2019

Annual Ground Water Report And Communication

RCVD Via Email 3/26/2020

From:	Smith, Cory, EMNRD
To:	Clara Cardoza (ccardoza@hilcorp.com)
Cc:	Jeffrey Walker; nnepawq@frontiernet.net
Subject:	RE: Incident # NRMD0928136813-Charles el al #1 2019 Annual GWM Rpt
Date:	Thursday, March 26, 2020 11:01:00 AM
Attachments:	image001.png image002.png image003.png image004.png

Clara,

OCD has reviewed the 2019 annual Ground Water report for the release at the Charles el al #1 OCD incident# nRMD0928136813

OCD approves HEC request to transfer to Bi-Annual sampling events until HEC believes the site is ready to transition back to quarterly sampling to pursue closure.

Please continue to sample for the previously approved sample constituents. OCD recommends that an upgradient background sample be collected to compare the inorganic constituents which maybe naturally occurring in the area.

Please include this approval in your 2020 AGWR. The Report will be scanned into the Online Incident File.

Thank you,

Cory

From: Jeffrey Walker <Jeff.Walker@ghd.com>
Sent: Wednesday, March 25, 2020 9:11 AM
To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>; nnepawq@frontiernet.net
Cc: Clara Cardoza (ccardoza@hilcorp.com) <ccardoza@hilcorp.com>
Subject: [EXT] Incident # NRMD0928136813-Charles el al #1 2019 Annual GWM Rpt

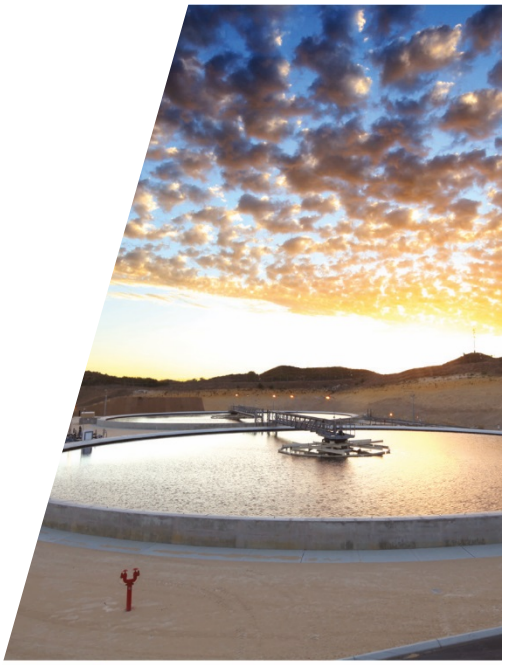
Cory and Steve,

The attached 2019 Annual Groundwater Monitoring Report is submitted on behalf of Hilcorp Energy for your review and comment. Please do not hesitate to contact myself or Clara Cardoza with any questions about this document or the site.

Thank you-Jeff

Jeffrey L. Walker
Sr. Project Manager

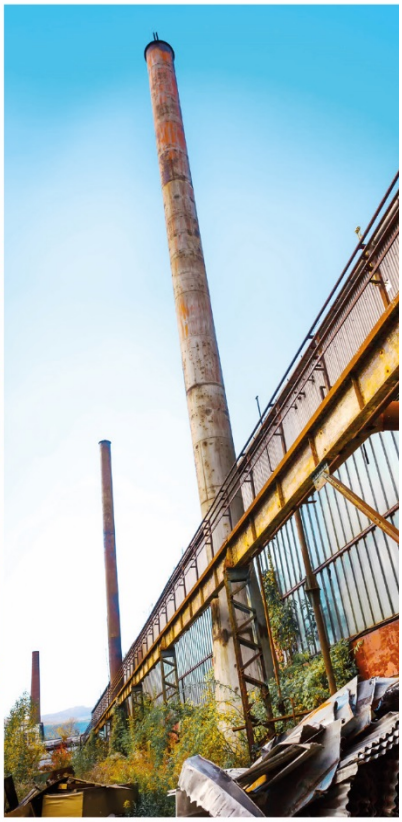
GHD



2019 Annual Groundwater Monitoring Report

Charles et al No. 1
San Juan County, New Mexico
API# 30-045-06623
NMOCD# 3R-432

Hilcorp Energy Company



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1. Introduction

This Annual Groundwater Monitoring Report presents groundwater data collected during the 2019 reporting period. Monitoring activities and data collection were performed by Hilcorp Energy Company (Hilcorp) at the Charles et al. No. 1 site (hereafter referred to as the "Site"). The Site is located on Navajo Nation allotted land in Blanco Canyon, Section 12, Township 27N, Range 9W, of San Juan County, New Mexico. Geographical coordinates for the site are 36°35'10.25" North, 107°44'24.89" West. A Site Vicinity Map and Site Detail Map are included as Figures 1 and 2, respectively.

1.1 Background

The Charles et al. No. 1 natural gas well was spudded in April 1965 by the Austral Oil Company of Houston, Texas. Operatorship of the well was transferred several times before a subsidiary of Burlington Resources became the operator in August 1992. ConocoPhillips (COP) acquired Burlington Resources on March 30, 2006. COP plugged and abandoned the well on June 11, 2010. Site ownership was transferred from COP to Hilcorp in April 2017.

A COP employee discovered an area of dead vegetation approximately 100 feet from the Blanco Canyon wash and approximately ¼ mile from the Charles et al. No. 1 wellhead while investigating a pipeline release on June 23, 2008. Envirotech, Inc. (Envirotech) installed seven piezometer/monitor wells (MW) using a hand auger in June 2008. A solar powered fan apparatus was installed over MW-1 in August 2008 to facilitate soil vapor extraction (SVE) remediation of the area. The SVE equipment was removed in June 2017 when MW-1 was plugged and abandoned, as detailed below.

Envirotech conducted quarterly groundwater sampling events beginning June 2008. Tetra Tech, Inc. (Tetra Tech) began monitoring the Site in March 2010. Site consulting responsibilities were transferred from Tetra Tech to GHD (formerly CRA) on June 15, 2011.

In June 2016, the shallow wells MW-1 through MW-7 were pulled from the ground using a backhoe. The wells had not displayed any hydrocarbon concentrations above standards (with the exception of MW-1) in 10 years.

A work plan that included the plugging and abandonment of all Site monitor wells and a limited soils excavation was submitted to the Federal Indian Minerals Office, a division of the United States Department of the Interior's Office of Natural Resources Revenue, and the Federal Bureau of Land Management. Approvals from these agencies were received and a Pre-Construction Notification, required as a condition of the wetlands study of the area, was issued to the United States Army Corps of Engineers and to the Navajo Environmental Protection Agency (NNEPA). The wetlands study was conducted by SME Environmental Consultants of Durango, Colorado, prior to excavation activities, to assess potential impacts on designated wetlands aquatic resources.

The planned soil excavation and removal was conducted in June 2016 to address the pocket of hydrocarbon impacted soils impacting groundwater in the immediate area of MW-1. Approximately 30 cubic yards of hydrocarbon impacted soils were removed and disposed of at the Envirotech Landfarm. The excavation area was limited due to encroachment upon two separate pipelines (the abandoned COP and Chevron pipelines) crossing through the Site. A replacement monitor well (MW

1R) was installed via hand auger in approximately the same location as the former MW-1. The historical timeline for the Site is presented in Table 1.

2. Regulatory Framework

The Site is located on Navajo Nation lands and is therefore subject to joint oversight by New Mexico Oil Conservation Division (NMOCD) and the NNEPA. Groundwater cleanup standards for the Site consequently come from both agencies with hydrocarbon constituents of concern (COCs) regulated under the 2012 Navajo Nation Leaking Storage Tank Soil and Water Cleanup Standards. Table 4 in Appendix C of that document (The Water Cleanup Standards (equivalent to the Federal Maximum Contaminant Levels)) provide standards for hydrocarbon constituents benzene, toluene, ethylbenzene, total xylenes (BTEX) and naphthalene. The NNEPA standards do not include cleanup levels for inorganic constituents and therefore Site COCs sulfate, total dissolved solids (TDS) and dissolved manganese are regulated under New Mexico Water Quality Control Commission (NMWQCC) Standards 20.6.2.3103 Section A. The Site has been assigned an Abatement Plan number 3RP-432 by the NMOCD. The NMOCD guidelines require groundwater to be analyzed for potential contaminants as defined by the NMWQCC Standards. The regulation also states that non-aqueous phase liquids (NAPL) shall not be present floating atop or immersed within groundwater, as can be reasonably measured. In this report, groundwater analytical results for the COCs are compared to the NNEPA and NMWQCC standards as shown in the following table:

Analyte	NNEPA/NMWQCC Standard for Groundwater
Benzene	0.005 mg/L
Toluene	1.0 mg/L
Ethylbenzene	0.70 mg/L
Total Xylenes	10.0 mg/L
Naphthalene	6.2 mg/L
Sulfate	600 mg/L
Manganese	0.20 mg/L
Total Dissolved Solids	1000 mg/L

In a January 28, 2019 email, the NMOCD provided a response to their review of the 2018 Annual Groundwater Monitoring Report for the Site. The report was submitted to the NMOCD on January 22, 2019. The NMOCD requested more information on the 2016 limited excavation at the Site and required one time sampling and analyses of additional NMWQCC 20.6.2.3103 Section A constituents. Requested additional information was provided to NMOCD and to the NNEPA in separate emails and a list of additional groundwater constituents was proposed and approved by NMOCD (see Appendix A).

3. Groundwater Monitoring Methodology and Analytical Results

Groundwater sampling of the lone Site monitor well (MW-1R), was conducted by Hilcorp at the Site on February 26, May 17, August 9 and October 28, 2019.

3.1 Groundwater Monitoring Methodology

Prior to collection of groundwater samples, depth to groundwater is typically measured in MW-1R using a water level meter (Table 2). Depths to water during 2019 monitoring events decreased significantly compared to same periods in 2018 (see Table 2).

The groundwater sample collected during the first quarterly event in February 2019 was analyzed for BTEX by EPA Method 8260. In May 2019, groundwater was analyzed for the NMOCD approved list of constituents including:

Full range volatile organic compounds (includes BTEX) and naphthalene

- bicarbonate
- chloride
- fluoride
- iron
- manganese
- nitrate
- pH
- potassium
- sodium
- specific conductance
- sulfate
- total alkalinity
- total dissolved solids

Sampling events occurring after the required one-time sampling for additional NMWQCC constituents that took place during the second quarterly monitoring event in May 2019 included only those constituents that were detected above their respective maximum contaminant level. These included sulfate, TDS and dissolved manganese. Prior to sampling, the purging of up to three casing volumes of groundwater was attempted at MW-1R using a 0.5 inch diameter, polyethylene bailer. During the first two quarters of 2019 there was insufficient volume to collect both field parameters and a laboratory sample. Field parameters including pH, temperature and conductivity were collected during the third and fourth quarterly events. These results are presented in Table 3.

3.2 Analytical Results

The 2019 analytical results of the quarterly groundwater sampling events are discussed below:

- Benzene: The NNEPA standard for benzene is 0.005 milligrams per liter (mg/L). Groundwater samples collected from MW-1R during the first and third quarterly events in 2019 were at concentrations in excess of this standard. Second and fourth quarterly results were at concentrations below the laboratory reporting limits (LRLs) however, the LRLs were at levels above the NNEPA standard and so there is uncertainty in whether these results are below the standard.

- Toluene: The NNEPA standard for toluene is 1.0 mg/L. Groundwater samples collected from MW-1R in 2018 contained toluene at concentrations ranging from below the LRL to 0.519 mg/L.
- Ethylbenzene: The NNEPA standard for ethylbenzene is 0.7 mg/L. Groundwater samples collected from MW-1R in 2019 were at concentrations above this standard during the second and fourth quarters. Concentrations ranged from 0.576 to 1.11 mg/L.
- Xylenes: The NNEPA standard for xylenes is 10 mg/L. Groundwater samples collected from MW-1R in 2019 contained xylenes at concentrations ranging from 1.56 mg/L to 6.71 mg/L
- Naphthalene: The NNEPA standard for naphthalene is 6.2 mg/L. Groundwater samples collected from MW-1R in 2019 contained naphthalene at concentrations ranging from 0.258 mg/L to 0.447 mg/L.
- Sulfate: The NMWQCC standard for sulfate in groundwater is 600 mg/L. Groundwater samples collected from MW-1R in 2019 ranged from 1040 mg/L to 4300 mg/L.
- TDS: The NMWQCC standard for TDS in groundwater is 1000 mg/L. Samples collected from MW-1R in 2019 ranged from 2850 mg/L to 7670 mg/L.
- Manganese: The NMWQCC standard for dissolved manganese in groundwater is 0.2 mg/L. Samples collected from MW-1R in 2019 ranged from 1.17 to mg/L to 17.6 mg/L.

An historical Hydrocarbon Groundwater Analytical Results Summary is available as Table 4 with Groundwater General Chemistry Analytical Results Summary presented in Table 5. Copies of laboratory analytical reports for the 2019 quarterly groundwater sampling events are included in Appendix B. A hydrocarbon concentration in groundwater map for the 2019 sampling events is included as Figure 3.

4. Conclusions and Recommendations

Based on 2019 quarterly monitoring results, GHD makes the following conclusions with regard to hydrogeology and groundwater quality at the Site:

- The elevation of the groundwater in MW-1R appears to be lower by up to 2 feet as compared to 2018 data.
- Benzene continues to be detected at concentrations above the NNEPA standard and ostensibly did so for all four quarters of 2019.
- Concentrations of ethylbenzene were detected in groundwater above the standard during the second and fourth quarters during 2019.
- Other hydrocarbons including toluene, xylenes and naphthalene were detected in groundwater of MW-1R but at concentrations below the respective standards for these compounds.
- Inorganic constituents sulfate, TDS and dissolved manganese were detected at concentrations in excess of their respective NMWQCC standard.

- Historical groundwater sampling results from former wells MW-2 through MW-7, which were essentially non-detect for BTEX constituents from 2008 until their removal in 2017, would indicate that the BTEX plume that remains in groundwater near MW-1R is stable and immobile in the subsurface. The trend in benzene concentrations further support intrinsic biodegradation of petroleum hydrocarbons is occurring at the Site.

GHD/Hilcorp make the following recommendations for 2020 groundwater monitoring:

- Based on the stability of the Site dissolved-phase groundwater impacts, semi-annual sampling is recommended for 2020. Using historical data and predicted groundwater flow directions, additional wells, including existing air sparge wells, SP-1 through SP-6, may be incorporated into the groundwater monitoring fluid level/sampling routine, depending on the month of monitoring.

