TIMBERWOLF ENVIRONMENTAL

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January 28, 2021

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

Accepted for Record
CS

Re: Status Report – 4th 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 fourth quarter of 2020 (4Q20) at the San Juan 28-7 Unit 183M (Site). Due to multiple SVE system vacuum pump failures during 3Q20 and 4Q20 limited remediation activities were conducted during 4Q20.

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 (i.e., vacuum pump), 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

However, three (3) electric pump motors were burned up during 3Q20. The third motor was a factory original replacement pump and vacuum unit which was installed the week of 9/28/20. This motor ran for less than 48 hours prior to failing. The week of 10/26/20, Hilcorp personnel installed a rebuilt electric motor to replace one of the burned-up motors; however, this motor tripped a breaker at start up. To avoid burning up the electric motor no further attempt was made to restart the SVE system with the rebuilt motor.

The week of 11/09/20, a new electric motor was installed in the vacuum pump and the SVE system was restarted. The SVE system ran for 127.7 hours prior to being manually shut down due to electric motor sounding as though it was on the verge of burning up. No further attempt was made to restart the SVE system until additional diagnostics was performed. During 4Q20, several diagnostics were conducted, and certain improvements made, including: replacing the breaker and upgrading wiring to the vacuum pump.

To assist in determining the cause of electric motor failures, a vacuum pump was returned to the manufacturer the week of 11/2/20 for diagnostics and repair. On 12/4/20, the manufacture diagnosed the cause of motor failure to be excessive amperage draw, likely from a restricted inlet or outlet. The manufacturer stated the electric motor windings were burnt; the electric motor windings were rewound, and motor refurbished.

The week of 12/7/20, the manufacturer shipped the rebuilt vacuum pump and motor back to Hilcorp. Scheduling conflicts due to weather, Coronavirus restrictions, and holidays precluded vacuum pump reinstallation in December 2020. (Note: The refurbished vacuum pump was installed on 01/12/21 and the SVE system was restarted without incident.)

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. Zero (0) gallons of water/condensate was recovered during 4Q20.

Runtime, flow rates, and percentage of runtime for 4Q20 are documented in Table 2 below.

Table 2. System Runtime and Flow Rates – 4Q20

Measurement	Leg 1	Leg 2	Leg 3	Total
Runtime (hours)	44	43.7	40	127.7
Runtime (min)	2,640	2,622	2,400	7,662
Average CFM	11.2	9	20.6	--
Runtime Percentage	34.5%	34.2%	31.3%	100%

min – minutes
CFM – cubic feet per minute

The 4Q20 had 2,208 hours in the quarter; the SVE system ran for 127.7 hours. The runtime percentage (%) in 4Q20 was 5.8%. The 5.8% runtime was directly related to SVE system vacuum pump failures and previously mentioned scheduling conflicts. The vacuum pump was returned to the manufacturer for diagnostics and repair. A field log of the O&M events and maintenance 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 for 4Q20 are presented in Table 3 below; cumulative totals are provided in the attached Table A–2.

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	18.09	14.43	30.24	138.07	0.51
Benzene	0.22	0.18	0.38	1.71	NC
Toluene	0.81	0.64	1.35	6.16	NC
Ethylbenzene	0.02	0.02	0.04	0.16	NC
Xylenes	0.16	0.13	0.27	1.25	NC

[1]Calculation = minutes ran * CFM * Concentration (mg/m^3) * 1 M^3/35.3147 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 4Q20 was 5.8% of total available hours in 4Q20. The 5.8% runtime was directly related to SVE system vacuum pump failures, specifically three (3) electric motor failures and multiple system shutdowns, as well as scheduling conflicts as documented in *SVE System Operations*. A vacuum pump was returned to the manufacturer for diagnostics and repairs. Manufacturer repaired vacuum pump and shipped it back to Hilcorp.

