NV

ENSOLUM

March 28, 2023

New Mexico Oil Conservation Division
New Mexico Energy, Minerals, and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: 2022 Annual Groundwater Monitoring Report
Charles et al #1
San Juan County, New Mexico
Hilcorp Energy Company
NMOCD Incident Number: NRMD0928136813
NMOCD Administrative Order: 3R-432

To Whom it May Concern:

Ensolum, LLC (Ensolum), on behalf of Hilcorp Energy Company (Hilcorp), presents this *2022 Annual Groundwater Monitoring Report* to the New Mexico Oil Conservation Division (NMOCD). This report documents groundwater monitoring activities conducted at the former Charles et al #1 natural gas production well (Site) during 2022. 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 Site 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). 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, shallow groundwater monitoring wells MW-2 through MW-7 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 general location as former monitoring well MW-1 for continued monitoring. Hilcorp acquired the Site from ConocoPhillips in April 2017 and has continued to monitor groundwater conditions in well MW-1R. 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 groundwater-quality standards be met as presented by the New Mexico Water Quality Control Commission (NMWQCC) and listed in Title 20, Chapter 6, Part 2, Section 3103 (20.6.2.3103) of the New Mexico Administrative Code (NMAC).

Because there are two regulatory groundwater standards applicable for this Site, the most conservative cleanup standards developed by the NNEPA and NMWQCC have been used to compare groundwater analytical results obtained at the Site. Manganese, sulfate and TDS were removed from the biannual sampling criteria per approval from the NMOCD dated April 12, 2022, and were not analyzed in the September 2022 sampling event. The groundwater standards for the Site are presented in milligrams per liter (mg/L) and are as follows:

- Benzene: 0.005 mg/L
- Toluene: 1.0 mg/L
- Ethylbenzene: 0.7 mg/L
- Total Xylenes: 0.62 mg/L

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 January 7, 2022, and September 26, 2022. Static groundwater level monitoring included recording depth-to-water in monitoring well MW-1R using a Keck oil/water interface probe. Depth-to-groundwater during the January and September 2022 events were measured at 5.54 feet and 5.53 feet below top of well casing, respectively. Well construction and depth-to-groundwater information is presented in Table 1. Based on historical well gauging information (prior to plugging and abandoning wells MW-2 through MW-7), groundwater flow direction was consistently to the east-northeast.

GROUNDWATER SAMPLING

Groundwater from well MW-1R 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, and electrical conductivity, were collected while purging the well during the January 2022 sampling event. Due to insufficient water volumes and slow recharge of the well, field parameters were not measured during the September 2022 sampling event. Groundwater quality measurements are presented in Table 2.

Following well purging, groundwater samples were placed directly into laboratory-provided containers and labeled with the date and time of collection, well designation, project name, sample collector's name, and parameters to be analyzed. Containers were immediately sealed, packed on ice, and submitted to Hall Environmental Analysis Laboratory (Hall) for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8260B. Proper chain-of-custody 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.

GROUNDWATER ANALYTICAL RESULTS

During the January 2022 groundwater sampling event, concentrations of benzene and total xylenes exceeded the applicable NNEPA/NMWQCC cleanup standards. Additionally, the concentration of benzene exceeded the NNEPA/NMWQCC cleanup standard during the September 2022 groundwater sampling event. Toluene and ethylbenzene concentrations were in compliance with the cleanup standard during both 2022 sampling events. A summary of analytical results are presented in Table 3 and depicted on Figure 3, with complete laboratory analytical reports attached as Appendix A.

CONCLUSIONS AND RECOMMENDATIONS

Since 2008, BTEX concentrations in groundwater have declined in well MW-1/MW-1R. Benzene concentrations have had minor fluctuations but are generally consistent. 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.

Ensolum appreciates the opportunity to provide these environmental services to Hilcorp. Please contact either of the undersigned with any questions.

Sincerely,

Ensolum, LLC

Stuart Hyde, LG
Senior Geologist
(970) 903-1607
shyde@ensolum.com

Daniel R. Moir, PG
Senior Managing Geologist
(303) 887-2946
dmoir@ensolum.com

Attachments:

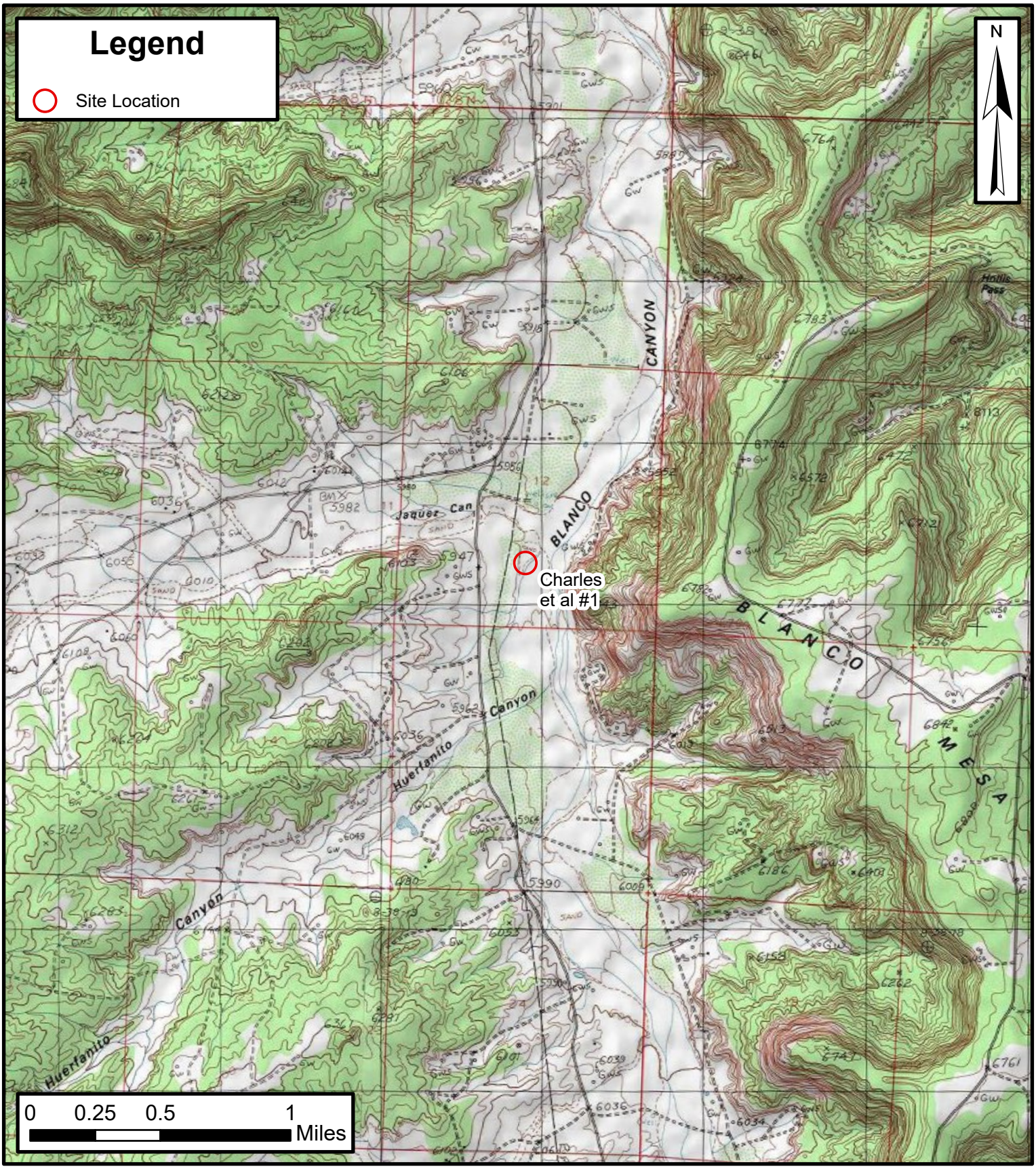
Figure 1: Site Location Map
Figure 2: Site Map
Figure 3: 2022 Groundwater Analytical Results

Table 1: Groundwater Elevations
Table 2: Groundwater Quality Parameters
Table 3: Groundwater Analytical Results

