

June 11, 2024

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Report of Work Completed – SVE Remediation

ECMC Location Name (ID)	PICEANCE CREEK UNIT-62S96W18NESW (315347)
Client Location Name	PCU F23-18G
ECMC Spill/Release Point ID	9186
Legal Description	NESW Sec. 18 T2S-R96W
Coordinates (Lat/Long)	39.876360 / -108.212270
County	Rio Blanco County, Colorado

Mr. Janicek,

Confluence Compliance Companies, LLC (Confluence) prepared this Report of Work Completed (ROWC) for Caerus Oil and Gas LLC (Caerus) to document operation and maintenance (O&M) activities associated with the soil vapor extraction (SVE) remediation system located at the PCU F23-18G well pad (Location). The Location is 19 miles southwest of Meeker, Colorado, in Rio Blanco County as illustrated in the attached Topographic Map. Additional information on the Location and the associated remediation project is provided in the title block above and the attached Site Diagram and O&M Tables.

Background

On January 8, 2015, a produced water leak was discovered in the truck unloading area at the Location. The line was isolated, and the leak was stopped. The spill was confined to the working surface of the pad and was reported via Energy and Carbon Management Commission (ECMC) Form 19 Document 400767949. Form 27 Document 2495192 was later submitted to open Remediation Project 9186. Multiple subsequent site investigations were performed to determine the vertical and horizontal extent of soil impacts and install vertical soil vapor extraction (SVE) wells to accelerate attenuation of hydrocarbons, monitor subsurface conditions, and support future remediation efforts. A third-party consultant continued the SVE remediation O&M activities through the first quarter of 2023, with quarterly updates submitted to the ECMC via Form 27.

On June 22, 2023, Confluence personnel were onsite at the Location for an initial visit and to perform monthly O&M activities. Form 27 Document 403479448 and the associated ROWC, including historical data through second quarter 2023, were submitted to report results of the site investigation and provide a quarterly update to the ECMC. Confluence personnel continued O&M activities monthly through December 2023. Air emissions were calculated by referencing lab analysis from June 2022 (reported in Form 27 Document 403096669) and factoring SVE system flow rates documented from June 2023 through December 2023. The estimated cumulative emissions during the 7-month monitoring period were 0.02131 tons, below the Colorado Department of Public Health and Environment (CDPHE) allowable threshold for volatile organic compounds (VOCs) of 2 tons per 12-month rolling period. Remediation updates for the third and fourth quarters of 2023 were submitted to the ECMC via Form 27 Documents 403552475 and 403642184, respectively.

On January 31, February 28, and March 25, 2024, Confluence personnel were onsite to perform monthly O&M activities. Additionally, on February 28, 2024, one air sample was collected from the exhaust stack and submitted for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), and total volatile petroleum hydrocarbons (TVPH). First quarter 2024 remediation updates, including laboratory analytical results and a request to reduce O&M activities to a quarterly schedule, were submitted to the ECMC via Form 27 Document 403739503.

Methodology

On May 20, 2024, Confluence personnel were onsite at the Location to perform quarterly SVE O&M activities. Using a photoionization detector (PID), the exhaust stack and SVE wells were field screened. Based on PID measurements, adjustments were made to the SVE system flow and vacuum in order to optimize volatilization of organic compounds within the impacted area. As part of O&M activities, a new flow gauge was installed with a lower range to more accurately document SVE system flow rates.

Results

These results summarize observations from onsite remedial investigation efforts and associated laboratory analytical results. For organizational and presentation purposes, the results summary is divided between general observations of lithology and hydrogeology for the entire Location and site investigation activities. Collected spatial data are depicted in the attached Site Diagram. Laboratory analytical reports are attached and summarized in the Soil Analytical Results Table.

Lithology and Hydrogeology

Lithology at the Location consists of sandy clay at the surface. Soil boring data at the Location indicates poorly graded, medium grained sands below grade with sandstone shelves and thin clay layers. Groundwater at the Location is estimated to generally flow northwest towards Hatch Gulch, and ultimately to Piceance Creek located 5.85 miles northwest. According to Division of Water Resources (DWR) data, two springs are located within 0.5 miles of the Location at elevations of 7,085 and 7,150 feet above mean sea level (AMSL), while the Location sits at 7,400 feet AMSL. Based on this information, the estimated depth to groundwater is greater than 100 feet. Groundwater has not been encountered during investigative or remedial activities.

