



February 22, 2017

Mr. Chris Canfield, P.G.
Environmental Protection Specialist
Colorado Oil and Gas Conservation Commission (COGCC)
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

RE: Work Plan for Supplemental Environmental Assessment to Evaluate Potential Soil and Groundwater Impacts Associated with the Serafini Gas Unit #1 Well Pad and Tank Battery – Longmont, Colorado (COGCC REM #6883) - Olsson Project # 012-0483

Dear Mr. Canfield,

Top Operating Company (Top Operating) has retained Olsson Associates (Olsson) to prepare a work plan for supplemental environmental assessment to evaluate potential soil and groundwater impacts associated with the Serafini Gas Unit #1 well pad and tank battery (Site). This work plan is prepared in response to the COGCC's email correspondence to Top Operating dated January 19, 2017. The purpose of this work plan is to provide the COGCC with and updated status of the site, fill potential data gaps to further define the nature and extent of petroleum hydrocarbon soil impacts, and confirm that the benzene groundwater impacts have decreased to below the Table 910-1 concentration.

Site Description

The Site is a natural gas well and tank battery facility located in the western part of Weld County south of Highway 119, east of County Line Road (Weld County Road 1), and north of Weld County Road 20 1/2. The site is located in a farmed field to the south of Saint Vrain Creek. There is an irrigation canal to the west of the site, and a residence to the southeast. Figure 1 illustrates a general site location, and Figure 2 provides detailed description of site features.

Soils beneath the site consist of the Olney fine sandy loam which overlies and is in part derived from alluvial sand and gravel. The depth to groundwater is shallow, and lies within 3.5 feet to 5 feet below ground surface (bgs). A potentiometric surface map based on June 2016 groundwater elevation data is presented on Figure 3.

The Serafini Gas Unit 1-18 well was drilled and completed in 1982. There was an unlined earthen pit located at the site that was used for produced water storage that Top Operating permitted with the Colorado Oil and Gas Conservation Commission (COGCC) in early 1990. The pit is identified in the COGCC records as facility number 103527. The pit status is listed as "unknown" and is not shown to have been closed in the COGCC database; however, the tank

Top Operating Company
Serafini Gas Unit #1 Work Plan
February 2017

Olsson Associates
Golden, Colorado
Project #012-0483

battery has two produced water sumps located on the west and southwest end of the tank berm. The pit was shown to be located to the southwest of the tank battery, and southeast of the separators. The former pit may be the source of the impacts.

Limited Subsurface Investigation – July 6, 2012

Top Operating and Olsson conducted a limited subsurface investigation to further define the nature and extent of the impacts observed by Terracon in soil boring B9 in 2010. A backhoe was used to excavate test pit trenches in the vicinity of B9 and to the north and east of the tank battery to assess the vertical and lateral extent of impacted soils. A total of five test pits were excavated to the north and east of the centralized tank battery. Analytical results from the test pit sampling were presented to the COGCC in September 2012. The test pit locations are shown on Figure 2.

Top Operating and Olsson installed an infiltration gallery within test pit TP-1 consisting of a 4-inch diameter polyvinyl chloride (PVC) riser pipe, a 90° PVC elbow, and a length of 4-inch diameter 0.020 factory slotted pipe into test pit TP-1 approximately a foot from the base of the trench. Top Operating backfilled the excavation with ¾-inch diameter gravel to approximately one foot bgs, and the surface was completed with clean excavated overburden soils that had been segregated and set off to one side. The impacted soils were hauled offsite. The PVC riser pipe was completed at the surface with a PVC slip cap, and was covered with a 10-inch diameter flush mount well cover that was grouted in place within the center of the access driveway.

The purpose of the infiltration gallery pipe was to extract accumulated groundwater using a 1-inch diameter PVC stinger pipe and a vacuum truck to conduct soil washing and remove the petroleum hydrocarbons from the subsurface. This corrective measure was intended to serve as remedial action for the site without disrupting the production operations for the central tank battery.

