ENSOLUM

November 29, 2022

New Mexico Oil Conservation Division
New Mexico Energy, Minerals, and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: Soil Vapor Extraction (SVE) Pilot Test Report and Final Remediation Work Plan
Sunray B 1B
San Juan County, New Mexico
Hilcorp Energy Company
NMOCD Incident No: nAPP2212649502

To Whom it May Concern:

On behalf of Hilcorp Energy Company (Hilcorp), Ensolum, LLC. (Ensolum) has prepared this *Soil Vapor Extraction (SVE) Pilot Test Report and Final Remediation Work Plan* for the Sunray B 1B natural gas production well (Site) on land managed by the Bureau of Land Management (BLM) in Unit F, Section 15, Township 30 North, Range 10 West in San Juan County, New Mexico (Figure 1).

SITE BACKGROUND

On April 26, 2022, Hilcorp discovered a release of produced water and condensate originating from a 1/8-inch hole in the 300-barrel (bbl) production storage tank at the Site. The hole appeared to be caused by corrosion of the steel tank. Based on the operator's tank-gauging data and the volume of fluid remaining in the tank, the release was estimated to consist of 7 barrels (bbls) of produced water (no volume recovered) and 14 bbls of condensate, of which 5 barrels were recovered. All released fluids stayed within the bermed, unlined secondary containment on the production pad. Immediately upon discovery, the operator shut off the oil dump controller and removed the remaining fluids from the production storage tank. Additionally, Hilcorp moved the tank and excavated the top three feet of visually impacted soil from the Site on April 27 to 29, 2022. Hilcorp submitted the initial Form C-141 to the New Mexico Oil Conservation Division (NMOCD) on May 6, 2022, and the Site was assigned NMOCD incident number nAPP2212649502. Hilcorp also submitted a *Report of Undesirable Event* to the BLM via sundry on May 9, 2022.

On June 27 and 28, 2022, Hilcorp retained Ensolum to perform delineation activities and identify the horizontal and vertical extent of impacts related to the Site release. In total, seven borings, BH01 through BH07, were advanced to depths up to 30 feet below ground surface (bgs) in the locations presented on Figure 2. Based on field screening results obtained during delineation activities, borings BH04 (SVE01), BH05 (SVE02), and BH02 (SVE03) were completed as soil vapor extraction (SVE) wells to be used for future remediation, if pilot test results were favorable. Additional details regarding the June 2022 investigations were presented in the *Site Characterization Report and Remediation Work Plan* (dated July 25, 2022) prepared by Ensolum. The work plan, approved by the NMOCD on September 13, 2022, presents further information regarding the release background, site characterization based on potential sensitive receptors

and depth to groundwater, site-specific closure criteria, delineation data, and a proposed remediation plan for the Site.

SITE CLOSURE CRITERIA

As presented in the July 25, 2022 work plan, the following closure criteria apply to the Site in accordance with *Table I, Closure Criteria for Soils Impacted by a Release* (Table I Closure Criteria), 19.15.29.12 of the New Mexico Administrative Code (NMAC):

- Chloride: 10,000 milligrams per kilogram (mg/kg)
- Total Petroleum Hydrocarbons (TPH) as a combination of gasoline range organics (GRO), diesel range organics (DRO), and motor oil range organics (MRO): 2,500 mg/kg
- TPH-GRO + TPH-DRO: 1,000 mg/kg
- A combination of benzene, toluene, ethylbenzene, and xylenes (BTEX): 50 mg/kg
- Benzene: 10 mg/kg

SVE SYSTEM PILOT TESTING

To determine if SVE is a feasible remedy at the Site and aid in future system design, Ensolum conducted a pilot test to determine the flow rate and applied vacuum required to volatilize and remove petroleum hydrocarbons from the impacted subsurface soils. Pilot test data was also used to estimate the system's radius-of-influence (ROI) and radius-of-effect (ROE) to determine well spacing and the need for additional SVE wells at the Site.