May 20, 2024 Quarterly SVE O&M Results

Airflow was measured at a rate of 18 standard cubic feet per minute (SCFM), and the PID measurement from the exhaust stack was 12.1 parts per million (ppm) with SVE04 25 percent (%) open, SVE07 at 100% open, and SVE06 closed. During system adjustments, PID measurements of the exhaust stack and isolated SVE wells ranged from 1.6 to 25.3 ppm. The optimal valve configuration for maximizing remedial potential was found to be as follows: SVE04 30% open, SVE06 closed, and SVE07 100% open. After system adjustments were made, the final exhaust stack PID measurement was 15.5 ppm.

Analysis and Recommendations

Based on the decreasing trend of PID measurements at the exhaust stack, removal of hydrocarbons from the subsurface is occurring. Current air emissions calculations indicate the SVE system discharged approximately 0.03346 tons of VOCs during the previous 12-month rolling period, which is below the CDPHE air permitting threshold of 2 tons of VOCs per year. Refer to the attached tables for O&M readings and emissions data.



Confluence recommends continued operation and quarterly maintenance of the SVE system to remediate subsurface soil impacts. Additionally, Confluence recommends continuing the collection of air emissions samples for laboratory analysis of BTEX and TVPH on a semi-annual basis.

Confluence is grateful for the opportunity to support you with this project. If you have any questions about the methods, results or recommendations presented here, please do not hesitate to contact us.

Regards,

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Attachments

- Topographic Location Map
- Site Diagram – SVE System
- Table 1 – O&M Readings
- Table 2 – Emissions Data
- Photographic Log



Topographic Location Diagram

Caerus Oil and Gas LLC

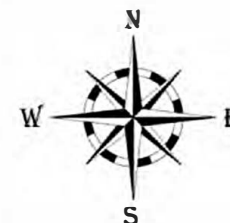
PCU F23-18G

(PICEANCE CREEK UNIT-62S96W/18NESW)

ECMC Location ID: 315347

Rio Blanco County

NESW Sec. 18 T2S-R96W



Topographic map sourced from Esri using data provided by United States Geological Survey

Created by: Miranda Beard on 08/04/2023.

PCU F23-18G

Google Earth

8 mi

Image Landsat/Copernicus

Site Diagram SVE System Monitoring

Caerus Oil and Gas LLC

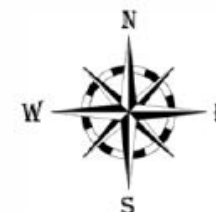
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Legend

 SVE Well

Spatial data was collected using a handheld GPS unit with submeter accuracy. Illustration discrepancies may be present in this diagram due to the inherent limitations of data accuracy for both project data and the underlying aerial imagery. The position of illustrated data may have been manually adjusted to align with the aerial imagery in a manner more representative of field conditions for presentation purposes only.

Map created by: Miranda Beard on 10/05/2023.

