2Q 2020

SVE REPORT

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September 3, 2020

RCVD Via Email 9/4/2020
Reviewed by Cory

Mr. Cory Smith, Environmental Specialist
New Mexico Oil Conservation Division – District 3
1000 Rio Brazos Road
Aztec, New Mexico 87410

Re: Status Report – 2nd Quarter 2020
San Juan 28-7 Unit 183M
Rio Arriba County, New Mexico
OCD Incident No. NCS1901627746

Dear Mr. Smith:

On behalf of Hilcorp Energy Company (Hilcorp), Timberwolf Environmental, LLC (Timberwolf) presents this report to document remedial activities conducted during the second quarter of 2020 (2Q20) at the San Juan 28-7 Unit 183M (Site). Activities conducted during the 2Q20 consisted of the following:

- Operation and maintenance of the soil vapor extraction (SVE) system
- Installation of a replacement generator

Environmental Setting and Site Geology

The Site is situated on federal land managed by the Bureau of Land Management (BLM) in western Rio Arriba County, New Mexico (Figure 1). The area consists of sparse vegetative cover comprised primarily of scrub brush and native grasses. Area terrain is comprised of plateaus divided by canyons. The primary canyon in the area is Carrizo Canyon, which drains to the northwest into the San Juan River, approximately 19 miles from the Site (Figures 2 and 3).

The Site is situated along the rimrock of an unnamed side canyon to Carrizo Canyon. Average elevation at the Site is approximately 6,523 feet (ft) above mean sea level. The closest surface water is a first order tributary of Carrizo Creek, situated 1,500 ft southeast of the Site and 330 ft lower in elevation.

According to the U.S. Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS), the Site soil consists of the Vessilla-Menefee-Orlie complex, 2 to 30 percent slopes. The surface horizon is comprised of a sandy loam, underlain by bedrock encountered between 15 to 19 inches below ground surface (bgs). Native salinity of the soil is nonsaline to very slightly saline (0.0 to 2.0 millimhos per centimeter (mmhos/cm)).

Site History

Release Event

Corrosion near the base of the former oil tank resulted in the release of approximately 150 barrels (bbls) of oil and 7 bbls of produced water. All released fluid was contained by the berm. Standing fluid was recovered; the tank was removed from service and disposed off-site. The initial investigation identified the area of the former tank battery as the primary area of concern (AOC).

Hilcorp constructed a new tank battery northeast of the original tank battery. Tanks and interconnective piping were removed from the original tank battery.

Site Investigation

A soil investigation, conducted during March 2019, revealed the constituents of concern (COC) were: total BTEX (i.e., benzene, toluene, ethylbenzene, and xylene) and total petroleum hydrocarbons (TPH). Impacted soil was horizontally and vertically delineated; the vertical extent of impacted soil was approximately 27 ft bgs. Additionally, the soil investigation revealed that subsurface soil is unconsolidated to a depth of 10 ft below ground surface (bgs) which is underlain by sandstone. Findings of the investigation are documented in Timberwolf's report entitled: *Site Characterization Report and Remedial Action Plan*, dated May 21, 2019.

Site Remediation –SVE System

To remediate hydrocarbon impacted soil, a soil vapor extraction (SVE) system was designed, constructed, and installed at the Site. System start-up date was 12/18/19. The SVE system is comprised of 11 SVE wells, four vent wells, and a SVE trailer. The SVE trailer is comprised of a regenerative blower, hour meter, moisture separator and filter, sampling port, and a manifold with three independent legs. Additionally, the SVE trailer is equipped with a programmable automation panel to control valves for each manifold leg.

The SVE system creates a treatment field of approximately 0.15 acres and treats soil to a depth of approximately 30 ft bgs for a total volume of approximately 7,021 cubic yards of soil. The SVE wells, measured radius of influence of 25 ft, and leg configurations are shown in Figure 4.

