

1Q 2020

SVE REPORT



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April 30, 2020

RCVD Via Email 5/21/2020

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 – 1<sup>st</sup> 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 first quarter of 2020 (1Q20) at the San Juan 28-7 Unit 183M (Site). Activities conducted during the 1Q20 consisted of the following:

- Operation and maintenance of the soil vapor extraction (SVE) system
- Collection and laboratory analysis of an initial gas sample
- Installation of additional equipment (i.e., heat tape, insulation, and hour meter)

### **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**

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.

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.

## **SVE System Overview**

To remediate impacted soil at the Site, Hilcorp installed and operates a soil vapor extraction (SVE) system. The SVE system is comprised 11 SVE wells, four vent wells, and a SVE trailer (Photo No. 1).

### ***SVE Wells and Vents***

SVE and vent wells at the Site include:

- 4 shallow SVE wells (i.e., SVE1 – SVE4)
- 7 deep SVE wells (i.e., SVE5 – SVE11)
- 4 deep SVE vents

Each vent or SVE wells was constructed of 2-inch polyvinyl chloride (PVC) screened and blank pipe. The four shallow SVE wells were completed in unconsolidated soil with screened intervals from 7 to 10 feet (ft) bgs. Seven deep SVE wells and four vents were completed within sandstone with screened intervals from 15 ft to 25 ft bgs.

### ***SVE System***

The SVE system consists of SVE wells and vents and a SVE trailer. The SVE trailer is comprised of:

- a liquid-ring, explosion proof, regenerative blower capable of producing 77 cubic feet per minute (CFM) at 4.5 inches of mercury
- moisture separator and filter
- sampling port
- manifold with three independent legs
- 12 inlet ports comprised of 2-inch cam-lock fittings and PVC piping
- gate valves
- vacuum gauges

Each leg accommodates four inlet ports and supports up to four SVE wells. SVE wells are connected to inlet ports with 2-inch PVC piping and vacuum hoses. System configuration is documented in Photo Nos. 2 – 5. The system is powered by an electrical generator which was installed at the Site from 12/13/20 through 12/17/19.

Each inlet port is equipped with a vacuum gauge capable of measuring the vacuum exerted on each SVE well and a gate valve to regulate vacuum and flow. Each leg is equipped with a flow meter and automated valve. The three legs converge into a 3-inch PVC trunk line to form the manifold. The trunk line is fitted with a sampling port and empties into a moisture separator. The moisture separator is equipped with a high-level shut-off and drain line to manage recovered water and condensate. Air exiting the moisture separator is filtered prior to entering a regenerative blower. Exhaust from the blower exits the trailer through a 2-inch steel pipe fitted with a rain cap.

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. System startup was initiated on 12/18/19.

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**

<b>Leg</b>	<b>SVE Wells and Location</b>	<b>Scheduled Runtime</b>
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 as shown in Photo No. 6. Approximately 41 gallons of water/condensate was recovered during the first quarter of 2020.



Runtime, flow rates, and percentage of runtime for 1Q20 are documented in Table 2 below. Note: runtimes were measured from an hour meter installed on SVE system on 01/15/20. The system did not run from 01/01/20 to 01/15/20 due to water freezing in moisture separator. On 01/15/20, the moisture separator was fitted with heat tape and insulation to defrost the tank and prevent further freezing.

**Table 2. System Runtime and Flow Rates – 1Q20**

Measurement	Leg 1	Leg 2	Leg 3	Total
Runtime (hours)	134.8	125.4	117.4	377.6
Runtime (min)	8,088	7,524	7,044	22,656
Average CFM	11.75	8.5	20	N/A
Runtime Percentage	35.7%	33.2%	31.1%	100%

min – minutes

CFM – cubic feet per minute

The 1Q20 had 2,184 hours in the quarter; the SVE system ran for 377.6 hours. The runtime for the system in 1Q20 was 17.3%. The low runtime was due to persistent generator malfunctions. Of the nine operation and maintenance (O&M) events conducted during 1Q20, the generator had shut down on seven occasions. Most of the generator malfunctions were related to sensor alarms. A field log of the O&M events and work performed at the Site is provided in the attached Table A-1.

### **Collection and Analysis of Initial Gas Sample**

On 02/12/20, a composite gas sample was collected from the three legs using a single summa canister. A summa canister was prepared by the laboratory and received with a vacuum of 25 inches of mercury and was equipped with a gauge to monitor canister vacuum.

The summa canister was connected to the sampling port after the legs had ran for a minimum of 45 minutes. The valve at the sampling port was opened to purge air within the tubing between the sampling port and summa canister. After purging, the summa canister valve was opened, and the vacuum gauge was monitored until vacuum in the canister became static. The sample stabilized within 10 minutes with a final vacuum reading of 4.1 inches of mercury. Upon stabilization, canister and sample port valves were closed prior to disconnecting the summa canister.

The gas sample (i.e., 183M Initial) was shipped to Pace National in Mt. Juliet, Tennessee for chemical analysis of volatile organic compounds (VOCs) using EPA method Toxic Organics 15 (TO 15) and analysis of oxygen and carbon dioxide using ASTM method D1946. The sample was shipped under proper chain-of-custody protocol. The laboratory report and chain-of-custody documents are attached. Constituents which exceeded laboratory detection limits are presented in Table 3; all constituent results are documented in the attached Table A-2.

**Table 3. Initial Gas Analysis – 02/12/20**

Volatile Organic Carbons	183M Initial* (mg/m <sup>3</sup> )	183M Initial* %
Benzene	268	NC
Cyclohexane	1,900	NC
Ethanol	2.47	NC
Ethylbenzene	25.8	NC
Heptane	1,760	NC
N-Hexane	1,520	NC
2-Propanol	11.7	NC
Toluene	964	NC
Vinyl Acetate	67.3	NC
Total Xylenes	195.3	NC
TPH (GC/MS) Low Fraction	21,600	2.16
Oxygen	163,000	16.3
Carbon Dioxide	NC	< 0.500

mg/m<sup>3</sup> – milligrams per cubic meter

\*composite sample for Leg 1, Leg 2, & Leg 3

% – percent

NC – not calculated

A few notable observations from the laboratory data in Table 3:

- Cyclohexane is a daughter product of benzene, the fact that cyclohexane has a much higher concentration than benzene reveals the benzene degradation process has already begun by the time soil vapors reach the sampling port
- Alcohol and acetate are common laboratory contaminants. Ethanol, 2-propanol and vinyl acetate were reported at low concentrations which is indicative of a laboratory contaminants
- TPH low fraction (i.e., GRO) was measured at 21,600 milligrams per cubic meter (mg/m<sup>3</sup>) or 2.16 percent which indicates an efficient vapor extraction of petroleum hydrocarbons
- The relatively high concentration of oxygen indicates the vents are effective

During 1Q20, samples were collected from each leg and screened for volatile organic carbons (VOCs) utilizing a photoionization detector (PID) during three O&M events. Each sample was collected from the sampling port using a vacuum pump to fill a dedicated Tedlar® bag. The PID meter was then connected to the Tedlar® bag and the meter's pump extracted the air sample from the bag. The PID readings are presented in Table 4 below.

**Table 4. PID Readings**

Date	PID (ppm)		
	Leg 1	Leg 2	Leg 3
02/12/20	577.6	442.8	595.5
02/20/20	555	446.7	571.1
03/06/20	1152	624.2	866.5

PID – photoionization detector  
ppm – parts per million

## **Mass Removal**

Timberwolf used the results from the initial gas analysis, flow rates, and runtimes to calculate constituent mass removal. Mass removal of GRO and BTEX and associated recovered volume are presented in Table 5 below.

**Table 5. Mass Removal and Associated Volume**

Constituent	Mass Removal by Leg (kg) <sup>1</sup>			Total Mass Removed <sup>2</sup> (lbs)	Recovered Volume <sup>3</sup> (bbl)
	Leg 1	Leg 2	Leg 3		
GRO	58.1	39.1	86.2	403	1.50
Benzene	0.72	0.49	1.07	5.01	NC
Toluene	2.59	1.75	3.85	18.0	NC
Ethylbenzene	0.07	0.05	0.10	0.48	NC
Xylenes	0.53	0.35	0.78	3.65	NC

<sup>1</sup>Calculation = minutes ran \* CFM \* Concentration (mg/m<sup>3</sup>) \* 1 M3/35.3147 ft<sup>3</sup>\*1g/1000 mg \* 1 kg/1000 g

<sup>2</sup>Calculation = [Leg 1 + Leg 2 + Leg 3] \* 2.2 lbs/kg

<sup>3</sup>Calculation = lbs / 6.42 lb/gal / 42 gal/bbl

GRO = from TPH (GC/MS) Low Fraction

GRO – gasoline range organics

Assumptions: API Gravity = 52

kg – kilograms

lbs – pounds

bbl -barrel

NC – not calculated

## **Summary**

System runtime during 1Q20 was 17.3% of total available hours in 1Q20. The low runtime was due to generator malfunctions. The total mass removed during 1Q20 for TPH low fraction (i.e., GRO) was approximately 403 lbs (i.e., 1.50 bbls).

