mg/L. Following the initial system start-up sampling procedures, the sampling program will be conducted on a quarterly schedule and sampled within the second month of every quarter. The following sections provide an overview to the sampling program, as well as data for the reporting period.

### 4.1 Overview

Water samples are collected from the influent and effluent process streams of the System (Figure 1). The effluent sample port (EFF) is located downstream of the aeration tank and GAC filter. The influent sample port (INF) is located upstream of the aeration tank and downstream of existing residential pressure tanks.

Effluent water samples are collected following one minute of purging at a rate of 250 to 500 milliliters (mL) per minute (min). Influent water samples are collected following parameter stabilization while purging at a rate of 250 to 500 mL/min, to ensure that samples are representative of formation conditions.

Samples are collected in laboratory-provided unpreserved glass 40-mL vials and designated using the following sample identification nomenclature:

*Prefix [INF or EFF] – mmddyy – time [24-hour]*

Sample vials are subsequently placed in an ice-filled cooler to maintain a temperature of approximately 4 degrees Celsius during transportation to the laboratory. Samples are submitted to Summit Scientific Laboratory (Summit) under standard chain-of-custody procedures for analysis of dissolved gases (methane, ethane, propane) by Environmental Protection Agency (EPA) Method RSK-175. Additionally, one sample is collected from the system influent in a laboratory-provided 750-mL IsoFlask™ and submitted to Dolan Integration Group (DIG) for isotopic and gas compositional analysis, per COGCC directive.

### 4.2 Quarterly Reporting Data

Quarterly sampling was conducted in the second month of the quarter on February 23, 2022. Analytical results indicated that post-treatment methane concentrations were reduced below the target level of 10 mg/L. Isotopic analyses completed by DIG confirmed that the elevated methane concentrations were thermogenic and biogenic in origin. Analytical results are summarized in Table 1 and the combined laboratory report is provided as Attachment A.

## 5.0 Upcoming Site Activities

System maintenance activities will be conducted concurrent with System sampling events on a quarterly schedule. Maintenance will include inspection, cleaning, and replacement of the System components, as needed.

Second quarter 2022 System sampling and maintenance will be conducted in May 2022.

