



December 18, 2023
Kleinfelder Project No. 20234315.001A

Mr. Blair Rollins
Caerus Piceance, LLC
1001 17th Street #1600
Denver, Colorado 80202

**SUBJECT: Site Investigation Report
 Caerus Piceance, LLC
 Plug And Abandonment Closure
 Remediation Project Number: 24192
 NPR 22C-15-596 Well (H15 Pad)
 Garfield County, Colorado**

Dear Mr. Rollins:

Kleinfelder Inc. (Kleinfelder) performed soil sampling activities at the NPR 22C-15-596 well on the H15 Pad in Garfield County, Colorado under contract by Caerus Piceance LLC (Caerus). Enclosed is the site investigation report for this effort.

Please do not hesitate to contact me at (303) 319-2456 or by email at VDeCianne@kleinfelder.com should you have questions or concerns.

Respectfully submitted,
KLEINFELDER, INC.

A handwritten signature in black ink, appearing to read "Vince DeCianne", is written over a horizontal line.

Vince DeCianne
VP, Senior Principal Professional



**SITE INVESTIGATION REPORT
CAERUS PICEANCE, LLC
PLUG AND ABANDONMENT CLOSURE
REMEDATION PROJECT NUMBER: 24192
NPR 22C-15-596 WELL (H15 PAD)
GARFIELD COUNTY, COLORADO**

KLEINFELDER PROJECT NO. 20234315.001A

December 18, 2023

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**ONLY THE CLIENT OR ITS DESIGNATED REPRESENTATIVES MAY USE THIS DOCUMENT AND ONLY FOR THE SPECIFIC PROJECT FOR WHICH THIS
REPORT WAS PREPARED.**

A Report Prepared for:

Caerus Piceance, LLC
1001 17th Street #1600
Denver, CO 80202

**SITE INVESTIGATION REPORT
CAERUS PICEANCE, LLC
PLUG AND ABANDONMENT CLOSURE
REMEDATION PROJECT NUMBER: 24192
NPR 22C-15-596 Well (H15 PAD)
GARFIELD COUNTY, COLORADO**

Prepared by:



Trevor Lakin
Environmental Scientist/Professional

Reviewed by:



Vince DeCianne
VP, Senior Principal Professional

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December 18, 2023
Kleinfelder Project No. 20234315.001A

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**SITE INVESTIGATION REPORT
CAERUS PICEANCE, LLC
PLUG AND ABANDONMENT CLOSURE
REMEDATION PROJECTNUMBER: 24192
NPR 22C-15-596 (H15 PAD)
GARFIELD COUNTY, COLORADO**

1 INTRODUCTION

This document was prepared by Kleinfelder Inc. (Kleinfelder) on behalf of Caerus Piceance, LLC (Caerus) to provide documentation of recent sampling support services conducted for the abandonment of the NPR 22C-15-596 well located on the H15 Pad (site) located in Garfield County, Colorado (**Figure 1**).

Kleinfelder has been contracted by Caerus to perform soil sampling support services to provide necessary information to complete the Colorado Energy and Carbon Management Commission (ECMC) Form 27 for their upstream oil and gas production facilities located in the Piceance Basin. Caerus is proceeding with the plugging and abandonment (P&A) and removal of the NPR 22C-15-596 natural gas well and associated flowlines to the separator and gas lift on the location.

Caerus submitted ECMC Form 27 Approved Initial and Supplemental Site and Investigation and Remediation Workplans as a notification to abandon the NPR 22C-15-596 (API #045-21089) well (refer to **Appendix A and Appendix B**). Refer to the Report of Work Complete dated February 23, 2023, for initial site investigation activities. Caerus proposed collection of soil samples from the base of hydrovac potholes adjacent to the NPR 22C-15-596 well to delineate apparent impacts. Kleinfelder collected the samples, which were analyzed by Pace Analytical National (Pace) laboratory and results are reported herein.

2 SITE LOCATION AND GEOLOGIC SETTING

The H15 Pad is located within the Piceance Basin in Garfield County, western Colorado (SENE, Section 15, Township 5 South, Range 96 West) (**Figure 1**). The Piceance Basin is a geologic structural basin consisting of sandstones and siltstones, containing reserves of coal, natural gas, and oil shale.

No surface water or groundwater were encountered during Kleinfelder's soil sampling activities. Adjacent land was observed to be rangeland. The general soil type within the wellhead P&A area was classified based on Kleinfelder's field observations using the Unified Soil Classification System (USCS) as clayey gravels, gravel-sand-clay mixtures. Topographical information is provided in **Figure 1**.

3 FIELD ACTIVITIES

As prescribed within the approved ECMC Form 27 Site Investigation and Remediation Workplan, Kleinfelder performed the following field activities at the H15 Pad on **October 5, 2023**:

October 5, 2023

- Collected four (4) soil samples from the base of four hydrovac potholes located in each cardinal direction (north, east, south, and west) from the cut and capped NPR 22C-15-596 wellhead at 8 feet below ground surface (bgs),
- Screened soil with photoionization detector (PID) at all soil sample locations, and
- Shipped site soil samples to Pace to analyze for total petroleum hydrocarbons (TPH), sodium adsorption ratios (SAR), and pH. All other analytes within Table 915-1 were previously sampled and showed no exceedances, therefore they were not analyzed again per the approved reduced analyte suite.

Prior to Kleinfelder's soil screening and sampling activities on October 5th, 2023, Caerus identified all sample locations. Hydrovac potholing was performed by MK Hydrovac (MK) at each sample location and depth as indicated above.

Soil samples were collected from a stainless-steel hand auger and placed into four laboratory-supplied, 9-ounce jars with Teflon lids per sample. Each sample was collected directly from the hand auger from the appropriate depth and placed into the glass jars. The samples were immediately placed on ice in a cooler. Standard chain-of-custody (COC) procedures were used during sampling and transportation to Pace in Mount Juliet, Tennessee (via FEDEX). Site soil samples were analyzed for TPH, SAR, and pH. Kleinfelder used an EOS Arrow 100 Submeter Global Navigation Satellite System (GNSS) receiver to record latitude and longitude the sample location. Sample locations are shown on **Figure 2**.

Sampling equipment (i.e., hand auger cutter head, soil sampler, etc.) was washed with a solution of Liquinox[®] detergent, rinsed with tap water, and then distilled water between samples. During soil sampling activities, Kleinfelder documented staining and/or odor observations, if any, and screened the soil with a photoionization detector (PID). Kleinfelder placed the soil into a Ziploc[®] plastic bag directly from the hand auger for screening with the PID. The PID is a MiniRAE 3000[®], which is owned and maintained by

Kleinfelder. Prior to use, Kleinfelder calibrated the PID, which passed calibration. Soil sample conditions and locations are provided in **Table 1**.

4 RESULTS

Kleinfelder observed soil conditions within the well P&A area during the soil sampling activities. Hydrocarbon odors and soil staining were not observed at any sample location. PID readings were all below 1 part per million (PPM). **Table 1** summarizes the samples and associated field observations. Sample results from November 2, 2022, are included in **Table 2** to compare to the Middle Fork Water Treatment Facility's produced water fluid results (**Appendix C**).

Excluding SAR and pH, the sample analytical results did not exceed the ECMC Table 915-1 Residential Soil Screening Levels (RSSLs) (**see Table 2**).

- SAR was detected at concentrations above the Table 915-1 RSSLs at the south delineation location (SB08).
- pH was detected at concentrations above the Table 915-1 RSSLs at all sample locations.

Analytical results are summarized in **Table 2** and were compared to ECMC Table 915-1 RSSLs. Site specific laboratory reports are provided in **Appendix D**. Sample locations are provided in **Figure 2**.

5 CONCLUSIONS AND RECOMMENDATIONS

Based on field assessment and desktop review of the area, it is believed there is no reasonable pathway for groundwater within the investigation area. The nearest registered water well is located approximately 1 mile south of the H15 Pad and has a constructed depth of 34 feet and resides approximately 300 feet lower in elevation. This well does not have a listed yield depth. Other wells in the area have similar constructed depths with no listed yield depth. West Fork Parachute Creek located within 200' of the pad and resides approximately 50 feet lower in elevation to the H15 Pad.

On November 2, 2022, facility closure soil samples collected adjacent to the NPR 22C-15-596 gas lift and separator flowline tie-ins exceeded Table 915-1 RSSLs for pH (**Table 2**). Additionally, sample results from the October 5th, 2023 sampling indicated pH concentrations were above the Table 915-1 RSSLs at all sample locations. However, the pH result from the nearby Middle Fork Water Treatment Facility produced fluid sample (**see Appendix C**) was lower than that of the soil samples. Therefore, it is likely that the exceedances for pH in the soil samples are natural and are not a result of a possible release from a flowline. Consequently, additional soil samples will not be collected adjacent to the gas lift and separator flowline tie-ins.

SAR was detected above ECMC Table 915-1 RSSLs at the southern delineation sample location (SB08). Kleinfelder was unable to collect a sample for vertical delineation immediately adjacent to the NPR 22C-15-596 wellhead. Further delineation would require a different method (i.e., an excavator) to excavate adjacent to and south of the wellhead.

