

SVE PILOT TEST REPORT

NVF 1602039091

8/6/2019



August 6, 2019

Mr. Cory Smith
Environmental Specialist
New Mexico Oil Conservation Division
1000 Rio Brazos Road
Aztec, New Mexico 87410

**RE: Pilot Test Results
OH Randel #5
API #30-045-05964
Hilcorp Energy Company
San Juan County, New Mexico**

Dear Mr. Smith:

LT Environmental, Inc. (LTE), on behalf of Hilcorp Energy Company (Hilcorp), is submitting this summary of the soil vapor extraction (SVE) pilot test results at the OH Randel #5 natural gas production well (Site). The Site is located on Navajo tribal land approximately 2.65 miles west of United States Highway 550 in San Juan County, New Mexico, in Unit D of Section 10, Township 26 North and Range 11 West (Figure 1).

This report is being submitted as part of the proposed timeline of remediation events in the *Remediation Work Plan* submitted to the New Mexico Oil Conservation Division (NMOCD) on April 1, 2019 and approved by NMOCD on April 19, 2019. The full site history, characterization, and delineation of hydrocarbon impacts to soil were described in the *Delineation Report and Remedial Alternative Evaluation* submitted to the NMOCD on January 31, 2019 and filed on February 27, 2019.

Previous subsurface investigation results have defined three petroleum hydrocarbon-impacted sources (Primary, Secondary, and Tertiary) requiring remediation. The Primary and Secondary sources are currently being remediated with the existing SVE system and wells. The pilot test was conducted to determine if SVE is the appropriate technology to remediate the Tertiary source and if deemed appropriate, derive design parameters for full scale implementation.

PILOT TEST METHODOLOGY

SVE pilot testing was conducted to evaluate the flow rate and applied vacuum required to influence the subsurface and volatilize the petroleum hydrocarbons entrained in the soil. Five SVE wells (SVE-13 through SVE-17) were installed at the site on May 13, 2019 as pilot test wells and observation wells. Wells SVE-13 and SVE-14 were installed in the previous boring BH-31 and wells SVE-15 and SVE-16 were installed in the previous boring BH-37. SVE-17 was installed in





previous borehole BH-34. The wells were installed with a sonic drill rig to depths of 50 feet to 80 feet below ground surface (bgs). Two of the boring locations had SVE wells installed in a nested configuration (SVE-13/SVE-14 and SVE-15/SVE-16). Each nested well contains 15 feet of screen that was separated from the other well inside the boring with a bentonite chip seal and a bentonite grout mixture to prevent short circuiting. The nested configuration was designed to allow greater operational adjustments and ensure influence throughout the entire impacted interval. One of the goals of the pilot test was to confirm the feasibility of the nested wells. Well completion diagrams are included as Attachment 1.

The existing SVE system that is remediating the Primary and Secondary sources was utilized for the pilot test. The existing system is a two horsepower Atlantic AB-301 regenerative blower capable of a maximum applied 72 inches water column vacuum (IWC). The blower was connected to each pilot SVE well with aboveground piping and observations of vacuum were measured throughout the subsurface utilizing the other pilot test SVE wells and existing well infrastructure.

The pilot test was conducted on June 28, 2019. Each SVE test well was piped into the existing system manifold and a vacuum was applied. SVE stack volatile organic compound (VOC) measurements and vacuum responses at the other SVE wells were recorded. At the conclusion of testing each SVE well individually (SVE-13 through SVE-17) a vacuum was applied to SVE wells SVE-13 through SVE-16 concurrently to observe the response with current infrastructure wells SVE-7, SVE-10, SVE-11, and SVE-12. The SVE pilot test data is included as Table 1.

An air sample was collected from the SVE-15 stack. During testing, the highest VOC measurement of 1,257 parts per million (ppm) was observed in this well. The sample was collected in a one-Liter Tedlar® bag and shipped under chain-of-custody protocol to Hall Environmental Analysis Laboratory for analysis of benzene, toluene, ethylbenzene, total xylenes (collectively BTEX), and total petroleum hydrocarbons – gasoline range organics (TPH-GRO) by United States Environmental Protection Agency (USEPA) Methods 8021 and 8015, respectively.

PILOT TEST RESULTS

Stack VOC measurements and observed vacuum in the subsurface indicate that SVE is an applicable technology to remediate the Tertiary source. Applied vacuum at the SVE wells ranged from 70 IWC to 76 IWC. Responses observed in the observation wells ranged from 0.0 IWC to 53.4 IWC. Vacuum responses were observed as far away at 35 feet from SVE test wells. A conservative radius of influence of 30 feet will be utilized in the final design. Graphical representation of the data is presented as Attachment 2.

SVE stack VOC measurements ranged from 705 ppm to 1,257 ppm, indicating high volatility of hydrocarbons present and removal from the subsurface through SVE.





Elevated vacuum responses were observed in the nested wells even with the 15 feet of separation between the shallow and deep well screens. Vacuum responses observed in the nested wells ranged from 32.9 IWC to 53.4 IWC. This elevated vacuum response indicates that some short-circuiting occurred within the nested well borehole or within the geology itself. However, the vacuum responses in other wells were still observed upwards of 35 feet away. The nested wells can still be utilized in the final system configuration, but new wells will be installed with a longer screened interval instead of a nested configuration. Final remedial design will factor in screen lengths and fill in areas of the Site that require remediation but would likely not be influenced with the current well layout. Final well layout and design will be submitted under separate cover.

The air sample collected indicated elevated hydrocarbon concentrations with a GRO concentration of 460 milligrams per liter (mg/L). We expect this concentration to decline as the system is operational, but this elevated concentration does prove the effectiveness of SVE to remove hydrocarbons from the subsurface. The laboratory analytical report is included as Attachment 3.

