Rule Engineering, LLC
Solutions to Regulations for Industry

February 15, 2018

Mr. Brett Middleton
Caerus Oil and Gas
143 Diamond Avenue
Parachute, CO 81635

RE: **2017 Annual Report of Work Completed**
EF A28 595 – Pit Closure and Remediation System
COGCC Location ID: 335804
NENE, Section 28, T5S-R95W (39.590817/-108.053426 (WGS 84))
Garfield County, Colorado

Dear Mr. Middleton:

Rule Engineering, LLC (Rule) has prepared this report to summarize monitoring and remediation activities completed in 2017 for Caerus Oil and Gas (Caerus) at the above-referenced location. This report will outline quarterly soil-vapor extraction (SVE) events conducted and in-situ soil samples collected from soil borings and bio-vent well installation activities completed in 2017.

Background

Based on records acquired from the Colorado Oil & Gas Conservation Commission (COGCC) and provided by Caerus, the produced water storage pit at this location was closed in 2009. Per COGCC rules, the closure was documented in a Form 27, and a remediation number was assigned. After removal of the pit liner, below-liner soil samples identified organic, inorganic, and metal constituents of concern above COGCC allowable concentrations, indicating a possible liner failure which was reported in a Form 19. Impacted material was stockpiled onsite, and interim reclamation was completed. A hollow-stem auger drilling rig was used to install vertical bio-vent wells to monitor subsurface conditions, and support future remediation efforts. Additional detail on these project phases, may be found in the following COGCC documents associated with this project.

- Form 27 (Doc: 2232896) (Rem: 7742)
- Form 19 (Doc: 400781684)
- Form 4 (Doc: 400999848)

2017 Remediation and Monitoring Activities

SVE Remediation Events
Rule completed one quarterly SVE event on September 18th and 19th, 2017 using Caerus' SVE pilot trailer. Due to site conditions, only bio-vent wells closest to the working surface were able to be connected during the SVE event. For upcoming quarters Rule purposes the purchase of a longer supply hose to pilot all wells within the remediation area. Below please find the table outlining results from the SVE event:

Well	*Time*	*Duration (min)*	*SCFM*	*Vacuum (inch Hg)*	*PID (ppm)*
SVE11	1:15	30	30	11	37.2
SVESE01	1:55	30	130	8	41.7
SVE09	2:30	30	25	11	46.3
SVE09	8:40	60	25	11	108.3
SVE10	9:50	40	20	11	85.7
SVEN01	10:40	35	140	7	6.4
SVE02	11:20	30	140	6	2.1
SVE01	11:55	30	140	6	0.8
SVENE01	12:30	30	140	7	7.2

Bio-vent Well Soil Monitoring
Between May 3rd and May 5th, 2017 Rule provided oversight and sampling for a drilling contractor using a hollow-stem auger rig to advance six soil borings to depths between five and forty feet below ground surface (bgs). Soil borings were characterized using a 2-foot split-spoon sampler every five feet bgs to determine impacted soil depths and concentrations. All six soil boring locations were then constructed into bio-vent wells with 25 to 30 feet of slotted poly-vinyl chloride (PVC) completed with ten feet of solid PVC pipe to the surface.

Soil samples were selected from the borings for hydrocarbon analysis based on field screening and were placed into clean, laboratory provided containers and shipped under chain-of-custody procedures via FedEx to Environmental Science Corporation located in Mt. Juliet, Tennessee. Each soil sample was analyzed for gasoline range (GRO) and diesel range (DRO) total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl-benzene, and xylene (BTEX) (see attached laboratory analytical spreadsheet and laboratory reports for soil sampling results).

Findings

Bio-vent Well Soil Monitoring
A total of six bio-vent wells were characterized with 36 soil samples collected for laboratory analysis. A summary table outlining each bio-vent well location and depth of the highest TPH concentration is outlined below:

Bio-Vent Well	Impacted soil depth (ft)	TPH concentration (mg/Kg)	Benzene concentration (mg/Kg)
SVENW01	20 – 22	**2,930**	**0.324**
SVEN01	20 – 22	**1,988**	0.0181
SVENE01	15 – 17	**1,267**	0.0131
SVESW01	5 – 7	**2,638**	**0.435**
SVEMID01	20 – 22	**2,735**	0.0194
SVESE01	10 – 12	**2,080**	0.0211

Bold indicates an exceedance to COGCC Table 910-1 soil standards

Conclusions

All soil borings which were converted into bio-vent wells exhibited exceedances of the COGCC Table 910-1 soil standards for TPH, and two exhibited exceedances for benzene. Caerus intends to continue to utilize the bio-vent wells for passive venting with quarterly enhanced powered SVE events using Caerus's SVE trailer to supplement air flow and enhance on-going remediation.

