TIMBERWOLF ENVIRONMENTAL

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October 29, 2021

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

Re: Status Report – 3rd Quarter 2021
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 third quarter of 2021 (3Q21) at the San Juan 28-7 Unit 183M (Site).

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.

Investigation and Site Characterization

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.

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.

The work conducted is documented in the following reports:

- *Site Characterization Plan,* dated 03/05/19
- *Site Characterization and Remedial Action Plan*, dated 05/21/19
- *Status Report – 4th Quarter 2019,* dated 01/31/20
- *Status Report – 1st Quarter 2020,* dated 04/30/20
- *Status Report – 2nd Quarter 2020,* dated 09/03/20
- *Status Report – 3rd Quarter 2020,* dated 11/25/20
- *Status Report – 4th Quarter 2020,* dated 01/28/21
- *Status Report – 1st Quarter 2021,* dated 05/05/21
- *Status Report – 2nd Quarter 2021,* dated 07/28/21

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 are collected in the moisture separator, which is fitted with a 1-inch PVC pipe to transfer fluids to an open-top tank fitted with bird netting. Zero (0) gallons of water/condensate was recovered during 3Q21.

Runtime, flow rates, and percentage of runtime for 3Q21 are documented in Table 2 below.

Table 2. System Runtime and Flow Rates – 3Q21

Measurement	Leg 1	Leg 2	Leg 3	Total
Runtime (hours)	557.7	556	556	1,669.7
Runtime (min)	33,462	33,360	33,360	100,182
Average CFM	12	10	25	--
Runtime Percentage	33.4%	33.3%	33.3%	100%

min – minutes
CFM – cubic feet per minute

The 3Q21 had 2,208 hours in the quarter; the SVE system ran for 1,669.7 hours. Therefore, runtime percentage (%) in 3Q21 was 75.6%. Hilcorp personnel conducted two (2) operation and maintenance (O&M) events during 3Q21; a field log of O&M events and maintenance performed is provided in the attached Table A-1.

In September 2021, Hilcorp personnel installed a remote monitoring system (Cygnet) on the generator to provide immediate notification of generator malfunctions, errors, maintenance or other fault errors.

Mass Removal

Timberwolf used the results from the soil gas analysis (collected by Hilcorp on 03/23/21), flow rates, and runtimes to calculate constituent mass removal. Mass removal of GRO and BTEX and associated recovered volume for 3Q21 are presented in Table 3 below; cumulative totals are provided in the attached Table A–2.

Table 3. Mass Removal and Associated Volume – 3Q21

Constituent	Mass Removal by Leg (kg)[1]			Total Mass Removed[2] (lbs)	Recovered Volume[3] (bbl)
	Leg 1	Leg 2	Leg 3		
GRO	7.83	6.24	15.61	65.30	0.24
Benzene	0.30	0.24	0.60	2.51	NC
Toluene	2.13	1.70	4.25	17.78	NC
Ethylbenzene	0.17	0.13	0.33	1.38	NC
Xylenes	1.78	1.42	3.56	14.88	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
bbl -barrel
NC – not calculated

Assumptions:

- API Gravity = 52
- Concentrations of VOCs in soil gas vapor have remained static since the collection of SVE gas sample
- Hour meter reading for end of quarter was calculated based on hour reading from 10/05/21

Summary

System runtime during 3Q21 was 75.6% of total available hours in 3Q21. The limited runtime was related to a generator fault error and Hilcorp's primary Field Environmental Specialist being on extended leave during 3Q21; these two factors resulted in longer than typical system downtime. Mass removal calculations indicated 0.24 bbls of GRO recovered during 3Q21.

The installation of the Cygnet remote monitoring system is expected to greatly enhance quarterly runtimes.

Further Actions – Fourth Quarter 2021

During 4Q21, the following activities are planned for the Site:

- Conduct bi-weekly Site O&M to ensure proper system function and drain any water/condensate accumulation in the moisture separator as needed
- Facilitate enhanced bioremediation of the deeper strata by passive infusion of surfactants and nutrients via the induction vent wells; surfactants lower surface tension which increases both volatility and surface area, surfactants are typically composed of sulfates, phosphates, or carbonates and are biodegradable
- Prepare a 4Q21 status report