SVE Pilot Test Procedures

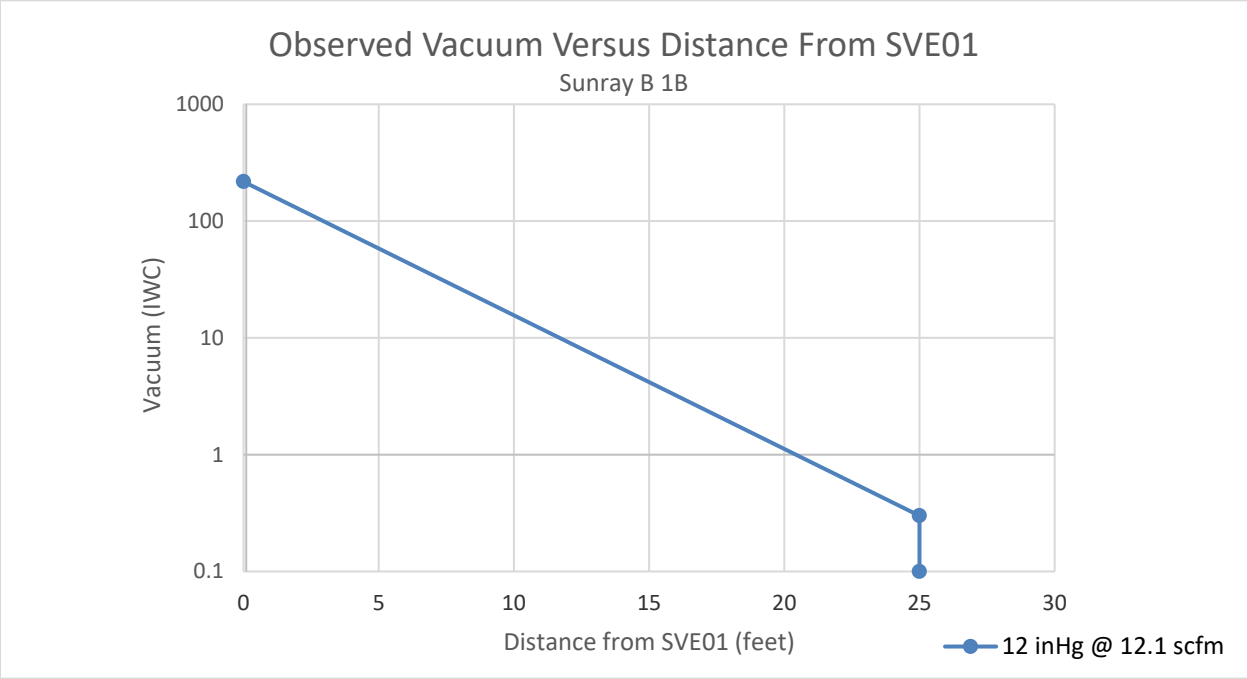
During SVE pilot testing activities, SVE01, screened from 6 feet to 16 feet bgs in the coarse sand and weathered sandstone encountered onsite, was used as the extraction well. A vacuum truck was used to apply a negative pressure to the well and an adjustable manifold was used to control the vacuum applied. Vacuum was gradually increased to determine the minimum vacuum necessary to achieve an effective ROI. Flow, vacuum, and field headspace results at the extraction well were recorded at 10- to 20-minute intervals throughout the test. Wells SVE02 (screened from 6 feet to 16 feet bgs) and SVE03 (screened from 10 feet to 25 feet bgs) were used as observation wells during testing. Vacuum influence and field headspace results were recorded at the observation wells at the same 10- to 20-minute intervals. The SVE well locations are presented on Figure 2. The following list summarizes the procedure of the SVE pilot test:

- Measured the distances from the extraction well to each observation well.
- Collected background measurements for volatile organic compounds (VOCs) using a photoionization detector (PID) at the SVE extraction and observation wells.
- Connected a flexible hose from the vacuum truck to the pilot test manifold, which was attached to the extraction well. Slowly opened the valve to increase flow and vacuum.
- Applied a low vacuum at approximately 7.5 inches of water column (IWC), then increased the vacuum/flow rate until influence was observed at the observation wells.
- Increased the vacuum/flow incrementally based on response observed. Tested vacuums between 7.5 IWC and 16 inches of mercury (inHg).
- Measured the vacuum and the field headspace at the observation wells. Recorded measurements approximately 10 to 20 minutes apart.

