Review of 2021 Annual Groundwater Monitoring Report: **Content satisfactory**

1. Continue to monitor well MW-1R semi-annually for BTEX per US EPA Method 8260B
2. OCD approves eliminating manganese, sulfate, and TDS from future sampling in all site wells
3. Provide at least one (1) groundwater flow direction schematic per annual report
4. Submit the Annual Monitoring Report to the OCD no later than March 31, 2023.

February 14, 2022

New Mexico Energy, Minerals and Natural Resources Department
New Mexico Oil Conservation Division
1000 Rio Brazos
Aztec, New Mexico 87410

Subject: **2021 Annual Groundwater Monitoring Report**
Charles et al #1
NMOCD Incident Number: NRMD0928136813
NMOCD Administrative Order: 3R-432
San Juan County, New Mexico

To Whom it May Concern:

WSP USA Inc. (WSP) presents this *2021 Annual Groundwater Monitoring Report* on behalf of Hilcorp Energy Company (Hilcorp) to the New Mexico Oil Conservation Division (NMOCD) to document groundwater monitoring activities conducted at the former Charles et al #1 natural gas production well (Site) during 2021 (well plugged and abandoned in 2010). The Site is located on Navajo Nation Tribal land in Section 12 within Township 27 North and Range 9 West, San Juan County, New Mexico (Figure 1).

SITE BACKGROUND

Impacted groundwater at the Site was discovered by ConocoPhillips (previous well owner) in 2008 while investigating a pipeline release approximately 0.25 miles from the Site. ConocoPhillips further investigated the release and subsequently installed seven groundwater monitoring wells (MW-1 through MW-7) at the Site. A solar-powered fan was additionally installed on groundwater monitoring well MW-1 in August 2008 to remediate soil and groundwater impacts using soil-vapor extraction technology. After 7 years of monitoring, groundwater impacts in wells MW-2 through MW-7 had attenuated to below Navajo Nation Environmental Protection Agency (NNEPA) standards. As such, all shallow groundwater monitoring wells were removed using a backhoe in June 2016.

Because petroleum hydrocarbon contaminants were still present in soil and groundwater in the vicinity of monitoring well MW-1, impacted soil was removed by excavation in June 2016 to mitigate further migration of contaminants. Approximately 30 cubic yards of impacted soil were removed and disposed off-Site; however, the excavation was limited in extent due to the location of two pipelines in the area. Once the excavation was backfilled, replacement well MW-1R was installed in the same location as former monitoring well MW-1 for monitoring purposes.

Hilcorp acquired the Site from ConocoPhillips in April 2017 and has continued to monitor groundwater conditions in well MW-1R. Additional details regarding the history of the Site can be found in the *2019 Annual Groundwater Monitoring Report* prepared by GHD Services Inc. (dated March 24, 2020). Current and former well locations and Site features are shown on Figure 2.

SITE GROUNDWATER CLEANUP STANDARDS

The Site is located on Navajo Nation Tribal land and is regulated by both the NMOCD and NNEPA. Specifically, groundwater cleanup standards have been presented in the NNEPA document titled *The Navajo Nation Leaking Storage Tank Soil and Water Cleanup Standards*, dated 2012. Additionally, NMOCD requires that groundwater-quality standards presented by the New Mexico Water Quality Control Commission (NMWQCC) in 20.6.2.3103 of the New Mexico Administrative Code (NMAC) be met. Because of this, the most conservative cleanup standards developed by the NNEPA and NMWQCC have been used to compare groundwater analytical results obtained at the Site. The standards are presented in milligrams per liter (mg/L) and are as follows:

WSP USA
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DURANGO CO 81301

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wsp.com

ANALYTE	LIMIT	AGENCY
Benzene	0.005 mg/L	NNEPA and NMWQCC
Toluene	1.0 mg/L	NNEPA and NMWQCC
Ethylbenzene	0.7 mg/L	NNEPA and NMWQCC
Xylenes	0.62 mg/L	NMWQCC
Naphthalene	0.0062 mg/L	NNEPA
Sulfate	600 mg/L	NMWQCC
Manganese	0.2 mg/L	NMWQCC
Total Dissolved Solids	1,000 mg/L	NMWQCC

In addition, NMWQCC standards state that light non-aqueous phase liquids (LNAPLs) shall not be present floating on the groundwater.

GROUNDWATER SAMPLING ACTIVITIES AND RESULTS

As approved by the NMOCD, groundwater gauging and sampling was performed on a biannual basis at the Site, which occurred on March 12, 2021 and August 6, 2021. In addition, on March 12, 2021, WSP installed a temporary groundwater-monitoring well (Background) at the Site at an hydrogeologically upgradient location in order to assess background conditions for total dissolved solids (TDS), manganese, and sulfate. The following sections summarize the sampling procedures and results gathered during these events.

GROUNDWATER SAMPLING

Static groundwater level monitoring included recording depth-to-water in monitoring well MW-1R using a Keck oil/water interface probe. Presence of any phase-separated petroleum hydrocarbons (LNAPLs) was investigated using the interface probe. Well construction and groundwater depth information is presented in Table 1. In general, depth to groundwater has been consistent over time in well MW-1R ranging from 4.37 to 6.51 feet below the top of the well casing.

Groundwater was purged and sampled using a disposable bailer. Purging was accomplished by removing stagnant groundwater from the monitoring well prior to collecting a sample. Due to insufficient recharge, approximately 0.25 gallons of groundwater was purged prior to sampling during both sampling events. Field measurements of groundwater quality parameters, including temperature, pH, turbidity, electrical conductivity, dissolved oxygen, and oxidation-reduction potential, were collected while purging the well during the March 2021 sampling event. Due to insufficient water volumes and slow recharge of the well, field parameters were not measured during the August 2021 sampling event. Groundwater quality measurements are presented in Table 2. In general, groundwater conditions at the Site are generally low in dissolved oxygen and have negative oxidation-reduction potential values (anerobic condition). These conditions are common at natural-attenuation sites where microbial-degradation processes are occurring.

Following well purging, groundwater samples were placed directly into laboratory-provided jars and labeled with the date and time of collection, well designation, project name, sample collector's name, and parameters to be analyzed. They were immediately sealed, packed on ice, and submitted to either Pace Analytical or Hall Environmental Analysis Laboratory (Hall) for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX) and naphthalene by Environmental Protection Agency (EPA) Method 8260B (naphthalene was only analyzed during the August 2021 sampling event), dissolved manganese by EPA Method 6020 or 200.7, sulfate by EPA Method 9056A or 300.0, and TDS by EPA Method 2540. Proper chain-of-custody (COC) procedures were followed documenting the date and time sampled, sample number, type of sample, sample collector's name, preservative used, analyses required, and sample collector's signature. Analytical laboratory reports from the sampling events are included as Enclosure A.

GROUNDWATER ANALYTICAL RESULTS

During the March 2021 groundwater sampling event, concentrations of xylenes, manganese, sulfate, and TDS exceeded the applicable NNEPA/NMWQCC cleanup standards. Although benzene was not detected during the March 2021 sampling event, the laboratory reporting limits for benzene were above the applicable cleanup standard.

Concentrations of benzene, ethylbenzene, xylenes, naphthalene, manganese, sulfate, and TDS exceeded NNEPA/NMWQCC cleanup standards during the August 2021 sampling event. Toluene concentrations were in compliance with the cleanup standard during the 2021 sampling events. A summary of analytical results are presented in Tables 3 and 4 and depicted on Figure 3.

ASSESSMENT OF BACKGROUND CONCENTRATIONS IN GROUNDWATER

At the request of the NMOCD, general chemistry parameters of groundwater in monitoring well MW-1R were first analyzed in May of 2019. During that event, the following inorganic constituents were analyzed in groundwater collected from well MW-1R: alkalinity, bicarbonate, chloride, fluoride, manganese, nitrate, pH, potassium, sodium, specific conductance, sulfate, and TDS. Concentrations of dissolved manganese, sulfate, and TDS exceeded NMWQCC standards during that event. All other constituents were either not detected above laboratory reporting limits or were below applicable NMWQCC standards. Manganese, sulfate, and TDS have continued to be sampled during biannual events since that time, with results presented in Table 4.