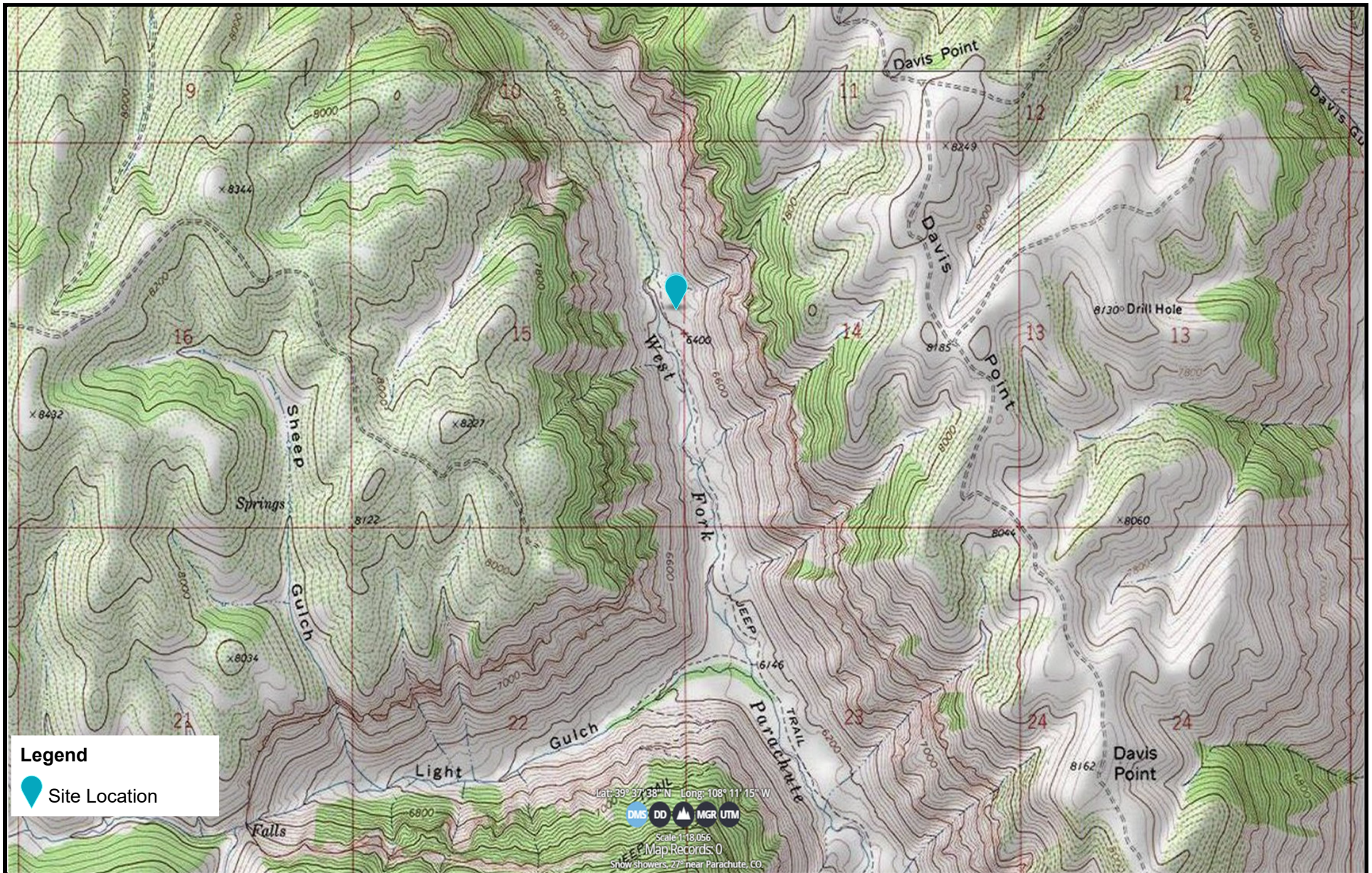
Due to the presence of underground flowlines adjacent to the NPR 22C-15-596 wellhead, Kleinfelder recommends requesting approval from the ECMC to address the Table 915-1 exceedances when the adjacent wellheads are plugged and abandoned, and the flowlines are removed. The current nearby underground utilities pose safety concerns for further excavation adjacent to the wellhead. Once the nearby flowlines have been removed, Kleinfelder recommends collecting soil samples at 8 feet bgs to be analyzed for TPH and SAR.


6 LIMITATIONS

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of geologic and environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. Acceptance of this report will indicate that Caerus has reviewed the document and determined that it does not need or want a greater level of service than provided.


During the course of the performance of Kleinfelder's services, hazardous materials may have been discovered. Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Nothing contained in this report should be construed or interpreted as requiring Kleinfelder to assume the status of an owner, operator, or generator, or person who arranges for disposal, transport, storage, or treatment of hazardous materials within the meaning of any governmental statute, regulation, or order. Caerus is solely responsible for directing notification of all governmental agencies, and the public at large, of the existence, release, treatment, or disposal of any hazardous materials observed at the project site, either before or during performance of Kleinfelder's services. Caerus is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including cuttings and samples resulting from Kleinfelder's services.

FIGURES



 <p>KLEINFELDER <i>Bright People. Right Solutions.</i></p> <p>www.kleinfelder.com</p>	PROJECT NO.	20234315.001A	Topographical Map	FIGURE 1
	DRAWN:	11/16/2023		
	DRAWN BY:	T. Lakin	Caerus Piceance, LLC Remediation Project Number: 24192 NPR 22C-15-596 (H15 Pad) SENE Sec. 15 T5S R96W Garfield County, Colorado	
	CHECKED BY:	J. Veith		
	FILE NAME:	H15 Figure 1_Topo Map.pub		



 <p>KLEINFELDER <i>Bright People. Right Solutions.</i></p> <p>www.kleinfelder.com</p>	PROJECT NO.	20234315.001A	Sample Location Map	FIGURE 2
	DRAWN:	11/16/2023		
	DRAWN BY:	T. Lakin		
	CHECKED BY:	J. Veith	Caerus Piceance, LLC Remediation Project Number: 24192 NPR 22C-15-596 (H15 Pad) SENE Sec. 15 T5S R96W Garfield County, Colorado	
	FILE NAME:	H15 (22C) Sample Map.pub		

TABLES



TABLE 1 - SAMPLE SUMMARY
CAERUS PICEANCE, LLC
REMEDIATION PROJECT NUMBER: 24192
NPR 22C-15-596 Well (H15 PAD)
SENE SEC. 15 T5S R96W
GARFIELD COUNTY, COLORADO

Sample ID	Sample Matrix	Latitude	Longitude	PID Reading (PPM)	Hydrocarbon Odor Detected (Y/N)	Soil Staining Observed (Y/N)	Comments
20231005-H15-(SB05)@8	Soil	39.61599197	-108.14636062	< 1	N	N	None
20231005-H15-(SB06)@8	Soil	39.61596434	-108.14640335	< 1	N	N	None
20231005-H15-(SB07)@8	Soil	39.61595942	-108.14636378	< 1	N	N	None
20231005-H15-(SB08)@8	Soil	39.61593539	-108.14638471	< 1	N	N	None

Notes:

PID = Photo-ionization Detector

PPM = Parts per million

Sample Objective	Background	Background	Background	Background	Assessment	Assessment	Assessment	Assessment	Assessment	Assessment	Assessment	Assessment	
Location ID	BG01	BG02	BG03	BG04	H15_22C-GL	H15_22C-GLTP	H15_22C-SEPFL	H15_22C-SEPFLTP	H15-(S805)	H15-(S806)	H15-S807	H15-(S808)	
Sample Date	11/16/2023	11/16/2023	11/16/2023	11/16/2023	11/2/2022	11/2/2022	11/2/2022	11/2/2022	10/5/2023	10/5/2023	10/5/2023	10/5/2023	
Sample ID	20221116_H15_BG01@1ft	20221116_H15_BG02@1ft	20221116_H15_BG03@1ft	20221116_H15_BG04@1ft	20221102_H15_22C-GL@4ft	20221102_H15_22C-GLTP_COMP	20221102_H15_22C-SEPFL@4ft	20221102_H15_22C-SEPFLTP_COMP	20231005-H15-(S805)@8	20231005-H15-(S806)@8	20231005-H15-(S807)@8	20231005-H15-(S808)@8	
Sample Depth (ft bgs)	1	1	1	1	4	GS	4	GS	8	8	8	8	
Contaminant of Concern	Cleanup Concentration (mg/kg unless otherwise noted)												
Soil TPH (total volatile [C6-C10] and extractable [C10-C36] hydrocarbons)	500	NM	NM	NM	NM	266.167	277.503	252.697	318.652	41.023	311.963	198.0858	141.606
TPH Low Fraction GND (C6-C10)		NM	NM	NM	NM	0.467	0.203	0.297	0.152	0.123	0.163	0.0858 J	0.106
DRO (C10-C38)		NM	NM	NM	NM	64.7	63.3	67.4	76.5	12.4	83.8	44.0	30.5
MRO (C28-C36)		NM	NM	NM	NM	201	214	185	242	28.5	228	154	111
Soils and Groundwater - liquid hydrocarbons including condensate and oil	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	Below Visual Detection Limits	
Electrical conductivity (EC) (by saturated paste method)	<4mmhos/cm	0.188	0.356	0.333	0.151	0.151	0.231	0.345	0.280	NM	NM	NM	NM
Sodium adsorption ratio (SAR) (by saturated paste method)	<6 SAR units	0.09	0.11	0.61	0.17	0.685	0.975	1.27	1.14	1.62	2.20	2.23	6.35
pH (by saturated paste method)	6-8.3 pH units	7.85 T8	7.50 T8	7.79 T8	8.15 T8	8.29 T8	8.33 T8	8.34 T8	8.36 T8	8.79 T8	8.72 T8	8.82 T8	9.42 T8
Boron (hot water soluble soil extract)	2 mg/L	0.866	1.19	0.894	0.334	0.267	0.821	0.869	0.845	NM	NM	NM	NM
Organic Compounds in Soils	Residential Soil Screening Level Concentrations												
benzene	1.2	NM	NM	NM	NM	<0.00100	<0.00100	<0.00100	<0.00100	NM	NM	NM	NM
toluene	490	NM	NM	NM	NM	0.0115	<0.00500	0.00633	<0.00500	NM	NM	NM	NM
ethylbenzene	5.8	NM	NM	NM	NM	<0.00250	<0.00250	<0.00250	<0.00250	NM	NM	NM	NM
xylenes (sum of o-, m- and p- isomers = total xylenes)	58	NM	NM	NM	NM	<0.00650	<0.00650	<0.00650	<0.00650	NM	NM	NM	NM
1,2,4-trimethylbenzene	30	NM	NM	NM	NM	<0.00500	<0.00500	<0.00500	<0.00500	NM	NM	NM	NM
1,3,5-trimethylbenzene	27	NM	NM	NM	NM	<0.00500	<0.00500	<0.00500	<0.00500	NM	NM	NM	NM
acenaphthene	360	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
anthracene	1800	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
benzo(a)anthracene	1.1	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
benzo(b)fluoranthene	1.1	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
benzo(k)fluoranthene	11	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
benzo(a)pyrene	0.11	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
chrysene	110	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
dibenz(a,h)anthracene	0.11	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
fluoranthene	240	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
fluorene	240	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
indeno[1,2,3-cd]pyrene	1.1	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
pyrene	180	NM	NM	NM	NM	<0.00600	<0.00600	<0.00600	<0.00600	NM	NM	NM	NM
1-methylnaphthalene	18	NM	NM	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	NM	NM	NM
2-methylnaphthalene	24	NM	NM	NM	NM	0.0243	<0.0200	<0.0200	0.0202	NM	NM	NM	NM
naphthalene	2	NM	NM	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	NM	NM	NM
Metals in Soils	Residential Soil Screening Level Concentrations												
arsenic	0.68	20.5	18.2	4.91	12.5	7.87	17.6	18.3	22.6	NM	NM	NM	NM
barium	15000	246	295	235	227	363	681	1260	1080	NM	NM	NM	NM
cadmium	71	0.504	0.525	ND	ND	<0.500	<0.500	1.96	<0.500	NM	NM	NM	NM
chromium (vi)	0.3	ND	ND	ND	ND	<1.00	<1.00	<1.00	<1.00	NM	NM	NM	NM
copper	3100	28.6	27.4	12.2	15.0	14.0	30.6	28.1	25.5	NM	NM	NM	NM
lead	400	17.2	17.6	7.60	13.2	8.64	17.5	15.4	15.4	NM	NM	NM	NM
nickel	1500	19.3	15.7	11.0	15.0	14.2	22.2	23.4	19.9	NM	NM	NM	NM
selenium	390	ND	ND	ND	ND	<2.00	<2.00	<2.00	<2.00	NM	NM	NM	NM
silver	390	ND	ND	ND	ND	<1.00	<1.00	<1.00	<1.00	NM	NM	NM	NM
zinc	23000	59.5	59.1	34.6	42.7	37.2	62.4	88.2	61.6	NM	NM	NM	NM

NOTES:

- Greater than Table 915-1 Standards and also greater than Middle Fork Water Treatment Facility's produced water fluid results. (See Appendix C - Attached)
- Greater than Table 915-1 Residential Soil Screening Level (RSSL) Concentrations
- Greater than Table 915-1 Standards, but less than adjusted standards (Highest background level is the adjusted standard for inorganics; 1.25X highest background level for metals).

BG = background sample
ft bgs = feet below ground surface
GS = Ground surface
J = The identification of the analyte is acceptable: the reported value is an estimate
MCL = maximum contaminant level
mg/kg = milligram per kilogram
mg/L = milligram per liter
mmhos/cm = millimhos per centimeter
ND = Not detected at the Reporting Limit (or MDL where applicable).
NM = Not measured
SB = soil boring
T8 = Samples received past/too close to holding time expiration

APPENDIX A

APPROVED ECMC FORM 27 SITE INVESTIGATION AND REMEDIATION WORKPLAN (INITIAL FORM)

State of Colorado Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:

403087304

Receive Date:

07/01/2022

Report taken by:

Steven Arauza

Site Investigation and Remediation Workplan (Initial Form)

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. However, this shall not preclude the Operator from taking immediate action to protect public health or safety, the environment, wildlife, or livestock.

This Form 27 describes site conditions as currently understood by the Operator; approval of this Form 27 by COGCC is based on the site conditions accurately described herein; any changes in site conditions identified during or subsequent to the performance of the approved workplan may necessitate additional investigation or remediation which shall be described on a supplemental Form 27. This Form 27 is intended to provide basic information regarding the proposed site investigation and remediation actions, but the workplan may be more fully described in attached documentation.

Closure request is not available for an Initial Site Investigation and Remediation Workplan.

OPERATOR INFORMATION

Name of Operator: CAERUS PICEANCE LLC	Operator No: 10456	Phone Numbers Phone: (970) 285-2925 Mobile: (970) 640-6919
Address: 1001 17TH STREET #1600		
City: DENVER	State: CO Zip: 80202	
Contact Person: Blair Rollins	Email: brollins@caerusoilandgas.com	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 24192 Initial Form 27 Document #: 403087304

PURPOSE INFORMATION

- ☐ Rule 913.c.(1): Pit or Cuttings Trench closure.
☐ Rule 913.c.(2): Buried or partially buried vessel closure, which will be by removal.
☐ Rule 913.c.(3): Remediation of Spill and Releases pursuant to Rule 912.
☐ Rule 913.c.(4): Land treatment of Oily Waste pursuant to Rule 905.e.
☐ Rule 913.c.(5): Closure of Centralized E&P Waste Management Facilities pursuant to Rule 907.h.
☐ Rule 913.c.(6): Remediation of impacted Groundwater pursuant to Rule 915.e.(3).D, and the contaminant concentrations in Table 915-1.
☐ Rule 913.c.(7): Investigation and remediation of natural gas in soil or Groundwater.
☐ Rule 913.c.(8): When requested by the Director due to any potential risk to soil, Groundwater, or surface water.
☒ Rule 913.c.(9): Decommissioning of Oil and Gas Facilities.
☐ Rule 913.g: Changes of Operator.
☐ Rule 915.b: Request to leave elevated inorganics in situ.
☐ Other:

SITE INFORMATION

Yes Multiple Facilities

Facility Type: FLOWLINE	Facility ID: 425805	API #:	County Name: GARFIELD
Facility Name: NPR H15-596	Latitude: 39.616619	Longitude: -108.146697	
** correct Lat/Long if needed: Latitude:		Longitude:	
QtrQtr: SENE	Sec: 15	Twp: 5S	Range: 96W Meridian: 6 Sensitive Area? Yes
Facility Type: WELL	Facility ID:	API #: 045-21089	County Name: GARFIELD
Facility Name: NPR 22C-15-596	Latitude: 39.615945	Longitude: -108.146357	
** correct Lat/Long if needed: Latitude:		Longitude:	
QtrQtr: SENE	Sec: 15	Twp: 5S	Range: 96W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications GC

Most Sensitive Adjacent Land Use Riparian Area

Is domestic water well within 1/4 mile? No

Is surface water within 1/4 mile? Yes

Is groundwater less than 20 feet below ground surface? No

Other Potential Receptors within 1/4 mile

SITE INVESTIGATION PLAN

TYPE OF WASTE:

☐ E&P Waste

☒ Other E&P Waste

☐ Non-E&P Waste

☐ Produced Water

☐ Workover Fluids

☐ Oil

☐ Tank Bottoms

☐ Condensate

☐ Pigging Waste

☐ Drilling Fluids

☐ Rig Wash

☐ Drill Cuttings

☐ Spent Filters

☐ Pit Bottoms

☒ Other (as described by EPA) Impacts associated with this P&A have not been identified

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
UNDETERMINED	SOILS	To be determined	Laboratory analysis

INITIAL ACTION SUMMARY

Description of initial action or emergency response measures take to abate, investigate, and/or remediate impacts associated with E&P Waste.

