



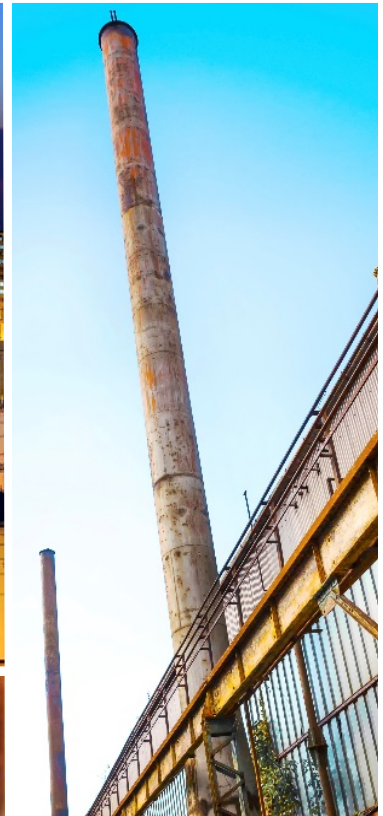
# Soil Assessment Report

Avalon Compressor Station Release

2RP-4657

Eddy County, New Mexico

ETC Texas Pipeline, LTD.





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## 1. Introduction

GHD is pleased to present this Soil Assessment Report to ETC Texas Pipeline, LTD. (ETC) for the Avalon Compressor Station location (hereafter referred to as the "Site"). The Site location coordinates are Latitude 32.025645 and longitude -104.117738 on land owned by the State of New Mexico. The Site is located in Unit L, Section 20, Township 26 South, Range 28 East, approximately 14-miles south of Malaga, in southern Eddy County, New Mexico. The location of the Site is presented on Figure 1 and Site details are shown on Figure 2.

## 2. NMOCD Closure Requirement Criteria for Soils

Subsurface investigation activities were completed in accordance with the revised and reissued Guidelines for Remediation of Leaks, Spills, and Releases Rule 19.15.29 New Mexico Administrative Code (NMAC) from the New Mexico Oil Conservation Division (NMOCD) issued on August 14, 2018. The following criteria from Table 1 (below) within NMAC 19.15.29.12 was utilized to determine site-specific screening limits:

Minimum depth below any point within the horizontal boundary of the release to ground water less than 10,000 mg/l TDS	Constituent	Limit*
≤ 50 feet	Chloride**	600 mg/kg
	TPH (GRO+DRO+MRO)	100 mg/kg
	BTEX	50 mg/kg
	Benzene	10 mg/kg
* Numerical limits or natural background level, whichever is greater.		
** This applies to release of produced water or other fluids which may contain chloride.		

Localized depth to groundwater was estimated at a depth of approximately 15 to 20 feet below ground surface (bgs) based on depth to water records available on the United States Geological Survey (USGS) National Water System Information map. The nearest well to the site is approximately 1.38 miles to the west. Well records showing groundwater measurement data are included in Appendix A. Information available from various sources including the Petroleum Recovery Research Center (PRRC) Mapping Portal and the United States Geological Survey (USGS) Current Water Database for the Nation concludes:

1. the depth to groundwater at the Site is less than 50-feet below ground surface (bgs);
2. the site is not within 300 feet of any continuously flowing watercourse;
3. the site is not within 200 feet of any lakebed, sinkhole or playa lake;
4. the site is not within 300 feet of an occupied permanent residence, school, etc.;
5. the site is not within 500 feet of a spring or private, domestic fresh water well;
6. the site is not within 1,000 feet of any fresh water well or spring;



7. the site is not within incorporated municipal boundaries or within a defined municipal fresh water well field;
8. the site is not within 300 feet of a wetland;
9. the site is not within an area overlying a subsurface mine;
10. the site is not within an unstable area; and
11. the site is not within a 100-year floodplain.

*Consequently, the anticipated site-specific screening limits to be applied to this location by the NMOCD based on the revised Rule are 10 mg/kg for benzene, 50 mg/kg for total benzene, toluene, ethylbenzene, and total xylenes (BTEX), 100 mg/kg for total petroleum hydrocarbons (TPH) including gasoline range organics (GRO), diesel range organics (DRO), and oil range organics (MRO), and 600 mg/kg for chloride.*

Per 19.15.29.13, Restoration, Reclamation, and Re-vegetation, the impacted area must be remediated a minimum of 4-feet bgs with non-waste containing, uncontaminated, earthen material with chloride concentrations less than 600 mg/kg. Soil cover must consist of topsoil at a thickness comparable to background topsoil thicknesses, or one foot of suitable earthen material capable of establishing and maintaining vegetation at the site. Reclamation is considered complete when all disturbed areas have established vegetative cover with a life-form ratio of plus or minus 50 percent of pre-remedial levels, and plant cover of a minimum of 70 percent of previous levels, excluding noxious weeds.

### 3. Project Information and Background

According to the NMOCD Release Notification and Corrective Action Form C-141 submitted to the agency by ETC, the release occurred between March 6 and March 8, 2018 and was reported to Ms. Crystal Weaver, Artesia District II NMOCD office on March 12, 2018 (see attached C-141 included in Appendix B). Remediation Permit (RP) 2RP-4657 was assigned to this release incident by the NMOCD Artesia office.

*Per the C-141: A cracked fitting on the discharge line was discovered. In order to make repairs, the line had to be isolated by blowing down the entirety of the discharge line. Once the line was blown down, a tee was welded on the fitting and the segment was fixed. The release volume was reported as 7,840 million cubic feet (Mcf) of natural gas with 0 Mcf volume recovered.*

### 4. 2018 Drilling and Sampling

Prior to assessment of soil, a Right of Entry permit was obtained from the New Mexico State Land Office (NMSLO). Permit RE-3741 was issued to ETC on August 12, 2018. On August 30, 2018 GHD mobilized to the site to collect soil samples with a hand auger and mark sample locations. Three hand auger samples were taken at depths of 6 inches bgs (HA-1, HA-2, and HA-3) for field screening. Due to the hard nature of the soil, the use of a trackhoe was warranted and further sampling rescheduled for a later date. Samples from HA-1, HA-2, and HA-3 were field screened for chloride and TPH. Chloride screening was accomplished in the field by mixing soil samples with



distilled water, then testing the rinsate using Hach chloride test strips. TPH field screening was conducted with a photoionization detector (PID) calibrated to isobutylene. Field screening results for samples collected from HA-1 through HA-3 are included on Table 1 and seen on Figure 2.

On September 5, 2018, GHD and ETC subcontractor LJ Services (LJS), mobilized to the Site to continue soil sampling activities at five test pit areas (TP-1 through TP-5). LJS provided a trackhoe to assist in soil sampling. A total depth of 4 feet bgs was reached in TP-1 through TP-5. Further advancement to the east of TP-5 will require a more aggressive means of digging and will need approval or deferral from the NMSLO. Chloride and TPH Field screening was conducted at TP-1 through TP-5. Chloride screening was accomplished in the field by mixing soil samples with distilled water, then testing the rinsate using Hach chloride test strips. TPH field screening was conducted with a photoionization detector (PID) calibrated to isobutylene.

Soil samples were collected for laboratory analysis from TP-1 through TP-5 at 2 feet and 4 feet bgs. Soil samples were packed into laboratory prepared jars and stored in a cooler with ice. The soil samples were sent to Hall Environmental Analysis Laboratory. (HEAL) in Albuquerque, New Mexico for chloride analysis by EPA Method 300, TPH analysis by EPA Method 8015M/D, and BTEX analysis by EPA Method 8021B.

#### 4.1 Soil Sampling Analytical Results

A soil analytical summary of results is provided in Table 1. A Soil Sample Location map is presented as Figure 2.