It was anticipated that the infiltration gallery would be evacuated on a quarterly basis beginning in August 2012. Olsson visited the site at the direction of Top Operating following the installation of the infiltration gallery in August 2012, March 2013, and June 2013 and during each visit the infiltration gallery was dry. Since the infiltration gallery was dry, no fluid extraction occurred at the site.

Groundwater Monitoring Program at the Serafini Gas Unit

Three monitoring wells were installed at the Site in March 2013 by Terracon Consulting Engineers and Scientists (Terracon) under the direction of the City of Longmont. Groundwater monitoring has been conducted by Terracon on a semi-annual basis since 2013. Benzene was first detected in monitoring well SGU-MW02 in June 2016 at a reported concentration of 0.0589 milligrams per liter (mg/L). This reported concentration of benzene exceeded the COGCC and Colorado Department of Health and Environment (CDPHE) groundwater standard of 0.005 mg/L.

Top Operating has voluntarily been conducting groundwater monitoring at the Site on a monthly basis since November 2016. The following table summarizes groundwater sampling results conducted by Top Operating.

<i>Site ID / Well Name</i>	<i>Sample Date</i>	<i>Benzene Concentration (mg/L)</i>
SGU-MW02	June 21, 2016	0.026
	November 16, 2016	0.017
	December 16, 2016	.0035
	January 25, 2017	ND
ND – Not Detected		
Benzene levels above 0.005 mg/L are considered non-compliance under CDPHE Reg. 41 and COGCC Table 910-1.		

Supplemental Site Assessment Investigation

Additional subsurface soil sampling will be conducted at the Site to assess petroleum impacted soils in the vadose zone. It is expected that additional soil boring activities will be conducted in March 2017. Soil borings will be advanced to approximately ten feet below ground surface (bgs). One soil boring will be advanced in the vicinity of Test Pit 1 / infiltration gallery to assess the current concentrations of the potentially impacted soil. A second soil boring will be advanced to the south of Test Pit 1 near the former produced water pit to further delineate potentially impacted soil in the south part of the Site. A third soil boring will be advanced to the west of Test Pit 1 to further delineate potentially impacted soil in the west part of the Site. A fourth soil boring will be advanced north east of Test Pit in the direction monitoring well SGU-MW02. Additional soil borings may be advanced to further assess potentially impacted soil based field screening and onsite evaluations. Soil borings will be field screened in two foot intervals using photoionization detector (PID) for headspace analysis and observations of visual staining and odor. Soil borings will be evaluated and logged in accordance with the Unified Soil Classification System.

One sample from each soil boring will be submitted for laboratory analysis. A sample will be submitted based on the highest field screening result using PID headspace analysis. If evidence of petroleum hydrocarbon impacts, such as odor and staining, are not detected or PID headspace readings above background from field screening, then a soil sample will be submitted from just above the saturated interface zone which is expected to be encountered at approximately six feet bgs.

Soil samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260, and total petroleum hydrocarbons (TPH) including gasoline range organics (GRO) by EPA Method 8260, and diesel range organics (DRO) by EPA modified Method 8015. The laboratory analytical results will be compared to the COGCC Table 910-1 acceptable Concentration Levels. Groundwater samples will not be collected if groundwater is encountered during soil boring investigation activities.

If concentrations from soil samples exceed COGCC Table 910-1, then permanent 2-inch poly vinyl chloride (PVC) monitoring wells will be installed in the locations where exceedances were observed. The proposed locations for additional soil borings are shown on Figure 2.

Infiltration Gallery

The infiltration gallery will be assessed for effectiveness and usability. The infiltration gallery will be checked for groundwater. If the infiltration gallery is dry, then the infiltration gallery will be abandoned using a backhoe to excavate the gravel and PVC piping. The excavation will be backfilled with clean fill and excavated material will be transported off site for proper disposal.

