



April 12, 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**  
Sullivan GC D #1E  
San Juan County, New Mexico  
Hilcorp Energy Company  
NMOCD Incident Number: NCS1518952648  
Ensolum Project No. 07A1988029

OCD 7/6/2022

A handwritten signature in blue ink, appearing to read "Long Shu".

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 Sullivan GC D #1E natural gas production well (Site), located in Unit F of Section 26 of Township 29 North and Range 11 West in San Juan County, New Mexico (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 original SVE system was installed at the Site by XTO Energy, the previous Site owner, in April 2016 in response to a release originating from a broken fiberglass line used to transfer natural gas condensate. The original SVE system was purchased from Geotech Environmental Equipment, Inc. (Geotech) and operated successfully until the summer of 2018. Due to a broken SVE blower motor, the SVE system did not operate between 2018 and March of 2022; however, a rental SVE system was brought onto the Site and began operation on December 2, 2021. The blower motor from the original Geotech system was replaced on March 21, 2022 and the Geotech SVE system was put back into service.

The current Geotech SVE system is configured so that vacuum is being applied to wells PR-1, MW-01, MW-02, MW-05, and MW-06 (shown on Figure 2). The SVE system consists of a 3 horsepower Rotron model EN656 regenerative blower capable of producing 212 standard cubic feet per minute (scfm) of flow and 73 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 verify the system was operating as designed and to perform any required maintenance. Field notes taken during O&M

Hilcorp Energy Company  
Sullivan GC D#1E  
April 12, 2022



visits are presented in Appendix A. During the first quarter of 2022, all SVE wells (PR-1, MW-01, MW-02, MW-05, and MW-06) were operated in order to induce air flow in impacted soil within the source area. Between January 10 and March 16, 2022, the rental SVE system operated for 1,557 hours, for a runtime efficiency of 99.81 percent (%). Appendix B presents Photographs 1 and 2 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. Additionally, Photographs 3 and 4 were taken of the runtime meters from the rental SVE system and the permanent Geotech SVE system, respectively, to be used to accurately calculate the runtime efficiency during the second quarter of 2022.

A first quarter emissions sample was collected from the rental SVE system on March 16, 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), located in Albuquerque, New Mexico for analysis of total volatile petroleum hydrocarbons (TVPH, also referred to 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 Processor Association (GPS) Method 2261. Table 2 presents a summary of analytical data collected during this sampling event and previous sampling events, with the full laboratory analytical report included in Appendix C.

Of note, the analytical data collected during the March 16, 2022 sampling event indicate substantially lower concentrations of VOCs and TVPH as compared to historical results. While conducting a Site visit on March 21, 2022, it was discovered that there was a broken pipe joint connecting SVE well MW-01 to the manifold. It is believed that fresh air was being pulled through the system, diluting the effluent emissions from the system, and accounted for abnormal analytical results. Since that time, the broken joint has been repaired and the system is operating as designed.

Emission 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, 89,994 pounds (45 tons) of TVPH have been removed by the system to date.

## RECOMMENDATIONS

Bi-weekly operation and maintenance (O&M) visits will continue to be performed by Ensolum and/or Hilcorp personnel to verify 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. Hilcorp will continue operating the SVE until asymptotic emissions are observed. At that time, an evaluation of residual petroleum hydrocarbons will be assessed and further recommendations for remedial actions, if any, will be provided to NMOCD.

Hilcorp Energy Company  
Sullivan GC D#1E  
April 12, 2022



We appreciate the opportunity to provide this report to the NMOCD. If you should have any questions or comments regarding this proposal, please contact the undersigned.

Sincerely,  
**Ensolum, LLC**

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

Daniel R. Moir, PG  
Senior Managing Geologist  
(303) 887-2946  
dmoir@ensolum.com