- Chloride concentrations above the revised Rule 19.15.29 screening limit of 600 mg/kg were not reported in any of the samples collected in September 2018 (TP-1 through TP-5).
- BTEX constituents were detected above the revised Rule 19.15.29 screening limit of 50 mg/kg in TP-1 at 2 feet bgs.
- Total TPH were detected above the revised Rule 19.15.29 screening limit of 100 mg/kg in TP-1 and TP-5 at 2 feet bgs.

The 2018 soil laboratory analytical report is included in Appendix C.

## 5. Summary of Findings

Evaluation of the analytical data obtained from soil assessment and delineation activities performed from August and September 2018 indicate horizontal and vertical delineation of chloride, TPH, and BTEX impacts have been achieved at the Site to support remediation activities.

#### 5.1 2018 Remediation Activities

Additional lateral delineation north and east of TP-1 and TP-5 may be warranted. If determined necessary during remediation activities, lateral soil delineation will be completed in conjunction with soil remediation efforts via collection of bottom and sideway confirmation samples. Soil remediation activities (excavation) per NMAC 19.15.29.13 will be conducted at the Site following NMOCD approval of the 2018 Remediation Work Plan attached as Appendix D of this report.



All of Which is Respectfully Submitted,

GHD Services, Inc.

A handwritten signature in blue ink, appearing to read "Christine Mathews". The signature is fluid and cursive, with the first name being more prominent.

Christine Mathews, Project Manager

A handwritten signature in black ink, appearing to read "Scott Foord". The signature is more stylized and less legible than the one above, with a long horizontal stroke at the end.

Scott Foord, P.G., Senior Project Manager



## about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

**Scott Foord**

Scott.Foord@ghd.com  
832.485.5208

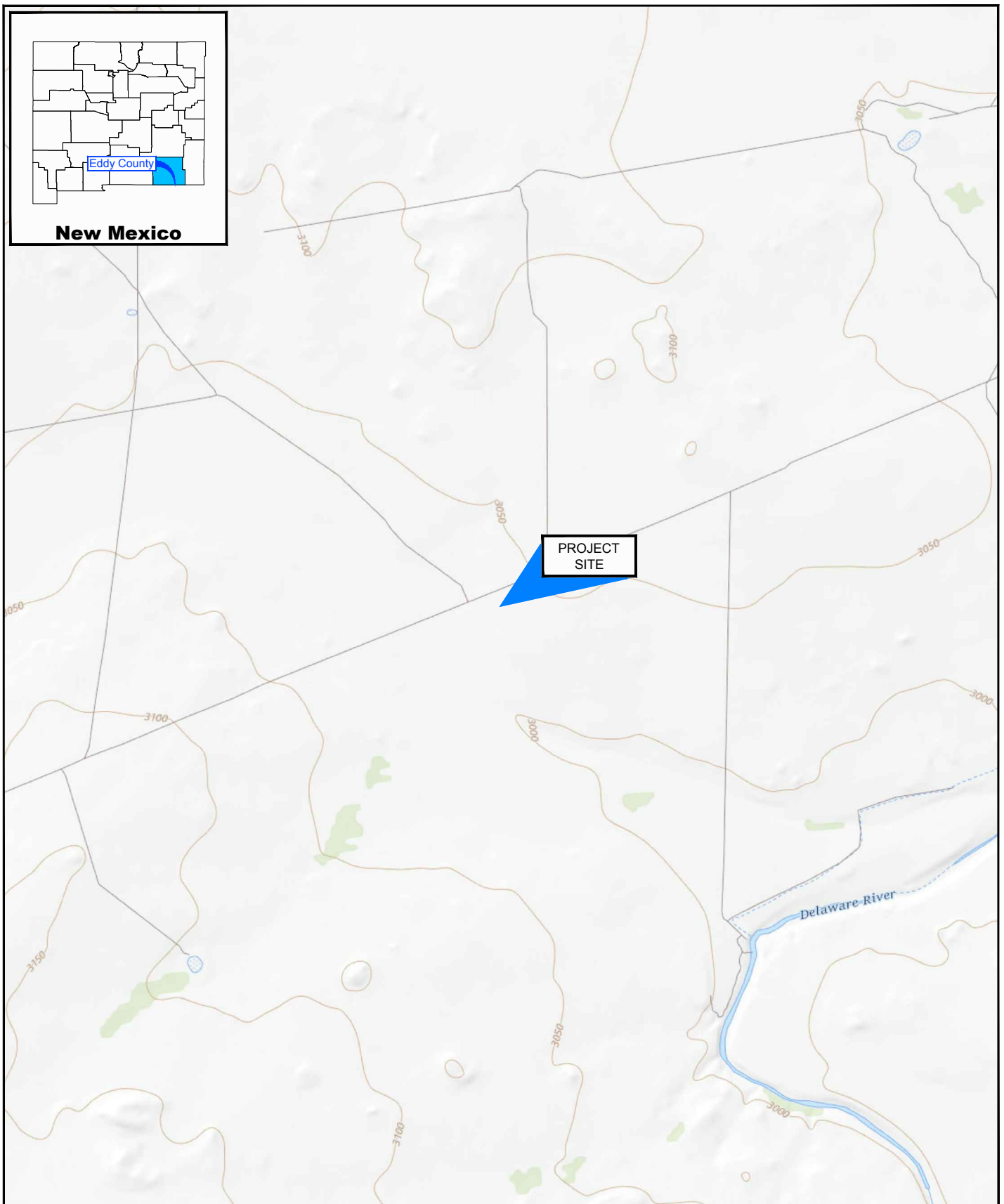
**Christine Mathews**

Christine.Mathews@ghd.com  
505.884.0672

[www.ghd.com](http://www.ghd.com)

## Figures





Source: USGS 7.5 Minute Quad "Red Bluff and Cottonwood Hills, New Mexico"

Lat/Long: 32.025645° North, 104.117738° West

0 1000 2000ft

Coordinate System:  
NAD 1983 (2011) StatePlane-  
New Mexico East (US Feet)