Appendix A: Laboratory Analytical Reports

ENSOLUM

FIGURES



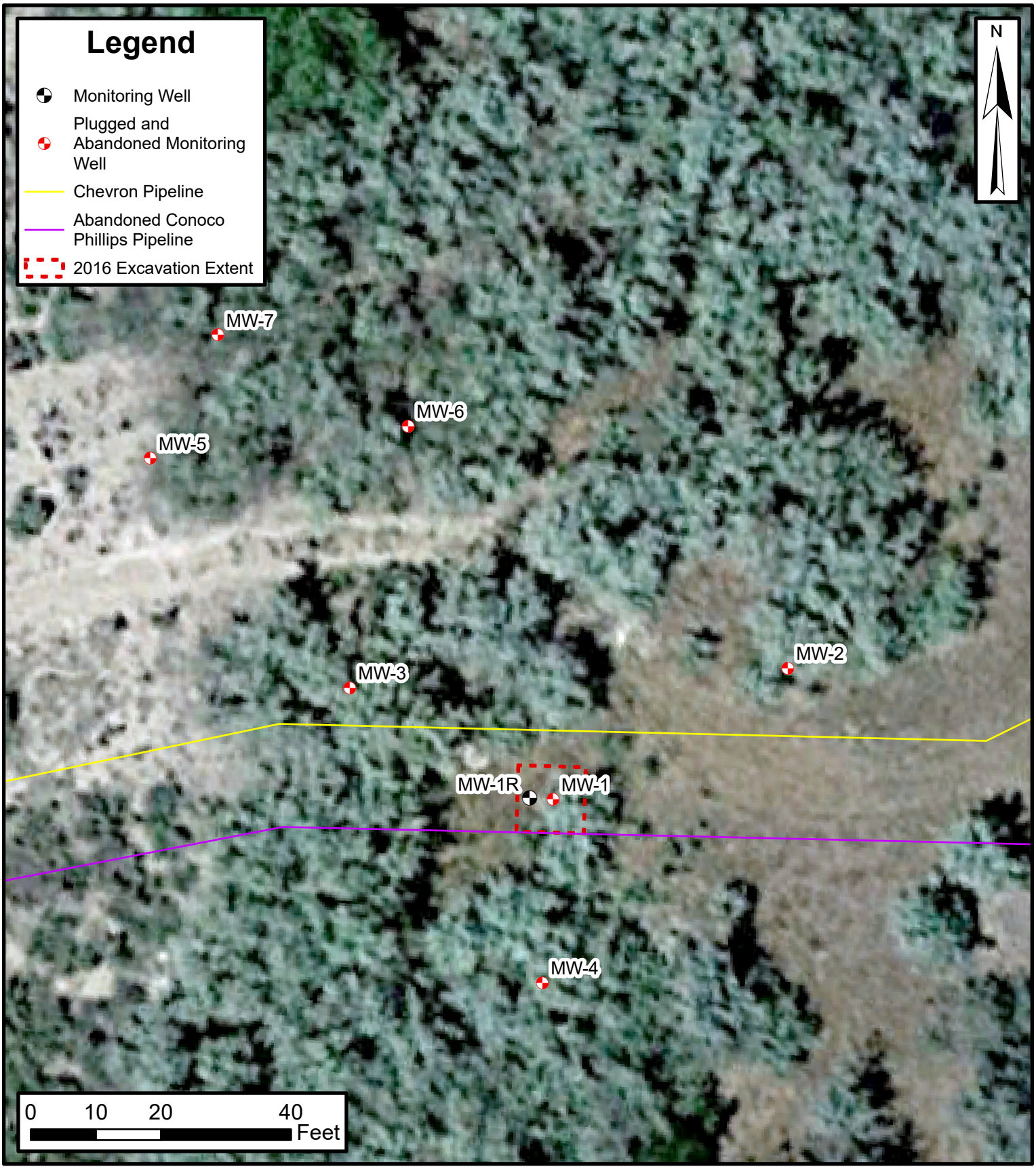
ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Site Location Map

Charles et al #1
Hilcorp Energy Company
36.586167, -107.740284
San Juan County, New Mexico

FIGURE
1

Sources: Environmental Systems Research Institute (ESRI), National Geographic Society, i-cubed



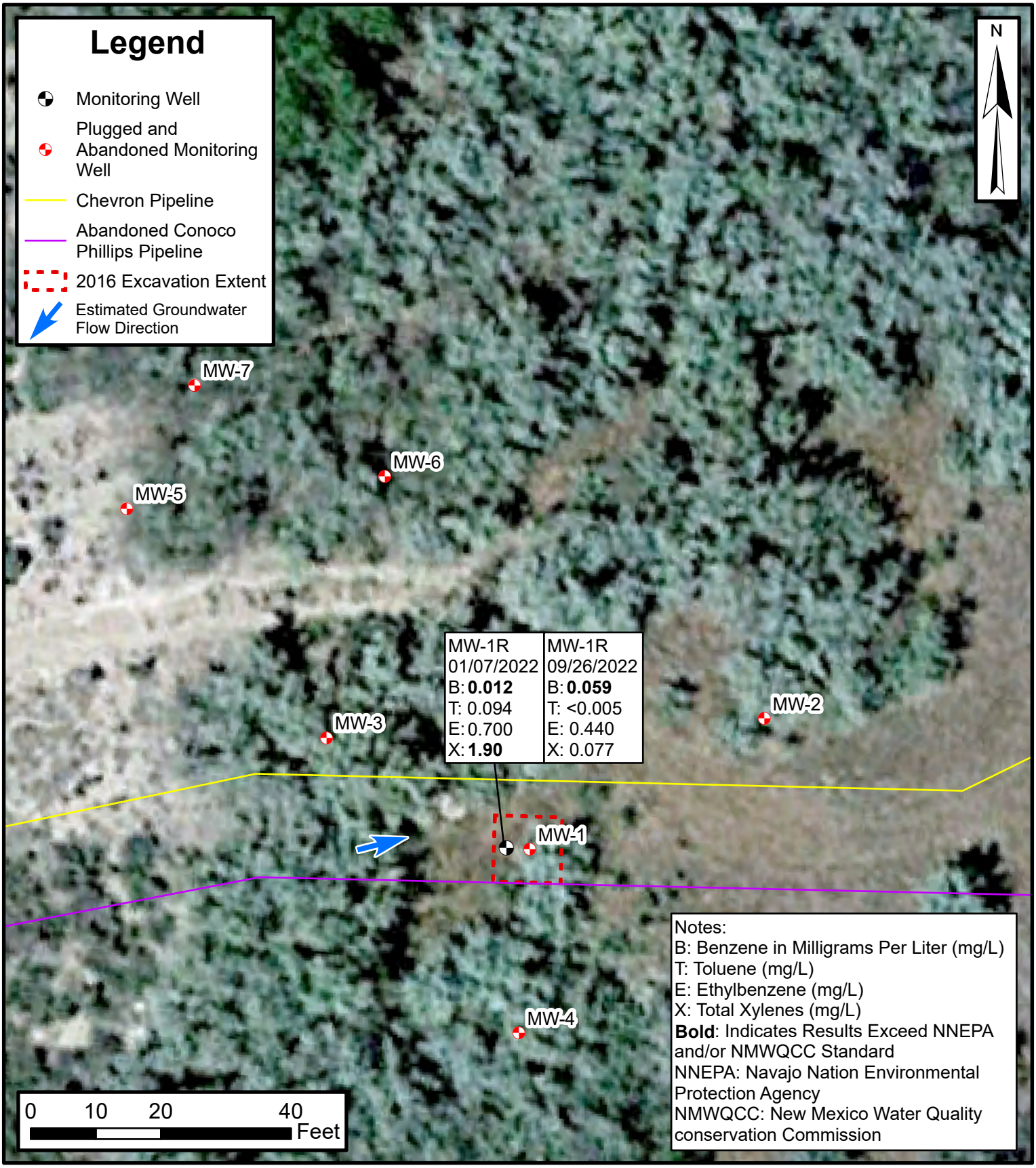
ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Site Map

