

Accepted - 09/27/2022

NV



April 11, 2022

**New Mexico Oil Conservation Division**

New Mexico Energy, Minerals, and Natural Resources Department  
1000 Rio Brazos Road  
Aztec, New Mexico 87410

**Re: First Quarter 2022 – SVE System Update**

Lambe #2C  
San Juan County, New Mexico  
Hilcorp Energy Company  
NMOCD Incident Number: NVF1836050592  
Ensolum Project No. 07A1988008

To Whom it May Concern:

Ensolum, LLC (Ensolum), on behalf of Hilcorp Energy Company (Hilcorp), presents this *First Quarter 2022 – SVE System Update* report summarizing the soil vapor extraction (SVE) system performance at the Lambe #2C natural gas production well (Site), located in Unit H, Section 20, Township 31 North, and Range 10 West in San Juan County (Figure 1). Specifically, this report summarizes Site activities performed in January, February, and March of 2022 to the New Mexico Oil Conservation Division (NMOCD).

**SVE SYSTEM SPECIFICATIONS**

The current SVE system was installed at the Site in September 2021, with operation beginning on September 24, 2021. The SVE system is configured so that vacuum is being applied at well MW01 (shown on Figure 2). SVE well MW01 is screened across the impacted soil interval from approximately 20 to 35 feet below ground surface (bgs). The SVE system consists of a 1 horsepower Atlantic Blower model AB-202/1 regenerative blower capable of producing 50 standard cubic feet per minute (scfm) flow and 30 inches of water column (IWC) vacuum. The layout of the SVE system and piping is shown on Figure 2.

**FIRST QUARTER 2022 ACTIVITIES**

During the first quarter of 2022, WSP USA Inc. (WSP, third-party environmental consultant for the Site) and Hilcorp personnel performed bi-weekly operation and maintenance (O&M) visits to ensure the system was operating as designed and to perform any required maintenance. Field notes taken during O&M visits are presented in Appendix A. During the first quarter of 2022, SVE well MW01 was operated in order to induce flow in impacted soil zone. Between January 7 and March 15, 2022, the SVE system operated for 1,444.9 hours for a runtime efficiency of 90 percent (%). Based on runtime hours collected during monthly O&M visits, it appears that the system performed at a runtime efficiency greater than 97% between January 7 and March 3, 2022. Between March 3 and March 9, 2022, power outages at the Site caused extensive downtime that reduced the quarterly runtime efficiency to 90%. Appendix B

Hilcorp Energy Company  
Bell Federal Gas Com B 1  
April 1, 2022



presents photographs of the runtime meter taken during the first and last field visits of the quarter. Table 1 presents the SVE system operational hours and percent runtime.

A first quarter air sample was collected on March 15, 2022 from a sample port located between the SVE piping manifold and the SVE blower using a high vacuum air sampler. Prior to collection, the emission sample was field screened with a photoionization detector (PID) for organic vapor monitoring (OVM). The emission sample was collected directly into a 1-Liter Tedlar® bag and submitted to Hall Environmental Analysis Laboratory (Hall) in Albuquerque, New Mexico for analysis of total volatile petroleum hydrocarbons (TVPH – also known as total petroleum hydrocarbons – gasoline range organics (TPH-GRO)) following United States Environmental Protection Agency (EPA) Method 8015D, volatile organic compounds (VOCs) following EPA Method 8260B, and fixed gas analysis of oxygen and carbon dioxide following Gas Processors Association (GPA) Method 2261. Table 2 presents a summary of analytical data collected during this sampling event and historical sampling events, with the full laboratory analytical report included in Appendix C.

Air sample data and measured stack flow rates are used to estimate total mass recovered and total emissions generated by the SVE system (Table 3). Based on these estimates, 199 pounds of TVPH have been removed by the system to date.

## RECOMMENDATIONS

Bi-weekly O&M visits will continue to be performed by Ensolum and/or Hilcorp personnel to ensure that the SVE system is operating within normal working ranges (i.e., temperature, pressure, and vacuum). Deviations from regular operations will be noted on field logs and included in the following quarterly report.

We appreciate the opportunity to provide this report to the New Mexico Oil Conservation Division. If you should have any questions or comments regarding this proposal, please contact the undersigned.

Sincerely,  
**Ensolum, LLC**

A handwritten signature in black ink, appearing to read "Stuart Hyde".

Stuart Hyde, LG  
Senior Geologist  
(970) 903-1607  
shyde@ensolum.com

A handwritten signature in black ink, appearing to read "Ashley L. Ager".

