



REVIEWED

By Mike Buchanan at 11:17 am, Jun 26, 2024

March 10, 2024

EMNRD-Oil Conservation Division
Attn: Nelson Velez
Environmental Specialist Advisor
1000 Rio Brazos Road
Aztec, NM 87410

Review of the Groundwater Quarterly Report for the 4Q of 2023: Content Satisfactory
1. Continue O&M of the SVE system as planned in the quarterly report.
2. The SVE system has demonstrated to be successful in remediation of COCs and is approved for expansion with removal of LNAPL recovery pumps as detailed in report.

**RE: Buckeye Groundwater Incident NAUT Remediation of COCs Quarterly Report
Groundwater Abatement Plan Application
Buckeye Compressor Station - Lea County, New Mexico**

Mr. Valez,

SVE operations began on October 25, 2023 with the first round of operations ending on January 25, 2024. The **Proposed LNAPL Reduction Initiative Quarterly Reporting and Groundwater Monitoring Reduction Workplan** received and “Accepted for the record” scheduled to OCD 2023, was understood to be based on the provided Conditions of Approval (COA) through the online portal, as explained in the January 22, 2024 letter to the EMNRD. As such, item 8 requires quarterly reporting for the first 2 years of operation and bi-annually thereafter. This document serves to provide the initial quarterly report for both the LNAPL recovery pump and SVE systems, and as requested in the January 22, 2024 letter, provide a record of pilot operations of the SVE system at the Buckeye Station.

LNAPL Recovery Systems

Two LNAPL recovery systems were initially installed on the week of July 17, 2023 with an October 30, 2023 letter provided to the EMNRD to comply with item 4 of the March 14, 2023 workplan acceptance requiring a “report of the findings will be due approximately 60 days after the LNAPL recovery system and SVE pilot test have been completed.” At that point in time, each system had recovered approximately 25 gallons of LNAPL

During the week of October 23rd, wells EW-1 and MW-9 both LNAPL and water levels were measured with an interface probe. A layer of approximately 3 feet of LNAPL were observed in each well. Recovery pump depths for each well was adjusted accordingly to maximize LNAPL recovery rates. A fault code was found on the recovery system at well EW-1. The problem was solved and approximately 8 gallons of LNAPL were recovered. Well MW-9 also has a system failure. However, after troubleshooting with assistance from the manufacturer, the LNAPL recovery system issue was determined to be with the control panel. The control unit was removed and returned to the manufacture for repair or replacement. In the October 30, 2023 report MorningStar noted that an LNAPL recovery update will be included with the required LNAPL/SVE system quarterly report to provide recovery totals and a status update for both systems.

During the week of November, 27th, the MW-9 control panel was re-installed and both units were adjusted in an effort to maximize recover. On November 28, 2023, EW-1 had recovered an

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additional 14 gallons of LNAPL during one month of operations. Following the updated program timing adjustments, MorningStar staff contacted Kane Environmental Engineering (Kane) on December 6, 2023, to inform them that EW-1 was now showing a non-resettable overcharging fault code and that the unit was emitting a burnt electronics odor. All manufacture published trouble shooting procedures were followed, and ultimately the control unit was required to be removed and returned to the manufacturer.

On the week of January 22nd, MW-9 was observed to have recovered 43 gallons from the previous recording on December 6, 2023. While the extrapolated 650 gallon per year recovery rate was positive, reports from field staff indicated that a fault code was present each day when the unit was checked. Fault codes were observed by the Kane staff present for monitoring and SVE sampling while on site and correspondence with the manufacture was planned.

The general operation of the LNAPL pumps has been observed to be unsatisfactory for the required effort involved. The selected solar units were intended to operate with little to no outside adjustments once established, but have demonstrated to require plant staff above and beyond their assigned efforts to keep these units operating. Correspondence with the manufacturer yielded some potential solutions to the primary fault codes being observed, but MorningStar has requested that the manufacturer hold the repaired EW-1 controller until these efforts can be made and determine if they produce better results.

MorningStar is requesting that discontinuation of the LNAPL recovery system be made at their digression. While the implemented system does recovery LNAPL, the effort being put forth has exceeded the recovery results. A final decision regarding the status of this system will be provided in the subsequent quarterly reports if approved.