Further Actions – First Quarter 2021

During 1Q21, the following activities are planned for the Site:

- Install a replacement vacuum pump and restart SVE system (completed 1/12/21)
- Conduct regular Site O&M to ensure proper system function and drain any water/condensate accumulation in the moisture separator
- Prepare a 1Q21 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

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Figures

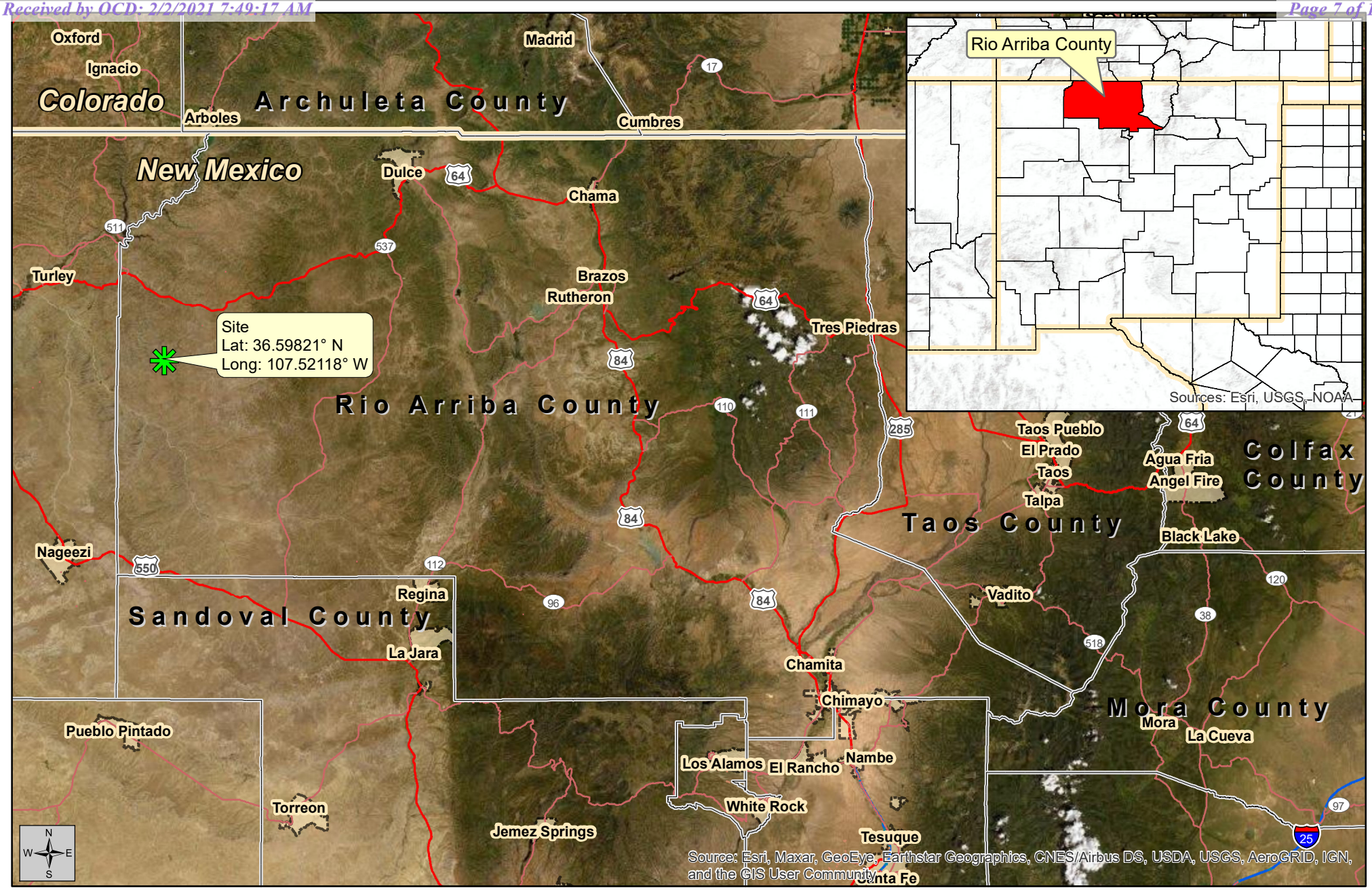

Figure 1 **Site Location Map**	**Status Report - 4th Quarter 2020**	**January 14, 2021**
TIMBERWOLF ENVIRONMENTAL	1:1,250,000 0 20 40 60 80 100 120 Miles **San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)** **Hilcorp Energy Company** **Rio Arriba County, New Mexico**	Site
Created By: Kevin Cole TE Project No.: HEC-190007	Datum: NAD83 Imagery Source: ESRI Vector Source: ESRI and TE	