Ashley Ager, MS, PG  
Development Manager, Geologist  
(970) 946-1093  
aager@ensolum.com

## Attachments:

Figure 1	Site Location
Figure 2	SVE System Configuration
Table 1	Soil Vapor Extraction System Runtime Calculations
Table 2	Soil Vapor Extraction System Emissions Analytical Results
Table 3	Soil Vapor Extraction System Mass Removal and Emissions
Appendix A	Field Notes
Appendix B	Project Photographs
Appendix C	Laboratory Analytical Reports



FIGURES



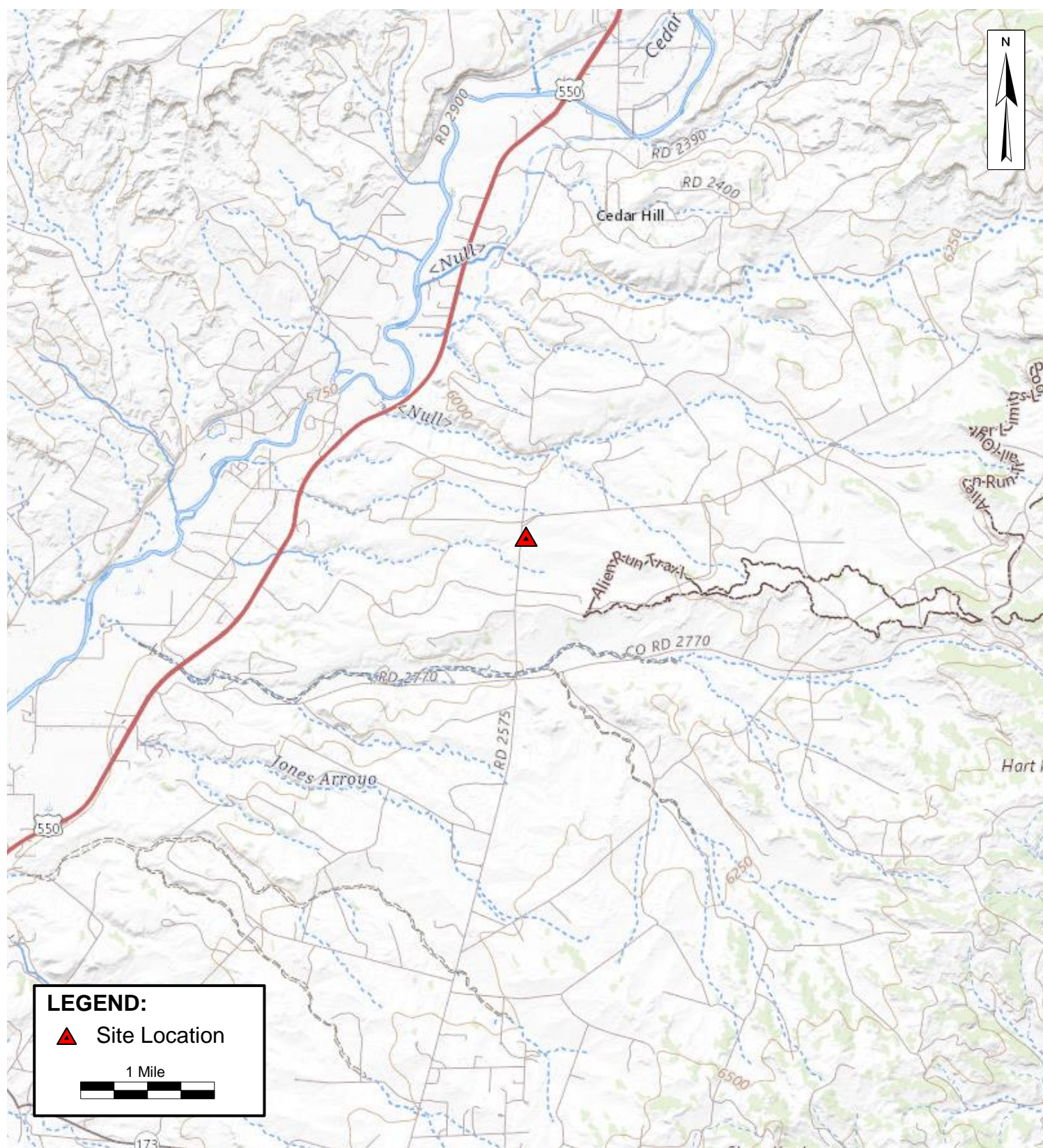


Image Courtesy of ESRI/USGS



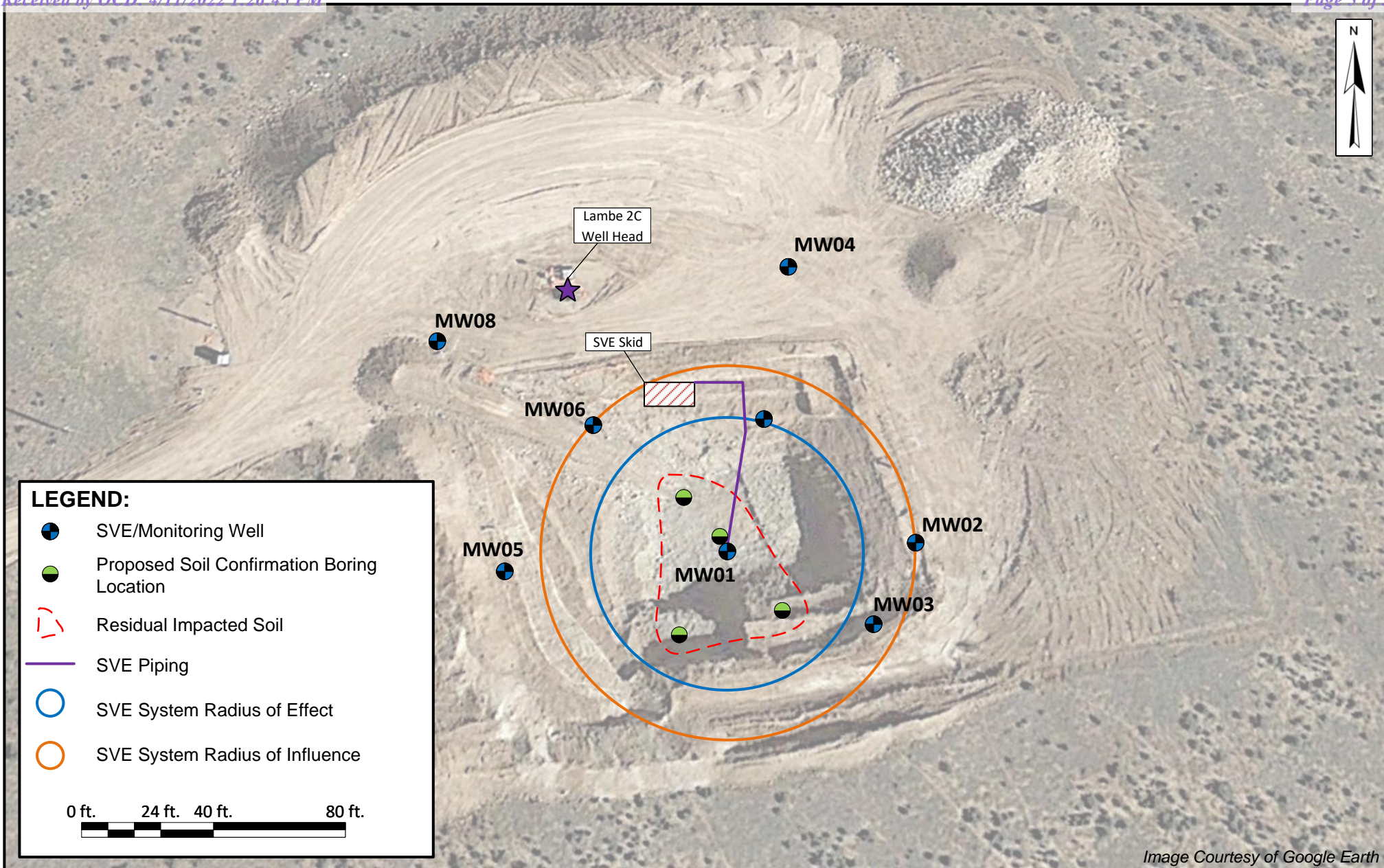
**SITE LOCATION**  
**HILCORP ENERGY COMPANY**  
**LAMBE 2C**

San Juan County, New Mexico  
36.885885° N, 107.899572° W

07A1988008

**FIGURE****1**







TABLES



**TABLE 1**  
**SOIL VAPOR EXTRACTION SYSTEM RUNTIME CALCULATIONS**  
Hilcorp Energy Company - Lambe #2C  
San Juan County, New Mexico  
  
Ensolum Project No. 07A1988008

Date	Total Operational Hours	Delta Hours	Days	Percent Runtime
1/7/2022	2,442.0	--	--	--
3/15/2022	3,886.9	1,444.9	67.0	90%



**TABLE 2**  
**SOIL VAPOR EXTRACTION SYSTEM EMISSIONS ANALYTICAL RESULTS**

Hilcorp Energy Company - Lambe #2C  
San Juan County, New Mexico