Caerus is providing this Form 27 as an initial notification for the plug and abandonment of the H15 22C-15-596 natural gas well and associated flowlines to the separator and gaslift skid on the location.

PROPOSED SAMPLING PLAN

Proposed Soil Sampling

☒ Will soil samples be collected as part of this investigation? (Number, type (grab/composite), analyses, and locations of samples):

Caerus will follow the COGCC Rule 911.a.(4) Operator Guidance document to photo-document, field screen and soil sample the P&A process of both the well head and flowline.

Proposed Groundwater Sampling

☐ Will groundwater samples be collected as part of this investigation? (Number, analyses, and locations of samples):

Caerus does not anticipate encountering groundwater associated with the well head and flowline P&A process. If groundwater is encountered, Caerus will notify the COGCC and attempt to collect a representative sample for analysis.

Proposed Surface Water Sampling

☐ Will surface water samples be collected as part of this investigation? (Number, analyses, and locations of samples):

Additional Investigative Actions

☐ Additional alternative investigative actions described in attached Site Investigation Plan (summary):

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 0
Number of soil samples exceeding 915-1
Was the areal and vertical extent of soil contamination delineated?
Approximate areal extent (square feet)

NA / ND

NA Highest concentration of TPH (mg/kg)
NA Highest concentration of SAR
BTEX > 915-1
Vertical Extent > 915-1 (in feet)

Groundwater

Number of groundwater samples collected 0
Was extent of groundwater contaminated delineated? No
Depth to groundwater (below ground surface, in feet) 75
Number of groundwater monitoring wells installed
Number of groundwater samples exceeding 915-1

NA Highest concentration of Benzene (µg/l)
NA Highest concentration of Toluene (µg/l)
NA Highest concentration of Ethylbenzene (µg/l)
NA Highest concentration of Xylene (µg/l)
NA Highest concentration of Methane (mg/l)

Surface Water

0 Number of surface water samples collected
 Number of surface water samples exceeding 915-1
If surface water is impacted, other agency notification may be required.

OTHER INVESTIGATION INFORMATION

☐ Were impacts to adjacent property or offsite impacts identified?

☐ Were background samples collected as part of this site investigation?

☐ Was investigation derived waste (IDW) generated as part of this investigation?

Volume of solid waste (cubic yards) Volume of liquid waste (barrels)

☐ Is further site investigation required?

REMEDIAL ACTION PLAN

SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

No source of impact has been identified to date for the purposed activities. If impacts are identified and confirmed through laboratory analysis, Caerus will provide this information to the COGCC with plans for source removal.

REMEDIATION SUMMARY

Describe how remediation of existing impacts to soil and groundwater is to be accomplished (i.e. summarize remedial action plan). Provide a brief narrative description including: technical justification, schedule for implementation, estimated time to attain NFA status, plus plans and specifications for the selected remedial action technology.

No source of impact has been identified to date for the purposed activities. If impacts are identified and confirmed through laboratory analysis, Caerus will provide this information to the COGCC with plans for source removal.

Soil Remediation Summary

☐ In Situ ☐ Ex Situ

☐ Bioremediation (or enhanced bioremediation)
☐ Chemical oxidation
☐ Air sparge / Soil vapor extraction
☐ Natural Attenuation
☐ Other _____

☐ Excavate and offsite disposal
☐ If Yes: Estimated Volume (Cubic Yards) _____
☐ Name of Licensed Disposal Facility or COGCC Facility ID # _____
☐ Excavate and onsite remediation
☐ Land Treatment
☐ Bioremediation (or enhanced bioremediation)
☐ Chemical oxidation
☐ Other _____

Groundwater Remediation Summary

☐ No Bioremediation (or enhanced bioremediation)
☐ No Chemical oxidation
☐ No Air sparge / Soil vapor extraction
☐ No Natural Attenuation
☐ No Other _____

GROUNDWATER MONITORING

If groundwater has been impacted, describe proposed monitoring plan, including # of wells or sample points, monitoring schedule, analytical methods, points of compliance. Attach a groundwater monitoring location diagram.

Groundwater is not expected to be encountered at the site. If groundwater is identified, Caerus will attempt to collect a sample for analysis and will provide the results to the COGCC under Supplemental eForm 27.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☐ Quarterly ☐ Semi-Annually ☐ Annually ☐ Other

☐ Request Alternative Reporting Schedule:

☐ Semi-Annually ☐ Annually ☐ Other

Rule 913.e:

After initial approval of a Form 27, the Operator will provide quarterly update reports in a Supplemental Form 27 to document progress of site investigation and remediation, unless an alternative reporting schedule has been requested by the Operator and approved by the Director. The Director may request a more frequent reporting schedule based on site-specific conditions.

Report Type: ☐ Groundwater Monitoring ☐ Land Treatment Progress Report ☐ O&M Report
☐ Other

Adequacy of Operator's General Liability Insurance and Financial Assurance

Describe the adequacy of the Operator's general liability insurance and Financial Assurance to fully address the anticipated costs of Remediation, including the estimated remaining cost for this project (below).

If this information has been provided on a Form 27 within the last 12 months, provide the Document Number of that form.

Plug and Abandonment costs associated with this P&A Form 27 would be covered under Caerus' active Plugging Insurance (Surety ID 20190099).

Operator anticipates the remaining cost for this project to be: \$

WASTE DISPOSAL INFORMATION

Was E&P waste generated as part of this remediation?

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

Volume of E&P Waste (solid) in cubic yards

E&P waste (solid) description

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility:

Volume of E&P Waste (liquid) in barrels

E&P waste (liquid) description

COGCC Disposal Facility ID #, if applicable:

Non-COGCC Disposal Facility:

RECLAMATION PLAN

RECLAMATION PLANNING

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing.

Caerus plans to return the disturbed area to the active working surface of the well pad for continued operation.

Is the described reclamation complete? No

Does the reclamation described herein constitute interim or final reclamation of the Oil and Gas Location?

☐ Interim ☐ Final

Did the Surface Owner provide the seed mix? Yes

If YES, does the seed mix comply with local soil conservation district recommendations? Yes

Did the local soil conservation district provide the seed mix? Yes

SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. _____

Proposed date of completion of Reclamation. _____

IMPLEMENTATION SCHEDULE

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

PRIOR DATES

Date of Surface Owner notification/consultation, if required. _____

Actual Spill or Release date, or date of discovery. _____

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). _____

Proposed site investigation commencement. 07/15/2022

Proposed completion of site investigation. _____

REMEDIAL ACTION DATES

Proposed start date of Remediation. _____

Proposed date of completion of Remediation. _____

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

☐ Change from approved implementation schedule per Rule 913.d.(2).

Basis for change in implementation schedule:

OPERATOR COMMENT

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: Jordan Veith

Title: Environmental Scientist

Submit Date: 07/01/2022

Email: jveith@kleinfelder.com

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with COGCC Rules and applicable orders and is hereby approved.

COGCC Approved: Steven Arauza

Date: 07/26/2022

Remediation Project Number: 24192

Condition of Approval**COA Type****Description**

	Comply with COGCC Rule 1105 flowline abandonment requirements, including notification and verification requirements.
	Comply with Rule 912 for any historical impacts that are discovered.
	Provide a revised Implementation Schedule with proposed start and completion dates for Site Investigation and Remediation on the next Supplemental Form 27, per Rule 913.d
	Operator shall collect soil samples from areas most likely to be impacted and shall collect an appropriate number of representative soil samples to delineate the horizontal and vertical extents of contamination, per Rule 915.e.(2).B.
	Operator shall collect sample(s) from comparable, nearby non-impacted native soil for purposes of establishing background soil conditions including pH, electrical conductivity (EC) and sodium adsorption ratio (SAR), per Rule 915.e.(2).D.
	Per Rule 913.b.(2), the Operator will conduct sampling and analysis of soil, and groundwater--if encountered, to determine the horizontal and vertical extent of any contamination in excess of the cleanup concentrations in Table 915-1 for soil and groundwater. The Operator shall analyze samples for the complete Table 915-1 list and shall compare analytical results for site investigation samples to both the Table 915-1 Residential Soil Screening Level Concentrations and the Protection of Groundwater Soil Screening Level Concentrations. Submit an assessment of potential pathways to groundwater via a Supplemental Form 27.
6 COAs	

Attachment Check List

Upon approval, the approved Form 27 and all listed attachments will be indexed to the Remediation Project file. Only the approved Form 27 will also be indexed to the related Facilities.

Att Doc Num**Name**

403087304	FORM 27-INITIAL-SUBMITTED
403087305	SOIL SAMPLE LOCATION MAP

Total Attach: 2 Files

General Comments**User Group****Comment****Comment Date**

		Stamp Upon Approval
--	--	---------------------

Total: 0 comment(s)

APPENDIX B
**APPROVED ECMC FORM 27 SITE INVESTIGATION AND REMEDIATION WORKPLAN (SUPPLEMENTAL
FORM)**

State of Colorado Energy & Carbon Management Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:

403471798

Receive Date:

07/20/2023

Report taken by:

Steven Arauza

Site Investigation and Remediation Workplan (Supplemental Form)

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. However, this shall not preclude the Operator from taking immediate action to protect public health or safety, the environment, wildlife, or livestock.