## TABLE

**TABLE 1**  
**DWR WATER WELL PERMIT # 137465**  
**SYSTEM PROCESS WATER ANALYTICAL RESULTS SUMMARY TABLE**

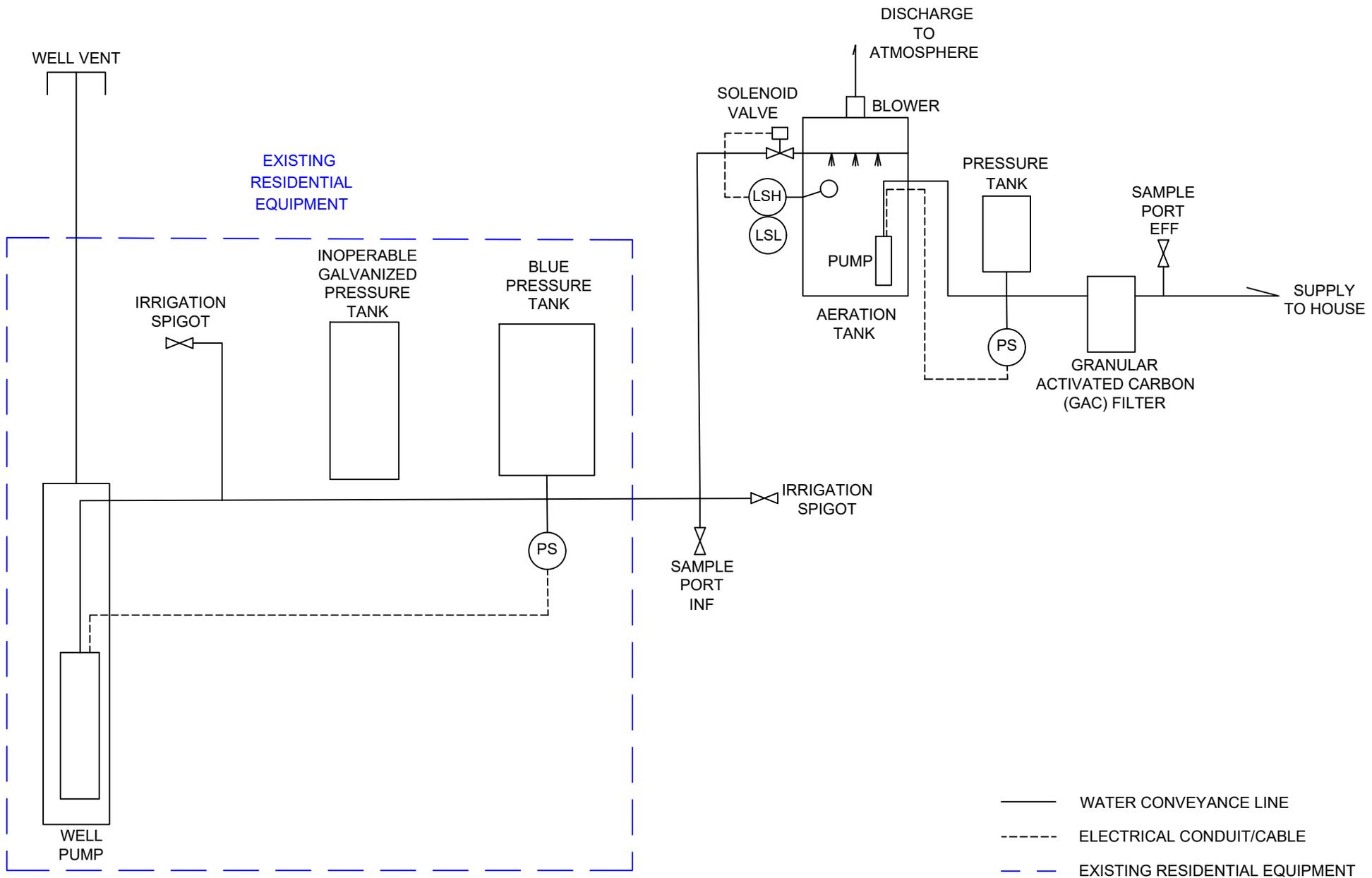


Sample ID	Date Sampled	Methane (mg/L)	Ethane (mg/L)	Propane (mg/L)
<b>Target Level (mg/L)</b>		<b>10</b>	<b>-</b>	<b>-</b>
EFF-080720-1100	8/7/2020	7.8	1.18	0.488
EFF-081220-0832	8/12/2020	3.3	0.95	0.46
EFF-081920-0855	8/19/2020	2.2	1.2	0.75
EFF-082620-0921	8/26/2020	2.9	0.99	0.65
EFF-110520-1026	11/5/2020	4.4	2.7	1.9
EFF-020921-1102	2/9/2021	3.6	3.4	2.0
EFF-053121-1255	5/13/2021	3.4	2.6	1.5
EFF-082421-1042	8/24/2021	3.4	1.0	0.37
EFF-110921-1304	11/9/2021	2.1	<0.10	<1.0
EFF-022322-1052	2/23/2022	4.6	1.8	1.7
INF-080720-1145	8/7/2020	38.6	6.79	4.03
INF-081220-0927	8/12/2020	10	2.8	2.4
INF-081920-0956	8/19/2020	12	3.9	2.8
INF-082620-1013	8/26/2020	11	3.7	2.0
INF-110520-1107	11/5/2020	11	3.5	2.4
INF-020921-1137	2/9/2021	13	6.9	4.3
INF-051321-1355	5/13/2021	12	4.9	2.6
INF-082421-1125	8/24/2021	12	3.9	2.1
INF-110921-1329	11/9/2021	12	3.9	3.9
INF-022322-1153	2/23/2022	10	2.5	2.9