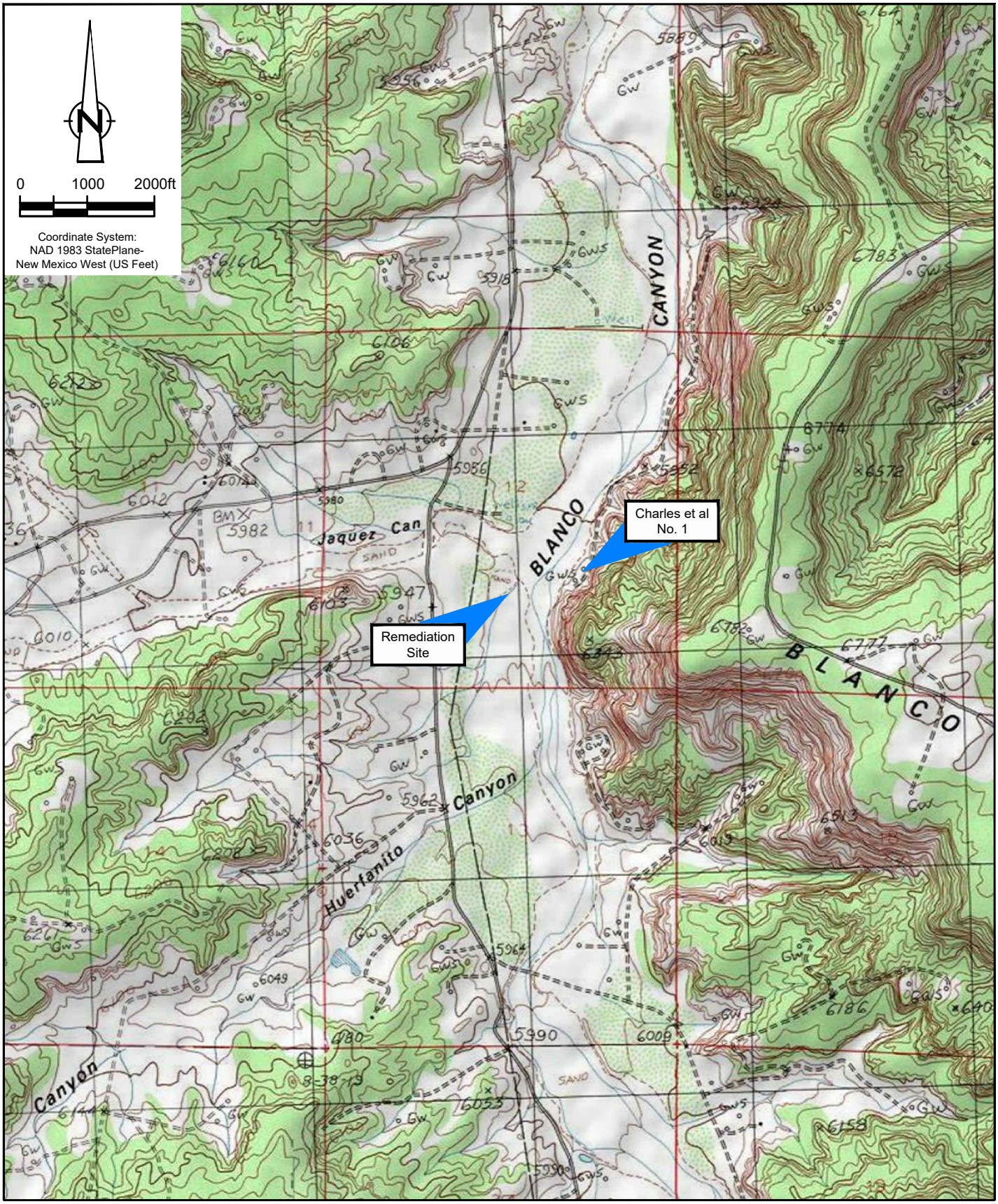
Respectfully Submitted,

GHD

Jeff Walker
Senior Project Manager

Tom Larson
Midland/NM Operations Manager

Figures



Source: USGS 7.5 Minute Quad "Fresno Canyon and Huerfanito Peak, New Mexico"

Lat/Long: 36.5861° North, 107.7401° West

HILCORP ENERGY COMPANY
SEC 12, T27N-R9W, SAN JUAN COUNTY, NEW MEXICO
CHARLES et al. No. 1

11207741-00

Feb 5, 2020

SITE LOCATION MAP

FIGURE 1

CAD File: I:\CAD\Files\Eight Digit Job Numbers\112-----\11207741-Charles et al. No. 1\11207741-00\11207741-00(001)\11207741-00(001)GN-DL001.dwg

Source: Tetratech, Inc. figure, "Site Layout Map"

Lat/Long: 36.5861° North, 107.7401° West

0 10 30ft

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

HILCORP ENERGY COMPANY
SEC 12, T27N-R9W, SAN JUAN COUNTY, NEW MEXICO
CHARLES et al. No. 1

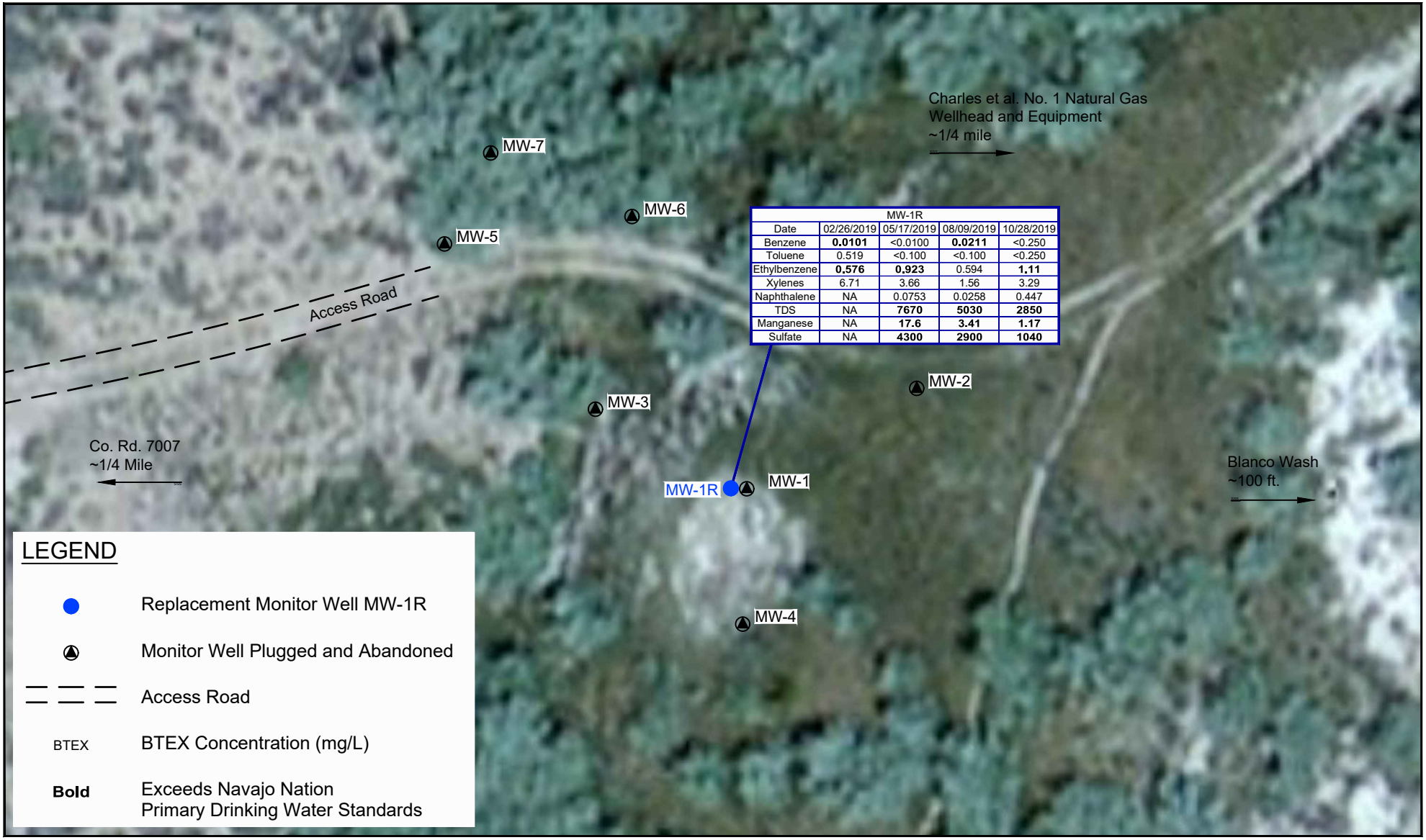
11207741-00

Feb 5, 2020

SITE DETAIL MAP

FIGURE 2

CAD File: I:\CAD\Files\Eight Digit Job Numbers\112-----\11207741-Charles et al. No. 1\11207741-00\11207741-00(001)\11207741-00(001)GN-DL001.dwg



MW-1R				
Date	02/26/2019	05/17/2019	08/09/2019	10/28/2019
Benzene	**0.0101**	<0.0100	**0.0211**	<0.250
Toluene	0.519	<0.100	<0.100	<0.250
Ethylbenzene	**0.576**	**0.923**	0.594	**1.11**
Xylenes	6.71	3.66	1.56	3.29
Naphthalene	NA	0.0753	0.0258	0.447
TDS	NA	**7670**	**5030**	**2850**
Manganese	NA	**17.6**	**3.41**	**1.17**
Sulfate	NA	**4300**	**2900**	**1040**

Lat/Long: 36.5861° North, 107.7401° West

0 10 30ft

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

HILCORP ENERGY COMPANY
SEC 12, T27N-R9W, SAN JUAN COUNTY, NEW MEXICO
CHARLES et al. No. 1

11207741-00

Feb 5, 2020

2019 GROUNDWATER CONCENTRATION MAP

FIGURE 3

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Tables

Table 1
Site History Timeline
Hilcorp Energy Company
Charles et al. No. 1

Date/Time Period	*Event/Action*	*Description/Comments*
April 12, 1965	Well Spudded	Well spudded by Austral Oil Company Inc.
March 30, 1978	Operator Change	Change in operatorship to the Superior Oil Company.
September 1, 1986	Operator Change	Change in operatorship to Mobil Producing TX and NM Inc.
August 1, 1992	Operator Change	Change in operatorship to Meridian Oil Inc, a subsidiary of Burlington Resources.
August 1, 2001	Well Abandoned	Burlington Resources abandons well due to low production.
May 20, 2003	Well Returns to Production	The Charles et al. No. 1 natural gas well returned to production.
March 31, 2006	Operator Change	ConocoPhillips acquires Burlington Resources.
June 23, 2008	Release Discovered	A release was discovered from the pipeline running from the wellhead to the meter house; upon walking the pipeline, an area of dead vegetation was also discovered approximately 100 feet from Blanco Wash.
June 24, 2008	Release Reported	ConocoPhillips reported the release to the New Mexico Oil Conservation Division (NMOCD) via phone and email.
June 25-26, 2008	Initial Site Assessment	Envirotech, Inc. of Farmington, NM advances several soil borings and installed piezometers using a hand auger to determine the extent of impact (Envirotech, 2009). Envirotech also installed Monitor Wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7; and obtained water level measurements and samples from all of the wells.
August 14, 2008	Soil Vapor Extraction System Installed	Envirotech, Inc. installed solar-powered Soil Vapor Extraction (SVE) equipment over the existing Monitor Well, MW-1; and obtained water level measurements and samples from all of the wells.
October 2, 2008	Groundwater Monitoring	Envirotech, Inc. completed the third round of groundwater sampling.
January 13, 2009	Groundwater Monitoring	Envirotech, Inc. completed the fourth round of groundwater sampling.
March 23, 2009	Groundwater Monitoring	Envirotech, Inc. completed the fifth round of groundwater sampling and recommended sampling only Monitor Wells MW-1, MW-2, MW-3, and MW-4.
June 29, 2009	Groundwater Monitoring	Envirotech, Inc. completed the sixth round of groundwater sampling and recommended drilling additional monitor wells downgradient of MW-2.
March 30, 2010	Groundwater Monitoring	Tetra Tech, Inc. completed quarterly groundwater sampling.
June 11, 2010	Well Abandoned	Charles et al. No. 1 is plugged and abandoned by ConocoPhillips.
June 11, 2010	Groundwater Monitoring	Tetra Tech, Inc. completed quarterly groundwater sampling.
September 21, 2010	Groundwater Monitoring	Tetra Tech, Inc. completed quarterly groundwater sampling. An oil absorbant sock was placed in MW-1.
December 16, 2010	Groundwater Monitoring	Tetra Tech, Inc. completed quarterly groundwater sampling. The benzene concentration in MW-1 exceeded the Navajo Nation Primary Drinking Water Regulations (NNPDWR) standard. Oil absorbant sock in MW-1 was replaced.

Table 1
Site History Timeline
Hilcorp Energy Company
Charles et al. No. 1

Date/Time Period	*Event/Action*	*Description/Comments*
March 18, 2011	Groundwater Monitoring	Tetra Tech, Inc. completed quarterly groundwater sampling. The benzene concentration in MW-1 exceeded the NNPDWR standard. Oil absorbant sock in MW-1 was replaced.
June 15, 2011	Transfer of Site Consulting Responsibilities	On June 15, 2011, Site consulting responsibilities were transferred from Tetra Tech of Albuquerque, NM to Conestoga-Rovers & Associates (CRA) of Albuquerque, NM.
June 23, 2011	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene and ethylbenzene concentrations in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
September 26, 2011	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene and ethylbenzene concentrations in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
December 12, 2011	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standard. Oil absorbant sock in MW-1 was replaced.
March 7, 2012	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standard. Oil absorbant sock in MW-1 was replaced.
June 4, 2012	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene, toluene, and ethylbenzene levels in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
September 17, 2012	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene, toluene, and ethylbenzene concentrations in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
January 9, 2013	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene and toluene concentrations in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
March 18, 2013	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
June 14, 2013	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene and Toluene concentrations in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
September 13, 2013	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene and Toluene concentrations in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
December 13, 2013	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
March 21, 2014	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 did not exceed the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
June 16, 2014	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.
September 19, 2014	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards. Oil absorbant sock in MW-1 was replaced.

Table 1
Site History Timeline
Hilcorp Energy Company
Charles et al. No. 1

Date/Time Period	*Event/Action*	*Description/Comments*
December 17, 2014	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards.
March 19, 2015	Groundwater Monitoring	CRA completed quarterly groundwater sampling. All constituents were below NNPDWR standards.
June 19, 2015	Groundwater Monitoring	CRA completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards.
September 14, 2015	Groundwater Monitoring	GHD (formerly CRA) completed quarterly groundwater sampling. Benzene concentration in MW-1 exceeded the NNPDWR standards.
June 2, 2016	MW Plugging and Abandonment	GHD and contractor MMT plug and abandon all existing site monitor wells (MW-1 thru MW-7).
June 6, 2016	Soil Excavation/MW replacement	GHD and contractor MMT excavate 10 X 12 ft X 7 ft deep excavation (~30cy) centered around MW-1. MW-1 replaced with 1" PVC MW-1R
July 1, 2016	Reseeding	Excavation site reseeded with High Plains Foothills Wet Meadow Mix from Western Native Seed Co.
September 12, 2016	Groundwater Monitoring	Quarterly groundwater sampling: Benzene concentration in MW-1R below NNPDWR standard.
November 28, 2016	Groundwater Monitoring	Quarterly groundwater sampling: Benzene concentration in MW-1R exceeds NNPDWR standard.
March 6, 2017	Groundwater Monitoring	Quarterly groundwater sampling: Benzene concentration in MW-1R below NNPDWR standard.
April 13, 2017	Sale of San Juan Asset to Hilcorp Energy	Site sold as part of ConocoPhillips Company announced sale of San Juan Asset to Hilcorp Energy Company.
June 12, 2017	Groundwater Monitoring	Quarterly groundwater sampling: Benzene concentration in MW-1R exceeds NNPDWR standard.
September 25, 2017	Groundwater Monitoring	Quarterly groundwater sampling: Benzene concentration in MW-1R below NNPDWR standard.
December 4, 2017	Groundwater Monitoring	Quarterly groundwater sampling: Benzene concentration in MW-1R exceeds NNPDWR standard.
March 13, 2018	Groundwater Monitoring	Quarterly groundwater sampling: ethylbenzne concentration in MW-1R exceeds NNPDWR standard.
June 25, 2018	Groundwater Monitoring	Quarterly groundwater sampling: toluene concentration in MW-1R exceeds NNPDWR standard..
September 4, 2018	Groundwater Monitoring	Quarterly groundwater sampling: all BTEX constituents below NNPDWR standards in MW-1R.
December 4, 2018	Groundwater Monitoring	Quarterly groundwater sampling: ethylbenzne concentration in MW-1R exceeds NNPDWR standard.
January 28, 2019	Groundwater Monitoring	Provide NMOCD and NNEPA additional information regarding 2016 soils excavation. NMOCD requires additional NMWQCC sample paramaters for one-time samling. Quarterly groundwater monitoring conducted February 26, May 17, August 9 and October 28, 2019 by Hilcorp.

