



February 14, 2025

New Mexico Oil Conservation Division

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

Re: 2024 Annual Groundwater Monitoring Report
Johnston Federal #4
San Juan County, New Mexico
Hilcorp Energy Company
NMOCD Incident Number: NAUTOFAB000306
NMOCD Administrative Order: 3RP-71

To Whom it May Concern:

Ensolum, LLC (Ensolum), on behalf of Hilcorp Energy Company (Hilcorp), presents this *2024 Annual Groundwater Monitoring Report* to the New Mexico Oil Conservation Division (NMOCD) to document groundwater monitoring activities conducted at the Johnston Federal #4 metering station (Site) during 2024. The Site is partially located on federally owned surface managed by the Bureau of Land Management (BLM) and partially located on private land, within Unit M, Section 27, Township 31 North and Range 9 West, San Juan County, New Mexico (Figure 1).

SITE BACKGROUND

Initial investigations were carried out by Burlington Resources (Burlington, a previous operator of the Site) in August 1998 to assess two historical production pits (shown on Figure 2). Soil samples were collected from each pit and analyzed for total petroleum hydrocarbons (TPH). TPH concentrations from samples collected at Production Pit #1 were compliant with NMOCD standards and this pit was subsequently granted closure by NMOCD. Soil analyzed from Production Pit #2 was tested for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and TPH, with results indicating exceedances of NMOCD standards. Based on sampling results, Burlington excavated approximately 3,055 cubic yards of hydrocarbon-impacted soil in December 1998. The NMOCD subsequently requested Burlington install monitoring wells to assess potential impacts to groundwater at the Site.

In May 1999, monitoring well MW-1 was installed at the Site to a depth of 50 feet below ground surface (bgs). ConocoPhillips Company (ConocoPhillips) acquired Burlington in March 2006 and installed three additional monitoring wells (MW-2, MW-3, and MW-4) in 2008 to further assess groundwater impacts related to the former Production Pit #2. To remediate dissolved-phase hydrocarbons from groundwater, four mobile dual phase extraction (MDPE) events were conducted in well MW-1 in August 2013, November 2014, April 2015, and November 2017. Recovered liquids were discharged to the on-Site evaporation tank. Vapors recovered during the events were utilized as fuel and burned in the MDPE internal combustion engine. A total of approximately 298 gallons equivalent of hydrocarbons (liquid and vapor) was removed from MW-1 during these events.

Hilcorp acquired the Site from ConocoPhillips in April 2017 and assumed groundwater monitoring responsibilities. Additionally, El Paso CGP Company (El Paso) is a co-producer at the Site and owns additional monitoring wells, from which non-aqueous phase liquid (LNAPL), also known as free product or phase separated hydrocarbons (PSH), is being recovered. Groundwater impacts associated with El Paso are located down gradient from the monitoring wells installed by ConocoPhillips.

Based on the review of the *2021 Annual Groundwater Monitoring Report*, prepared by WSP USA, Inc., dated March 4, 2022, the NMOCD concurred with the following recommendations in their February 6, 2023 approval: discontinue sulfate analysis for all wells; discontinue BTEX analysis for wells MW-2 and MW-3; and continue sampling for dissolved manganese from wells MW-1, MW-3, and MW-4.

SITE GROUNDWATER CLEANUP STANDARDS

The 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). The following standards are presented for constituents of concern (COCs) at the Site in milligrams per liter (mg/L).

- Benzene: 0.005 mg/L
- Toluene: 1.0 mg/L
- Ethylbenzene: 0.70 mg/L
- Total Xylenes: 0.62 mg/L
- Dissolved Manganese: 0.20 mg/L

In addition, NMWQCC standards state LNAPLs (or PSH) shall not be present floating on the groundwater table.

GROUNDWATER SAMPLING ACTIVITIES AND RESULTS

On August 16, 2024, Hilcorp conducted groundwater monitoring at the Site, which included annual depth-to-water gauging for wells MW-1, MW-2, and MW-4. Of all 3 wells, only MW-4 was sampled during 2024. MW-1 contained 0.03 feet of PSH during gauging, which prevented sampling. Additionally, the Hilcorp representative was unable to locate MW-3, resulting in no annual data being collected for that well in 2024.