This Form 27 describes site conditions as currently understood by the Operator; approval of this Form 27 by COGCC is based on the site conditions accurately described herein; any changes in site conditions identified during or subsequent to the performance of the approved workplan may necessitate additional investigation or remediation which shall be described on a supplemental Form 27. This Form 27 is intended to provide basic information regarding the proposed site investigation and remediation actions, but the workplan may be more fully described in attached documentation.

Closure request is not available for an Initial Site Investigation and Remediation Workplan.

OPERATOR INFORMATION

Name of Operator: CAERUS PICEANCE LLC	Operator No: 10456	Phone Numbers Phone: (970) 285-2925 Mobile: (970) 640-6919
Address: 1001 17TH STREET #1600		
City: DENVER	State: CO Zip: 80202	
Contact Person: Blair Rollins	Email: brollins@caerusoilandgas.com	

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 24192 Initial Form 27 Document #: 403087304

PURPOSE INFORMATION

- ☐ Rule 913.c.(1): Pit or Cuttings Trench closure.
- ☐ Rule 913.c.(2): Buried or partially buried vessel closure, which will be by removal.
- ☐ Rule 913.c.(3): Remediation of Spill and Releases pursuant to Rule 912.
- ☐ Rule 913.c.(4): Land treatment of Oily Waste pursuant to Rule 905.e.
- ☐ Rule 913.c.(5): Closure of Centralized E&P Waste Management Facilities pursuant to Rule 907.h.
- ☐ Rule 913.c.(6): Remediation of impacted Groundwater pursuant to Rule 915.e.(3).D, and the contaminant concentrations in Table 915-1.
- ☐ Rule 913.c.(7): Investigation and remediation of natural gas in soil or Groundwater.
- ☐ Rule 913.c.(8): When requested by the Director due to any potential risk to soil, Groundwater, or surface water.
- ☒ Rule 913.c.(9): Decommissioning of Oil and Gas Facilities.
- ☐ Rule 913.g: Changes of Operator.
- ☐ Rule 915.b: Request to leave elevated inorganics in situ.
- ☐ Other: _____

SITE INFORMATION

Yes Multiple Facilities

Facility Type: FLOWLINE	Facility ID: 425805	API #: _____	County Name: GARFIELD
Facility Name: NPR H15-596	Latitude: 39.616619	Longitude: -108.146697	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: SENE	Sec: 15	Twp: 5S	Range: 96W Meridian: 6 Sensitive Area? Yes

Facility Type: WELL	Facility ID: _____	API #: 045-21089	County Name: GARFIELD
Facility Name: NPR 22C-15-596	Latitude: 39.615945	Longitude: -108.146357	
** correct Lat/Long if needed: Latitude: _____		Longitude: _____	
QtrQtr: SENE	Sec: 15	Twp: 5S	Range: 96W Meridian: 6 Sensitive Area? Yes

SITE CONDITIONS

General soil type - USCS Classifications GC

Most Sensitive Adjacent Land Use Riparian Area

Is domestic water well within 1/4 mile? No

Is surface water within 1/4 mile? Yes

Is groundwater less than 20 feet below ground surface? No

Other Potential Receptors within 1/4 mile

SITE INVESTIGATION PLAN

TYPE OF WASTE:

- ☐ E&P Waste ☒ Other E&P Waste ☐ Non-E&P Waste
- ☐ Produced Water ☐ Workover Fluids _____
- ☐ Oil ☐ Tank Bottoms
- ☐ Condensate ☐ Pigging Waste
- ☐ Drilling Fluids ☐ Rig Wash
- ☐ Drill Cuttings ☐ Spent Filters
- ☐ Pit Bottoms
- ☒ Other (as described by EPA) Impacts associated with this P&A have not been identified

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
UNDETERMINED	SOILS	To be determined	Laboratory analysis

INITIAL ACTION SUMMARY

Description of initial action or emergency response measures take to abate, investigate, and/or remediate impacts associated with E&P Waste.

Caerus is providing this Form 27 as an initial notification for the plug and abandonment of the H15 22C-15-596 natural gas well and associated flowlines to the separator and gaslift skid on the location.

PROPOSED SAMPLING PLAN

Proposed Soil Sampling

☒ Will soil samples be collected as part of this investigation? (Number, type (grab/composite), analyses, and locations of samples):

Caerus will follow the COGCC Rule 911.a.(4) Operator Guidance document to photo-document, field screen and soil sample the P&A process of both the well head and flowline.

Proposed Groundwater Sampling

☐ Will groundwater samples be collected as part of this investigation? (Number, analyses, and locations of samples):

Caerus does not anticipate encountering groundwater associated with the well head and flowline P&A process. If groundwater is encountered, Caerus will notify the COGCC and attempt to collect a representative sample for analysis.

Proposed Surface Water Sampling

☐ Will surface water samples be collected as part of this investigation? (Number, analyses, and locations of samples):

Additional Investigative Actions

☐ Additional alternative investigative actions described in attached Site Investigation Plan (summary):

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 10

Number of soil samples exceeding 915-1 6

Was the areal and vertical extent of soil contamination delineated? No

Approximate areal extent (square feet) 150

NA / ND

-- Highest concentration of TPH (mg/kg) 1724

-- Highest concentration of SAR 8.6

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 6

Groundwater

Number of groundwater samples collected 0

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 75

Number of groundwater monitoring wells installed

Number of groundwater samples exceeding 915-1

NA Highest concentration of Benzene (µg/l)

NA Highest concentration of Toluene (µg/l)

NA Highest concentration of Ethylbenzene (µg/l)

NA Highest concentration of Xylene (µg/l)

NA Highest concentration of Methane (mg/l)

Surface Water

0 Number of surface water samples collected

Number of surface water samples exceeding 915-1

If surface water is impacted, other agency notification may be required.

OTHER INVESTIGATION INFORMATION

☐ Were impacts to adjacent property or offsite impacts identified?

☒ Were background samples collected as part of this site investigation?

Caerus collected background soil samples in support of this project, and are outlined in the attached report.

☐ Was investigation derived waste (IDW) generated as part of this investigation?

Volume of solid waste (cubic yards)

Volume of liquid waste (barrels)

☒ Is further site investigation required?

Caerus will continue to assess impacts in support of this project.

REMEDIAL ACTION PLAN

Does this Supplemental Form 27A include changes to a previously approved Remedial Action Plan? No

SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

No source of impact has been identified to date for the purposed activities. If impacts are identified and confirmed through laboratory analysis, Caerus will provide this information to the COGCC with plans for source removal.

REMEDIAL SUMMARY

Describe how remediation of existing impacts to soil and groundwater is to be accomplished (i.e. summarize remedial action plan). Provide a brief narrative description including: technical justification, schedule for implementation, estimated time to attain NFA status, plus plans and specifications for the selected remedial action technology.

No source of impact has been identified to date for the purposed activities. If impacts are identified and confirmed through laboratory analysis, Caerus will provide this information to the COGCC with plans for source removal.

Soil Remediation Summary

☐ In Situ

☐ Ex Situ

☐ Bioremediation (or enhanced bioremediation)
☐ Chemical oxidation
☐ Air sparge / Soil vapor extraction
☐ Natural Attenuation
☐ Other _____

☐ Excavate and offsite disposal
☐ If Yes: Estimated Volume (Cubic Yards) _____
☐ Name of Licensed Disposal Facility or COGCC Facility ID # _____
☐ Excavate and onsite remediation
☐ Land Treatment
☐ Bioremediation (or enhanced bioremediation)
☐ Chemical oxidation
☐ Other _____

Groundwater Remediation Summary

☐ No Bioremediation (or enhanced bioremediation)
☐ No Chemical oxidation
☐ No Air sparge / Soil vapor extraction
☐ No Natural Attenuation
☐ No Other _____

GROUNDWATER MONITORING

If groundwater has been impacted, describe proposed monitoring plan, including # of wells or sample points, monitoring schedule, analytical methods, points of compliance. Attach a groundwater monitoring location diagram.

Groundwater is not expected to be encountered at the site. If groundwater is identified, Caerus will attempt to collect a sample for analysis and will provide the results to the COGCC under Supplemental eForm 27.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☐ Quarterly☐ Semi-Annually☐ Annually☐ Other

☐ Request Alternative Reporting Schedule:

☐ Semi-Annually☐ Annually☐ Other

Rule 913.e:

After initial approval of a Form 27, the Operator will provide quarterly update reports in a Supplemental Form 27 to document progress of site investigation and remediation, unless an alternative reporting schedule has been requested by the Operator and approved by the Director. The Director may request a more frequent reporting schedule based on site-specific conditions.