ETC TEXAS PIPELINE, LTD.  
EDDY COUNTY, NEW MEXICO  
AVALON COMPRESSOR 2RP-4657

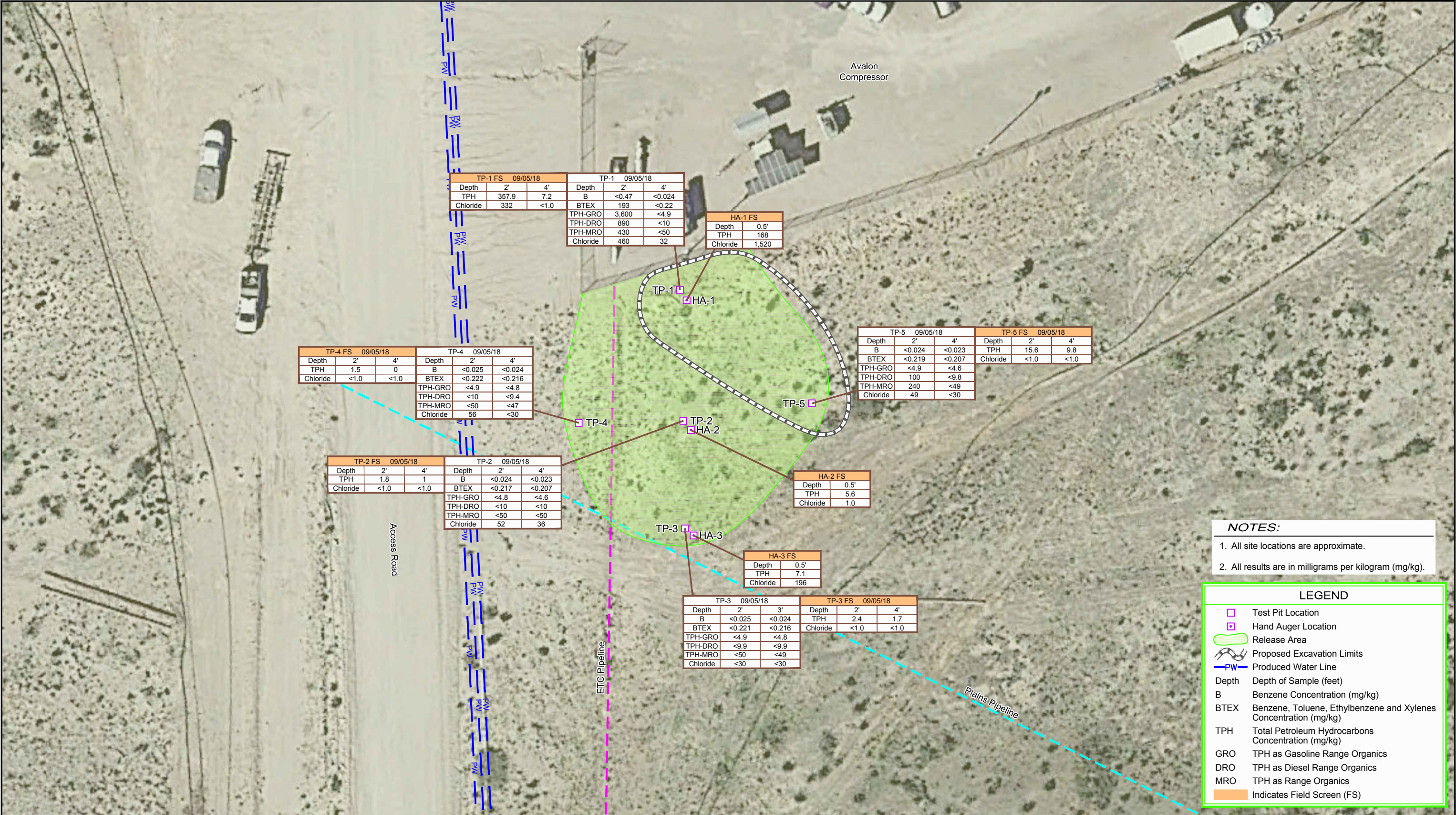
SITE LOCATION MAP

11135250-15

Nov 8, 2018

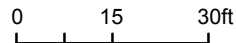
FIGURE 1





Source: Image © 2018 Google - Imagery Date: October 1, 2014

Lat/Long: 32.025645° North, 104.117738° West



Coordinate System:  
NAD 1983 (2011) StatePlane-  
New Mexico East (US Feet)



ETC TEXAS PIPELINE, LTD.  
EDDY COUNTY, NEW MEXICO  
AVALON COMPRESSOR 2RP-4657

SOIL SAMPLE LOCATION

11135250-15  
Nov 8, 2018

FIGURE 2



## Tables

### Table 1

Table 1

## Avalon Compressor Station- Summary of Soil Field Screening and Analytical Data

Sample ID	Depth (feet)	Date	Benzene	Toluene	Ethylbenzene	Xylenes	BTEX	TPH (GRO)	TPH (DRO)	TPH (MRO)	Total TPH	Total TPH Field Screen	Chloride	Chloride Field Screen (mg/L)
HA-1	0.5	8/30/2018	--	--	--	--	--	--	--	--	--	1520	--	168
HA-2	0.5	8/30/2018	--	--	--	--	--	--	--	--	--	5.6	--	<1.0
HA-3	0.5	8/30/2018	--	--	--	--	--	--	--	--	--	7.1	--	198
TP-1	2	9/5/2018	<0.47	32	21	140	53	3600	890	430	4,920	357.9	460	332
	4	9/5/2018	<0.024	<0.049	<0.049	<0.098	<0.22	<4.9	<10	<50	<64.9	7.2	32	<1.0
TP-2	2	9/5/2018	<0.024	<0.048	<0.048	<0.097	<0.217	<4.8	<10	<50	<64.8	1.8	52	<1.0
	4	9/5/2018	<0.023	<0.046	<0.046	<0.092	<0.207	<4.6	<10	<50	<64.6	1	36	<1.0
TP-3	2	9/5/2018	<0.025	<0.049	<0.049	<0.098	<0.221	<4.9	<9.9	<50	<64.8	2.4	<30	<1.0
	3	9/5/2018	<0.024	<0.048	<0.048	<0.096	0.216	<4.8	<9.9	<49	<64.7	1.7	<30	<1.0
TP-4	2	9/5/2018	<0.025	<0.049	<0.049	<0.099	<0.222	<4.9	<10	<50	<64.9	1.5	56	<1.0
	4	9/5/2018	<0.024	<0.048	<0.048	<0.096	<0.216	<4.8	<9.4	<47	<61.2	0	<30	<1.0
TP-5	2	9/5/2018	<0.024	<0.049	<0.049	<0.097	<0.219	<4.9	100	240	340	15.6	49	<1.0
	4	9/5/2018	<0.023	<0.046	<0.046	<0.092	<0.207	<4.6	<9.8	<49	<63.4	9.8	<30	<1.0
NMOCD Closure Criteria for Soils Impacted by Release Depth to Water Less Than 50 Feet			10	BTEX = 50				Total TPH: 100				NE	600	NE

## Notes:

All sample results are in milligrams per kilogram  
 NMOCD = New Mexico Oil Conservation Division  
 ND=Non Detect  
 NA = Not Analyzed  
 BTEX =Benzene, Toluene, Ethylbenzene, Xylenes  
 TPH = Total Petroleum Hydrocarbons  
 GRO = Gasoline Range Organics  
 DRO = Diesel Range Organics  
 MRO = Motor Oil Range Organics  
 NE = Not Established

# Appendices

## Appendix A

# USGS National Water Information System Well Data



Avalon Compressor Station  
1.38 mile NE

**USGS Home**  
**Contact USGS**  
**Search USGS**

## National Water Information System: Web Interface

[USGS Water Resources](#)

Data Category:

Groundwater

Geographic Area:

United States

GO

Click to hide News Bulletins

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- [Full News](#) 

Groundwater levels for the Nation

## Search Results -- 1 sites found

site\_no list =

- 320230104060601

**Minimum number of levels = 1**

Save file of selected sites to local disk for future upload

## USGS 320230104060601 26S.28E.18.33111

Available data for this site

Groundwater: Field measurements

GO

Eddy County, New Mexico

Hydrologic Unit Code --

Latitude 32°02'30", Longitude 104°06'06" NAD27

Land-surface elevation 3,070 feet above NAVD88

This well is completed in the Castile Gypsum (312CSTL) local aquifer.