100 ft

Table 1 - O&M Readings
PCU F23-18G

O&M Readings - Final Configuration						
Sample Date	Well ID	Well Isolation (%)	PID (ppm)	Flow Rate (SCFM)	Discharge (in. WC)	Vacuum (in. WC)
6/22/2023	Exhaust Stack	NA	73.9	17.66	-48	-46
6/22/2023	SVE04	100	66.5	17.66	-48	-46
6/22/2023	SVE06	50	17.9	17.66	-51	-49
6/22/2023	SVE07	50	21.5	17.66	-52	-50
7/31/2023	Exhaust Stack	NA	28.3	17.66	-48	-50
7/31/2023	SVE04	100	13.6	17.66	-52	-51
7/31/2023	SVE06	NA	NA	17.66	NA	NA
7/31/2023	SVE07	50	18.7	17.66	-52	-50
8/28/2023	Exhaust Stack	NA	37	17.66	-45	-44
8/28/2023	SVE04	100	28.7	17.66	-43	-40
8/28/2023	SVE06	25	9.3	17.66	-51	-49
8/28/2023	SVE07	100	21.8	17.66	-50	-48
9/27/2023	Exhaust Stack	NA	59.2	17.66	-49	-46
9/27/2023	SVE04	100	49.9	17.66	-49	-47
9/27/2023	SVE06	25	4.4	17.66	-52	-50
9/27/2023	SVE07	25	1	17.66	-52	-50
10/31/2023	Exhaust Stack	NA	107.5	17.66	-52	-50
10/31/2023	SVE04	100	99.2	17.66	-52	-50
10/31/2023	SVE06	25	33.1	17.66	-54	-52
10/31/2023	SVE07	75	50.2	17.66	-54	-52
11/30/2023	Exhaust Stack	NA	90.5	17.66	-50	-48
11/30/2023	SVE04	100	104.1	17.66	-48	-46
11/30/2023	SVE06	50	24.1	17.66	-52	-50
11/30/2023	SVE07	25	16.1	17.66	-51	-48
12/18/2023	Exhaust Stack	NA	64.6	17.66	-52	-49
12/18/2023	SVE04	100	63.3	17.66	-51	-49
12/18/2023	SVE06	50	27.4	17.66	-54	-52
12/18/2023	SVE07	50	25.5	17.66	-54	-52
1/31/2024	Exhaust Stack	NA	63.7	17.66	-45	-43
1/31/2024	SVE04	100	60	17.66	-44	-42
1/31/2024	SVE06	50	25.7	17.66	-52	-50
1/31/2024	SVE07	75	35.5	17.66	-52	-50
2/28/2024	Exhaust Stack	NA	13.54	17.66	-53	-52
2/28/2024	SVE04	25	3.84	17.66	-53	-52
2/28/2024	SVE06	100	29.31	17.66	-53	-52
2/28/2024	SVE07	25	3.02	17.66	-54	-52
3/25/2024	Exhaust Stack	NA	37.1	17.66	-50	-48
3/25/2024	SVE04	25	6.5	17.66	-52	-50
3/25/2024	SVE06	0	1.6	17.66	-53	-51
3/25/2024	SVE07	100	46.2	17.66	-52	-50
5/20/2024	Exhaust Stack	NA	15.5	18	-50	-47
5/20/2024	SVE04	30	7.4	18	-51	-50
5/20/2024	SVE06	0	1.6	18	-51	-49
5/20/2024	SVE07	100	25.3	18	-52	-50

AIR EMISSIONS ESTIMATES					Lab Results February 2024					Estimated Emissions Rates					Estimated Emissions Total					
CDPHE Air Permitting Threshold 12-month rolling average (tons)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.0
Monitoring Event	PID (ppm)	Total Flow (cf)	Flow Rate (cfm)	Total Operatoinal Hours	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	VOCs TVPH (µg/L)	Benzene (lb/hr)	Toluene (lb/hr)	Ethylbenzene (lb/hr)	Xylenes (lb/hr)	VOCs TVPH (lb/hr)	Benzene (tons)	Toluene (tons)	Ethylbenzene (tons)	Xylenes (tons)	VOCs TVPH (tons)	12 Month Average (Tons)
2/28/2024	NA	737,482	NA	NA	<0.0006	<0.002	<0.0009	<0.003	<0.83	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
6/22/2023	71.6	NA	17.66	720	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00284	-
7/31/2023	71.6	NA	17.66	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00294	-
8/28/2023	37.3	NA	17.66	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00294	-
9/27/2023	60.5	NA	17.66	720	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00284	-
10/31/2023	138.4	NA	17.66	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00294	-
11/30/2023	108	NA	17.66	720	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00284	-
12/18/2023	64.3	NA	17.66	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00294	-
1/31/2024	64.8	NA	17.66	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00294	-
2/28/2024	29.31	NA	17.66	696	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00003	0.00275	-
3/25/2024	46.2	NA	17.66	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00003	0.00000	0.00004	0.00294	-
5/20/2024	12.1	NA	18	744	NA	NA	NA	NA	NA	0.0002	0.0001	0.0000	0.0001	0.0079	0.00007	0.00004	0.00000	0.00004	0.00294	-
															0.00077	0.00043	0.00000	0.00043	0.03185	0.03346