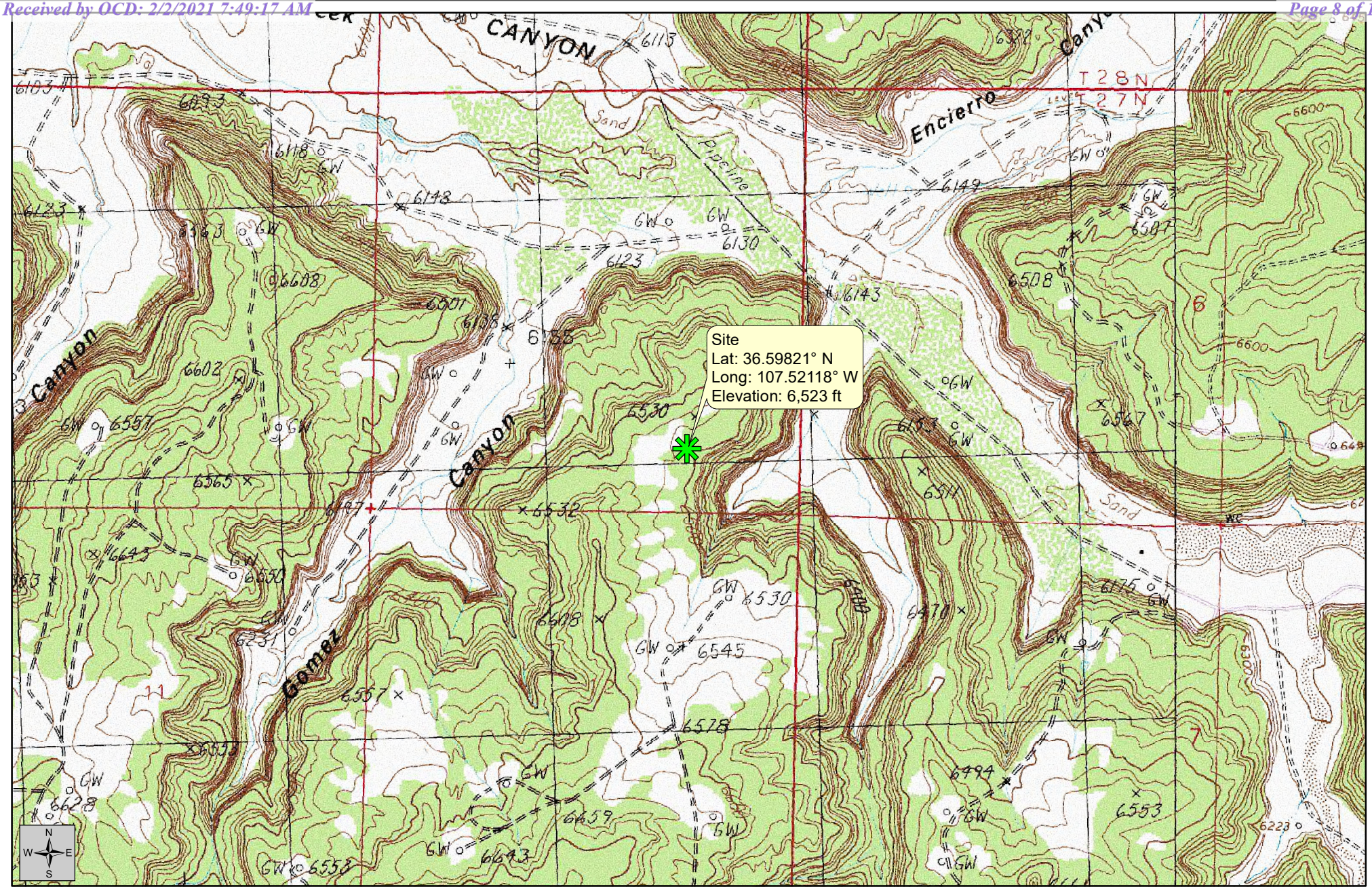

Figure 2
Topographic Map

Status Report - 4th Quarter 2020

January 14, 2021

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 - 4th Quarter 2020**	**January 14, 2021**