Ensolum Project No. 07A1988008

Date	PID (ppm)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	TVPH (µg/L)	Oxygen (%)	Carbon Dioxide (%)
9/25/2019 (1)	782	6.1	42	<5.0	56	--	--	--
10/14/2019 (1)	431	7.3	26	2.6	36	3,600	--	--
9/17/2021 (2)	78	<0.10	<0.10	<0.10	1.1	660	--	--
9/24/2021	97	<0.20	0.9	<0.20	4.3	880	--	--
12/2/2021	92	<0.20	2.3	0.6	6.5	300	22.1	0.288
3/15/2022	42	<0.1	<0.1	<0.1	0.5	41	22.1	0.249

**Notes:**

(1): sample collected during a Venturi event

(2): sample collected during pilot testing of the SVE system

µg/L: microgram per liter

PID: photoionization detector

ppm: parts per million

TVPH: total volatile petroleum hydrocarbons

%: percent

--: not sampled

<0.037: gray indicates result less than the stated laboratory reporting limit (PQL)





**TABLE 3**  
**SOIL VAPOR EXTRACTION SYSTEM MASS REMOVAL AND EMISSIONS**  
 Hilcorp Energy Company - Lambe #2C  
 San Juan County, New Mexico

Ensolum Project No. 07A1988008

**Flow and Laboratory Analysis**

Date	PID (ppm)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	TVPH (µg/L)
9/24/2021	97	0.20	0.94	0.20	4.3	880
12/2/2021	92	0.20	2.3	0.59	6.5	300
3/15/2022	42	0.10	0.10	0.10	0.48	41
<b>Average</b>	77	0.17	1.1	0.30	3.8	407