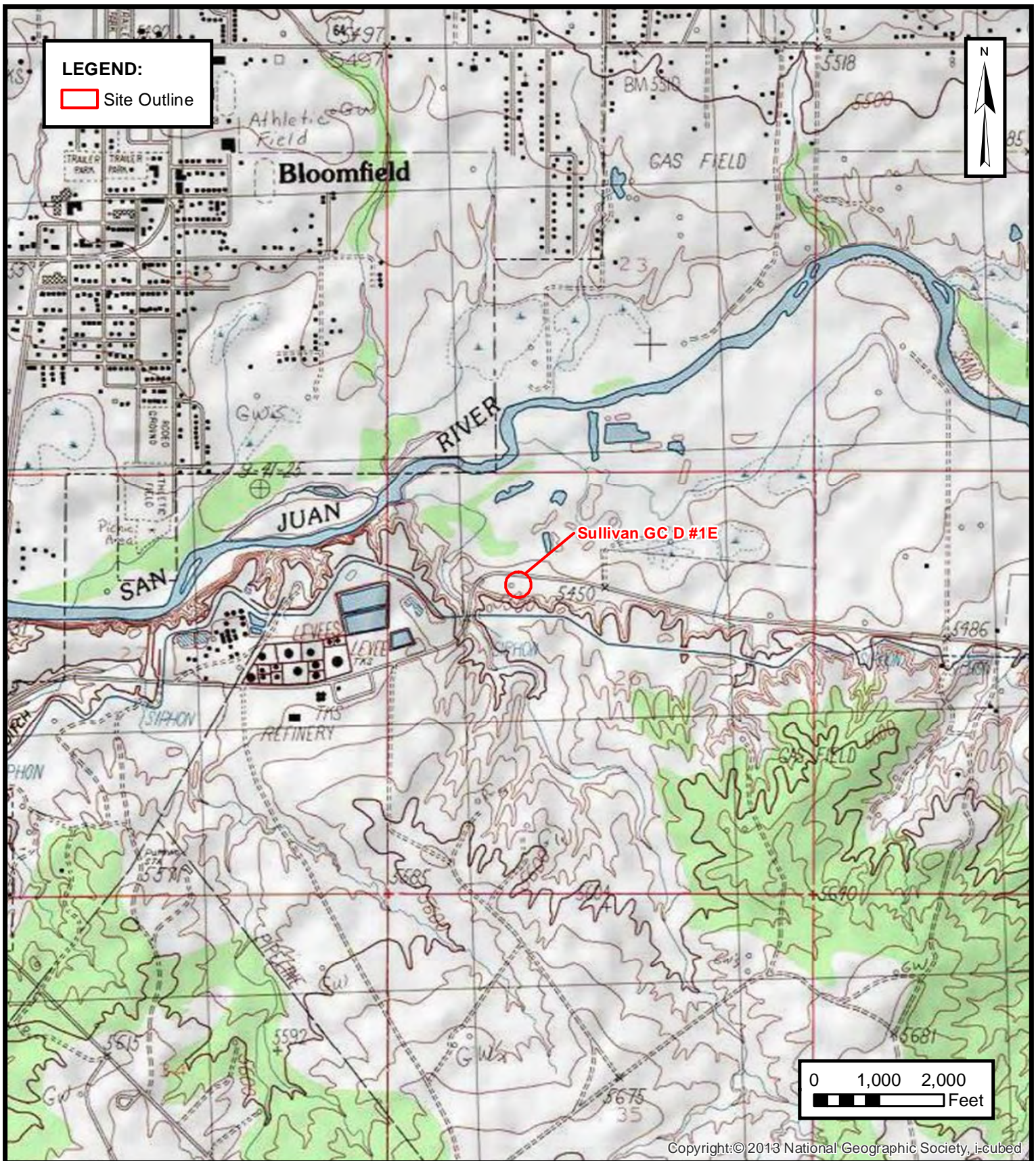
**Attachments:**

Figure 1	Site Location
Figure 2	SVE System Layout
Table 1	Soil Vapor Extraction System Runtime Calculations
Table 2	Soil Vapor Extraction System Emission 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