Table 2
Monitoring Well Specifications and Groundwater Elevations
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*TOC Elevation* (ft AMSL)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level (ft AMSL)*
MW-1	5917.87	6/25/2008	4.71	5913.16
		8/14/2008	5.21	5912.66
	5917.05	10/2/2008	5.13	5911.92
		1/13/2009	4.41	5912.64
		3/23/2009	3.01	5914.04
		6/29/2009	2.12	5914.93
		3/30/2010	2.68	5914.37
		6/11/2010	4.74	5912.31
		9/21/2010	5.52	5911.53
		12/16/2010	3.71	5913.34
		3/18/2011	2.98	5914.07
		6/23/2011	4.99	5912.06
		9/27/2011	4.55	5912.50
		12/12/2011	3.23	5913.82
		3/7/2012	3.67	5913.38
		6/4/2012	4.75	5912.30
		9/17/2012	5.57	5911.48
		1/9/2013	3.87	5913.18
		3/18/2013	3.09	5913.96
		6/14/2013	4.83	5912.22
		9/13/2013	5.42	5911.63
		12/13/2013	3.67	5913.38
		3/21/2014	3.27	5913.78
		6/16/2014	5.13	5911.92
		9/19/2014	5.70	5911.35
		12/17/2014	4.22	5912.83
		3/19/2015	3.36	5913.69
		6/19/2015	4.34	5912.71
		9/14/2015	5.55	5911.50
		6/2/2016	Plugged and Abandoned	
MW-1R	Not Determined	6/23/2016	6.28	--
		9/12/2016	6.49	--
		11/28/2016	5.13	--
		3/6/2017	4.29	--
		6/12/2017	3.07	--
		9/25/2017	3.38	--
		12/4/2017*	1.84	--
		3/13/2018*	1.85	--
		6/25/2018**	3.25	--
		9/4/2018**	3.53	--
		12/6/2018**	4.04	--
		2/26/2019***	4.37	--
		5/17/2019***	4.60	--
		8/9/2019***	6.39	--
		10/28/2019***	6.15	--

Table 2
Monitoring Well Specifications and Groundwater Elevations
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*TOC Elevation* (ft AMSL)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level (ft AMSL)*
MW-2	5917.33	6/25/2008	4.66	5912.67
		8/14/2008	5.35	5911.98
	5916.53	10/2/2008	5.12	5911.41
		1/13/2009	3.15	5913.38
		3/23/2009	2.65	5913.88
		6/29/2009	4.20	5912.33
		3/30/2010	2.57	5913.96
		6/11/2010	4.63	5911.90
		9/21/2010	5.53	5911.00
		12/16/2010	3.53	5913.00
		3/18/2011	2.70	5913.83
		6/23/2011	4.80	5911.73
		9/27/2011	4.30	5912.23
		12/12/2011	3.13	5914.20
		3/7/2012	2.58	5913.95
		6/4/2012	4.51	5912.02
		9/17/2012	5.56	5910.97
		1/9/2013	3.75	5912.78
		3/18/2013	3.02	5913.51
		6/14/2013	4.69	5911.84
		9/13/2013	5.09	5911.44
		12/13/2013	3.55	5912.98
		3/21/2014	3.15	5913.38
		6/16/2014	4.98	5911.55
		9/19/2014	5.49	5911.04
		12/17/2014	4.11	5912.42
		3/19/2015	3.30	5913.23
		6/19/2015	4.24	5912.29
		9/14/2015	5.57	5910.96
		6/2/2016	Plugged and Abandoned	
MW-3	5920.57	6/25/2008	7.16	5913.41
		8/14/2008	8.86	5911.71
	5919.8	10/2/2008	7.63	5912.17
		1/13/2009	5.56	5914.24
		3/23/2009	5.56	5914.24
		6/29/2009	1.10	5918.70
		3/30/2010	5.38	5914.42
		6/11/2010	7.44	5912.36
		9/21/2010	8.22	5911.58
		12/16/2010	6.06	5913.74
		3/18/2011	5.42	5914.38
		6/23/2011	7.68	5912.89
		9/27/2011	7.13	5912.67
		12/12/2011	5.78	5914.79
		3/7/2012	5.33	5914.47
		6/4/2012	7.27	5912.53
		9/17/2012	8.15	5911.65
		1/9/2013	6.37	5913.43
		3/18/2013	5.68	5914.12
		6/14/2013	7.36	5912.44

Table 2
Monitoring Well Specifications and Groundwater Elevations
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*TOC Elevation* (ft AMSL)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level (ft AMSL)*
MW-3 Cont	5919.8	9/13/2013	7.72	5912.08
		12/13/2013	6.20	5913.60
		3/21/2014	5.89	5913.91
		6/16/2014	7.71	5912.09
		9/19/2014	8.13	5911.67
		12/17/2014	6.71	5913.09
		3/19/2015	5.98	5913.82
		6/19/2015	7.01	5912.79
		9/14/2015	8.21	5911.59
		6/2/2016	Plugged and Abandoned	
MW-4	5920.48	6/25/2008	4.27	5916.21
		8/14/2008	7.89	5912.59
	5919.69	10/2/2008	7.73	5911.96
		1/13/2009	5.94	5913.75
		3/23/2009	5.64	5914.05
		6/29/2009	6.84	5912.85
		3/30/2010	5.40	5914.29
		6/11/2010	7.23	5912.46
		9/21/2010	8.17	5911.52
		12/16/2010	6.24	5913.45
		3/18/2011	5.50	5914.19
		6/23/2011	7.50	5912.19
		9/27/2011	6.98	5912.71
		12/12/2011	5.94	5914.54
		3/7/2012	5.36	5914.33
		6/4/2012	7.18	5912.51
		9/17/2012	8.18	5911.51
		1/9/2013	6.53	5913.16
		3/18/2013	5.81	5913.88
		6/14/2013	7.40	5912.29
		9/13/2013	7.77	5911.92
		12/13/2013	6.37	5913.32
		3/21/2014	6.03	5913.66
		6/16/2014	7.63	5912.06
		9/19/2014	8.09	5911.60
		12/17/2014	6.87	5912.82
		3/19/2015	6.05	5913.64
		6/19/2015	6.92	5912.77
		9/14/2015	DRY (1)	NA
		6/2/2016	Plugged and Abandoned	

Table 2
Monitoring Well Specifications and Groundwater Elevations
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*TOC Elevation* (ft AMSL)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level (ft AMSL)*
MW-5	5923.63	6/26/2008	8.23	5915.40
		8/14/2008	8.68	5914.95
	5921.55	10/2/2008	8.70	5912.85
		1/13/2009	6.96	5914.59
		3/23/2009	6.58	5914.97
		6/29/2009	4.10	5917.45
		3/30/2010	NM	NM
		6/11/2010	8.20	5913.35
		9/21/2010	9.25	5912.30
		12/16/2010	7.40	5914.15
		3/18/2011	6.74	5914.81
		6/23/2011	NM	NM
		9/26/2011	8.25	5913.30
		12/12/2011	7.12	5916.51
		3/7/2012	6.65	5914.90
		6/4/2012	8.17	5913.38
		9/17/2012	9.30	5912.25
		1/9/2013	7.76	5913.79
		3/18/2013	7.05	5914.50
		6/14/2013	8.49	5913.06
		9/13/2013	8.97	5912.58
		12/13/2013	7.55	5914.00
		3/21/2014	7.17	5914.38
		6/16/2014	8.72	5912.83
		9/19/2014	9.35	5912.20
		12/17/2014	8.07	5913.48
		3/19/2015	7.33	5914.22
		6/19/2015	8.24	5913.31
		9/14/2015	9.48	5912.07
		6/2/2016	Plugged and Abandoned	
MW-6	5920.68	6/26/2008	6.75	5913.93
		8/14/2008	6.97	5913.71
	5918.64	10/2/2008	6.83	5911.81
		1/13/2009	4.89	5913.75
		3/23/2009	4.12	5914.52
		6/29/2009	1.80	5916.84
		3/30/2010	NM	NM
		6/11/2010	6.63	5912.01
		9/21/2010	7.41	5911.23
		12/16/2010	5.12	5913.52
		3/15/2011	4.49	5914.15
		6/23/2011	6.80	5911.84
		9/26/2011	6.33	5912.31
		12/12/2011	4.84	5915.84
		3/7/2012	4.46	5914.18
		6/4/2012	6.45	5912.19
		9/17/2012	7.37	5911.27
		1/9/2013	5.46	5913.18
		3/18/2013	4.80	5913.84
		6/14/2013	6.60	5912.04

Table 2
Monitoring Well Specifications and Groundwater Elevations
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*TOC Elevation* (ft AMSL)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level (ft AMSL)*
MW-6 Cont.	5918.64	9/13/2013	6.90	5911.74
		12/13/2013	5.32	5913.32
		3/21/2014	5.03	5913.61
		6/16/2014	6.85	5911.79
		9/19/2014	7.34	5911.30
		12/17/2014	5.79	5912.82
		3/19/2015	5.22	5913.42
		6/19/2015	6.21	5912.43
		9/14/2015	DRY (1)	NA
		6/2/2016	Plugged and Abandoned	
MW-7	5920.75	6/26/2008	6.32	5914.43
		8/14/2008	7.17	5913.58
	5918.74	10/2/2008	6.42	5912.32
		1/13/2009	NM	NM
		3/23/2009	4.67	5914.07
		6/29/2009	1.56	5917.18
		3/30/2010	NM	NM
		6/11/2010	NM	NM
		9/21/2010	NM	NM
		12/16/2010	4.91	5913.83
		3/18/2011	DRY (1)	NA
		6/23/2011	6.55	5912.19
		9/26/2011	6.14	5912.60
		12/12/2011	DRY (1)	NA
		3/7/2012	DRY (1)	NA
		6/4/2012	6.08	5912.66
		9/17/2012	7.11	5911.63
		1/9/2013	5.28	5913.46
		3/18/2013	4.54	5914.20
		6/14/2013	6.31	5912.43
		9/13/2013	6.66	5912.08
		12/13/2013	5.35	5913.39
		3/21/2014	4.70	5914.04
		6/16/2014	6.59	5912.15
		9/19/2014	7.14	5911.60
		12/17/2014	5.59	5913.15
		3/19/2015	4.98	5913.76
		6/19/2015	6.10	5912.64
		9/14/2015	7.34	5911.40
		6/3/2016	Plugged and Abandoned	

Notes:
Measurements between 6/25/2008 and 6/29/2009 obtained by Envirotech, Inc.
ft = feet
AMSL = Above mean sea level
NA = Not available
NM = Not measured
6. * = Elevation Measurements obtained from 2009 Envirotech investigation
* PVC casing stick up broken off, likely by cattle. Shallower depth to water reflects new top of casing (TOC) measuring
**Section of PVC reattached above ground surface. Depth to water reflects new measuring point.
*** 39-in section PVC added to top of casing resulting in new TOC elevation

Table 3
Field Parameters Summary
Hilcorp Energy Company
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Well ID	Sample Date	Temperature (°C)	pH	TDS (g/L)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Volume (gallons)
MW-1R								
	6/23/2016	18.40	6.43		4	2.23	-68.3	0.25
	3/6/2017	--	--	--	--	--	--	--
	3/13/2018	--	--	--	--	--	--	--
	6/25/2018	--	--	--	--	--	--	--
	9/4/2018	--	--	--	--	--	--	--
	12/6/2018	--	--	--	--	--	--	--
	2/26/2019	--	--	--	--	--	--	--
	5/17/2019	--	--	--	--	--	--	--
	8/9/2019	18.70	8.03	2.85	5.83	1.40	-72.9	0.25
	10/28/2019	--	7.27	1.230	6	5.70	-85.5	0.25

Notes:
TDS = total dissolved solids
DO = dissolved oxygen
ORP = oxidation-reduction potential
-- = insuficient volume to collect field parameters

Table 4
Hydrocarbon Groundwater Analytical Results Summary
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Naphthalene (mg/L)*
	NNEPA Standards			***0.005***	***1***	***0.7***	***10***	***6.2***
MW-1	MW-1	6/25/2008	(orig)	**1.85**	0.486	**0.971**	0.379	
	MW-1	9/25/2008	(orig)	**0.575**	0.66	0.293	1.547	
	MW-1	1/13/2009	(orig)	**0.494**	0.581	0.474	3.572	
	MW-1	3/23/2009	(orig)	**0.21**	0.311	0.378	1.418	
	MW-1	6/29/2009	(orig)	**0.839**	0.107	0.674	3.404	
	MW-1	3/30/2010	(orig)	**0.48**	0.11	0.25	1.573	
	MW-1	6/11/2010	(orig)	**3.2**	0.45	0.69	4.51	
	MW-1	9/21/2010	(orig)	**2.3**	**1.1**	0.25	4.84	
	MW-1	12/16/2010	(orig)	**0.18**	0.2	0.25	1.79	
	MW-1	3/18/2011	(orig)	**0.15**	0.14	0.16	1.083	
	GW-74935-062311-PG04	6/23/2011	(orig)	**3.2**	0.933	**0.972**	5.8	
	GW-74935-062311-PG05	6/23/2011	(Duplicate)	**3.38**	**1.45**	**1.06**	6.76	
	GW-074935-092611-CM-008	9/26/2011	(orig)	**1.56**	**2.61**	0.624	6.59	
	GW-074935-092611-CM-009	9/26/2011	(Duplicate)	**1.57**	**3.02**	**0.756**	7.26	
	GW-074935-121211-CB-MW-1	12/12/2011	(orig)	**0.232**	0.947	0.5	3.94	
	GW-074935-121211-CB-DUP	12/12/2011	(Duplicate)	**0.244**	0.994	0.58	4.65	
	GW-074935-3712-CB-MW-1	3/7/2012	(orig)	**0.0637**	0.366	0.293	2.23	
	GW-074935-3712-CB-DUP	3/7/2012	(Duplicate)	**0.0693**	0.416	0.333	2.63	
	GW-074935-060412-CB-MW-1	6/4/2012	(orig)	**0.956**	**2.38**	**0.919**	6.71	
	GW-074935-060412-CB-DUP	6/4/2012	(Duplicate)	**0.934**	**2.26**	**0.966**	6.36	
	GW-074935-091712-CM-MW-1	9/17/2012	(orig)	**0.941**	**3.51**	**0.785**	5.56	
	GW-074935-091712-CM-DUP	9/17/2012	(Duplicate)	**0.984**	**3.04**	**0.852**	5.87	
	GW-074935-010913-CM-MW-1	1/9/2013	(orig)	**0.125**	**1.14**	0.334	2.44	
	GW-074935-010913-CM-DUP	1/9/2013	(Duplicate)	**0.142**	**1.52**	0.438	3.09	
	GW-074935-031813-CM-MW-1	3/18/2013	(orig)	**0.012**	0.195	0.0871	0.581	
	GW-074935-031813-CM-DUP	3/18/2013	(Duplicate)	**0.0114**	0.188	0.0891	0.575	
	GW-074935-061413-JK-MW1	6/14/2013	(orig)	**0.174**	**1.41**	0.668	3.26	
	GW-074935-061413-JK-DUP	6/14/2013	(Duplicate)	**0.189**	**2.02**	**0.742**	4.17	
	GW-074935-091313-CM-MW-1	9/13/2013	(orig)	**0.0414**	**3.24**	0.123	4.34	
	GW-074935-091313-CM-DUP	9/13/2013	(Duplicate)	**0.0372**	**3.3**	0.126	4.43	
	GW-074935-121313-CM-MW-1	12/13/2013	(orig)	**0.0053**	0.188	0.122	0.681	
	GW-074935-121313-CM-DUP	12/13/2013	(Duplicate)	**0.0071**	0.258	0.148	0.843	
	GW-074935-032114-CK-MW-1	3/21/2014	(orig)	< 0.001	0.0348	0.0591	0.247	

Table 4
Hydrocarbon Groundwater Analytical Results Summary
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Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Naphthalene (mg/L)*
NNEPA Standards				***0.005***	***1***	***0.7***	***10***	***6.2***
MW-1 Cont.	GW-074935-032114-CK-DUP	3/21/2014	(Duplicate)	< 0.001	0.0385	0.0651	0.26	
	GW-074935-061614-CK-MW-1	6/16/2014	(orig)	**0.133**	**1.94**	**0.994**	4.5	
	GW-074935-061614-CK-DUP	6/16/2014	(Duplicate)	**0.134**	**1.92**	**0.921**	4.5	
	GW-074935-091914-CB-MW-1	9/19/2014	(orig)	**0.159**	**2.34**	0.63	3.38	
	GW-074935-121714-JW-MW-1	12/17/2014	(orig)	**0.0138**	0.422	0.248	1.48	
	GW-074935-121714-JW-DUP	12/17/2014	(Duplicate)	**0.0137**	0.44	0.251	1.52	
	GW-074935-031915-CM-MW-1	3/19/2015	(orig)	< 0.005	0.227	0.174	1.03	
	GW-074935-061915-CB-MW-1	6/19/2015	(orig)	**0.025**	0.326	0.496	2.44	
	GW-074935-061915-CB-DUP	6/19/2015	(Duplicate)	**0.0241**	0.306	0.472	2.31	
	GW-074935-091415-CK-MW-1	9/14/2015	(orig)	**0.0339**	0.0257	0.242	0.504	
	Plugged and Abandoned June 2016							
MW-1R	GW-074935-062316-SP-MW-1R	6/23/2016	(orig)	0.0026	0.002	0.0521	0.215	
	GW-074935-091216-CM-MW-1R	9/23/2016	(orig)	< 0.001	< 0.001	0.191	0.518	
	GW-074935-11282016-CN-MW-1R	11/28/2016	(orig)	**0.028**	0.0084	**0.901**	4.39	
	GW-074635-030617-CN-MW-1R	3/6/2017	(orig)	**0.0342**	<0.020	0.333	1.940	
	GW-074935-061217-CN-MW1R	6/12/2017	(orig)	**0.0162**	<0.010	0.304	0.522	
	GW-11146002-092517-CN-MW-1R	9/25/2017	(orig)	**0.0126**	<0.010	0.600	1.050	
	GW-11146002-120417-SP-MW-1R	12/4/2017	(dup)	**0.015**	**1.880**	**0.946**	7.960	
	GW-11146002-031318-CN-MW1R	3/13/2018	(orig)	<0.050	0.505	**0.840**	4.800	
	GW-11146002-062518-CM-MW-1R	6/25/2018	(orig)	<0.025	**1.010**	0.165	4.410	
	GW-11146002-090418-JP-MW-1R	9/4/2018	(orig)	<0.020	0.798	<0.020	1.550	
	MW-1R	12/6/2018	(orig)	<0.010	0.268	**0.922**	3.400	
	MW-1R	2/26/2019	(orig)	**0.0101**	0.519	0.576	6.710	
	MW-1R	5/17/2019	(orig)	<0.0100	<0.100	**0.923**	3.660	0.0753
	MW-1R	8/9/2019	(orig)	**0.0211**	<0.100	0.594	1.560	0.0258
	MW-1R	10/28/2019	(orig)	<0.250	<0.250	**1.11**	3.290	0.447