If groundwater is present, then one grab sample will be collected and analyzed for BTEX. Soil washing activities will resume as originally proposed in September 2012 and the groundwater contained in the infiltration gallery will be extracted. Soil washing activities will be scheduled quarterly from March 2017 through December 2017. A monitoring well will be installed immediately adjacent to the infiltration gallery to better evaluate and monitor groundwater near the gallery. The monitoring well will be sampled during quarterly soil washing events unless the gallery is dry. The infiltration gallery will be decommissioned and abandoned in December 2017.

Groundwater Monitoring

Top Operating will conduct quarterly groundwater monitoring in 2017 of site monitoring wells including SGU-MW01, SGU-MW02, SGU-MW03, and any additional wells that may be installed as part of the supplemental environmental assessment. The quarterly sampling event will attempt to demonstrate four consecutive quarters of reporting benzene below 0.005 mg/L in monitoring wells at the site. Additional groundwater monitoring may be conducted that coincides with other groundwater programs associated with the Site. For example, it is expected that Terracon will be groundwater sampling on behalf of the City of Longmont in 2017, and Top Operating will request to collect split samples during that sampling event.

A brief letter report will be submitted to the COGCC via email summarizing the sampling event and sampling results quarterly. An annual report will be prepared to assess remediation progress, and will either present a request for closure if four quarters demonstrate compliance with Table 910-1 BTEX concentrations, continued monitoring, or recommendations for additional remediation as appropriate depending on analytical results.

Assessment of Production Equipment

Flow line pressure testing will be conducted on lines leading from the separators to the tank battery. Flow line pressures will be documented and submitted to the COGCC via email correspondence. A natural gas pipeline extends in a north east direction and is not operated by Top Operating. Pressure testing of this line will not be conducted by Top Operating and will have to be assessed by others. In addition, hydrostatic testing will be conducted on the two partially buried produced water tanks to verify integrity. Results from hydrostatic testing will be documented and submitted to the COGCC via email correspondence.

Supplemental Site Assessment Report

A Supplemental Site Assessment Report will be submitted to the COGCC following the completion of supplemental site assessment activities. The report will summarize activities and findings, and will also include updated figures including: actual soil boring locations, updated site features, updated potentiometric surface elevations, and sample results. It is anticipated that this report will be submitted to COGCC by April 30, 2017.

Project Schedule

It is anticipated that the supplemental environmental assessment will be completed by March 31, 2017, and an updated report is scheduled to be submitted by April 30, 2017. Top Operating will notify the COGCC if unexpected delays are encountered and scheduling adjustments need to be made.

Please do not hesitate to contact me or James Hix if you have any questions or comments regarding this work plan.

Sincerely,

Olsson Associates, Inc.