**Vapor Extraction Summary**

Date	Flow Rate (cfm)	Total System Flow (cf)	Delta Flow (cf)	Benzene (lb/hr)	Toluene (lb/hr)	Ethylbenzene (lb/hr)	Total Xylenes (lb/hr)	TVPH (lb/hr)
9/24/2021	51	4,590	4,590	0.000038	0.00018	0.000038	0.00082	0.17
12/2/2021	40	3,811,470	3,806,880	0.000030	0.00024	0.000059	0.00081	0.088
3/15/2022	40	9,329,550	5,518,080	0.000022	0.00018	0.000052	0.00052	0.026
<b>Average</b>				0.000030	0.00021	0.000049	0.00081	0.13

**Flow and Laboratory Analysis**

Date	Total SVE System Hours	Delta Hours	Benzene (pounds)	Toluene (pounds)	Ethylbenzene (pounds)	Total Xylenes (pounds)	TVPH (pounds)	TVPH (tons)
9/24/2021	1.5	1.5	0.000057	0.00027	0.000057	0.0012	0.25	0.00013
12/2/2021	1,588	1,586	0.047	0.38	0.094	1.3	140	0.070
3/15/2022	3,887	2,299	0.052	0.41	0.12	1.2	59	0.029
<b>Total Mass Recovery to Date</b>			0.10	0.80	0.21	2.5	199	0.10

**Notes:**

cf: cubic feet

cfm: cubic feet per minute

µg/L: micrograms per liter

lb/hr: pounds per hour

--: not sampled

PID: photoionization detector

ppm: parts per million

TVPH: total volatile petroleum hydrocarbons

gray: laboratory reporting limit used for calculating emissions



## APPENDIX A

### Field Notes



LAMBE 2C SVE SYSTEM  
BIWEEKLY O&M FORM

DATE: 1/20/22  
TIME ONSITE: 1155

O&M PERSONNEL: Raece Hanson  
TIME OFFSITE: 1300

SVE SYSTEM - MONTHLY O&M

SVE ALARMS: No KO TANK HIGH LEVEL No

SVE SYSTEM	READING	TIME
Blower Hours (take photo)	<u>2748.7</u>	<u>1201</u>
Inlet Vacuum (IWC)	<u>15</u>	<u>1202</u>
K/O Tank Vacuum (IWC)	<u>14</u>	<u>1203</u>
Inlet Flow Rotameter (scfm)	<u>41</u>	<u>1204</u>
Inlet PID	<u>25.6</u>	<u>1215</u>
Exhaust PID	<u>22.4</u>	<u>1217</u>
K/O Tank Liquid Level	<u>-</u>	<u>-</u>
K/O Liquid Drained (gallons)	<u>~8</u>	<u>-</u>
Clean/Dry Air Filter (check)	<u>✓</u>	<u>1240</u>

SVE SYSTEM - QUARTERLY SAMPLING

SAMPLE ID:	SAMPLE TIME:
Analytes: TVPH (8015), VOCs (8260), Fixed Gas (CO/CO2/O2)	
OPERATING WELLS	

Change in Well Operation:

LOCATION	VACUUM (IWC)	PID HEADSPACE (PPM)	FLOW (CFM)	ADJUSTMENTS
SVE01	<u>2.8</u>	<u>22.1</u>		

COMMENTS/OTHER MAINTENANCE:

--



LAMBE 2C SVE SYSTEM  
BIWEEKLY O&M FORM

DATE: 2/3/22  
TIME ONSITE: 1410

O&M PERSONNEL: Reece Hanson  
TIME OFFSITE: 1440

SVE SYSTEM - MONTHLY O&M	
SVE ALARMS:	<u>None</u>
KO TANK HIGH LEVEL	<u>N/A</u>

SVE SYSTEM	READING	TIME
Blower Hours (take photo)	<u>3082.8</u>	<u>1416</u>
Inlet Vacuum (IWC)	<u>15.5</u>	<u>1420</u>
K/O Tank Vacuum (IWC)	<u>15</u>	
Inlet Flow Rotameter (scfm)	<u>42</u>	
Inlet PID	<u>26.2</u>	
Exhaust PID	<u>50.1</u>	
K/O Tank Liquid Level		
K/O Liquid Drained (gallons)	<u>3.0</u>	
Clean/Dry Air Filter (check)	<u>✓</u>	

SVE SYSTEM - QUARTERLY SAMPLING	
SAMPLE ID:	SAMPLE TIME:
Analytes: TVPH (8015), VOCs (8260), Fixed Gas (CO/CO2/O2)	
OPERATING WELLS	

Change in Well Operation:	
---------------------------	--

LOCATION	VACUUM (IWC)	PID HEADSPACE (PPM)	FLOW (CFM)	ADJUSTMENTS
SVE01		<u>49.3</u>		

COMMENTS/OTHER MAINTENANCE:

LAMBE 2C SVE SYSTEM  
BIWEEKLY O&M FORM

DATE: 3/1/22  
TIME ONSITE: 12:45

O&M PERSONNEL: E. Carion  
TIME OFFSITE: \_\_\_\_\_

SVE SYSTEM - MONTHLY O&M		
SVE ALARMS:	<u>None</u>	KO TANK HIGH LEVEL <u>None</u>
<b>SVE SYSTEM</b>	<b>READING</b>	<b>TIME</b>
Blower Hours (take photo)	<u>36949</u>	<u>12:45</u>
Inlet Vacuum (IWC)	<u>15</u>	
K/O Tank Vacuum (IWC)	<u>15</u>	
Inlet Flow Rotameter (scfm)	<u>39</u>	
Inlet PID	<u>44.1</u>	
Exhaust PID	<u>47.3</u>	
K/O Tank Liquid Level	<u>EMPTY</u>	
K/O Liquid Drained (gallons)	<u>2</u>	
Clean/Dry Air Filter (check)	<u>Clean &amp; Dry</u>	