Charles et al #1
Hilcorp Energy Company
36.586167, -107.740284
San Juan County, New Mexico

FIGURE
2

Sources: Google Earth 2022



ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

2022 Groundwater Analytical Results

Charles et al #1
Hilcorp Energy Company
36.586167, -107.740284
San Juan County, New Mexico

FIGURE
3

Sources: Google Earth 2022

ENSOLUM

TABLES

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-1	5,917.87	6/25/2008	4.71	5,913.16
		8/14/2008	5.21	5,912.66
	5,917.05	10/2/2008	5.13	5,911.92
		1/13/2009	4.41	5,912.64
		3/23/2009	3.01	5,914.04
		6/29/2009	2.12	5,914.93
		3/30/2010	2.68	5,914.37
		6/11/2010	4.74	5,912.31
		9/21/2010	5.52	5,911.53
		12/16/2010	3.71	5,913.34
		3/18/2011	2.98	5,914.07
		6/23/2011	4.99	5,912.06
		9/27/2011	4.55	5,912.50
		12/12/2011	3.23	5,913.82
		3/7/2012	3.67	5,913.38
		6/4/2012	4.75	5,912.30
		9/17/2012	5.57	5,911.48
		1/9/2013	3.87	5,913.18
		3/18/2013	3.09	5,913.96
		6/14/2013	4.83	5,912.22
		9/13/2013	5.42	5,911.63
		12/13/2013	3.67	5,913.38
		3/21/2014	3.27	5,913.78
		6/16/2014	5.13	5,911.92
		9/19/2014	5.70	5,911.35
		12/17/2014	4.22	5,912.83
		3/19/2015	3.36	5,913.69
		6/19/2015	4.34	5,912.71
		9/14/2015	5.55	5,911.50
		6/2/2016	Plugged and Abandoned	

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
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	--
		1/27/2020***	4.81	--
		7/7/2020***	6.51	--
		3/12/2021***	4.98	--
		8/6/2021***	NM	--
		1/7/2022***	5.54	--
		9/26/2022***	5.53	--
MW-2	5,917.33	6/25/2008	4.66	5,912.67
		8/14/2008	5.35	5,911.98
	5,916.53	10/2/2008	5.12	5,911.41
		1/13/2009	3.15	5,913.38
		3/23/2009	2.65	5,913.88
		6/29/2009	4.20	5,912.33
		3/30/2010	2.57	5,913.96
		6/11/2010	4.63	5,911.90
		9/21/2010	5.53	5,911.00
		12/16/2010	3.53	5,913.00
		3/18/2011	2.70	5,913.83

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-2	5,916.53	6/23/2011	4.80	5,911.73
		9/27/2011	4.30	5,912.23
		12/12/2011	3.13	5,913.40
		3/7/2012	2.58	5,913.95
		6/4/2012	4.51	5,912.02
		9/17/2012	5.56	5,910.97
		1/9/2013	3.75	5,912.78
		3/18/2013	3.02	5,913.51
		6/14/2013	4.69	5,911.84
		9/13/2013	5.09	5,911.44
		12/13/2013	3.55	5,912.98
		3/21/2014	3.15	5,913.38
		6/16/2014	4.98	5,911.55
		9/19/2014	5.49	5,911.04
		12/17/2014	4.11	5,912.42
		3/19/2015	3.30	5,913.23
		6/19/2015	4.24	5,912.29
		9/14/2015	5.57	5,910.96
		6/2/2016	Plugged and Abandoned	
MW-3	5,920.57	6/25/2008	7.16	5,913.41
		8/14/2008	8.86	5,911.71
	5,919.80	10/2/2008	7.63	5,912.17
		1/13/2009	5.56	5,914.24
		3/23/2009	5.56	5,914.24
		6/29/2009	1.10	5,918.70
		3/30/2010	5.38	5,914.42
		6/11/2010	7.44	5,912.36
		9/21/2010	8.22	5,911.58
		12/16/2010	6.06	5,913.74
		3/18/2011	5.42	5,914.38
		6/23/2011	7.68	5,912.12
		9/27/2011	7.13	5,912.67