**Notes:**

mg/L= Milligrams per liter

## FIGURES



No.	Date	Revisions	By	CHK

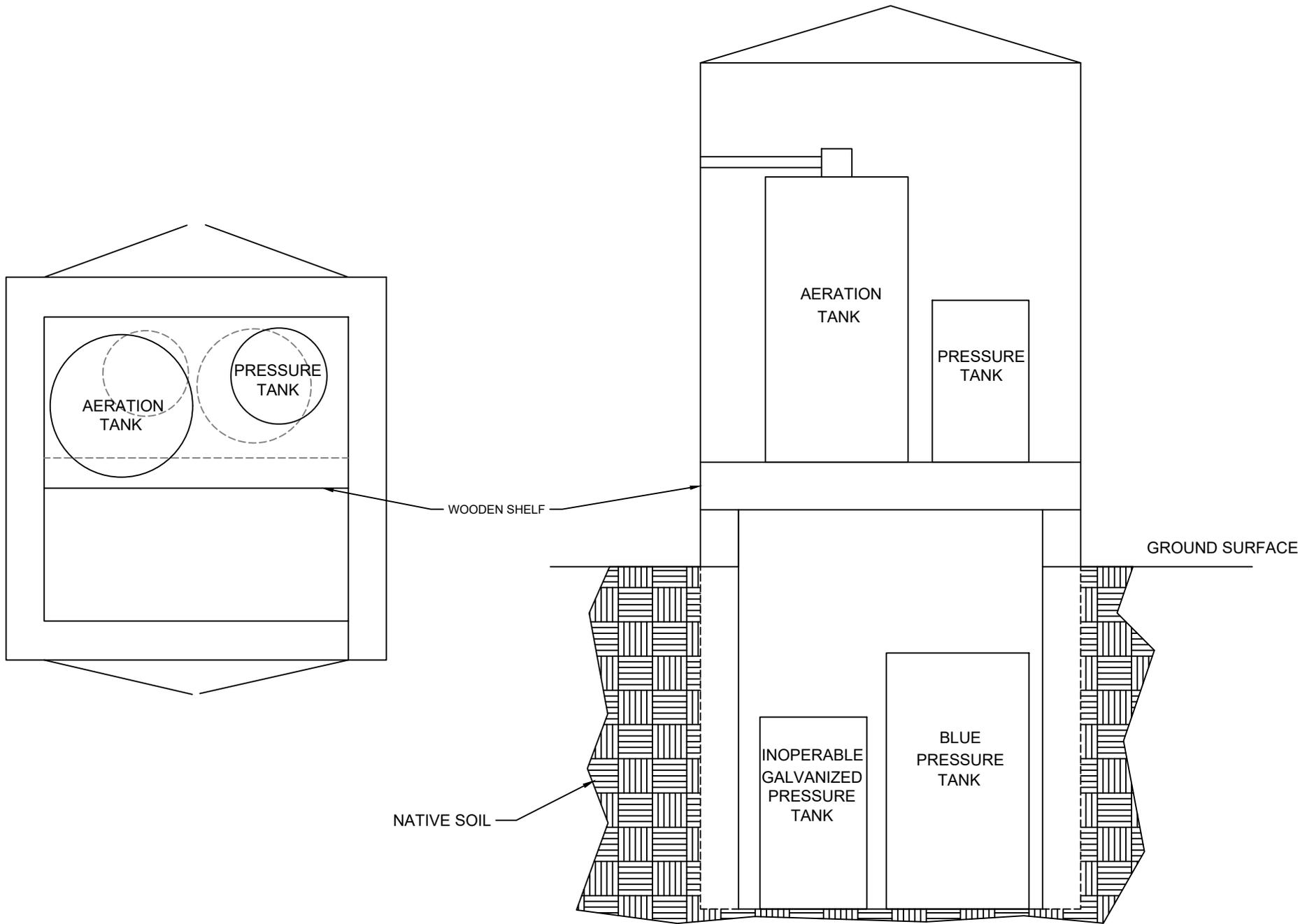
Project Manager's Name: CHRISTINE HAMLIN		
Professional Engineer's No.:		
State:	Date Signed:	Project Mgr.:
		CH
Designed by:	Drawn by:	Checked by:
DAG	DAG	CH