As approved by the NMOCD, WSP collected a grab-groundwater sample using a hydro-punch in a hydrogeologically upgradient (southwest of well MW-1R) location (shown on Figure 3) in order to assess background concentrations of manganese, sulfate, and TDS. The location of the upgradient/background sample was based on historical groundwater-elevation data submitted to the NMOCD between 2008 and 2016. This sample was collected during the March 2021 sampling event and submitted to Pace Analytical for analysis of manganese, sulfate, and TDS. Results indicate the background concentrations of these constituents are present upgradient of the Site, and specifically upgradient of well MW-1R, at concentrations above NMWQCC standards. Over the past seven biannual sampling events,

- Manganese concentrations in groundwater from well MW-1R has averaged 4.89 mg/L, which is greater than the background concentration of 4.29 mg/L; however, the manganese concentration during the May 2019 was 17.6 mg/L and appears to be an outlier and has skewed the average high. Manganese concentrations in groundwater from well MW-1R has been below the background concentration five out of the seven sampling events, including the August 2021 sample;
- Sulfate concentrations in groundwater from well MW-1R has averaged 2,772.86 mg/L, which is less than the background concentration of 4,850 mg/L. All seven sampling events have had sulfate concentrations below the sulfate background concentration; and
- TDS concentrations in groundwater from well MW-1R has averaged 5,550 mg/L, which is less than the background concentration of 7,210 mg/L. TDS concentrations have been below the background concentration five out of the seven sampling events.

In general, background concentrations of manganese, sulfate, and TDS are greater than concentrations detected in well MW-1R. Laboratory reports for the background sample analysis are included in Enclosure A.

CONCLUSIONS AND RECOMMENDATIONS

Since 2008, BTEX concentrations have declined in well MW-1/MW-1R. The decline in contaminant concentrations indicates natural attenuation is occurring through biodegradation at the Site. As such, Hilcorp will continue to monitor contaminant concentrations in well MW-1R on a biannual basis.

Additionally, based on background sampling during the March 2021 event, elevated concentrations manganese, sulfate, and TDS were detected in the shallow groundwater upgradient of well MW-1R at concentrations exceeding the NMWQCC standards. In general, concentrations of three constituents in groundwater from well MW-1R has been below or near their respective background concentrations over the past seven sampling events. Therefore, concentrations of manganese, sulfate, and TDS detected in well MW-1R can likely be attributed naturally occurring sources and do not appear to be associated with the 2008 release. Based on these results, WSP recommends eliminating the analysis of manganese, sulfate, and TDS during future sampling events.

WSP appreciates the opportunity to provide these environmental services to Hilcorp. Please contact either of the undersigned with any questions at (970) 385-1096.

Kind regards,

Stuart Hyde, L.G.
Senior Geologist

Daniel Moir, P.G.
Sr. Lead Consultant, Geologist

Enclosed:

Figure 1: Site Location Map
Figure 2: Site Map
Figure 3: 2021 Groundwater Analytical Results

Table 1: Well Construction Information and Groundwater Elevations
Table 2: Field Parameter Results
Table 3: Petroleum Hydrocarbon Groundwater Analytical Results
Table 4: Groundwater General Chemistry Analytical Results

Enclosure A: Analytical Laboratory Reports

FIGURES

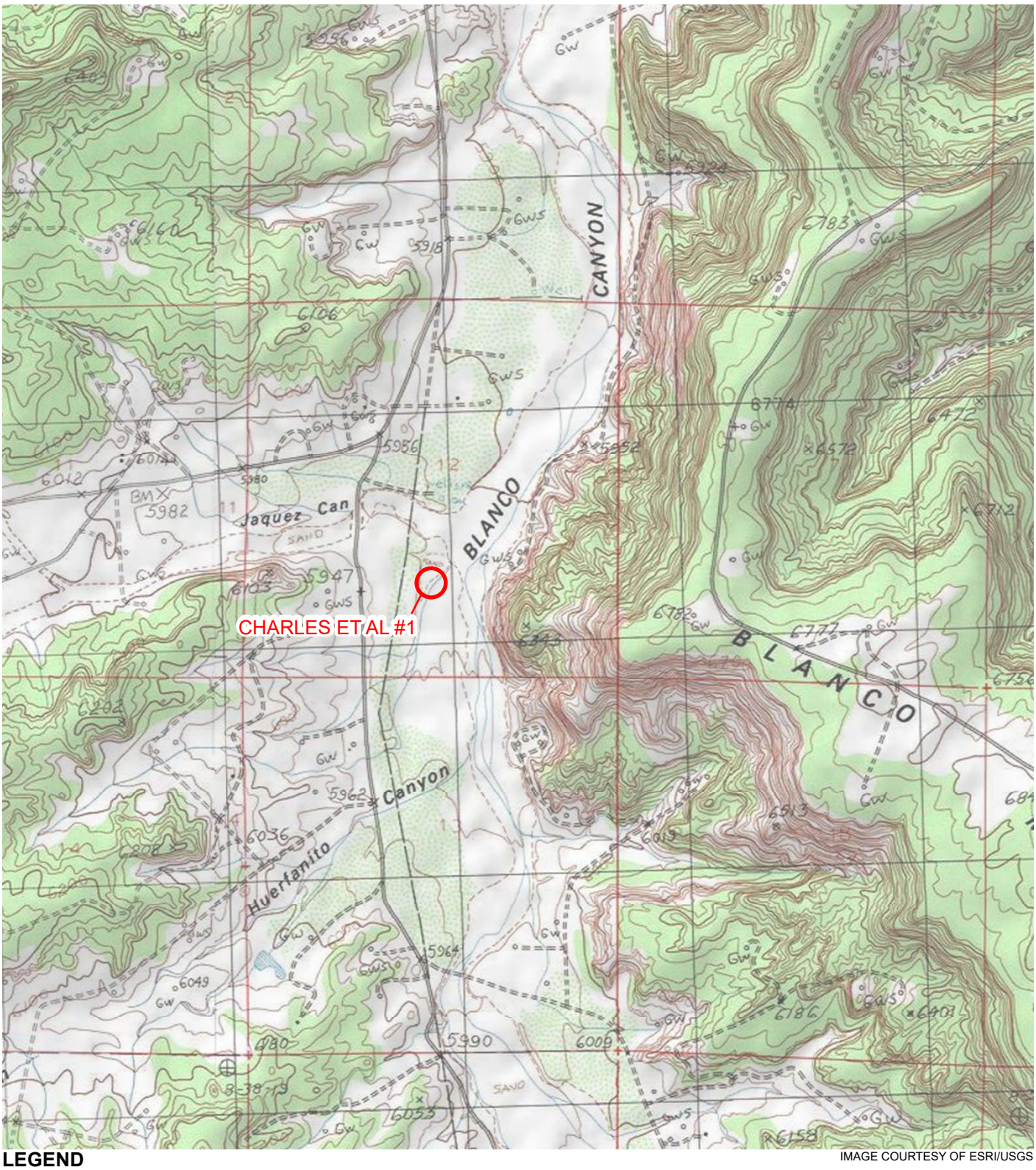

IMAGE COURTESY OF ESRI/USGS

LEGEND

SITE LOCATION

0 2,000 4,000

Feet

N

NEW MEXICO

FIGURE 1
SITE LOCATION MAP
CHARLES ET AL #1
SEC 12-T27N-R9W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

wsp

P:\Hilcorp\GIS\MXD\017819028_CHARLES ET AL #1\017819028_FIG01_SL_2020.mxd

IMAGE COURTESY OF ESRI

LEGEND

- REPLACEMENT MONITORING WELL
- PLUGGED AND ABANDONED MONITORING WELL (JUNE 2016)
- BACKGROUND GRAB - GROUNDWATER SAMPLE
- CHEVRON PIPELINE
- ABANDONED PIPELINE (CONOCO PHILLIPS)
- EXCAVATION EXTENT (JUNE 2016)

0 30 60
Feet

N

FIGURE 2
SITE MAP
CHARLES ET AL #1
SEC 12-T27N-R9W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

C:\Users\UST689650\OneDrive - WSP O365\Hilcorp\TE017821007_CHARLES ET AL #1\MXD\TE017821007_FIG02_SITE_2021.mxd