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-3	5,919.80	12/12/2011	5.78	5,914.02
		3/7/2012	5.33	5,914.47
		6/4/2012	7.27	5,912.53
		9/17/2012	8.15	5,911.65
		1/9/2013	6.37	5,913.43
		3/18/2013	5.68	5,914.12
		6/14/2013	7.36	5,912.44
		9/13/2013	7.72	5,912.08
		12/13/2013	6.20	5,913.60
		3/21/2014	5.89	5,913.91
		6/16/2014	7.71	5,912.09
		9/19/2014	8.13	5,911.67
		12/17/2014	6.71	5,913.09
		3/19/2015	5.98	5,913.82
		6/19/2015	7.01	5,912.79
		9/14/2015	8.21	5,911.59
		6/2/2016	Plugged and Abandoned	
MW-4	5,920.48	6/25/2008	4.27	5,916.21
		8/14/2008	7.89	5,912.59
	5,919.69	10/2/2008	7.73	5,911.96
		1/13/2009	5.94	5,913.75
		3/23/2009	5.64	5,914.05
		6/29/2009	6.84	5,912.85
		3/30/2010	5.40	5,914.29
		6/11/2010	7.23	5,912.46
		9/21/2010	8.17	5,911.52
		12/16/2010	6.24	5,913.45
		3/18/2011	5.50	5,914.19
		6/23/2011	7.50	5,912.19
		9/27/2011	6.98	5,912.71
		12/12/2011	5.94	5,913.75
		3/7/2012	5.36	5,914.33

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-4	5,919.69	6/4/2012	7.18	5,912.51
		9/17/2012	8.18	5,911.51
		1/9/2013	6.53	5,913.16
		3/18/2013	5.81	5,913.88
		6/14/2013	7.40	5,912.29
		9/13/2013	7.77	5,911.92
		12/13/2013	6.37	5,913.32
		3/21/2014	6.03	5,913.66
		6/16/2014	7.63	5,912.06
		9/19/2014	8.09	5,911.60
		12/17/2014	6.87	5,912.82
		3/19/2015	6.05	5,913.64
		6/19/2015	6.92	5,912.77
		9/14/2015	DRY	--
		6/2/2016	Plugged and Abandoned	
MW-5	5,923.63	6/26/2008	8.23	5,915.40
		8/14/2008	8.68	5,914.95
	5,921.55	10/2/2008	8.70	5,912.85
		1/13/2009	6.96	5,914.59
		3/23/2009	6.58	5,914.97
		6/29/2009	4.10	5,917.45
		3/30/2010	NM	--
		6/11/2010	8.20	5,913.35
		9/21/2010	9.25	5,912.30
		12/16/2010	7.40	5,914.15
		3/18/2011	6.74	5,914.81
		6/23/2011	NM	--
		9/26/2011	8.25	5,913.30
		12/12/2011	7.12	5,914.43
		3/7/2012	6.65	5,914.90
	5,921.55	6/4/2012	8.17	5,913.38
		9/17/2012	9.30	5,912.25

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-5	5,921.55	1/9/2013	7.76	5,913.79
		3/18/2013	7.05	5,914.50
		6/14/2013	8.49	5,913.06
		9/13/2013	8.97	5,912.58
		12/13/2013	7.55	5,914.00
		3/21/2014	7.17	5,914.38
		6/16/2014	8.72	5,912.83
		9/19/2014	9.35	5,912.20
		12/17/2014	8.07	5,913.48
MW-5	5,921.55	3/19/2015	7.33	5,914.22
		6/19/2015	8.24	5,913.31
		9/14/2015	9.48	5,912.07
		6/2/2016	Plugged and Abandoned	
MW-6	5,920.68	6/26/2008	6.75	5,913.93
		8/14/2008	6.97	5,913.71
	5,918.64	10/2/2008	6.83	5,911.81
		1/13/2009	4.89	5,913.75
		3/23/2009	4.12	5,914.52
		6/29/2009	1.80	5,916.84
		3/30/2010	NM	--
		6/11/2010	6.63	5,912.01
		9/21/2010	7.41	5,911.23
		12/16/2010	5.12	5,913.52
		3/15/2011	4.49	5,914.15
		6/23/2011	6.80	5,911.84
		9/26/2011	6.33	5,912.31
		12/12/2011	4.84	5,913.80
		3/7/2012	4.46	5,914.18
		6/4/2012	6.45	5,912.19
		9/17/2012	7.37	5,911.27
		1/9/2013	5.46	5,913.18
		3/18/2013	4.80	5,913.84