**Methane Mitigation System  
Process and Instrumentation Diagram**

DWR Permit Number 137465

TASMAN GEOSCIENCES PROJECT	
Date: June 2020	
TASMAN GEOSCIENCES BROOMFIELD CO 80020 TELEPHONE NO 303-487-1228	



No.	Date	Revisions	By	Chk

Project Manager's name TRAVIS JOHANSEN	
Professional Engineer's No.	
Date	Date Signed
Project Mgr.	
TJ	
Designed by	Drawn by
DAG	DAG
Checked by	
TJ	



**Methane Mitigation System  
System Enclosure Layout**

DWR Permit Number 137465

TASMAN GEOSCIENCES PROJECT	
Date	
June 2020	
TASMAN GEOSCIENCES BROMFIELD CO 80020 TELEPHONE NO 303-487-1228	

## **ATTACHMENT A**



**dig**  
Dolan Integration Group

## Geochemistry for Energy

11025 Dover Street Unit 800  
Westminster, CO 80021  
p: 303.531.2030

### Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

**Job #:** 22027167  
**Lab #:** DIG-027381  
**Client:** Summit Scientific  
**Sample Name(s):** INF-022322-1153

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitability of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall

# Analytical Report



Job #: 22027167  
 Lab #: DIG-027381  
 Client: Summit Scientific  
 Sample Name: INF-022322-1153  
 Date Sampled: 02/23/22  
 Time Sampled: 11:53  
 Sample Description: Isoflask  
 Sampling Notes:  
 Date Received: 02/24/22  
 Date Analyzed: Gas Composition: 02/24/22  $\delta^{13}\text{C}$ : 02/26/22  $\delta\text{D}$ : 02/24/22  
 Date Reported: 02/28/22  
 Comments:

Measured Values:	Measured ppm	Analyte mol % <sup>a</sup>	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	$\delta\text{D}$ ‰ VSMOW	Comments
Nitrogen (N <sub>2</sub> )	403301	41.13	-	-	-	
Oxygen + Argon (O <sub>2</sub> +Ar)	54283	5.54	-	-	-	
Carbon Dioxide (CO <sub>2</sub> )	841	0.09	-	-	-	
Helium (He) <sup>b</sup>	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H <sub>2</sub> )	na	na	-	-	-	
Methane (CH <sub>4</sub> )	464662	47.38	88.98	-61.8	-267	
Ethane (C <sub>2</sub> H <sub>6</sub> )	36404	3.71	6.97		-	
Ethene (C <sub>2</sub> H <sub>4</sub> )	nd	nd	nd		-	
Propane (C <sub>3</sub> H <sub>8</sub> )	15681	1.60	3.00		-	
iso-Butane (C <sub>4</sub> H <sub>10</sub> )	1886	0.19	0.36		-	
n-Butane (C <sub>4</sub> H <sub>10</sub> )	2710	0.28	0.52		-	
iso-Pentane (C <sub>5</sub> H <sub>12</sub> )	434	0.04	0.08		-	
n-Pentane (C <sub>5</sub> H <sub>12</sub> )	305	0.03	0.06		-	
Hexanes + (C <sub>6</sub> H <sub>14</sub> )	115	0.01	0.02		-	

Calculated Values:	
Total HCs (ppm)	522197
Gas Wetness (mol % C <sub>2</sub> +C <sub>1</sub> +) )	11.02
C <sub>1</sub> /(C <sub>2</sub> +C <sub>3</sub> ) (mol/mol)	9