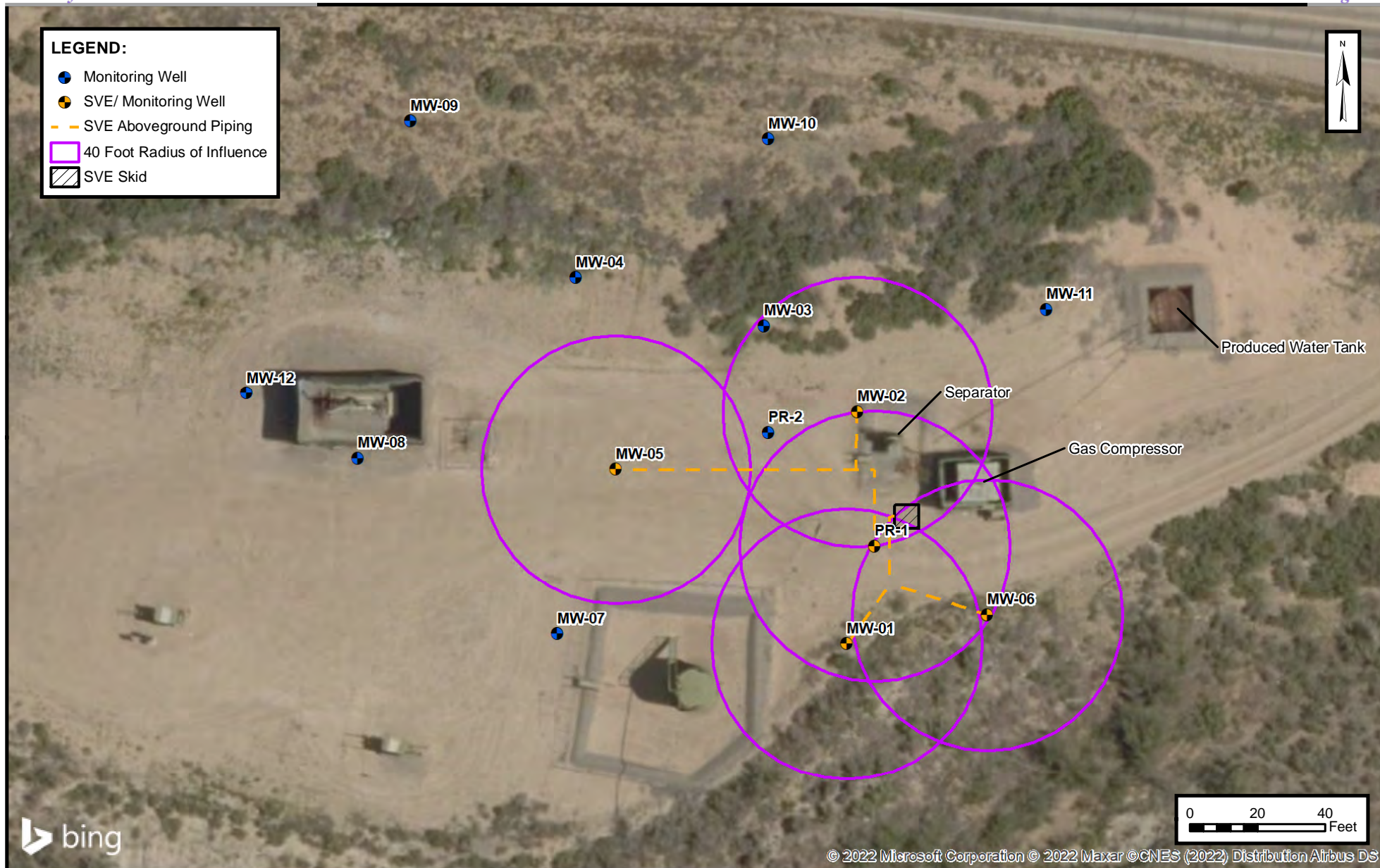
## SITE LOCATION

HILCORP ENERGY COMPANY  
SULLIVAN GC D #1E  
San Juan County, New Mexico  
36.885855° N, 107.899525° W

PROJECT NUMBER: 07A1988029

**FIGURE**  
**1**





### SVE SYSTEM LAYOUT

HILCORP ENERGY COMPANY  
SULLIVAN GC D #1E  
San Juan County, New Mexico  
36.885855° N, 107.899525° W

PROJECT NUMBER:07A1988029

FIGURE

2



TABLES



**TABLE 1**  
**SOIL VAPOR EXTRACTION SYSTEM RUNTIME CALCULATIONS**  
Hilcorp Energy Company - Sullivan GC D#1E  
San Juan County, New Mexico  
  
Ensolum Project No. 07A1988029

**Rental SVE Skid Runtime Operation**

Date	Total Operational Hours	Delta Hours	Days	% Runtime
1/10/2022	1,906	--	--	--
3/16/2022	3,463	1,557	65	99.81%

**Permanent Geotech SVE Skid Runtime Operation**

Date	Total Operational Hours	Delta Hours	Days	% Runtime
3/21/2022	1.6	--	--	--





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

Hilcorp Energy Company - Sullivan GC D #1E  
San Juan County, New Mexico

Ensolum Project No. 07A1988029

Date	PID (ppm)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	TVPH/GRO (µg/L)	Oxygen (%)	Carbon Dioxide (%)
4/18/2016	--	840	1,900	87	840	140,000	--	--
4/20/2016	2,375	840	1,900	87	840	140,000	--	--
4/29/2017	3,520	280	1,000	64	630	65,000	--	--
8/11/2016	4,215	92	700	90	910	23,000	--	--
1/24/2018	2,837	46	140	<5.0	410	21,000	--	--
6/29/2018	3,000	63	210	<5.0	410	27,000	--	--
12/2/2021	741	15	<5.0	<5.0	99	33,000	--	--
3/16/2022 (1)	982	<0.10	<0.10	<0.10	1.1	64	19.4	1.23