- Collected one air sample from SVE01 in a 1-Liter Tedlar® bag using a high-vacuum air sampler and submitted the sample for laboratory analysis.

SVE Pilot Test Results and Conclusions

Based on the pilot test data, SVE is a viable technology to remediate subsurface impacts at the Site. The vacuum responses observed during the pilot test are shown below for extraction well SVE01 and observation wells SVE02 and SVE03. Observation wells were both spaced 25 feet from the SVE test well (SVE01). Vacuum influence was observed at both observation wells as shown on the graph below.



As shown in the graph above, vacuum influence was observed at a distance of 25 feet at 12 inHg. A greater vacuum response was observed at SVE02 due to the corresponding well screening interval of that well to that of the extraction well; however, a vacuum response on the deeper-screened SVE03 was also observed with an applied vacuum of 12 inHg. Based on the vacuum observations, an ROI of at least 25 feet can be assumed.

The ROE was also calculated using the pilot test data, and calculations are included in Appendix A. The ROE was determined by calculating the annual pore volume exchange assuming an ROI of 25 feet at a flow rate of approximately 12 standard cubic feet per minute (scfm) to match the measured flow rate from the extraction well when 12 inHg vacuum was applied. The calculated pore volume indicates an annual pore volume exchange of 810, exceeding the literature values of at least 500 pore volume exchanges annually. Additionally, the pore velocity was calculated at the ROI of 25 feet for a flow rate of approximately 12 scfm to verify that the ROE corresponds with the observed ROI. The pore velocity was calculated to be 28 feet per day (ft/day), which exceeds the recommended velocity of 3 ft/day (DiGiulo and Ravi 1999).

Based on the data collected during pilot testing, Ensolum recommends installing a 4 horsepower Roots 32 URAI rotary lobe positive displacement blower or similar blower capable of producing approximately 142 inlet cubic feet per minute (icfm), or approximately 50 scfm at Site elevation and 12 inHg. At the elevation corrected flow rate and three wells each operating at 12 scfm (for a

combined system flow rate of approximately 36 scfm), the system can achieve an ROE of 25 feet, 810 annual pore volume exchanges, and a velocity of 28 ft/day. If an increase in individual well flow rate is observed after initial SVE system startup, the system will be designed so that SVE wells can be cycled to operate two at a time and induce the required vacuum. Pilot test calculations and additional information are presented in Appendix A.

During the pilot test, Ensolum collected an air sample from the pilot test manifold, via high vacuum air sampler. The air sample was collected in a 1-Liter Tedlar® bag and submitted to Hall Environmental Analysis Laboratory (Hall) for analysis of BTEX by EPA Method 8260, fixed gas analysis of oxygen and carbon dioxide, and TPH-GRO by EPA Method 8015. TPH-GRO was detected at a concentration of 140,000 micrograms per liter (µg/L) from well SVE01, indicating that SVE is capable of removing petroleum hydrocarbons from the subsurface. Table 1 presents a summary of analytical data collected during the pilot test, with the full analytical laboratory report included in Appendix B.

SVE SYSTEM INSTALLATION, STARTUP, AND OPERATIONS

As stated above, SVE is a viable technology to remediate subsurface impacts at the Site. Based on the calculations presented above, the SVE system should be sized to apply a minimum of 12 inHg vacuum and a flow rate of 142 icfm and 50 scfm. The system will be initially constructed to induce flow and vacuum on all SVE wells concurrently. However, an adjustable manifold will be constructed for the system allowing the wells to be cycled, if necessary.