<sup>a</sup> Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. % )

<sup>b</sup> Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

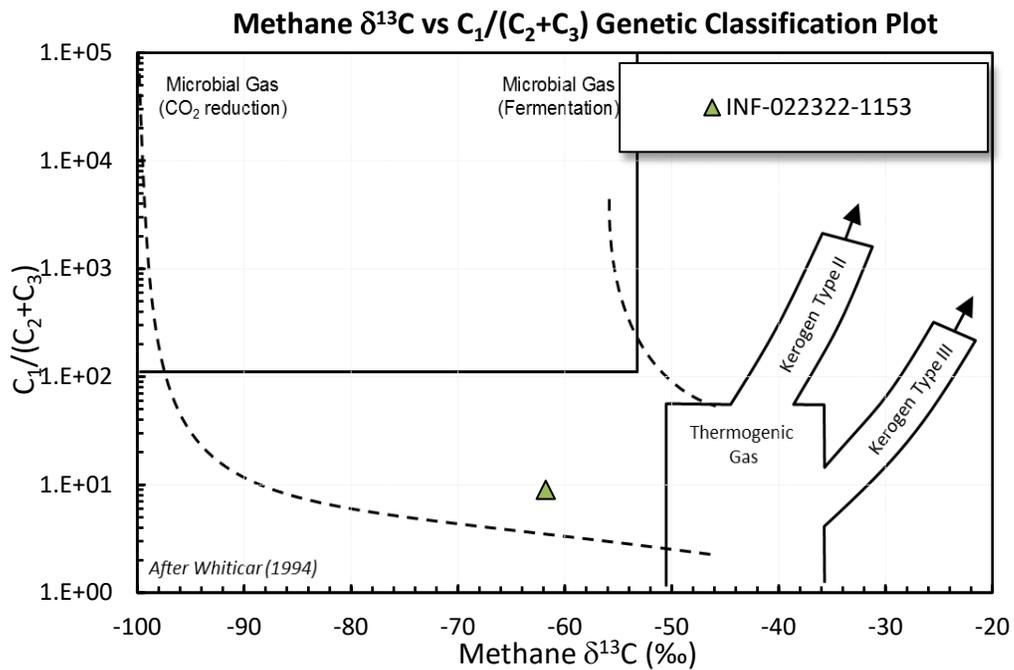
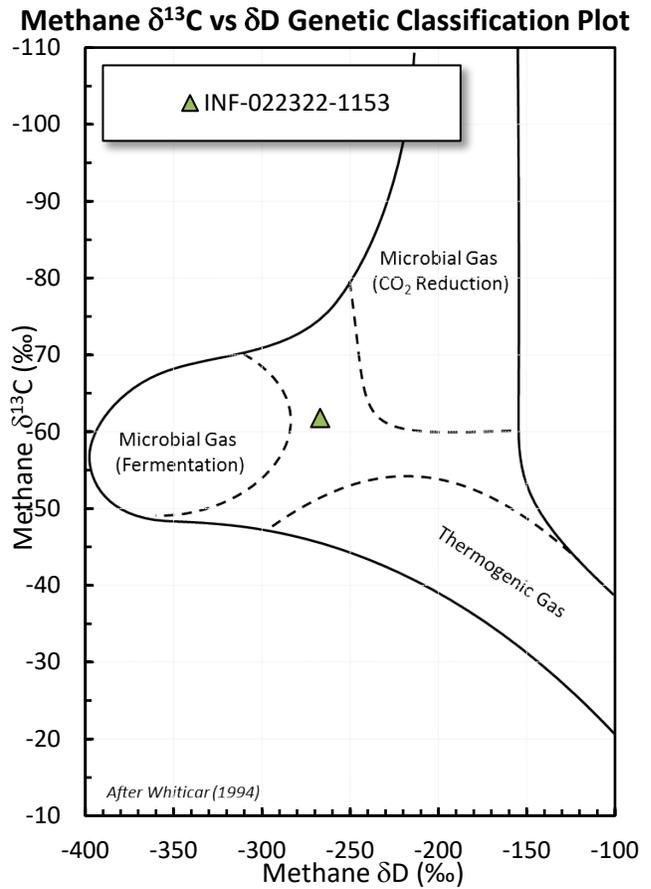
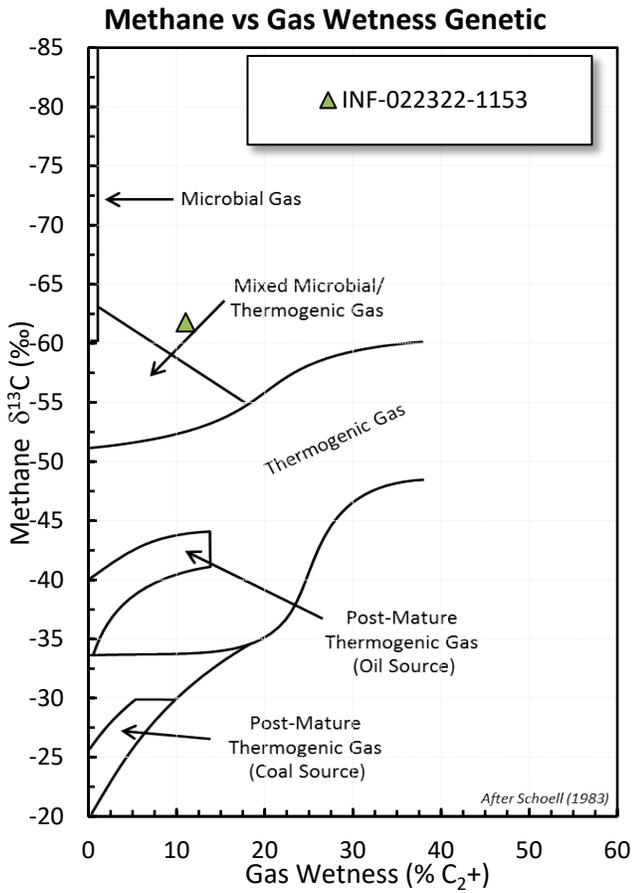
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error  $\delta^{13}\text{C}$  < 0.5 ‰