SVE System Operations

The SVE system was designed with three independent legs (i.e., Leg 1, Leg 2, and Leg 3). Legs 1 and 3 provide vacuum extraction to the deep SVE wells; Leg 2 is piped to the shallow wells.

The automation panel was programmed to oscillate between Legs 1, 2, and 3 every four hours for continuous 24-hr operations. Programmed runtimes are presented in Table 1 below.

Table 1. Programmed Runtimes and Leg Configurations

Leg	SVE Wells and Location	Scheduled Runtime
Leg 1	Deep Wells SVE7, SVE8, and SVE9 Eastern side of treatment zone	4 hours
Leg 2	Shallow Wells SVE1, SVE2, SVE3, and SVE4	4 hours
Leg 3	Deep Wells SVE5, SVE6, SVE10, and SVE11 Central and Western side of treatment zone	4 hours
Leg 1	Deep Wells SVE7, SVE8, and SVE9 Eastern side of treatment zone	4 hours
Leg 2	Shallow Wells SVE1, SVE2, SVE3, and SVE4	4 hours
Leg 3	Deep Wells SVE5, SVE6, SVE10, and SVE11 Central and Western side of treatment zone	4 hours

SVE – soil vapor extraction well

Water and condensate collected in the moisture separator was drained through a 1-inch PVC pipe and transferred to an open-top tank fitted with bird netting. Approximately 0.25 gallons of water/condensate was recovered during 2Q20.

Runtime, flow rates, and percentage of runtime for 2Q20 are documented in Table 2 below.

Table 2. System Runtime and Flow Rates – 2Q20

Measurement	Leg 1	Leg 2	Leg 3	Total
Runtime (hours)	157.3	156	156	469.3
Runtime (min)	9,438	9,360	9,360	28,158
Average CFM	13	10	19.5	--
Runtime Percentage	33.5%	33.2%	33.2%	100%

min – minutes
CFM – cubic feet per minute

The 2Q20 had 2,184 hours in the quarter; the SVE system ran for 469.3 hours. The runtime percentage (%) in 2Q20 was 21.5%. The low runtime was related to prolonged down periods due to persistent generator malfunctions. The original generator was replaced by Hilcorp personnel the week of 06/08/20. The SVE system and replacement generator start-up was conducted on 06/11/20 by Hilcorp and Timberwolf personnel. A field log of the O&M events and work performed at the Site is provided in the attached Table A-1.

Mass Removal

Timberwolf used the results from the initial gas analysis (collected on 02/12/20), flow rates, and runtimes to calculate constituent mass removal. Mass removal of GRO and BTEX and associated recovered volume are presented in Table 3 below.

Table 3. Mass Removal and Associated Volume

Constituent	Mass Removal by Leg (kg)[1]			Total Mass Removed[2] (lbs)	Recovered Volume[3] (bbl)
	Leg 1	Leg 2	Leg 3		
GRO	75.04	57.25	111.64	536.65	1.99
Benzene	0.93	0.71	1.39	6.66	NC
Toluene	3.35	2.56	4.98	23.95	NC
Ethylbenzene	0.09	0.07	0.13	0.64	NC
Xylenes	0.68	0.52	1.01	4.85	NC

[1]Calculation = minutes ran * CFM * Concentration (mg/m^3) * 1 M3/35.3147 ft^3 *1g/1000 mg * 1 kg/1000 g
[2]Calculation = [Leg 1 + Leg 2 + Leg 3] * 2.2 lbs/kg
[3]Calculation = lbs / 6.42 lb/gal / 42 gal/bbl
GRO = from TPH (GC/MS) Low Fraction (i.e., gasoline range organics)
kg – kilograms
lbs – pounds
NC – not calculated
bbl -barrel
NC – not calculated

Assumptions:

- API Gravity = 52
- Concentrations of VOCs in soil gas vapor have remained static since the collection of initial gas sample

Summary

System runtime during 2Q20 was 21.5% of total available hours in 2Q20. The low runtime was related to prolonged down periods due to persistent generator malfunctions. A replacement generator was installed the week of 06/08/20. The total mass removed during 2Q20 for TPH low fraction (i.e., GRO) was approximately 536.7 lbs (i.e., 2.0 bbls).