The initial gas sample revealed elevated concentrations in the following COCs: benzene, cyclohexane, ethanol, ethylbenzene, heptane, n-hexane, 2-propanol, toluene, vinyl acetate, total xylenes, TPH low fraction (i.e., GRO).

## **Further Actions – Second Quarter 2020**

During 2Q20, Timberwolf plans to conduct the following activities at the Site:

- Conduct regular Site O&M to ensure proper system function and drain any water/condensate accumulation in the moisture separator
- Install a more reliable power source

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  
Photographic Log  
Laboratory Report and Chain-of-Custody Documents

Cc: Clara Cardoza, Hilcorp Energy Company

## Figures

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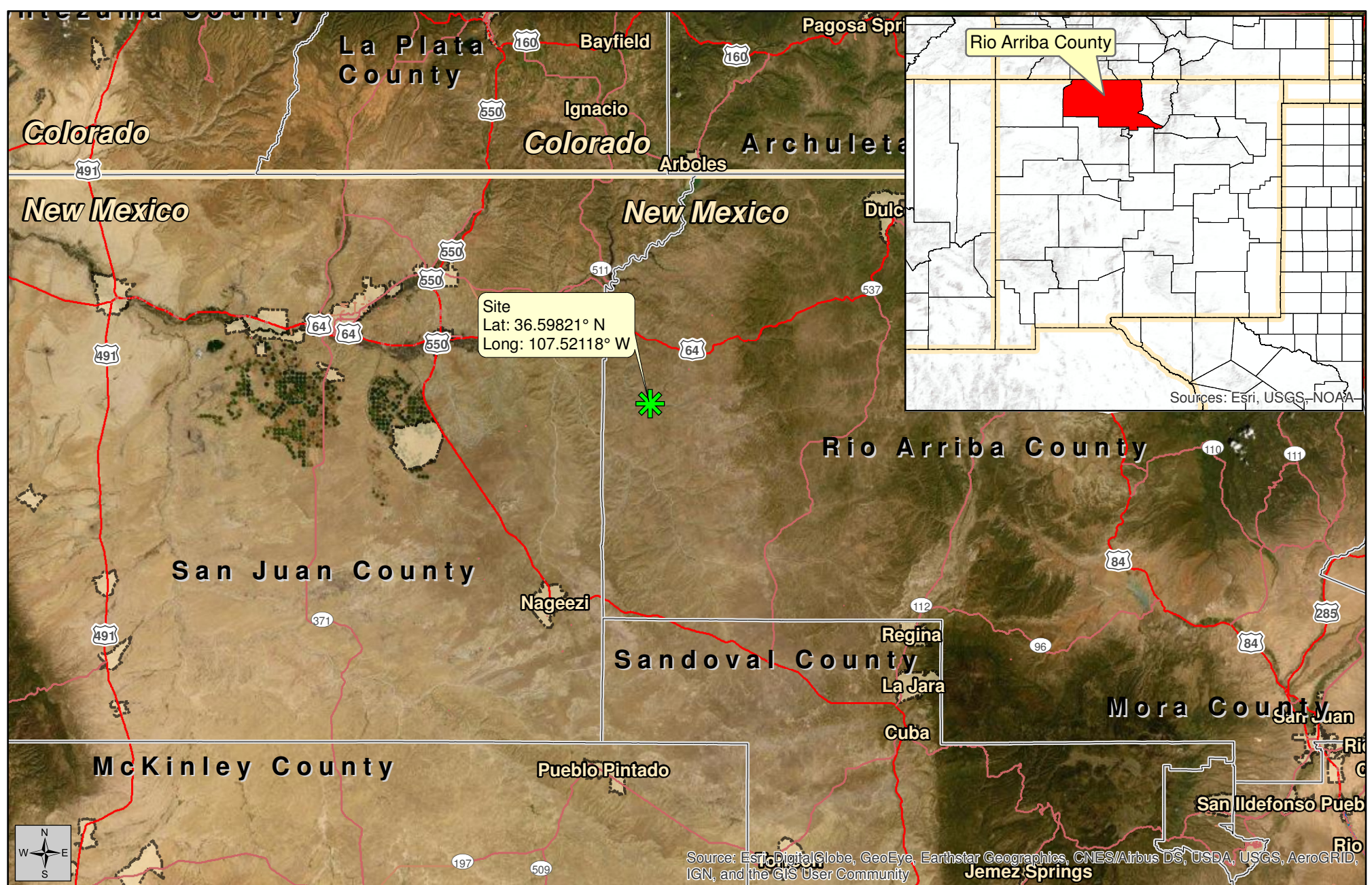


Figure 1  
Site Location Map

## Status Report - 1st Quarter 2020


April 12, 2019



Created By:  
Chris Perez  
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: ESRI and TE