System installation images along with recovery data can be found in **Appendix A**.

Soil Vapor Extraction System

The approved Soil Vapor Extraction (SVE) system began operations on October 25th, at 8:45am with extracted samples collected from the system and each of the three Vapor Extraction Points (VEP), MW-2, MW-3 and MW-8. A sample collection was completed from 15-30 minutes and approximately 8-10 hours after startup as required. The extracted samples were transported to Pace Analytical under chain of custody on October 26th.

Handheld analyzer data collection was initiated for each (VEP) beginning on October 25th and will continue to be collected at the required intervals prescribed by the minimum recordkeeping timeline within the approved Groundwater Abatement Plan. All analytical data and records are provided in **Appendix B** of this report. The following records have been supplied for review with a compliance summary provided below.:

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1. *Morningstar's SVE system must be designed to have a minimum of 90% operational runtime, 24/7 start to finish.*
 - The SVE runtime has met the 90% online requirement with an 8:45am on October 25, 2023 start through 8:45 am on January 25, 2024. Total period hours were 2208, with 2087 recorded hours on January 25th for a **94.5%** runtime rate.
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.*
 - A runtime meter is installed in the SVE unit control panel and logs have been provided. In addition to the control panel runtime meter, MorningStar installed an alert beacon to indicated any blower motor downtime to alert plant staff remotely in the event of any shutdowns.
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 (O₂) and carbon di-oxide (CO₂) 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.*
 - All required data has been logged during each sampling event and provided within this report.
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.*
 - After initial startup and the first two daily sampling events, plant staff were unable to complete data logging event for the subsequent 5-days. Additionally, plant operations issues did not allow for weekly data collection for weeks 1, 3, 4, and 5 of the 12-week three-month period. Data collection thereafter has not been interrupted and collection procedures have been established.

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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.*
- Only free product condensate has been recovered to date. As such all liquids have been logged, and routed to plant operations for appropriate classification and sales. Any collected water will be disposed of in accordance with the requirements, if and when recovery efforts begin yielding water. At the time of last collection on January 24, 2024, 200-gallons of LNAPL had been removed from the liquid collection system associated with the SVE blower.
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. *O₂ and CO₂.*

NOTE: *BTEX, TPH, O₂, and CO₂ will be analyzed Via EPA Method TO-15 and ASTM 1946D. The change was approved by Nelson Velez on August 14, 2023.*

- All required sampling has met the agreed upon sampling methodology requirements and has been completed by an accredited laboratory. NOTE: While correspondence on December 15, 2023 with Mr. Velez approved only collecting the above required samples for each Vapor Extraction Point (VEP), sampling the entire cluster was only omitted once. Sampling the full cluster provides more appropriate constituent concentrations for the mass removal calculations rather than extrapolated data.
7. *The following timeline will be required for the above laboratory sampling elements:*
 - a. *Weekly - next three (3) weeks (first month);*
 - b. *Bi-weekly (twice a month) – 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.*
 - Initial analysis was collected at start-up. After initial startup, plant staff were only able to complete sampling events every other week (11/8/24) during the first month. One bi-weekly sampling event (12/13/24) was not able to be completed during the remainder of the first quarter, but as with the handheld data collection requirements, collection procedures have been established and bi-monthly sampling events are scheduled.

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8. *MorningStar must submit to OCD quarterly reports for the first 2 years of operation, then bi-annual thereafter, detailing the following:*
 - a. *Summary of remediation activity;*
 - b. *Chart of O₂ & CO₂ levels over time;*
 - c. *SVE runtime;*
 - d. *SVE mass removal;*
 - e. *Product recovery, if applicable;*
 - f. *Laboratory air sample analysis, if applicable.*
- This report serves at the first of the quarterly reports for the initial 2-year period.
 - a. Summary data has been included;
 - b. O₂ & CO₂ Charts have been supplied in **Appendix B**;
 - c. SVE runtime logs are supplied in **Appendix B**;
 - d. SVE mass removal calculations have been supplied in **Appendix B**;
 - e. The product recovery log table is supplied in **Appendix B**;
 - f. Laboratory air samples will be provided as a compressed folder for data management purposes.
9. *MorningStar must notify OCD of its initial system startup which is required within 90 days of this approval. If this cannot be achieved, MorningStar must verify the delay within its request for a time extension.*
- Notifications and delay have all been documented within the January 22, 2024 letter to the EMNRD along with the email correspondence providing cause of delays and extension requests.
10. *MorningStar must submit to OCD a closure plan prior to initiating confirmation sampling for final remediation termination.*
- A closure plan will be submitted upon project completion for approval.