Static groundwater-level measurements included recording depth-to-groundwater and the presence of PSH, where detected, using a Keck oil/water interface probe. To prevent cross-contamination, the interface probe was decontaminated with Alconox[®] soap and rinsed with distilled water prior to each measurement. The measured depth-to-groundwater and PSH, along with calculated groundwater elevations, are summarized in Table 1 and were used to develop a groundwater potentiometric surface map (Figure 3). Historical Site-wide depth-to-groundwater data indicate the inferred groundwater flow direction is toward the east.

GROUNDWATER SAMPLING

Groundwater was purged and sampled from well MW-4 using a disposable bailer. Purging involved removing 3-casing volumes of stagnant groundwater from the monitoring well prior to sampling. Field measurements of groundwater quality parameters, including temperature, pH, and electrical conductivity, were recorded during the purging process, and are presented in Table 2.

The groundwater sample from MW-4 was placed directly into a laboratory-provided container and labeled with the date and time of collection, well designation, project name, sample collector's name, and the parameters to be analyzed. The samples were immediately sealed, packed on ice, and submitted to Eurofins Environmental Testing Laboratory (Eurofins) for analysis of BTEX by United States Environmental Protection Agency (EPA) Method 8260B, and dissolved manganese by EPA Method 200.7. Proper chain-of-custody procedures were followed, documenting the date and time of sampling, sample number, sample type, sample collector's name, preservative used, required analyses, and sample collector's signature.

GROUNDWATER ANALYTICAL RESULTS

During the annual groundwater-sampling event in August 2024, PSH was present in well MW-1 at a thickness of 0.03 feet, preventing the collection of a groundwater sample. Additionally, monitoring well MW-3 could not be located and was not sampled. Benzene was detected in groundwater from MW-4 at a concentration that meets the applicable NMWQCC standard. Dissolved manganese was detected in MW-4 at a concentration exceeding the NMWQCC standard. No other constituents of concern were detected in groundwater above NMWQCC standards during the August 2024 sampling event. A summary of analytical results is presented in Table 3 and is depicted on Figure 4, with complete laboratory analytical reports attached as Appendix A.

CONCLUSIONS

Since groundwater monitoring began at the Site in 1999, elevated concentrations of BTEX constituents have consistently been detected in well MW-4. Additionally, dissolved manganese in well MW-4 has exceeded NMWQCC standards since 1999. The presence of PSH in well MW-1 has varied since 2016. According to the *2022 Annual Groundwater Monitoring Report* dated March 23, 2023, well MW-2 is located hydrogeologically upgradient of the source area and other Site wells. MW-2 has never contained PSH and/or detections of COCs above NMWQCC standards.

BTEX concentrations at the Site have generally decreased over time, and monitoring of well MW-4 indicates PSH has not migrated downgradient from well MW-1 since it was first detected in 2016. Significant remediation efforts are underway at the adjacent El Paso remediation site, including air sparging within the groundwater, which may be contributing to unexpected conditions at the Site. Air sparging can cause groundwater table mounding, as well as the movement of groundwater and associated dissolved contaminants to previously unimpacted area. Given the location of the air sparge system directly north and west of well MW-4, it is possible impacts from the adjacent remediation site are contributing to variability and increased concentrations observed in MW-4.

Elevated dissolved manganese concentrations in well MW-4 appear to result from the generally low-oxygen, reducing conditions in the groundwater, which are a common byproduct of petroleum hydrocarbon degradation in aquifer systems. This is further supported by the low dissolved manganese concentrations in the hydrogeologically upgradient well MW-2, which is located outside and upgradient of the original petroleum-hydrocarbon plume. As groundwater conditions at the Site equilibrate and dissolved oxygen levels increase, the groundwater will become increasingly aerobic. In turn, dissolved manganese is expected to precipitate out of solution, leading to decreased concentrations in groundwater.

RECOMMENDATIONS

Based on current and historical data gathered at the Site, Ensolum/Hilcorp recommend the following actions:

- Continue annual sampling to assess BTEX concentrations in wells MW-1 and MW-4 and dissolved manganese concentrations in wells MW-1, MW-3, and MW-4.