Further Actions – Third Quarter 2020

During 3Q20, the following activities are planned for the Site:

- Conduct regular Site O&M to ensure proper system function and drain any water/condensate accumulation in the moisture separator
- Prepare a 3Q20 status report

If you have any questions regarding this report or need further assistance, please call us at 979-324-2139.

Sincerely,
Timberwolf Environmental, LLC

Michael Morse
Project Scientist

Jim Foster
President

Attachments: Figures
Attached Table

Cc: Clara Cardoza, Hilcorp Energy Company

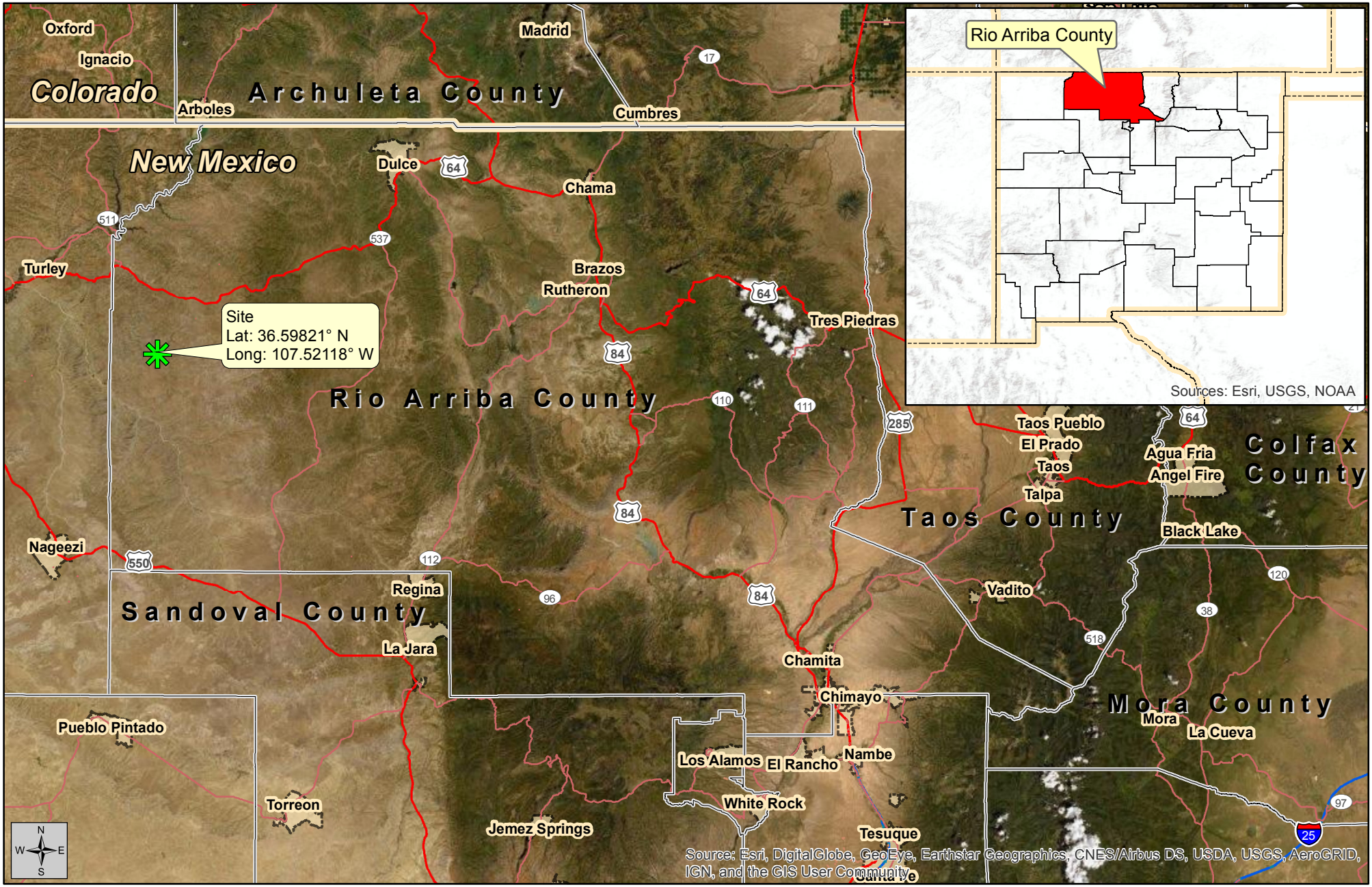

Figure 1
Site Location Map

Status Report - 2nd Quarter 2020

July 27, 2020

1:1,250,000

0 20 40 60 80 100 120 Miles

San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)
Hilcorp Energy Company
Rio Arriba County, New Mexico