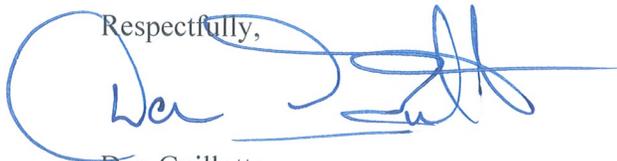
The SVE system operations have exceeded all expectations and are running smoothly. LNAPL recovery for the SVE has caused the only recorded downtimes due to liquids accumulation within the system cyclonic separation drum. Modifications were made to route the accumulated liquid into a graduated tote to aid in recordkeeping efforts and ease of transport for disposal.

With such positive results, MorningStar requests approval to expand the SVE system and potentially eliminate the LNAPL recovery pumping systems as noted above. MorningStar proposes to include the MW-19 with timing at their digression. This addition would serve to continue recovery efforts that will be reduced by the removal of the EW-1 pumping system, and expedite the total remediation effort time frame. If approved, the MW-19 VEP would be rolling into the sampling program in progress once constructed.

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If you have any questions or require further assistance, please contact Alan Kane at (281) 639-9590 or email: alanjkane@comcast.net, or Russell Hamm at (918) 693-4833 or email: rhammenviro@gmail.com.

Respectfully,

A handwritten signature in blue ink, appearing to read 'Dan Guillotte', with a large circular flourish on the left side.

Dan Guillotte
Manager Environmental Health and Safety

cc: Kane Environmental Engineering, Inc.
File



- LEGEND:
- - - - - FENCE LINE
 - MONITORING WELL LOCATION
 - LNAPL ABOVE GROUND LINE
 - LNAPL PUMP AND STORAGE TANK
 - SVE ABOVE GROUND COLLECTION LINE
 - ⋯ SVE BURRIED COLLECTION LINE
 - SVE BLOWER STATION
 - EXISTING STRUCTURE OR VESSEL

**BUCKEYE COMPRESSOR STATION
LEA COUNTY, NEW MEXICO**

LNAPL and SVE Remediation Line Routing



ENVIRONMENTAL ENGINEERING, INC.

FIGURE
1

Appendix A -LNAPL Pump Systems

EW-1 Installation & Initial Recovery



MW-9 Installation & Initial Recovery



**Buckeye Groundwater Incident nAUTOFGP000135 Quarterly Report
LNAPL Recovery Pumps**

Unit	7/17-18/2023	7/20/2023		7/21/2023		Total Recovery	10/23/2023		Total Recovery	11/28/2023		Total Recovery	1/22/2024		Total Recovery
EW-1	Initial Install	1.5"	12.5-gal	1.5"	12.5-gal	approx. 25-gal	1"	8.312-gal	approx. 33-gal	1.7"	14-gal	approx. 47-gal	--	System Fault	approx. 47-gal
MW-9	Initial Install	1"	8.312-gal	2"	16.5-gal	approx. 25-gal	--	System Fault	approx. 25-gal	--	Reinstallation	approx. 25-gal	5.2"	43-gal	approx. 68-gal
						approx. 50-gal			approx. 58-gal			approx. 72-gal			approx. 115-gal