SVE SYSTEM - QUARTERLY SAMPLING	
SAMPLE ID:	SAMPLE TIME:
Analytes: TVPH (8015), VOCs (8260), Fixed Gas (CO/CO2/O2)	
OPERATING WELLS	

Change in Well Operation:				
LOCATION	VACUUM (IWC)	PID HEADSPACE (PPM)	FLOW (CFM)	ADJUSTMENTS
SVE01		44.1		

COMMENTS/OTHER MAINTENANCE:

LAMBE 2C SVE SYSTEM  
BIWEEKLY O&M FORM

DATE: 3/15/22  
TIME ONSITE: 12:00

O&M PERSONNEL: E. Carro  
TIME OFFSITE: \_\_\_\_\_

SVE SYSTEM - MONTHLY O&M				
SVE ALARMS		<u>NA</u>	KO TANK HIGH LEVEL <u>NA</u>	
SVE SYSTEM	READING	TIME		
Blower Hours (take photo)	<u>3886.9</u>			
Inlet Vacuum (IWC)	<u>15</u>			
K/O Tank Vacuum (IWC)	<u>15</u>			
Inlet Flow Rotameter (scfm)	<u>40</u>			
Inlet PID	<u>42.3</u>			
Exhaust PID	<u>36.4</u>			
K/O Tank Liquid Level				
K/O Liquid Drained (gallons)	<u>2</u>			
Clean/Dry Air Filter (check)	<u>clean/dry</u>			

SVE SYSTEM - QUARTERLY SAMPLING	
SAMPLE ID:	SAMPLE TIME: <u>12:30</u>
Analytes:	TVPH (8015), VOCs (8260), Fixed Gas (CO/CO2/O2)
OPERATING WELLS	<u>SVE01</u>

Change in Well Operation: \_\_\_\_\_

LOCATION	VACUUM (IWC)	PID HEADSPACE (PPM)	FLOW (CFM)	ADJUSTMENTS
SVE01		<u>42.3</u>		

COMMENTS/OTHER MAINTENANCE:





## APPENDIX B

### Project Photographs



**PROJECT PHOTOGRAPHS**  
Lambe #2C  
San Juan County, New Mexico  
Hilcorp Energy Company

<p><b>Photograph 1</b></p> <p>Runtime meter taken on January 7, 2022</p>	
<p><b>Photograph 2</b></p> <p>Runtime meter taken on March 15, 2022</p>	



## APPENDIX C

### Laboratory Analytical Reports



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [clients.hallenvironmental.com](http://clients.hallenvironmental.com)

March 23, 2022

Devin Hencmann  
HILCORP ENERGY  
PO Box 4700  
Farmington, NM 87499  
TEL: (505) 564-0733  
FAX

RE: Lambe 2C

OrderNo.: 2203828

Dear Devin Hencmann:

Hall Environmental Analysis Laboratory received 1 sample(s) on 3/16/2022 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

## Analytical Report

Lab Order 2203828

Date Reported: 3/23/2022

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY

Client Sample ID: Influent 3-15-22

Project: Lambe 2C

Collection Date: 3/15/2022 12:30:00 PM

Lab ID: 2203828-001

Matrix: AIR

Received Date: 3/16/2022 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	41	5.0		µg/L	1	3/16/2022 11:18:46 AM	G86522
Surr: BFB	159	37.3-213		%Rec	1	3/16/2022 11:18:46 AM	G86522
<b>EPA METHOD 8260B: VOLATILES</b>							Analyst: BRM
Benzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Toluene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Ethylbenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Methyl tert-butyl ether (MTBE)	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2,4-Trimethylbenzene	0.14	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,3,5-Trimethylbenzene	0.12	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2-Dichloroethane (EDC)	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2-Dibromoethane (EDB)	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Naphthalene	ND	0.20		µg/L	1	3/16/2022 1:22:16 PM	C86526
1-Methylnaphthalene	ND	0.40		µg/L	1	3/16/2022 1:22:16 PM	C86526
2-Methylnaphthalene	ND	0.40		µg/L	1	3/16/2022 1:22:16 PM	C86526
Acetone	ND	1.0		µg/L	1	3/16/2022 1:22:16 PM	C86526
Bromobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Bromodichloromethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Bromoform	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Bromomethane	ND	0.20		µg/L	1	3/16/2022 1:22:16 PM	C86526
2-Butanone	ND	1.0		µg/L	1	3/16/2022 1:22:16 PM	C86526
Carbon disulfide	ND	1.0		µg/L	1	3/16/2022 1:22:16 PM	C86526
Carbon tetrachloride	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Chlorobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Chloroethane	ND	0.20		µg/L	1	3/16/2022 1:22:16 PM	C86526
Chloroform	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Chloromethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
2-Chlorotoluene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
4-Chlorotoluene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
cis-1,2-DCE	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
cis-1,3-Dichloropropene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2-Dibromo-3-chloropropane	ND	0.20		µg/L	1	3/16/2022 1:22:16 PM	C86526
Dibromochloromethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Dibromomethane	ND	0.20		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2-Dichlorobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,3-Dichlorobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,4-Dichlorobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Dichlorodifluoromethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1-Dichloroethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1-Dichloroethene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Estimated value
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Page 1 of 2