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1:10,000

0 0.25 0.5 0.75 1 Miles

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

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

Datum: NAD83
Imagery Source: ESRI
Vector Source: TE

Site

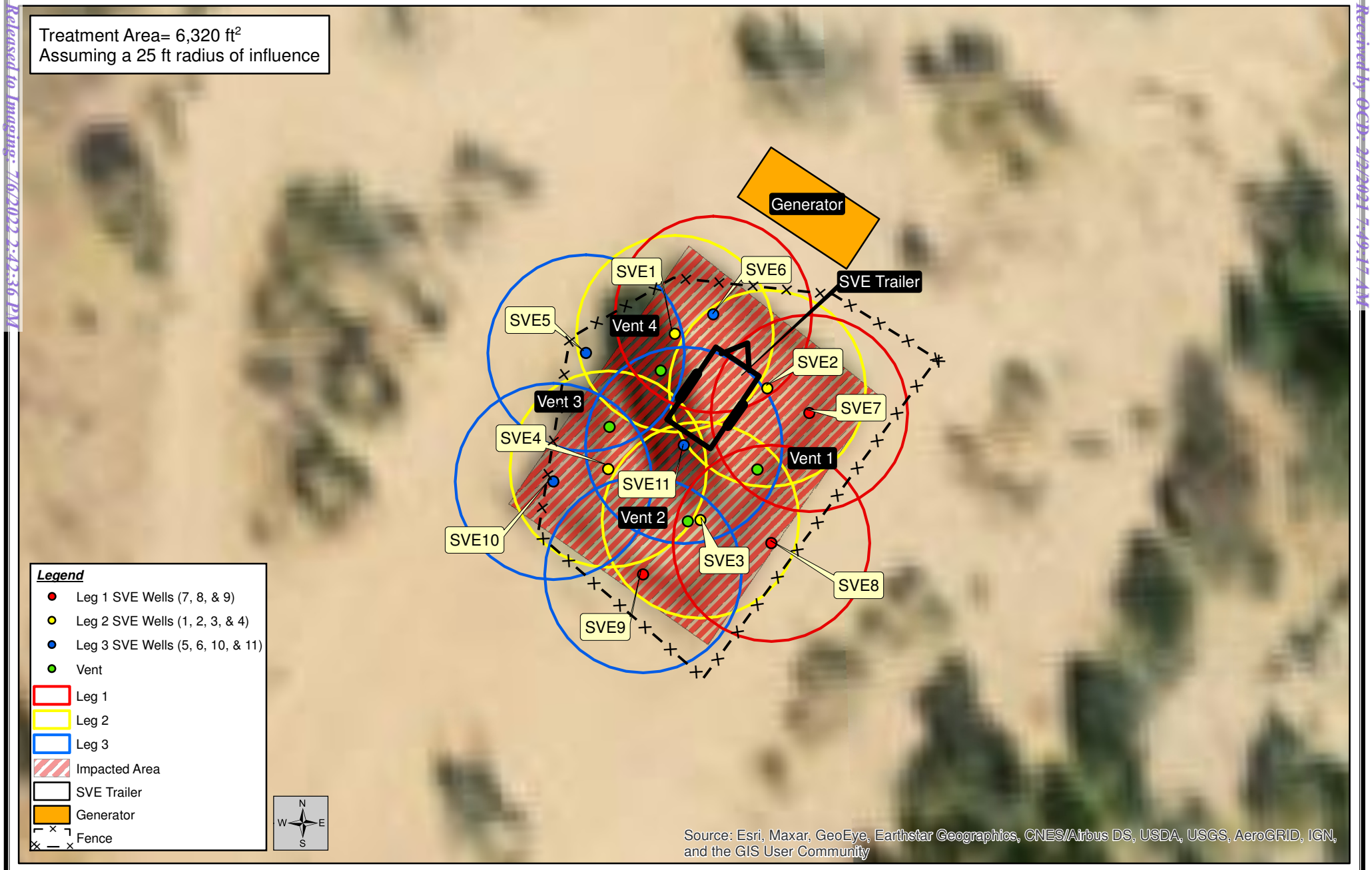

Figure 4 **SVE System Overview**	**Status Report - 4th Quarter 2020**	**January 14, 2021**
TIMBERWOLF ENVIRONMENTAL	1:250 0 40 80 120 Feet **San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)** **Hilcorp Energy Company** **Rio Arriba County, New Mexico**	Datum: NAD83 Imagery Source: ESRI Vector Source: TE
	Created By: Kevin Cole TE Project No.: HEC-190007	

Attached Table

Table A-1. Operation and Maintenance Events
Status Report 4th Quarter 2020
San Juan 28-7 183M

Date	Hour Meter (hrs)	Water/Condenstate Recovered (gal)	Maintenance
Week of 10/12/20	N/A	0	• Maintenance kit was delivered for the vacuum pump and electric motor. Kit included bearings, oil seals, inlet and outlet silencers, canister filter, and gaskets • Hilcorp personnel conducted all maintenance and repairs (i.e., bearings)
Week of 10/26/20	N/A	0	• Vacuum pump with refurbished motor installed. Tripped the SVE system breaker at start up • Hilcorp personnel placed order for new electric motor • Hilcorp personnel conducted all maintenance and repairs
Week of 11/2/20	N/A	0	• Vacuum pump and electric motor was sent to the manufacurer for diagnostics and repair • Hilcorp personnel conducted all maintenance and repairs