TIMELINE

The following timeline is proposed following submittal of this report;

- 3rd Quarter 2019 – Begin installation of additional SVE wells;
- 4th Quarter 2019 – Begin operation of SVE wells with new SVE system (if deemed necessary);
- 1st Quarter 2021 – Soil confirmation sampling to determine system effectiveness and additional system operation if necessary; and
- 1st Quarter 2022– Additional soil confirmation sampling (if necessary) and site closure.

Quarterly reporting will be conducted after installation of the SVE system to keep the NMOCD informed on major site advancements and SVE system operations. Quarterly reports will document hydrocarbon mass recovery, system runtime, and gas sample analysis. An annual gas sample will be collected from the influent SVE system and submitted for analysis of full VOCs by USEPA Method 8260.

We look forward to your review of this pilot test results report and subsequent approval of the remediation approach. If you have any questions or comments, please do not hesitate to contact Ashley Ager at (970) 385-1096 or aager@ltenv.com.

Sincerely,

LT ENVIRONMENTAL, INC.





A handwritten signature in black ink, appearing to read 'Devin Hencmann'.

Devin Hencmann
Project Geologist

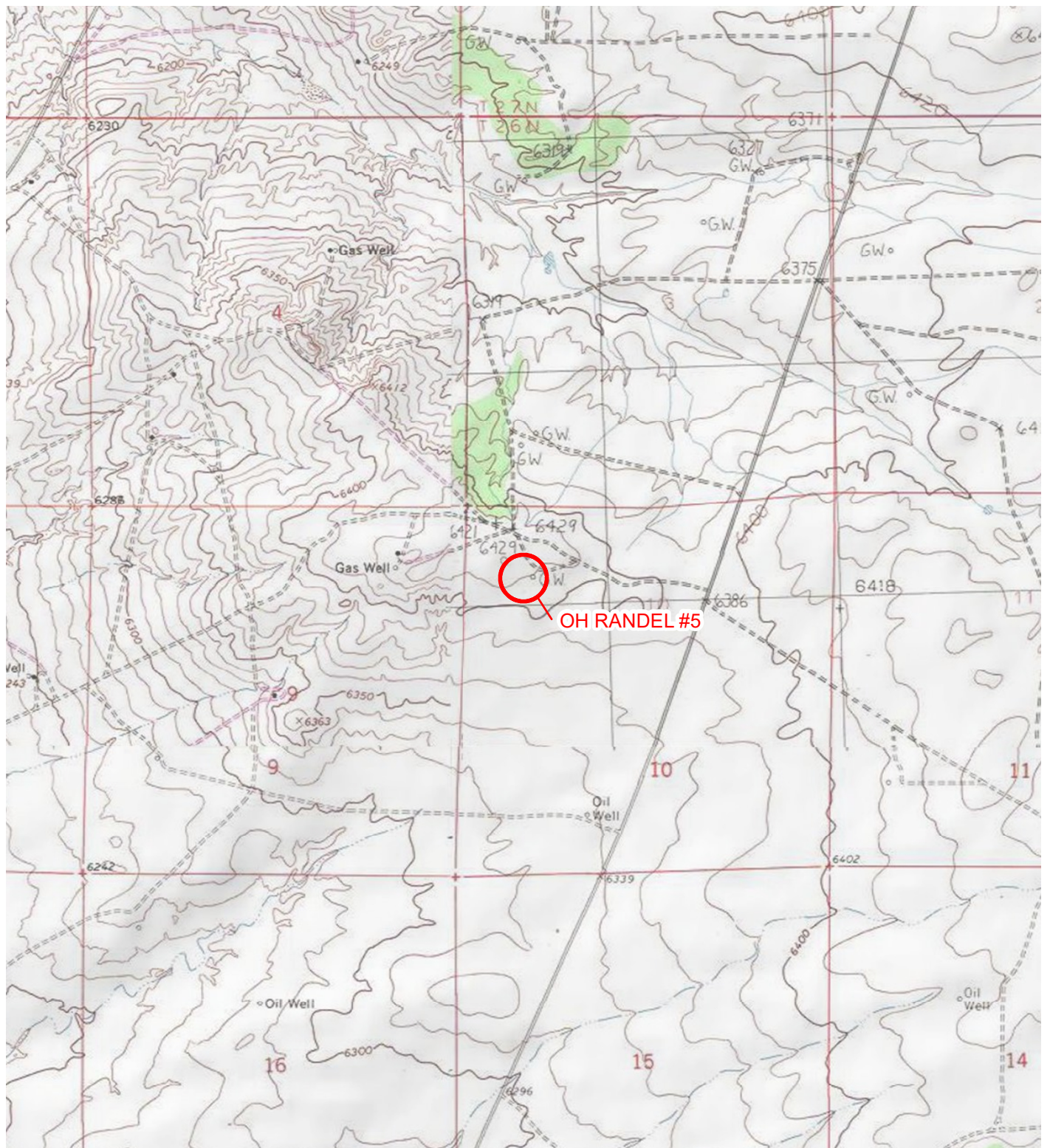
A handwritten signature in black ink, appearing to read 'Ashley L. Ager'.