## Analytical Report

Lab Order 2203828

Date Reported: 3/23/2022

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY

Client Sample ID: Influent 3-15-22

Project: Lambe 2C

Collection Date: 3/15/2022 12:30:00 PM

Lab ID: 2203828-001

Matrix: AIR

Received Date: 3/16/2022 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8260B: VOLATILES</b>							Analyst: BRM
1,2-Dichloropropane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,3-Dichloropropane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
2,2-Dichloropropane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1-Dichloropropene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Hexachlorobutadiene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
2-Hexanone	ND	1.0		µg/L	1	3/16/2022 1:22:16 PM	C86526
Isopropylbenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
4-Isopropyltoluene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
4-Methyl-2-pentanone	ND	1.0		µg/L	1	3/16/2022 1:22:16 PM	C86526
Methylene chloride	ND	0.30		µg/L	1	3/16/2022 1:22:16 PM	C86526
n-Butylbenzene	ND	0.30		µg/L	1	3/16/2022 1:22:16 PM	C86526
n-Propylbenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
sec-Butylbenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Styrene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
tert-Butylbenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1,1,2-Tetrachloroethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1,2,2-Tetrachloroethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Tetrachloroethene (PCE)	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
trans-1,2-DCE	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
trans-1,3-Dichloropropene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2,3-Trichlorobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2,4-Trichlorobenzene	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1,1-Trichloroethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,1,2-Trichloroethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Trichloroethene (TCE)	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Trichlorofluoromethane	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
1,2,3-Trichloropropane	ND	0.20		µg/L	1	3/16/2022 1:22:16 PM	C86526
Vinyl chloride	ND	0.10		µg/L	1	3/16/2022 1:22:16 PM	C86526
Xylenes, Total	0.48	0.15		µg/L	1	3/16/2022 1:22:16 PM	C86526
Surr: Dibromofluoromethane	100	70-130		%Rec	1	3/16/2022 1:22:16 PM	C86526
Surr: 1,2-Dichloroethane-d4	92.4	70-130		%Rec	1	3/16/2022 1:22:16 PM	C86526
Surr: Toluene-d8	98.3	70-130		%Rec	1	3/16/2022 1:22:16 PM	C86526
Surr: 4-Bromofluorobenzene	103	70-130		%Rec	1	3/16/2022 1:22:16 PM	C86526

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Estimated value
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Page 2 of 2



## ANALYTICAL SUMMARY REPORT

March 22, 2022

Hall Environmental  
 4901 Hawkins St NE Ste D  
 Albuquerque, NM 87109-4372

Work Order: G22030304

Project Name: Not Indicated

Energy Laboratories Inc. Gillette WY received the following 1 sample for Hall Environmental on 3/17/2022 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
G22030304-001	2203828-001B; Influent 3-15-22	03/15/22 12:30	03/17/22	Air	Natural Gas Analysis - BTU Natural Gas Analysis - Compressibility Factor Natural Gas Analysis - GPM Natural Gas Analysis - Molecular Weight Natural Gas Analysis - Routine Natural Gas Analysis - Pressure Base Natural Gas Analysis - Psuedo- Critical Pressure Natural Gas Analysis - Psuedo- Critical Temperature Natural Gas Analysis - Specific Gravity Natural Gas Analysis - Temperature Base

The analyses presented in this report were performed by Energy Laboratories, Inc., 400 W. Boxelder Rd., Gillette, WY 82718, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these tests results, please contact your Project Manager.

Report Approved By:



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Gillette, WY 866.686.7175 • Helena, MT 877.472.0711

## LABORATORY ANALYTICAL REPORT

Prepared by Gillette, WY Branch

**Client:** Hall Environmental  
**Project:** Not Indicated  
**Client Sample ID:** 2203828-001B; Influent 3-15-22  
**Location:**  
**Lab ID:** G22030304-001

**Report Date:** 03/22/22  
**Collection Date:** 03/15/22 12:30  
**Date Received:** 03/17/22  
**Sampled By:** Not Indicated

### Analyses

**Result Units Qualifier Method Analysis Date / By**

### NATURAL GAS CHROMATOGRAPHIC ANALYSIS REPORT

Oxygen	22.127 Mol %	GPA 2261	03/18/22 16:06 / blb
Nitrogen	77.624 Mol %	GPA 2261	03/18/22 16:06 / blb
Carbon Monoxide	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Carbon Dioxide	0.249 Mol %	GPA 2261	03/18/22 16:06 / blb
Hydrogen Sulfide	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Methane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Ethane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Propane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Isobutane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
n-Butane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Isopentane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
n-Pentane	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb
Hexanes plus	< 0.001 Mol %	GPA 2261	03/18/22 16:06 / blb

### GPM @ STD COND/1000 CU.FT., MOISTURE FREE GAS

GPM Ethane	< 0.0003 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM Propane	< 0.0003 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM Isobutane	< 0.0003 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM n-Butane	< 0.0003 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM Isopentane	< 0.0004 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM n-Pentane	< 0.0004 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM Hexanes plus	< 0.0004 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM Pentanes plus	< 0.0004 gal/MCF	GPA 2261	03/18/22 16:06 / blb
GPM Total	< 0.0004 gal/MCF	GPA 2261	03/18/22 16:06 / blb