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-6	5,918.64	6/14/2013	6.60	5,912.04
		9/13/2013	6.90	5,911.74
		12/13/2013	5.32	5,913.32
		3/21/2014	5.03	5,913.61
		6/16/2014	6.85	5,911.79
		9/19/2014	7.34	5,911.30
		12/17/2014	5.79	5,912.85
		3/19/2015	5.22	5,913.42
		6/19/2015	6.21	5,912.43
		9/14/2015	DRY	--
		6/2/2016	Plugged and Abandoned	
MW-7	5,920.75	6/26/2008	6.32	5,914.43
		8/14/2008	7.17	5,913.58
	5,918.74	10/2/2008	6.42	5,912.32
		1/13/2009	NM	--
		3/23/2009	4.67	5,914.07
		6/29/2009	1.56	5,917.18
		3/30/2010	NM	--
		6/11/2010	NM	--
		9/21/2010	NM	--
		12/16/2010	4.91	5,913.83
		3/18/2011	DRY	--
MW-7	5,918.74	6/23/2011	6.55	5,912.19
		9/26/2011	6.14	5,912.60
		12/12/2011	DRY	--
		3/7/2012	DRY	--
		6/4/2012	6.08	5,912.66
		9/17/2012	7.11	5,911.63
		1/9/2013	5.28	5,913.46
		3/18/2013	4.54	5,914.20
		6/14/2013	6.31	5,912.43
		9/13/2013	6.66	5,912.08

ENSOLUM

TABLE 1
GROUNDWATER ELEVATIONS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Top of Casing Elevation (feet AMSL)	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)
MW-7	5,918.74	12/13/2013	5.35	5,913.39
		3/21/2014	4.70	5,914.04
		6/16/2014	6.59	5,912.15
		9/19/2014	7.14	5,911.60
		12/17/2014	5.59	5,913.15
		3/19/2015	4.98	5,913.76
		6/19/2015	6.10	5,912.64
		9/14/2015	7.34	5,911.40
		6/3/2016	Plugged and Abandoned	

Notes:

AMSL: above mean sea level

BTOC: below top of casing

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*

ENSOLUM

TABLE 2
GROUNDWATER QUALITY MEASUREMENTS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Sample Date	Temperature (°C)	pH	TDS (g/L)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)
MW-1R	6/23/2016	18.40	6.43	NM	3.63	2.23	-68.3
	3/6/2017	NM	NM	NM	NM	NM	NM
	3/13/2018	NM	NM	NM	NM	NM	NM
	6/25/2018	NM	NM	NM	NM	NM	NM
	9/4/2018	NM	NM	NM	NM	NM	NM
	12/6/2018	NM	NM	NM	NM	NM	NM
	2/26/2019	NM	NM	NM	NM	NM	NM
	5/17/2019	NM	NM	NM	NM	NM	NM
	8/9/2019	18.70	8.03	2.85	5.83	1.40	-72.9
	10/28/2019	NM	7.27	1.23	5.80	5.70	-85.5
	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
	8/6/2021	NM	NM	NM	NM	NM	NM
	1/7/2022	6.90	7.73	NM	6.42	NM	NM
	9/26/2022	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

ENSOLUM

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Sample ID	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)
NNEPA/NMWQCC Standard				**0.005**	**1.0**	**0.7**	**0.62**
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
	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**	0.630	**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	**1.05**
	GW-11146002-120417-SP-MW-1R	12/4/2017	(dup)	**0.015**	**1.880**	**0.946**	**7.96**
	GW-11146002-031318-CN-MW1R	3/13/2018	(orig)	<0.050	0.505	**0.840**	**4.80**
	GW-11146002-062518-CM-MW-1R	6/25/2018	(orig)	<0.025	**1.010**	0.165	**4.41**
	GW-11146002-090418-JP-MW-1R	9/4/2018	(orig)	<0.020	0.798	<0.020	**1.55**
	MW-1R	12/6/2018	(orig)	<0.010	0.268	**0.922**	**3.40**
	MW-1R	2/26/2019	(orig)	**0.0101**	0.519	0.576	**6.71**
	MW-1R	5/17/2019	(orig)	<0.0100	<0.100	**0.923**	**3.66**
	MW-1R	8/9/2019	(orig)	**0.0211**	<0.100	0.594	**1.56**

ENSOLUM

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Sample ID	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)
NNEPA/NMWQCC Standard				**0.005**	**1.0**	**0.7**	**0.62**
MW-1R	MW-1R	10/28/2019	(orig)	<0.250	<0.250	**1.11**	**3.29**
	MW-1R	1/27/2020	(orig)	<0.050	0.335	**0.737**	**5.13**
	MW-1R	7/7/2020	(orig)	**0.0344**	<0.05	**0.866**	**3.54**
	MW-1R	3/12/2021	(orig)	<0.025	0.0822	**0.502**	**3.48**
	MW-1R	8/6/2021	(orig)	**0.024**	<0.005	**0.990**	**1.20**
	MW-1R	1/7/2022	(orig)	**0.012**	0.094	0.700	**1.90**
	MW-1R	9/26/2022	(orig)	**0.059**	<0.005	0.440	0.077
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						
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