**Notes:**

(1): piping to SVE well MW-01 was disconnected allowing fresh air to be pulled into the system and biasing analytical results low, issue was discovered March 21, 2022

GRO: gasoline range hydrocarbons

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 (RL)



TABLE 3  
SOIL VAPOR EXTRACTION SYSTEM MASS REMOVAL AND EMISSIONS  
Hilcorp Energy Company - Sullivan GC D #1E  
San Juan County, New Mexico  
Ensolum Project No. 07A1988029

Flow and Laboratory Analysis						
Date	PID (ppm)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	TVPH (µg/L)
4/18/2016	--	840	1,900	87	840	140,000
4/20/2016	2,375	840	1,900	87	840	140,000
4/29/2017	3,520	280	1,000	64	630	65,000
8/11/2016	4,215	92	700	90	910	23,000
1/24/2018	2,837	46	140	5.0	410	21,000
6/29/2018	3,000	63	210	5.0	410	27,000
12/2/2021	741	15	5.0	5.0	99	33,000
3/16/2022 (1)	982	0.10	0.10	0.10	1.1	64
Average	2,524	272	732	43	518	56,133

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)
4/18/2016	90	0	0	0.283	0.640	0.029	0.283	47.13
4/20/2016	109	313,920	313,920	0.342	0.775	0.035	0.342	57.07
4/29/2017	90	1,480,320	1,166,400	0.189	0.488	0.025	0.247	34.50
8/11/2016	70	6,923,520	5,443,200	0.049	0.223	0.020	0.202	11.52
1/24/2018	60	--	--	0.015	0.094	0.011	0.148	4.94
6/29/2018	41	53,246,160	46,322,640	0.008	0.027	0.001	0.063	3.68
12/2/2021	Rental SVE System Startup							
12/2/2021	49	53,246,160	0	0	0	0	0	0
3/16/2022 (1)	49	60,581,754	7,335,594	0.0014	0.00047	0.00047	0.0092	3.0
Average				0.111	0.281	0.015	0.162	20.233

Flow and Laboratory Analysis								
Date	Total SVE System Hours	Delta Hours	Benzene (pounds)	Toluene (pounds)	Ethylbenzene (pounds)	Total Xylenes (pounds)	TVPH (pounds)	TVPH (tons)
4/18/2016	0	0	0.0	0.0	0.0	0.0	0.0	0.0
4/20/2016	48	48	16.4	37.2	1.7	16.4	2,739.5	1.4
4/29/2017	264	216	40.7	105.4	5.5	53.4	7,452.5	3.7
8/11/2016	1,560	1,296	63.1	288.4	26.1	261.3	14,929.2	7.5
1/24/2018	--	--	--	--	--	--	--	--
6/29/2018	16,848	15,288	127.8	410.3	11.7	961.2	56,263.6	28.1
12/2/2021	Rental SVE System Startup							
12/2/2021	968	0	0.0	0.0	0.0	0.0	0.0	0.0
3/16/2022 (1)	3,463	2,495	3.5	1.2	1.2	22.9	7,559.5	3.8
Total Mass Recovery to Date			251	842	46	1,315	88,944	44

Notes:

(1): piping to SVE well MW-01 was disconnected allowing fresh air to be pulled into the system and biasing analytical results low, issue was discovered March 21, 2022

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



1-10-22

Location Sullivan GC D#1E Date 1/10/22 141Project / Client Hillcorp  
D. Burns, R. Hansen T-1251455 - on site for system O&M  
- system running upon arrival1500 - SVE Blower hours: 1906.4  
Temp: 90°F

No liquids observed in process Skid KO tank

Total Flow: 124 CFM

KO tank vac: -19 IWC

Post KO tank vac: -21 IWC

Leg 1 vac: -11 IWC

Leg 1 Flow: 50 SCFM

Green KO tank vacuum: -18 IWC

WELL | PID

MW-06 | 288

MW-01 | 289.4

PR-1 | 221

MW-02 | 181

MW-05 | 82.0 - SVE disconnected @

PID - In Fluvit LEG 1 | 491 hose clamp

PID - exhaust stack | 287 gasket

Cont. → Rite in the Rain



DATE: 2/4/22 O&M PERSONNEL: Rocco Hanson  
TIME ONSITE: 1025 TIME OFFSITE: 1115

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

Change in Well Operation:					
Zone / Leg A	LOCATION	VACUUM (IWC)	PID HEADSPACE (PPM)	FLOW (CFM)	ADJUSTMENTS
	MW-01		16.1		
	MW-02		22.0		
	MW-05		42.4	71.1	
	MW-06		42.4	74.4	
	PR-2 DR-1		35.9	74.4	