Timberwolf Environmental

Created By:
Kevin Cole
TE Project No.: HEC-190007

Datum: NAD83
Imagery Source: ESRI
Vector Source: ESRI and TE

Site

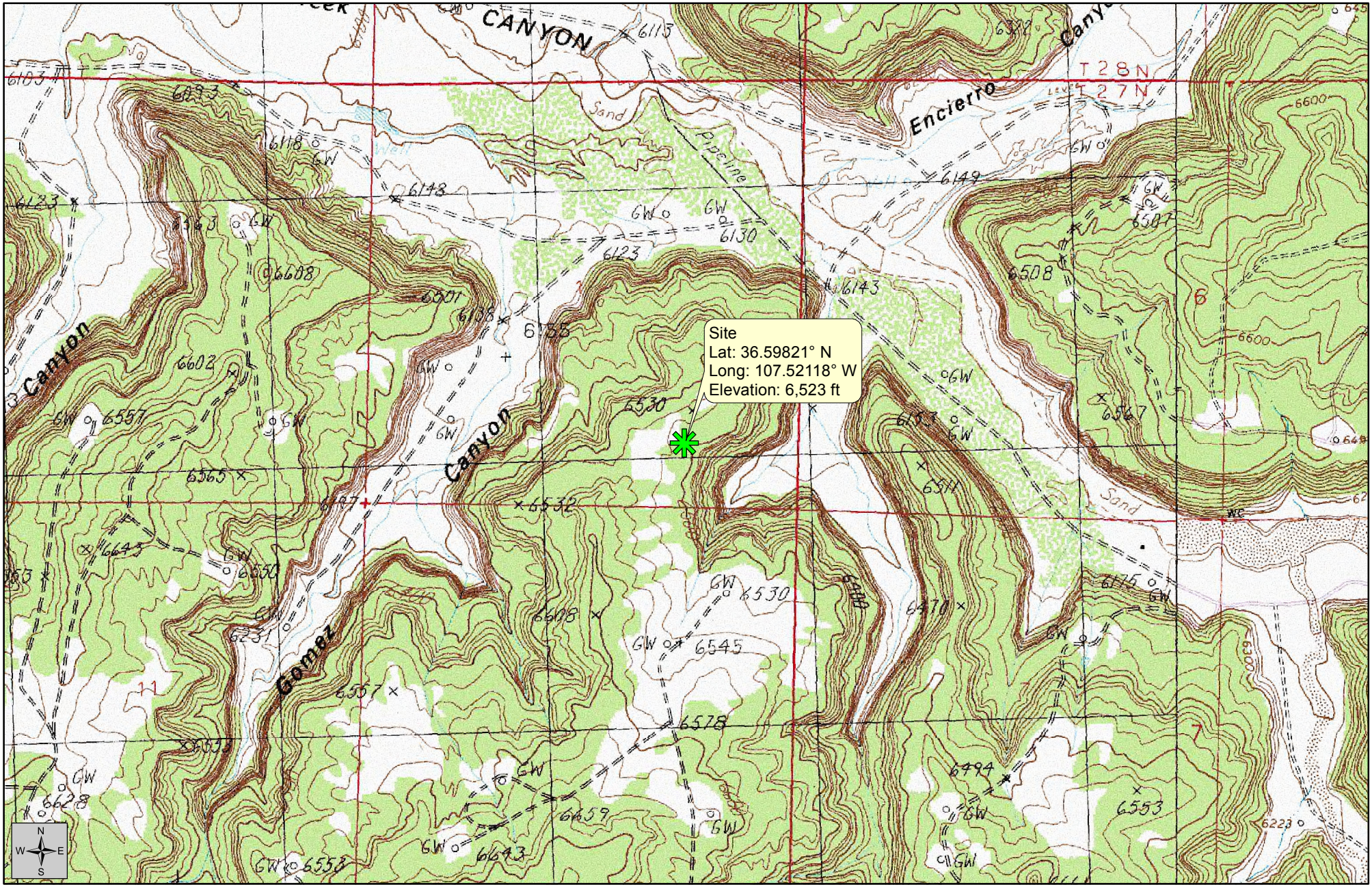

Figure 2 **Topographic Map**	**Status Report - 2nd Quarter 2020**	**July 27, 2020**

1:24,000

0 0.5 1 1.5 2 Miles

San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)
Hilcorp Energy Company
Rio Arriba County, New Mexico

TIMBERWOLF ENVIRONMENTAL

Created By:
Kevin Cole
TE Project No.: HEC-190007

Datum: NAD83
Imagery Source: USGS
Quads: Gould Pass and Santos Peak
Vector Source: TE

Site

Figure 3
Aerial Map

Status Report - 2nd Quarter 2020

July 27, 2020

1:10,000

0 0.25 0.5 0.75 1 Miles

San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)
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Rio Arriba County, New Mexico