Table 4
Hydrocarbon Groundwater Analytical Results Summary
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Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Naphthalene (mg/L)*
	NNEPA Standards			***0.005***	***1***	***0.7***	***10***	***6.2***
MW-2	MW-2	6/25/2008	(orig)	0.0042	0.0046	0.0016	0.0011	
	MW-2	9/25/2008	(orig)	**0.0195**	0.0258	0.0051	0.1008	
	MW-2	1/13/2009	(orig)	0.0021	0.002	0.0022	0.0281	
	MW-2	3/23/2009	(orig)	0.0014	0.0004	0.0006	0.0073	
	MW-2	6/29/2009	(orig)	0.0015	< 0.0002	0.0002	0.0004	
	MW-2	3/30/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-2	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-2	9/21/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-2	12/16/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-2	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	GW-74935-062311-PG02	6/23/2011	(orig)	0.0006	< 0.001	< 0.001	< 0.003	
	GW-074935-092611-JP-010	9/26/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121211-CB-MW-2	12/12/2011	(orig)	0.00034	< 0.001	< 0.001	< 0.003	
	GW-074935-3712-CB-MW-2	3/7/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-060412-CB-MW-2	6/4/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091712-CM-MW-2	9/17/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-010913-CM-MW-2	1/9/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-031813-CM-MW-2	3/18/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-061413-JK-MW-2	6/14/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091313-CM-MW-2	9/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121313-CM-MW-2	12/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-032114-CK-MW-2	3/21/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-061614-CK-MW-2	6/16/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091914-CB-MW-2	9/19/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121714-JW-MW-2	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	Plugged and Abandoned June 2016							

Table 4
Hydrocarbon Groundwater Analytical Results Summary
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Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Naphthalene (mg/L)*
	NNEPA Standards			***0.005***	***1***	***0.7***	***10***	***6.2***
MW-3	MW-3	6/25/2008	(orig)	ND	ND	ND	ND	
	MW-3	9/25/2008	(orig)	ND	0.0023	0.0009	0.0121	
	MW-3	1/13/2009	(orig)	ND	ND	ND	ND	
	MW-3	3/23/2009	(orig)	< 0.0002	0.0002	0.0002	0.0014	
	MW-3	6/29/2009	(orig)	< 0.0002	0.0017	0.0007	0.0082	
	MW-3	3/30/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-3	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-3	9/21/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-3	12/16/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-3	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	GW-74935-062311-PG01	6/23/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-092611-CM-006	9/26/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121211-CB-MW-3	12/12/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-3712-CB-MW-3	3/7/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-060412-CB-MW-3	6/4/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091712-CM-MW-3	9/17/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-010913-CM-MW-3	1/9/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-031813-CM-MW-3	3/18/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-061413-JK-MW-3	6/14/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091313-CM-MW-3	9/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121313-CM-MW-3	12/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-032114-CK-MW-3	3/21/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-061614-CK-MW-3	6/16/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091914-CB-MW-3	9/19/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091914-CB-DUP	9/19/2014	(Duplicate)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121714-JW-MW-3	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	Plugged and Abandoned June 2016							

Table 4
Hydrocarbon Groundwater Analytical Results Summary
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Naphthalene (mg/L)*
	NNEPA Standards			***0.005***	***1***	***0.7***	***10***	***6.2***
MW-4	MW-4	6/25/2008	(orig)	0.0038	0.0199	0.0014	0.007	
	MW-4	9/25/2008	(orig)	ND	ND	ND	ND	
	MW-4	1/13/2009	(orig)	ND	ND	ND	ND	
	MW-4	3/23/2009	(orig)	< 0.0002	< 0.0002	< 0.0002	< 0.0002	
	MW-4	6/29/2009	(orig)	< 0.0002	< 0.0002	0.0002	0.0029	
	MW-4	3/30/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-4	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-4	9/21/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-4	12/16/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	MW-4	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	
	GW-74935-062311-PG03	6/23/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-092611-SP-007	9/26/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121211-CB-MW-4	12/12/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-3712-CB-MW-4	3/7/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-060412-CB-MW-4	6/4/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-010913-CM-MW-4	1/9/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091712-CM-MW-4	9/17/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-031813-CM-MW-4	3/18/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-061413-JK-MW-4	6/14/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091313-CM-MW-4	9/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121313-CM-MW-4	12/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-032114-CK-MW-4	3/21/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-061614-CK-MW-4	6/16/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-091914-CB-MW-4	9/19/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	GW-074935-121714-JW-MW-4	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	
	Plugged and Abandoned June 2016							
MW-5	MW-5	6/26/2008	(orig)	ND	ND	ND	ND	
	MW-5	9/25/2008	(orig)	ND	ND	ND	ND	
	MW-5	1/13/2009	(orig)	ND	ND	ND	ND	
	MW-5	3/23/2009	(orig)	ND	ND	ND	ND	
	Plugged and Abandoned June 2016							

Table 4
Hydrocarbon Groundwater Analytical Results Summary
Hilcorp Energy Company
Charles et al. No. 1

Well ID	*Sample ID*	*Date*	*Sample Type*	*Benzene (mg/L)*	*Toluene (mg/L)*	*Ethylbenzene (mg/L)*	*Xylenes (total) (mg/L)*	*Naphthalene (mg/L)*
NNEPA Standards				***0.005***	***1***	***0.7***	***10***	***6.2***
MW-6	MW-6	6/26/2008	(orig)	ND	ND	ND	ND	
	MW-6	9/25/2008	(orig)	ND	ND	ND	ND	
	MW-6	1/13/2009	(orig)	ND	ND	ND	ND	
	MW-6	3/23/2009	(orig)	ND	ND	ND	ND	
	Plugged and Abandoned June 2016							
MW-7	MW-7	6/26/2008	(orig)	ND	ND	ND	ND	
	MW-7	9/25/2008	(orig)	ND	ND	ND	ND	
	MW-7	3/23/2009	(orig)	ND	ND	ND	ND	
	Plugged and Abandoned June 2016							

Notes:
1. MW = monitoring well
2. ND = Not Detected
3. NNEPA = Navajo Nation Environmental Protection Agency
4. mg/L = milligrams per liter (parts per million)
5. < 1.0 = Below laboratory detection limit of 1.0 mg/L
6. **Bold** = concentrations that exceed the NNEPA limits
7. Analytes sampled between 6/25/2008 and 6/29/2009 obtained by Envirotech, Inc.

Table 5
Groundwater General Chemistry Analytical Results Summary
Hilcorp Energy Company
Charles et al. No. 1

Sample ID	*Date*	*Sodium (mg/L)*	*Potassium (mg/L)*	*TDS (mg/L)*	*Nitrate (as N)*	*Iron (mg/L)*	*Manganese (mg/L)*	*Chloride (mg/L)*	*Fluoride (mg/L)*	*Sulfate (mg/L)*	*Specific Conductance (µmhos/cm)*	*Alkalinity (mg/L)*	*Bicorbonate (mg/L)*	*pH*
NMWQCC Standard				***1000***	***10***	***1***	***0.2***	***250***	***1.6***	***600***				***7 - 9***
MW-1R	5/17/2019	1820	2.88	**7670**	<0.100	NS	**17.6**	111	0.297	**4300**	8440	1010	1010	7.53
MW-1R	8/9/2019	--	**--**	**5030**	--	**--**	**3.41**	--	**--**	**2900**	--	**--**	--	**--**
MW-1R	10/28/2019	--	**--**	**2850**	--	**--**	**1.17**	--	**--**	**1040**	--	**--**	--	**--**

Notes:
mg/L = milligrams per liter
NMWQCC = New Mexico Water Quality Control Commission
< x = analyte concentration below laboratory detection limit of x
Bold = exceeds NMWQCC groundwater standard
-- = Not Analyzed

Appendices

Appendix A
Supplemental NMWQCC Analyte List Approval

From: Jeffrey Walker
To: Smith, Cory, EMNRD; Clara Cardoza; Fields, Vanessa, EMNRD
Cc: Filing-NA; Griswold, Jim, EMNRD; Steve Austin (nnepawq@frontiernet.net)
Bcc: 011146002
Subject: RE: 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~ Incident # NRMD0928136813
Date: Monday, March 25, 2019 11:02:00 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png

Thanks Cory, will do-

From: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>
Sent: Monday, March 25, 2019 10:58 AM
To: Jeffrey Walker <Jeff.Walker@ghd.com>; Clara Cardoza <ccardoza@hilcorp.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>
Cc: Filing-NA <filing@craworld.com>; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Steve Austin (nnepawq@frontiernet.net) <nnepawq@frontiernet.net>
Subject: RE: 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~ Incident # NRMD0928136813

Jeff,

OCD approves HEC sampling parameters. Please include this approval in the next AGWMR.

OCD approval does not relieve HEC of any other requirements imposed by other regulatory agencies.

Thanks,

Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us

From: Jeff.Walker@ghd.com <Jeff.Walker@ghd.com>
Sent: Monday, March 25, 2019 10:38 AM
To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>; Clara Cardoza <ccardoza@hilcorp.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>
Cc: filing@craworld.com; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Steve Austin (nnepawq@frontiernet.net) <nnepawq@frontiernet.net>
Subject: [EXT] RE: 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~ Incident # NRMD0928136813

Mr. Smith

HEC/GHD fully understand the 8 consecutive quarter requirement for closure with regard to groundwater constituents-not sure why you keep referring to the 4 quarter scenario..?

With regard to sampling for applicable 3103 constituents, HEC/GHD propose the following list:

EPA Method 8260-Full range, to include VOCs and naphthalenes
chloride
nitrate
sulfate
fluoride
total alkalinity
total dissolved solids
bicarbonate
specific conductance
pH
iron
manganese
sodium
potassium

HEC will have their laboratory analyze for these constituents at the next quarterly sampling event. Please let us know if this list of groundwater constituents is acceptable.

Thank you-

From: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>
Sent: Thursday, February 07, 2019 2:18 PM
To: Jeffrey Walker <Jeff.Walker@ghd.com>; Clara Cardoza <ccardoza@hilcorp.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>
Cc: Filing-NA <filing@craworld.com>; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Steve Austin (nnepawq@frontiernet.net) <nnepawq@frontiernet.net>
Subject: RE: 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~ Incident # NRMD0928136813

Mr. Walker,

Per 20.6.2.4103.D NMAC - "Subsurface-water and surface-water abatement shall not be considered complete until a minimum of eight (8) consecutive quarterly samples from all compliance sampling stations approved by the secretary meet the abatement standards of Subsections A, B and C of this section. Abatement of water contaminants measured in solid-matrix samples of the vadose zone shall be considered complete after one-time sampling from compliance stations approved by the secretary."

If HilCorp can provide the OCD an approved sampling or Work plan signed by an OCD representative (Messrs. Olson, VonGonten and Bayliss) approving the 4 consecutive quarters to close the site than the OCD can review those documents. However as GHD mentioned there has been no ground water monitor work plans submitted for this site nor any other site for COP/HEC in the San Juan Basin for the last 7 years and therefore the requirement of 20.6.2.4103.D NMAC apply. Mr. Griswold has tasked District III Environmental Specialists to manage our Districts ground water cases now and for the foreseeable future.

Since 2010 COPC/HEC has only ever sampled the water for BTEX constituents, this pipeline release has the potential to release produce water, natural gas, and natural gas liquids. To verify that the release impacts and to verify closure HEC needs to sample for the applicable constituents in 20.6.2.3103 which at a minimum should include TDS, ph, Cation, Anion, Iron, Manganese, and Extended range BTEX .

The NNEPA and the NMOCD work jointly to achieve remediation on soil and ground water impacts on the Navajo Nation with the NNEPA retaining primacy.

Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us

From: Jeff.Walker@ghd.com <Jeff.Walker@ghd.com>
Sent: Friday, February 1, 2019 2:33 PM
To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>; Clara Cardoza <ccardoza@hilcorp.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>
Cc: filing@craworld.com; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Steve Austin (nnepawq@frontiernet.net) <nnepawq@frontiernet.net>
Subject: [EXT] RE: 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~ Incident # NRMD0928136813

Mr. Smith,

Please see responses below submitted on behalf of Hilcorp Energy with regard to incident # NRMD0928136813

From: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>
Sent: Monday, January 28, 2019 11:46 AM
To: Clara Cardoza <ccardoza@hilcorp.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>
Cc: Filing-NA <filing@craworld.com>; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Jeffrey Walker <Jeff.Walker@ghd.com>; Steve Austin (nnepawq@frontiernet.net) <nnepawq@frontiernet.net>
Subject: RE: 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~

Clara,

OCD and received and reviewed the Charles et Al #1 2018 Annual Ground Water Report for 3R-432 and has accepted for record the report with the following conditions.

- OCD will require **8** consecutive quarters of sampling per 20.6.2.4103 NMAC (Unless HEC can provide to OCD an APPROVED plan that states otherwise.)

Previous site producer ConocoPhillips (COP) and Hilcorp (HEC) have been conducting groundwater monitoring at this site on a quarterly basis for 10 years. We are aware of the requirement of 8 consecutive quarters of below standard concentrations for a given constituent to achieve site closure. It is not entirely clear what is meant by "an approved plan that states otherwise". There have been no groundwater monitoring workplans submitted for this site or any other COP/HEC SJ basin site for the 7 or so years CRA/GHD have been consulting. For at least that long (going back to when TetraTech was the consultant), in working with COP/HEC on these sites with the NMOCD Dist. III hydrologists in Santa Fe (Messrs. von Gonten, then Bayliss), the arrangement was to conduct a sit down meeting, generally on an annual basis, to discuss in detail individual site groundwater issues. Mr. von Gonten evidently did not have the time or inclination to review or provide comment on either workplans or annual reports and so preferred this method. The last such meeting was conducted with Mr. Bayliss 9/18/17 @ the Dist. III office although this meeting was not specifically to discuss groundwater issues. This was at the time of the transition between COP and HEC and representatives of both site owners were present. Mr. Bayliss has also provided brief comment on some annual reports, but these were more of the nature of approving proposed remedial efforts (MDPE, NAPL recovery, etc) rather than to address specific sampling parameters, schedules, etc. Please confirm with your Bureau Chief, Mr. Griswold, who was present for most of these meetings, that this arrangement for discussing individual site groundwater monitoring schedules, sampling parameters, and path forward to satisfy NMOCD requirements (in lieu of a workplan approval process), was the accepted practice. Until such time as a replacement Dist. III hydrologist is named, if that is indeed the bureau's plan, should your office and the Environmental Bureau desire to depart from this arrangement and require individual annual groundwater monitoring plans for each site, HEC can accommodate.

- HEC need to include additional information for vadose zone delineation/sampling that occurred during the excavation in July of 2016. Executive summary of the excavation, size, amount of soils removed, results of any sampling if no sampling HEC needs to explain why.)