Week of 11/9/20	1936.3	0	• New electric motor was installed in vacuum pump. SVE system restarted • System ran for 127.7 hrs prior to being manually shut down over concerns of electric motor burning up. The electric motor did not sound to be operating normally and therefore was shut down to prevent motor failure. Hour meter reading after shutting system down: 2064.0 hrs • Hilcorp personnel conducted all maintenance and repairs
12/4/20	N/A	0	• Diagnostics from Atlantic Blower (i.e., Manufacturer) regarding burned up electric motor: the motor was burned up due to excessive amperage draw, likely from a restricted inlet or outlet • Manufacturer in process of finishing up refurbishing electric motor for vacuum pump
Week of 12/7/20	N/A	0	• Refurbished vacuum pump was shipped from manufacturer and received by Hilcorp

N/A = not available
gal - gallons
hrs - hours
* - Timberwolf personnel not on site

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Table A-2. Cumulative Mass Removal
Status Report 4th Quarter 2020
San Juan 28-7 183M

Quarter	Constituent (lbs)					Recovered Volume (bbl)
	Benzene	Toluene	Ethylbenzene	Xylene	GRO	GRO
1Q20	5.01	18.01	0.48	3.65	403.47	1.50
2Q20	6.66	23.95	0.64	4.85	536.65	1.99
3Q20	14.82	53.32	1.43	10.80	1,194.72	4.43
4Q20	1.71	6.16	0.16	1.25	138.07	0.51
Total	28.2	101.44	2.71	20.55	2,272.91	8.43

mass (mg) removed equation = ((CFM*volatile*runtime in minutes)/(35.3147))

lbs - pounds

bbl - barrels

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District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 16599

CONDITIONS

Operator:	OGRID:
HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	372171
	Action Number: 16599
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
csmith	4Q 2020 Report Accepted for Record	7/6/2022