300 Gallon Tote Volume: 40" X 48" X 36" (69120cuin=299.22gal)

1"=1920cuin or 8.312gal

Appendix B -Soil Vapor Extraction (SVE) Systems

SVE Installation



MW-3



MW-2

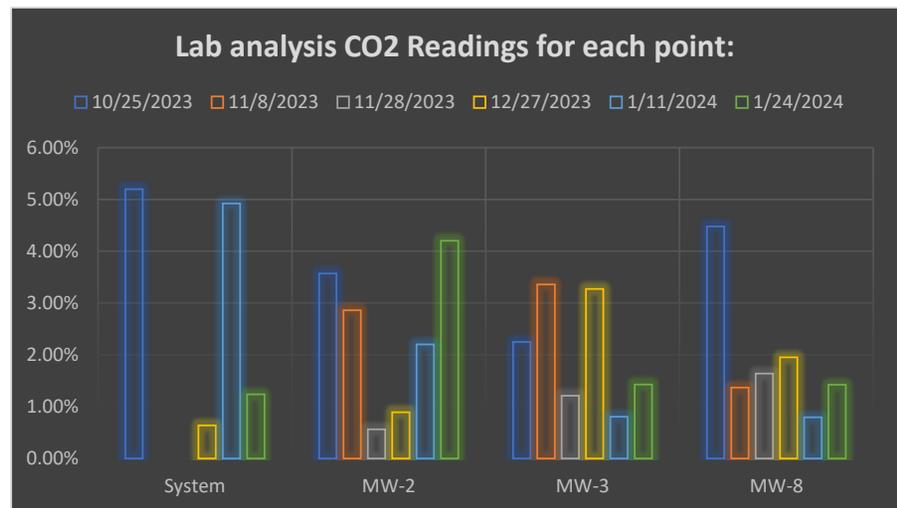
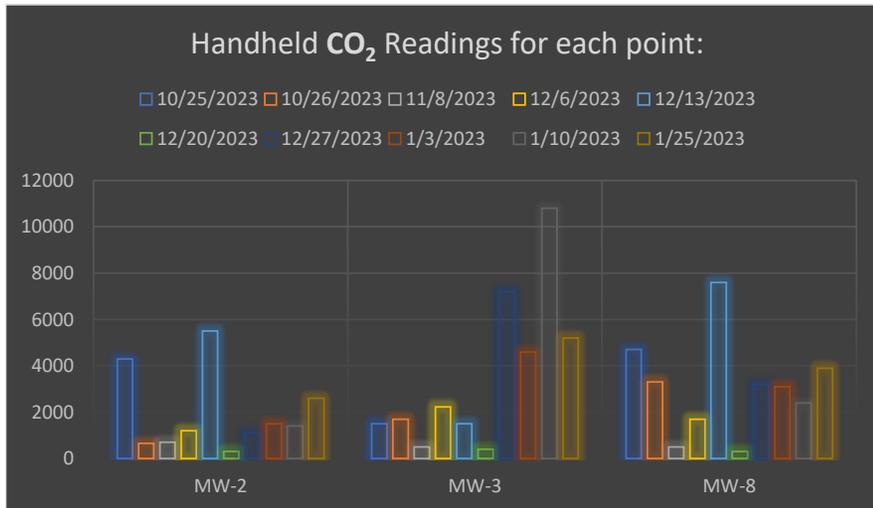
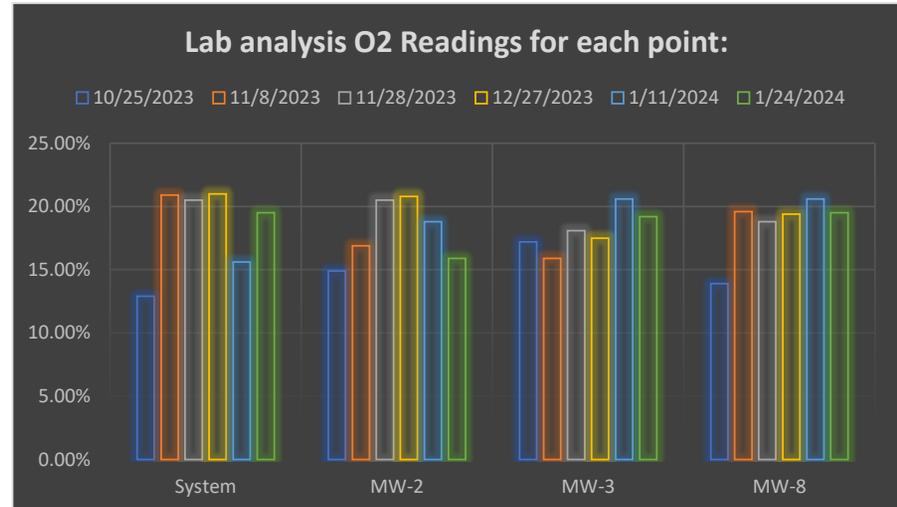
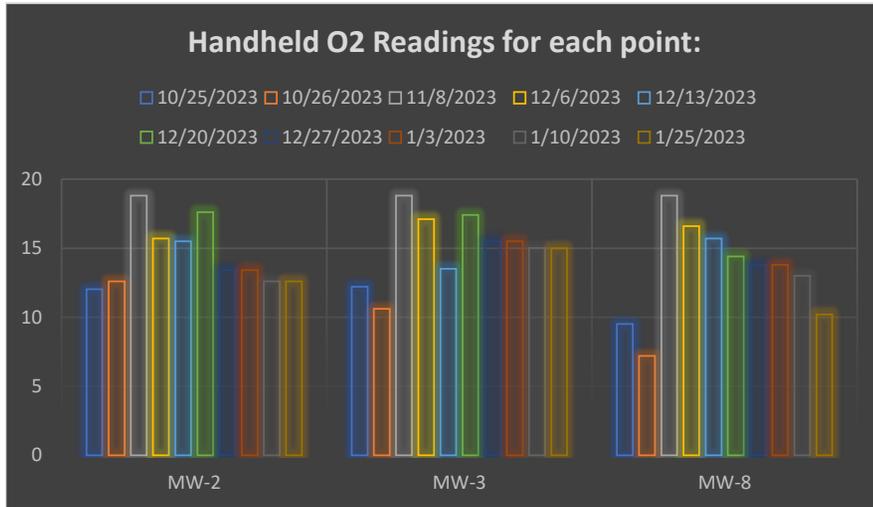