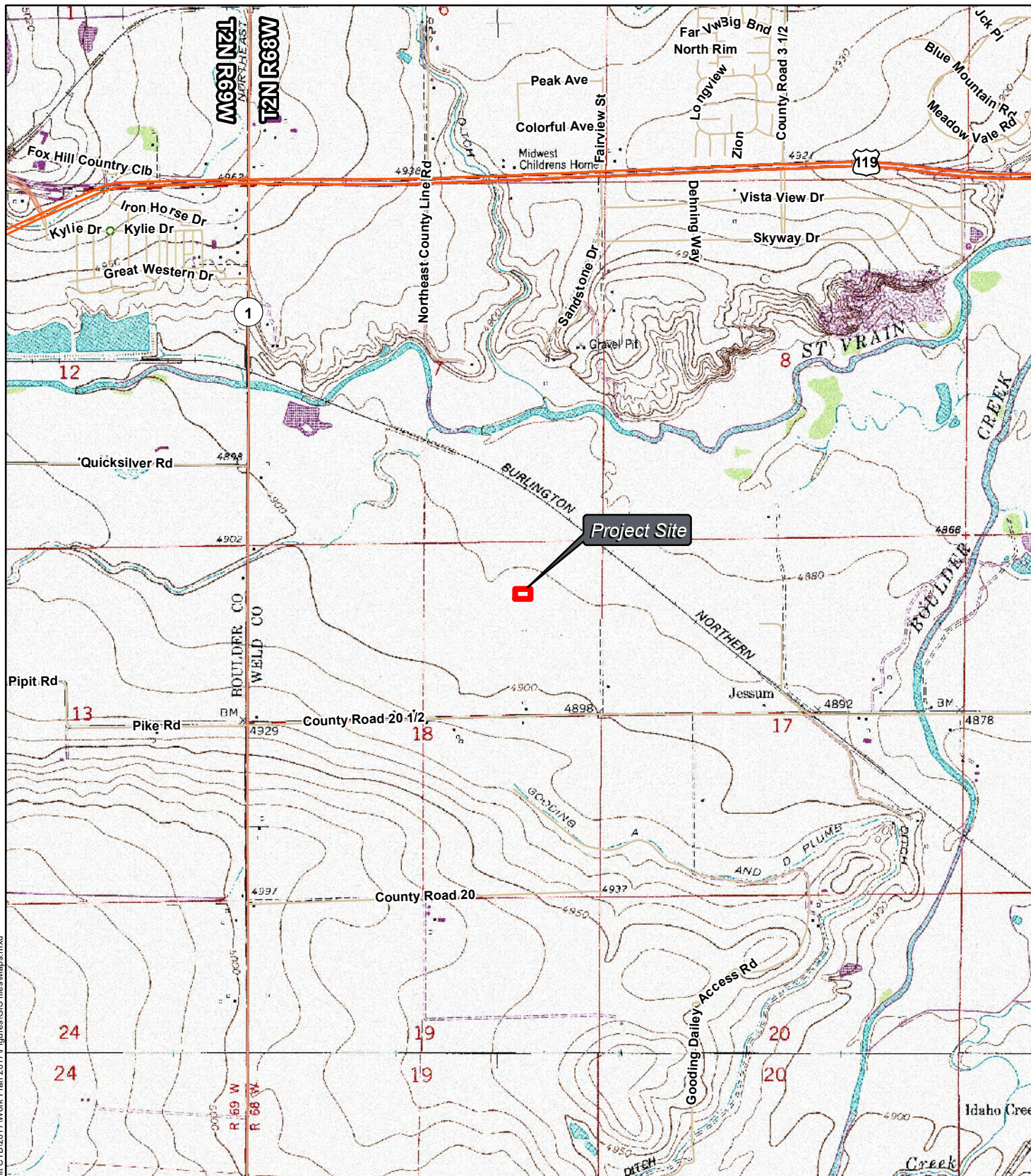


Trent Watne
Project Scientist



James W. Hix
Senior Geologist

FIGURES



Project Site

DISCLAIMER : This Geographic Information System (GIS) and its components are designed as a source of reference for answering inquiries, for planning and for modeling. GIS is not intended, nor does it replace legal description information in the chain of title and other information contained in official government records such as the County Clerk and Records office or the courts. In addition, the representations of locations in this GIS cannot be substituted for actual legal surveys.