Ashley L. Ager, P.G.
Senior Geologist

cc: Clara Cardoza, Hilcorp

Attachments:

- Figure 1 Site Location Map
- Figure 2 Pilot Test SVE Layout
- Table 1 SVE Pilot Test Results
- Attachment 1 Well Completion Diagrams
- Attachment 2 Pilot Test Data
- Attachment 3 Laboratory Analytical Report



LEGEND

○ SITE LOCATION



NEW MEXICO

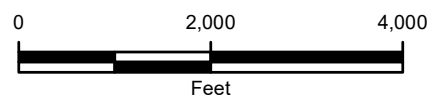


IMAGE COURTESY OF ESRI/USGS

FIGURE 1
SITE LOCATION MAP
OH RANDEL #5
NWNW SEC 10 T26N R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY



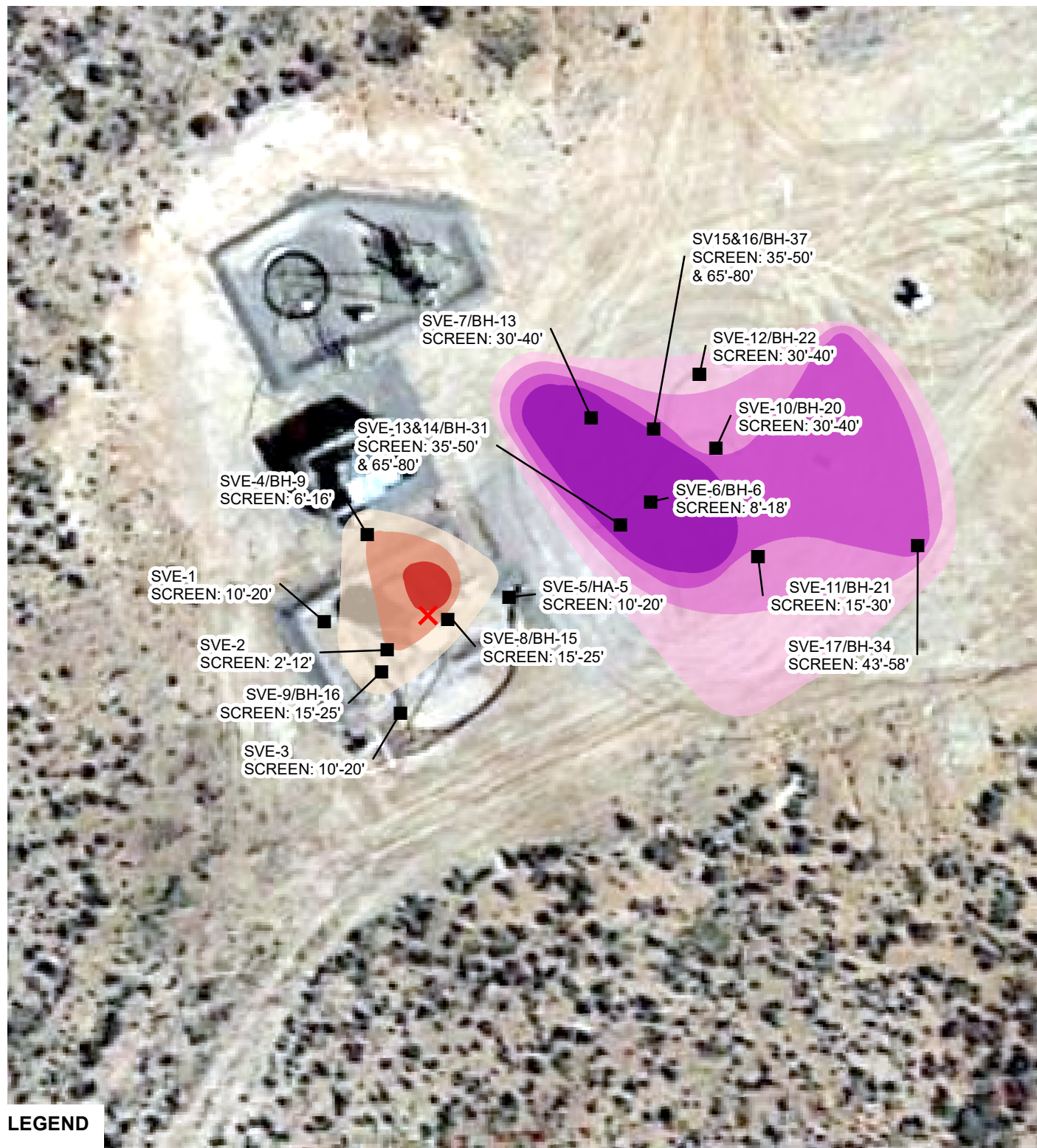


IMAGE COURTESY OF GOOGLE EARTH

LEGEND



RELEASE LOCATION



SOIL VAPOR EXTRACTION (SVE) WELL

INFERRED BTEX ISOCONCENTRATION (PARTS PER MILLION)

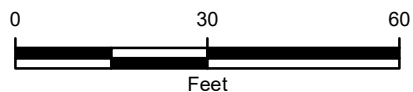
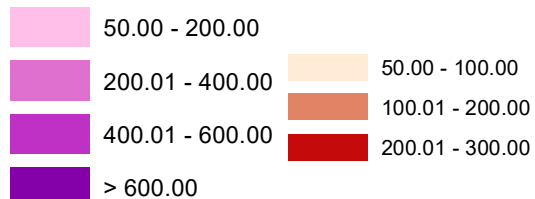