MW-8



Quarterly Report Required SVE System Data

b. Chart of O₂ & CO₂ levels over time



c. SVE Runtime

MorningStar Partners Soil Vapor Extraction System-Targa Compressor Station Application ID: 196869		
SVE System Start Date	Time	Meter Reading
10/25/2023	8:45	0.1
11/16/2023	15:30	508
11/17/2023	8:36	525
11/20/2023	8:30	597
11/21/2023	7:10	617
11/22/2023	8:30	642
11/23/2023	9:00	671
11/24/2023	7:30	689
11/25/2023	8:15	701
11/26/2023	10:30	712
11/27/2023	8:30	739
11/28/2023	9:00	764
11/28/2023	13:20	768.4
11/30/2023	16:16	789
12/3/2023	14:45	886
12/4/2023	10:41	902
12/7/2023	9:00	961
12/8/2023	9:00	980
12/9/2023	9:00	1009
12/10/2023	9:00	1038
12/11/2023	9:00	1066
12/12/2023	9:00	1094
12/13/2023	9:00	1121
12/14/2023	7:00	1138
12/15/2023	15:40	1171
12/16/2023	10:00	1188
12/17/2023	8:30	1212
12/18/2023	17:00	1244.6
12/19/2023	16:00	1267.6
12/20/2023	8:00	1280.2
12/21/2023	10:11	1309.7
12/22/2023	11:00	1334.7
12/23/2023	10:00	1357.6
12/24/2023	9:00	1380.6
12/25/2023	10:00	1405.6
12/26/2023	10:00	1429.6
12/27/2023	14:00	1456.9
12/28/2023	8:00	1475
12/29/2023	8:15	1592
12/30/2023	8:30	1504
12/31/2023	8:00	1526
1/1/2024	8:30	1565
1/2/2024	8:10	1595
1/4/2024	8:30	1646
1/5/2024	8:30	1669
1/6/2023	8:30	1693
1/7/2023	8:30	1717

d. SVE mass removal

Buckeye SVE System

Input Data:	Lbs/day Initial	Lbs/day 11/8/23	Lbs/day 11/28/23	Lbs/day 12/28/23	Lbs/day 1/11/24	Lbs/day 1/25/24
TPH	125.09	3.64	103.250	43.58	23.82	119.15
Benzene	1.14	0.05	3.48	1.83	3.11	5.31
Toluene	0.49	0.21	3.27	1.74	3.05	3.22
Ethylbenzene	0.22	0.07	0.34	0.51	0.59	0.54
Xylenes	0.44	0.28	0.22	0.55	0.46	0.44

Assumptions

Mass removal is calculated based on the duration of time between sampling events.
 Example Calculation (benzene) from start till the next sampling event. Duration seven days.