Operations and Maintenance Plan

Regular operation and maintenance (O&M) visits will be conducted at the Site to ensure that the system is operating properly and assess for any required maintenance. Specifically, personnel will check that the SVE system is operating within normal working temperature, pressure, and vacuum range. System runtime will be recorded during each visit and vapor concentrations will be periodically measured with a PID from a sampling port located on the inlet side of the vacuum blower and prior to the dilution valve. Vacuum, temperature, and flow measurements will also be recorded. Any deviations from normal operating parameters will be recorded and corrected by on-site personnel, if possible. The SVE system will also be connected to Hilcorp's telemetry network so that a Hilcorp environmental manager will be notified immediately of any system downtime via email. Immediate notification will allow for quick response to maximize system runtime.

Future Runtime Calculations and Proposed Remediation Timeline

The SVE system will be tied into grid power to allow for 24 hours per day operation. Based on 24 hours of available runtime, the system will have to operate a minimum of 7,884 hours per year to maintain a 90 percent (%). A runtime meter will be installed on the SVE system in a location accessible to the NMOCD and will be used to track runtime hours. Downtime outside of Hilcorp's control (i.e., equipment failure) will be accounted for and the total available annual runtime hours will be adjusted. This information will be detailed and submitted to the NMOCD in quarterly Site reports.

The United States Army Corps of Engineers, *Soil Vapor Extraction and Bioventing – Engineer Manual,* dated June 3, 2002 states "Unless target cleanup goals are low or initial concentrations are very high, 1,000 to 1,500 pore volumes would be a good estimate of the required air exchanges". Assuming the permanent SVE system is able to achieve the anticipated flow and vacuum presented above, the system should be able to achieve 1,500 pore volume exchanges in approximately 22 months if 100% operational runtime is achieved. With a runtime of 90%, it is estimated that the system will operate at the Site for approximately 24 months. This estimate may be extended if it is determined that wells need to be cycled in order to achieve the required flow and vacuum. Additionally, if TPH-GRO concentrations collected from the system become asymptotic before the estimated closure date, the system will be adjusted in attempts to maximize performance and increase mass removal.

Quarterly reports will be prepared and submitted to the NMOCD to present air sample results, mass removal calculations, and any system adjustments required during the previous quarter of operation. Based on the above assumptions, the following general timeline is anticipated for the operation of the system. Day zero (0) is the date which NMOCD approvals this report and work plan.

- Months 0 to 6 – Acquire/construct and install the SVE system per the specifications outlined in this report. Additionally, a permanent power drop is not located at the Site and will need to be installed prior to system hookup. Hilcorp will work with the local electrical utility in order to install the appropriate power drop.
- 6 Months to 1.5 Years – Collect regular air samples from the SVE system at a location upgradient of the blower and any dilution valves. Assess system efficacy and update the remediation timeline based on sampling analytical results after one year of operation. Perform system maintenance and optimize system operation, as necessary. Continue O&M visits to monitor system performance and prepare quarterly reports;
- 1.5 Years to 2.5 Years – At any point, if air concentrations of TPH-GRO collected from the system become asymptotic and/or are below 1.0 milligrams per liter (mg/L), soil samples can be collected and analyzed for TPH and BTEX constituents to determine if concentrations are below NMOCD Table I Closure Criteria. Additionally, the system will be adjusted to maximize performance and address areas with remaining soil impacts. Continue air sample collection, monitoring, and reporting as necessary;
- Year 2.5 – Collect soil confirmation samples and analyze for TPH and BTEX constituents. Request site closure if soil sample results are below NMOCD Table I Closure Criteria. If soil concentrations are above Closure Criteria, the remediation timeline will be reviewed and the system will be adjusted to maximize performance and address areas with remaining soil impacts. Continue quarterly air sample collection, monitoring, and reporting as necessary.

REFERENCES

DiGiulio, D., Ravi, V., & Brusseau, M., 1999. Evaluation of mass flux to and from ground water using a vertical flux model (VFLUX): application to the soil vacuum extraction closure problem. Ground water monitoring & remediation, 19, 96-104. doi: 10.1111/j.1745-6592.1999.tb00210.x

United States Army Corps of Engineers (USACE), 2002. Engineering and Design, Soil Vapor Extraction and Bioventing - Engineer Manual, Document EM 1110-1-4001. June 3, 2002.