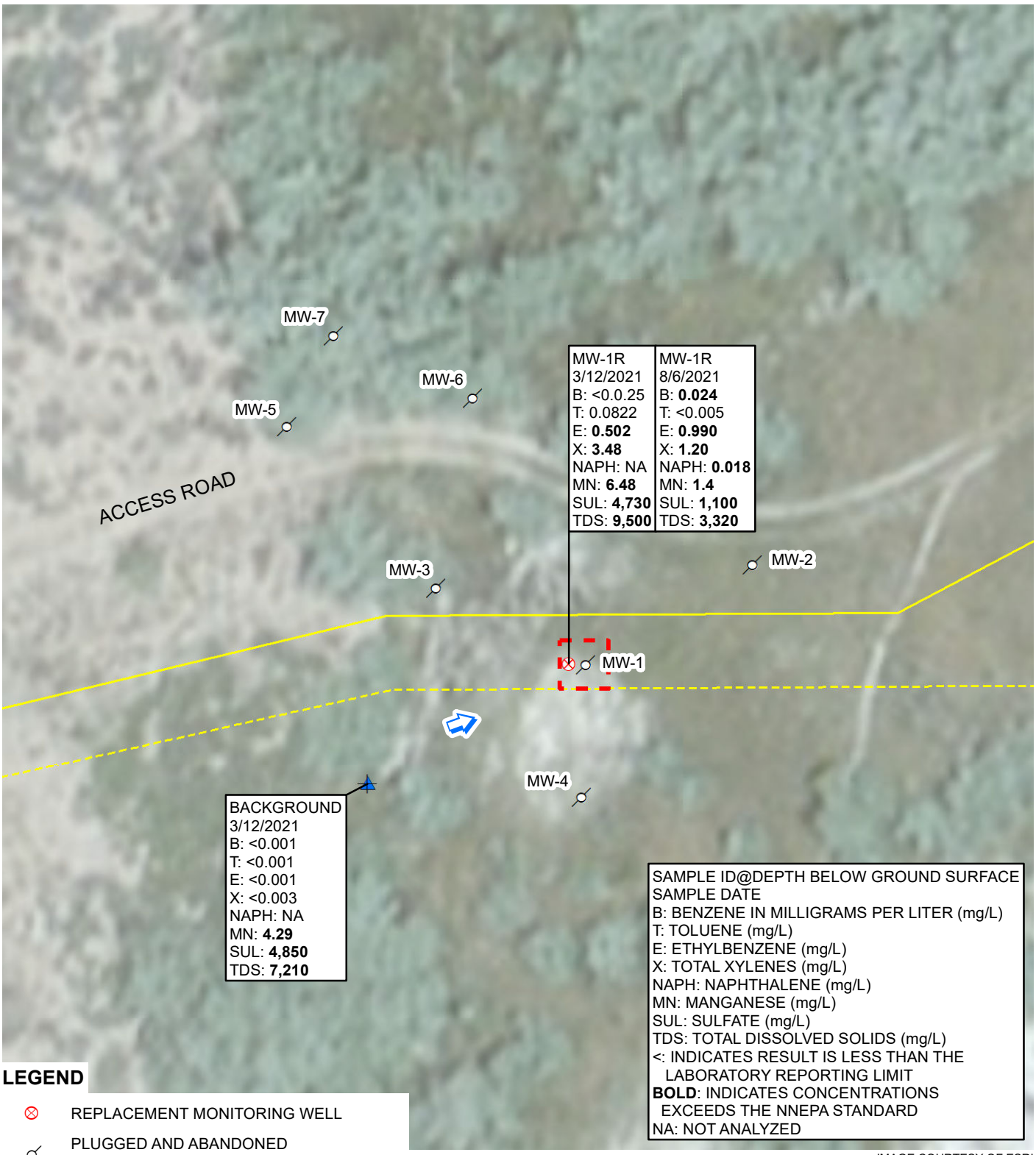

FIGURE 3
2021 GROUNDWATER ANALYTICAL RESULTS
CHARLES ET AL #1
SEC 12-T27N-R9W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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TABLES

TABLE 1
WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet 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	--

TABLE 1
WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-1R	Not Determined	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	--
		1/27/2020***	4.81	--
		7/7/2020***	6.51	--
		3/12/2021***	4.98	--
		8/6/2021***	NM	--
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	5913.40
		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	

TABLE 1
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CHARLES ET AL #1
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SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
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	5912.12
		9/27/2011	7.13	5912.67
		12/12/2011	5.78	5914.02
		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
		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

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MW-4	5919.69	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	5913.75
		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	NA
		6/2/2016	Plugged and Abandoned	
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	NA
		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	NA
		9/26/2011	8.25	5913.30
		12/12/2011	7.12	5914.43
		3/7/2012	6.65	5914.90

TABLE 1
WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-5	5921.55	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	NA
		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	5913.80
		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
		9/13/2013	6.90	5911.74
		12/13/2013	5.32	5913.32

TABLE 1
WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-6	5918.64	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	5912.85
		3/19/2015	5.22	5913.42
		6/19/2015	6.21	5912.43
		9/14/2015	DRY	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	NA
		3/23/2009	4.67	5914.07
		6/29/2009	1.56	5917.18
		3/30/2010	NM	NA
		6/11/2010	NM	NA
		9/21/2010	NM	NA
		12/16/2010	4.91	5913.83
		3/18/2011	DRY	NA
		6/23/2011	6.55	5912.19
		9/26/2011	6.14	5912.60
		12/12/2011	DRY	NA
		3/7/2012	DRY	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

TABLE 1

WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS

CHARLES ET AL #1

HILCORP ENERGY COMPANY

SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-7	5918.74	6/3/2016	Plugged and Abandoned	

Notes:

ft - feet
AMSL - above mean sea level
BTOC - below top of casing
NA - not available
NM - not measured

* PVC casing stick up broken off, likely by cattle. Shallower depth to water reflects new top of casing (TOC) measuring point.
**Section of PVC reattached above ground surface. Depth to water reflects new measuring point.
*** 39-inch section PVC added to top of casing resulting in new TOC elevation

TABLE 2
FIELD PARAMETER RESULTS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

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	NM	3.63	2.23	-68.3	0.25
	3/6/2017	NM	NM	NM	NM	NM	NM	NM
	3/13/2018	NM	NM	NM	NM	NM	NM	NM
	6/25/2018	NM	NM	NM	NM	NM	NM	NM
	9/4/2018	NM	NM	NM	NM	NM	NM	NM
	12/6/2018	NM	NM	NM	NM	NM	NM	NM
	2/26/2019	NM	NM	NM	NM	NM	NM	NM
	5/17/2019	NM	NM	NM	NM	NM	NM	NM
	8/9/2019	18.70	8.03	2.85	5.83	1.40	-72.9	0.25
	10/28/2019	NM	7.27	1.23	5.80	5.70	-85.5	0.25
	1/27/2020	5.20	6.80	3.98	7.99	7.23	-67.1	--
	7/7/2020	22.70	6.67	2.46	4.90	0.35	-51.1	--
	3/12/2021	7.90	7.54	4.32	8.75	5.71	-44.3	0.25
	8/6/2021	NM	NM	NM	NM	NM	NM	NM

Notes:

g/L - grams per liter
mS/cm - millisiemens per centimeter
mg/L - milligrams per liter
°C - degrees Celcius
DO - dissolved oxygen
mV - millivolts
ORP - oxidation-reduction potential
TDS - total dissolved solids
NM - not measured due to insuficient volume to collect field parameters