Error  $\delta\text{D}$  < 5.0 ‰

# Stable Isotope Interpretive Plots



# Chain of Custody Form



JOB 22027167

DIG - 027



main 303.531.2030 • info@digforenergy.com • digforenergy.com  
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:		Send Invoice to (if different):	
Name: Muri Premer / Paul Shrewsbury		Name: Ben Shrewsbury	AFE
Company: Summit Scientific		Company: Summit Scientific	Pro
Address: 4653 Table Mountain Drive		Address: 4653 Table Mountain Drive	PO
City, State: Golden, CO 80403		City, State: Golden, CO 80403	Loc
Phone: 303-277-9310		Phone: 303-277-9310	San
Email: mpremer@s2scientific.com / pshrewsbury@s2scientific.com		Email: bshrewsbury@s2scientific.com	API

Turnaround Time\*\*:  Standard (≤ 10 Business days)  Rush (≤ 5 Business days)

Container Number	Sample Identification	Date Sampled	Time	Sample Type*	Gas Composition	d13C of Methane (C1)	d13C of Ethane (C2)
	INF-022322-1153	2/23/22	11:53	Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Chain of Custody Record Comments:

Relinquished by Signature	Company	Date	Time	Received by Signature
	Summit Scientific	2/24/22	12:19	Patrick Traver

\*Gas composition vs RSK-175 - Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.  
\*\* Rush and Expedited Rush turnaround time analysis will incur additional costs at 2x and 3x the standard turnaround time pricing.

# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

March 01, 2022

Karen Olson

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: DWR Permit #137465

Work Order #2202304

Enclosed are the results of analyses for samples received by Summit Scientific on 02/23/22 14:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large, stylized initial "M".

Muri Premer For Paul Shrewsbury

President



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

Project: DWR Permit #137465

Project Number: AFE #EX-000335  
Project Manager: Karen Olson

**Reported:**  
03/01/22 10:34

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EFF-022322-1052	2202304-01	Water	02/23/22 10:52	02/23/22 14:00
INF-022322-1153	2202304-02	Water	02/23/22 11:53	02/23/22 14:00

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.*

# Summit Scientific

2202309

S<sub>2</sub>

4653 Table Mountain Drive ♦ Golden, Colorado 80403  
303-277-9310

Client: PDC Energy / Tasman Geosciences Project Manager: Karen Olson  
Address: 6855 W. 119th Ave. E-Mail: Karen.Olson@pdce.com; chamlin@tasman-geo.com  
City/State/Zip: Broomfield / CO / 80020  
Phone: 303-487-1228 Project Name: DWR Permit # 137465  
Sampler Name: Boyce Goldade Project Number: AFE # EX-000335

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested					Special Instructions		
					HCl	HNO3	None	Other	Water	Soil	Air-Canister #	Other	RSK-175 (Dissolved Gases)	DIC	Gas Composition	DIC Methane (Carbon)	DIC Methane (Hydrogen)			
1	EFF-022322-1052	2/23/22	1052	3			X		X					X						4th Containers for INF-022322-1153 Sample is Isoflask S/N FOA11
2	<del>INF-022322-1153</del>			<del>3</del>			<del>X</del>		<del>X</del>					<del>X</del>						
3	INF-022322-1153	2/23/22	1153	3			X		X					X						
4	INF-022322-1153	2/23/22	1153	1				X	X						X	X	X			DIC Analysis by Isoflask
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished by: <u>Boyce J Goldade</u>	Date/Time: 2/23/22 @ 1400	Received by: <u>[Signature]</u>	Date/Time: 22322 1400	<b>Turn Around Time (Check)</b> Same Day <input type="checkbox"/> 72 hours <input type="checkbox"/> 24 hours <input checked="" type="checkbox"/> Standard <input type="checkbox"/> 48 hours <input type="checkbox"/> <b>Sample Integrity:</b> Temperature Upon Receipt: <u>1.6</u> Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Notes:</b> Please provide data in PDF and COGCC EDD formats. COGCC Facility No.: 765500
Relinquished by:	Date/Time:	Received by:	Date/Time:		
Relinquished by:	Date/Time:	Received by:	Date/Time:		

S<sub>2</sub>

S2 Work Order# 2202304

Sample Receipt Checklist

Client: ADCenergy/Tasman Client Project ID: DWR Permit # 137465

Shipped Via:  H.D./P.U./FedEx/UPS/USPS/Other  Airbill #: \_\_\_\_\_

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

Temp (°C) 16

Thermometer ID: G86A9201901378

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C <sup>(1)</sup> ? NOTE: If samples are delivered the same day of sampling, this requirement is met if there is evidence that cooling has begun.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>on ILS</u>
Were all samples received intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>24 hrs</u>
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) <sup>(1)</sup> ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)</sup> ? Record the pH in Comments.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Additional Comments (if any):

<sup>(1)</sup> If NO, then contact the client before proceeding with analysis and note in case narrative.