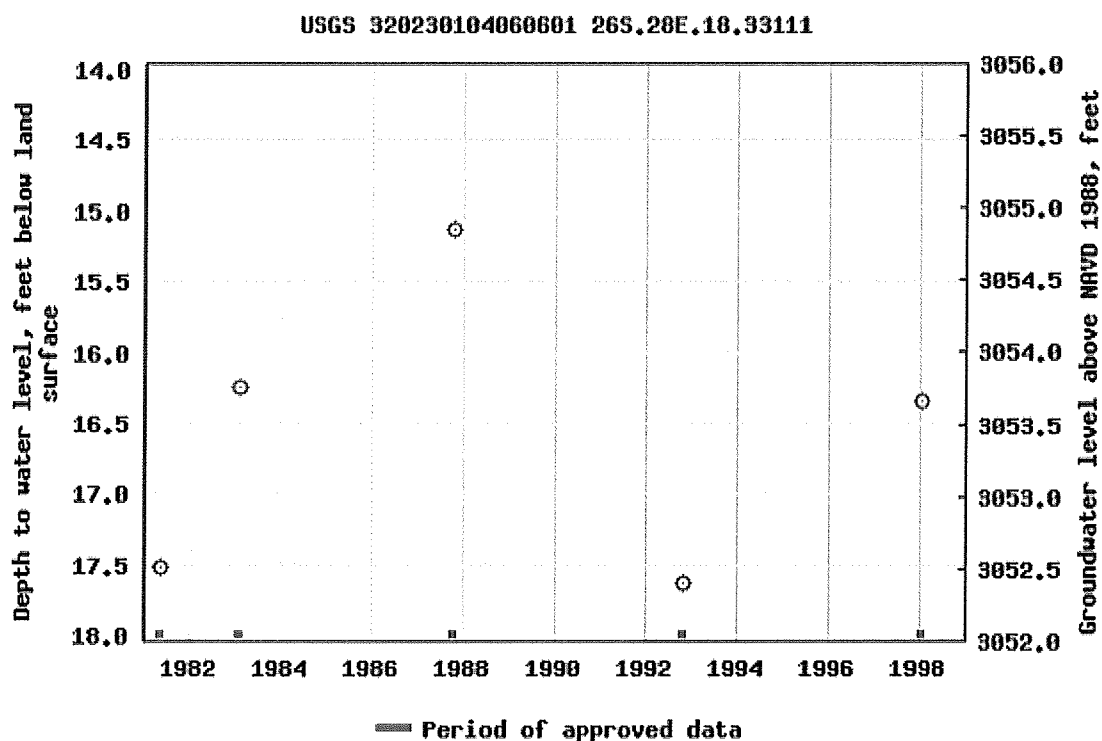
### Output formats

[Table of data](#)

[Tab-separated data](#)

[Graph of data](#)

[Reselect period](#)



Breaks in the plot represent a gap of at least one year between field measurements.

[Download a presentation-quality graph](#)

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[U.S. Department of the Interior | U.S. Geological Survey](#)

**Title: Groundwater for USA: Water Levels**

**URL: <https://nwis.waterdata.usgs.gov/nwis/gwlevels?>**



Page Contact Information: [USGS Water Data Support Team](#)

Page Last Modified: 2018-07-25 09:28:54 EDT

3.46 1.09 nadww01





~2.70 miles west

[USGS Home](#)  
[Contact USGS](#)  
[Search USGS](#)

## National Water Information System: Web Interface

[USGS Water Resources](#)

Data Category:

Groundwater

Geographic Area:

United States

GO

Click to hide News Bulletins

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Groundwater levels for the Nation

## Search Results -- 1 sites found

site\_no list =

- 320134104094801

Minimum number of levels = 1

[Save file of selected sites](#) to local disk for future upload

## USGS 320134104094801 26S.27E.23.321431

Available data for this site

Groundwater: Field measurements

GO

Eddy County, New Mexico

Hydrologic Unit Code 13060011

Latitude 32°01'34", Longitude 104°09'48" NAD27

Land-surface elevation 3,065 feet above NGVD29

This well is completed in the Bell Canyon Formation (313BLCN) local aquifer.

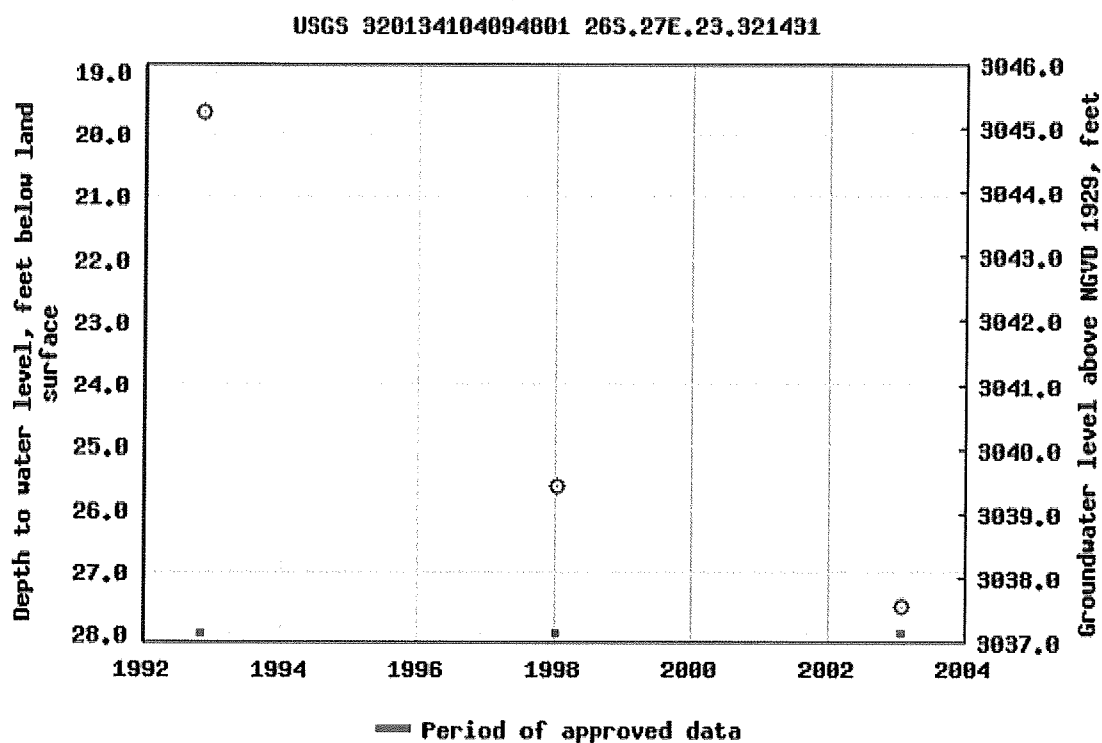
### Output formats

[Table of data](#)

[Tab-separated data](#)

[Graph of data](#)

[Reselect period](#)



Breaks in the plot represent a gap of at least one year between field measurements.

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**Title: Groundwater for USA: Water Levels**

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Page Contact Information: [USGS Water Data Support Team](#)

Page Last Modified: 2018-07-25 09:28:07 EDT

9.32 1 nadww01

# Appendix B

## NMOCD Release Notification and Corrective Action

### Form C-141

District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
811 S. First St., Artesia, NM 88210  
District III  
1000 Rio Brazos Road, Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico  
Energy Minerals and Natural Resources

NM OIL CONSERVATION  
ARTESIA DISTRICT

MAR 12 2018

Form C-141  
Revised April 3, 2017

Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Submit 1 Copy to appropriate District Office in  
accordance with 19.15.29 NMAC.

PAB1807457621

Release Notification and Corrective Action

NAB1807457743

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Energy Transfer #26256	Contact: Carolyn J. Blackaller
Address: 600 N. Marienfeld Street, Suite 700, Midland, TX 79701	Telephone No.: (817) 302-9766
Facility Name: Avalon Compressor Station	Facility Type: Natural Gas Compressor Station

Surface Owner	Mineral Owner	API No.
---------------	---------------	---------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
L	20	26s	28e					Eddy

Latitude 32.02557 Longitude 104.11776 NAD83

NATURE OF RELEASE

Type of Release: Natural Gas	Volume of Release: 7,840 Mcf	Volume Recovered: 0 Mcf
Source of Release: Blowdown due to cracked fitting on discharge line	Date and Hour of Occurrence: 3/6/2018 at 14:30	Date and Hour of Discovery: 3/6/2018 at 14:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Crystal Weaver, Environmental Specialist, OCD - Artesia District II	
By Whom? Carolyn J. Blackaller, Sr. Environmental Specialist	Date and Hour: 3/8/2018 at 10:38	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. Not Applicable	

If a Watercourse was Impacted, Describe Fully.\*  
Not Applicable

Describe Cause of Problem and Remedial Action Taken.\*

A cracked fitting on the discharge line was discovered. In order to make repairs, the line had to be isolated by blowing down the entirety of the discharge line. Once the line was blown down, a tee was welded on the fitting and the segment was fixed.