Report Type:

☐ Groundwater Monitoring☐ Land Treatment Progress Report☐ O&M Report☒ Other Q1, Q2 2023 REM update

Adequacy of Operator's General Liability Insurance and Financial Assurance

Describe the adequacy of the Operator's general liability insurance and Financial Assurance to fully address the anticipated costs of Remediation, including the estimated remaining cost for this project (below).

If this information has been provided on a Form 27 within the last 12 months, provide the Document Number of that form.

Plug and Abandonment costs associated with this P&A Form 27 would be covered under Caerus' active Plugging Insurance (Surety ID 20190099).

Operator anticipates the remaining cost for this project to be: \$ 12500

WASTE DISPOSAL INFORMATION

Was E&P waste generated as part of this remediation? _____

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

Volume of E&P Waste (solid) in cubic yards _____

E&P waste (solid) description _____

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: _____

Volume of E&P Waste (liquid) in barrels _____

E&P waste (liquid) description _____

COGCC Disposal Facility ID #, if applicable: _____

Non-COGCC Disposal Facility: _____

REMEDIATION COMPLETION REPORT

REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? No _____

If YES:

☐ Compliant with Rule 913.h.(1).☐ Compliant with Rule 913.h.(2).☐ Compliant with Rule 913.h.(3).

Do all soils meet Table 915-1 standards? _____

Does the previous reply indicate consideration of background concentrations? _____

Does Groundwater meet Table 915-1 standards? _____

Is additional groundwater monitoring to be conducted? _____

Operator shall comply with the COGCC 1000-Series Reclamation Requirements for all impacted and disturbed areas.

RECLAMATION PLAN

RECLAMATION PLANNING

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing.

Caerus plans to return the disturbed area to the active working surface of the well pad for continued operation.

Is the described reclamation complete? No

Does the reclamation described herein constitute interim or final reclamation of the Oil and Gas Location?

☐ Interim

☐ Final

Did the Surface Owner provide the seed mix? Yes

If YES, does the seed mix comply with local soil conservation district recommendations? Yes

Did the local soil conservation district provide the seed mix? Yes

SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. _____

Proposed date of completion of Reclamation. _____

IMPLEMENTATION SCHEDULE

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

PRIOR DATES

Date of Surface Owner notification/consultation, if required. _____

Actual Spill or Release date, or date of discovery. _____

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). _____

Proposed site investigation commencement. 07/15/2022

Proposed completion of site investigation. 10/01/2023

REMEDIAL ACTION DATES

Proposed start date of Remediation. 07/20/2023

Proposed date of completion of Remediation. 10/01/2023

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

☐ Change from approved implementation schedule per Rule 913.d.(2).

Basis for change in implementation schedule:

OPERATOR COMMENT

Caerus will continue to conduct field investigation to determine the vertical and horizontal extent of contamination associated with the project.

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: Blair Rollins

Title: EHS Specialist

Submit Date: 07/20/2023

Email: brollins@caerusoilandgas.com

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with COGCC Rules and applicable orders and is hereby approved.

COGCC Approved: Steven Arauza

Date: 08/02/2023

Remediation Project Number: 24192

COA Type**Description**

	Attached report (doc #403471866) includes a request for a reduced analyte suite of TPH and SAR only. Operator will analyze future soil samples for TPH, SAR, and pH.
	Submit an assessment of potential pathways to groundwater via a Supplemental Form 27.
2 COAs	

Attachment Check List

Upon approval, the approved Form 27 and all listed attachments will be indexed to the Remediation Project file. Only the approved Form 27 will also be indexed to the related Facilities.

Att Doc Num**Name**

403471798	INVESTIGATION/REMEDIATION WORKPLAN (SUPPLEMENTAL)
403471866	SITE INVESTIGATION REPORT
403484054	FORM 27-SUPPLEMENTAL-SUBMITTED

Total Attach: 3 Files

General Comments**User Group****Comment****Comment Date**

Environmental	Comply with outstanding COAs.	08/02/2023
---------------	-------------------------------	------------

Total: 1 comment(s)

APPENDIX C
PRODUCED WATER ANALYSIS - CAERUS OPERATOR KNOWLEDGE

H15 P&A Projects (REM # 24110 and 24192)

Produced Water Analysis – Operator Knowledge



In the Central District of Caerus' Piceance operations, produced water is transported from well pads to the Middle Fork Water Treatment Facility for reuse or disposal. Produced water being received at the facility is treated through the Dissolved Air Flocculation (DAF) system prior to reuse or disposal. Caerus has collected produced water samples from the DAF inlet at the Facility to determine the pH and chromium Vland selenium concentrations of produced water being produced from the Central and North Districts. Produced water sample results are outlined below:

Sample Name	Sample Date	Sample Type	Hexavalent chromium (mg/L)	pH
Middle Fork	03/03/2020	DAF Inlet	0.014	6.98

It is the Operators knowledge that the most likely source for impacts associated with the H15 wellhead P&A projects would be from produced water releases around the wellhead. Based on the laboratory analytical results of produced water samples collected from the Middle Fork Water Treatment Facility, Caerus believes that the hexavalent chromium exceedance found in the samples collected around the project area at the H15 P&A Project are not due to oil and natural gas production activities but are rather naturally occurring background concentrations within the area.



Riverton Laboratory
29 Country Acres Rd., Riverton, WY 82501
(307) 856-0866 • www.spl-inc.com

CASE NARRATIVE

Client: Caerus Oil and Gas
Project: Caerus BIG SDS Sampling Project

Lab Order: 20030513
Report Date: 3/25/2020

This data package consists of the following:

Case Narrative - 1 Page
Sample Analysis Reports - 6 Pages
Qualifier Data- 1 Page
Login & COC- 2 Pages

Some parameters were subcontracted out to Pace Analytical.

**Riverton Laboratory**

29 Country Acres Rd., Riverton, WY 82501
(307) 856-0866 • www.spl-inc.com

Laboratory Analytical Report

Customer Name: Caerus Order ID: 20030513
Project ID: Caerus BIG SDS Sampling Project Report Date: 3/25/2020

Lab Sample ID: 20030513-01 Date: Time:
Customer Sample ID: Middle Fork Collection: 3/3/2020 2:33 PM
Matrix: Aqueous Received: 3/5/2020 2:24 PM

Notes:

Analyses	Result	Units	RL	Qual.	Method	Analysis Date/Time	Analyst
Appearance	Clear w/ small black particulates				Visual	3/23/2020 12:30:00 PM	JS
Arsenic	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:47:07 PM	RH
Barium, Total	27.3	mg/L	0.5		EPA 6010 C	3/10/2020 9:47:07 PM	RH
Cadmium	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:47:07 PM	RH
Chloride	6271	mg/L	100		EPA 300.0	3/23/2020 1:41:00 PM	TMC
Apparent Color (Unfiltered)	150	pcu			SM 2120 B	3/23/2020 12:15:00 PM	JS
True Color (Filtered)	60	pcu			SM 2120 B	3/23/2020 12:15:00 PM	JS
Visual	Clear w/ particulates				SM 2120 B	3/23/2020 12:15:00 PM	JS
Flash Point	122.0	°F	0		SW 1010	3/23/2020 2:30:00 PM	SDF
Lead	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:47:07 PM	RH
Nickel	ND	mg/L	0.5		EPA 200.7	3/10/2020 9:47:07 PM	RH
Odor	Faint Hydrocarbon				Olfactory	3/23/2020 12:40:00 PM	JS
pH	6.98	s.u.	0.01		EPA 150.1	3/23/2020 3:10:00 PM	JS
Physical State	Liquid				Visual	3/23/2020 12:30:00 PM	JS
Silver	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:47:07 PM	RH
Specific Gravity	1.009	g/cc	0.001		ASTM D 1429-03	3/23/2020 12:45:00 PM	JS
Sulfide	0.27	mg/L	0.01	H,M	SM 4500-S2- D	3/10/2020 10:00:00 AM	TMC
Zinc	ND	mg/L	0.5		EPA 200.7	3/10/2020 9:47:07 PM	RH

29 Country Acres Rd., Riverton, WY 82501 • www.spl-inc.com

Definitions:

ND-Not Detected at the reporting limit

S-Spike Recovery outside accepted recovery limits

D-Diluted out of recovery limits

RL-Analyte Reporting Limit

J-Analyte detected below quantitation limits

L-Analyzed by a contract laboratory

H-Holding times for preparation or analysis exceeded

M-Matrix Effect

Documentation will be kept for five (5) years.