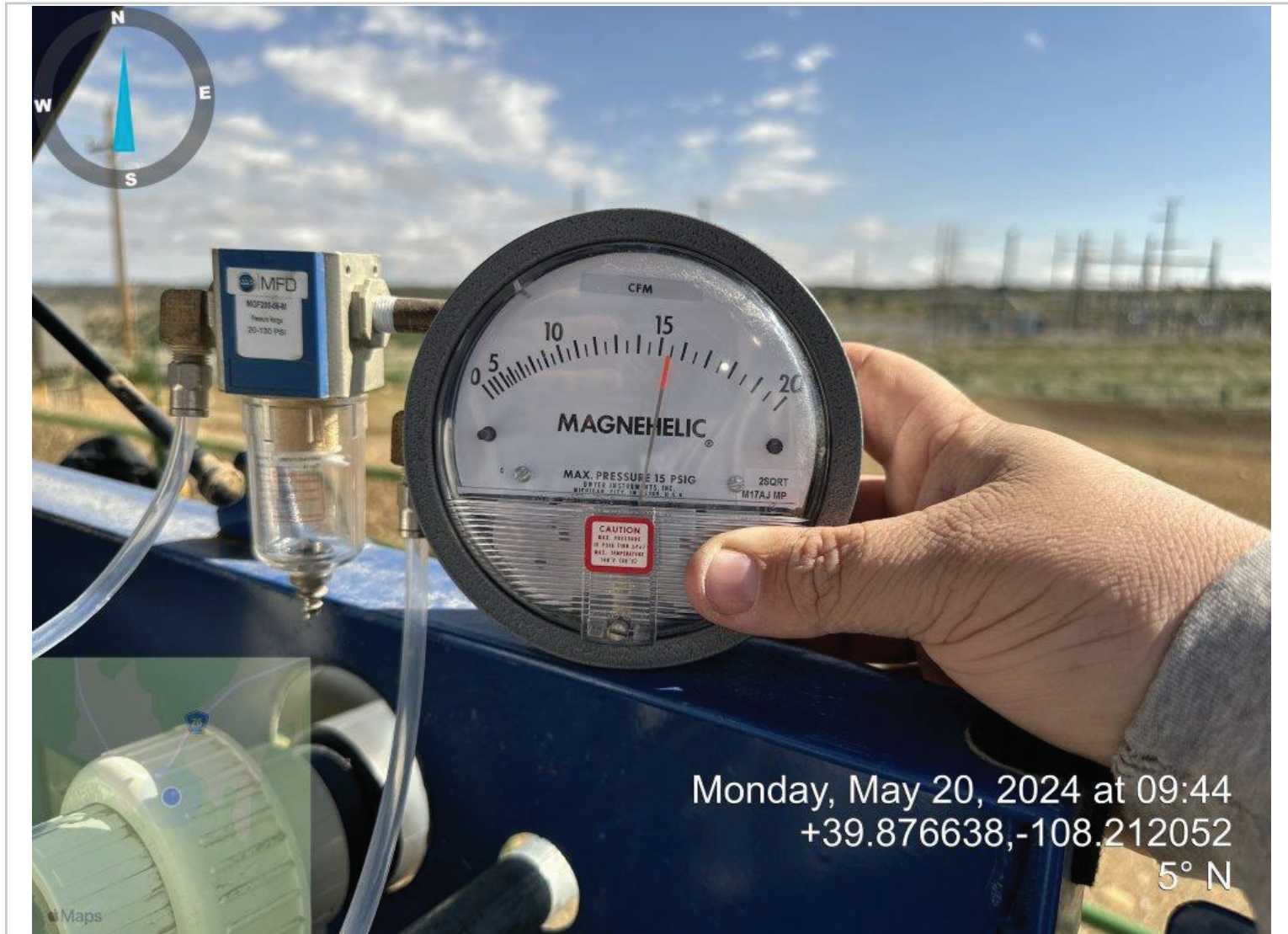


Photographic Log

Remediation Investigation

PCU F23-18G (ECMC Location ID: 315347)

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Updated Flow Meter



Photographic Log

Remediation Investigation

PCU F23-18G (ECMC Location ID: 315347)

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Updated Flow Meter Installed



Photographic Log

Remediation Investigation

PCU F23-18G (ECMC Location ID: 315347)

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Operating SVE System Stack



Photographic Log

Remediation Investigation

PCU F23-18G (ECMC Location ID: 315347)

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Stack PID reading