ENSOLUM

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Hilcorp Energy Company - Charles et al #1
San Juan County, New Mexico

Ensolum Project No. 07A1988021

Well ID	Sample ID	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)
NNEPA/NMWQCC Standard				**0.005**	**1.0**	**0.7**	**0.62**
MW-3	GW-074935-121714-JW-MW-3	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003
	Plugged and Abandoned June 2016						
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						
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						
Background	Background	3/12/2021	(orig)	<0.001	<0.001	<0.001	<0.003

Notes:

mg/L: milligrams per liter

ND: not detected, practical quantitation limit unknown

NMWQCC: New Mexico Water Quality Control Commission

NNEPA: Navajo Nation Environmental Protection Agency

--: not analyzed

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

*Concentrations in **bold** and shaded exceed the New Mexico Water Quality Control Commission Standards, 20.6.2 of the New Mexico Administrative Code*

ENSOLUM

APPENDIX A

Laboratory Analytical Reports

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

February 21, 2023

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

RE: Charles et al No 1 OrderNo.: 2201370

Dear Kate Kaufman:

Hall Environmental Analysis Laboratory received 1 sample(s) on 1/11/2022 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued January 20, 2022.

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. 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. All samples are reported as received unless otherwise indicated.

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 **2201370**
Date Reported: **2/21/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY **Client Sample ID:** MW-1R
Project: Charles et al No 1 **Collection Date:** 1/7/2022 11:50:00 AM
Lab ID: 2201370-001 **Matrix:** AQUEOUS **Received Date:** 1/11/2022 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **JR**
Benzene	12	5.0		µg/L	5	1/13/2022 8:00:34 PM
Toluene	94	5.0		µg/L	5	1/13/2022 8:00:34 PM
Ethylbenzene	700	50		µg/L	50	1/13/2022 7:31:55 PM
Xylenes, Total	1900	75		µg/L	50	1/13/2022 7:31:55 PM
Surr: 1,2-Dichloroethane-d4	93.5	70-130		%Rec	5	1/13/2022 8:00:34 PM
Surr: 4-Bromofluorobenzene	81.9	70-130		%Rec	5	1/13/2022 8:00:34 PM
Surr: Dibromofluoromethane	89.8	70-130		%Rec	5	1/13/2022 8:00:34 PM
Surr: Toluene-d8	104	70-130		%Rec	5	1/13/2022 8:00:34 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	Above Quantitation Range/Estimated Value
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 standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2201370**

21-Feb-23

Client: HILCORP ENERGY

Project: Charles et al No 1

Sample ID: **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **LCSW**	Batch ID: **R85155**	RunNo: **85155**
Prep Date:	Analysis Date: **1/13/2022**	SeqNo: **2996276** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	22	1.0	20.00	0	111	70	130			
Toluene	20	1.0	20.00	0	98.4	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		99.7	70	130			
Surr: 4-Bromofluorobenzene	9.7		10.00		97.2	70	130			
Surr: Dibromofluoromethane	11		10.00		106	70	130			
Surr: Toluene-d8	9.9		10.00		99.0	70	130			

Sample ID: **mb**	SampType: **MBLK**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW**	Batch ID: **R85155**	RunNo: **85155**
Prep Date:	Analysis Date: **1/13/2022**	SeqNo: **2996277** 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								
Ethylbenzene	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	11		10.00		106	70	130			
Surr: 4-Bromofluorobenzene	9.7		10.00		96.8	70	130			
Surr: Dibromofluoromethane	10		10.00		105	70	130			
Surr: Toluene-d8	10		10.00		105	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 standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

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: 2201370 RcptNo: 1

Received By: **Sean Livingston** 1/11/2022 8:00:00 AM Sean Livingston

Completed By: **Sean Livingston** 1/11/2022 9:35:19 AM Sean Livingston

Reviewed By: KPG 1/11/22

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 preserved added to bottles? Yes ☑ No ☐ NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA? Yes ☐ No ☐ HNO3 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? yes
Checked by: JN 1/11/22

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:

Filtered off ~100mL from sample 001B for 001C, adding ~0.4mL HNO3 for dissolved metals analysis, checked for proper pH <2 - JN 1/11/22 LOT #: FJ2651. Used 2.