**Riverton Laboratory**

29 Country Acres Rd., Riverton, WY 82501
(307) 856-0866 • www.spl-inc.com

LABORATORY ANALYTICAL REPORT

Customer Name: Caerus

Order ID: 20030513

Project ID: Caerus BIG SDS Sampling Project

Report Date: 3/25/2020

Lab ID: 20030513-01

Date Time

Customer Sample ID: Middle Fork

Collection 3/3/2020 2:33 PM

Matrix: Aqueous

Received: 3/5/2020 2:24 PM

Notes:

Analyses	Result	Units	RL	Qual.	Method	Analysis Date/Time	Analyst
Organic Compounds							
Benzene	19300	ug/L	100		EPA 8021 B	3/11/2020 4:02	TMC
Surr: 4-Bromofluorobenzene	114.3	%	70-130		EPA 8021 B		
Toluene	29110	ug/L	100		EPA 8021 B	3/11/2020 4:02	TMC
Surr: 4-Bromofluorobenzene	114.3	%	70-130		EPA 8021 B		
Ethyl Benzene	541.6	ug/L	100		EPA 8021 B	3/11/2020 4:02	TMC
Surr: 4-Bromofluorobenzene	114.3	%	70-130		EPA 8021 B		
m,p-Xylene	10970	ug/L	200		EPA 8021 B	3/11/2020 4:02	TMC
Surr: 4-Bromofluorobenzene	114.3	%	70-130		EPA 8021 B		
o Xylene	2043	ug/L	100		EPA 8021 B	3/11/2020 4:02	TMC
Surr: 4-Bromofluorobenzene	114.3	%	70-130		EPA 8021 B		

Definitions:

ND-Not Detected at the reporting limit

S-Spike Recovery outside accepted recovery limits

D-Diluted out of recovery limits

RL-Analyte Reporting Limit

J-Analyte detected below quantitation limits

L-Analyzed by a contract laboratory

H-Holding times for preparation or analysis exceeded

M-Matrix Effect

Documentation will be kept for five (5) years.

ANALYTICAL RESULTS

Project: 20030513

Pace Project No.: 10511176

Sample: 20030513-01		Lab ID: 10511176001		Collected: 03/03/20 14:33		Received: 03/10/20 09:25		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP, TCLP		Analytical Method: EPA 6010C Preparation Method: EPA 3010A Leachate Method/Date: EPA 1311; 03/12/20 10:04							
Selenium	<0.10	mg/L	0.10	1	03/12/20 11:30	03/13/20 13:22	7782-49-2		
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3010A							
Chromium	<10.0	ug/L	10.0	1	03/11/20 06:20	03/11/20 16:11	7440-47-3		
7470A Mercury, TCLP		Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/12/20 10:04							
Mercury	<0.60	ug/L	0.60	1	03/12/20 14:25	03/16/20 14:04	7439-97-6		
Trivalent Chromium Calculation		Analytical Method: Trivalent Chromium Calculation							
Chromium, Trivalent	<0.010	mg/L	0.010	1		03/18/20 10:22			
Chromium, Hexavalent		Analytical Method: SM 3500-Cr B Modified							
Chromium, Hexavalent	0.014	mg/L	0.010	1		03/10/20 19:51		FS,H3	

REPORT OF LABORATORY ANALYSIS

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Date: 03/18/2020 06:51 PM

**Riverton Laboratory**

29 Country Acres Rd., Riverton, WY 82501
(307) 856-0866 • www.spl-inc.com

Laboratory Analytical Report

Customer Name: Caerus Order ID: 20030513
Project ID: Caerus BIG SDS Sampling Project Report Date: 3/25/2020

Lab Sample ID: 20030513-02 Date: 3/23/2020 Time: 12:30:00 PM
Customer Sample ID: SGV Federal 7K Tank Collection: 3/3/2020 1:00 PM
Matrix: Aqueous Received: 3/5/2020 2:24 PM

Notes:

Analyses	Result	Units	RL	Qual.	Method	Analysis Date/Time	Analyst
Appearance	Turbid Orange- Yellow w/ oil sheen				Visual	3/23/2020 12:30:00 PM	JS
Arsenic	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:52:28 PM	RH
Barium, Total	4.22	mg/L	0.5		EPA 6010 C	3/10/2020 9:52:28 PM	RH
Cadmium	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:52:28 PM	RH
Chloride	9549	mg/L	100		EPA 300.0	3/23/2020 2:48:00 PM	TMC
Apparent Color (Unfiltered)	1780	pcu			SM 2120 B	3/23/2020 12:15:00 PM	JS
True Color (Filtered)	390	pcu			SM 2120 B	3/23/2020 12:15:00 PM	JS
Visual	Turbid Orange				SM 2120 B	3/23/2020 12:15:00 PM	JS
Flash Point	109.4	°F	0		SW 1010	3/23/2020 2:30:00 PM	SDF
Lead	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:52:28 PM	RH
Nickel	ND	mg/L	0.5		EPA 200.7	3/10/2020 9:52:28 PM	RH
Odor	Sour Ammonia				Olfactory	3/23/2020 12:40:00 PM	JS
pH	8.23	s.u.	0.01		EPA 150.1	3/23/2020 3:10:00 PM	JS
Physical State	Liquid				Visual	3/23/2020 12:30:00 PM	JS
Silver	ND	mg/L	0.5		EPA 6010 C	3/10/2020 9:52:28 PM	RH
Specific Gravity	1.015	g/cc	0.001		ASTM D 1429-03	3/23/2020 12:45:00 PM	JS
Sulfide	0.40	mg/L	0.1	H,M	SM 4500-S2- D	3/10/2020 10:00:00 AM	TMC
Zinc	ND	mg/L	0.5		EPA 200.7	3/10/2020 9:52:28 PM	RH

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Definitions:

ND-Not Detected at the reporting limit

S-Spike Recovery outside accepted recovery limits

D-Diluted out of recovery limits

RL-Analyte Reporting Limit

J-Analyte detected below quantitation limits

L-Analyzed by a contract laboratory

H-Holding times for preparation or analysis exceeded

M-Matrix Effect

Documentation will be kept for five (5) years.

**Riverton Laboratory**

29 Country Acres Rd., Riverton, WY 82501
(307) 856-0866 • www.spl-inc.com

LABORATORY ANALYTICAL REPORT

Customer Name: Caerus

Order ID: 20030513

Project ID: Caerus BIG SDS Sampling Project

Report Date: 3/25/2020

Lab ID: 20030513-02

Date Time

Customer Sample ID: SGV Federal 7K Tank

Collection 3/3/2020 1:00 PM

Matrix: Aqueous

Received: 3/5/2020 2:24 PM

Notes:

Analyses	Result	Units	RL	Qual.	Method	Analysis Date/Time	Analyst
Organic Compounds							
Benzene	11300	ug/L	100		EPA 8021 B	3/11/2020 5:27	TMC
Surr: 4-Bromofluorobenzene	91.2	%	70-130		EPA 8021 B		
Toluene	54030	ug/L	100		EPA 8021 B	3/11/2020 5:27	TMC
Surr: 4-Bromofluorobenzene	91.2	%	70-130		EPA 8021 B		
Ethyl Benzene	6974	ug/L	100		EPA 8021 B	3/11/2020 5:27	TMC
Surr: 4-Bromofluorobenzene	91.2	%	70-130		EPA 8021 B		
m,p-Xylene	72660	ug/L	200		EPA 8021 B	3/11/2020 5:27	TMC
Surr: 4-Bromofluorobenzene	91.2	%	70-130		EPA 8021 B		
o Xylene	14420	ug/L	100		EPA 8021 B	3/11/2020 5:27	TMC
Surr: 4-Bromofluorobenzene	91.2	%	70-130		EPA 8021 B		

Definitions:

ND-Not Detected at the reporting limit

S-Spike Recovery outside accepted recovery limits

D-Diluted out of recovery limits

RL-Analyte Reporting Limit

J-Analyte detected below quantitation limits

L-Analyzed by a contract laboratory

H-Holding times for preparation or analysis exceeded

M-Matrix Effect

Documentation will be kept for five (5) years.

ANALYTICAL RESULTS

Project: 20030513

Pace Project No.: 10511176

Sample: 20030513-02		Lab ID: 10511176002		Collected: 03/03/20 13:00		Received: 03/10/20 09:25		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP, TCLP		Analytical Method: EPA 6010C Preparation Method: EPA 3010A Leachate Method/Date: EPA 1311; 03/12/20 10:04							
Selenium	<0.10	mg/L	0.10	1	03/12/20 11:30	03/13/20 13:30	7782-49-2		
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3010A							
Chromium	25.1	ug/L	10.0	1	03/11/20 06:20	03/11/20 16:32	7440-47-3		
7470A Mercury, TCLP		Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/12/20 10:04							
Mercury	<0.60	ug/L	0.60	1	03/12/20 14:25	03/16/20 14:11	7439-97-6		
Trivalent Chromium Calculation		Analytical Method: Trivalent Chromium Calculation							
Chromium, Trivalent	<0.010	mg/L	0.010	1		03/18/20 10:22			
Chromium, Hexavalent		Analytical Method: SM 3500-Cr B Modified							
Chromium, Hexavalent	0.034	mg/L	0.010	1		03/10/20 19:51		FS,H3	

REPORT OF LABORATORY ANALYSIS

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Date: 03/18/2020 06:51 PM

QUALIFIERS

Project: 20030513

Pace Project No.: 10511176

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

FS The sample was filtered in the laboratory prior to analysis.

H3 Sample was received or analysis requested beyond the recognized method holding time.