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

Sincerely,
Timberwolf Environmental, LLC

(for)
Michael Morse
Project Scientist

Jim Foster
President

Attachments: Figures
Attached Tables

Cc: Kate Kaufman, Hilcorp Energy Company

Figures

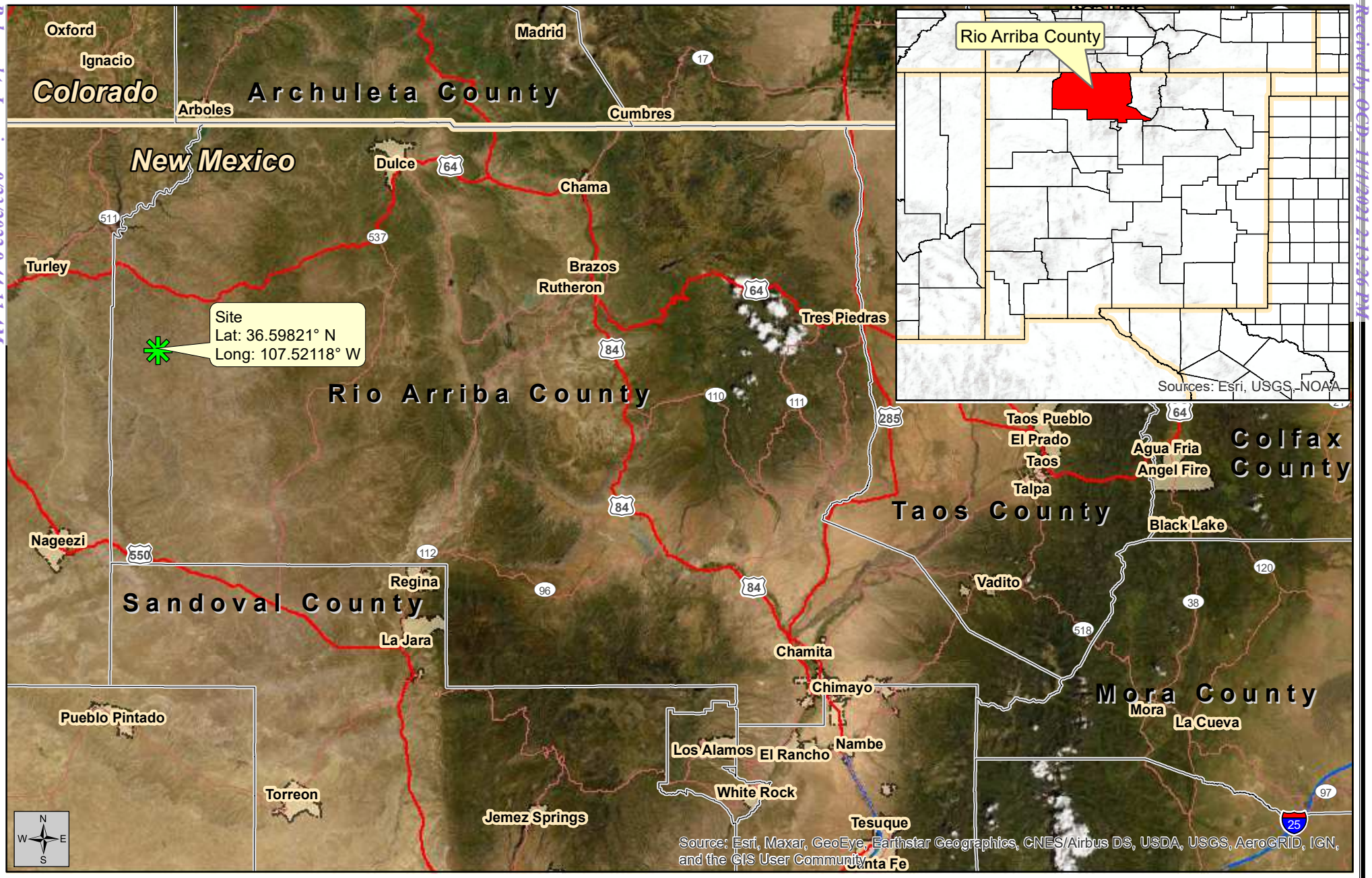

Figure 1 **Site Location Map**	**Status Report - 3rd Quarter 2021**	**September 13, 2021**

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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