Describe Area Affected and Cleanup Action Taken.\*

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Carolyn Blackaller		OIL CONSERVATION DIVISION	
Printed Name: Carolyn J. Blackaller		Approved by Environmental Specialist: [Signature]	
Title: Sr. Environmental Specialist		Approval Date: 3/13/18	Expiration Date: N/A
E-mail Address: carolyn.blackaller@energytransfer.com		Conditions of Approval: FINAL	
Date: 3/9/2018	Phone: (817) 302-9766	Attached <input type="checkbox"/> 200-4657	

\* Attach Additional Sheets If Necessary



ENERGY TRANSFER

NM OIL CONSERVATION  
ARTESIA DISTRICT

MAR 12 2018

RECEIVED

March 9, 2018

State of New Mexico Oil Conservation Division, District II  
811 S. 1<sup>st</sup> Street  
Artesia, NM 88210

**RE: Form C-141 - Release Notification and Corrective Action**  
Energy Transfer Company  
Avalon Compressor Station

Ms. Crystal Weaver,

In accordance with 19.15.29 NMAC, please find enclosed Form C-141 – Release Notification and Corrective Action for the Energy Transfer Partners Avalon Compressor Station blowdown that occurred between 3/6/2018 and 3/8/2018. Should you have any questions or require additional information, please do not hesitate to contact me at (817) 302-9766 or at [carolyn.blackaller@energytransfer.com](mailto:carolyn.blackaller@energytransfer.com)

Sincerely,

Carolyn J. Blackaller  
Sr. Environmental Specialist

# Appendix C

## Soil Laboratory Analytical Report



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

September 11, 2018

Christine Mathews

GHD

6121 Indian School Road, NE #200

Albuquerque, NM 87110

TEL: (505) 884-0672

FAX

RE: Avalon 2

OrderNo.: 1809378

Dear Christine Mathews:

Hall Environmental Analysis Laboratory received 10 sample(s) on 9/7/2018 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

# Analytical Report

Lab Order: 1809378

Date Reported: 9/11/2018

## Hall Environmental Analysis Laboratory, Inc.

**CLIENT:** GHD  
**Project:** Avalon 2

**Lab Order:** 1809378

**Lab ID:** 1809378-001

**Collection Date:** 9/5/2018 9:45:00 AM

**Client Sample ID:** S-11135250-15-090518-MG-TP-1-2'

**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	460	30		mg/Kg	20	9/10/2018 6:08:34 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	890	10		mg/Kg	1	9/10/2018 11:10:06 AM	40215
Motor Oil Range Organics (MRO)	430	50		mg/Kg	1	9/10/2018 11:10:06 AM	40215
Surr: DNOP	115	50.6-138		%Rec	1	9/10/2018 11:10:06 AM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	3600	93		mg/Kg	20	9/9/2018 12:39:55 AM	40209
Surr: BFB	538	15-316	S	%Rec	20	9/9/2018 12:39:55 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.47		mg/Kg	20	9/9/2018 12:39:55 AM	40209
Toluene	32	0.93		mg/Kg	20	9/9/2018 12:39:55 AM	40209
Ethylbenzene	21	0.93		mg/Kg	20	9/9/2018 12:39:55 AM	40209
Xylenes, Total	140	1.9		mg/Kg	20	9/9/2018 12:39:55 AM	40209
Surr: 4-Bromofluorobenzene	112	80-120		%Rec	20	9/9/2018 12:39:55 AM	40209

**Lab ID:** 1809378-002

**Collection Date:** 9/5/2018 9:49:00 AM

**Client Sample ID:** S-11135250-15-090518-MG-TP-1-4'

**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	32	30		mg/Kg	20	9/10/2018 6:20:59 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	9/10/2018 2:51:18 PM	40215
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/10/2018 2:51:18 PM	40215
Surr: DNOP	67.0	50.6-138		%Rec	1	9/10/2018 2:51:18 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/9/2018 1:03:16 AM	40209
Surr: BFB	96.6	15-316		%Rec	1	9/9/2018 1:03:16 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	9/9/2018 1:03:16 AM	40209
Toluene	ND	0.049		mg/Kg	1	9/9/2018 1:03:16 AM	40209
Ethylbenzene	ND	0.049		mg/Kg	1	9/9/2018 1:03:16 AM	40209
Xylenes, Total	ND	0.098		mg/Kg	1	9/9/2018 1:03:16 AM	40209
Surr: 4-Bromofluorobenzene	87.8	80-120		%Rec	1	9/9/2018 1:03:16 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit



**Analytical Report**Lab Order: **1809378**Date Reported: **9/11/2018****Hall Environmental Analysis Laboratory, Inc.****CLIENT:** GHD  
**Project:** Avalon 2**Lab Order:** 1809378**Lab ID:** 1809378-003**Collection Date:** 9/5/2018 10:00:00 AM**Client Sample ID:** S-11135250-15-090518-MG-TP-2-2'**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	52	30		mg/Kg	20	9/10/2018 7:23:01 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>lrm</b>
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	9/10/2018 11:54:12 AM	40215
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/10/2018 11:54:12 AM	40215
Surr: DNOP	100	50.6-138		%Rec	1	9/10/2018 11:54:12 AM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/9/2018 1:26:39 AM	40209
Surr: BFB	92.4	15-316		%Rec	1	9/9/2018 1:26:39 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	9/9/2018 1:26:39 AM	40209
Toluene	ND	0.048		mg/Kg	1	9/9/2018 1:26:39 AM	40209
Ethylbenzene	ND	0.048		mg/Kg	1	9/9/2018 1:26:39 AM	40209
Xylenes, Total	ND	0.097		mg/Kg	1	9/9/2018 1:26:39 AM	40209
Surr: 4-Bromofluorobenzene	87.3	80-120		%Rec	1	9/9/2018 1:26:39 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

# Analytical Report

Lab Order: 1809378

Date Reported: 9/11/2018

## Hall Environmental Analysis Laboratory, Inc.

**CLIENT:** GHD  
**Project:** Avalon 2

**Lab Order:** 1809378

**Lab ID:** 1809378-004

**Collection Date:** 9/5/2018 10:05:00 AM

**Client Sample ID:** S-11135250-15-090518-MG-TP-2-4'

**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	36	30		mg/Kg	20	9/10/2018 7:35:25 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	9/10/2018 12:16:13 PM	40215
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/10/2018 12:16:13 PM	40215
Surr: DNOP	88.9	50.6-138		%Rec	1	9/10/2018 12:16:13 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	9/9/2018 1:50:01 AM	40209
Surr: BFB	93.3	15-316		%Rec	1	9/9/2018 1:50:01 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	9/9/2018 1:50:01 AM	40209
Toluene	ND	0.046		mg/Kg	1	9/9/2018 1:50:01 AM	40209
Ethylbenzene	ND	0.046		mg/Kg	1	9/9/2018 1:50:01 AM	40209
Xylenes, Total	ND	0.092		mg/Kg	1	9/9/2018 1:50:01 AM	40209
Surr: 4-Bromofluorobenzene	88.4	80-120		%Rec	1	9/9/2018 1:50:01 AM	40209

**Lab ID:** 1809378-005

**Collection Date:** 9/5/2018 10:35:00 AM

**Client Sample ID:** S-11135250-15-090518-MG-TP-3-2'

**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	ND	30		mg/Kg	20	9/10/2018 7:47:50 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	9/10/2018 12:38:28 PM	40215
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/10/2018 12:38:28 PM	40215
Surr: DNOP	75.2	50.6-138		%Rec	1	9/10/2018 12:38:28 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/9/2018 2:13:20 AM	40209
Surr: BFB	93.8	15-316		%Rec	1	9/9/2018 2:13:20 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.025		mg/Kg	1	9/9/2018 2:13:20 AM	40209
Toluene	ND	0.049		mg/Kg	1	9/9/2018 2:13:20 AM	40209
Ethylbenzene	ND	0.049		mg/Kg	1	9/9/2018 2:13:20 AM	40209
Xylenes, Total	ND	0.098		mg/Kg	1	9/9/2018 2:13:20 AM	40209
Surr: 4-Bromofluorobenzene	88.7	80-120		%Rec	1	9/9/2018 2:13:20 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