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

Sincerely,
Ensolum, LLC



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Attachments:

Figure 1	Site Location Map
Figure 2	Site Map
Figure 3	Groundwater Elevation Map
Figure 4	Groundwater Analytical Results
Table 1	Groundwater Elevations
Table 2	Groundwater Quality Measurements
Table 3	Groundwater Analytical Results
Appendix A	Analytical Laboratory Reports

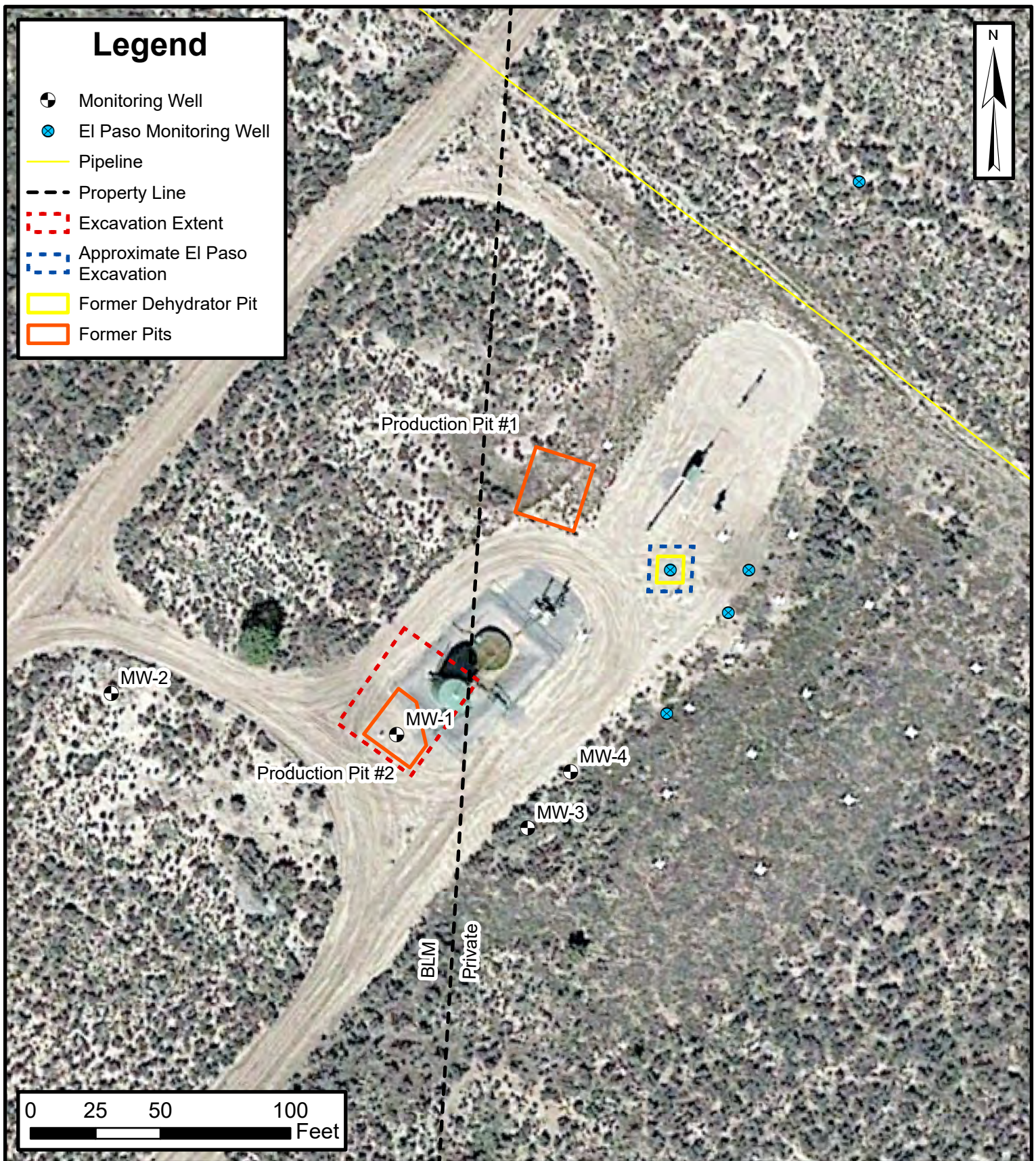


FIGURES



36.86279, -107.77242
SW/SW & SW/SE Sec 27, T31N, R09W
San Juan County, New Mexico