Project Number: 012-0483

Drawn By: JDF

Revision Date: 2/21/2017

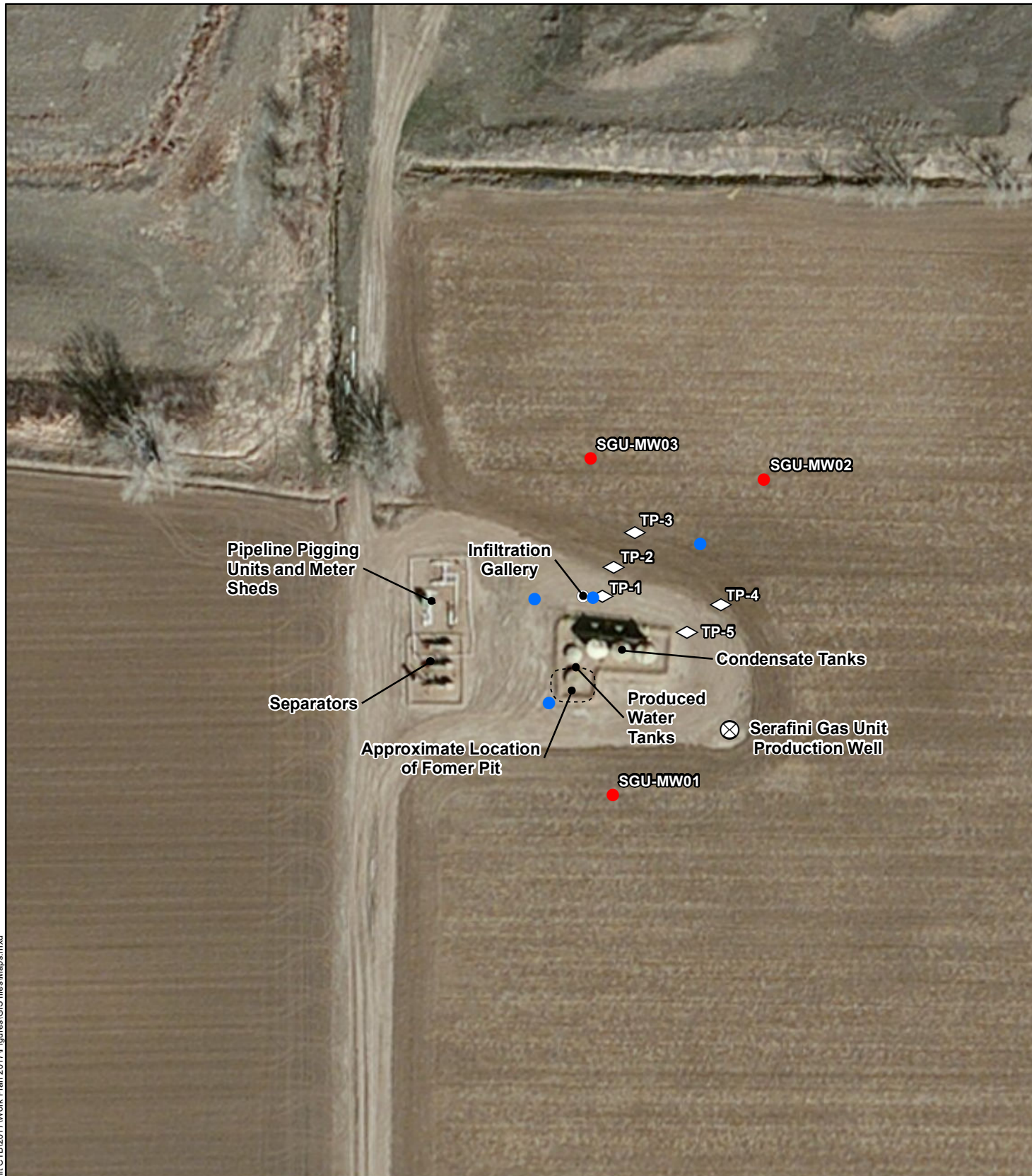
General Site Map
Top Operating Company
Serafini Gas Unit #1 (Sherwood Property)
Weld County, Colorado
NWNE Sec 18 T2N R68W 6th PM

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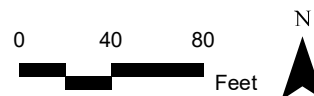
Figure

1



- Monitoring Well
- Proposed Soil Boring Locations
- ◇ Test Pit and Soil Sample Location
- Infiltration Gallery Location
- ⊖ Former Pit