(7 days) (1.14 lbs/day) = 7.98 lbs

Mass Removal	Duration (days)	Total Uncontrolled (lbs)	Total Uncontrolled (Tons)	Flare (Tons)
	14			
	7			
	13			
	30			
	14			
	13			
TPH		7500.32	3.750	0.0750
Benzene		229.02	0.115	0.0023
Toluene		187.60	0.094	0.0019
Ethylbenzene		39.22	0.020	0.0004
Xylene		39.64	0.020	0.0004
			4.00	

Buckeye SVE System

Input Data:	Velocity (m/s)		ft/second	Flowrate ft ³ /minute
Full SVE Stream	10.26		33.6613	40.474
Pipe Diameter	2.0	1.917	Inch ID	
Crosssectional Area of Piping	0.02004		ft ²	
Flowrate Q=(A)(V)				

Example Calculation

Benzene lbs per day

$(\text{Flowrate ft}^3/\text{min})(60 \text{ min/hr})(267 \text{ ft}^3/1,000,000 \text{ ft}^3)(78.10 \text{ lb/mol})(\text{mol}/373\text{ft}^3)(24 \text{ hr/day})$

Analytical Results	%	PPM	Uncontrolled (lb/day)	Uncontrolled (Tons)	Flare (Tons)
Oxygen	19.50				
Carbon Dioxide	1.420				
TPH		7550	119.15	21.75	0.4349
Benzene		435	5.31	0.97	0.0194
Toluene		224	3.22	0.59	0.0118
Ethylbenzene		32.4	0.54	0.10	0.0020
Xylene		26.30	0.44	0.08	0.0016

Buckeye SVE System

Input Data:	Velocity (m/s)		ft/second	Flowrate ft ³ /minute
Full SVE Stream	9.80		32.1522	38.660
Pipe Diameter	2.0	1.917	Inch ID	
Crosssectional Area of Piping	0.02004		ft ²	
Flowrate Q=(A)(V)				

Example Calculation

Benzene lbs per day

$(\text{Flowrate ft}^3/\text{min})(60 \text{ min/hr})(267 \text{ ft}^3/1,000,000 \text{ ft}^3)(78.10 \text{ lb/mol})(\text{mol}/373\text{ft}^3)(24 \text{ hr/day})$

Analytical Results	%	PPM	Uncontrolled (lb/day)	Uncontrolled (Tons)	Flare (Tons)
Oxygen	15.60				
Carbon Dioxide	4.920				
TPH		1580	23.82	4.35	0.0869
Benzene		267	3.11	0.57	0.0114
Toluene		222	3.05	0.56	0.0111
Ethylbenzene		37.1	0.59	0.11	0.0021
Xylene		29.10	0.46	0.08	0.0017

Buckeye SVE System

Input Data:	Velocity (m/s)		ft/second	Flowrate ft ³ /minute
Full SVE Stream	5.94		19.4881	23.433
Pipe Diameter	2.0	1.917	Inch ID	
Crosssectional Area of Piping	0.02004		ft ²	
Flowrate Q=(A)(V)				

Example Calculation

Benzene lbs per day

$(\text{Flowrate ft}^3/\text{min})(60 \text{ min/hr})(1.83 \text{ ft}^3/1,000,000 \text{ ft}^3)(78.10 \text{ lb/mol})(\text{mol}/373\text{ft}^3)(24 \text{ hr/day})$