FIGURE 2
PILOT TEST SVE LAYOUT
OH RANDEL #5
NWNW SEC 10 T26N R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY



**TABLE 1
PILOT TEST RESULTS**

**OH RANDEL #5
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY**

Test Well	SVE Vacuum	VOC Stack (ppm)	Monitoring Points	SVE-7	SVE-10	SVE-11	SVE-12	SVE-13	SVE-14	SVE-15	SVE-16
SVE-13	74	1,119	Distance to Test Well (ft)	22.5	24	--	35	NA	0.5	21	21
			Vacuum (IWC)	0.2	0.2	--	0	NA	53.4	0.8	0.2
SVE-14	72	1,027	Distance to Test Well (ft)	22.5	24	--	35	0.5	--	21	21
			Vacuum (IWC)	0.2	0.1	--	0.1	41.7	--	0.7	0.2
SVE-15	74	*1,257	Distance to Test Well (ft)	13	35	--	15	21	21	--	0.5
			Vacuum (IWC)	0.3	0.5	--	0.1	10.5	2.5	--	47.2
SVE-16	75	1,152	Distance to Test Well (ft)	13	35	--	15	21	21	0.5	--
			Vacuum (IWC)	0.2	0.2	--	0.1	1.4	1.1	32.9	--
SVE-17	76	731.6	Distance to Test Well (ft)	22.5	47	43	--	--	--	--	--
			Vacuum (IWC)	--	0.1	0.0	--	--	--	--	--
SVE-13,14,15,16	70	705.8	Distance to Test Well (ft)	--	--	--	--	--	--	--	--
			Vacuum (IWC)	0.8	0.5	0.8	0.2	--	--	--	--

Notes:

ft - feet

IWC - inches water column vacuum

ppm - parts per million

VOC - volatile organic compound

* - indicates highest observed reading, air sample collected

-- - not applicable

BH-31 became SVE-13 (screen 35'-50') and SVE-14 (screen 65'-80')

BH-37 became SVE-15 (screen 35'-50') and SVE-16 (screen 65'-80')

BH-34 became SVE-17 (screen 43'-58')





Advancing Opportunity

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: BH-31, SVE 13 and SVE 14		Project: OH Randel #5	
Date: 12/16/18, 12/18/18, 5/13/2019		Project Number: 017818016	
Logged By: EC/JA		Drilled By: Layne/Cascade	
Drilling Method: Sonic		Sampling Method: Core Barrel	
Seal: 30-33', 60-63'		Grout: 0-30', 50-60'	
Diameter: 2"	Length: 0-35', 0-65'	Hole Diameter: 8"	Depth to Liquid: NA
Diameter: 2"	Length: 35-50', 65-80'	Total Depth: 96'	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Gray= grout Brown=sand Blue=Bentonite
					0					SVE14 SVE13
					1					
					2					
					3					
					4					
	M	0.5	No		5	0-10		SM	Dark reddish brown silty sand <15% silt. No stain or odor	
					6					
					7					
					8					
					9					
					10					
					11					
	Dry	548	No		12	10-20			Dense light reddish brown silty sand, No staining, slight HC odor	
					13					
					14					
					15					



Boring/Well #	BH31, SVE13, SVE14
Project:	OH Randel #5
Project #	017818016
Date	12/16/18-12/18/18, 5/13/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					SVE14 SVE13
					16					
					17					
	Dry	982	No		18	10-20		CH	Firm reddish brown clay, some sand, slight HC odor	
					19					
					20			SW-SM	Dense, white/gray sand some silt	
					21					
	Dry	2,444	No	BH31 20-25'	22					
					23					
					24					
					25	20-30				
					26					
					27					
	Dry	2,018	No		28					
					29					
					30			CH	Firm yellow brown sandy clay, < 30% sand No stain strong HC odor	
					31					
	Dry	1,776	No	BH31 30-35'	32					
					33					
					34	30-40			SAA, strong HC odor	
					35					
					36					
					37					



Boring/Well #	BH31, SVE13, SVE14
Project:	OH Randel #5
Project #	017818016
Date	12/16/18-12/18/18, 5/13/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					SVE14 SVE13
	Dry	386	No		38	30-40			Dense white, gray sand some silt	
					39					
					40					
	Dry	360	No		41			SW-SM	SAA, No stain strong HC odor	
					42					
					43					
					44					
					45	40-50				
	Dry	348	No		46					
					47					
					48					
					49					
					50					
					51				SAA, No stain strong HC odor	
					52					
					53					
					54					
					55					
					56					
					57					
	Dry	2,109	No		58	57-68		SM	White/gray/brown sandstone <25% silt, strong HC odor mostly soild sandstone	
					59					



Boring/Well #	BH31, SVE13, SVE14
Project:	OH Randel #5
Project #	017818016
Date	12/16/18-12/18/18, 5/13/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					SVE14 SVE13
	Dry	2,389	No		61					
					62					
	Dry	2,570	No		63					
					64	57-68				
	Dry	2,483	No		65					
					66					
	Dry	1,673	No		67				SAA, No stain strong HC odor	
					68					
	Dry	2,013	No		69					
					70					
	Dry	1,624	No		71			SM		
					72					
	Dry	1,373	No		73	68-77				
					74					
	Dry	2,352	Yes		75					
					76				SAA, some black staining, strong HC odor	
	Dry	1,546	Yes		77					
					78					
	Dry	1,677	Yes		79					
					80	77-83				
	Dry	1,574	Yes		81					
					82				Sand with silt 25% more fines than above, light gray stain, HC odor	backfill to 80'



Boring/Well #	BH31, SVE13, SVE14
Project:	OH Randel #5
Project #	017818016
Date	12/16/18-12/18/18, 5/13/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	1,821	Yes		83	77-83		SM	SAA, heavy black and gray stain	Backfill to 80'
	Dry	1,277	No		84	83-87			SAA No stain	
					85					
	Dry	514.4	No		86			Light gray sand with silt, increased fines ~30% slight odor		
					87					
	Dry	13.9	No		88	ML		Light gray sandy silt, almost clay, No odor or stain		
					89					
					90					
	Dry	12.4	No		91					
					92					
	Dry	9.8	No		93					
					94					
	Dry	7.2	No	BH31 @ 94-96'	95					
					96					
					97					
					98			TD @ 96'		
					99					
					100					
					101					
					102					
					103					
					104					
					105					