There is no additional information to provide as the small excavation was not intended as a vadose zone delineation/sampling exercise. The 2016 well PnA and excavation are summarized in the 2016 annual report. The excavation of a small area around MW1 was an add on to the original scope to pull the non-detect PVC monitor wells MW-2 – MW-7 and to remove and replace the MW1 monitor well. MW-2 thru MW-7 could pull easily out of the ground, but MW-1 had a 55-gal drum, embedded in concrete, with a solar powered fan mounted on top and would need to be excavated. The integrity of the MW-1 well/solar SVE apparatus had always been in question, and it was the only well of all seven relatively close-spaced wells to ever show any hydrocarbon impacts in 10 years of monitoring. Since groundwater was very shallow, COP decided to dig out around the well in the process of removing and replacing it to see if there was just a pocket of impacted soils in the immediate vicinity keeping the groundwater samples from falling below standards for hydrocarbons. The excavation did remove some visually impacted soils and the extent of excavation was very limited due to pipelines (Chevron and COP) on either side of MW-1. GHD were advised at the time (Spring 2016) by the COP Tribal Liaison (Collette Brown) to seek approval for this work from the Federal Indian Minerals Office prior to the work (Navajo Nation oversight jurisdiction belonging to NNEPA was not communicated to consultant by COP; turnover of COP site managers-6 individuals over 5 years-no doubt a contributing factor; this was communicated to Mr. Austin in a separate email, with assurance to correct going forward). A workplan was subsequently submitted and approved by FIMO and BLM, and a wetlands study was contracted (SME Env.) including USACE pre-construction notification, etc. Jurisdiction with regard to environmental oversight is still in question. Mr. Griswold, during one of the aforementioned meetings to discuss the site, stated that NMOCD was not entirely sure if they indeed had jurisdiction. A Plugging Plan of Operations-a pre-PnA requirement for all groundwater wells in NM-was sought through the NMOSE for this work, but NMOSE indicated they did not have jurisdiction on Navajo Nation lands. Perhaps this issue can serve to clear up whether NMOCD or NNEPA (dual?) has overall jurisdiction.

- After review, HEC/COPC has never sampled MW-1/1R for all constituents listed in 20.2.6.3103 NMAC Prior to closure sampling at least 1 sampling including all the constituents will need to be collected. Please keep in mind if the sampling results indicate elevated levels additional sampling and or monitor wells may be required.

NMAC 20.2.6.3103 lists the maximum allowable concentrations in groundwater for those constituents. Many of those constituents do not apply to releases at oil and gas sites and it is not evident in NMAC 20.2.6 exactly where it is stated that all constituents need to be collected at all sites for closure. There are several COP/HEC groundwater sites, and no doubt other sites, that have been granted closure by NMOCD without having been sampled for all 20.2.6.3103 listed constituents, several in the last year by the Dist III hydrologist. BTEX constituents are the primary and known contaminants of concern at this site. From experience, the literature, etc, no doubt at this petroleum hydrocarbon contaminated site, natural attenuation of the hydrocarbon plume has created reducing groundwater conditions that can create the potential for some naturally occurring metals, such as manganese and iron, to occur in the dissolved phase, possibly in concentrations above the standards. There is no doubt that impacted soils remain in the subsurface from the original release, further excavation of these soils is 1)limited by encroaching pipelines on either side of MW-1 and 2) would cause much greater environmental damage to this designated wetland than would be achieved by removal. As such, this remote site, in a designated wetlands setting, is a prime candidate for remediation by natural attenuation, and that this remedy will be protective of human health and the environment, similar to the aforementioned sites that have been granted closure with existing dissolved phase metals in concentrations above groundwater standards.
OCD has also assigned this incident to below highlighted incident# please include this on all communication and reports going forward.

NRMD0928136813 CHARLES ET AL #001 @ 30-045-06623

General Incident Information

Site Name:	CHARLES ET AL #001		
Well:	[30-045-06623] CHARLES ET AL #001		
Facility:			
Operator:	[373888] Harvest Four Corners, LLC		
Status:	Closure Not Approved	**Severity:**	Major
Type:	Natural Gas Release	**Surface Owner:**	Indian
District:	Aztec	**County:**	San Juan (45)
Incident Location:	J-12-27N-09W 1450 FSL 1450 FEL		
Lat/Long:	36.5864296,-107.7359238 NAD83		

All other requirements remain the same as previously communicated. Acceptance of this Annual ground water report does not relieve HEC of any other requirements imposed by other regulatory agencies.

Cory Smith
Environmental Specialist
Oil Conservation Division
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(505)334-6178 ext 115
cory.smith@state.nm.us

From: Jeff.Walker@ghd.com <Jeff.Walker@ghd.com>
Sent: Tuesday, January 22, 2019 10:12 AM
To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>
Cc: Clara Cardoza <ccardoza@hilcorp.com>; filing@craworld.com
Subject: [EXT] 3R-432 Charles et al #1 2018 Annual GWM Rpt. ~RPT-11146002~

Cory/Vanessa,

Please find attached the 2018 Annual Groundwater Monitoring report for the subject site, submitted on behalf of Hilcorp Energy. Please let Clara or me know if you have any questions regarding this document or the site.

Also, please acknowledge receipt for record keeping.

Thank you-Jeff

Jeffrey L. Walker
Sr. Project Manager

GHD
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Appendix B
Laboratory Analytical Reports

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

March 06, 2019

HilCorp-Farmington, NM

Sample Delivery Group:	L1074333
Samples Received:	02/28/2019
Project Number:	
Description:	Charles et al No. 1
Report To:	Clara Cardoza
	382 Road 3100
	Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
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 National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

TABLE OF CONTENTS

CHARLES ET AL #1 L1074333-01 GW

Collected by	Collected date/time	Received date/time
	02/26/19 12:35	02/28/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1243708	10	03/01/19 13:13	03/01/19 13:13	TJJ	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1245494	50	03/06/19 03:04	03/06/19 03:04	JHH	Mt. Juliet, TN

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.

Daphne R Richards

Daphne Richards
Project Manager

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	0.0101		0.0100	10	03/01/2019 13:13	WG1243708
Toluene	0.519		0.0100	10	03/01/2019 13:13	WG1243708
Ethylbenzene	0.576		0.0100	10	03/01/2019 13:13	WG1243708
Total Xylenes	6.71		0.150	50	03/06/2019 03:04	WG1245494
(S) Toluene-d8	*90.2*		*80.0-120*		*03/01/2019 13:13*	WG1243708
(S) Toluene-d8	*97.5*		*80.0-120*		*03/06/2019 03:04*	WG1245494
(S) a,a,a-Trifluorotoluene	*104*		*80.0-120*		*03/01/2019 13:13*	WG1243708
(S) a,a,a-Trifluorotoluene	*95.7*		*80.0-120*		*03/06/2019 03:04*	WG1245494
(S) 4-Bromofluorobenzene	*91.2*		*77.0-126*		*03/01/2019 13:13*	WG1243708
(S) 4-Bromofluorobenzene	*103*		*77.0-126*		*03/06/2019 03:04*	WG1245494
(S) 1,2-Dichloroethane-d4	*100*		*70.0-130*		*03/01/2019 13:13*	WG1243708
(S) 1,2-Dichloroethane-d4	*98.0*		*70.0-130*		*03/06/2019 03:04*	WG1245494

Method Blank (MB)

(MB) R3388591-3 03/01/19 06:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
(S) Toluene-d8	*98.6*			*80.0-120*
(S) a,a,a-Trifluorotoluene	*109*			*80.0-120*
(S) 4-Bromofluorobenzene	*89.4*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*96.5*			*70.0-130*

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

(LCS) R3388591-1 03/01/19 05:17 • (LCSD) R3388591-2 03/01/19 05:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0263	0.0270	105	108	70.0-123			2.55	20
Ethylbenzene	0.0250	0.0247	0.0259	98.8	104	79.0-123			4.76	20
Toluene	0.0250	0.0219	0.0254	87.8	102	79.0-120			14.5	20
(S) Toluene-d8				*82.5*	*94.2*	*80.0-120*				
(S) a,a,a-Trifluorotoluene				*102*	*107*	*80.0-120*				
(S) 4-Bromofluorobenzene				*96.4*	*91.9*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*92.9*	*94.6*	*70.0-130*				

Method Blank (MB)

(MB) R3389059-3 03/05/19 22:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*101*			*80.0-120*
(S) a,a,a-Trifluorotoluene	*98.4*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.1*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*93.0*			*70.0-130*

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

(LCS) R3389059-1 03/05/19 21:08 • (LCSD) R3389059-2 03/05/19 21:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Xylenes, Total	0.0750	0.0822	0.0831	110	111	79.0-123			1.09	20
(S) Toluene-d8				*100*	*99.7*	*80.0-120*				
(S) a,a,a-Trifluorotoluene				*94.6*	*95.1*	*80.0-120*				
(S) 4-Bromofluorobenzene				*103*	*103*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*107*	*106*	*70.0-130*				

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.

Abbreviations and Definitions

MDL	Method Detection 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 Reporting Limit (or MDL where applicable).
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

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

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 [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	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	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	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

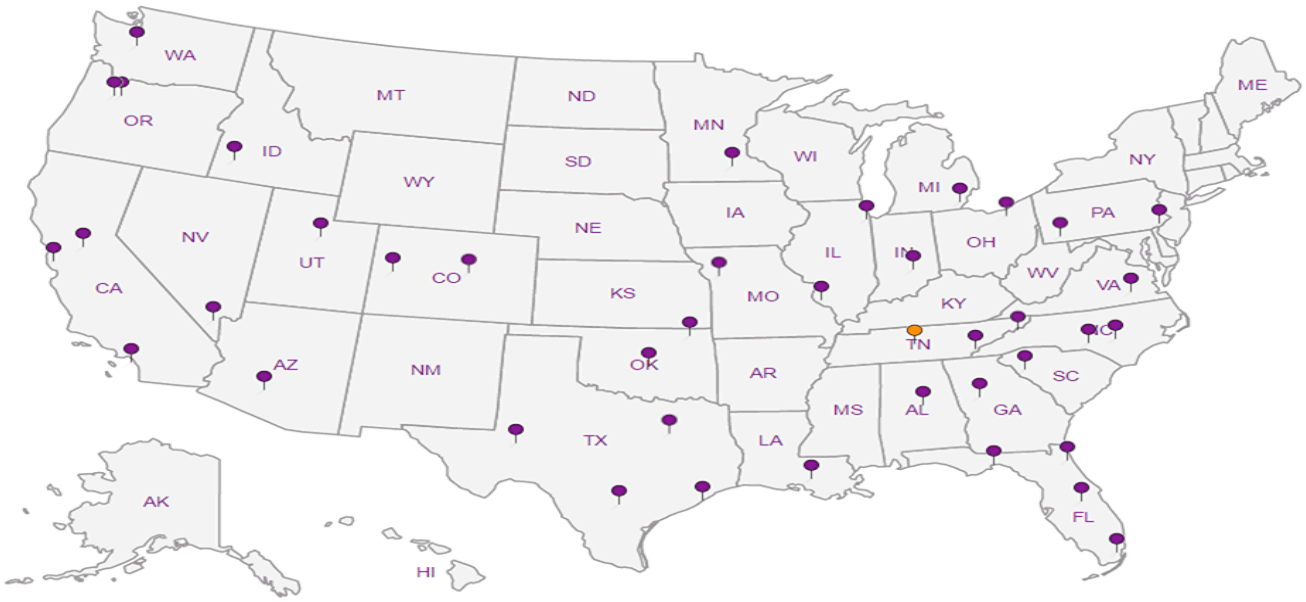
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] 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.



CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

L1074333

ALL SHADED AREAS are for LAB USE ONLY

Company: **HilCorp-Farmington, NM**	Billing Information: **PO Box 61529 Houston, TX 77208** khoekstra@hilcorp.com
Address: **382 Road 3100 Aztec, NM 87401**	
Report To: CLARA CARDOZA	Email To: ccardoza@hilcorp.com
Copy To: KURT HOEKSTRA	Site Collection Info/Address:
Customer Project Name/Number:	State: / County/City: Time Zone Collected: PT MT CT ET
Phone: **505-486-9543** Email:	Site/Facility ID #: CHARLES etal #1
Collected by (print):	Purchase Order #: Quote #:
Collected by (signature):	Turnaround Date Required:
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive _____ [ ] Hold _____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [X] 5 Day (Expedite Charges Apply)
	Compliance Monitoring? [ ] Yes [ ] No
	DW PWS ID #: DW Location Code:
	Immediately Packed on Ice: [ ] Yes [ ] No
	Field Filtered (if applicable): [ ] Yes [ ] No Analysis: _____

Container Preservative Type **

Lab Project Manager: **288 - Daphne Richards**

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	(Y)	N	NA
Bottles Intact	(Y)	N	NA
Correct Bottles	(Y)	N	NA
Sufficient Volume	(Y)	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips: _____			
Sample pH Acceptable	Y	N	NA
pH Strips: _____			
Sulfide Present	Y	N	NA
Lead Acetate Strips: _____			

LAB USE ONLY:
Lab Sample # / Comments

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Cons	BTEX 8260										Lab Sample # / Comments
CHARLES etal #1	GW		2-26	12:35				2	X										-01

Customer Remarks / Special Conditions / Possible Hazards:

#Error

#Error

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

LAB Tracking #: 4794 8827 3391

Samples received via: (FEDEX) UPS Client Courier Pace Courier

LAB Sample Temperature Info:

Temp Blank Received: Y N NA

Therm ID#: _____

Cooler 1 Temp Upon Receipt ____oC

Cooler 1 Therm Corr. Factor ____oC

Cooler 1 Corrected Temp ____oC

Comments:

Trip Blank Received: Y N NA

HCL MeOH TSP Other

NonConformance(s) YES / NO

Page ____ of ____

Relinquished by/Company: (Signature) Kurt Hoekstra	Date/Time: 7:20 2-27-19	Received by/Company: (Signature)
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)

Date/Time: 2/28/19 0845	MTJL LAB USE ONLY
Date/Time:	Table # C160
Date/Time:	Acctnum: **HILCORANM**
	Template:
	Prelogin:
	PM: **288 - Daphne Richards**
	PB:

rec 2VB, no TB 0.9+0 PN 3/5

RAD SCREEN: <0.5 mR/hr

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 29, 2019

HilCorp-Farmington, NM

Sample Delivery Group:	L1101012
Samples Received:	05/21/2019
Project Number:	
Description:	Charles et al No. 1
Site:	CHARLES ET AL NO. 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
Project Manager

TABLE OF CONTENTS

MW-1R L1101012-01 GW

Collected by	Collected date/time	Received date/time
Kurt	05/17/19 11:00	05/21/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1285192	1	05/24/19 09:13	05/24/19 10:32	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1286070	1	05/26/19 12:04	05/26/19 12:04	MCG	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG1285060	1	05/22/19 15:01	05/22/19 15:01	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9050A	WG1285418	1	05/23/19 16:06	05/23/19 16:06	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1286696	1	05/27/19 01:53	05/27/19 01:53	ST	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1286696	100	05/26/19 21:29	05/26/19 21:29	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1284760	1	05/22/19 15:34	05/23/19 23:03	TRB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1284760	5	05/22/19 15:34	05/24/19 08:47	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1286680	10	05/25/19 13:58	05/25/19 13:58	JAH	Mt. Juliet, TN

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.

Daphne R Richards

Daphne Richards
Project Manager

Sample Handling and Receiving

VOC pH outside of method requirement.