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

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

Site

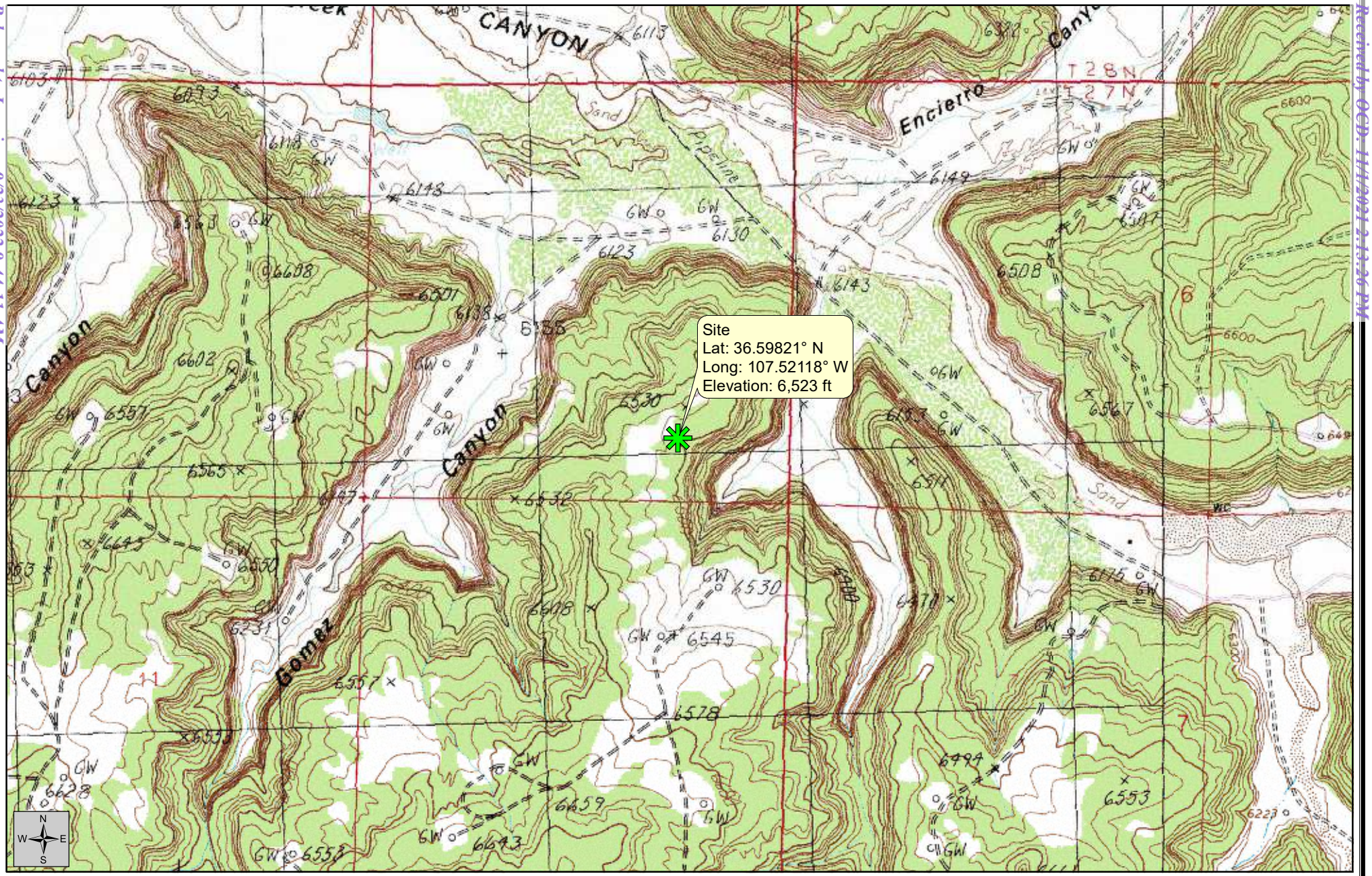

Figure 2
Topographic Map

Status Report - 3rd Quarter 2021

September 13, 2021

1:24,000

0 0.5 1 1.5 2 Miles

TIMBERWOLF ENVIRONMENTAL

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

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

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

Site

Figure 3 **Aerial Map**	**Status Report - 3rd Quarter 2021**	**September 13, 2021**
TIMBERWOLF ENVIRONMENTAL	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**	Site
Created By: Kevin Cole TE Project No.: HEC-190007	Datum: NAD83 Imagery Source: ESRI Vector Source: TE	