Advancing Opportunity

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: BH-34 and SVE 17		Project: OH Randel #5	
Date: 12/15/2018		Project Number: 017818016	
Logged By: EC/JA		Drilled By: Layne	
Drilling Method: Sonic		Sampling Method: Core Barrel	
Seal: 38-41'		Grout: 0-38'	
Diameter: 2"	Length: 0-43'	Hole Diameter: 8"	Depth to Liquid: NA
Diameter: 2"	Length: 58-43'	Total Depth: 76'	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Gray= grout Brown=sand Blue=Bentonite
					0					SVE17
					1					
					2					
	M	0.0	No		3				Dark red/brown silty sand, no stain or odor	
					4					
					5	0-10		SM		
					6					
					7					
	M	0.0	No		8				Dense yellow brown silty sand <30% silt, no stain or odor	
					9					
					10					
					11					
					12					
	M	0.0	No		13	10-15		SP/CL	Dense light gray/white sand w/ some interbedded clay <1", no stain or odor	
					14					
					15					



Advancing Opportunity

Boring/Well #	BH34 and SVE17
Project:	OH Randel #5
Project #	017818016
Date	12/15/2018

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					SVE17
					16					
					17					
	M	0.0	No		18	15-20		SP/CL	loose white sand, interbedded clay <1/2" thick, no stain or odor	
					19					
					20				Firm, dark brown sandy clay <30% sand, no stain or odor	
					21					
	M	0.0	No		22			CL		
					23				Loose light brown sandy clay with gravel <30% sand gravel, no stain/odor	
					24					
					25	20-30				
					26					
	M	0.0	No		27					
					28				Dense, white, sand trace silt <10%, no stain or odor	
					29					
					30					
					31					
	M	108.3	No		32			SP		
					33				SAA, no stain or odor	
					34	30-40				
					35					
					36					
	Dry	67.4	No		37				SAA, no stain slight odor	



Boring/Well #	BH34 and SVE17
Project:	OH Randel #5
Project #	017818016
Date	12/15/2018

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					SVE17
					38	30-40			SAA	
					39					
					40					
					41					
	Dry	38.4	No		42				Dense, white/gray sand, some silt <15%, no stain or odor	
					43					
					44					
					45	40-50				
					46					
	Dry	19.7	No		47			SP	Dense, white/gray sand, trace silt <5%, no stain or odor	
					48					
					49					
					50					
					51					
	Dry	950.2	No		52				Dense, reddish brown sand, some clay <15%, no stain, slight odor	
					53					
					54					
					55	50-60				
					56					
	Dry	1,118	No	BH34 55-60'	57				Very dense white/grey sand, trace fines <5%, no stain, strong HC odor	
					58					
					59					



Boring/Well #	BH34 and SVE17
Project:	OH Randel #5
Project #	017818016
Date	12/15/2018

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60	50-60				
					61					
					62					
	Dry	1,047	No		63					
					64					
					65	60-70		SP	SAA, no stain and strong HC odor	
					66					
					67					
	Dry	987	No		68					
					69					
					70					
					71					
	Dry	888	No		72				Dense, reddish brown clayey sand 75% clay, no stain, strong HC odor	
					73	70-76		SC		
					74				Very dense, white/gray clayey sand, no stain, strong HC odor	
	Dry	943	No		75					
					76			SP	White sand with pyrite inclusion, black reduced clay layers <1" thick	
									TD @ 76'	

Backfill to 58'



Advancing Opportunity

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: BH-37, SVE 15 and SVE 16		Project: OH Randel #5	
Date: 5/09/19 to 5/10/19		Project Number: 017818016	
Logged By: EC/JA		Drilled By: Cascade	
Drilling Method: Sonic		Sampling Method: Core Barrel	
Seal: 30-33', 60-63'		Grout: 0-30', 50-60'	
Diameter: 2"	Length: 0-35', 0-65'	Hole Diameter: 8"	Depth to Liquid: NA
Diameter: 2"	Length: 35-50', 65-80'	Total Depth: 80'	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion Gray= grout Brown=sand Blue=Bentonite
					0					SVE16 SVE15
					1					
					2					
	Dry	0.0	No		3	0-5			Compact, reddish brown silty sand	
					4					
					5					
					6					
	M	6.8	No		7				Reddish brown silty sand, white mottling, no stain or odor	
					8	5-10				
					9					
	M	12.3	No		10				Compact, yellow brown silty sand, trace clay <5% no stain/odor	
					11					
					12					
	M	478	No		13	10-15			Light brown coarse sand some silt <15%, HC staining, strong odor	
					14					
					15					



Advancing Opportunity

Boring/Well #	BH37, SVE15, SVE16
Project:	OH Randel #5
Project #	017818016
Date	5/9/19 to 5/10/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					SVE16 SVE15
					16					
					17					
	M	4,027	Yes		18	10-20		SM	SAA, gray stain, HC odor	
					19					
					20					
					21					
	Dry	4,979	Yes		22					
					23	20-25				
	Dry	6,774	Yes		24					
					25					
					26					
					27	25-29		ML		
	Dry	4,235	Yes		28					
					29				SAA, slightly more sand, gray HC stain and odor	
					30					
	Dry		Yes		31					
					32					
					33	29-37		SM	Brown silty sand, non-plastic, med. Cohesion, sand is poorly graded, gray HC stain and odor	
					34					
					35					
					36			SM-SP	Poorly graded sand with silt, gray HC stain and odor	
	Dry	5,026	Yes		36					
					37				Sandy limestone	