TABLE 3
PETROLEUM HYDROCARBON GROUNDWATER ANALYTICAL RESULTS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Naphthalene (mg/L)
NNEPA/NMWQCC Standard				**0.005**	**1.0**	**0.7**	**0.62**	**0.0062**
MW-1	MW-1	6/25/2008	(orig)	**1.85**	0.486	**0.971**	0.379	NT
	MW-1	9/25/2008	(orig)	**0.575**	0.66	0.293	**1.547**	NT
	MW-1	1/13/2009	(orig)	**0.494**	0.581	0.474	**3.572**	NT
	MW-1	3/23/2009	(orig)	**0.21**	0.311	0.378	**1.418**	NT
	MW-1	6/29/2009	(orig)	**0.839**	0.107	0.674	**3.404**	NT
	MW-1	3/30/2010	(orig)	**0.48**	0.11	0.25	**1.573**	NT
	MW-1	6/11/2010	(orig)	**3.2**	0.45	0.69	**4.51**	NT
	MW-1	9/21/2010	(orig)	**2.3**	**1.1**	0.25	**4.84**	NT
	MW-1	12/16/2010	(orig)	**0.18**	0.2	0.25	**1.79**	NT
	MW-1	3/18/2011	(orig)	**0.15**	0.14	0.16	**1.083**	NT
	GW-74935-062311-PG04	6/23/2011	(orig)	**3.2**	0.933	**0.972**	**5.8**	NT
	GW-74935-062311-PG05	6/23/2011	(Duplicate)	**3.38**	**1.45**	**1.06**	**6.76**	NT
	GW-074935-092611-CM-008	9/26/2011	(orig)	**1.56**	**2.61**	0.624	**6.59**	NT
	GW-074935-092611-CM-009	9/26/2011	(Duplicate)	**1.57**	**3.02**	**0.756**	**7.26**	NT
	GW-074935-121211-CB-MW-1	12/12/2011	(orig)	**0.232**	0.947	0.5	**3.94**	NT
	GW-074935-121211-CB-DUP	12/12/2011	(Duplicate)	**0.244**	0.994	0.58	**4.65**	NT
	GW-074935-3712-CB-MW-1	3/7/2012	(orig)	**0.0637**	0.366	0.293	**2.23**	NT
	GW-074935-3712-CB-DUP	3/7/2012	(Duplicate)	**0.0693**	0.416	0.333	**2.63**	NT
	GW-074935-060412-CB-MW-1	6/4/2012	(orig)	**0.956**	**2.38**	**0.919**	**6.71**	NT
	GW-074935-060412-CB-DUP	6/4/2012	(Duplicate)	**0.934**	**2.26**	**0.966**	**6.36**	NT
	GW-074935-091712-CM-MW-1	9/17/2012	(orig)	**0.941**	**3.51**	**0.785**	**5.56**	NT
	GW-074935-091712-CM-DUP	9/17/2012	(Duplicate)	**0.984**	**3.04**	**0.852**	**5.87**	NT
	GW-074935-010913-CM-MW-1	1/9/2013	(orig)	**0.125**	**1.14**	0.334	**2.44**	NT
	GW-074935-010913-CM-DUP	1/9/2013	(Duplicate)	**0.142**	**1.52**	0.438	**3.09**	NT
	GW-074935-031813-CM-MW-1	3/18/2013	(orig)	**0.012**	0.195	0.0871	0.581	NT
	GW-074935-031813-CM-DUP	3/18/2013	(Duplicate)	**0.0114**	0.188	0.0891	0.575	NT
	GW-074935-061413-JK-MW1	6/14/2013	(orig)	**0.174**	**1.41**	0.668	**3.26**	NT
	GW-074935-061413-JK-DUP	6/14/2013	(Duplicate)	**0.189**	**2.02**	**0.742**	**4.17**	NT
	GW-074935-091313-CM-MW-1	9/13/2013	(orig)	**0.0414**	**3.24**	0.123	**4.34**	NT
	GW-074935-091313-CM-DUP	9/13/2013	(Duplicate)	**0.0372**	**3.3**	0.126	**4.43**	NT
	GW-074935-121313-CM-MW-1	12/13/2013	(orig)	**0.0053**	0.188	0.122	**0.681**	NT
	GW-074935-121313-CM-DUP	12/13/2013	(Duplicate)	**0.0071**	0.258	0.148	**0.843**	NT
	GW-074935-032114-CK-MW-1	3/21/2014	(orig)	<0.001	0.0348	0.0591	0.247	NT
	GW-074935-032114-CK-DUP	3/21/2014	(Duplicate)	<0.001	0.0385	0.0651	0.26	NT
	GW-074935-061614-CK-MW-1	6/16/2014	(orig)	**0.133**	**1.94**	**0.994**	**4.5**	NT
	GW-074935-061614-CK-DUP	6/16/2014	(Duplicate)	**0.134**	**1.92**	**0.921**	**4.5**	NT
	GW-074935-091914-CB-MW-1	9/19/2014	(orig)	**0.159**	**2.34**	0.630	**3.38**	NT
	GW-074935-121714-JW-MW-1	12/17/2014	(orig)	**0.0138**	0.422	0.248	**1.48**	NT
	GW-074935-121714-JW-DUP	12/17/2014	(Duplicate)	**0.0137**	0.44	0.251	**1.52**	NT
	GW-074935-031915-CM-MW-1	3/19/2015	(orig)	<0.005	0.227	0.174	**1.03**	NT
	GW-074935-061915-CB-MW-1	6/19/2015	(orig)	**0.025**	0.326	0.496	**2.44**	NT
	GW-074935-061915-CB-DUP	6/19/2015	(Duplicate)	**0.0241**	0.306	0.472	**2.31**	NT
	GW-074935-091415-CK-MW-1	9/14/2015	(orig)	**0.0339**	0.0257	0.242	0.504	NT
	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	NT
	GW-074935-091216-CM-MW-1R	9/23/2016	(orig)	<0.001	< 0.001	0.191	0.518	NT
	GW-074935-11282016-CN-MW-1R	11/28/2016	(orig)	**0.028**	0.0084	**0.901**	**4.39**	NT
	GW-074635-030617-CN-MW-1R	3/6/2017	(orig)	**0.0342**	<0.020	0.333	**1.940**	NT
	GW-074935-061217-CN-MW1R	6/12/2017	(orig)	**0.0162**	<0.010	0.304	0.522	NT
	GW-11146002-092517-CN-MW-1R	9/25/2017	(orig)	**0.0126**	<0.010	0.600	**1.05**	NT
	GW-11146002-120417-SP-MW-1R	12/4/2017	(dup)	**0.015**	**1.880**	**0.946**	**7.96**	NT
	GW-11146002-031318-CN-MW1R	3/13/2018	(orig)	<0.050	0.505	**0.840**	**4.80**	NT
	GW-11146002-062518-CM-MW-1R	6/25/2018	(orig)	<0.025	**1.010**	0.165	**4.41**	NT
	GW-11146002-090418-JP-MW-1R	9/4/2018	(orig)	<0.020	0.798	<0.020	**1.55**	NT
	MW-1R	12/6/2018	(orig)	<0.010	0.268	**0.922**	**3.40**	NT
	MW-1R	2/26/2019	(orig)	**0.0101**	0.519	0.576	**6.71**	NT
	MW-1R	5/17/2019	(orig)	<0.0100	<0.100	**0.923**	**3.66**	**0.0753**
	MW-1R	8/9/2019	(orig)	**0.0211**	<0.100	0.594	**1.56**	**0.0258**

TABLE 3
PETROLEUM HYDROCARBON GROUNDWATER ANALYTICAL RESULTS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Naphthalene (mg/L)
NNEPA/NMWQCC Standard				**0.005**	**1.0**	**0.7**	**0.62**	**0.0062**
MW-1R	MW-1R	10/28/2019	(orig)	<0.250	<0.250	**1.11**	**3.29**	**0.447**
	MW-1R	1/27/2020	(orig)	<0.050	0.335	**0.737**	**5.13**	**0.0270**
	MW-1R	7/7/2020	(orig)	**0.0344**	<0.05	**0.866**	**3.54**	NT
	MW-1R	3/12/2021	(orig)	<0.025	0.0822	**0.502**	**3.48**	NT
	MW-1R	8/6/2021	(orig)	**0.024**	<0.005	**0.990**	**1.20**	**0.018**
MW-2	MW-2	6/25/2008	(orig)	0.0042	0.0046	0.0016	0.0011	NT
	MW-2	9/25/2008	(orig)	**0.0195**	0.0258	0.0051	0.1008	NT
	MW-2	1/13/2009	(orig)	0.0021	0.002	0.0022	0.0281	NT
	MW-2	3/23/2009	(orig)	0.0014	0.0004	0.0006	0.0073	NT
	MW-2	6/29/2009	(orig)	0.0015	< 0.0002	0.0002	0.0004	NT
	MW-2	3/30/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-2	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-2	9/21/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-2	12/16/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-2	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	GW-74935-062311-PG02	6/23/2011	(orig)	0.0006	< 0.001	< 0.001	< 0.003	NT
	GW-074935-092611-JP-010	9/26/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121211-CB-MW-2	12/12/2011	(orig)	0.00034	< 0.001	< 0.001	< 0.003	NT
	GW-074935-3712-CB-MW-2	3/7/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-060412-CB-MW-2	6/4/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091712-CM-MW-2	9/17/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-010913-CM-MW-2	1/9/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-031813-CM-MW-2	3/18/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-061413-JK-MW-2	6/14/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091313-CM-MW-2	9/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121313-CM-MW-2	12/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-032114-CK-MW-2	3/21/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-061614-CK-MW-2	6/16/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091914-CB-MW-2	9/19/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121714-JW-MW-2	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	Plugged and Abandoned June 2016							
MW-3	MW-3	6/25/2008	(orig)	ND	ND	ND	ND	NT
	MW-3	9/25/2008	(orig)	ND	0.0023	0.0009	0.0121	NT
	MW-3	1/13/2009	(orig)	ND	ND	ND	ND	NT
	MW-3	3/23/2009	(orig)	< 0.0002	0.0002	0.0002	0.0014	NT
	MW-3	6/29/2009	(orig)	< 0.0002	0.0017	0.0007	0.0082	NT
	MW-3	3/30/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-3	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-3	9/21/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-3	12/16/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-3	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	GW-74935-062311-PG01	6/23/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-092611-CM-006	9/26/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121211-CB-MW-3	12/12/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-3712-CB-MW-3	3/7/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-060412-CB-MW-3	6/4/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091712-CM-MW-3	9/17/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-010913-CM-MW-3	1/9/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-031813-CM-MW-3	3/18/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-061413-JK-MW-3	6/14/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091313-CM-MW-3	9/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121313-CM-MW-3	12/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-032114-CK-MW-3	3/21/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-061614-CK-MW-3	6/16/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091914-CB-MW-3	9/19/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091914-CB-DUP	9/19/2014	(Duplicate)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121714-JW-MW-3	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	Plugged and Abandoned June 2016							
MW-4	MW-4	6/25/2008	(orig)	0.0038	0.0199	0.0014	0.007	NT
	MW-4	9/25/2008	(orig)	ND	ND	ND	ND	NT
	MW-4	1/13/2009	(orig)	ND	ND	ND	ND	NT
	MW-4	3/23/2009	(orig)	< 0.0002	< 0.0002	< 0.0002	< 0.0002	NT
	MW-4	6/29/2009	(orig)	< 0.0002	< 0.0002	0.0002	0.0029	NT