### CALCULATED PROPERTIES

Calculation Pressure Base	14.730 psia	GPA 2261	03/18/22 16:06 / blb
Calculation Temperature Base	60 °F	GPA 2261	03/18/22 16:06 / blb
Compressibility Factor, Z	1.0000 unitless	GPA 2261	03/18/22 16:06 / blb
Molecular Weight	28.94 unitless	GPA 2261	03/18/22 16:06 / blb
Pseudo-critical Pressure, psia	548 psia	GPA 2261	03/18/22 16:06 / blb
Pseudo-critical Temperature, deg R	240 deg R	GPA 2261	03/18/22 16:06 / blb
Specific Gravity (air=1.000)	1.002 unitless	GPA 2261	03/18/22 16:06 / blb
Gross BTU per cu ft @ std cond, dry	< 0.01 BTU/cu ft	GPA 2261	03/18/22 16:06 / blb
Gross BTU per cu ft @ std cond, wet	< 0.01 BTU/cu ft	GPA 2261	03/18/22 16:06 / blb

**Report** RL - Analyte Reporting Limit  
**Definitions:** QCL - Quality Control Limit

MCL - Maximum Contaminant Level  
ND - Not detected at the Reporting Limit (RL)



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## QA/QC Summary Report

Prepared by Gillette, WY Branch

Client: Hall Environmental

Work Order: G22030304

Report Date: 03/22/22

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: GPA 2261</b>							Analytical Run: R269910		
<b>Lab ID: CCV-2203181521</b> Continuing Calibration Verification Standard							03/18/22 15:22		
Oxygen	0.625	Mol %	0.001	104	90	110			
Nitrogen	1.370	Mol %	0.001	98	85	110			
Carbon Dioxide	0.959	Mol %	0.001	96	90	110			
Hydrogen Sulfide	0.021	Mol %	0.001	84	70	130			
Methane	93.456	Mol %	0.001	100	90	110			
Ethane	1.015	Mol %	0.001	101	90	110			
Propane	1.008	Mol %	0.001	101	90	110			
Isobutane	0.496	Mol %	0.001	99	90	110			
n-Butane	0.495	Mol %	0.001	99	90	110			
Isopentane	0.200	Mol %	0.001	100	90	110			
n-Pentane	0.201	Mol %	0.001	100	90	110			
Hexanes plus	0.154	Mol %	0.001	103	90	110			
<b>Lab ID: ICV-2203181526</b> Initial Calibration Verification Standard							03/18/22 15:26		
Oxygen	0.393	Mol %	0.001	98	75	110			
Nitrogen	5.157	Mol %	0.001	103	90	110			
Carbon Dioxide	4.895	Mol %	0.001	98	90	110			
Hydrogen Sulfide	0.126	Mol %	0.001	127	100	136			
Methane	73.202	Mol %	0.001	100	90	110			
Ethane	5.001	Mol %	0.001	101	90	110			
Propane	4.998	Mol %	0.001	100	90	110			
Isobutane	1.984	Mol %	0.001	99	90	110			
n-Butane	1.964	Mol %	0.001	98	90	110			
Isopentane	0.983	Mol %	0.001	98	90	110			
n-Pentane	0.993	Mol %	0.001	99	90	110			
Hexanes plus	0.304	Mol %	0.001	101	90	110			
<b>Lab ID: ICV1-2203181542</b> Initial Calibration Verification Standard							03/18/22 15:42		
Nitrogen	98.950	Mol %	0.001	100	90	110			
Carbon Monoxide	1.050	Mol %	0.001	103	90	110			
<b>Lab ID: CCV1-2203181547</b> Continuing Calibration Verification Standard							03/18/22 15:48		
Nitrogen	99.904	Mol %	0.001	100	85	110			
Carbon Monoxide	0.096	Mol %	0.001	95	90	110			
<b>Lab ID: CCV-2203181615</b> Continuing Calibration Verification Standard							03/18/22 16:15		
Oxygen	0.622	Mol %	0.001	104	90	110			
Nitrogen	1.358	Mol %	0.001	97	85	110			
Carbon Dioxide	0.957	Mol %	0.001	96	90	110			
Hydrogen Sulfide	0.022	Mol %	0.001	88	70	130			
Methane	93.480	Mol %	0.001	100	90	110			
Ethane	1.014	Mol %	0.001	101	90	110			
Propane	1.007	Mol %	0.001	101	90	110			
Isobutane	0.494	Mol %	0.001	99	90	110			
n-Butane	0.494	Mol %	0.001	99	90	110			

### Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)