**Analytical Report**Lab Order: **1809378**Date Reported: **9/11/2018****Hall Environmental Analysis Laboratory, Inc.****CLIENT:** GHD  
**Project:** Avalon 2**Lab Order:** 1809378**Lab ID:** 1809378-006**Collection Date:** 9/5/2018 10:38:00 AM**Client Sample ID:** S-11135250-15-090518-MG-TP-3-3'**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	ND	30		mg/Kg	20	9/10/2018 8:00:15 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>lrm</b>
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	9/10/2018 1:00:28 PM	40215
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/10/2018 1:00:28 PM	40215
Surr: DNOP	87.8	50.6-138		%Rec	1	9/10/2018 1:00:28 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/9/2018 2:36:40 AM	40209
Surr: BFB	91.2	15-316		%Rec	1	9/9/2018 2:36:40 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	9/9/2018 2:36:40 AM	40209
Toluene	ND	0.048		mg/Kg	1	9/9/2018 2:36:40 AM	40209
Ethylbenzene	ND	0.048		mg/Kg	1	9/9/2018 2:36:40 AM	40209
Xylenes, Total	ND	0.096		mg/Kg	1	9/9/2018 2:36:40 AM	40209
Surr: 4-Bromofluorobenzene	85.5	80-120		%Rec	1	9/9/2018 2:36:40 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quantitative Limit

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Detection Limit

## Analytical Report

Lab Order: 1809378

Date Reported: 9/11/2018

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: GHD  
Project: Avalon 2

Lab Order: 1809378

Lab ID: 1809378-007

Collection Date: 9/5/2018 10:50:00 AM

Client Sample ID: S-11135250-15-090518-MG-TP-4-2'

Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: MRA
Chloride	56	30		mg/Kg	20	9/10/2018 8:12:40 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: lrm
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	9/10/2018 1:22:36 PM	40215
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	9/10/2018 1:22:36 PM	40215
Surr: DNOP	70.0	50.6-138		%Rec	1	9/10/2018 1:22:36 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/9/2018 2:59:57 AM	40209
Surr: BFB	93.2	15-316		%Rec	1	9/9/2018 2:59:57 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.025		mg/Kg	1	9/9/2018 2:59:57 AM	40209
Toluene	ND	0.049		mg/Kg	1	9/9/2018 2:59:57 AM	40209
Ethylbenzene	ND	0.049		mg/Kg	1	9/9/2018 2:59:57 AM	40209
Xylenes, Total	ND	0.099		mg/Kg	1	9/9/2018 2:59:57 AM	40209
Surr: 4-Bromofluorobenzene	87.9	80-120		%Rec	1	9/9/2018 2:59:57 AM	40209

Lab ID: 1809378-008

Collection Date: 9/5/2018 10:52:00 AM

Client Sample ID: S-11135250-15-090518-MG-TP-4-4'

Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: MRA
Chloride	ND	30		mg/Kg	20	9/10/2018 8:25:04 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: lrm
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	9/10/2018 1:44:43 PM	40215
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/10/2018 1:44:43 PM	40215
Surr: DNOP	67.0	50.6-138		%Rec	1	9/10/2018 1:44:43 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	9/9/2018 3:23:13 AM	40209
Surr: BFB	94.3	15-316		%Rec	1	9/9/2018 3:23:13 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.024		mg/Kg	1	9/9/2018 3:23:13 AM	40209
Toluene	ND	0.048		mg/Kg	1	9/9/2018 3:23:13 AM	40209
Ethylbenzene	ND	0.048		mg/Kg	1	9/9/2018 3:23:13 AM	40209
Xylenes, Total	ND	0.096		mg/Kg	1	9/9/2018 3:23:13 AM	40209
Surr: 4-Bromofluorobenzene	88.4	80-120		%Rec	1	9/9/2018 3:23:13 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quantitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

**Analytical Report**Lab Order: **1809378**Date Reported: **9/11/2018****Hall Environmental Analysis Laboratory, Inc.****CLIENT:** GHD  
**Project:** Avalon 2**Lab Order:** 1809378**Lab ID:** 1809378-009**Collection Date:** 9/5/2018 10:13:00 AM**Client Sample ID:** S-11135250-15-090518-MG-TP-5-2'**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	49	30		mg/Kg	20	9/10/2018 8:37:29 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>lrm</b>
Diesel Range Organics (DRO)	100	9.5		mg/Kg	1	9/10/2018 2:06:59 PM	40215
Motor Oil Range Organics (MRO)	240	48		mg/Kg	1	9/10/2018 2:06:59 PM	40215
Surr: DNOP	74.0	50.6-138		%Rec	1	9/10/2018 2:06:59 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	9/9/2018 3:46:27 AM	40209
Surr: BFB	98.6	15-316		%Rec	1	9/9/2018 3:46:27 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	9/9/2018 3:46:27 AM	40209
Toluene	ND	0.049		mg/Kg	1	9/9/2018 3:46:27 AM	40209
Ethylbenzene	ND	0.049		mg/Kg	1	9/9/2018 3:46:27 AM	40209
Xylenes, Total	ND	0.097		mg/Kg	1	9/9/2018 3:46:27 AM	40209
Surr: 4-Bromofluorobenzene	90.8	80-120		%Rec	1	9/9/2018 3:46:27 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quantitative Limit

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Detection Limit

**Analytical Report**Lab Order: **1809378**Date Reported: **9/11/2018****Hall Environmental Analysis Laboratory, Inc.****CLIENT:** GHD  
**Project:** Avalon 2**Lab Order:** 1809378**Lab ID:** 1809378-010**Collection Date:** 9/5/2018 10:15:00 AM**Client Sample ID:** S-11135250-15-090518-MG-TP-5-4'**Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch ID
<b>EPA METHOD 300.0: ANIONS</b>							Analyst: <b>MRA</b>
Chloride	ND	30		mg/Kg	20	9/10/2018 8:49:54 PM	40252
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>lrm</b>
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	9/10/2018 2:29:06 PM	40215
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	9/10/2018 2:29:06 PM	40215
Surr: DNOP	64.8	50.6-138		%Rec	1	9/10/2018 2:29:06 PM	40215
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	9/9/2018 4:09:46 AM	40209
Surr: BFB	91.7	15-316		%Rec	1	9/9/2018 4:09:46 AM	40209
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	9/9/2018 4:09:46 AM	40209
Toluene	ND	0.046		mg/Kg	1	9/9/2018 4:09:46 AM	40209
Ethylbenzene	ND	0.046		mg/Kg	1	9/9/2018 4:09:46 AM	40209
Xylenes, Total	ND	0.092		mg/Kg	1	9/9/2018 4:09:46 AM	40209
Surr: 4-Bromofluorobenzene	86.3	80-120		%Rec	1	9/9/2018 4:09:46 AM	40209

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

**Qualifiers:**

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quantitative Limit

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1809378

11-Sep-18

Client: GHD  
Project: Avalon 2

Sample ID	MB-40252	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBS	Batch ID:	40252	RunNo:	54055					
Prep Date:	9/10/2018	Analysis Date:	9/10/2018	SeqNo:	1786008	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.5								

Sample ID	LCS-40252	SampType:	lcs	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSS	Batch ID:	40252	RunNo:	54055					
Prep Date:	9/10/2018	Analysis Date:	9/10/2018	SeqNo:	1786009	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	14	1.5	15.00	0	94.7	90	110			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
PQL Practical Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1809378

11-Sep-18

Client: GHD  
Project: Avalon 2

Sample ID	1809378-001AMS	SampType:	MS	TestCode:	EPA Method 8015M/D: Diesel Range Organics					
Client ID:	S-11135250-15-0905	Batch ID:	40215	RunNo:	54038					
Prep Date:	9/7/2018	Analysis Date:	9/10/2018	SeqNo:	1785135	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	910	10	50.61	893.3	32.5	53.5	126			S
Surr: DNOP	5.0		5.061		98.8	50.6	138			