 Site



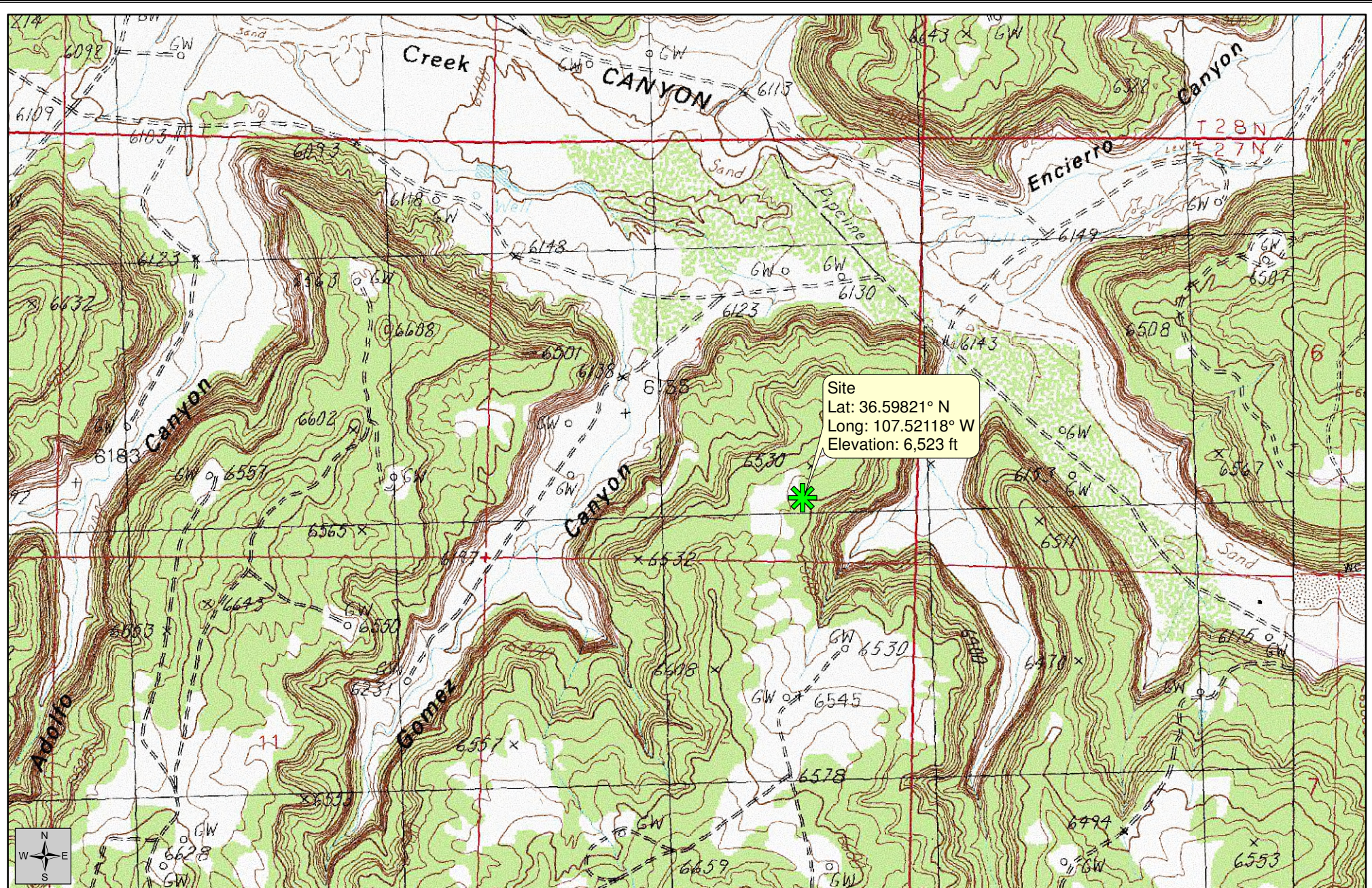


Figure 2  
Topographic Map

## Status Report - 1st Quarter 2020


April 12, 2019



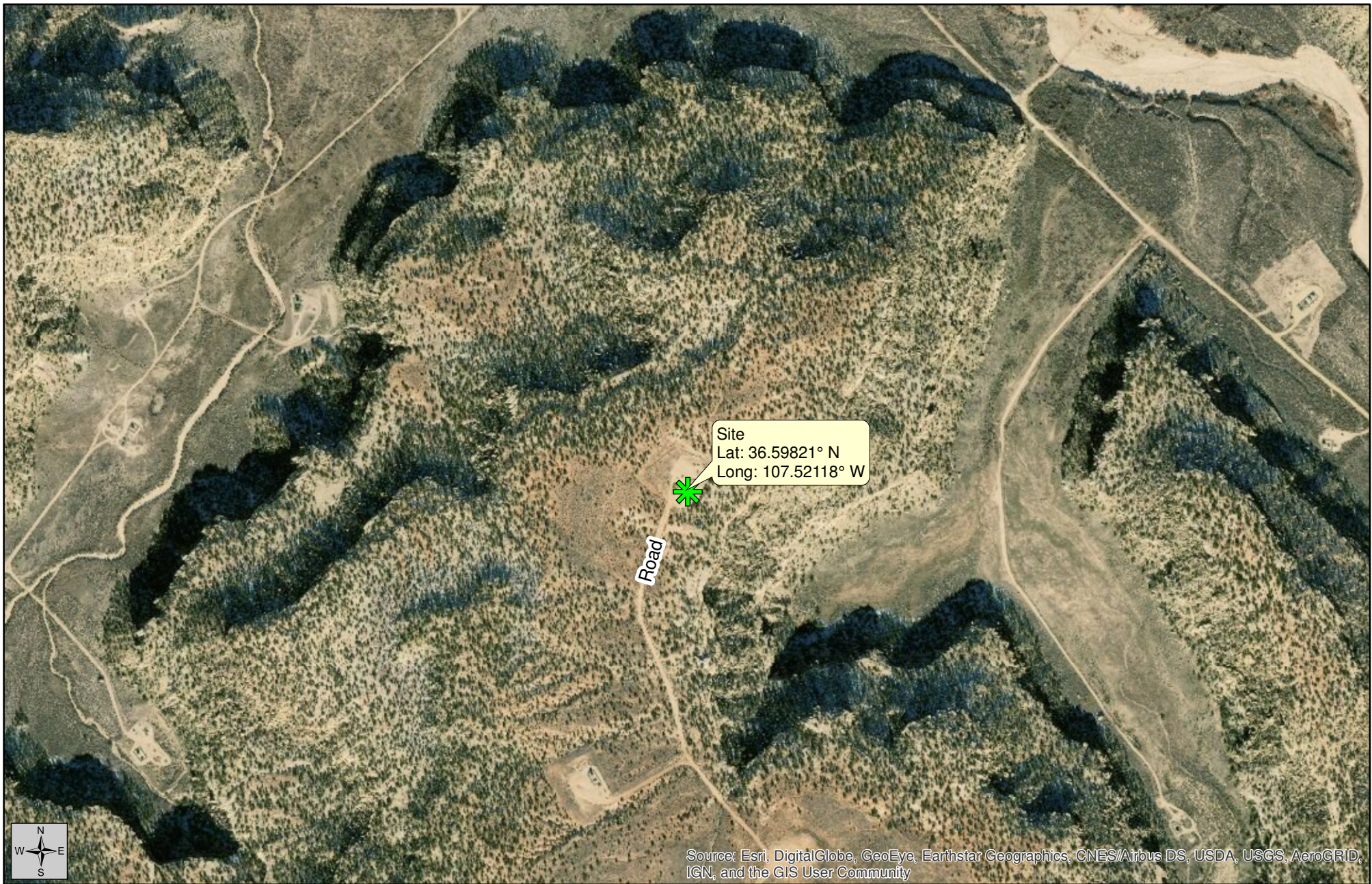
Created By:  
Chris Perez  
TE Project No.: HEC-190007

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 - 1st Quarter 2020

April 12, 2019



Created By:  
Chris Perez  
TE Project No.: HEC-190007

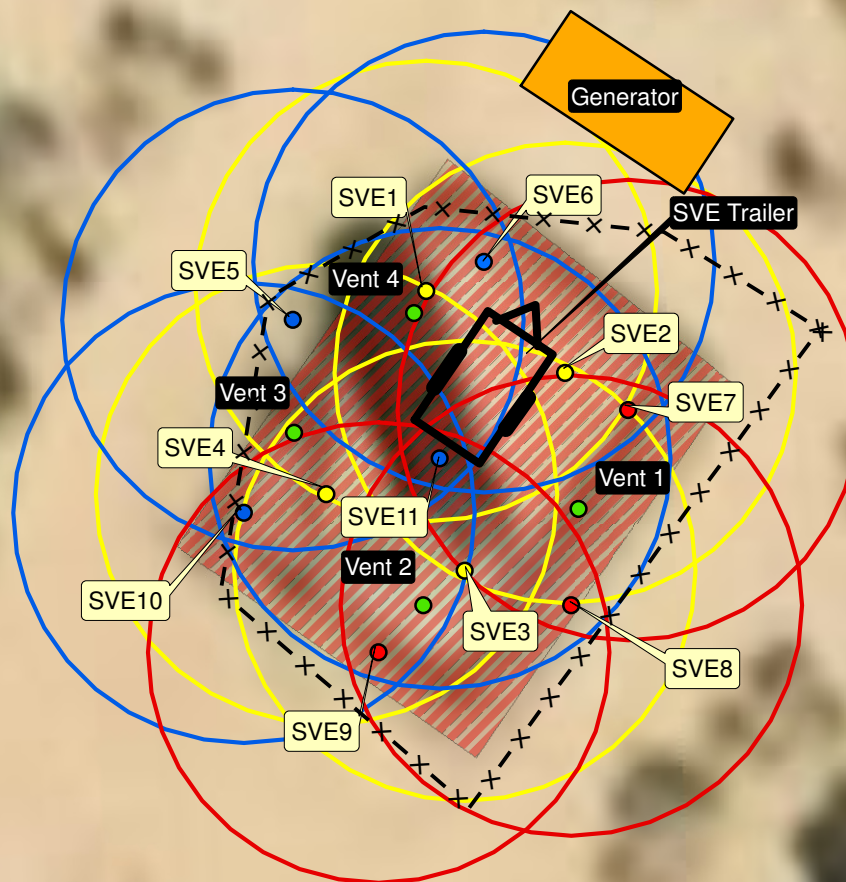
0 0.25 0.5 0.75 1 Miles  
1:10,000  
**San Juan 28-7 Unit 183M (OCD Incident No. NCS1901627746)**  
**Hilcorp Energy Company**  
**Rio Arriba County, New Mexico**

Datum: NAD83  
Imagery Source: ESRI  
Vector Source: TE

 **Site**



Treatment Area= 6,320 ft<sup>2</sup>  
Assuming a 25 ft radius of influence



**Legend**

- Leg 1 SVE Wells (7, 8, & 9)
- Leg 2 SVE Wells (1, 2, 3, & 4)
- Leg 3 SVE Wells (5, 6, 10, & 11)
- Vent
- Leg 1
- Leg 2
- Leg 3
- ▨ Impacted Area
- SVE Trailer
- Generator
- x- Fence