FIGURE
1



Site Map

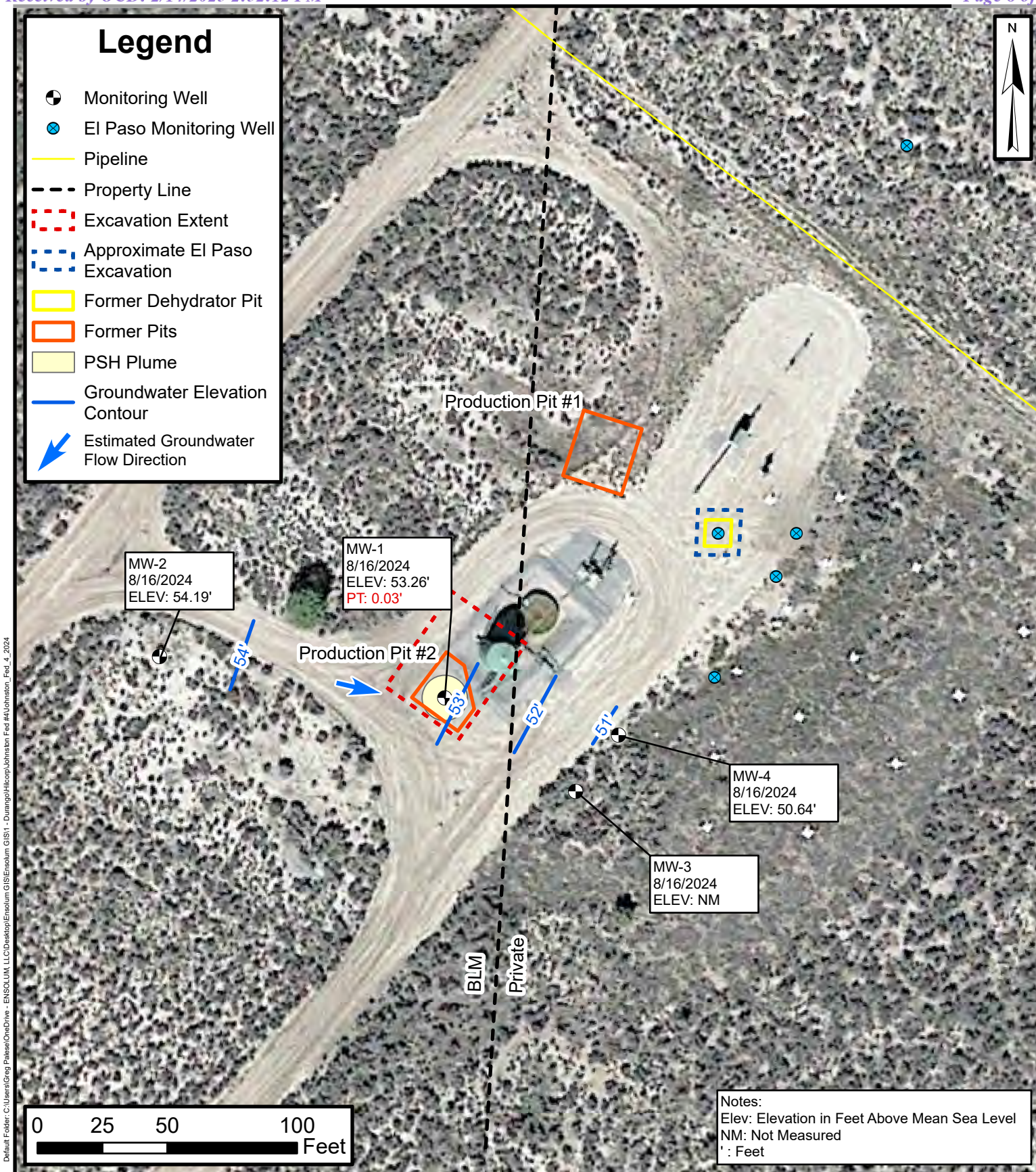
Johnston Federal #4
Hilcorp Energy Company

36.86279, -107.77242
SW/SW & SW/SE Sec 27, T31N, R09W
San Juan County, New Mexico