Sample ID	1809378-001AMSD	SampType:	MSD	TestCode:	EPA Method 8015M/D: Diesel Range Organics					
Client ID:	S-11135250-15-0905	Batch ID:	40215	RunNo:	54038					
Prep Date:	9/7/2018	Analysis Date:	9/10/2018	SeqNo:	1785192	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	870	10	50.05	893.3	-43.5	53.5	126	4.29	21.7	S
Surr: DNOP	3.3		5.005		66.9	50.6	138	0	0	

Sample ID	LCS-40215	SampType:	LCS	TestCode:	EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS	Batch ID:	40215	RunNo:	54038					
Prep Date:	9/7/2018	Analysis Date:	9/11/2018	SeqNo:	1785644	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	53	10	50.00	0	106	70	130			
Surr: DNOP	4.4		5.000		88.0	50.6	138			

Sample ID	MB-40215	SampType:	MBLK	TestCode:	EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS	Batch ID:	40215	RunNo:	54038					
Prep Date:	9/7/2018	Analysis Date:	9/11/2018	SeqNo:	1785645	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	9.8		10.00		98.5	50.6	138			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
PQL Practical Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1809378

11-Sep-18

Client: GHD  
Project: Avalon 2

Sample ID	MB-40209		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 40209		RunNo: 54007					
Prep Date:	9/7/2018		Analysis Date: 9/8/2018		SeqNo: 1783993		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	940		1000		94.2	15	316			

Sample ID	LCS-40209		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 40209		RunNo: 54007					
Prep Date:	9/7/2018		Analysis Date: 9/8/2018		SeqNo: 1783994		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	5.0	25.00	0	102	75.9	131			
Surr: BFB	1000		1000		103	15	316			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
PQL Practical Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1809378

11-Sep-18

Client: GHD  
Project: Avalon 2

Sample ID	MB-40209		SampType: MBLK		TestCode: EPA Method 8021B: Volatiles					
Client ID:	PBS		Batch ID: 40209		RunNo: 54007					
Prep Date:	9/7/2018		Analysis Date: 9/8/2018		SeqNo: 1784036		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: 4-Bromofluorobenzene	0.89		1.000		89.2	80	120			

Sample ID	LCS-40209			SampType:	LCS			TestCode:	EPA Method 8021B: Volatiles		
Client ID:	LCSS			Batch ID:	40209			RunNo:	54007		
Prep Date:	9/7/2018			Analysis Date:	9/8/2018			SeqNo:	1784037		
								Units:	mg/Kg		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Benzene	0.88	0.025	1.000	0	88.5	77.3	128				
Toluene	0.93	0.050	1.000	0	93.3	79.2	125				
Ethylbenzene	0.92	0.050	1.000	0	92.4	80.7	127				
Xylenes, Total	2.8	0.10	3.000	0	93.5	81.6	129				
Surr: 4-Bromofluorobenzene	0.93		1.000		93.3	80	120				

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit	P Sample pH Not In Range
PQL Practical Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# Sample Log-In Check List

Client Name: **GHD**

Work Order Number: **1809378**

RcptNo: 1

Received By: **Michelle Garcia**

9/7/2018 8:45:00 AM

Completed By: **Ashley Gallegos**

9/7/2018 9:32:20 AM

Reviewed By: **ENM**
**9/7/18**
*Michelle Garcia*
*[Signature]*

Labeled by: **JAB 09/07/18**

## Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Courier

## Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☒ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☒ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
8. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
9. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
10. Were any sample containers received broken? Yes ☐ No ☒
11. Does paperwork match bottle labels? Yes ☒ No ☐  
 (Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
13. Is it clear what analyses were requested? Yes ☒ No ☐
14. Were all holding times able to be met? Yes ☒ No ☐  
 (If no, notify customer for authorization.)

# of preserved bottles checked for pH: **3**  
 (<2 or >12 unless noted)  
 Adjusted? **JAB**  
 Checked by: **JAB 09/07/18**

## Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
 By Whom: \_\_\_\_\_ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person  
 Regarding: \_\_\_\_\_  
 Client Instructions: \_\_\_\_\_

16. Additional remarks:

## 17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.3	Good	Yes			



# Appendix D

## 2018 Remediation Work Plan



November 12, 2018

Reference No. 11135250

Ms. Maria Pruett  
New Mexico Oil Conservation Division  
Energy, Minerals, and Natural Resources Department  
District 2  
811 S. First Street  
Artesia, New Mexico 88210

**Re: 2018 Remediation Work Plan  
Avalon Compressor Station (2RP-4657)  
Lea County, New Mexico**

Dear Ms. Pruett:

## 1. Project Information

The Site is located on land owned by the State of New Mexico in Unit L, Section 20, Township 26 South, Range 28 East, approximately 14-miles south of Malaga, in southern Eddy County, New Mexico. ETC submitted an initial C-141 Form to the New Mexico Oil Conservation Division (NMOCD) dated March 12, 2018 describing a release of 7,840 million cubic feet (Mcf) of natural gas with zero (0) volume being recovered. Per the C-141: *A cracked fitting on the discharge line was discovered. In order to make repairs, the line had to be isolated by blowing down the entirety of the discharge line. Once the line was blown down, a tee was welded on the fitting and the segment was fixed.*

## 2. NMOCD Closure Requirement Criteria for Soils

Subsurface investigation activities were completed in accordance with the revised and reissued Guidelines for Remediation of Leaks, Spills, and Releases Rule 19.15.29 New Mexico Administrative Code (NMAC) from the NMOCD issued on August 14, 2018. The following criteria from Table 1 (below) within NMAC 19.15.29.12 were utilized to determine site-specific screening limits:

Minimum depth below any point within the horizontal boundary of the release to ground water less than 10,000 mg/l TDS	Constituent	Limit*
≤ 50 feet	Chloride**	600 mg/kg
	TPH (GRO+DRO+MRO)	100 mg/kg
	BTEX	50 mg/kg
	Benzene	10 mg/kg
* Numerical limits or natural background level, whichever is greater.		
** This applies to release of produced water or other fluids which may contain chloride.		



Localized depth to groundwater was estimated at a depth of approximately 15 to 20 feet below ground surface (bgs) based on depth to water records available on the United States Geological Survey (USGS) National Water System Information map. The nearest well to the site is approximately 1.38 miles to the west. Information available from various sources including the Petroleum Recovery Research Center (PRRC) Mapping Portal and the United States Geological Survey (USGS) Current Water Database for the Nation concludes:

- a) the depth to groundwater at the Site is less than 50-feet bgs;
- b) the site is not within 300 feet of any continuously flowing watercourse;
- c) the site is not within 200 feet of any lakebed, sinkhole or playa lake;
- d) the site is not within 300 feet of an occupied permanent residence, school, etc.;
- e) the site is not within 500 feet of a spring or private, domestic fresh water well;
- f) the site is not within 1,000 feet of any fresh water well or spring;
- g) the site is not within incorporated municipal boundaries or within a defined municipal fresh water well field;
- h) the site is not within 300 feet of a wetland;
- i) the site is not within an area overlying a subsurface mine;
- j) the site is not within an unstable area; and
- k) the site is not within a 100-year floodplain.

*Consequently, the anticipated site-specific screening limits to be applied to this location by the NMOCD based on the revised Rule are 10 mg/kg for benzene, 50 mg/kg for total benzene, toluene, ethylbenzene, and total xylenes (BTEX), 100 mg/kg for total petroleum hydrocarbons (TPH) including gasoline range organics ( GRO), diesel range organics (DRO), an oil range organics (ORO), and 600 mg/kg for chloride.*

Per 19.15.29.13, Restoration, Reclamation, and Re-vegetation, the impacted area must be remediated a minimum of 4-feet bgs with non-waste containing, uncontaminated, earthen material with chloride concentrations less than 600 mg/kg. Soil cover must consist of topsoil at a thickness comparable to background topsoil thicknesses, or one foot of suitable earthen material capable of establishing and maintaining vegetation at the site. Reclamation is considered complete when all disturbed areas have established vegetative cover with a life-form ratio of plus or minus 50 percent of pre-remedial levels, and plant cover of a minimum of 70 percent of previous levels, excluding noxious weeds.