[illegible]

COMMENTS/OTHER MAINTENANCE

O&M PERSONNEL: Roece Hansen  
TIME OFFSITE: 1115

Blower Temp: 100° F

\* vacuum pump not creating vacuum to sample, possible broken seal





## APPENDIX B

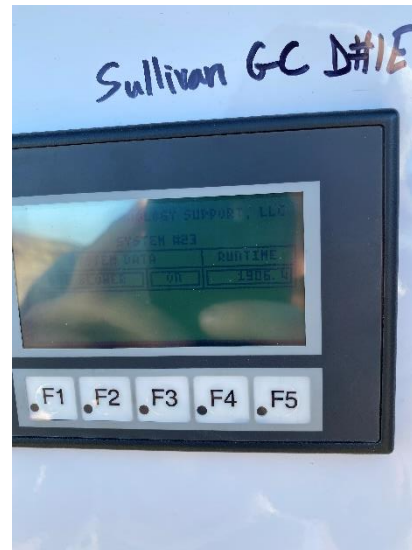
### Project Photographs



**PROJECT PHOTOGRAPHS**  
Sullivan GC D #1E  
San Juan County, New Mexico  
Hilcorp Energy Company

**Photograph 1**

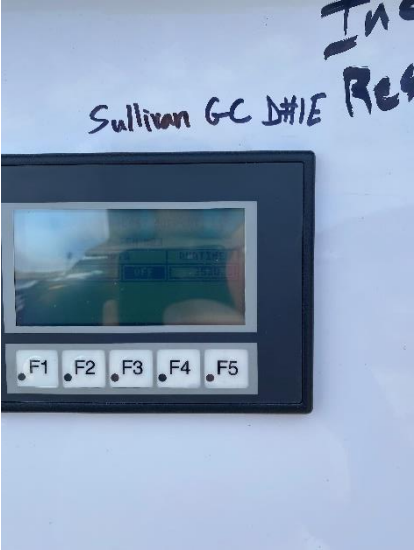

Runtime meter taken on January 10, 2022 from the rental SVE skid

**Photograph 2**

Runtime meter taken on March 16, 2022 from the rental SVE skid



**PROJECT PHOTOGRAPHS**  
Sullivan GC D #1E  
San Juan County, New Mexico  
Hilcorp Energy Company

<p><b>Photograph 3</b></p> <p>Runtime meter taken on March 21, 2022 from the rental SVE skid</p>	
<p><b>Photograph 4</b></p> <p>Runtime meter taken on March 21, 2022 from the permanent Geotch SVE skid</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 28, 2022

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

RE: Sullivan GC D1E

OrderNo.: 2203923

Dear Mitch Killough:

Hall Environmental Analysis Laboratory received 1 sample(s) on 3/18/2022 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 2203923

Date Reported: 3/28/2022

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY

Client Sample ID: Influent 3-16-22

Project: Sullivan GC D1E

Collection Date: 3/16/2022 1:30:00 PM

Lab ID: 2203923-001

Matrix: AIR

Received Date: 3/18/2022 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: NSB
Gasoline Range Organics (GRO)	64	10		µg/L	2	3/21/2022 10:22:57 AM
Surr: BFB	218	37.3-213	S	%Rec	2	3/21/2022 10:22:57 AM
<b>EPA METHOD 8260B: VOLATILES</b>						Analyst: CCM
Benzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Toluene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Ethylbenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Methyl tert-butyl ether (MTBE)	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2,4-Trimethylbenzene	0.56	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,3,5-Trimethylbenzene	0.37	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2-Dichloroethane (EDC)	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2-Dibromoethane (EDB)	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Naphthalene	ND	0.20		µg/L	1	3/22/2022 2:10:00 PM
1-Methylnaphthalene	ND	0.40		µg/L	1	3/22/2022 2:10:00 PM
2-Methylnaphthalene	ND	0.40		µg/L	1	3/22/2022 2:10:00 PM
Acetone	ND	1.0		µg/L	1	3/22/2022 2:10:00 PM
Bromobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Bromodichloromethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Bromoform	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Bromomethane	ND	0.20		µg/L	1	3/22/2022 2:10:00 PM
2-Butanone	ND	1.0		µg/L	1	3/22/2022 2:10:00 PM
Carbon disulfide	ND	1.0		µg/L	1	3/22/2022 2:10:00 PM
Carbon tetrachloride	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Chlorobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Chloroethane	ND	0.20		µg/L	1	3/22/2022 2:10:00 PM
Chloroform	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Chloromethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
2-Chlorotoluene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
4-Chlorotoluene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
cis-1,2-DCE	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
cis-1,3-Dichloropropene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2-Dibromo-3-chloropropane	ND	0.20		µg/L	1	3/22/2022 2:10:00 PM
Dibromochloromethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Dibromomethane	ND	0.20		µg/L	1	3/22/2022 2:10:00 PM
1,2-Dichlorobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,3-Dichlorobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,4-Dichlorobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Dichlorodifluoromethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1-Dichloroethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1-Dichloroethene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM

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.
	D	Sample Diluted Due to Matrix
	H	Holding times for preparation or analysis exceeded
	ND	Not Detected at the Reporting Limit
	PQL	Practical Quantitative Limit
	S	% Recovery outside of range due to dilution or matrix interference

B	Analyte detected in the associated Method Blank
E	Estimated value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Page 1 of 2

## Analytical Report

Lab Order 2203923

Date Reported: 3/28/2022

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY

Client Sample ID: Influent 3-16-22

Project: Sullivan GC D1E

Collection Date: 3/16/2022 1:30:00 PM

Lab ID: 2203923-001

Matrix: AIR

Received Date: 3/18/2022 8:05:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8260B: VOLATILES</b>						Analyst: CCM
1,2-Dichloropropane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,3-Dichloropropane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
2,2-Dichloropropane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1-Dichloropropene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Hexachlorobutadiene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
2-Hexanone	ND	1.0		µg/L	1	3/22/2022 2:10:00 PM
Isopropylbenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
4-Isopropyltoluene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
4-Methyl-2-pentanone	ND	1.0		µg/L	1	3/22/2022 2:10:00 PM
Methylene chloride	ND	0.30		µg/L	1	3/22/2022 2:10:00 PM
n-Butylbenzene	ND	0.30		µg/L	1	3/22/2022 2:10:00 PM
n-Propylbenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
sec-Butylbenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Styrene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
tert-Butylbenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1,1,2-Tetrachloroethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1,2,2-Tetrachloroethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Tetrachloroethene (PCE)	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
trans-1,2-DCE	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
trans-1,3-Dichloropropene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2,3-Trichlorobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2,4-Trichlorobenzene	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1,1-Trichloroethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,1,2-Trichloroethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Trichloroethene (TCE)	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Trichlorofluoromethane	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
1,2,3-Trichloropropane	ND	0.20		µg/L	1	3/22/2022 2:10:00 PM
Vinyl chloride	ND	0.10		µg/L	1	3/22/2022 2:10:00 PM
Xylenes, Total	1.1	0.15		µg/L	1	3/22/2022 2:10:00 PM
Surr: Dibromofluoromethane	103	70-130		%Rec	1	3/22/2022 2:10:00 PM
Surr: 1,2-Dichloroethane-d4	101	70-130		%Rec	1	3/22/2022 2:10:00 PM
Surr: Toluene-d8	92.8	70-130		%Rec	1	3/22/2022 2:10:00 PM
Surr: 4-Bromofluorobenzene	93.8	70-130		%Rec	1	3/22/2022 2:10:00 PM

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 25, 2022

Hall Environmental

4901 Hawkins St NE Ste D

Albuquerque, NM 87109-4372

Work Order: G22030363

Project Name: Not Indicated

Energy Laboratories Inc. Gillette WY received the following 1 sample for Hall Environmental on 3/22/2022 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
G22030363-001	2203923-001B; Influent 3-16-22	03/16/22 13:30	03/22/22	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:** 2203923-001B; Influent 3-16-22  
**Location:**  
**Lab ID:** G22030363-001

**Report Date:** 03/25/22  
**Collection Date:** 03/16/22 13:30  
**Date Received:** 03/22/22  
**Sampled By:** Not Indicated

### Analyses

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

### NATURAL GAS CHROMATOGRAPHIC ANALYSIS REPORT

Oxygen	19.445 Mol %	GPA 2261	03/24/22 13:49 / blb
Nitrogen	78.851 Mol %	GPA 2261	03/24/22 13:49 / blb
Carbon Monoxide	< 0.001 Mol %	GPA 2261	03/24/22 13:49 / blb
Carbon Dioxide	1.228 Mol %	GPA 2261	03/24/22 13:49 / blb
Hydrogen Sulfide	< 0.001 Mol %	GPA 2261	03/24/22 13:49 / blb
Methane	0.398 Mol %	GPA 2261	03/24/22 13:49 / blb
Ethane	0.042 Mol %	GPA 2261	03/24/22 13:49 / blb
Propane	0.014 Mol %	GPA 2261	03/24/22 13:49 / blb
Isobutane	0.004 Mol %	GPA 2261	03/24/22 13:49 / blb
n-Butane	0.004 Mol %	GPA 2261	03/24/22 13:49 / blb
Isopentane	0.002 Mol %	GPA 2261	03/24/22 13:49 / blb
n-Pentane	0.001 Mol %	GPA 2261	03/24/22 13:49 / blb
Hexanes plus	0.011 Mol %	GPA 2261	03/24/22 13:49 / blb