Advancing Opportunity

Boring/Well #	BH37, SVE15, SVE16
Project:	OH Randel #5
Project #	017818016
Date	5/9/19 to 5/10/19

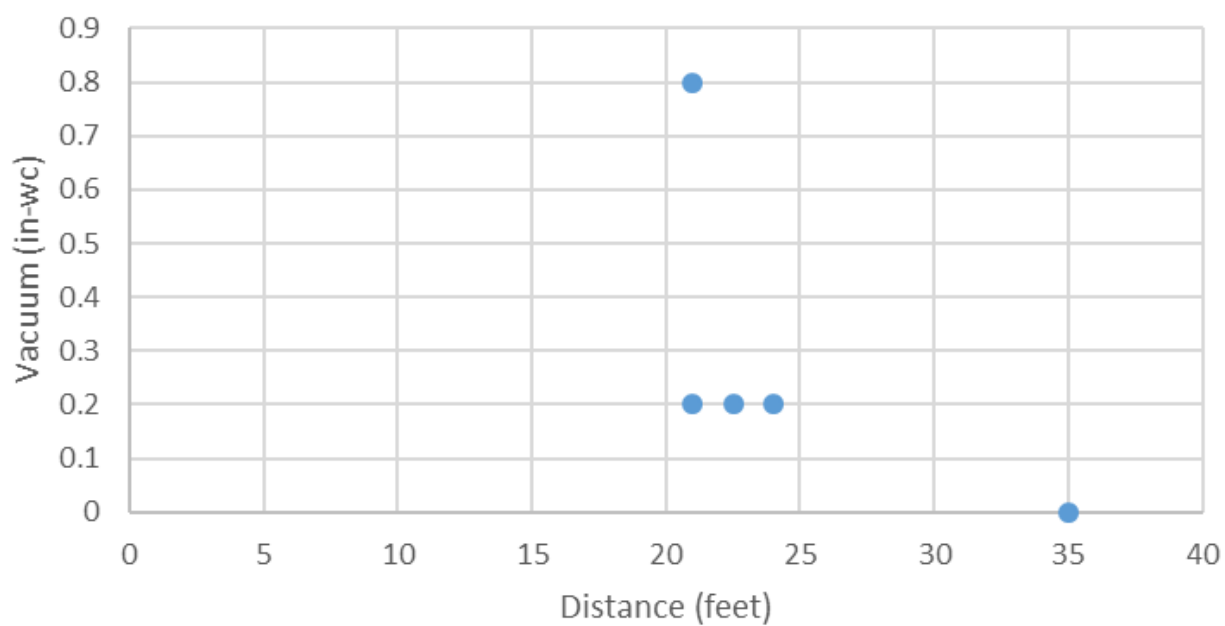
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					SVE16 SVE15
					38				Sandy limestone	
					39					
					40					
	Dry	5,162	Yes		41	37-44		SM	Reddish brown/gray silty sand with intermixed pieces of compact sandstone, Fe and gray HC staining, sand is medium and poorly graded	
					42					
					43					
					44					
	Dry	4,116	Yes		45					
					46	44-48				
					47				Reddish brown/gray poorly graded sand with silt, gray HC stain and odor	
					48					
	Dry	4,323	Yes		49					
					50	48-52				
					51					
					52					
	Dry	5,725	Yes		53			SM-SP		
					54	52-56			SAA, gray HC stain and odor	
					55					
					56					
	Dry	4,088	Yes		57					
					58	56-62				
					59					



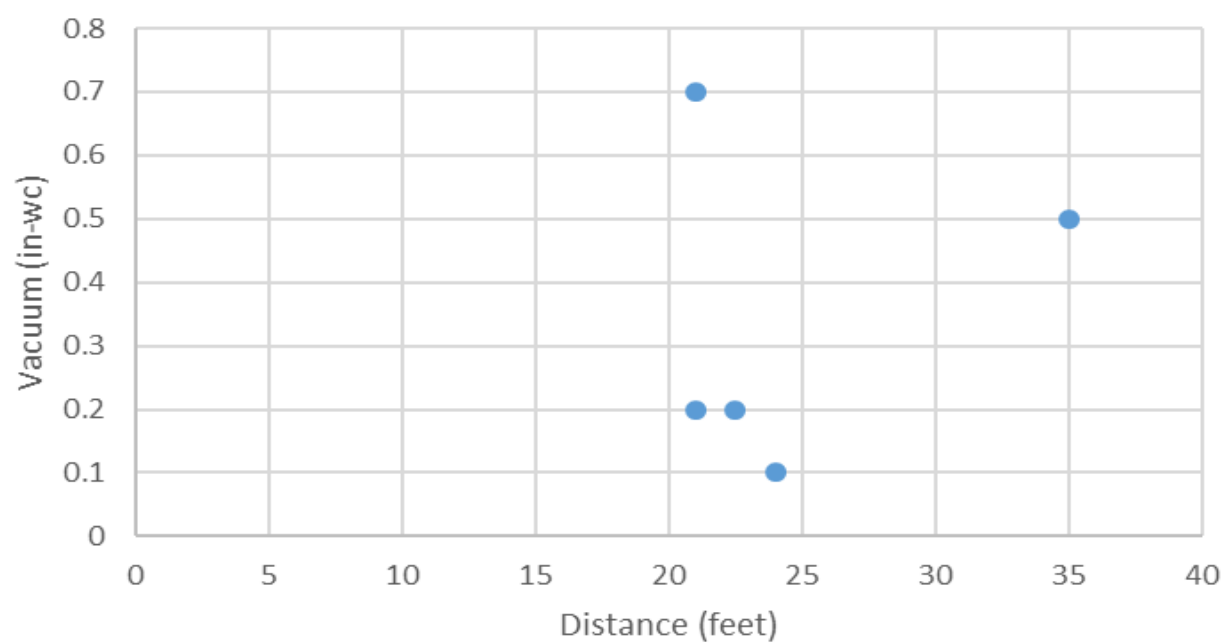
Boring/Well #	BH37, SVE15, SVE16
Project:	OH Randel #5
Project #	017818016
Date	5/9/19 to 5/10/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					SVE16 SVE15
					61	56-62				
					62					
	Dry	1,581	Yes		63					
					64	62-65				
					65					
	Dry	1,597	Yes		66					
					67					
					68					
					69	65-72				
					70					
					71			SM-SP	SAA, gray HC stain and odor	
					72					
	Dry	3,091	Yes		73					
					74					
					75	72-78				
					76					
					77					
					78					
	Dry	2,619	Yes		79	78-80				
					80					
					81				TD @ 80'	
					82					