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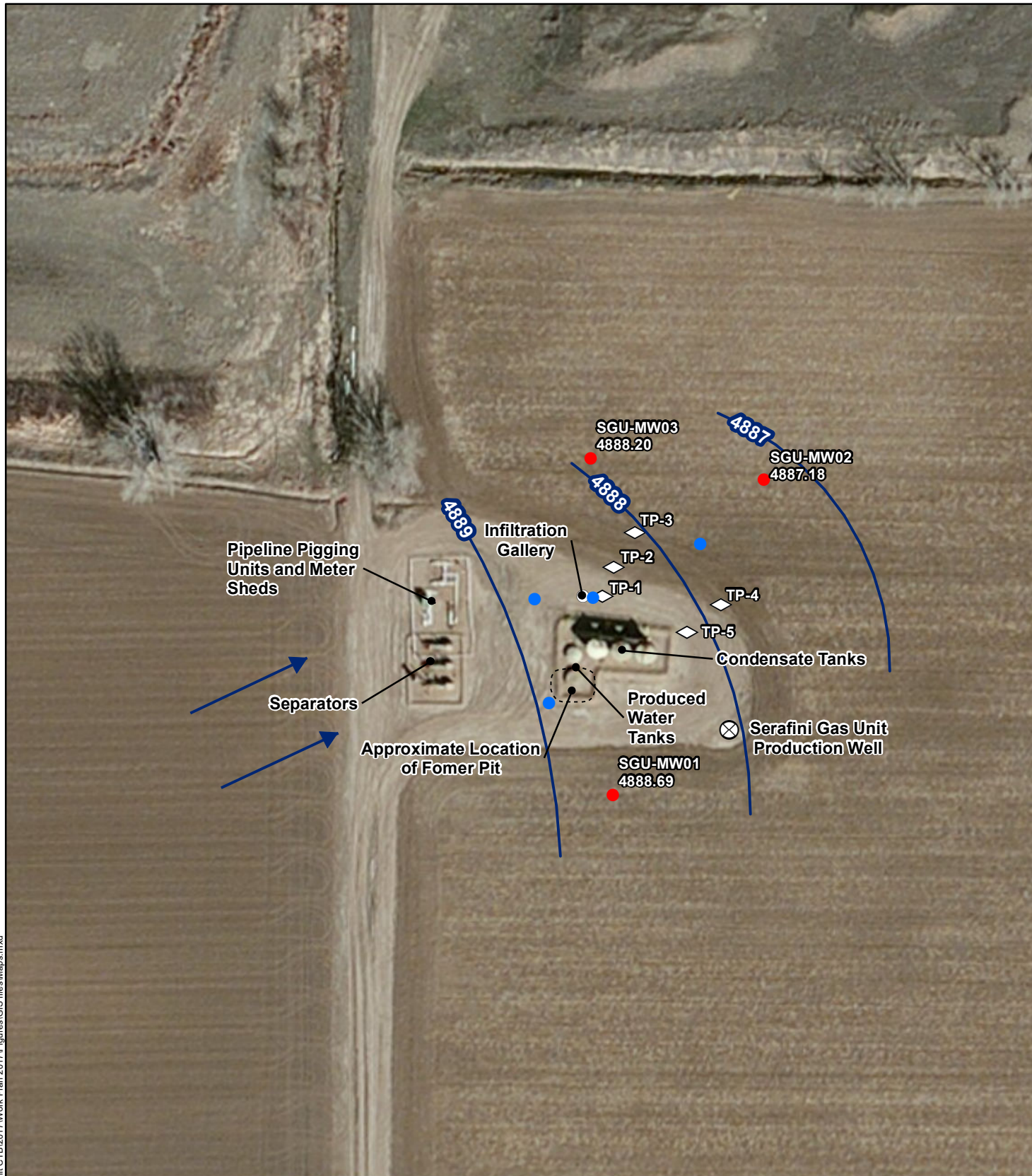
Detailed Site Map
 Top Operating Company
 Serafini Gas Unit #1 (Sherwood Property)
 Weld County, Colorado
 NWNE Sec 18 T2N R68W 6th PM



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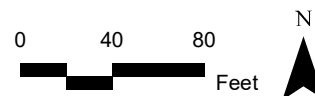
Figure

2



- Monitoring Well
- ◇ Test Pit and Soil Sample Location
- Proposed Soil Boring Locations
- Infiltration Gallery Location
- ⋯ Former Pit
- Groundwater Flow Direction
- Groundwater Contour
- 4888 Groundwater Elevation based on June 2016

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Potentiometric Surface Map
 Top Operating Company
 Serafini Gas Unit #1 (Sherwood Property)
 Weld County, Colorado
 NWNE Sec 18 T2N R68W 6th PM



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Figure

3