TABLE 3
PETROLEUM HYDROCARBON GROUNDWATER ANALYTICAL RESULTS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Naphthalene (mg/L)
NNEPA/NMWQCC Standard				**0.005**	**1.0**	**0.7**	**0.62**	**0.0062**
MW-4	MW-4	3/30/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-4	6/11/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-4	9/21/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-4	12/16/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	MW-4	3/18/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	NT
	GW-74935-062311-PG03	6/23/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-092611-SP-007	9/26/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121211-CB-MW-4	12/12/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-3712-CB-MW-4	3/7/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-060412-CB-MW-4	6/4/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-010913-CM-MW-4	1/9/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091712-CM-MW-4	9/17/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-031813-CM-MW-4	3/18/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-061413-JK-MW-4	6/14/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091313-CM-MW-4	9/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121313-CM-MW-4	12/13/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-032114-CK-MW-4	3/21/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-061614-CK-MW-4	6/16/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-091914-CB-MW-4	9/19/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	GW-074935-121714-JW-MW-4	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	NT
	Plugged and Abandoned June 2016							
MW-5	MW-5	6/26/2008	(orig)	ND	ND	ND	ND	NT
	MW-5	9/25/2008	(orig)	ND	ND	ND	ND	NT
	MW-5	1/13/2009	(orig)	ND	ND	ND	ND	NT
	MW-5	3/23/2009	(orig)	ND	ND	ND	ND	NT
	Plugged and Abandoned June 2016							
MW-6	MW-6	6/26/2008	(orig)	ND	ND	ND	ND	NT
	MW-6	9/25/2008	(orig)	ND	ND	ND	ND	NT
	MW-6	1/13/2009	(orig)	ND	ND	ND	ND	NT
	MW-6	3/23/2009	(orig)	ND	ND	ND	ND	NT
	Plugged and Abandoned June 2016							
MW-7	MW-7	6/26/2008	(orig)	ND	ND	ND	ND	NT
	MW-7	9/25/2008	(orig)	ND	ND	ND	ND	NT
	MW-7	3/23/2009	(orig)	ND	ND	ND	ND	NT
	Plugged and Abandoned June 2016							
Background	Background	3/12/2021	(orig)	<0.001	<0.001	<0.001	<0.003	NT

Notes:

mg/L - milligrams per liter

ND - not detected, practical quantitation limit unknown

NE - not established

NNEPA - Navajo Nation Environmental Protection Agency

NT - not tested

<0.037 - indicates result less than the stated laboratory reporting limit (PQL)

BOLD - indicates concentration exceeds the applicable standard

TABLE 4
GROUNDWATER GENERAL CHEMISTRY ANALYTICAL RESULTS

CHARLES ET AL #1
HILCORP ENERGY COMPANY
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Alkalinity (mg/L)	Bicarbonate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nitrate (as N) (mg/L)	pH	Potassium (mg/L)	Sodium (mg/L)	Specific Conductance (µmhos/cm)	Sulfate (mg/L)	TDS (mg/L)
NMWQCC Standard			**NE**	**NE**	**250**	**1.6**	**0.2**	**10**	**7 - 9**	**NE**	**NE**	**NE**	**600**	**1,000**
MW-1R	MW-1R	5/17/2019	1,010	1,010	111	0.30	**17.6**	<0.100	7.53	2.88	1,820	8,440	**4,300**	**7,670**
	MW-1R	8/9/2019	NT	NT	NT	NT	**3.41**	NT	NT	NT	NT	NT	**2,900**	**5,030**
	MW-1R	10/28/2019	NT	NT	NT	NT	**1.17**	NT	NT	NT	NT	NT	**1,040**	**2,850**
	MW-1R	1/27/2020	NT	NT	NT	NT	**1.64**	NT	NT	NT	NT	NT	**3,430**	**6,820**
	MW-1R	7/7/2020	NT	NT	NT	NT	**2.55**	NT	NT	NT	NT	NT	**1,910**	**3,660**
	MW-1R	3/12/2021	NT	NT	NT	NT	**6.48**	NT	NT	NT	NT	NT	**4,730**	**9,500**
	MW-1R	8/6/2021	NT	NT	NT	NT	**1.4**	NT	NT	NT	NT	NT	**1,100**	**3,320**
Background	Background	3/12/2021	NT	NT	NT	NT	**4.29**	NT	NT	NT	NT	NT	**4,850**	**7,210**

Notes:
µmhos/cm - microohms per centimeter
mg/L - milligrams per liter
NE - not established
NMWQCC - New Mexico Water Quality Control Commission
NT - not tested
<0.037 - indicates result less than the stated laboratory reporting limit (PQL)
BOLD - indicates concentration exceeds the NMWQCC standard