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

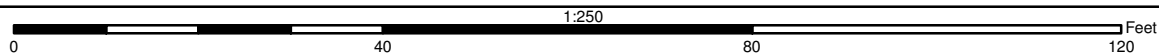
**Figure 4**  
**SVE System Overview**

**Status Report - 1st Quarter 2020**

**January 31, 2020**



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 Table**

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

Date	Hour Meter (hrs)	Water/Condensate recovered (gal)	Maintenance
01/10/20	--	System Frozen	System was shut down upon arrival at Site. System shut down due to separator tank being full and fluid in tank being frozen. Attempted to drain system but unable to defrost separator and drain. *Planned to return to site on Tuesday (01/14/20) after getting equipment necessary to defrost and insulate separator tank.
01/14/20	--	System Frozen	Installed heat tape and insulation on bottom 2/3 of water separator (Allowed tank to defrost overnight) (Had to get more insulation to cover the rest of the tank) *Planned to return next day (01/15/20) to drain defrosted tank, install hour meter, and install remaining insulation
01/15/20	Hour Meter Installed	15	Installed remaining insulation; Replaced fuse for leg 2 automation valve; Installed hour meter; Repaired cracked PVC pipe on leg 1. Restarted generator and SVE system.
01/20/20	122.2	21	No maintenance required. System running properly
01/31/20	168	0	Generator was not running upon arrival at site. Hilcorp was notified of the generator not running. Hilcorp sent a mechanic to work on the generator. Generator was indicating the following fault alarms: Change Air Filter; Change oil and oil filter; ECU override and lockout
02/12/20	194.0	2.5	Generator not running upon arrival at site (Alarms: under voltage and under phase). Attempted system restart, generator started and had a rough idle. Generator shut down after 1 hour (Alarm: Low oil pressure). Hilcorp mechanic came out and replaced spark plugs, changed oil and cleaned O2 sensor) Generator and SVE system back up and running. Took composite air sample from all three legs
02/20/20	215.5	0.25	Generator not running upon arrival at site (Alarms: low oil pressure). Hilcorp mechanic replaced O2 sensor and adjusted fuel flow. Was able to get generator back up and running.
03/06/20	301.1*	1.5	Generator was not running upon arrival at site Alarms: Generator under frequency; Battery under voltage. Generator and SVE system back up and running prior to leaving site. Hour meter reading upon leaving site <b>303.9</b> hours
03/11/20	372.6	0.5	Generator fuel line was re-plumbed to glycol dehydrator on 03/9/20 by Hilcorp mechanics/field personnel. Generator was not running upon arrival on 03/11/20; Attempted to restart generator and it shut down twice. Alarms: change oil and filter. Was able to get generator and SVE system back up and running prior to leaving the site.
03/26/20	374.8*	0	Generator was not running upon arrival at site. Alarms: Oil pressure low; Change oil and filter; change air filter Hilcorp mechanic came to site and replaced spark plugs; adjusted fuel flow and checked oil. Generator and SVE system back up and running prior to leaving site Hour meter reading upon leaving site <b>376.2</b> hours
04/01/20	377.6	0	Generator was not running upon arrival Alarms: Oil pressure low; Change oil and filter; change air filter Attempted several 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 override Contacted Jeff Bell with Hilcorp and updated him on the situation

-- = No Maintenance Required      gal - gallons      hrs - hours

**Table A-2. Initial Gas Analysis - 02/12/20**  
**Status Report - 1st Quarter 2020**  
**San Juan 28-7 Unit 183M**  
**Rio Arriba County, New Mexico**

Volatiles	183M Initial (mg/m3)
Acetone	< 5.94
Allyl Chloride	< 1.25
Benzene	268
Benzyl Chloride	< 2.08
Bromodichloromethane	< 2.68
Bromoform	< 12.4
Bromomethane	< 1.55
1,3-Butadiene	< 8.85
Carbon Disulfide	< 1.24
Carbon Tetrachloride	< 2.52
Chlorobenzene	< 1.85
Chloroethane	< 1.06
Chloroform	< 1.95
Chloromethane	< 0.826
2-Chlorotoluene	< 2.06
Cyclohexane	1,900
Chlorodibromomethane	< 3.40
1,2-Dibromoethane	< 3.08
1,2-Dichlorobenzene	< 2.40
1,3-Dichlorobenzene	< 2.40
1,4-Dichlorobenzene	< 2.40
1,2-Dichloroethane	< 1.62
1,1-Dichloroethane	< 1.60
1,1-Dichloroethene	< 1.59
Cis-1,2-Dichloroethene	< 1.59
Trans-1,2-Dichloroethene	< 1.59
1,2-Dichloropropane	< 1.85
Cis-1,3-Dichloropropene	< 1.82
Trans-1,3-Dichloropropene	< 1.82
1,4-Dioxane	< 1.44
Ethanol	2.47
Ethylbenzene	25.8
4-Ethyltoluene	< 1.96
Trichlorofluoromethane	< 2.25
Dichlorodifluoromethane	< 1.98
1,1,2-Trichlorotrifluoroethane	< 3.07
1,2-Dichlorotetrafluoroethane	< 2.80
Heptane	1760
Hexachloro-1,3-Butadiene	< 13.5
N-Hexane	1,520

**Table A-2. Initial Gas Analysis - 02/12/20**  
**Status Report - 1st Quarter 2020**  
**San Juan 28-7 Unit 183M**  
**Rio Arriba County, New Mexico**

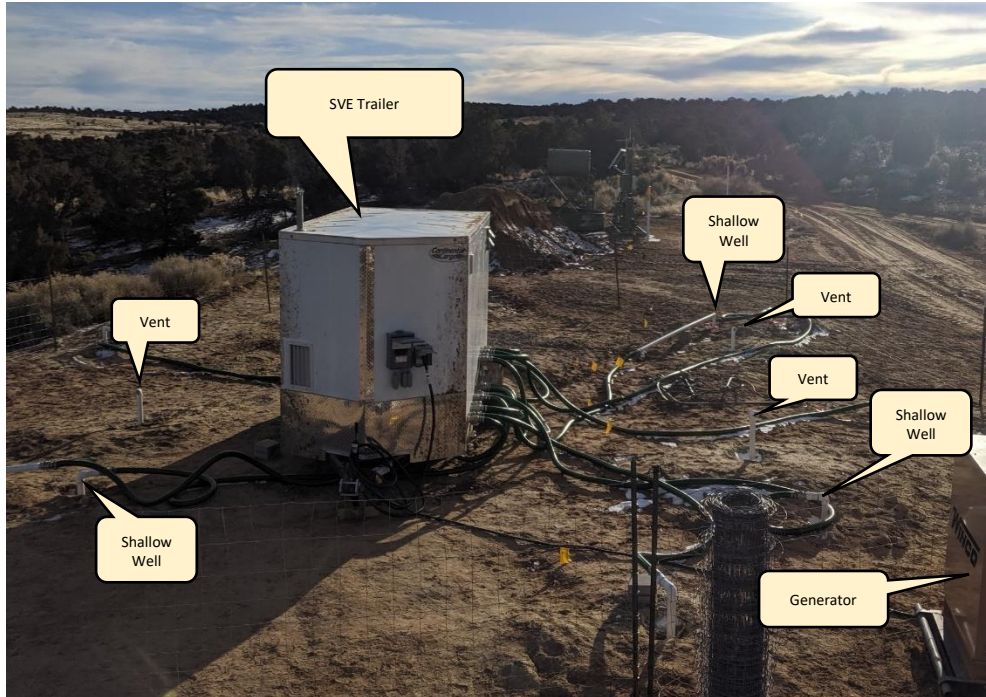

Volatiles	183M Initial (mg/m3)
Isopropylbenzene	< 1.97
Methylene Chloride	< 1.39
Methyl Butyl Ketone	< 10.2
2-Butanone (Mek)	< 7.37
4-Methyl-2-Pentanone (Mibk)	< 10.2
Methyl Methacrylate	< 1.64
Methyl Tert-Butyl Ether	< 1.44
Naphthalene	< 6.60
2-Propanol	11.7
Propene	< 1.38
Styrene	< 1.70
1,1,2,2-Tetrachloroethane	< 2.75
Tetrachloroethene	< 2.72
Tetrahydrofuran	< 1.18
Toluene	964
1,2,4-Trichlorobenzene	< 9.33
1,1,1-Trichloroethane	< 2.18
1,1,2-Trichloroethane	< 2.18
Trichloroethene	< 2.14
1,2,4-Trimethylbenzene	< 1.96
1,3,5-Trimethylbenzene	< 1.96
2,2,4-Trimethylpentane	< 1.87
Vinyl Chloride	< 1.02
Vinyl Bromide	< 1.75
Vinyl Acetate	67.3
Total Xylene	195.3
TPH (GC/MS) low fraction	21,600
Oxygen	16,300
Carbon Dioxide	< 5,000