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

GPM Ethane	0.0110 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM Propane	0.0040 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM Isobutane	0.0010 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM n-Butane	0.0010 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM Isopentane	0.0010 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM n-Pentane	< 0.0004 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM Hexanes plus	0.0050 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM Pentanes plus	0.0060 gal/MCF	GPA 2261	03/24/22 13:49 / blb
GPM Total	0.0240 gal/MCF	GPA 2261	03/24/22 13:49 / blb

### CALCULATED PROPERTIES

Calculation Pressure Base	14.730 psia	GPA 2261	03/24/22 13:49 / blb
Calculation Temperature Base	60 °F	GPA 2261	03/24/22 13:49 / blb
Compressibility Factor, Z	1.0000 unitless	GPA 2261	03/24/22 13:49 / blb
Molecular Weight	28.95 unitless	GPA 2261	03/24/22 13:49 / blb
Pseudo-critical Pressure, psia	548 psia	GPA 2261	03/24/22 13:49 / blb
Pseudo-critical Temperature, deg R	242 deg R	GPA 2261	03/24/22 13:49 / blb
Specific Gravity (air=1.000)	1.003 unitless	GPA 2261	03/24/22 13:49 / blb
Gross BTU per cu ft @ std cond, dry	6.10 BTU/cu ft	GPA 2261	03/24/22 13:49 / blb
Gross BTU per cu ft @ std cond, wet	5.99 BTU/cu ft	GPA 2261	03/24/22 13:49 / 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: G22030363

Report Date: 03/25/22

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: GPA 2261</b>							Analytical Run: R270004		
<b>Lab ID: CCV-2203241254</b>	Continuing Calibration Verification Standard						03/24/22 12:55		
Oxygen	0.637	Mol %	0.001	106	90	110			
Nitrogen	1.378	Mol %	0.001	98	85	110			
Carbon Dioxide	0.954	Mol %	0.001	95	90	110			
Hydrogen Sulfide	0.025	Mol %	0.001	100	70	130			
Methane	93.438	Mol %	0.001	100	90	110			
Ethane	1.014	Mol %	0.001	101	90	110			
Propane	1.009	Mol %	0.001	101	90	110			
Isobutane	0.495	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-2203241303</b>	Initial Calibration Verification Standard						03/24/22 13:04		
Oxygen	0.391	Mol %	0.001	97	75	110			
Nitrogen	5.154	Mol %	0.001	103	90	110			
Carbon Dioxide	4.900	Mol %	0.001	99	90	110			
Hydrogen Sulfide	0.130	Mol %	0.001	131	100	136			
Methane	73.196	Mol %	0.001	100	90	110			
Ethane	4.997	Mol %	0.001	101	90	110			
Propane	4.993	Mol %	0.001	100	90	110			
Isobutane	1.984	Mol %	0.001	99	90	110			
n-Butane	1.965	Mol %	0.001	98	90	110			
Isopentane	0.986	Mol %	0.001	99	90	110			
n-Pentane	0.997	Mol %	0.001	100	90	110			
Hexanes plus	0.307	Mol %	0.001	102	90	110			
<b>Lab ID: ICV1-2203241325</b>	Initial Calibration Verification Standard						03/24/22 13:25		
Nitrogen	98.951	Mol %	0.001	100	90	110			
Carbon Monoxide	1.049	Mol %	0.001	103	90	110			
<b>Lab ID: CCV1-2203241334</b>	Continuing Calibration Verification Standard						03/24/22 13:35		
Nitrogen	99.904	Mol %	0.001	100	85	110			
Carbon Monoxide	0.096	Mol %	0.001	95	90	110			
<b>Lab ID: CCV-2203241628</b>	Continuing Calibration Verification Standard						03/24/22 16:28		
Oxygen	0.609	Mol %	0.001	102	90	110			
Nitrogen	1.288	Mol %	0.001	92	85	110			
Carbon Dioxide	0.965	Mol %	0.001	97	90	110			
Hydrogen Sulfide	0.021	Mol %	0.001	84	70	130			
Methane	93.560	Mol %	0.001	100	90	110			
Ethane	1.015	Mol %	0.001	101	90	110			
Propane	1.006	Mol %	0.001	101	90	110			
Isobutane	0.492	Mol %	0.001	98	90	110			
n-Butane	0.492	Mol %	0.001	98	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: G22030363