TIMBERWOLF ENVIRONMENTAL

Created By:
Kevin Cole
TE Project No.: HEC-190007

Datum: NAD83
Imagery Source: ESRI
Vector Source: TE

Site

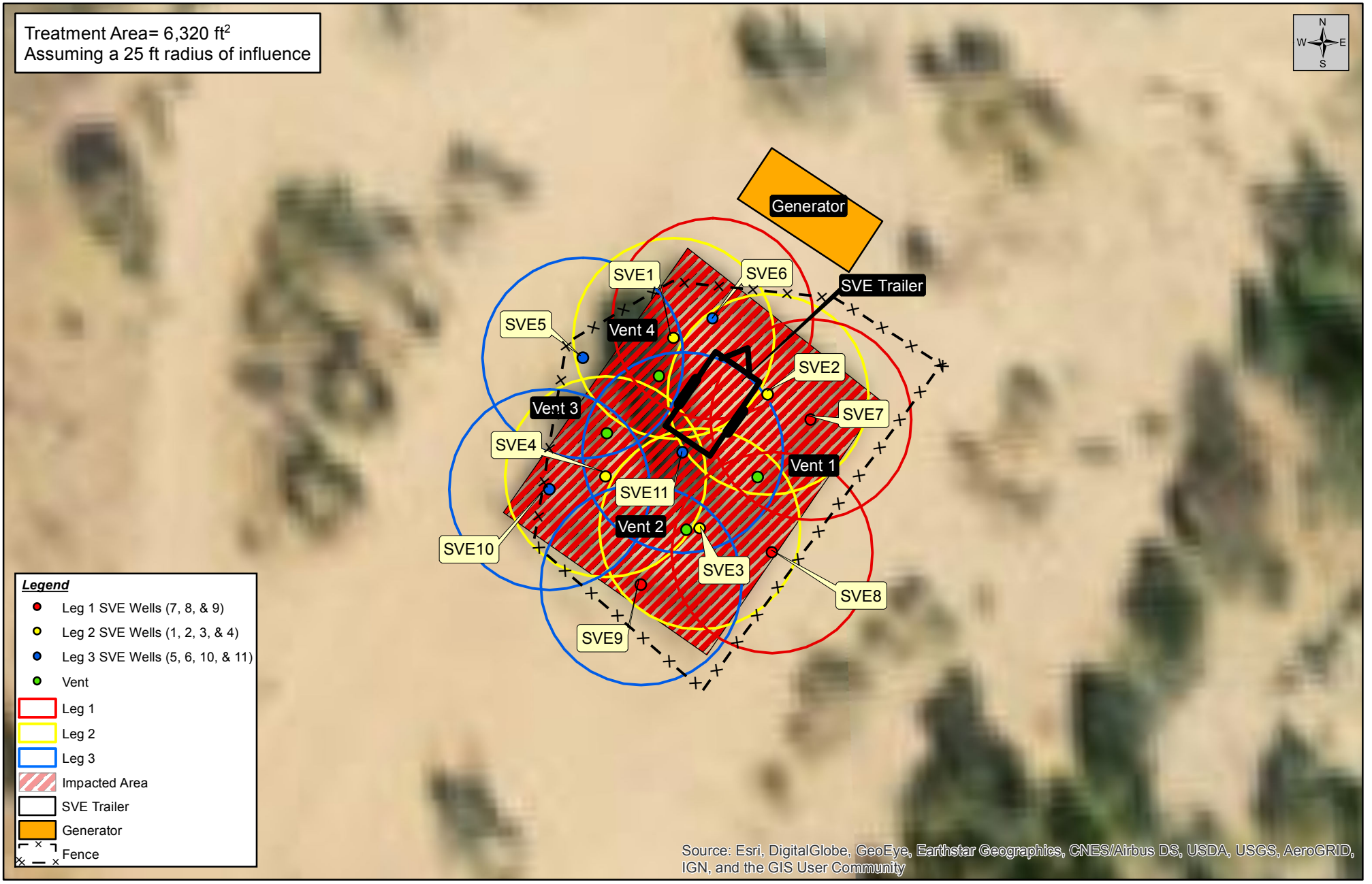

Figure 4
SVE System Overview

Status Report - 2nd Quarter 2020

July 27, 2020

1:250

0 40 80 120 Feet

San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)
Hilcorp Energy Company
Rio Arriba County, New Mexico

TIMBERWOLF ENVIRONMENTAL

Created By:
Kevin Cole
TE Project No.: HEC-190007

Datum: NAD83
Imagery Source: ESRI
Vector Source: TE

Table A-1. Operation and Maintenance Events
Status Report 2nd Quarter 2020
San Juan 28-7 183M

Date	Hour Meter (hrs)	Water/Condenstate Recovered (gal)	Operation & Maintenance Notes
04/01/20	377.6	0	Generator was not running upon arrival Alarms: Oil pressure low; Change oil and filter; change air filter Attempted serveral times to restart generator. Generator would start initially with a rough idle up and idle down. After a minute or two the generator would then shut down due to ECU overide Contacted Jeff Bell with Hilcorp and updated him on the sitituation
06/04/20	N/A	0	System down: Met with Hilcorp personnel at Site to diagnose system malfuntions. It was determined that a new generator is required
Week of 06/08/20	N/A	0	A new generator was installed by Hilcorp personnel during the week of 06/08/20. Timberwolf personnel not on site during generator installation
06/11/20	377.6	0	Met with Kurt Hoekstra, Jeff Bell, and Caleb with Hilcorp. Got the new generator started and SVE system back up and running. Left site at 1245, hour meter reading upon leaving: **379.6**
06/12/20	403.5	0.25	Arrived on site and system was running properly. Hour meter upon leaving **403.5 @ 1245**
06/22/20	641.1	0	Kurt Hoekstra with Hilcorp conducted the SVE system check. 10:00AM
07/01/20	856.9	0	Kurt Hoekstra with Hilcorp conducted the SVE system check. 10:00AM

-- = No Maintenace Required

gal - gallons

hrs - hours