## **Photographic Log**

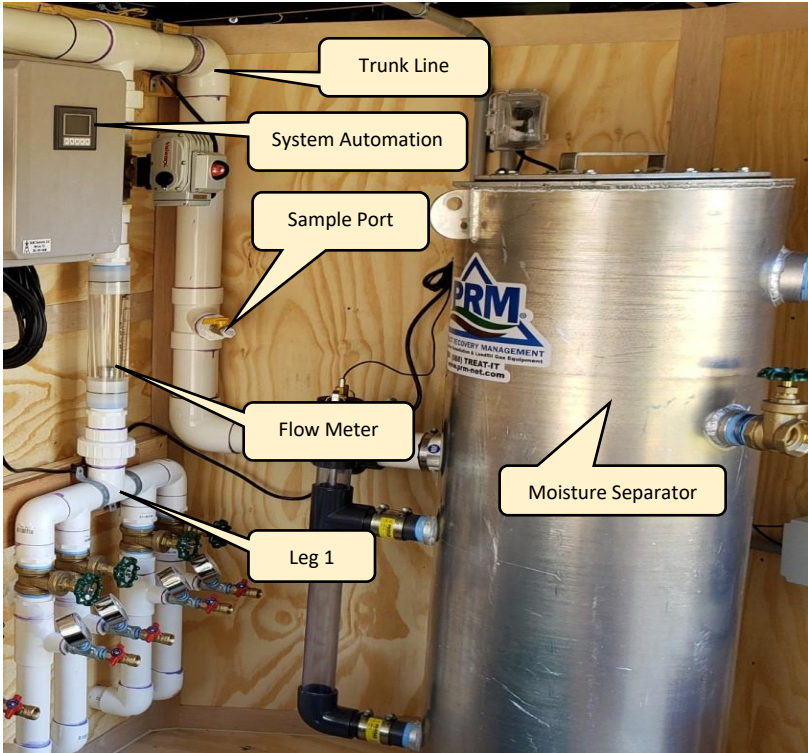
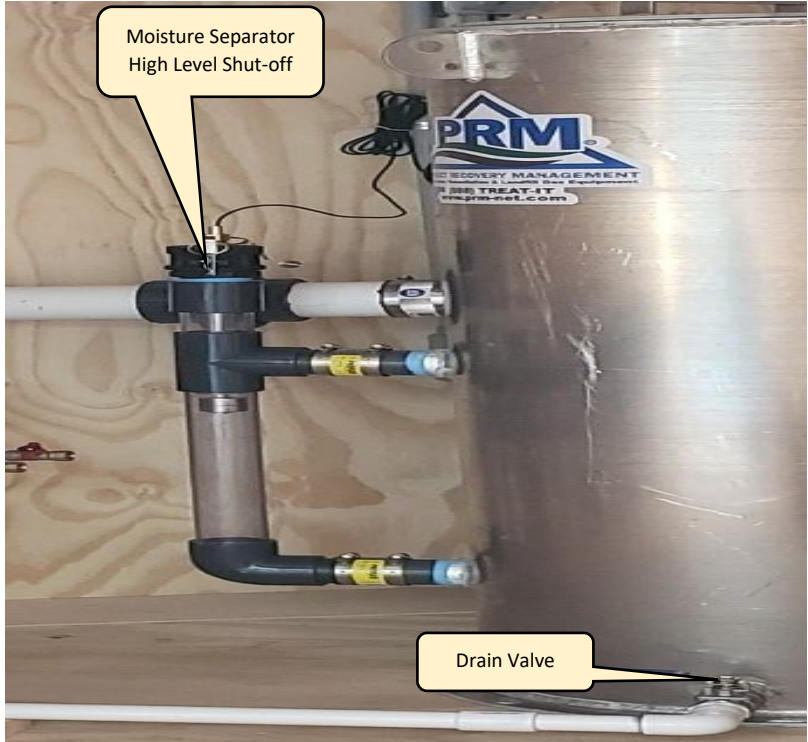
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## PHOTOGRAPHIC LOG



<b>Project No.:</b>	HEC-190007	<b>Client:</b>	Hilcorp Energy Company
<b>Project Name:</b>	San Juan 28-7 No. 183M	<b>Site Location:</b>	Rio Arriba County, New Mexico
<b>Task Description:</b>	1 <sup>st</sup> Quarter 2020 Report	<b>Date:</b>	January-March, 2020
<b>Photo No.:</b> 1	 <p>This photograph shows an outdoor site with a white SVE Trailer in the center. Several yellow callout boxes identify key features: 'SVE Trailer' points to the main unit; 'Vent' points to a vent pipe on the left; 'Shallow Well' points to a wellhead in the lower left; another 'Shallow Well' points to a wellhead on the right; two more 'Vent' labels point to vent pipes on the right; and 'Generator' points to a generator unit on the far right. The background shows a dry, hilly landscape under a cloudy sky.</p>		
<b>Direction:</b> South			
<b>Comments:</b> SVE Trailer and Wells.  Note: Locations of vents and shallow wells.			
<b>Photo No.:</b> 2	 <p>This photograph shows the interior of a facility with a wooden wall. It features a complex network of white PVC pipes and valves. Three vertical pipes with flow meters are prominent. Electrical control boxes are mounted on the wall. A green hose is visible in the foreground.</p>		
<b>Direction:</b> N/A			
<b>Comments:</b> View of manifold and 3 independent legs			

## PHOTOGRAPHIC LOG

<b>Project No.:</b>	HEC-190007	<b>Client:</b>	Hilcorp Energy Company
<b>Project Name:</b>	San Juan 28-7 No. 183M	<b>Site Location:</b>	Rio Arriba County, New Mexico
<b>Task Description:</b>	1 <sup>st</sup> Quarter 2020 Report	<b>Date:</b>	January-March, 2020
<b>Photo No.:</b> 3			
<b>Direction:</b> N/A			
<b>Comments:</b> View inside SVE trailer: system automation, flow meter, leg 1, 3-inch trunk line, sample port, and moisture separator.			
<b>Photo No.:</b> 4			
<b>Direction:</b> N/A			
<b>Comments:</b> Moisture Separator high level shut-off and drain.			



## PHOTOGRAPHIC LOG

<b>Project No.:</b>	HEC-190007	<b>Client:</b>	Hilcorp Energy Company
<b>Project Name:</b>	San Juan 28-7 No. 183M	<b>Site Location:</b>	Rio Arriba County, New Mexico
<b>Task Description:</b>	1 <sup>st</sup> Quarter 2020 Report	<b>Date:</b>	January-March, 2020
<b>Photo No.:</b> 5	 <p>Moisture Separator</p> <p>Filter</p> <p>Regenerative Pump</p>		
<b>Direction:</b> N/A			
<b>Comments:</b> Moisture Separator, filter, and regenerative pump.			
<b>Photo No.:</b> 6			
<b>Direction:</b> N/A			
<b>Comments:</b> Open top water/condensate storage tank fitted with bird netting.			