Report Date: 03/25/22

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: GPA 2261</b>							Analytical Run: R270004		
<b>Lab ID: CCV-2203241628</b>	Continuing Calibration Verification Standard							03/24/22 16:28	
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: R270004		
<b>Lab ID: G22030363-001ADUP</b>	Sample Duplicate		Run: Varian GC_220324A				03/24/22 13:58		
Oxygen	19.447	Mol %	0.001				0.0	10	
Nitrogen	78.839	Mol %	0.001				0.0	10	
Carbon Monoxide	< 0.001	Mol %	0.001					10	
Carbon Dioxide	1.228	Mol %	0.001				0.0	10	
Hydrogen Sulfide	< 0.001	Mol %	0.001					10	
Methane	0.409	Mol %	0.001				2.7	10	
Ethane	0.042	Mol %	0.001				0.0	10	
Propane	0.014	Mol %	0.001				0.0	10	
Isobutane	0.004	Mol %	0.001				0.0	10	
n-Butane	0.004	Mol %	0.001				0.0	10	
Isopentane	0.002	Mol %	0.001				0.0	10	
n-Pentane	0.001	Mol %	0.001				0.0	10	
Hexanes plus	0.010	Mol %	0.001				9.5	10	

### Qualifiers:

RL - Analyte Reporting Limit

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## Work Order Receipt Checklist

Hall Environmental

G22030363

Login completed by: Jill S. Jeffress

Date Received: 3/22/2022

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 type="checkbox"/>	Not Applicable <input checked="" type="checkbox"/>
Container/Temp Blank temperature:	°C		
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:

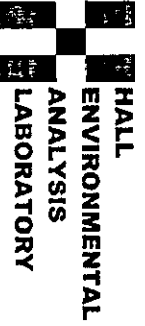
Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

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

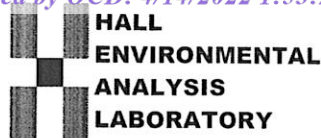
SUB CONTRACTOR		Energy Labs-Gillette		COMPANY	Energy Laboratories		PHONE	(866) 686-7175		FAX
ADDRESS		400 W Boxelder Rd		ACCOUNT #				EMAIL		
CITY STATE ZIP		Gillette, WY 82718								
ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS				
1	2203923-001B	Influent 3-16-22	FEDLAR	Air	3/16/2022 1:30:00 PM	1 FIXED GASES O <sub>2</sub> , CO <sub>2</sub> , CO				
ANALYTICAL COMMENTS										

6220 30363

## 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	<i>Cec</i>	Date	3/18/2022	Time	12:02 PM	Received By	<i>M. Ray</i>	Date	3/22/2022	Time	11:09
Relinquished By		Date		Time		Received By		Date		Time	
Relinquished By		Date		Time		Received By		Date		Time	
TAT:	Standard	RUSH	New BD	2nd BD	3rd BD						
<div style="display: flex; justify-content: space-between;"> <div> <p>Temp of samples</p> <p>Comments</p> </div> <div> <p>REPORT TRANSMITTAL DESIRED</p> <p>HARDCOPY (extra cost)</p> <p>FAX</p> <p>EMAIL</p> <p>ONLINE</p> </div> <div> <p>FOR LAB USE ONLY</p> <p>Attempt to Cool?</p> </div> </div>											



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: 2203923

RcptNo: 1

Received By: Cheyenne Cason 3/18/2022 8:05:00 AM

Completed By: Cheyenne Cason 3/17/2022 8:12:03 AM

Reviewed By: *[Signature]* 3-18-22

JTA 3-18-22

JR 3/18/22

### 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  $>12$  unless noted)

Adjusted?

Checked by: *[Signature]* 3-18-22

### 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	Yes			



[illegible]

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.



[www.hallenvironmental.com](http://www.hallenvironmental.com)

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

# Analysis Request

Project Manager:

Devin Henckman

Sampler: E. Carroll

On Ice:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
---------	---	-----------------------------

# of Coolers: ( NA

Cooler Temp<sub>(including CF)</sub>: ~~0.8 + 0.1~~ (°C)[illegible]

Container	Preservative	HEAL No.
-----------	--------------	----------

Type and # Type

35-11

20	Editor
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1111

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Received by:

Received by.

12

Received by:

2

but C

attracted to other a

Remarks:

cc: eric.carroll@wsp.com



**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 98719

**CONDITIONS**

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 98719
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

**CONDITIONS**

Created By	Condition	Condition Date
csmith	Quarterly Report Approved, Continue Operating as previously approved.	7/6/2022