Lab Sample ID	Project Sample ID	Method
L1101012-01	MW-1R	8260B

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	7670		100	1	05/24/2019 10:32	WG1285192

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	1010		20.0	1	05/26/2019 12:04	WG1286070
Alkalinity,Bicarbonate	1010		20.0	1	05/26/2019 12:04	WG1286070

Sample Narrative:

L1101012-01 WG1286070: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
pH	7.53	T8	1	05/22/2019 15:01	WG1285060

Sample Narrative:

L1101012-01 WG1285060: 7.53 at 8.5C

Wet Chemistry by Method 9050A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	umhos/cm		umhos/cm		date / time	
Specific Conductance	8440		10.0	1	05/23/2019 16:06	WG1285418

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	111		100	100	05/26/2019 21:29	WG1286696
Fluoride	0.297		0.100	1	05/27/2019 01:53	WG1286696
Nitrate as (N)	ND	Q	0.100	1	05/27/2019 01:53	WG1286696
Sulfate	4300		500	100	05/26/2019 21:29	WG1286696

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Manganese	17.6		0.0100	1	05/23/2019 23:03	WG1284760
Potassium	2.88		1.00	1	05/23/2019 23:03	WG1284760
Sodium	1820		5.00	5	05/24/2019 08:47	WG1284760

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acetone	ND		0.500	10	05/25/2019 13:58	WG1286680
Acrolein	ND	J4	0.500	10	05/25/2019 13:58	WG1286680
Acrylonitrile	ND		0.100	10	05/25/2019 13:58	WG1286680
Benzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Bromobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Bromodichloromethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
Bromoform	ND		0.0100	10	05/25/2019 13:58	WG1286680
Bromomethane	ND		0.0500	10	05/25/2019 13:58	WG1286680
n-Butylbenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
sec-Butylbenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
tert-Butylbenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Carbon tetrachloride	ND		0.0100	10	05/25/2019 13:58	WG1286680
Chlorobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Chlorodibromomethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
Chloroethane	ND		0.0500	10	05/25/2019 13:58	WG1286680
Chloroform	ND		0.0500	10	05/25/2019 13:58	WG1286680
Chloromethane	ND		0.0250	10	05/25/2019 13:58	WG1286680
2-Chlorotoluene	ND		0.0100	10	05/25/2019 13:58	WG1286680
4-Chlorotoluene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,2-Dibromo-3-Chloropropane	ND		0.0500	10	05/25/2019 13:58	WG1286680
1,2-Dibromoethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
Dibromomethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,2-Dichlorobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,3-Dichlorobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,4-Dichlorobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Dichlorodifluoromethane	ND		0.0500	10	05/25/2019 13:58	WG1286680
1,1-Dichloroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,2-Dichloroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1-Dichloroethene	ND		0.0100	10	05/25/2019 13:58	WG1286680
cis-1,2-Dichloroethene	ND		0.0100	10	05/25/2019 13:58	WG1286680
trans-1,2-Dichloroethene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,2-Dichloropropane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1-Dichloropropene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,3-Dichloropropane	ND		0.0100	10	05/25/2019 13:58	WG1286680
cis-1,3-Dichloropropene	ND		0.0100	10	05/25/2019 13:58	WG1286680
trans-1,3-Dichloropropene	ND		0.0100	10	05/25/2019 13:58	WG1286680
2,2-Dichloropropane	ND		0.0100	10	05/25/2019 13:58	WG1286680
Di-isopropyl ether	ND		0.0100	10	05/25/2019 13:58	WG1286680
Ethylbenzene	0.923		0.0100	10	05/25/2019 13:58	WG1286680
Hexachloro-1,3-butadiene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Isopropylbenzene	0.0829		0.0100	10	05/25/2019 13:58	WG1286680
p-Isopropyltoluene	ND		0.0100	10	05/25/2019 13:58	WG1286680
2-Butanone (MEK)	ND		0.100	10	05/25/2019 13:58	WG1286680
Methylene Chloride	ND		0.0500	10	05/25/2019 13:58	WG1286680
4-Methyl-2-pentanone (MIBK)	ND		0.100	10	05/25/2019 13:58	WG1286680
Methyl tert-butyl ether	ND		0.0100	10	05/25/2019 13:58	WG1286680
Naphthalene	0.0753	J4	0.0500	10	05/25/2019 13:58	WG1286680
n-Propylbenzene	0.0778		0.0100	10	05/25/2019 13:58	WG1286680
Styrene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1,1,2-Tetrachloroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1,2,2-Tetrachloroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1,2-Trichlorotrifluoroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
Tetrachloroethene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Toluene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,2,3-Trichlorobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,2,4-Trichlorobenzene	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1,1-Trichloroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
1,1,2-Trichloroethane	ND		0.0100	10	05/25/2019 13:58	WG1286680
Trichloroethene	ND		0.0100	10	05/25/2019 13:58	WG1286680
Trichlorofluoromethane	ND		0.0500	10	05/25/2019 13:58	WG1286680
1,2,3-Trichloropropane	ND	J4	0.0250	10	05/25/2019 13:58	WG1286680
1,2,4-Trimethylbenzene	0.557		0.0100	10	05/25/2019 13:58	WG1286680
1,2,3-Trimethylbenzene	0.0925		0.0100	10	05/25/2019 13:58	WG1286680
1,3,5-Trimethylbenzene	0.0749		0.0100	10	05/25/2019 13:58	WG1286680
Vinyl chloride	ND		0.0100	10	05/25/2019 13:58	WG1286680
Xylenes, Total	3.66		0.0300	10	05/25/2019 13:58	WG1286680
(S) Toluene-d8	*90.6*		*80.0-120*		*05/25/2019 13:58*	WG1286680

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*05/25/2019 13:58*	WG1286680
(S) 1,2-Dichloroethane-d4	*101*		*70.0-130*		*05/25/2019 13:58*	WG1286680

Sample Narrative:

L1101012-01 WG1286680: Non-target compounds too high to run at a lower dilution.

Method Blank (MB)

(MB) R3415490-1 05/24/19 10:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		2.82	10.0

L1100381-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1100381-01 05/24/19 10:32 • (DUP) R3415490-3 05/24/19 10:32

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	2830	2820	1	0.354		5

Laboratory Control Sample (LCS)

(LCS) R3415490-2 05/24/19 10:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8720	99.1	85.0-115	

Method Blank (MB)

(MB) R3415082-1 05/26/19 09:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity	2.84	J	2.71	20.0
Alkalinity,Bicarbonate	2.84	J	2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1100775-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1100775-01 05/26/19 09:23 • (DUP) R3415082-2 05/26/19 09:28

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	23.9	23.8	1	0.249		20
Alkalinity,Bicarbonate	23.9	23.8	1	0.249		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

L1101012-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1101012-01 05/26/19 12:04 • (DUP) R3415082-6 05/26/19 12:11

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	1010	1010	1	0.0257		20
Alkalinity,Bicarbonate	1010	1010	1	0.0257		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3415082-5 05/26/19 10:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	102	102	85.0-115	

Laboratory Control Sample (LCS)

(LCS) R3415082-5 05/26/19 10:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier

Sample Narrative:

LCS: Endpoint pH 4.5

L1100970-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1100970-04 05/22/19 15:01 • (DUP) R3413795-2 05/22/19 15:01

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.34	8.36	1	0.240		1

Sample Narrative:

OS: 8.34 at 10.9C

DUP: 8.36 at 10.9C

L1101267-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1101267-03 05/22/19 15:01 • (DUP) R3413795-3 05/22/19 15:01

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.57	7.55	1	0.265		1

Sample Narrative:

OS: 7.57 at 14.2C

DUP: 7.55 at 14.2C

Laboratory Control Sample (LCS)

(LCS) R3413795-1 05/22/19 15:01

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.99	99.9	99.0-101	

Sample Narrative:

LCS: 9.99 at 22C

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

Method Blank (MB)

(MB) R3414355-1 05/23/19 16:06

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

L1099326-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1099326-01 05/23/19 16:06 • (DUP) R3414355-3 05/23/19 16:06

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	546	549	1	0.548		20

L1100826-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1100826-03 05/23/19 16:06 • (DUP) R3414355-4 05/23/19 16:06

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	4560	4590	1	0.656		20

Laboratory Control Sample (LCS)

(LCS) R3414355-2 05/23/19 16:06

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	445	445	100	90.0-110	

Method Blank (MB)

(MB) R3415303-1 05/26/19 12:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Nitrate	U		0.0227	0.100
Sulfate	U		0.0774	5.00

L1100824-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1100824-02 05/26/19 17:05 • (DUP) R3415303-3 05/26/19 17:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	5.24	5.22	1	0.373		15
Fluoride	0.565	0.564	1	0.106		15
Nitrate	ND	0.0518	1	4.95	J	15
Sulfate	28.0	27.9	1	0.117		15

L1101101-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1101101-06 05/26/19 23:50 • (DUP) R3415303-6 05/27/19 00:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	55.5	55.4	1	0.180		15
Fluoride	0.453	0.452	1	0.0442		15
Nitrate	U	0.000	1	0.000		15
Sulfate	22.4	22.3	1	0.140		15

Laboratory Control Sample (LCS)

(LCS) R3415303-2 05/26/19 13:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	40.4	101	80.0-120	
Fluoride	8.00	8.15	102	80.0-120	
Nitrate	8.00	8.24	103	80.0-120	
Sulfate	40.0	40.9	102	80.0-120	

L1100945-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1100945-01 05/26/19 18:15 • (MS) R3415303-4 05/26/19 18:33 • (MSD) R3415303-5 05/26/19 18:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	3.74	56.8	57.0	106	106	1	80.0-120			0.259	15
Fluoride	5.00	0.170	5.52	5.53	107	107	1	80.0-120			0.302	15
Nitrate	5.00	0.0550	5.37	5.36	106	106	1	80.0-120			0.127	15
Sulfate	50.0	0.853	53.7	53.8	106	106	1	80.0-120			0.264	15

L1101101-06 Original Sample (OS) • Matrix Spike (MS)

(OS) L1101101-06 05/26/19 23:50 • (MS) R3415303-7 05/27/19 00:25

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	55.5	103	95.3	1	80.0-120	E
Fluoride	5.00	0.453	5.52	101	1	80.0-120	
Nitrate	5.00	U	4.87	97.3	1	80.0-120	
Sulfate	50.0	22.4	72.0	99.2	1	80.0-120	

Method Blank (MB)

(MB) R3414458-1 05/23/19 22:27

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Manganese	U		0.00120	0.0100
Potassium	U		0.102	1.00
Sodium	0.176	J	0.0985	1.00

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

(LCS) R3414458-2 05/23/19 22:29 • (LCSD) R3414458-3 05/23/19 22:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Manganese	1.00	0.931	0.957	93.1	95.7	80.0-120			2.74	20
Potassium	10.0	9.28	9.47	92.8	94.7	80.0-120			2.01	20
Sodium	10.0	9.80	10.1	98.0	101	80.0-120			2.72	20

L1100525-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1100525-03 05/23/19 22:35 • (MS) R3414458-5 05/23/19 22:41 • (MSD) R3414458-6 05/23/19 22:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Manganese	1.00	0.0536	0.963	0.984	91.0	93.0	1	75.0-125			2.07	20
Potassium	10.0	3.74	12.7	13.0	90.1	92.4	1	75.0-125			1.77	20
Sodium	10.0	51.2	58.9	58.4	76.8	72.0	1	75.0-125		V	0.816	20

Method Blank (MB)

(MB) R3415424-3 05/25/19 12:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100
Hexachloro-1,3-butadiene	0.000768	J	0.000256	0.00100

Method Blank (MB)

(MB) R3415424-3 05/25/19 12:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
1,2,3-Trichlorobenzene	0.000289	J	0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*92.4*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.2*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*

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

(LCS) R3415424-1 05/25/19 11:48 • (LCSD) R3415424-2 05/25/19 12:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.108	0.116	86.0	92.8	19.0-160			7.63	27
Acrolein	0.125	0.197	0.212	158	170	10.0-160		J4	7.43	26
Acrylonitrile	0.125	0.133	0.126	107	101	55.0-149			5.64	20
Benzene	0.0250	0.0296	0.0286	118	114	70.0-123			3.34	20

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

(LCS) R3415424-1 05/25/19 11:48 • (LCSD) R3415424-2 05/25/19 12:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromobenzene	0.0250	0.0299	0.0292	120	117	73.0-121			2.57	20
Bromodichloromethane	0.0250	0.0278	0.0272	111	109	75.0-120			2.27	20
Bromoform	0.0250	0.0237	0.0233	94.9	93.4	68.0-132			1.60	20
Bromomethane	0.0250	0.0176	0.0188	70.2	75.3	10.0-160			6.99	25
n-Butylbenzene	0.0250	0.0276	0.0267	110	107	73.0-125			3.33	20
sec-Butylbenzene	0.0250	0.0287	0.0277	115	111	75.0-125			3.38	20
tert-Butylbenzene	0.0250	0.0308	0.0291	123	116	76.0-124			5.51	20
Carbon tetrachloride	0.0250	0.0309	0.0298	124	119	68.0-126			3.48	20
Chlorobenzene	0.0250	0.0272	0.0261	109	104	80.0-121			4.10	20
Chlorodibromomethane	0.0250	0.0267	0.0258	107	103	77.0-125			3.36	20
Chloroethane	0.0250	0.0244	0.0250	97.7	99.9	47.0-150			2.20	20
Chloroform	0.0250	0.0283	0.0273	113	109	73.0-120			3.46	20
Chloromethane	0.0250	0.0138	0.0135	55.0	54.0	41.0-142			1.92	20
2-Chlorotoluene	0.0250	0.0288	0.0269	115	108	76.0-123			6.71	20
4-Chlorotoluene	0.0250	0.0281	0.0269	112	108	75.0-122			4.38	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0312	0.0288	125	115	58.0-134			7.98	20
1,2-Dibromoethane	0.0250	0.0290	0.0270	116	108	80.0-122			7.04	20
Dibromomethane	0.0250	0.0299	0.0280	120	112	80.0-120			6.70	20
1,2-Dichlorobenzene	0.0250	0.0301	0.0292	121	117	79.0-121			3.30	20
1,3-Dichlorobenzene	0.0250	0.0297	0.0285	119	114	79.0-120			4.13	20
1,4-Dichlorobenzene	0.0250	0.0281	0.0262	113	105	79.0-120			7.03	20
Dichlorodifluoromethane	0.0250	0.0274	0.0269	109	108	51.0-149			1.74	20
1,1-Dichloroethane	0.0250	0.0274	0.0264	110	105	70.0-126			4.04	20
1,2-Dichloroethane	0.0250	0.0295	0.0284	118	113	70.0-128			4.06	20
1,1-Dichloroethene	0.0250	0.0296	0.0268	118	107	71.0-124			9.96	20
cis-1,2-Dichloroethene	0.0250	0.0296	0.0276	118	111	73.0-120			6.79	20
trans-1,2-Dichloroethene	0.0250	0.0277	0.0284	111	113	73.0-120			2.25	20
1,2-Dichloropropane	0.0250	0.0269	0.0252	108	101	77.0-125			6.52	20
1,1-Dichloropropene	0.0250	0.0279	0.0270	112	108	74.0-126			3.34	20
1,3-Dichloropropane	0.0250	0.0240	0.0238	96.1	95.0	80.0-120			1.09	20
cis-1,3-Dichloropropene	0.0250	0.0285	0.0280	114	112	80.0-123			1.76	20
trans-1,3-Dichloropropene	0.0250	0.0269	0.0261	108	104	78.0-124			2.93	20
2,2-Dichloropropane	0.0250	0.0282	0.0282	113	113	58.0-130			0.0564	20
Di-isopropyl ether	0.0250	0.0241	0.0233	96.4	93.1	58.0-138			3.41	20
Ethylbenzene	0.0250	0.0276	0.0270	110	108	79.0-123			2.22	20
Hexachloro-1,3-butadiene	0.0250	0.0233	0.0230	93.1	92.0	54.0-138			1.18	20
Isopropylbenzene	0.0250	0.0274	0.0263	110	105	76.0-127			3.92	20
p-Isopropyltoluene	0.0250	0.0289	0.0285	116	114	76.0-125			1.48	20
2-Butanone (MEK)	0.125	0.127	0.123	102	98.1	44.0-160			3.59	20
Methylene Chloride	0.0250	0.0243	0.0245	97.2	97.9	67.0-120			0.710	20

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

(LCS) R3415424-1 05/25/19 11:48 • (LCSD) R3415424-2 05/25/19 12:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Methyl-2-pentanone (MIBK)	0.125	0.124	0.120	99.5	95.9	68.0-142			3.67	20
Methyl tert-butyl ether	0.0250	0.0292	0.0290	117	116	68.0-125			0.586	20
Naphthalene	0.0250	0.0358	0.0350	143	140	54.0-135	J4	J4	2.36	20
n-Propylbenzene	0.0250	0.0277	0.0264	111	106	77.0-124			4.66	20
Styrene	0.0250	0.0254	0.0246	101	98.5	73.0-130			2.89	20
1,1,1,2-Tetrachloroethane	0.0250	0.0266	0.0263	107	105	75.0-125			1.32	20
1,1,2,2-Tetrachloroethane	0.0250	0.0313	0.0297	125	119	65.0-130			5.36	20
Tetrachloroethene	0.0250	0.0276	0.0267	110	107	72.0-132			3.11	20
Toluene	0.0250	0.0244	0.0239	97.7	95.8	79.0-120			2.05	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0305	0.0264	122	106	69.0-132			14.3	20
1,2,3-Trichlorobenzene	0.0250	0.0287	0.0272	115	109	50.0-138			5.21	20
1,2,4-Trichlorobenzene	0.0250	0.0254	0.0245	102	98.0	57.0-137			3.66	20
1,1,1-Trichloroethane	0.0250	0.0276	0.0268	110	107	73.0-124			2.68	20
1,1,2-Trichloroethane	0.0250	0.0269	0.0269	108	108	80.0-120			0.125	20
Trichloroethene	0.0250	0.0294	0.0282	118	113	78.0-124			4.12	20
Trichlorofluoromethane	0.0250	0.0266	0.0247	106	99.0	59.0-147			7.10	20
1,2,3-Trichloropropane	0.0250	0.0334	0.0327	133	131	73.0-130	J4	J4	2.07	20
1,2,3-Trimethylbenzene	0.0250	0.0279	0.0261	112	104	77.0-120			6.70	20
1,2,4-Trimethylbenzene	0.0250	0.0290	0.0271	116	109	76.0-121			6.74	20
1,3,5-Trimethylbenzene	0.0250	0.0301	0.0291	121	116	76.0-122			3.60	20
Vinyl chloride	0.0250	0.0236	0.0226	94.5	90.3	67.0-131			4.57	20
Xylenes, Total	0.0750	0.0762	0.0746	102	99.5	79.0-123			2.12	20
(S) Toluene-d8				*91.4*	*91.8*	*80.0-120*				
(S) 4-Bromofluorobenzene				*101*	*102*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*117*	*110*	*70.0-130*				