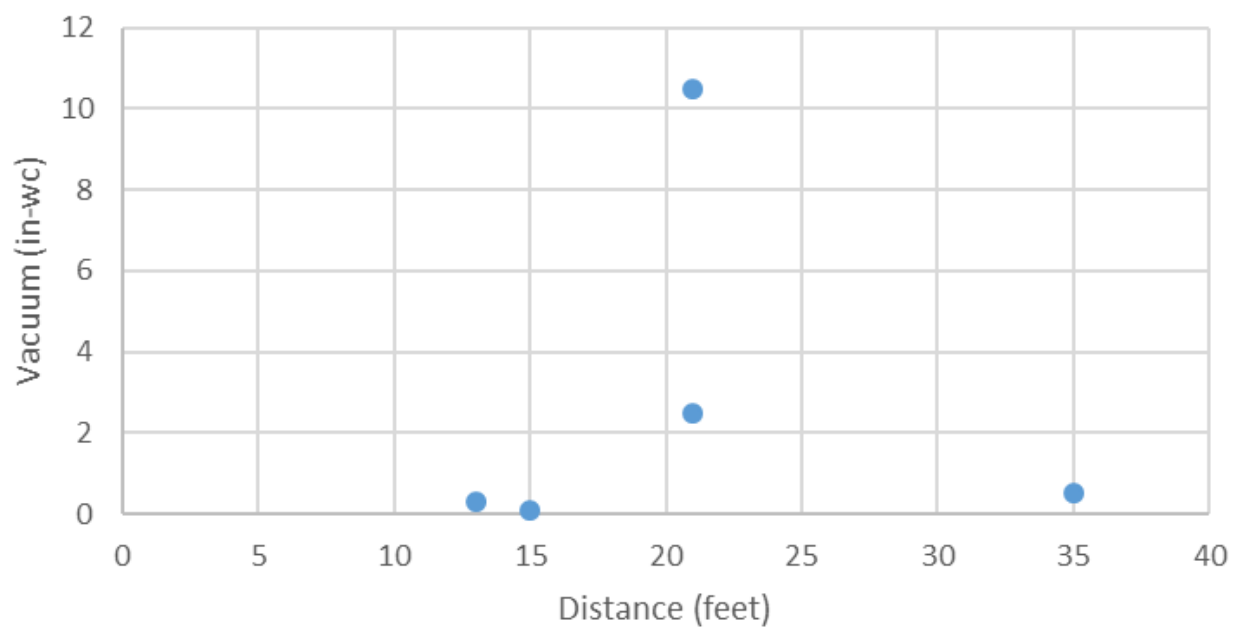
SVE-13



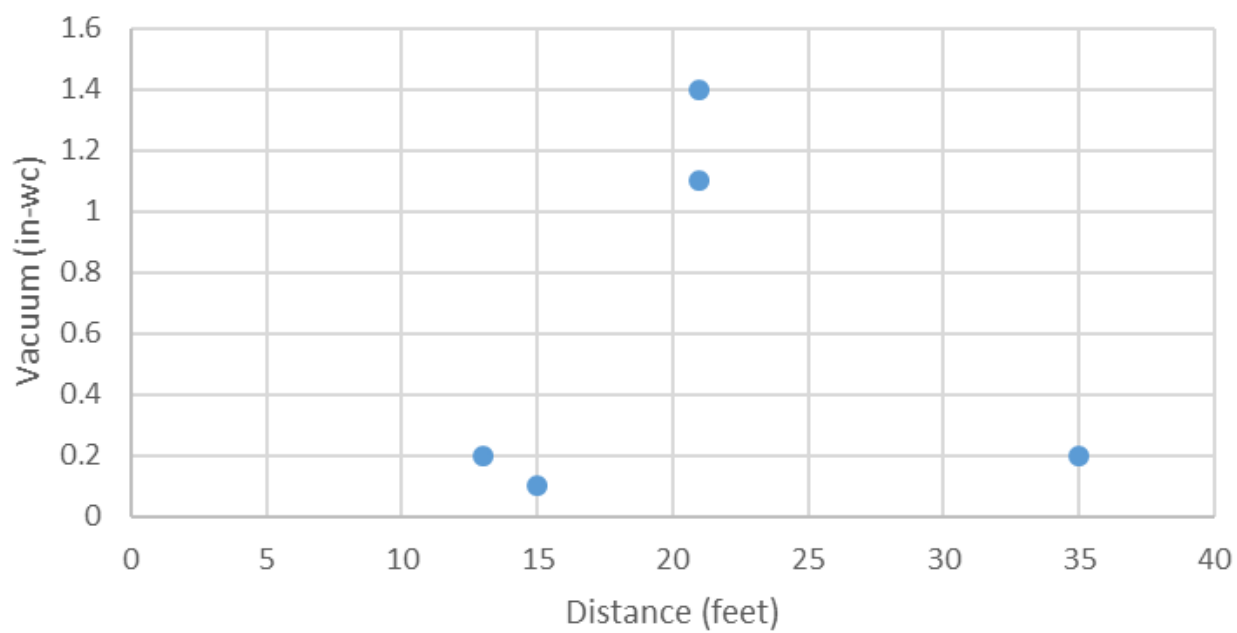
SVE-14



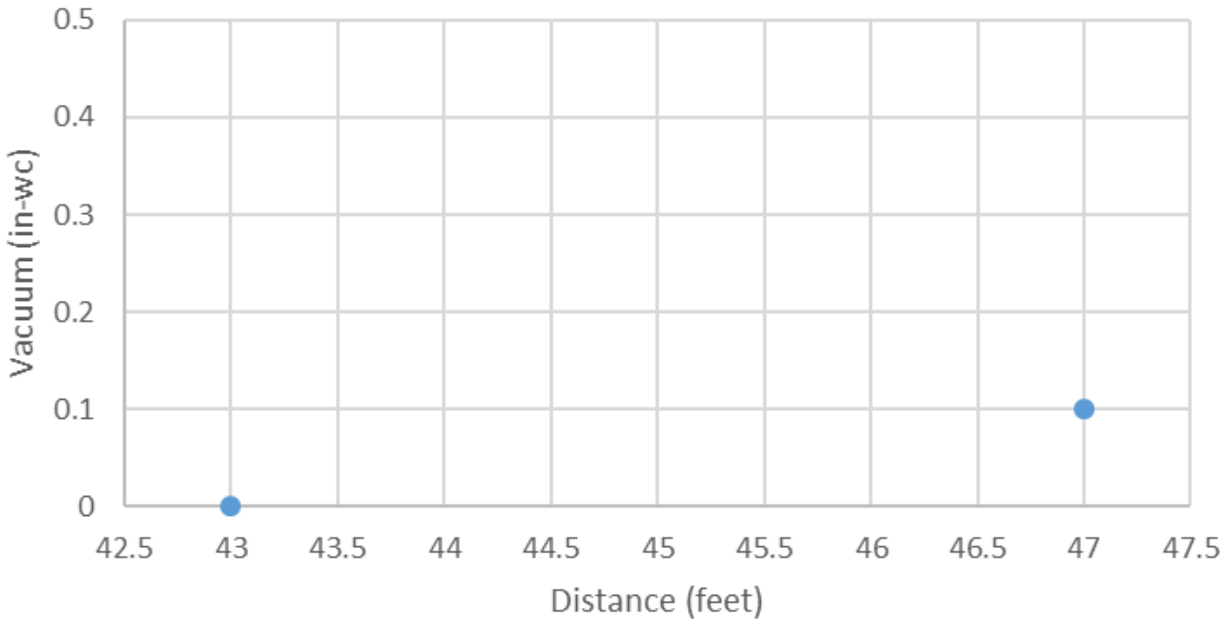
SVE-15



SVE-16



SVE-17







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

July 10, 2019

Clara Cardoza

HILCORP ENERGY

PO Box 4700

Farmington, NM 87499

TEL: (505) 564-0733

FAX:

RE: OH Randel 5

OrderNo.: 1906G47

Dear Clara Cardoza:

Hall Environmental Analysis Laboratory received 1 sample(s) on 6/29/2019 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,

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

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1906G47**

Date Reported: **7/10/2019**

CLIENT: HILCORP ENERGY

Client Sample ID: SVE-15

Project: OH Randel 5

Collection Date: 6/28/2019 1:20:00 PM

Lab ID: 1906G47-001

Matrix: AIR

Received Date: 6/29/2019 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RANGE							Analyst: NSB
Gasoline Range Organics (GRO)	460000	2500	E	µg/L	500	7/5/2019 10:32:18 AM	G61170
Surr: BFB	145	53-256		%Rec	500	7/5/2019 10:32:18 AM	G61170
EPA METHOD 8021B: VOLATILES							Analyst: NSB
Benzene	7200	50	E	µg/L	500	7/5/2019 10:32:18 AM	B61170
Toluene	15000	50	E	µg/L	500	7/5/2019 10:32:18 AM	B61170
Ethylbenzene	360	50		µg/L	500	7/5/2019 10:32:18 AM	B61170
Xylenes, Total	3000	100		µg/L	500	7/5/2019 10:32:18 AM	B61170
Surr: 4-Bromofluorobenzene	96.4	81.6-133		%Rec	500	7/5/2019 10:32:18 AM	B61170

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	Value above quantitation range
	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		

Sample Log-In Check List

Client Name: **HILCORP ENERGY FAR**

Work Order Number: **1906G47**

RcptNo: 1

Received By: **Erin Melendrez**

6/29/2019 9:30:00 AM

UAG

Completed By: **Erin Melendrez**

6/29/2019 10:46:15 AM

UAG

Reviewed By:

50 7.1.19

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°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. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
10. Were any sample containers received broken? Yes ☐ No ☒
11. Does paperwork match bottle labels? Yes ☒ No ☐
(Note discrepancies on chain of custody)
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? Yes ☒ No ☐
(If no, notify customer for authorization.)

of preserved
bottles checked
for pH:

(<2 or >12 unless noted)

Adjusted?

Checked by:

YG 7/1/19

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	1.2	Good	Yes			