## **Laboratory Report and Chain-of-Custody Documents**

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February 20, 2020

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

## Timberwolf Environmental, LLC

Sample Delivery Group: L1189522  
Samples Received: 02/14/2020  
Project Number: 190007  
Description: HEC-190007

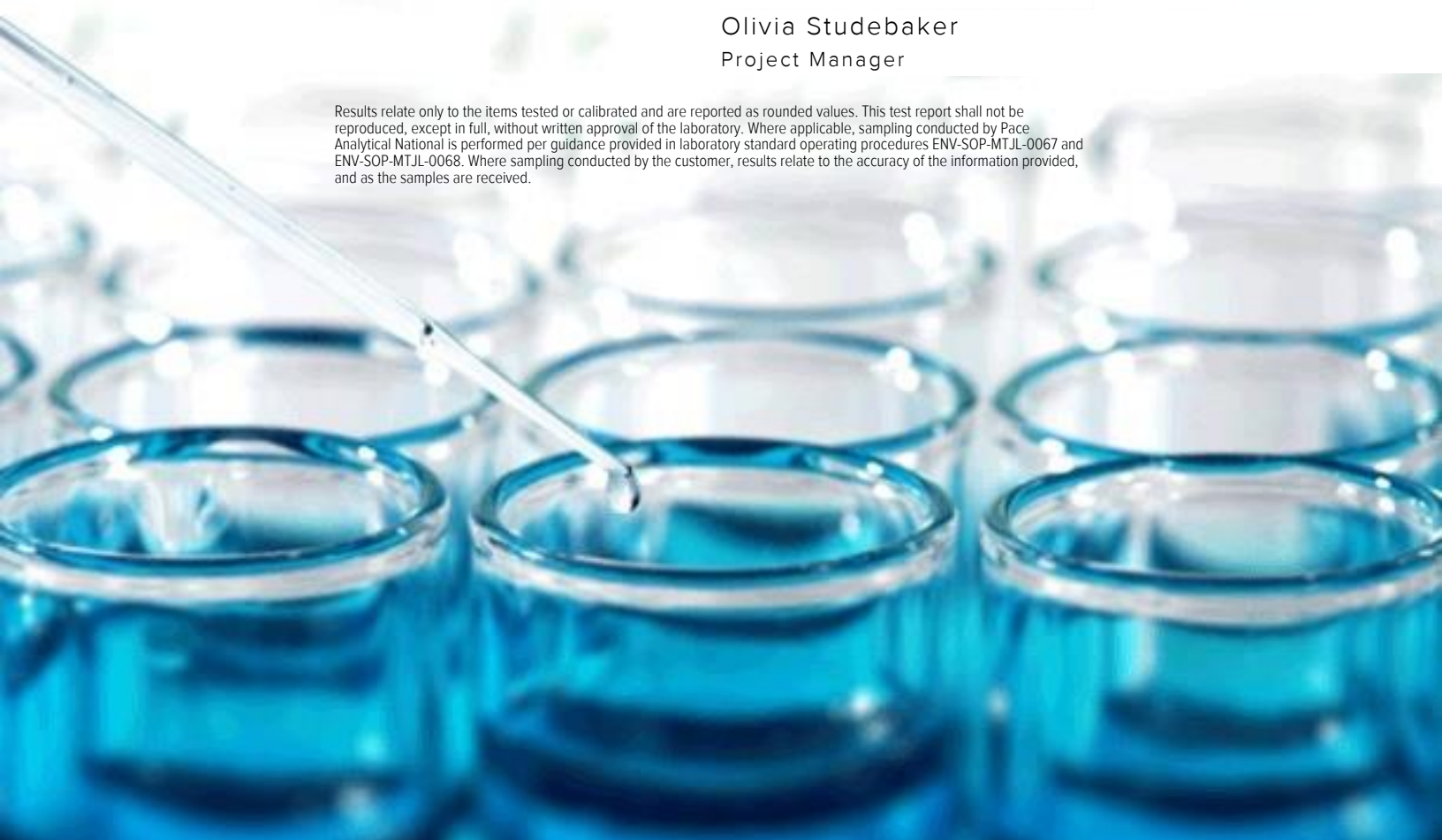
Report To: Jim Foster  
1920 W Villa Maria, Ste 205  
Bryan, TX 77807

Entire Report Reviewed By:



Olivia Studebaker  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.





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<sup>1</sup> Cp
<sup>2</sup> Tc
<sup>3</sup> Ss
<sup>4</sup> Cn
<sup>5</sup> Sr
<sup>6</sup> Qc
<sup>7</sup> Gl
<sup>8</sup> Al
<sup>9</sup> Sc

# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



183M INITIAL (1,2, & 3 LEGS) L1189522-01 Air

Collected by  
Michael Morse

Collected date/time  
02/12/20 13:45

Received date/time  
02/14/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1428428	2000	02/16/20 02:48	02/16/20 02:48	CAW	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG1428942	50000	02/17/20 04:23	02/17/20 04:23	CAW	Mt. Juliet, TN
Organic Compounds (GC) by Method D1946	WG1430237	1	02/19/20 12:39	02/19/20 12:39	JAL	Mt. Juliet, TN

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

ACCOUNT:

Timberwolf Environmental, LLC

PROJECT:

190007

SDG:

L1189522

DATE/TIME:

02/20/20 17:32

PAGE:

3 of 15



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Olivia Studebaker  
Project Manager

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

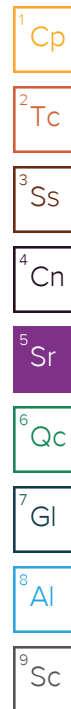


Collected date/time: 02/12/20 13:45

L1189522

## Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Acetone	67-64-1	58.10	2500	5940	ND	ND		2000	<a href="#">WG1428428</a>
Allyl chloride	107-05-1	76.53	400	1250	ND	ND		2000	<a href="#">WG1428428</a>
Benzene	71-43-2	78.10	400	1280	84000	268000		2000	<a href="#">WG1428428</a>
Benzyl Chloride	100-44-7	127	400	2080	ND	ND		2000	<a href="#">WG1428428</a>
Bromodichloromethane	75-27-4	164	400	2680	ND	ND		2000	<a href="#">WG1428428</a>
Bromoform	75-25-2	253	1200	12400	ND	ND		2000	<a href="#">WG1428428</a>
Bromomethane	74-83-9	94.90	400	1550	ND	ND		2000	<a href="#">WG1428428</a>
1,3-Butadiene	106-99-0	54.10	4000	8850	ND	ND		2000	<a href="#">WG1428428</a>
Carbon disulfide	75-15-0	76.10	400	1240	ND	ND		2000	<a href="#">WG1428428</a>
Carbon tetrachloride	56-23-5	154	400	2520	ND	ND		2000	<a href="#">WG1428428</a>
Chlorobenzene	108-90-7	113	400	1850	ND	ND		2000	<a href="#">WG1428428</a>
Chloroethane	75-00-3	64.50	400	1060	ND	ND		2000	<a href="#">WG1428428</a>
Chloroform	67-66-3	119	400	1950	ND	ND		2000	<a href="#">WG1428428</a>
Chloromethane	74-87-3	50.50	400	826	ND	ND		2000	<a href="#">WG1428428</a>
2-Chlorotoluene	95-49-8	126	400	2060	ND	ND		2000	<a href="#">WG1428428</a>
Cyclohexane	110-82-7	84.20	10000	34400	553000	1900000		50000	<a href="#">WG1428942</a>
Dibromochloromethane	124-48-1	208	400	3400	ND	ND		2000	<a href="#">WG1428428</a>
1,2-Dibromoethane	106-93-4	188	400	3080	ND	ND		2000	<a href="#">WG1428428</a>
1,2-Dichlorobenzene	95-50-1	147	400	2400	ND	ND		2000	<a href="#">WG1428428</a>
1,3-Dichlorobenzene	541-73-1	147	400	2400	ND	ND		2000	<a href="#">WG1428428</a>
1,4-Dichlorobenzene	106-46-7	147	400	2400	ND	ND		2000	<a href="#">WG1428428</a>
1,2-Dichloroethane	107-06-2	99	400	1620	ND	ND		2000	<a href="#">WG1428428</a>
1,1-Dichloroethane	75-34-3	98	400	1600	ND	ND		2000	<a href="#">WG1428428</a>
1,1-Dichloroethene	75-35-4	96.90	400	1590	ND	ND		2000	<a href="#">WG1428428</a>
cis-1,2-Dichloroethene	156-59-2	96.90	400	1590	ND	ND		2000	<a href="#">WG1428428</a>
trans-1,2-Dichloroethene	156-60-5	96.90	400	1590	ND	ND		2000	<a href="#">WG1428428</a>
1,2-Dichloropropane	78-87-5	113	400	1850	ND	ND		2000	<a href="#">WG1428428</a>
cis-1,3-Dichloropropene	10061-01-5	111	400	1820	ND	ND		2000	<a href="#">WG1428428</a>
trans-1,3-Dichloropropene	10061-02-6	111	400	1820	ND	ND		2000	<a href="#">WG1428428</a>
1,4-Dioxane	123-91-1	88.10	400	1440	ND	ND		2000	<a href="#">WG1428428</a>
Ethanol	64-17-5	46.10	1260	2380	1310	2470		2000	<a href="#">WG1428428</a>
Ethylbenzene	100-41-4	106	400	1730	5940	25800		2000	<a href="#">WG1428428</a>
4-Ethyltoluene	622-96-8	120	400	1960	ND	ND		2000	<a href="#">WG1428428</a>
Trichlorofluoromethane	75-69-4	137.40	400	2250	ND	ND		2000	<a href="#">WG1428428</a>
Dichlorodifluoromethane	75-71-8	120.92	400	1980	ND	ND		2000	<a href="#">WG1428428</a>
1,1,2-Trichlorotrifluoroethane	76-13-1	187.40	400	3070	ND	ND		2000	<a href="#">WG1428428</a>
1,2-Dichlorotetrafluoroethane	76-14-2	171	400	2800	ND	ND		2000	<a href="#">WG1428428</a>
Heptane	142-82-5	100	10000	40900	431000	1760000		50000	<a href="#">WG1428942</a>
Hexachloro-1,3-butadiene	87-68-3	261	1260	13500	ND	ND		2000	<a href="#">WG1428428</a>
n-Hexane	110-54-3	86.20	10000	35300	431000	1520000		50000	<a href="#">WG1428942</a>
Isopropylbenzene	98-82-8	120.20	400	1970	ND	ND		2000	<a href="#">WG1428428</a>
Methylene Chloride	75-09-2	84.90	400	1390	ND	ND		2000	<a href="#">WG1428428</a>
Methyl Butyl Ketone	591-78-6	100	2500	10200	ND	ND		2000	<a href="#">WG1428428</a>
2-Butanone (MEK)	78-93-3	72.10	2500	7370	ND	ND		2000	<a href="#">WG1428428</a>
4-Methyl-2-pentanone (MIBK)	108-10-1	100.10	2500	10200	ND	ND		2000	<a href="#">WG1428428</a>
Methyl methacrylate	80-62-6	100.12	400	1640	ND	ND		2000	<a href="#">WG1428428</a>
MTBE	1634-04-4	88.10	400	1440	ND	ND		2000	<a href="#">WG1428428</a>
Naphthalene	91-20-3	128	1260	6600	ND	ND		2000	<a href="#">WG1428428</a>
2-Propanol	67-63-0	60.10	2500	6150	4750	11700		2000	<a href="#">WG1428428</a>
Propene	115-07-1	42.10	800	1380	ND	ND		2000	<a href="#">WG1428428</a>
Styrene	100-42-5	104	400	1700	ND	ND		2000	<a href="#">WG1428428</a>
1,1,2,2-Tetrachloroethane	79-34-5	168	400	2750	ND	ND		2000	<a href="#">WG1428428</a>
Tetrachloroethylene	127-18-4	166	400	2720	ND	ND		2000	<a href="#">WG1428428</a>
Tetrahydrofuran	109-99-9	72.10	400	1180	ND	ND		2000	<a href="#">WG1428428</a>
Toluene	108-88-3	92.10	10000	37700	256000	964000		50000	<a href="#">WG1428942</a>
1,2,4-Trichlorobenzene	120-82-1	181	1260	9330	ND	ND		2000	<a href="#">WG1428428</a>