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.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
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 Reporting Limit (or MDL where applicable).
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.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
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
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J4	The associated batch QC was outside the established quality control range for accuracy.
Q	Sample was prepared and/or analyzed past holding time as defined in the method. Concentrations should be considered minimum values.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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 [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	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	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	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

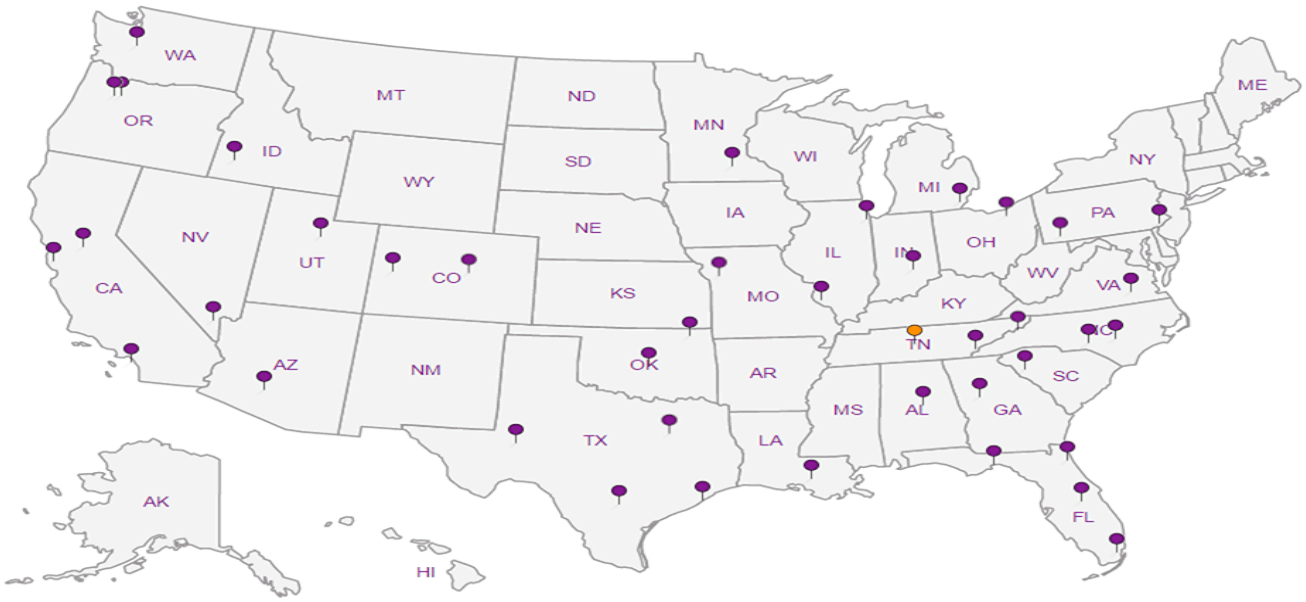
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] 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.



HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

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Houston, TX 77208
idealehilcorp.com

Report to: Jennifer Deal
Kurt Hoekstra CLARA CARDOZA

Email To: c.cardoza@hilcorp.com
khoekstra@hilcorp.com

Project Description: **Charles et al No. 1**

City/State Collected:

Phone: **505-486-9543**
Fax:

Client Project #

Lab Project #

Collected by (print): KURT

Site/Facility ID # CHARLES et al #1

P.O. #

Collected by (signature): Kurt Hoekstra
Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 1101012
G038

Acctnum: **HILCORANM**
Template:
Prelogin:
TSR: **Daphne Richards**
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	VOCs 8260 Full Range*/ 40mL amber/ HCl	Chloride, Fluoride, Nitrate, Sulfate	Total ALK, Bicarb/ 250m LHDPE/ No Pres	pH, TDS, SPCON/ 250mL HDPE/ No Pres	Mn, Na, K/ 250mL HDPE/ HNO3	12	NO SAMPLES FIELD FILTERED					Remarks	Sample # (lab only)
MW-1R		GW		5-17	11:00	7	X	X	X	X	X	X							-01

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
VOC Full Range including naphthalene plus 1-methyl and 2-methal naphthalene

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 4882 8626 3272

Sample Receipt Checklist
COC Seal Present/Intact: ✓NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N

RAD SCREEN: <0.5 mR/hr

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
Kurt Hoekstra	5-20-19	7:45			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: A3BF°C 1.6-.1=1.5 Bottles Received: 7	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Carol Kemp	Date: 5/21/19 Time: 8:45	Hold: Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

August 19, 2019

HilCorp-Farmington, NM

Sample Delivery Group:	L1127716
Samples Received:	08/10/2019
Project Number:	CHARLES ET AL NO. 1
Description:	Charles et al No. 1
Site:	CHARLES ET AL NO. 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By:

Daphne R Richards

Daphne Richards
Project Manager

TABLE OF CONTENTS

MW-1R L1127716-01 GW

Collected by	Collected date/time	Received date/time
Kurt	08/09/19 11:45	08/10/19 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1327392	1	08/14/19 11:26	08/14/19 11:47	MMF	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1326369	100	08/10/19 18:43	08/10/19 18:43	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1327921	1	08/13/19 17:52	08/13/19 22:57	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1327100	10	08/12/19 16:22	08/12/19 16:22	JCP	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1329667	1	08/16/19 19:57	08/17/19 03:16	JNJ	Mt. Juliet, TN

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.

Daphne R Richards

Daphne Richards
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	5030		100	1	08/14/2019 11:47	WG1327392

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	2900		500	100	08/10/2019 18:43	WG1326369

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Manganese,Dissolved	3.41		0.00500	1	08/13/2019 22:57	WG1327921

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0211		0.0100	10	08/12/2019 16:22	WG1327100
Toluene	ND		0.0100	10	08/12/2019 16:22	WG1327100
Ethylbenzene	0.594		0.0100	10	08/12/2019 16:22	WG1327100
Total Xylenes	1.56		0.0300	10	08/12/2019 16:22	WG1327100
(S) Toluene-d8	*101*		*80.0-120*		*08/12/2019 16:22*	WG1327100
(S) 4-Bromofluorobenzene	*94.1*		*77.0-126*		*08/12/2019 16:22*	WG1327100
(S) 1,2-Dichloroethane-d4	*99.6*		*70.0-130*		*08/12/2019 16:22*	WG1327100

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Anthracene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Acenaphthene	0.000189	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Acenaphthylene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Benzo(a)anthracene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Benzo(a)pyrene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Benzo(b)fluoranthene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Benzo(g,h,i)perylene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Benzo(k)fluoranthene	ND		0.0000500	1	08/17/2019 03:16	WG1329667
Chrysene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Dibenz(a,h)anthracene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Fluoranthene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Fluorene	0.000209		0.0000500	1	08/17/2019 03:16	WG1329667
Indeno(1,2,3-cd)pyrene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
Naphthalene	0.0258	J3	0.000250	1	08/17/2019 03:16	WG1329667
Phenanthrene	ND		0.0000500	1	08/17/2019 03:16	WG1329667
Pyrene	ND	J3	0.0000500	1	08/17/2019 03:16	WG1329667
1-Methylnaphthalene	0.00806	J3	0.000250	1	08/17/2019 03:16	WG1329667
2-Methylnaphthalene	0.00365	J3	0.000250	1	08/17/2019 03:16	WG1329667
2-Chloronaphthalene	ND	J3	0.000250	1	08/17/2019 03:16	WG1329667
(S) Nitrobenzene-d5	*96.0*		*31.0-160*		*08/17/2019 03:16*	WG1329667
(S) 2-Fluorobiphenyl	*116*		*48.0-148*		*08/17/2019 03:16*	WG1329667
(S) p-Terphenyl-d14	*91.5*		*37.0-146*		*08/17/2019 03:16*	WG1329667

Method Blank (MB)

(MB) R3441284-1 08/14/19 11:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		2.82	10.0

L1127716-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1127716-01 08/14/19 11:47 • (DUP) R3441284-3 08/14/19 11:47

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	5030	5060	1	0.595		5

Laboratory Control Sample (LCS)

(LCS) R3441284-2 08/14/19 11:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8460	96.1	85.0-115	

Method Blank (MB)

(MB) R3439403-1 08/10/19 09:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.0774	5.00

L1127403-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1127403-01 08/10/19 11:37 • (DUP) R3439403-3 08/10/19 11:52

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	3.66	1	0.000		15

L1127548-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1127548-01 08/10/19 16:54 • (DUP) R3439403-6 08/10/19 17:09

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	24.4	24.5	1	0.288		15

Laboratory Control Sample (LCS)

(LCS) R3439403-2 08/10/19 10:05

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	41.1	103	80.0-120	

L1127403-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1127403-01 08/10/19 11:37 • (MS) R3439403-4 08/10/19 12:06 • (MSD) R3439403-5 08/10/19 12:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	ND	53.5	53.7	100	101	1	80.0-120			0.343	15

L1127548-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1127548-01 08/10/19 16:54 • (MS) R3439403-7 08/10/19 17:23

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	24.4	63.6	78.5	1	80.0-120	J6

Method Blank (MB)

(MB) R3440107-1 08/13/19 20:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Manganese,Dissolved	U		0.000250	0.00500

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

(LCS) R3440107-2 08/13/19 20:50 • (LCSD) R3440107-3 08/13/19 20:54

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Manganese,Dissolved	0.0500	0.0490	0.0490	98.0	98.0	80.0-120			0.0193	20

L1128000-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1128000-02 08/13/19 20:59 • (MS) R3440107-5 08/13/19 21:08 • (MSD) R3440107-6 08/13/19 21:12

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Manganese,Dissolved	0.0500	0.0490	0.0980	0.0965	98.0	95.0	1	75.0-125			1.53	20

Method Blank (MB)

(MB) R3440985-2 08/12/19 10:37

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*101*			*80.0-120*
(S) 4-Bromofluorobenzene	*94.9*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*97.4*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3440985-1 08/12/19 09:57

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0250	0.0232	92.7	70.0-123	
Ethylbenzene	0.0250	0.0238	95.3	79.0-123	
Toluene	0.0250	0.0244	97.6	79.0-120	
Xylenes, Total	0.0750	0.0710	94.7	79.0-123	
(S) Toluene-d8			*112*	*80.0-120*	
(S) 4-Bromofluorobenzene			*101*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*98.1*	*70.0-130*	

Method Blank (MB)

(MB) R3441399-3 08/17/19 02:14

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000140	0.0000500
Acenaphthene	U		0.0000100	0.0000500
Acenaphthylene	U		0.0000120	0.0000500
Benzo(a)anthracene	U		0.00000410	0.0000500
Benzo(a)pyrene	U		0.0000116	0.0000500
Benzo(b)fluoranthene	U		0.00000212	0.0000500
Benzo(g,h,i)perylene	U		0.00000227	0.0000500
Benzo(k)fluoranthene	U		0.0000136	0.0000500
Chrysene	U		0.0000108	0.0000500
Dibenz(a,h)anthracene	U		0.00000396	0.0000500
Fluoranthene	U		0.0000157	0.0000500
Fluorene	U		0.00000850	0.0000500
Indeno(1,2,3-cd)pyrene	U		0.0000148	0.0000500
Naphthalene	U		0.0000198	0.000250
Phenanthrene	U		0.00000820	0.0000500
Pyrene	U		0.0000117	0.0000500
1-Methylnaphthalene	U		0.00000821	0.000250
2-Methylnaphthalene	U		0.00000902	0.000250
2-Chloronaphthalene	U		0.00000647	0.000250
(S) Nitrobenzene-d5	*102*			*31.0-160*
(S) 2-Fluorobiphenyl	*108*			*48.0-148*
(S) p-Terphenyl-d14	*113*			*37.0-146*

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

(LCS) R3441399-1 08/17/19 01:32 • (LCSD) R3441399-2 08/17/19 01:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00228	0.00186	114	93.0	67.0-150		J3	20.3	20
Acenaphthene	0.00200	0.00231	0.00186	115	93.0	65.0-138		J3	21.6	20
Acenaphthylene	0.00200	0.00245	0.00197	122	98.5	66.0-140		J3	21.7	20
Benzo(a)anthracene	0.00200	0.00243	0.00189	122	94.5	61.0-140		J3	25.0	20
Benzo(a)pyrene	0.00200	0.00257	0.00201	129	100	60.0-143		J3	24.5	20
Benzo(b)fluoranthene	0.00200	0.00255	0.00194	128	97.0	58.0-141		J3	27.2	20
Benzo(g,h,i)perylene	0.00200	0.00260	0.00201	130	100	52.0-153		J3	25.6	20
Benzo(k)fluoranthene	0.00200	0.00254	0.00209	127	105	58.0-148			19.4	20
Chrysene	0.00200	0.00242	0.00189	121	94.5	64.0-144		J3	24.6	20
Dibenz(a,h)anthracene	0.00200	0.00257	0.00199	129	99.5	52.0-155		J3	25.4	20
Fluoranthene	0.00200	0.00265	0.00211	132	105	69.0-153		J3	22.7	20

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

(LCS) R3441399-1 08/17/19 01:32 • (LCSD) R3441399-2 08/17/19 01:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	0.00200	0.00240	0.00198	120	99.0	64.0-136			19.2	20
Indeno(1,2,3-cd)pyrene	0.00200	0.00259	0.00202	129	101	54.0-153		J3	24.7	20
Naphthalene	0.00200	0.00247	0.00195	123	97.5	61.0-137		J3	23.5	20
Phenanthrene	0.00200	0.00236	0.00193	118	96.5	62.0-137			20.0	20
Pyrene	0.00200	0.00227	0.00180	114	90.0	60.0-142		J3	23.1	20
1-Methylnaphthalene	0.00200	0.00255	0.00207	128	103	66.0-142		J3	20.8	20
2-Methylnaphthalene	0.00200	0.00243	0.00196	122	98.0	62.0-136		J3	21.4	20
2-Chloronaphthalene	0.00200	0.00234	0.00186	117	93.0	64.0-140		J3	22.9	20
(S) Nitrobenzene-d5				*120*	*94.0*	*31.0-160*				
(S) 2-Fluorobiphenyl				*136*	*110*	*48.0-148*				
(S) p-Terphenyl-d14				*142*	*109*	*37.0-146*				

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 Reporting Limit (or MDL where applicable).
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 Reporting Limit (or MDL where applicable).
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.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
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
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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 [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	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	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	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

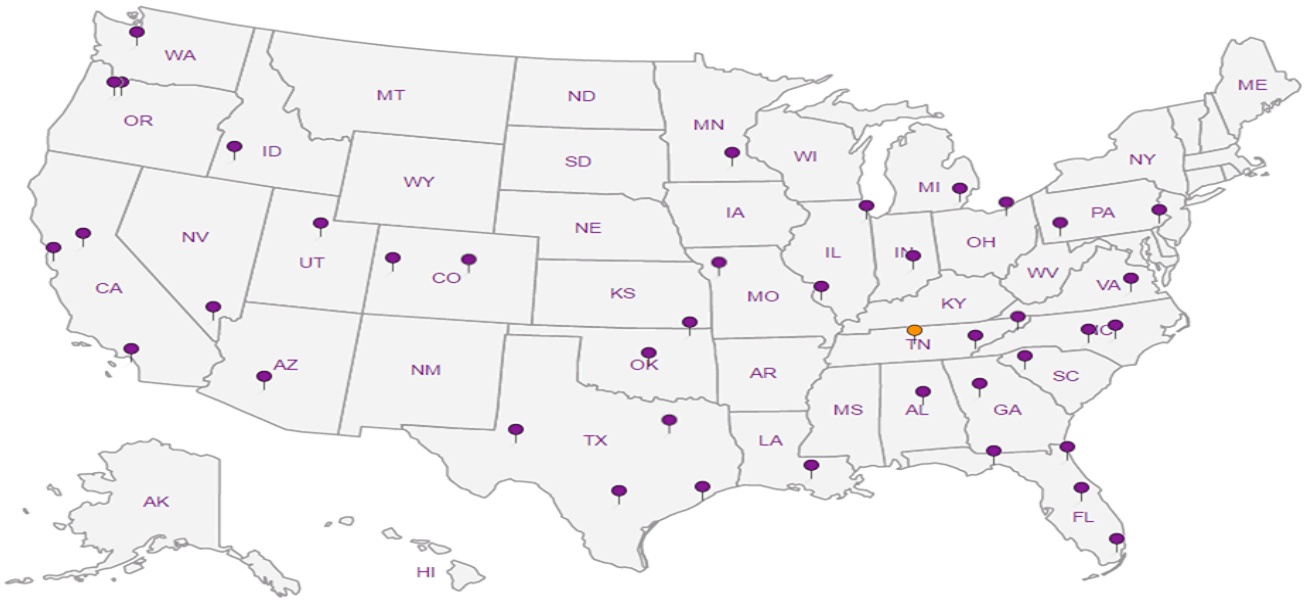
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] 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.



HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

Billing Information:

PO Box 61529
Houston, TX 77208

idealehilcorp.com

Email To: @hilcorp.com;khoekstra@hilcorp.com
ccardoza@hilcorp.com

Report to: Kurt Hoekstra

Project Description: Charles et al No. 1

City/State Collected:

Phone: 505-486-9543
Fax:

Client Project # CHARLES ET AL NO. 1

Lab Project # HILCORANM-CHARLES

Collected by (print): Kurt

Site/Facility ID # CHARLES ET AL NO. 1

P.O. #

Collected by (signature): Kurt Hoekstra
Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pres Chk	Dissolved Mn 250mlHDPE-NoPres	PAHSIMLVI 40mlAmb-NoPres-WT	SULFATE,TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	No Samples Field Filtered						Remarks	Sample # (lab only)
MW-1R		GW		8-9-19	11:45	7		X	X	X	X	X							-01

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # L1127716

B209

Acctnum: HILCORANM
Template: T153791
Prelogin: P722245
TSR: 288 - Daphne Richards
PB:
Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

RAD SCREEN: <0.5 mR/hr

Samples returned via: __ UPS __ FedEx __ Courier __ _____
Tracking #

	Date:	Time:	
Relinquished by : (Signature) Kurt Hoekstra	8-9-19	1:30	Received by: (Signature)
Relinquished by : (Signature)			Received by: (Signature)
Relinquished by : (Signature)			Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 1.6 °C Bottles Received: 7

Date: 8/10/19 Time: 9:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 08, 2019

HilCorp-Farmington, NM

Sample Delivery Group:	L1155369
Samples Received:	10/30/2019
Project Number:	CHARLES ET AL NO. 1
Description:	Charles et al No. 1
Site:	CHARLES ET AL NO. 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

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.

TABLE OF CONTENTS

MW-1R L1155369-01 GW

Collected by	Collected date/time	Received date/time
Kurt	10/28/19 10:04	10/30/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1372654	1	11/01/19 16:20	11/01/19 16:56	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1372427	100	10/31/19 09:58	10/31/19 09:58	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1372781	1	11/03/19 19:48	11/04/19 12:16	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1374169	250	11/03/19 01:28	11/03/19 01:28	HJF	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1372636	1	10/31/19 06:39	10/31/19 21:56	AAT	Mt. Juliet, TN

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

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2850		50.0	1	11/01/2019 16:56	WG1372654

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1040		500	100	10/31/2019 09:58	WG1372427

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Manganese,Dissolved	1.10		0.00500	1	11/04/2019 12:16	WG1372781

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.250	250	11/03/2019 01:28	WG1374169
Toluene	ND		0.250	250	11/03/2019 01:28	WG1374169
Ethylbenzene	1.11		0.250	250	11/03/2019 01:28	WG1374169
Total Xylenes	3.29		0.750	250	11/03/2019 01:28	WG1374169
(S) Toluene-d8	*100*		*80.0-120*		*11/03/2019 01:28*	WG1374169
(S) 4-Bromofluorobenzene	*98.6*		*77.0-126*		*11/03/2019 01:28*	WG1374169
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*11/03/2019 01:28*	WG1374169

Sample Narrative:

L1155369-01 WG1374169: Non-target compounds too high to run at a lower dilution.

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Anthracene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Acenaphthene	0.000196		0.0000500	1	10/31/2019 21:56	WG1372636
Acenaphthylene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Benzo(a)anthracene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Benzo(a)pyrene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Benzo(b)fluoranthene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Benzo(g,h,i)perylene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Benzo(k)fluoranthene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Chrysene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Dibenz(a,h)anthracene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Fluoranthene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Fluorene	0.000312		0.0000500	1	10/31/2019 21:56	WG1372636
Indeno(1,2,3-cd)pyrene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Naphthalene	0.0447		0.000250	1	10/31/2019 21:56	WG1372636
Phenanthrene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
Pyrene	ND		0.0000500	1	10/31/2019 21:56	WG1372636
1-Methylnaphthalene	0.00917		0.000250	1	10/31/2019 21:56	WG1372636
2-Methylnaphthalene	0.0104		0.000250	1	10/31/2019 21:56	WG1372636
2-Chloronaphthalene	ND		0.000250	1	10/31/2019 21:56	WG1372636
(S) Nitrobenzene-d5	*114*		*31.0-160*		*10/31/2019 21:56*	WG1372636
(S) 2-Fluorobiphenyl	*99.5*		*48.0-148*		*10/31/2019 21:56*	WG1372636
(S) p-Terphenyl-d14	*104*		*37.0-146*		*10/31/2019 21:56*	WG1372636

Method Blank (MB)

(MB) R3467894-1 11/01/19 16:56

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		2.82	10.0

L1154620-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1154620-01 11/01/19 16:56 • (DUP) R3467894-3 11/01/19 16:56

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	976	998	1	2.23		5

Laboratory Control Sample (LCS)

(LCS) R3467894-2 11/01/19 16:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8570	97.4	85.0-115	

Method Blank (MB)

(MB) R3467036-1 10/30/19 21:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	0.125	J	0.0774	5.00

L1155003-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1155003-01 10/31/19 01:42 • (DUP) R3467036-3 10/31/19 01:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	18.1	18.5	1	1.91		15

L1155343-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1155343-01 10/31/19 08:14 • (DUP) R3467036-7 10/31/19 08:27

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	9.01	8.72	1	3.36		15

Laboratory Control Sample (LCS)

(LCS) R3467036-2 10/30/19 21:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	39.4	98.4	80.0-120	

L1155003-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1155003-01 10/31/19 01:42 • (MS) R3467036-4 10/31/19 02:08

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	18.1	68.9	101	1	80.0-120	

L1155315-19 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1155315-19 10/31/19 06:56 • (MS) R3467036-5 10/31/19 07:09 • (MSD) R3467036-6 10/31/19 07:22

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	41.3	88.3	88.6	94.0	94.6	1	80.0-120			0.360	15

Method Blank (MB)

(MB) R3468185-1 11/04/19 10:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Manganese,Dissolved	U		0.000250	0.00500

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

(LCS) R3468185-2 11/04/19 10:52 • (LCSD) R3468185-3 11/04/19 10:56

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Manganese,Dissolved	0.0500	0.0538	0.0553	108	111	80.0-120			2.77	20

L1155490-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1155490-03 11/04/19 11:00 • (MS) R3468185-5 11/04/19 11:08 • (MSD) R3468185-6 11/04/19 11:12

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Manganese,Dissolved	0.0500	0.0117	0.0597	0.0610	96.1	98.6	1	75.0-125			2.09	20

Method Blank (MB)

(MB) R3469885-2 11/03/19 00:09

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*101*			*80.0-120*
(S) 4-Bromofluorobenzene	*93.7*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*114*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3469885-1 11/02/19 23:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00512	102	70.0-123	
Ethylbenzene	0.00500	0.00466	93.2	79.0-123	
Toluene	0.00500	0.00490	98.0	79.0-120	
Xylenes, Total	0.0150	0.0140	93.3	79.0-123	
(S) Toluene-d8			*98.7*	*80.0-120*	
(S) 4-Bromofluorobenzene			*91.6*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*117*	*70.0-130*	

Method Blank (MB)

(MB) R3467388-3 10/31/19 15:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000140	0.0000500
Acenaphthene	U		0.0000100	0.0000500
Acenaphthylene	U		0.0000120	0.0000500
Benzo(a)anthracene	U		0.00000410	0.0000500
Benzo(a)pyrene	U		0.0000116	0.0000500
Benzo(b)fluoranthene	U		0.00000212	0.0000500
Benzo(g,h,i)perylene	U		0.00000227	0.0000500
Benzo(k)fluoranthene	U		0.0000136	0.0000500
Chrysene	U		0.0000108	0.0000500
Dibenz(a,h)anthracene	U		0.00000396	0.0000500
Fluoranthene	U		0.0000157	0.0000500
Fluorene	U		0.00000850	0.0000500
Indeno(1,2,3-cd)pyrene	U		0.0000148	0.0000500
Naphthalene	U		0.0000198	0.000250
Phenanthrene	U		0.00000820	0.0000500
Pyrene	U		0.0000117	0.0000500
1-Methylnaphthalene	U		0.00000821	0.000250
2-Methylnaphthalene	U		0.00000902	0.000250
2-Chloronaphthalene	U		0.00000647	0.000250
(S) Nitrobenzene-d5	*112*			*31.0-160*
(S) 2-Fluorobiphenyl	*98.5*			*48.0-148*
(S) p-Terphenyl-d14	*106*			*37.0-146*

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

(LCS) R3467388-1 10/31/19 14:39 • (LCSD) R3467388-2 10/31/19 15:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00227	0.00204	114	102	67.0-150			10.7	20
Acenaphthene	0.00200	0.00224	0.00207	112	103	65.0-138			7.89	20
Acenaphthylene	0.00200	0.00246	0.00227	123	114	66.0-140			8.03	20
Benzo(a)anthracene	0.00200	0.00234	0.00216	117	108	61.0-140			8.00	20
Benzo(a)pyrene	0.00200	0.00204	0.00189	102	94.5	60.0-143			7.63	20
Benzo(b)fluoranthene	0.00200	0.00195	0.00175	97.5	87.5	58.0-141			10.8	20
Benzo(g,h,i)perylene	0.00200	0.00176	0.00166	88.0	83.0	52.0-153			5.85	20
Benzo(k)fluoranthene	0.00200	0.00199	0.00191	99.5	95.5	58.0-148			4.10	20
Chrysene	0.00200	0.00229	0.00215	114	108	64.0-144			6.31	20
Dibenz(a,h)anthracene	0.00200	0.00176	0.00166	88.0	83.0	52.0-155			5.85	20
Fluoranthene	0.00200	0.00252	0.00231	126	115	69.0-153			8.70	20

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

(LCS) R3467388-1 10/31/19 14:39 • (LCSD) R3467388-2 10/31/19 15:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	0.00200	0.00237	0.00217	118	108	64.0-136			8.81	20
Indeno(1,2,3-cd)pyrene	0.00200	0.00177	0.00167	88.5	83.5	54.0-153			5.81	20
Naphthalene	0.00200	0.00205	0.00191	102	95.5	61.0-137			7.07	20
Phenanthrene	0.00200	0.00217	0.00200	108	100	62.0-137			8.15	20
Pyrene	0.00200	0.00205	0.00188	102	94.0	60.0-142			8.65	20
1-Methylnaphthalene	0.00200	0.00220	0.00205	110	102	66.0-142			7.06	20
2-Methylnaphthalene	0.00200	0.00210	0.00196	105	98.0	62.0-136			6.90	20
2-Chloronaphthalene	0.00200	0.00237	0.00221	118	111	64.0-140			6.99	20
(S) Nitrobenzene-d5				*121*	*113*	*31.0-160*				
(S) 2-Fluorobiphenyl				*105*	*97.0*	*48.0-148*				
(S) p-Terphenyl-d14				*109*	*103*	*37.0-146*				

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 Reporting Limit (or MDL where applicable).
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 Reporting Limit (or MDL where applicable).
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.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
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
J	The identification of the analyte is acceptable; the reported value is an estimate.

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 [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	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	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	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

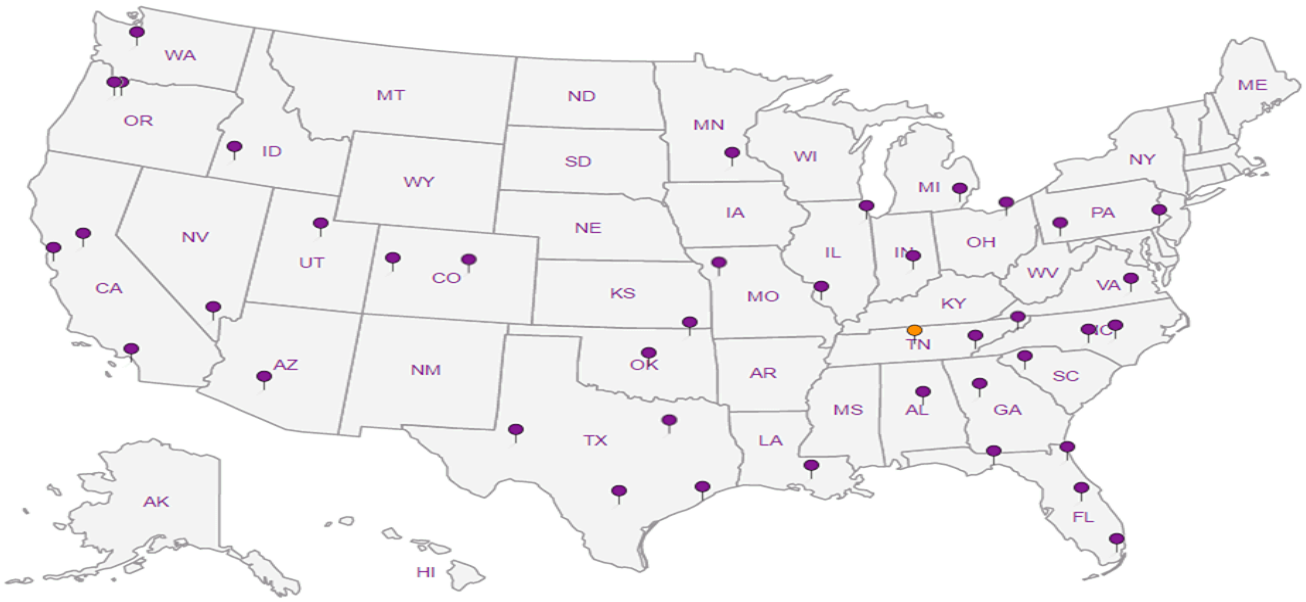
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] 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.



HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

Billing Information:

PO Box 61529
Houston, TX 77208

Pres Chk

Report to: Kurt Hoekstra

Email To: jdeal@hilcorp.com;khoekstra@hilcorp.com;ccardoz

Project Description: Charles et al No. 1

City/State Collected:

Please Circle: PT MT CT ET

Phone: 505-486-9543
Fax:

Client Project #: CHARLES ET AL NO. 1

Lab Project #: HILCORANM-CHARLES

Collected by (print): Kurt

Collected by (signature): Kurt Hoekstra
Immediately Packed on Ice N ___ Y X

Site/Facility ID #: CHARLES ET AL NO. 1

P.O. #

Quote #

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved Mn 250mlHDPE-NoPres	PAHSIMLVI 40mlAmb-NoPres-WT	SULFATE,TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	NO SAMPLES FIELD FILTERED						Remarks	Sample # (lab only)
MW-1R		GW		10-28	10:04	7	X	X	X	X	X							-01

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

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SDG # L1155369

Tabl 1022

Acctnum: HILCORANM

Template: T153791

Prelogin: P735169

PM: 823 - Olivia Studebaker

PB: TB 10-10-19

Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 1203 5789 5129

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

	Date:	Time:		
Relinquished by: (Signature) Kurt Hoekstra	10-29-19	8:25	Received by: (Signature)	Trip Blank Received: Yes / No (HCl / MeoH) TBR: 1
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C 5.0-2.4-4.8 A3 Bottles Received: 7
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10-30-19 Time: 0830

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

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.

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