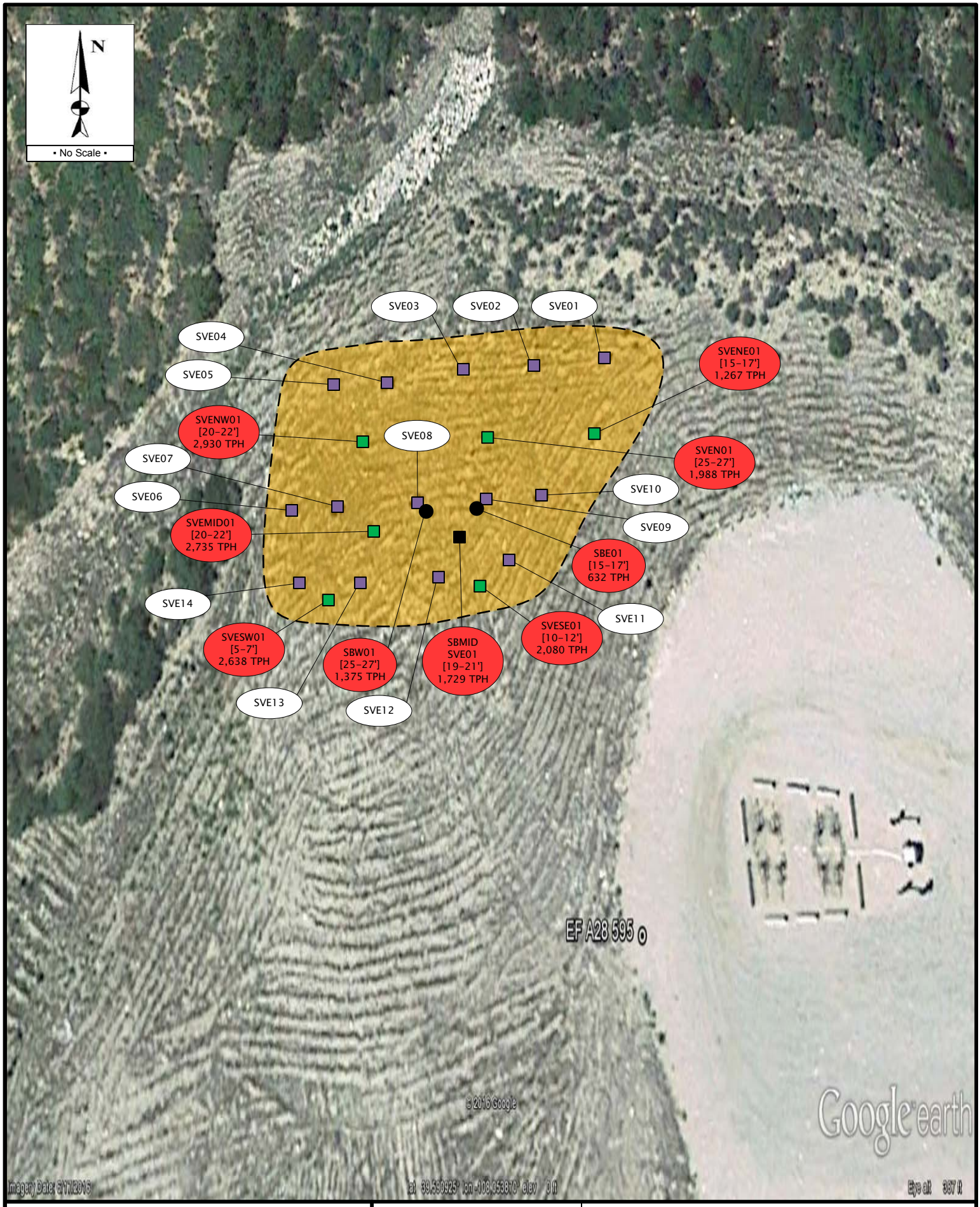
If you have any questions with the provided report, please contact me at (970) 244-8500 or at brollins@ruleengineering.com.

Sincerely,
Rule Engineering, LLC

Blair K. Rollins

Blair K. Rollins
Project Manager

cc: M. Brown
R. Knight



GREEN - 2017 Bio-vent Well / Sample
BLACK - 2016 Bio-vent Well / Sample
PURPLE - 2014 Bio-vent Well
Remediation Cell

CAERUS

Pad: A28 595 (Location ID: 335804)
Area: North Parachute Ranch
Legal: NENE, Sec. 28, T5S, R95W, 6th PM