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## QA/QC Summary Report

Prepared by Gillette, WY Branch

Client: Hall Environmental

Work Order: G22030304

Report Date: 03/22/22

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: GPA 2261</b>							Analytical Run: R269910		
<b>Lab ID: CCV-2203181615</b>	Continuing Calibration Verification Standard							03/18/22 16:15	
Isopentane	0.199	Mol %	0.001	99	90	110			
n-Pentane	0.200	Mol %	0.001	100	90	110			
Hexanes plus	0.153	Mol %	0.001	102	90	110			
<b>Method: GPA 2261</b>							Batch: R269910		
<b>Lab ID: G22030304-001ADUP</b>	Sample Duplicate		Run: Varian GC_220318A				03/18/22 16:10		
Oxygen	22.129	Mol %	0.001				0.0	10	
Nitrogen	77.623	Mol %	0.001				0.0	10	
Carbon Monoxide	< 0.001	Mol %	0.001					10	
Carbon Dioxide	0.248	Mol %	0.001				0.4	10	
Hydrogen Sulfide	< 0.001	Mol %	0.001					10	
Methane	< 0.001	Mol %	0.001					10	
Ethane	< 0.001	Mol %	0.001					10	
Propane	< 0.001	Mol %	0.001					10	
Isobutane	< 0.001	Mol %	0.001					10	
n-Butane	< 0.001	Mol %	0.001					10	
Isopentane	< 0.001	Mol %	0.001					10	
n-Pentane	< 0.001	Mol %	0.001					10	
Hexanes plus	< 0.001	Mol %	0.001					10	

### Qualifiers:

RL - Analyte Reporting Limit

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## Work Order Receipt Checklist

Hall Environmental

G22030304

Login completed by: Jill S. Jeffress

Date Received: 3/17/2022

Reviewed by: Misty Stephens

Received by: jsj

Reviewed Date: 3/22/2022

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	20.4°C No Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input checked="" type="checkbox"/>

### Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

### Contact and Corrective Action Comments:

None



## CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

Hall Environmental Analysis Laboratory  
 4901 Hawkins NE  
 Albuquerque, NM 87109  
 TEL. 505-345-3975  
 FAX 505-345-4107  
 Website: clients.hallenvironmental.com

SUB CONTRACTOR		Energy Labs-Gillette		COMPANY		Energy Laboratories		PHONE		FAX	
ADDRESS		400 W Boxelder Rd		ACCOUNT #		EMAIL					
CITY, STATE, ZIP		Gillette, WY 82718									
ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS					
1	2203828-001B	Influent 3-15-22	TEDLAR	Air	3/15/2022 12:30:00 PM	1 FIXED GASES O <sub>2</sub> , CO <sub>2</sub> , CO * RUSH 7 DAY TAT*					
ANALYTICAL COMMENTS											

## SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By	SN	Date	3/16/2022	Time	9:24 AM	Received By	Jim Jeffries	Date	3/16/2022	Time	1:00 PM
Relinquished By		Date		Time		Received By		Date		Time	
Relinquished By		Date		Time		Received By		Date		Time	
TAT	Standard <input type="checkbox"/>	<input checked="" type="radio"/> RUSH	Next BD <input type="checkbox"/>	2nd BD <input type="checkbox"/>	3rd BD <input type="checkbox"/>	REPORT TRANSMITTAL DESIRED <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE Temp of samples <u>20.4</u> °C Attempt to Cool? <u>no</u> Comments: <u>FE0 BY 12</u>					



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: clients.hallenvironmental.com

## Sample Log-In Check List

Client Name: HILCORP ENERGY

Work Order Number: 2203828

RcptNo: 1

Received By: Tracy Casarrubias

3/16/2022 8:00:00 AM

Completed By: Sean Livingston

3/16/2022 8:59:50 AM

Reviewed By: *SR 3/16/22**SR Livingston*

### Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Courier

### Log In

3. Was an attempt made to cool the samples? Yes ☐ No ☐ NA ☒
4. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☐ No ☐ NA ☒
5. Sample(s) in proper container(s)? Yes ☒ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
8. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
9. Received at least 1 vial with headspace  $<1/4"$  for AQ VOA? Yes ☐ No ☐ NA ☒
10. Were any sample containers received broken? Yes ☐ No ☒
11. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
13. Is it clear what analyses were requested? Yes ☒ No ☐
14. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved  
bottles checked  
for pH:

( $<2$  or  $\geq 12$  unless noted)

Adjusted? \_\_\_\_\_

Checked by: *SR 3/16/22*

### Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: \_\_\_\_\_

Date: \_\_\_\_\_

By Whom: \_\_\_\_\_

Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: \_\_\_\_\_

Client Instructions: \_\_\_\_\_

16. Additional remarks:

### 17. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	NA	Good				





**District I**

1625 N. French Dr., Hobbs, NM 88240  
Phone:(575) 393-6161 Fax:(575) 393-0720

**District II**

811 S. First St., Artesia, NM 88210  
Phone:(575) 748-1283 Fax:(575) 748-9720

**District III**

1000 Rio Brazos Rd., Aztec, NM 87410  
Phone:(505) 334-6178 Fax:(505) 334-6170

**District IV**

1220 S. St Francis Dr., Santa Fe, NM 87505  
Phone:(505) 476-3470 Fax:(505) 476-3462

**State of New Mexico**  
**Energy, Minerals and Natural Resources**  
**Oil Conservation Division**  
**1220 S. St Francis Dr.**  
**Santa Fe, NM 87505**

CONDITIONS

Action 97378

**CONDITIONS**

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 97378
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

**CONDITIONS**

Created By	Condition	Condition Date
nvelez	Accepted for the record. See App ID 124692 for most updated status.	9/27/2022