Analytical Results	%	PPM	Uncontrolled (lb/day)	Uncontrolled (Tons)	Flare (Tons)
Oxygen	21.00				
Carbon Dioxide	0.641				
TPH		4770	43.58	7.95	0.1591
Benzene		259	1.83	0.33	0.0067
Toluene		209	1.74	0.32	0.0064
Ethylbenzene		53.5	0.51	0.09	0.0019
Xylene		56.90	0.55	0.10	0.0020

Buckeye SVE System

Input Data:	Velocity (m/s)		ft/second	Flowrate ft ³ /minute
Full SVE Stream	5.94		19.4881	23.433
Pipe Diameter	2.0	1.917	Inch ID	
Crosssectional Area of Piping	0.02004		ft ²	
Flowrate Q=(A)(V)				

Example Calculation Benzene lbs per day
 (Flowrate ft³/min)(60 min/hr)(126 ft³/1,000,000 ft³)(78.10 lb/mol)(mol/373ft³)(24 hr/day)

Analytical Results	%	PPM	Uncontrolled (lb/day)	Uncontrolled (Tons)	Flare (Tons)
Oxygen	20.50				
Carbon Dioxide	0.00				
TPH		11300	103.25	18.84	0.3768
Benzene		492	3.48	0.63	0.0127
Toluene		392	3.27	0.60	0.0119
Ethylbenzene		35.6	0.34	0.06	0.0012
Xylene		22.80	0.22	0.04	0.0008

Buckeye SVE System

Input Data:	Velocity (m/s)		ft/second	Flowrate ft ³ /minute
Full SVE Stream	5.07		16.6338	20.001
Pipe Diameter	2.0	1.917	Inch ID	
Crosssectional Area of Piping	0.02004		ft ²	
Flowrate Q=(A)(V)				

Example Calculation Benzene lbs per day
 (Flowrate ft³/min)(60 min/hr)(126 ft³/1,000,000 ft³)(78.10 lb/mol)(mol/373ft³)(24 hr/day)

Analytical Results	%	PPM	Uncontrolled (lb/day)	Uncontrolled (TPY)	Flare (TPY)
Oxygen	20.90				
Carbon Dioxide	0.00				
TPH		467.0	3.64	0.66	0.0133
Benzene		7.95	0.05	0.01	0.0002
Toluene		29.8	0.21	0.04	0.0008
Ethylbenzene		8.02	0.07	0.01	0.0002
Xylene		33.80	0.28	0.05	0.0010

Buckeye SVE System

Input Data:	Velocity (m/s)		ft/second	Flowrate ft ³ /minute
Full SVE Stream	7.6		24.9343	29.981
Pipe Diameter	2.0	1.917	Inch ID	
Crosssectional Area of Piping	0.02004		ft ²	
Flowrate Q=(A)(V)				

Example Calculation

Benzene lbs per day

$(\text{Flowrate ft}^3/\text{min})(60 \text{ min/hr})(126 \text{ ft}^3/1,000,000 \text{ ft}^3)(78.10 \text{ lb/mol})(\text{mol}/373\text{ft}^3)(24 \text{ hr/day})$

Analytical Results	%	PPM	Uncontrolled (lb/day)	Uncontrolled (TPY)	Flare (TPY)
Oxygen	12.90				
Carbon Dioxide	5.20				
TPH		17400	203.41	37.12	0.7424
Benzene		1120	10.12	1.85	0.0370
Toluene		79.60	0.85	0.15	0.0031
Ethylbenzene		2.74	0.03	0.01	0.0001
Xylene		5.77	0.07	0.01	0.0003

e. Product recovery log

f. Laboratory air sample analysis
(supplied electronically)

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 325907

CONDITIONS

Operator: MorningStar Operating LLC 400 W 7th St Fort Worth, TX 76102	OGRID: 330132
	Action Number: 325907
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
michael.buchanan	Review of the Groundwater Quarterly Report for the 4Q of 2023: Content Satisfactory 1. Continue O&M of the SVE system as planned in the quarterly report. 2. The SVE system has demonstrated to be successful in remediation of COCs and is approved for expansion with removal of LNAPL recovery pumps as detailed in report. 3. Submit the 2024 Quarterly reports as scheduled, to OCD through the online portal.	6/26/2024