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

Sincerely,

Ensolum, LLC

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

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

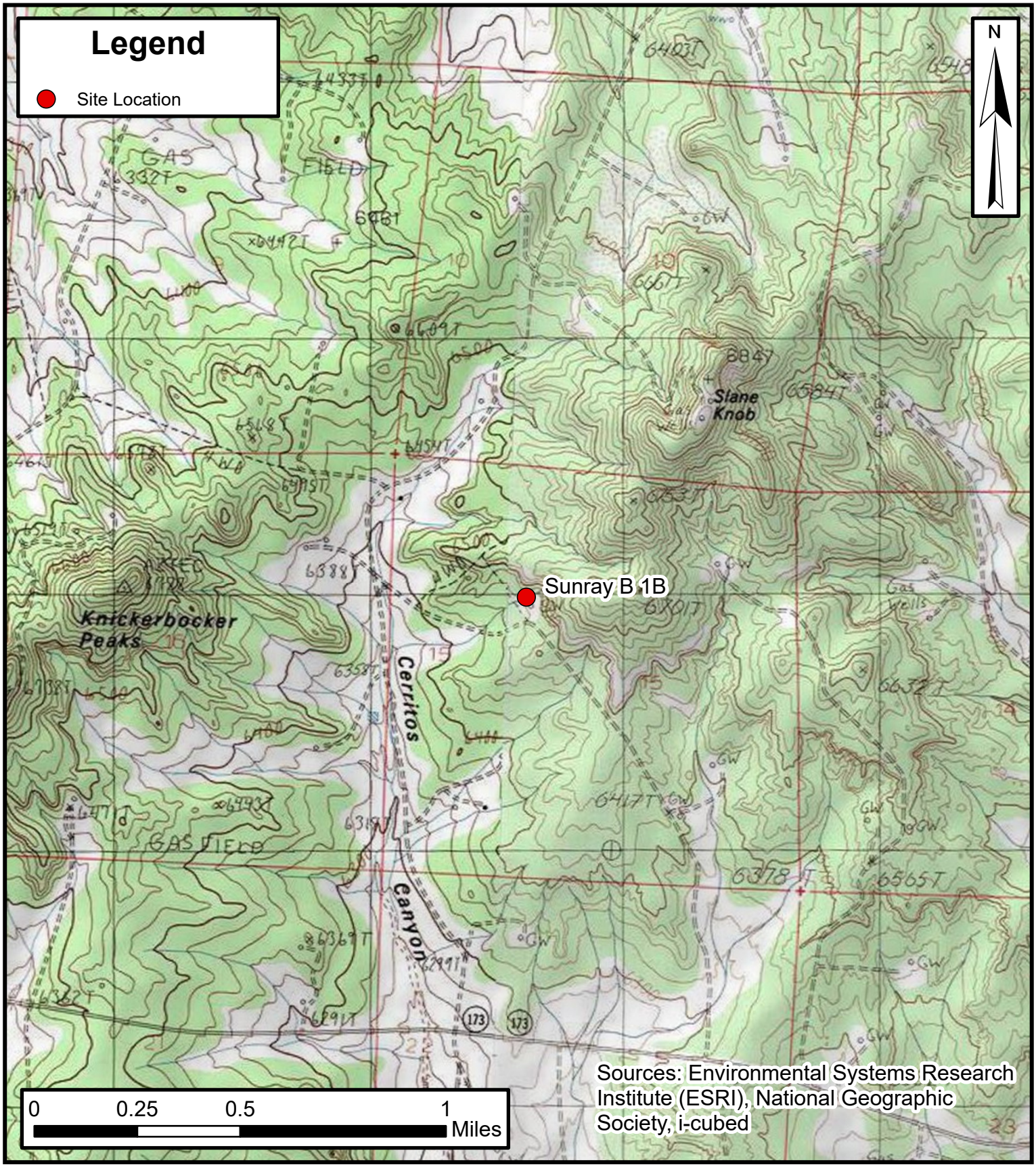
Hannah Mishriki, PE
Senior Engineer
(610) 390-7059
hmishriki@ensolum.com

Attachments:

Figure 1:	Site Location Map
Figure 2:	SVE System Radius of Influence and Radius of Effect
Table 1:	Soil Vapor Extraction Pilot Test Emissions Analytical Results
Appendix A:	Pilot Test Data and Calculations
Appendix B:	Laboratory Analytical Report

ENSOLUM

FIGURES



ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Site Location Map

Sunray B 1B
Hilcorp Energy Company

36.8147621, -107.8746643
San Juan County, New Mexico

FIGURE
1

ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

SVE System Radius of Influence and Radius of Effect

Sunray B 1B
Hilcorp Energy Company
36.8147621, -107.8746643
San Juan County, New Mexico

FIGURE
2

ENSOLUM

TABLES

ENSOLUM

TABLE 1
SOIL VAPOR EXTRACTION PILOT TEST EMISSIONS ANALYTICAL RESULTS
Hilcorp Energy Company - Sunray B 1B
San Juan County, New Mexico

Date	Event	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPVP/GRO (µg/L)	Inlet PID (ppm)
10/19/2022	Pilot Test	630	6,500	280	2300	140,000	802

Notes:

GRO: gasoline range hydrocarbons

µg/L: microgram per liter

PID: photoionization detector

ppm: parts per million

TVPH: total volatile petroleum hydrocarbons

ENSOLUM

APPENDIX A

Pilot Test Data and Calculations

SOIL VAPOR EXTRACTION SYSTEM PILOT TEST DATA

SUNRAY B 1B
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Date : 10/19/2022 2"

Extraction Test Well

SVE01/BH04

Pilot Test Extraction Well							Observation Wells		Observation Wells	
Time	Wellhead Vacuum (in. wc)	Well Velocity (fpm)	Vapor Temp (F)	Well Flow (acfm)	Well Flow (scfm)	PID at Stack (ppm)	**SVE02** Distance From **25**	**SVE03** Test Well (feet) **25**	**SVE02** Distance From **25**	**SVE03** Test Well (feet) **25**
							Vacuum (in. wc)		PID Measurement (ppm)	
10:00	---	---	--	--	--	--	0.0	0.0	2.4	0.0
10:20	7.5	40	70.0	0.9	0.9	1,106	0.0	0.0	8.6	0.0
10:30	17.0	75	70.5	1.6	1.5	1,304	0.0	0.0	8.1	0.0
10:45	35.7	180	72.5	3.9	3.5	1,583	0.0	0.0	6.2	0.0
11:00	58.1	375	71.7	8.2	7.0	961	0.0	0.0	2.0	0.0
11:10	82.9	520	75.0	11.3	8.9	784	0.0	0.0	13.1	0.0
11:20	107.5	680	72.4	14.8	10.8	774	0.0	0.0	7.3	0.0
11:30	163.2	930	71.4	20.3	12.1	511	0.3	0.1	6.3	0.0
11:40	190.4	1,020	73.5	22.3	11.8	664	0.3	0.1	9.8	0.0
12:00	217.6	1,075	73.4	23.5	10.9	745	0.3	0.1	8.7	0.0
12:15	217.6	1,270	72.4	27.7	12.8	802	0.3	0.1	5.4	0.0

Notes:
ND - not detected
in. wc - inches of water column
ppm - parts per million
PID - photoionization detector
fpm - feet per minute
acfm - actual cubic feet per minute
NM - not measured

ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

RADIUS OF EFFECT CALCULATIONS - SVE 01

SUNRAY B 1B
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Site Specific Information		
Test Well	SVE01	
SVE Screen Length (H)	10	ft
Soil Type	sand	
Porosity (n)	40%	percent
Test Specific Information		
Radius of Influence (ROI)	25	feet - 0.3 IWC and 0.1 IWC observed in at a distance of 25 feet
Flow Rate (1)	12.1	SCFM
Wellhead Vacuum (1)	163.2	IWC
Calculations (Flowrate - 12.1 SCFM)		
Total Volume (ft^3)	19,635	= PI * ROI * ROI * H
Volume Pore Space (ft^3)	7,854	= Total Volume * n
Pore Volume Exchange Rate	0.45	days
Annual Pore Volume Exchanges	810	>500 Required
Velocity at ROI (ft/min)	0.019	= Flowrate/(2*PI * ROI * H * n)
Velocity at ROI (ft/day)	28	> 3 ft/day recommended

Conclusions

A conservative ROI and ROE can be at least 21 feet for a flowrate of 12.1 scfm. The radius of effect (ROE) was evaluated using annual pore volume exchange rate and subsurface air velocity. Acceptable annual pore volume exchanges >500 and acceptable pore space velocity.