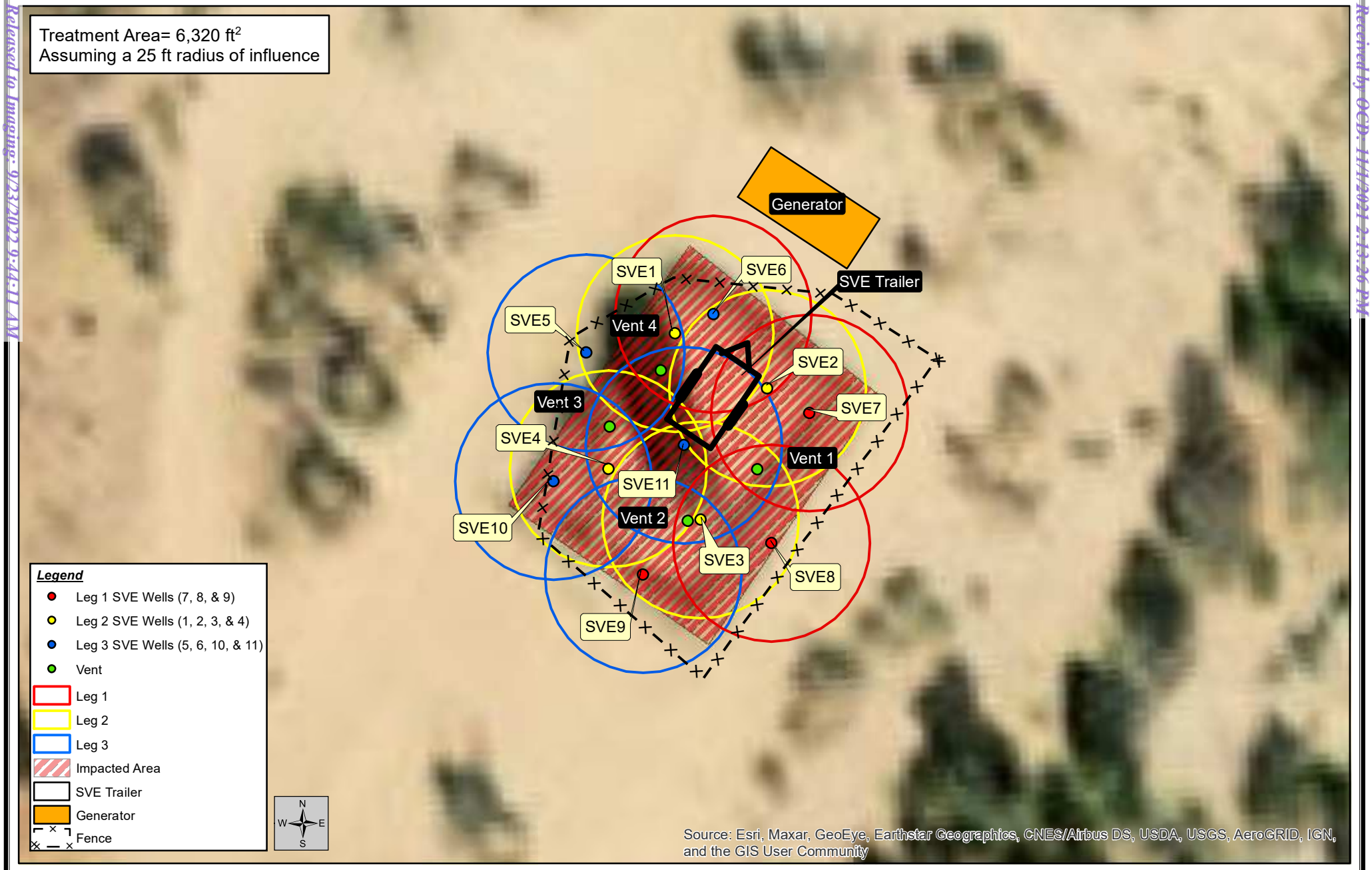

Figure 4
SVE System Overview

Status Report - 3rd Quarter 2021

September 13, 2021

1:250

0 25 50 75 100 125 Feet

TIMBERWOLF ENVIRONMENTAL

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

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

Attached Tables

Table A-1. Operation and Maintenance Events
Status Report 3rd Quarter 2021
San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)

Date	Hour Meter (hrs)	Water/Condenstate Recovered (gal)	Maintenance Performed
07/21/21	5431.0	0	• Hilcorp operator performed SVE system O&M checks • All systems functioning properly • Timberwolf personnel not on site
08/12/21	5674.3	0	• Jim Foster with Timberwolf performed SVE system O&M checks • Generator down with a general fault error and required maintenance

gal - gallons
hrs - hours

Table A-2. Cumulative Mass Removal
Status Report 3rd Quarter 2021
San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)

Quarter	Constituent (lbs)					Recovered Volume (bbl)
	Benzene	Toluene	Ethylbenzene	Xylene	GRO	GRO
4Q19	18.5	32.4	0.73	6.27	1,017	3.77
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
1Q21	22.85	82.18	2.20	16.65	1,841.41	6.83
2Q21	2.13	15.09	1.17	12.63	55.43	0.21
3Q21	2.51	17.78	1.38	14.88	65.30	0.24
Total	74.19	248.89	8.19	70.98	5,252.05	19.48

mass (mg) removed equation = ((CFM*volatile*runtime in minutes)/(35.3147))
lbs - pounds
bbl - barrels

District I
1625 N. French Dr., Hobbs, NM 88240
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District III
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Phone:(505) 334-6178 Fax:(505) 334-6170
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 58962

CONDITIONS

Operator:	OGRID:
HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	372171
	Action Number: 58962
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
nvelez	Accepted for the record. See App ID 125796 for most updated status.	9/23/2022