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	0.5	Good				

Chain-of-Custody Record

Client: Hilcorp Farmington NM

Mailing Address: 382 Road 3100 Aztec, NM 87410

Billing Address: PO Box 61529 Houston, TX 77208

Phone #: 505-486-9543

email or Fax#: khoekstra@hilcorp.com

QA/QC Package: kkaufman@hilcorp.com
☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☐ EDD (Type)

Turn-Around Time:
X Standard ☐ Rush

Project Name: Charles et al No. 1

Project #:

Project Manager: KATE KAUFMAN

Sampler: Kurt Hoekstra

On Ice: X Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): 0.1+0.4=0.5°

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

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2201370	Analysis Request: Dissolved Mn	BTEX 8260 & Naphthalene	Sulfate / TDS
1-7-22	11:50	Water	MW-1R	(3) 40ml VOA (1) Liter Plastic	HCl Cool	001	X	X	X

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
1-10	1500	Kurt Hoekstra	Chad Ward		1/10/21	1500
1/10/22	1810	Chad Ward	Sac courier		1/11/22	8:00

Remarks: *Dissolved Mn and Fe are to be filterd and preserved in the lab.

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.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

October 03, 2022

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

RE: Charles et at No. 1 OrderNo.: 2209E10

Dear Kate Kaufman:

Hall Environmental Analysis Laboratory received 1 sample(s) on 9/27/2022 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 **2209E10**
Date Reported: **10/3/2022**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: MW-1R
Project: Charles et at No. 1
Collection Date: 9/26/2022 1:35:00 PM
Lab ID: 2209E10-001 **Matrix:** AQUEOUS **Received Date:** 9/27/2022 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **CCM**
Benzene	59	5.0		µg/L	5	9/29/2022 11:28:00 PM
Toluene	ND	5.0		µg/L	5	9/29/2022 11:28:00 PM
Ethylbenzene	440	50		µg/L	50	9/29/2022 11:05:00 PM
Xylenes, Total	7.7	7.5		µg/L	5	9/29/2022 11:28:00 PM
Surr: 1,2-Dichloroethane-d4	110	70-130		%Rec	5	9/29/2022 11:28:00 PM
Surr: 4-Bromofluorobenzene	105	70-130		%Rec	5	9/29/2022 11:28:00 PM
Surr: Dibromofluoromethane	99.7	70-130		%Rec	5	9/29/2022 11:28:00 PM
Surr: Toluene-d8	101	70-130		%Rec	5	9/29/2022 11:28:00 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	Estimated value
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 interference		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2209E10**
03-Oct-22

Client: HILCORP ENERGY
Project: Charles et at No. 1

Sample ID: **100ng lcs** SampType: **LCS** TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **LCSW** Batch ID: **SL91406** RunNo: **91406**
Prep Date: Analysis Date: **9/29/2022** SeqNo: **3273617** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	22	1.0	20.00	0	109	70	130			
Toluene	20	1.0	20.00	0	98.8	70	130			
Surr: 1,2-Dichloroethane-d4	12		10.00		118	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		105	70	130			
Surr: Dibromofluoromethane	11		10.00		106	70	130			
Surr: Toluene-d8	9.6		10.00		95.9	70	130			

Sample ID: **mb** SampType: **MBLK** TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW** Batch ID: **SL91406** RunNo: **91406**
Prep Date: Analysis Date: **9/29/2022** SeqNo: **3273618** 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								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	12		10.00		117	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		102	70	130			
Surr: Dibromofluoromethane	11		10.00		109	70	130			
Surr: Toluene-d8	9.6		10.00		95.6	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 interference
B	Analyte detected in the associated Method Blank
E	Estimated value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: HILCORP ENERGY Work Order Number: 2209E10 RcptNo: 1

Received By: Juan Rojas 9/27/2022 7:00:00 AM

Completed By: Sean Livingston 9/27/2022 8:53:01 AM

Reviewed By: KPG 9-27-22

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: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: JM 9/27/22

Special Handling (if applicable)

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

Person Notified: _____ Date: _____

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

Regarding: _____

Client Instructions: _____

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.2	Good				

Chain-of-Custody Record

Client: Hilcorp Farmington NM

Mailing Address: 382 Road 3100 Aztec, NM 87410

Billing Address: PO Box 61529 Houston, TX 77208

Phone #: 505-486-9543

email or Fax#: Brandon.Sinclair@hilcorp.com

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance

☐ NELAC ☐ Other_____

☐ EDD (Type) _____

Turn-Around Time:

X Standard ☐ Rush_____

Project Name:

Charles et al No. 1

Project #:

Project Manager:

Kate Kaufman

Sampler: Brandon Sinclair

On Ice: ~~☐ Yes~~ ☐ No

# of Coolers: 1

Cooler Temp(including CF): 1.2-0=1.2

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2209510	Analysis Request: ~~Dissolved Mn~~	BTEX 8260	~~Sulfate / TDS~~
9-26	1335	Water	MW-1R	(3) 40ml VOA ~~(1) Liter Plastic~~	HCl Cool	001	*	X	*

Date: 9-26 Time: 1722 Relinquished by:

Received by: Via: Date Time 1722

Date: 9/26/22 Time: 1818 Relinquished by:

Received by: Via: Date Time

courier 9/27/22 7:00

Remarks: *Dissolved Mn and Fe are to be filterd and preserved in the lab.

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

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 201675
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
nvelez	Accepted for the record. Tribal land incident.	5/19/2023