ENCLOSURE A – ANALYTICAL LABORATORY REPORTS

Pace Analytical®

ANALYTICAL REPORT

March 22, 2021

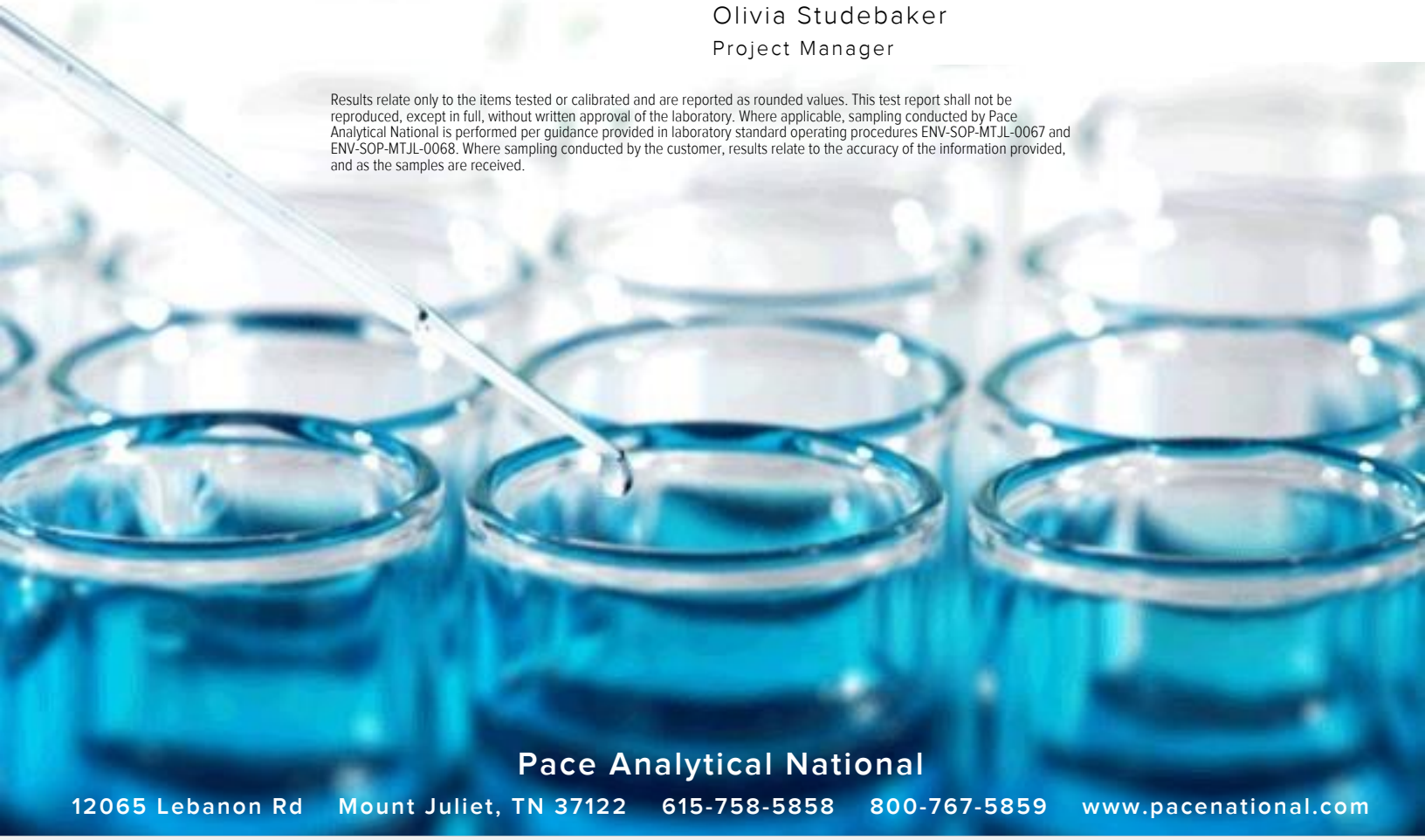
HilCorp-Farmington, NM

Sample Delivery Group:	L1326616
Samples Received:	03/13/2021
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.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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SAMPLE SUMMARY

MW-1R L1326616-01 GW

Collected by: Kurt
Collected date/time: 03/12/21 10:42
Received date/time: 03/13/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1636758	1	03/19/21 11:47	03/19/21 12:12	CAT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1636757	100	03/19/21 02:56	03/19/21 02:56	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1633554	1	03/15/21 22:07	03/16/21 11:19	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1636555	25	03/18/21 15:31	03/18/21 15:31	ADM	Mt. Juliet, TN

CASE NARRATIVE

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	9500		200	1	03/19/2021 12:12	WG1636758

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	4730		500	100	03/19/2021 02:56	WG1636757

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Manganese,Dissolved	6.48		0.00500	1	03/16/2021 11:19	WG1633554

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.0250	25	03/18/2021 15:31	WG1636555
Toluene	0.0822		0.0250	25	03/18/2021 15:31	WG1636555
Ethylbenzene	0.502		0.0250	25	03/18/2021 15:31	WG1636555
Total Xylenes	3.48		0.0750	25	03/18/2021 15:31	WG1636555
(S) Toluene-d8	*100*		*80.0-120*		*03/18/2021 15:31*	WG1636555
(S) 4-Bromofluorobenzene	*96.8*		*77.0-126*		*03/18/2021 15:31*	WG1636555
(S) 1,2-Dichloroethane-d4	*91.1*		*70.0-130*		*03/18/2021 15:31*	WG1636555

Method Blank (MB)

(MB) R3633224-1 03/19/21 12:12

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

L1326976-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1326976-01 03/19/21 12:12 • (DUP) R3633224-3 03/19/21 12:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	169	169	1	0.000		5

L1327023-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1327023-01 03/19/21 12:12 • (DUP) R3633224-4 03/19/21 12:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	735	732	1	0.409		5

Laboratory Control Sample (LCS)

(LCS) R3633224-2 03/19/21 12:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8420	95.7	77.4-123	

Method Blank (MB)

(MB) R3632853-1 03/18/21 14:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.594	5.00

L1326192-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1326192-04 03/19/21 15:12 • (DUP) R3632853-10 03/19/21 15:38

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	1230	1230	20	0.328		15

Laboratory Control Sample (LCS)

(LCS) R3632853-2 03/18/21 15:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	40.0	100	80.0-120	

L1326126-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1326126-01 03/19/21 14:33 • (MS) R3632853-8 03/19/21 14:46 • (MSD) R3632853-9 03/19/21 14:59

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	19.4	69.5	69.6	100	100	1	80.0-120			0.0844	15

Method Blank (MB)

(MB) R3631211-1 03/16/21 09:26

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Manganese,Dissolved	U		0.000704	0.00500

Laboratory Control Sample (LCS)

(LCS) R3631211-2 03/16/21 09:29

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Manganese,Dissolved	0.0500	0.0492	98.4	80.0-120	

L1325230-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1325230-11 03/16/21 09:33 • (MS) R3631211-4 03/16/21 09:39 • (MSD) R3631211-5 03/16/21 09:43

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,Dissolved	0.0500	ND	0.0497	0.0495	97.8	97.5	1	75.0-125			0.268	20

Method Blank (MB)

(MB) R3632726-4 03/18/21 13:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*103*			*80.0-120*
(S) 4-Bromofluorobenzene	*95.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*90.4*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3632726-1 03/18/21 11:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00418	83.6	70.0-123	
Ethylbenzene	0.00500	0.00473	94.6	79.0-123	
Toluene	0.00500	0.00496	99.2	79.0-120	
Xylenes, Total	0.0150	0.0144	96.0	79.0-123	
(S) Toluene-d8			*103*	*80.0-120*	
(S) 4-Bromofluorobenzene			*97.7*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*92.9*	*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.

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

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

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

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
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	LA000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
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

* 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 Analytical.

HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

Billing Information:
Jennifer Deal
PO Box 61529
Houston, TX 77208

Pres Chk

Report to: Kurt Hoekstra

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

Project Description: Charles et al No. 1

City/State Collected:

Please Circle: PT MT CT ET

Phone: 505-486-9543

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 ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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National Center for Testing & Innovation

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

SDG # L1326616

C095

Acctnum: HILCORANM
Template: T170423
Prelogin: P816011
PM: 823 - Olivia Studebaker
PB: CS 12/9/2020
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved Mn 250mlHDPE-NoPres	SULFATE,TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	Remarks	Sample # (lab only)
MW-1R		GW		3-12	10:42	5	X	X	X		-01

* 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 # 9348 1611 2489

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	3-12-21	2:30	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: NPW 5.0=5 °C Bottles Received: 5
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 3/13/21 Time: 9:06