Collected date/time: 02/12/20 13:45

L1189522

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
1,1,1-Trichloroethane	71-55-6	133	400	2180	ND	ND		2000	<a href="#">WG1428428</a>
1,1,2-Trichloroethane	79-00-5	133	400	2180	ND	ND		2000	<a href="#">WG1428428</a>
Trichloroethylene	79-01-6	131	400	2140	ND	ND		2000	<a href="#">WG1428428</a>
1,2,4-Trimethylbenzene	95-63-6	120	400	1960	ND	ND		2000	<a href="#">WG1428428</a>
1,3,5-Trimethylbenzene	108-67-8	120	400	1960	ND	ND		2000	<a href="#">WG1428428</a>
2,2,4-Trimethylpentane	540-84-1	114.22	400	1870	ND	ND		2000	<a href="#">WG1428428</a>
Vinyl chloride	75-01-4	62.50	400	1020	ND	ND		2000	<a href="#">WG1428428</a>
Vinyl Bromide	593-60-2	106.95	400	1750	ND	ND		2000	<a href="#">WG1428428</a>
Vinyl acetate	108-05-4	86.10	400	1410	19100	67300		2000	<a href="#">WG1428428</a>
m&p-Xylene	1330-20-7	106	800	3470	39800	173000		2000	<a href="#">WG1428428</a>
o-Xylene	95-47-6	106	400	1730	5150	22300		2000	<a href="#">WG1428428</a>
TPH (GC/MS) Low Fraction	8006-61-9	101	400000	1650000	5230000	21600000		2000	<a href="#">WG1428428</a>
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		102				<a href="#">WG1428428</a>
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		101				<a href="#">WG1428942</a>

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Organic Compounds (GC) by Method D1946

Analyte	CAS #	Mol. Wt.	RDL %	Result %	Qualifier	Dilution	Batch
Oxygen	7782-44-7	32	2.00	16.3	B	1	<a href="#">WG1430237</a>
Carbon Dioxide	124-38-9	44.01	0.500	ND		1	<a href="#">WG1430237</a>



Method Blank (MB)

(MB) R3500283-3 02/15/20 08:02

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Acetone	U		0.0569	1.25
Allyl Chloride	U		0.0546	0.200
Benzene	U		0.0460	0.200
Benzyl Chloride	U		0.0598	0.200
Bromodichloromethane	U		0.0436	0.200
Bromoform	U		0.0786	0.600
Bromomethane	U		0.0609	0.200
1,3-Butadiene	U		0.0563	2.00
Carbon disulfide	U		0.0544	0.200
Carbon tetrachloride	U		0.0585	0.200
Chlorobenzene	U		0.0601	0.200
Chloroethane	U		0.0489	0.200
Chloroform	U		0.0574	0.200
Chloromethane	U		0.0544	0.200
2-Chlorotoluene	U		0.0605	0.200
Dibromochloromethane	U		0.0494	0.200
1,2-Dibromoethane	U		0.0185	0.200
1,2-Dichlorobenzene	U		0.0603	0.200
1,3-Dichlorobenzene	U		0.0597	0.200
1,4-Dichlorobenzene	U		0.0557	0.200
1,2-Dichloroethane	U		0.0616	0.200
1,1-Dichloroethane	U		0.0514	0.200
1,1-Dichloroethene	U		0.0490	0.200
cis-1,2-Dichloroethene	U		0.0389	0.200
trans-1,2-Dichloroethene	U		0.0464	0.200
1,2-Dichloropropane	U		0.0599	0.200
cis-1,3-Dichloropropene	U		0.0588	0.200
trans-1,3-Dichloropropene	U		0.0435	0.200
1,4-Dioxane	U		0.0554	0.200
Ethylbenzene	U		0.0506	0.200
4-Ethyltoluene	U		0.0666	0.200
Trichlorofluoromethane	U		0.0673	0.200
Dichlorodifluoromethane	U		0.0601	0.200
1,1,2-Trichlorotrifluoroethane	U		0.0687	0.200
1,2-Dichlorotetrafluoroethane	U		0.0458	0.200
Hexachloro-1,3-butadiene	U		0.0656	0.630
Isopropylbenzene	U		0.0563	0.200
Methylene Chloride	U		0.0465	0.200
Methyl Butyl Ketone	U		0.0682	1.25
2-Butanone (MEK)	U		0.0493	1.25

1

Cp

2

Tc

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Ss

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Cn

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Sr

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Qc

7

Gl

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Al

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Sc

Method Blank (MB)

(MB) R3500283-3 02/15/20 08:02

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
4-Methyl-2-pentanone (MIBK)	U		0.0650	1.25
Methyl Methacrylate	U		0.0773	0.200
MTBE	U		0.0505	0.200
Naphthalene	U		0.154	0.630
2-Propanol	U		0.0882	1.25
Propene	U		0.0932	0.400
Styrene	U		0.0465	0.200
1,1,2,2-Tetrachloroethane	U		0.0576	0.200
Tetrachloroethylene	U		0.0497	0.200
Tetrahydrofuran	U		0.0508	0.200
1,2,4-Trichlorobenzene	U		0.148	0.630
1,1,1-Trichloroethane	U		0.0665	0.200
1,1,2-Trichloroethane	U		0.0287	0.200
Trichloroethylene	U		0.0545	0.200
1,2,4-Trimethylbenzene	U		0.0483	0.200
1,3,5-Trimethylbenzene	U		0.0631	0.200
2,2,4-Trimethylpentane	U		0.0456	0.200
Vinyl chloride	U		0.0457	0.200
Vinyl Bromide	U		0.0727	0.200
Vinyl acetate	U		0.0639	0.200
m&p-Xylene	U		0.0946	0.400
o-Xylene	U		0.0633	0.200
Ethanol	U		0.0832	0.630
TPH (GC/MS) Low Fraction	U		6.91	200
(S) 1,4-Bromofluorobenzene	93.3			60.0-140