Evaluation of the analytical data obtained from soil assessment and delineation activities performed in August and September 2018 indicate horizontal and vertical delineation of BTEX and TPH impacts has been achieved at the Site to support remediation activities (excavation). Additional lateral delineation north and east of TP-1 and TP-5 may be warranted. If determined necessary during remediation activities,



lateral soil delineation will be completed in conjunction with soil remediation efforts via collection of bottom and sideway confirmation samples.

### 3. 2018 Scope of Work

The scope of work for this project in 2018 will involve soil remediation activities inclusive of excavation, sampling, backfilling, and restoration of the impacted area (see Figure 1).

Field screening of soils for chloride and TPH will be performed in order to guide excavation activities. Subsequently, the excavation will be backfilled with clean soil, graded and contoured to ensure proper surface area drainage. The following outlines basic project details that will be completed by GHD and selected subcontractors.

#### ***Field Program***

- Prior to mobilizing excavation equipment to the Site, a New Mexico 811 utility notification will be made at least 48-hours prior to mobilization.
- Underground utilities in proximity to the proposed excavation area will be day-lighted prior to remedial excavation activities.
- GHD anticipates that pipeline operators will not allow excavation within 10 feet of any pipelines, therefore remediation within these areas will be deferred until operations of the pipelines cease.
- Approximately 280 cubic yards (cy) of shallow sub-surface area off-pad soil will be excavated (Figure 2). Impacted soil in the affected area will be excavated until field screening indicates that volatile organic compounds (VOCs) are at background concentrations. This volume could increase if additional impact to soil is observed within the proposed excavation area.
- Field screening will be conducted with a photoionization detector (PID) calibrated to isobutylene.
- Sidewall and bottom confirmation samples will be collected from the excavated area prior to backfilling and analyzed for BTEX by EPA Method 8021B and TPH by EPA Method 8015 Modified.
- The excavated area will be backfilled with clean soil following evaluation of the confirmation samples.
- The disturbed off-pad area will be fertilized and re-seeded with a Bureau of Land Management-approved seed mix.

#### **Quality Assurance/ Quality Control**

Confirmation soil sampling will be completed in accordance with our standard Quality Assurance/ Quality Control procedures designed to minimize cross-contamination between samples and to provide reliable laboratory results.

#### **Reporting**

A report summarizing remediation activities will be submitted. The report will include a Site description, project history, description of field events, a discussion of results, and recommendations (if any).





The report will include:

- A scaled Site plan showing the locations of the excavation and other Site features
- Tabulation of field screening and laboratory analytical results and
- Geotagged photographic documentation of field activities.

#### **Vegetation Monitoring**

Following completion of soil remediation activities at the Site, and as required by the New Mexico State Land Office (NMSLO), GHD will conduct vegetation monitoring visits to the Site. The status of vegetative growth within the remediated area will be documented with photographs and in field notes during each visit. A closure request report will be completed following one year of monitoring for submittal to NMSLO.

#### **4. Work Plan Approval Request**

GHD is prepared to initiate the scope of work immediately. If you have any questions or comments with regards to this work plan, please do not hesitate to contact our Albuquerque office at (505) 884-0672. Your timely response to this correspondence is appreciated.

Sincerely,

GHD

A handwritten signature in blue ink, appearing to read "Christine Mathews", is written over a faint, light blue circular stamp.

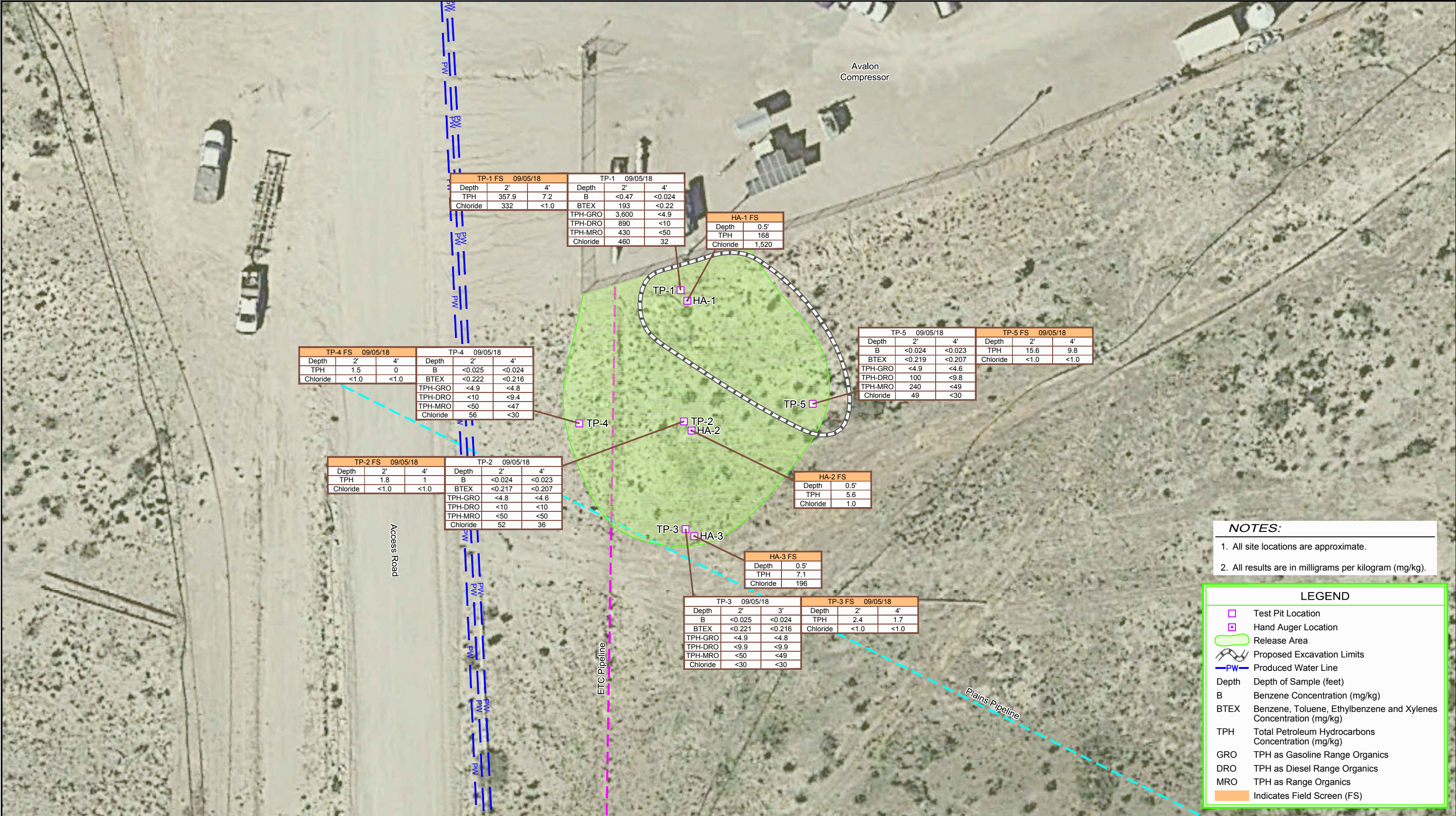
Christine Mathews  
Project Manager

CM/ji/1

Encl.

Attachment: Figure 1 – Proposed Excavation Area Map





Source: Image © 2018 Google - Imagery Date: October 1, 2014

Lat/Long: 32.025645° North, 104.117738° West