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

REPORT OF LABORATORY ANALYSIS

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Riverton Laboratory

29 Country Acres Rd., Riverton, WY 82501
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Login Report

Customer Name: Caerus

Order ID: 20030513

Project ID: Caerus BIG SDS Sampling Project

Order Date: 3/5/2020

Comment: 3/5/20- Sample rec'd out of hold for Sulfide. Ok to run past hold as per DM, verified by AC. TT

SAMPLE CONDITION RECORD

Number of cooler/packages received:	1
Number of bottles received:	10
Were the samples received intact? (no broken bottles, leaks, etc.)	Yes
Were the samples received with custody seals?	No
Were custody seals intact?	N/A
Did signature match?	N/A
Is the COC properly completed, legible, and signed?	Yes
Were all samples received accounted for on the COC?	Yes
Were all requested analyses understood and appropriate?	Yes
Did the bottle labels correspond with the COC information?	Yes
Were Samples collected in proper containers?	Yes
Were the Temp and Pressure recorded for cylinders?	N/A
Were all containers properly preserved, and pH checked - should be ≤ 2 ?	N/A
Do VOA vials have < 6 mm headspace?	N/A
Was a trip blank present?	No
Were all analyses within holding time at time of receipt?	No
Have rush or project due dates been checked and accepted?	Yes
Login verification: Client Name:	Yes
Login verification: Project Name:	Yes
Login Verification: Matrix:	Yes
Sample/Cooler Temperature(s):	10.2
Were cylinder valves leaking?	N/A
Were pressurized liquid samples collected at a rate of < 50 ml/min?	N/A

temp: 10.2

electronic format. Please contact one of our offices above for the form to be e-mailed to you.

APPENDIX D
LABORATORY ANALYTICAL RESULTS

October 16, 2023

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Caerus Oil and Gas

Sample Delivery Group: L1663806
Samples Received: 10/06/2023
Project Number:
Description: H15 P&A Investigation (22C)
Site: H15
Report To: Blair Rollins
143 Diamond Avenue
Parachute, CO 81635

Entire Report Reviewed By:



T. Alan Harvill
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

SAMPLE SUMMARY

20231005-H15-(SB05)@8 L1663806-01 Solid

Collected by Trevor Lakin
Collected date/time 10/05/23 12:46
Received date/time 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2148821	1	10/15/23 16:59	10/15/23 16:59	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2149277	1	10/11/23 14:30	10/11/23 17:00	NTG	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG2147527	1	10/08/23 15:25	10/09/23 00:00	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2150540	1	10/13/23 09:15	10/13/23 18:37	ICD	Mt. Juliet, TN

20231005-H15-(SB06)@8 L1663806-02 Solid

Collected by Trevor Lakin
Collected date/time 10/05/23 14:35
Received date/time 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2148821	1	10/15/23 17:25	10/15/23 17:25	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2149277	1	10/11/23 14:30	10/11/23 17:00	NTG	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG2147527	1	10/08/23 15:25	10/09/23 00:24	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2150540	5	10/13/23 09:15	10/14/23 09:50	JAS	Mt. Juliet, TN

20231005-H15-(SB07)@8 L1663806-03 Solid

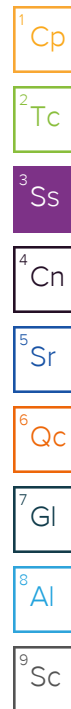
Collected by Trevor Lakin
Collected date/time 10/05/23 13:49
Received date/time 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2148821	1	10/15/23 17:19	10/15/23 17:19	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2149277	1	10/11/23 14:30	10/11/23 17:00	NTG	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG2147527	1	10/08/23 15:25	10/09/23 00:49	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2150540	5	10/13/23 09:15	10/14/23 09:24	JAS	Mt. Juliet, TN

20231005-H15-(SB08)@8 L1663806-04 Solid

Collected by Trevor Lakin
Collected date/time 10/05/23 15:53
Received date/time 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2148821	1	10/15/23 18:16	10/15/23 18:16	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2149277	1	10/11/23 14:30	10/11/23 17:00	NTG	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG2147527	1	10/08/23 15:25	10/09/23 01:13	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2150540	2	10/13/23 09:15	10/14/23 10:02	JAS	Mt. Juliet, TN



CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



T. Alan Harvill
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.62		1	10/15/2023 16:59	WG2148821

1
Cp

2
Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.79	T8	1	10/11/2023 17:00	WG2149277

3
Ss

4
Cn

Sample Narrative:
L1663806-01 WG2149277: 8.79 at 22.4C

5
Sr

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.123		0.0217	0.100	1	10/09/2023 00:00	WG2147527
(S) a,a,a-Trifluorotoluene(FID)	90.3			77.0-120		10/09/2023 00:00	WG2147527

6
Qc

7
Gl

8
Al

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	12.4		1.61	4.00	1	10/13/2023 18:37	WG2150540
C28-C36 Motor Oil Range	28.5		0.274	4.00	1	10/13/2023 18:37	WG2150540
(S) o-Terphenyl	34.7			18.0-148		10/13/2023 18:37	WG2150540

9
Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	2.20		1	10/15/2023 17:25	WG2148821

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.72	T8	1	10/11/2023 17:00	WG2149277

Sample Narrative:

L1663806-02 WG2149277: 8.72 at 22.4C

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.163		0.0217	0.100	1	10/09/2023 00:24	WG2147527
(S) a,a,a-Trifluorotoluene(FID)	90.5			77.0-120		10/09/2023 00:24	WG2147527

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	83.8		8.05	20.0	5	10/14/2023 09:50	WG2150540
C28-C36 Motor Oil Range	228		1.37	20.0	5	10/14/2023 09:50	WG2150540
(S) o-Terphenyl	48.9			18.0-148		10/14/2023 09:50	WG2150540

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	2.23		1	10/15/2023 17:19	WG2148821

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.82	T8	1	10/11/2023 17:00	WG2149277

Sample Narrative:

L1663806-03 WG2149277: 8.82 at 22.4C

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.0858	J	0.0217	0.100	1	10/09/2023 00:49	WG2147527
(S) a,a,a-Trifluorotoluene(FID)	90.9			77.0-120		10/09/2023 00:49	WG2147527

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	44.0		8.05	20.0	5	10/14/2023 09:24	WG2150540
C28-C36 Motor Oil Range	154		1.37	20.0	5	10/14/2023 09:24	WG2150540
(S) o-Terphenyl	52.1			18.0-148		10/14/2023 09:24	WG2150540

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	6.35		1	10/15/2023 18:16	WG2148821

1
Cp

2
Tc

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	9.42	T8	1	10/11/2023 17:00	WG2149277

3
Ss

4
Cn

Sample Narrative:

L1663806-04 WG2149277: 9.42 at 22.4C

5
Sr

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.106		0.0217	0.100	1	10/09/2023 01:13	WG2147527
(S) a,a,a-Trifluorotoluene(FID)	90.7			77.0-120		10/09/2023 01:13	WG2147527

6
Qc

7
Gl

8
Al

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	30.5		3.22	8.00	2	10/14/2023 10:02	WG2150540
C28-C36 Motor Oil Range	111		0.548	8.00	2	10/14/2023 10:02	WG2150540
(S) o-Terphenyl	49.1			18.0-148		10/14/2023 10:02	WG2150540

9
Sc

L1663983-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663983-01 10/11/23 17:00 • (DUP) R3984946-2 10/11/23 17:00

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.46	8.48	1	0.236		1

Sample Narrative:

OS: 8.46 at 21.9C

DUP: 8.48 at 21.6C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1664108-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1664108-07 10/11/23 17:00 • (DUP) R3984946-3 10/11/23 17:00

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	5.65	5.70	1	0.881		1

Sample Narrative:

OS: 5.65 at 21.1C

DUP: 5.7 at 20.9C

Laboratory Control Sample (LCS)

(LCS) R3984946-1 10/11/23 17:00

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	su	su	%	%	
pH	10.0	10.0	100	99.0-101	

Sample Narrative:

LCS: 10 at 21C

Method Blank (MB)

(MB) R3985336-2 10/08/23 22:48

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	95.0			77.0-120

Laboratory Control Sample (LCS)

(LCS) R3985336-1 10/08/23 21:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	6.94	126	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			98.2	77.0-120	

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Method Blank (MB)

(MB) R3986182-1 10/13/23 15:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C36 Motor Oil Range	U		0.274	4.00
(S) o-Terphenyl	56.5			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3986182-2 10/13/23 16:13

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
C10-C28 Diesel Range	50.0	35.3	70.6	50.0-150	
(S) o-Terphenyl			58.6	18.0-148	

L1663851-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663851-01 10/13/23 17:31 • (MS) R3986182-3 10/13/23 17:45 • (MSD) R3986182-4 10/13/23 17:58

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	49.4	3.51	36.8	35.8	67.4	65.4	1	50.0-150			2.75	20
(S) o-Terphenyl					45.3	44.4		18.0-148				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.
Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
T8	Sample(s) received past/too close to holding time expiration.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

ACCREDITATIONS & LOCATIONS

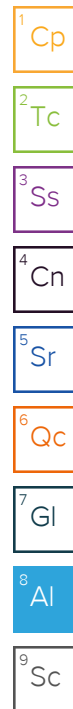
Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey--NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio--VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA -- ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA -- ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA--Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



NCF / OK