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3500283-1 02/15/20 06:33 • (LCSD) R3500283-2 02/15/20 07:19

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethanol	3.75	3.93	4.00	105	107	55.0-148			1.77	25
Propene	3.75	3.81	3.85	102	103	64.0-144			1.04	25
Dichlorodifluoromethane	3.75	3.73	3.65	99.5	97.3	64.0-139			2.17	25
1,2-Dichlorotetrafluoroethane	3.75	3.94	3.97	105	106	70.0-130			0.759	25
Chloromethane	3.75	3.87	3.91	103	104	70.0-130			1.03	25
Vinyl chloride	3.75	3.98	3.92	106	105	70.0-130			1.52	25
1,3-Butadiene	3.75	3.76	3.40	100	90.7	70.0-130			10.1	25
Bromomethane	3.75	3.85	3.75	103	100	70.0-130			2.63	25

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3500283-1 02/15/20 06:33 • (LCSD) R3500283-2 02/15/20 07:19

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Chloroethane	3.75	3.90	3.94	104	105	70.0-130			1.02	25
Trichlorofluoromethane	3.75	3.82	3.81	102	102	70.0-130			0.262	25
1,1,2-Trichlorotrifluoroethane	3.75	3.86	3.83	103	102	70.0-130			0.780	25
1,1-Dichloroethene	3.75	3.88	3.87	103	103	70.0-130			0.258	25
1,1-Dichloroethane	3.75	3.89	3.92	104	105	70.0-130			0.768	25
Acetone	3.75	4.54	4.53	121	121	70.0-130			0.221	25
2-Propanol	3.75	3.99	3.99	106	106	70.0-139			0.000	25
Carbon disulfide	3.75	3.87	3.90	103	104	70.0-130			0.772	25
Methylene Chloride	3.75	3.86	3.86	103	103	70.0-130			0.000	25
MTBE	3.75	3.85	3.88	103	103	70.0-130			0.776	25
trans-1,2-Dichloroethene	3.75	3.87	3.90	103	104	70.0-130			0.772	25
Vinyl acetate	3.75	4.29	4.41	114	118	70.0-130			2.76	25
Methyl Ethyl Ketone	3.75	4.03	4.14	107	110	70.0-130			2.69	25
cis-1,2-Dichloroethene	3.75	3.92	3.89	105	104	70.0-130			0.768	25
Chloroform	3.75	3.82	3.85	102	103	70.0-130			0.782	25
1,1,1-Trichloroethane	3.75	3.84	3.87	102	103	70.0-130			0.778	25
Carbon tetrachloride	3.75	3.79	3.81	101	102	70.0-130			0.526	25
Benzene	3.75	3.96	3.99	106	106	70.0-130			0.755	25
1,2-Dichloroethane	3.75	3.80	3.89	101	104	70.0-130			2.34	25
Trichloroethylene	3.75	3.80	3.85	101	103	70.0-130			1.31	25
1,2-Dichloropropane	3.75	3.89	3.92	104	105	70.0-130			0.768	25
1,4-Dioxane	3.75	3.88	3.89	103	104	70.0-140			0.257	25
Bromodichloromethane	3.75	3.84	3.90	102	104	70.0-130			1.55	25
cis-1,3-Dichloropropene	3.75	3.93	3.97	105	106	70.0-130			1.01	25
4-Methyl-2-pentanone (MIBK)	3.75	4.06	4.10	108	109	70.0-139			0.980	25
trans-1,3-Dichloropropene	3.75	3.99	3.99	106	106	70.0-130			0.000	25
1,1,2-Trichloroethane	3.75	3.86	3.88	103	103	70.0-130			0.517	25
Tetrachloroethylene	3.75	3.93	3.93	105	105	70.0-130			0.000	25
Methyl Butyl Ketone	3.75	4.16	4.19	111	112	70.0-149			0.719	25
Dibromochloromethane	3.75	3.87	3.89	103	104	70.0-130			0.515	25
1,2-Dibromoethane	3.75	3.93	4.01	105	107	70.0-130			2.02	25
Chlorobenzene	3.75	3.99	4.00	106	107	70.0-130			0.250	25
Ethylbenzene	3.75	3.95	3.98	105	106	70.0-130			0.757	25
m&p-Xylene	7.50	7.80	7.82	104	104	70.0-130			0.256	25
o-Xylene	3.75	3.88	3.89	103	104	70.0-130			0.257	25
Styrene	3.75	3.99	4.02	106	107	70.0-130			0.749	25
Bromoform	3.75	3.78	3.78	101	101	70.0-130			0.000	25
1,1,2,2-Tetrachloroethane	3.75	3.95	3.97	105	106	70.0-130			0.505	25
4-Ethyltoluene	3.75	4.04	4.07	108	109	70.0-130			0.740	25
1,3,5-Trimethylbenzene	3.75	3.94	3.95	105	105	70.0-130			0.253	25

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3500283-1 02/15/20 06:33 • (LCSD) R3500283-2 02/15/20 07:19

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
1,2,4-Trimethylbenzene	3.75	3.97	3.98	106	106	70.0-130			0.252	25
1,3-Dichlorobenzene	3.75	4.09	4.05	109	108	70.0-130			0.983	25
1,4-Dichlorobenzene	3.75	4.20	4.19	112	112	70.0-130			0.238	25
Benzyl Chloride	3.75	4.09	4.11	109	110	70.0-152			0.488	25
1,2-Dichlorobenzene	3.75	4.00	4.01	107	107	70.0-130			0.250	25
1,2,4-Trichlorobenzene	3.75	3.85	3.81	103	102	70.0-160			1.04	25
Hexachloro-1,3-butadiene	3.75	3.67	3.71	97.9	98.9	70.0-151			1.08	25
Naphthalene	3.75	3.60	3.63	96.0	96.8	70.0-159			0.830	25
TPH (GC/MS) Low Fraction	203	215	213	106	105	70.0-130			0.935	25
Allyl Chloride	3.75	3.94	3.96	105	106	70.0-130			0.506	25
2-Chlorotoluene	3.75	4.02	4.02	107	107	70.0-130			0.000	25
Methyl Methacrylate	3.75	3.96	3.99	106	106	70.0-130			0.755	25
Tetrahydrofuran	3.75	3.96	3.98	106	106	70.0-137			0.504	25
2,2,4-Trimethylpentane	3.75	3.95	3.93	105	105	70.0-130			0.508	25
Vinyl Bromide	3.75	3.82	3.83	102	102	70.0-130			0.261	25
Isopropylbenzene	3.75	3.94	3.95	105	105	70.0-130			0.253	25
(S) 1,4-Bromofluorobenzene				97.6	97.6	60.0-140				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3500387-3 02/16/20 23:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Cyclohexane	U		0.0534	0.200
Heptane	U		0.0626	0.200
n-Hexane	U		0.0457	0.200
Toluene	U		0.0499	0.200
(S) 1,4-Bromofluorobenzene	100			60.0-140

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3500387-1 02/16/20 22:21 • (LCSD) R3500387-2 02/16/20 23:00

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
n-Hexane	3.75	3.80	3.96	101	106	70.0-130			4.12	25
Cyclohexane	3.75	3.87	4.00	103	107	70.0-130			3.30	25
Heptane	3.75	3.76	3.84	100	102	70.0-130			2.11	25
Toluene	3.75	3.76	3.85	100	103	70.0-130			2.37	25
(S) 1,4-Bromofluorobenzene				100	101	60.0-140				

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3501107-3 02/19/20 09:04

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	%		%	%
Oxygen	5.84		0.225	2.00
Carbon Dioxide	U		0.121	0.500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3501107-1 02/19/20 08:36 • (LCSD) R3501107-2 02/19/20 08:46

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	%	%	%	%	%	%			%	%
Oxygen	2.50	2.53	2.51	101	100	70.0-130			0.794	20
Carbon Dioxide	2.50	2.36	2.35	94.4	94.0	70.0-130			0.425	20

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

### Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Sample Detection Limit.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

### Qualifier Description

B	The same analyte is found in the associated blank.
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1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

\* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico <sup>1</sup>	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1 6</sup>	90010	South Carolina	84004
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1 4</sup>	2006
Louisiana <sup>1</sup>	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

## Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>6</sup> Wastewater n/a Accreditation not applicable

## Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.