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®

ANALYTICAL REPORT

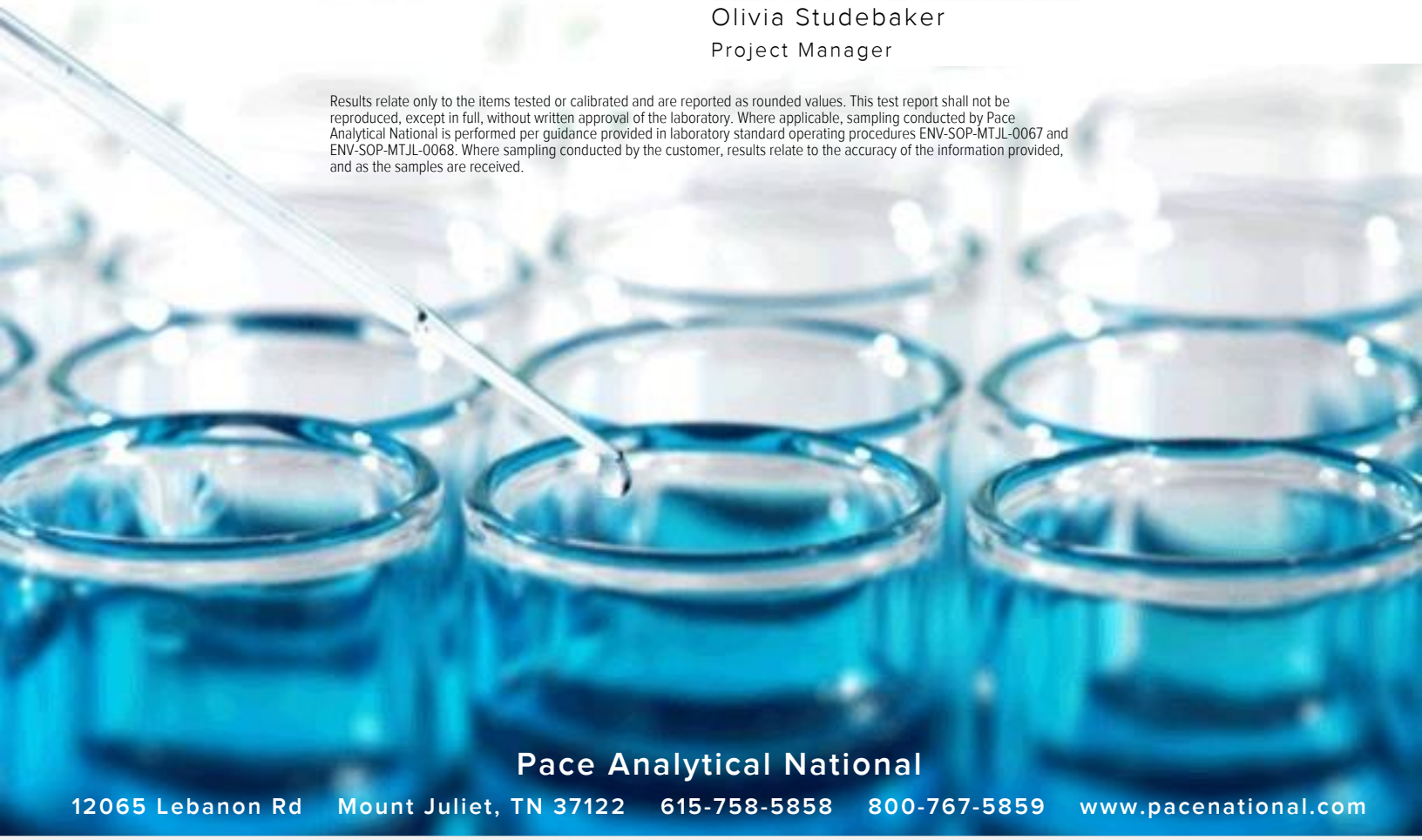
March 23, 2021

HilCorp-Farmington, NM

Sample Delivery Group:	L1327399
Samples Received:	03/16/2021
Project Number:	
Description:	Charles et al No. 1
Report To:	Kurt Hoekstra
	382 Road 3100
	Aztec, NM 87401

Entire Report Reviewed By:

Olivia Studebaker
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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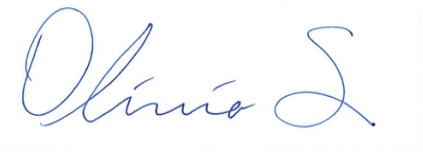
SAMPLE SUMMARY

BACKGROUND L1327399-01 GW

	Collected by	Collected date/time	Received date/time
		03/12/21 10:45	03/16/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1637345	1	03/19/21 15:40	03/19/21 16:43	CAT	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1637620	100	03/22/21 23:18	03/22/21 23:18	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1636440	1	03/18/21 04:45	03/18/21 10:45	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1637394	1	03/19/21 15:54	03/19/21 15:54	JCP	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	7210		100	1	03/19/2021 16:43	WG1637345

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	4850		500	100	03/22/2021 23:18	WG1637620

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Manganese,Dissolved	4.29		0.0100	1	03/18/2021 10:45	WG1636440

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	03/19/2021 15:54	WG1637394
Toluene	ND		0.00100	1	03/19/2021 15:54	WG1637394
Ethylbenzene	ND		0.00100	1	03/19/2021 15:54	WG1637394
Total Xylenes	ND		0.00300	1	03/19/2021 15:54	WG1637394
(S) Toluene-d8	*91.7*		*80.0-120*		*03/19/2021 15:54*	WG1637394
(S) 4-Bromofluorobenzene	*98.8*		*77.0-126*		*03/19/2021 15:54*	WG1637394
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*03/19/2021 15:54*	WG1637394

Method Blank (MB)

(MB) R3633223-1 03/19/21 16:43

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

L1327848-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1327848-04 03/19/21 16:43 • (DUP) R3633223-3 03/19/21 16:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	199	199	1	0.000		5

L1327848-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1327848-05 03/19/21 16:43 • (DUP) R3633223-4 03/19/21 16:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	204	207	1	1.46		5

Laboratory Control Sample (LCS)

(LCS) R3633223-2 03/19/21 16:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8470	96.3	77.4-123	

Method Blank (MB)

(MB) R3633615-1 03/22/21 13:28

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.594	5.00

L1327117-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1327117-06 03/22/21 15:37 • (DUP) R3633615-3 03/22/21 15:56

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	8.94	8.99	1	0.563		15

L1327410-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1327410-02 03/23/21 01:08 • (DUP) R3633615-7 03/23/21 01:26

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	ND	5	3.77		15

Laboratory Control Sample (LCS)

(LCS) R3633615-2 03/22/21 13:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	39.8	99.5	80.0-120	

L1327117-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1327117-09 03/22/21 16:32 • (MS) R3633615-4 03/22/21 17:28 • (MSD) R3633615-5 03/22/21 17:46

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	87.2	135	136	96.0	98.2	1	80.0-120	E	E	0.792	15

L1327410-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1327410-01 03/22/21 23:36 • (MS) R3633615-6 03/22/21 23:54

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	52.7	106	107	1	80.0-120	E

Method Blank (MB)

(MB) R3632193-1 03/18/21 10:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Manganese,Dissolved	U		0.000934	0.0100

Laboratory Control Sample (LCS)

(LCS) R3632193-2 03/18/21 10:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Manganese,Dissolved	1.00	0.910	91.0	80.0-120	

L1327818-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1327818-04 03/18/21 10:13 • (MS) R3632193-4 03/18/21 10:18 • (MSD) R3632193-5 03/18/21 10:21

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,Dissolved	1.00	ND	0.906	0.906	90.6	90.6	1	75.0-125			0.0926	20

Method Blank (MB)

(MB) R3632874-2 03/19/21 10:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*87.3*			*80.0-120*
(S) 4-Bromofluorobenzene	*94.9*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*129*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3632874-1 03/19/21 09:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00591	118	70.0-123	
Ethylbenzene	0.00500	0.00518	104	79.0-123	
Toluene	0.00500	0.00462	92.4	79.0-120	
Xylenes, Total	0.0150	0.0148	98.7	79.0-123	
(S) Toluene-d8			*86.6*	*80.0-120*	
(S) 4-Bromofluorobenzene			*96.1*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*126*	*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.

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
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
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	LA000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
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

* 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 Analytical.

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

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

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

ALL BOLD OUTLINED AREAS are for LAB USE ONLY

Company: Hilcorp

Billing Information: PO BOX 61529 Houston, Tx 77208

Address: 382 Rd. 3100 Aztec, NM 87410

Report To: Jennifer Deal

Email To: jdeal@hilcorp.com, stuart.hyde@wsp.com

Copy To:

Site Collection Info/Address:

Customer Project Name/Number: HILCORANM - Charles

State: NM County/City: San Juan Time Zone Collected: / [ ]PT [X]MT [ ]CT [ ]ET

Container Preservative Type **

Lab Project Manager:

** 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 _____

Phone: 505-801-6517
Email: jdeal@wsp.com

Site/Facility ID #: Charles et al No. 1

Compliance Monitoring? [ ] Yes [ ] No

Collected By (print): Eric Carroll

Purchase Order # :
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature): Eric Carroll

Turnaround Date Required:

Immediately Packed on Ice: [ ] Yes [ ] No

Sample Disposal:
[ ] Dispose as appropriate
[ ] Return
[ ] Archive: _____
[ ] Hold: _____

Rush: (Expedite Charges Apply)
[ ] Same Day [ ] Next Day
[ ] 2 Day [ ] 3 Day
[ ] 4 Day [ ] 5 Day

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: Dissolved Mn

Container Type: Plastic (P) or Glass (G)

* 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)

Analyses: Dissolved Mn; Sulfate; TDS; BTEX 8260

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 Ctns	Dissolved Mn	Sulfate	TDS	BTEX 8260	Lab Sample # / Comments:
Background	GW	Grab	3/12	10:45				4	x	x	x	x	L1327399-01

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:

Customer Remarks / Special Conditions / Possible Hazards:

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 #: 7731 6194 5856

Samples received via: FEDEX UPS Client Courier Pace Courier

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: NFB3
Cooler 1 Temp Upon Receipt: 1.9 oC
Cooler 1 Therm Corr. Factor: -.3 oC
Cooler 1 Corrected Temp: 1.6 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Eric Carroll / WSP	3/15 1330		
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
		Kailey Miller	3/16/21 900

G023

Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

August 18, 2021

Kate Kaufman
HILCORP ENERGY
PO Box 4700
Farmington, NM 87499
TEL: (505) 564-0733
FAX

RE: Charles et al 1 OrderNo.: 2108376

Dear Kate Kaufman:

Hall Environmental Analysis Laboratory received 1 sample(s) on 8/7/2021 for the analyses presented in the following report.