[Signature]  
Custodian Printed Name or Initials

2.23.22  
Date/Time



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

Project: DWR Permit #137465  
 Project Number: AFE #EX-000335  
 Project Manager: Karen Olson

**Reported:**  
 03/01/22 10:34

**EFF-022322-1052**  
**2202304-01 (Water)**

**Summit Scientific**

**Dissolved Gases by RSK-175**

Date Sampled: **02/23/22 10:52**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Methane</b>	<b>4.6</b>	1.0	mg/L	100	BFB0287	02/24/22	02/24/22	RSK-175 mod	
<b>Ethane</b>	<b>1.8</b>	1.0	"	"	"	"	"	"	
<b>Propane</b>	<b>1.7</b>	1.0	"	"	"	"	"	"	

Date Sampled: **02/23/22 10:52**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: Ethene</i>		126 %	70-130		"	"	"	"	

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: DWR Permit #137465  
 Project Number: AFE #EX-000335  
 Project Manager: Karen Olson

**Reported:**  
 03/01/22 10:34

**INF-022322-1153**  
**2202304-02 (Water)**

**Summit Scientific**

**Dissolved Gases by RSK-175**

Date Sampled: **02/23/22 11:53**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Methane</b>	<b>9.6</b>	1.0		mg/L	100	BFB0287	02/24/22	02/24/22	RSK-175 mod	
<b>Ethane</b>	<b>2.5</b>	1.0		"	"	"	"	"	"	
<b>Propane</b>	<b>2.9</b>	0.10		"	10	"	"	"	"	

Date Sampled: **02/23/22 11:53**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: Ethene</i>		170 %			70-130	"	"	"	"	S-04

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: DWR Permit #137465

Project Number: AFE #EX-000335  
Project Manager: Karen Olson

**Reported:**  
03/01/22 10:34

### Dissolved Gases by RSK-175 - Quality Control

#### Summit Scientific

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

#### Batch BFB0287 - GC

##### Blank (BFB0287-BLK1)

Prepared & Analyzed: 02/24/22

Methane	ND	0.010	mg/L							
Ethane	ND	0.010	"							
Propane	ND	0.010	"							
<i>Surrogate: Ethene</i>	<i>0.0450</i>		<i>"</i>	<i>0.0364</i>		<i>124</i>	<i>70-130</i>			

##### LCS (BFB0287-BS1)

Prepared & Analyzed: 02/24/22

Methane	0.039	0.010	mg/L	0.0428		90.3	70-130			
Ethane	0.090	0.010	"	0.0798		113	70-130			
Propane	0.16	0.010	"	0.139		114	70-130			
<i>Surrogate: Ethene</i>	<i>0.0942</i>		<i>"</i>	<i>0.0728</i>		<i>129</i>	<i>70-130</i>			

##### Duplicate (BFB0287-DUP1)

Source: 2202304-01

Prepared & Analyzed: 02/24/22

Methane	2.7	1.0	mg/L		4.6			50.5	30	QR-03
Ethane	0.84	1.0	"		1.8			71.8	30	QR-03
Propane	0.59	1.0	"		1.7			95.6	30	QR-03
<i>Surrogate: Ethene</i>	<i>0.0451</i>		<i>"</i>	<i>0.0364</i>		<i>124</i>	<i>70-130</i>			

##### Matrix Spike (BFB0287-MS1)

Source: 2202304-01

Prepared & Analyzed: 02/24/22

Methane	4.5	1.0	mg/L	0.0428	4.6	NR	70-130			QM-05
Ethane	2.5	1.0	"	0.0798	1.8	852	70-130			QM-05
Propane	2.6	1.0	"	0.139	1.7	670	70-130			QM-05
<i>Surrogate: Ethene</i>	<i>0.150</i>		<i>"</i>	<i>0.0728</i>		<i>206</i>	<i>70-130</i>			<i>QM-05</i>

Summit Scientific

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**Reported:**  
03/01/22 10:34

### Notes and Definitions

- S-04 A sample matrix effect prevented complete surrogate recovery.
- QR-03 The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.
- QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The associated LCS and/or LCSD were within acceptance limits, therefore the data are considered valid.
- 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

**ATTACHMENT B**

**DWR WATER WELL PERMIT # 137465**  
**Methane Mitigation System**  
**Photographic Overview**

**Well Ventilation**



**Water Treatment System**