Notes:
ft - feet
ROI - radius of influence
IWC - inches water column
min - minute
s - second
SCFM - standard cubic feet per minute

ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

ENSOLUM

APPENDIX B

Laboratory Analytical Report

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

October 28, 2022

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

RE: Sunray B 1B OrderNo.: 2210A49

Dear Stuart Hyde:

Hall Environmental Analysis Laboratory received 1 sample(s) on 10/20/2022 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 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,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **2210A49**
Date Reported: **10/28/2022**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: SVE01
Project: Sunray B 1B
Collection Date: 10/19/2022 12:20:00 PM
Lab ID: 2210A49-001 **Matrix:** AIR
Received Date: 10/20/2022 7:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	140000	500	E	µg/L	100	10/21/2022 8:30:47 AM
Surr: BFB	520	15-380	S	%Rec	100	10/21/2022 8:30:47 AM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	630	10		µg/L	100	10/21/2022 8:30:47 AM
Toluene	6500	10	E	µg/L	100	10/21/2022 8:30:47 AM
Ethylbenzene	280	10		µg/L	100	10/21/2022 8:30:47 AM
Xylenes, Total	2300	20		µg/L	100	10/21/2022 8:30:47 AM
Surr: 4-Bromofluorobenzene	113	70-130		%Rec	100	10/21/2022 8:30:47 AM

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

Qualifiers:

*	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 Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210A49**

28-Oct-22

Client: HILCORP ENERGY

Project: Sunray B 1B

Sample ID: **2210A49-001ADUP** SampType: **DUP** TestCode: **EPA Method 8015D: Gasoline Range**

Client ID: **SVE01** Batch ID: **G92004** RunNo: **92004**

Prep Date: Analysis Date: **10/21/2022** SeqNo: **3300844** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	120000	500						14.4	20	E
Surr: BFB	910000		200000		456	15	380	0	0	S

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/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 Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210A49**

28-Oct-22

Client: HILCORP ENERGY

Project: Sunray B 1B

Sample ID: **2210A49-001ADUP** SampType: **DUP** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **SVE01** Batch ID: **B92004** RunNo: **92004**

Prep Date: Analysis Date: **10/21/2022** SeqNo: **3300907** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	560	10						12.0	20	
Toluene	5700	10						13.6	20	E
Ethylbenzene	240	10						17.0	20	
Xylenes, Total	1900	20						16.0	20	
Surr: 4-Bromofluorobenzene	220		200.0		108	70	130	0	0	

Qualifiers:

*	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 Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: Hilcorp Energy | Work Order Number: 2210A49 | RcptNo: 1

Received By: **Juan Rojas** 10/20/2022 7:15:00 AM

Completed By: **Tracy Casarrubias** 10/20/2022 10:27:06 AM

Reviewed By: KPG 10.20.22

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° C to 6.0°C Yes ☐ No ☑ NA ☐
5. Sample(s) in proper container(s)? Not required 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: JN 10/20/22

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 °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	NA	Good	Yes			

Chain-of-Custody Record

Client: Hilcorp

Mitch Killough

Mailing Address:

Phone #:

email or Fax#:

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance

☐ NELAC ☐ Other

☐ EDD (Type)

Turn-Around Time:

☒ Standard ☐ Rush

Project Name: Sunray B 1B

Project #:

Project Manager: S. Hyde

Sampler: D. Burns

On Ice: ☒ Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): N/A (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2210A49	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	Analysis Request
10-19-22	1220	Air	SVE 01	1 Teflar	NA	001	X	X									

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
10-19-22	1420				10/19/22	1400
10/19/22	1802			courier	10/20/22	7:15

Remarks:

cc: shyde
hmishriki@ensolum.com
dburns

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.