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

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

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

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **2108376**
Date Reported: **8/18/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY **Client Sample ID:** MW-1R
Project: Charles et al 1 **Collection Date:** 8/6/2021 12:00:00 PM
Lab ID: 2108376-001 **Matrix:** GROUNDWA **Received Date:** 8/7/2021 9:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Sulfate	1100	50	*	mg/L	100	8/10/2021 7:48:50 PM
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **ELS**
Manganese	1.4	0.010	*	mg/L	5	8/9/2021 12:53:20 PM
EPA METHOD 8260B: VOLATILES						Analyst: **CCM**
Benzene	24	5.0	D	µg/L	5	8/10/2021 4:53:00 PM
Toluene	ND	5.0	D	µg/L	5	8/10/2021 4:53:00 PM
Ethylbenzene	990	50		µg/L	50	8/11/2021 1:08:00 PM
Naphthalene	18	10	D	µg/L	5	8/10/2021 4:53:00 PM
Xylenes, Total	1200	75		µg/L	50	8/11/2021 1:08:00 PM
Surr: 1,2-Dichloroethane-d4	85.4	70-130	D	%Rec	5	8/10/2021 4:53:00 PM
Surr: 4-Bromofluorobenzene	95.3	70-130	D	%Rec	5	8/10/2021 4:53:00 PM
Surr: Dibromofluoromethane	85.2	70-130	D	%Rec	5	8/10/2021 4:53:00 PM
Surr: Toluene-d8	98.1	70-130	D	%Rec	5	8/10/2021 4:53:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **JMT**
Total Dissolved Solids	3320	200	*D	mg/L	1	8/13/2021 2:29:00 PM

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

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2108376**

18-Aug-21

Client: HILCORP ENERGY

Project: Charles et al 1

Sample ID: **MB**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **C80386**	RunNo: **80386**
Prep Date:	Analysis Date: **8/9/2021**	SeqNo: **2833581** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Manganese	ND	0.0020								

Sample ID: **LLLCS**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **C80386**	RunNo: **80386**
Prep Date:	Analysis Date: **8/9/2021**	SeqNo: **2833583** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Manganese	ND	0.0020	0.002000	0	94.5	50	150			

Sample ID: **LCS**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **C80386**	RunNo: **80386**
Prep Date:	Analysis Date: **8/9/2021**	SeqNo: **2833585** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Manganese	0.47	0.0020	0.5000	0	93.3	85	115			

Qualifiers:

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

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2108376**
18-Aug-21

Client: HILCORP ENERGY
Project: Charles et al 1

Sample ID: **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **PBW**	Batch ID: **R80444**	RunNo: **80444**							
Prep Date:	Analysis Date: **8/10/2021**	SeqNo: **2835493**	Units: **mg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

Sample ID: **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **LCSW**	Batch ID: **R80444**	RunNo: **80444**							
Prep Date:	Analysis Date: **8/10/2021**	SeqNo: **2835494**	Units: **mg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	9.2	0.50	10.00	0	92.1	90	110			

Qualifiers:

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

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2108376**
18-Aug-21

Client: HILCORP ENERGY
Project: Charles et al 1

Sample ID: **100ng 8260 lcs** SampType: **LCS** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW** Batch ID: **R80417** RunNo: **80417**
Prep Date: Analysis Date: **8/10/2021** SeqNo: **2834483** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	19	1.0	20.00	0	96.5	70	130			
Toluene	20	1.0	20.00	0	98.5	70	130			
Surr: 1,2-Dichloroethane-d4	8.3		10.00		83.4	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		102	70	130			
Surr: Dibromofluoromethane	8.4		10.00		84.5	70	130			
Surr: Toluene-d8	9.8		10.00		97.7	70	130			

Sample ID: **mb** SampType: **MBLK** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW** Batch ID: **R80417** RunNo: **80417**
Prep Date: Analysis Date: **8/10/2021** SeqNo: **2834768** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Naphthalene	ND	2.0								
Surr: 1,2-Dichloroethane-d4	8.9		10.00		89.5	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		103	70	130			
Surr: Dibromofluoromethane	9.0		10.00		90.4	70	130			
Surr: Toluene-d8	9.8		10.00		97.9	70	130			

Sample ID: **100ng 8260 lcs** SampType: **LCS** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW** Batch ID: **R80454** RunNo: **80454**
Prep Date: Analysis Date: **8/11/2021** SeqNo: **2836027** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 1,2-Dichloroethane-d4	8.9		10.00		89.3	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		103	70	130			
Surr: Dibromofluoromethane	8.9		10.00		88.9	70	130			
Surr: Toluene-d8	9.6		10.00		96.5	70	130			

Sample ID: **MB** SampType: **MBLK** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW** Batch ID: **R80454** RunNo: **80454**
Prep Date: Analysis Date: **8/11/2021** SeqNo: **2836451** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.0		10.00		90.4	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	8.8		10.00		88.3	70	130			

Qualifiers:

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

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2108376**
18-Aug-21

Client: HILCORP ENERGY
Project: Charles et al 1

Sample ID: **MB** SampType: **MBLK** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW** Batch ID: **R80454** RunNo: **80454**
Prep Date: Analysis Date: **8/11/2021** SeqNo: **2836451** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Toluene-d8	9.7		10.00		96.5	70	130			

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2108376**

18-Aug-21

Client: HILCORP ENERGY

Project: Charles et al 1

Sample ID: **MB-61931**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **61931**	RunNo: **80521**
Prep Date: **8/12/2021**	Analysis Date: **8/13/2021**	SeqNo: **2839081** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID: **LCS-61931**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **61931**	RunNo: **80521**
Prep Date: **8/12/2021**	Analysis Date: **8/13/2021**	SeqNo: **2839082** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	998	20.0	1000	0	99.8	80	120			

Qualifiers:

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

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

Sample Log-In Check List

Client Name: **HILCORP ENERGY** Work Order Number: **2108376** RcptNo: **1**

Received By: **Sean Livingston** **8/7/2021 9:10:00 AM** Sean Livingston

Completed By: **Isaiah Ortiz** **8/9/2021 8:41:40 AM** I. Ortiz

Reviewed By: SPA 8-9-21

Chain of Custody

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

Log In

3. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
5. Sample(s) in proper container(s)?	Yes ☑	No ☐	
6. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
7. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
8. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA?	Yes ☑	No ☐	NA ☐
10. Were any sample containers received broken?	Yes ☐	No ☑	
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
12. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
13. Is it clear what analyses were requested?	Yes ☑	No ☐	
14. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

# of preserved bottles checked for pH: 1 (<2 or >12 unless noted)

Adjusted? NO

Checked by: MPG 8/9/21

Special Handling (if applicable)

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

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	5.8	Good	Not Present			

Chain-of-Custody Record

Client: Hilcorp - Kate Kaufman
1111 Travis St
Mailing Address: Houston TX
Phone #: 346-237-2075
email or Fax#: kkaufman@hilcorp.com
QA/QC Package:
☑ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☑ EDD (Type) Excel

Turn-Around Time:
☑ Standard ☐ Rush
Project Name: Charles et al #1
Project #:
Project Manager: S Hyde
Sampler: S Hyde
On Ice: ☑ Yes ☐ No
# of Coolers: 1
Cooler Temp(including CF): 5.8+0=5.8 (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2108376	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	Naphthalene	Dissolved Mn	TDS / Sulfate			
8/6/21	1200	GW	MW-1B	Various	Various	001	X										X	X	X			

Remarks:

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
8/6/21	1305		Chris Ward		8/10/21	1305
8/6/21	1811	Chris Ward	Sue Carver	Sue 8/7/21 ~~8/7~~ 8/7/21		9:10

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

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

CONDITIONS

Action 82122

CONDITIONS

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 82122
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
nvelez	Review of 2021 Annual Groundwater Monitoring Report: Content satisfactory 1. Continue to monitor well MW-1R semi-annually for BTEX per US EPA Method 8260B 2. OCD approves eliminating manganese, sulfate, and TDS from future sampling in all site wells 3. Provide at least one (1) groundwater flow direction schematic per annual report 4. Submit the Annual Monitoring Report to the OCD no later than March 31, 2023.	4/12/2022