State of New Mexico
Energy, Minerals and Natural Resources Department

Mitch Killough - Environmental Specialist
Hilcorp Energy Company
1111 Travis Street
Houston, TX 77002

RE: Conditional Approval of Soil Vapor Extraction (SVE) Remediation Method for Sunray B 001B (API #: 30-045-30010; Incident #: nAPP2212649502; Application ID: 165587)

Mr. Killough,

The Oil Conservation Division (OCD) has reviewed and approved the subject work plan with the following conditions;

1. Hilcorp's SVE system must be designed to have a minimum of 90% operational runtime, 24/7, start to finish.
2. On-site analog or digital runtime counter must be installed and viewable to OCD personnel. Any alternative method must be explained and pre-approved by OCD.
3. The following field data measurement parameters will be required and reported (prior to reaching vacuum pump);
    a. Total Extracted Flow Rate via a Flow Meter
    b. Flow Rates from each vapor extraction point/well (VEP)
    c. Volatile Organic Compound (VOC) Concentrations for each VEP and/or VEP cluster being implemented via Handheld Gas Analyzer (e.g. – Photo Ionization Detector (PID)
    d. Record vacuum pressure at each VEP and/or VEP cluster being implemented
    e. Oxygen (O_2) and carbon di-oxide (CO_2) levels via hand-held analyzers from each VEP and/or VEP cluster being implemented, prior to reaching vacuum pump and at discharge orifice or vent stack
4. The following minimum timeline will be required for the above data recordings;
    a. Daily for the first week
    b. Weekly for the next three (3) months
    c. Monthly thereafter for the first calendar year
    d. Then contingent upon the recorded data output
5. Any water condensation will be categorized as oil field waste and must be disposed of accordingly. System modifications to address increased water collection and disposal must be pre-approved by OCD.
6. Extracted vapor sampling (prior to reaching vacuum pump) for laboratory testing will be required as follows;
    a. Approximately 15-30 minutes and approximately 8-10 hours after startup (or at the end of the same day if initial sample collected in early morning), one full round of sampling for constituents noted in b, c, & d below
    b. BTEX per US EPA Method 8021B or 8260B
    c. TPH per US EPA Method 8015M
    d. O_2 and CO_2

RE: Conditional Approval of Soil Vapor Extraction (SVE) Remediation Method for Sunray B 001B (API #: 30-045-30010; Incident #: nAPP2212649502; Application ID: 165587)

7. The following timeline will be required for the above laboratory sampling elements;
    a. Weekly - next three (3) weeks (first month)
    b. Bi-weekly (every other week) – next two (2) months (first quarter)
    c. Bi-Monthly (every other month) - next nine (9) months (first year)
    d. Quarterly – Year #2 until diminishing returns has been consistently documented
8. Hilcorp must submit to OCD quarterly reports for the first 2 years of operation, then bi-annual (twice a year) thereafter, detailing the following;
    a. Summary of remediation activity
    b. Chart of O_2 & CO_2 levels over time
    c. SVE runtime
    d. SVE mass removal
    e. Product recovery, if applicable
    f. Laboratory air sample analysis, if applicable
9. Hilcorp must notify OCD of its initial system startup which is required within 90 days of this approval. If this cannot be achieved, Hilcorp must verify the delay within its request for a time extension.
10. Hilcorp must submit to OCD a closure plan prior to initiating confirmation sampling for final remediation termination

These conditions by the OCD does not relieve Hilcorp of responsibility for compliance with any federal, state, or local law.

If you have any questions, please contact Nelson Velez of the Environmental Incident Group at (505) 469-6146 or by email at nelson.velez@emnrd.nm.gov.

Respectfully,

Michael Bratcher
Incident Group Supervisor
(575) 626-0857

Nelson Velez
Environmental Specialist – Adv
(505) 469-6146

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 165587

CONDITIONS

Operator:	OGRID:
HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	372171
	Action Number: 165587
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
nvelez	See Conditions of Approval letter at the end of report.	2/17/2023