FIGURE

2

ENSOLUM
Environmental, Engineering and
Hydrogeologic Consultants



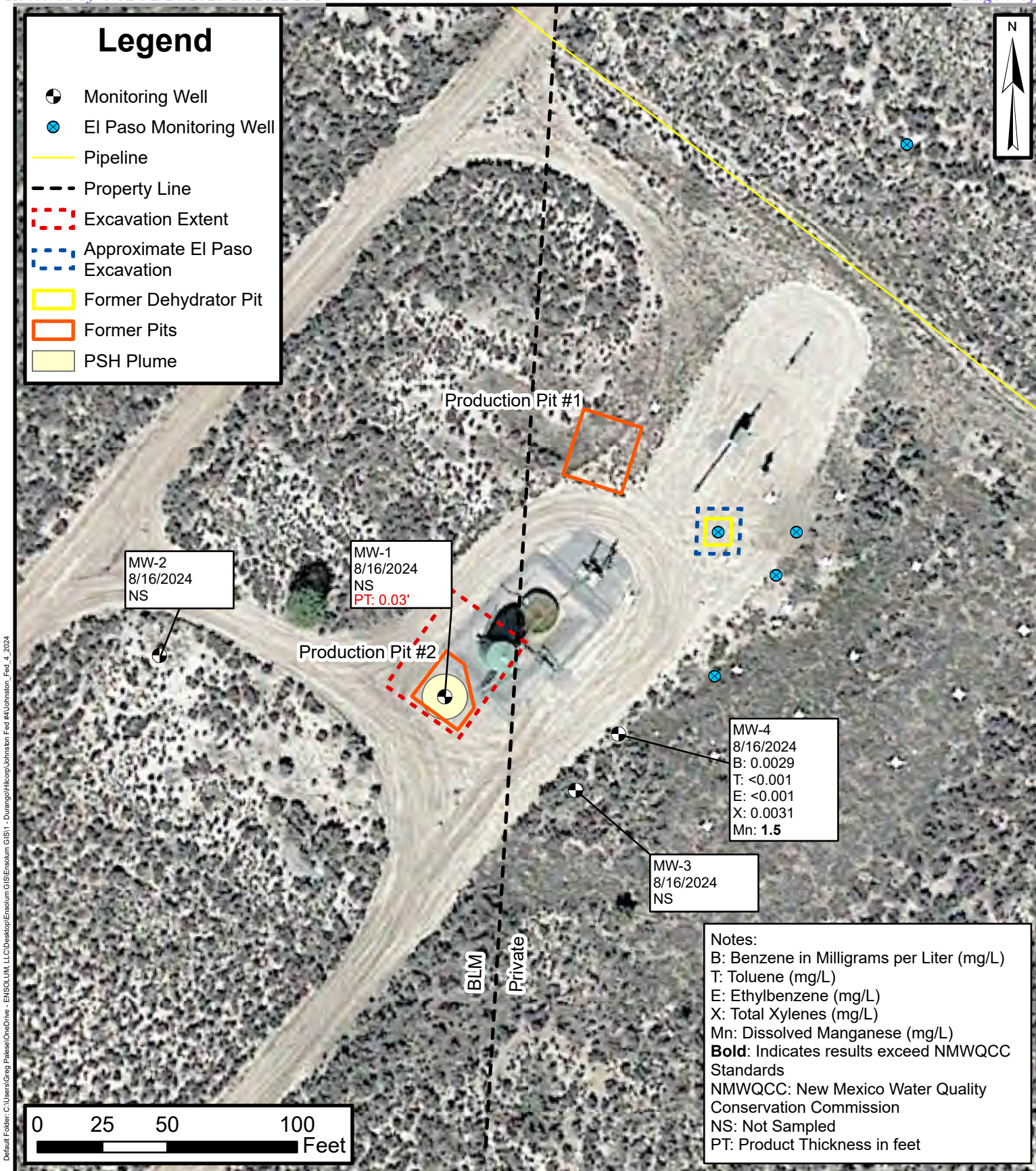
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Groundwater Elevation Map

Johnston Federal #4
Hilcorp Energy Company
36.86279, -107.77242
SW/SW & SW/SE Sec 27, T31N, R09W
San Juan County, New Mexico

FIGURE
3



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Groundwater Analytical Results

Johnston Federal #4
 Hilcorp Energy Company
 36.86279, -107.77242
 SW/SW & SW/SE Sec 27, T31N, R09W
 San Juan County, New Mexico

FIGURE
4



TABLES



TABLE 1
GROUNDWATER ELEVATIONS

Johnston Federal #4
Hilcorp Energy Company
San Juan County, New Mexico

Well Identification	Top of Casing Elevation (1)	Date	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Adjusted Groundwater Elevation (2)
MW-1	100	5/25/1999	--	NM	--	NM
		9/1/1999	--	47.02	--	52.98
		12/1/1999	--	46.96	--	53.04
		1/18/2000	--	44.05	--	55.95
		5/17/2000	--	46.90	--	53.10
		9/8/2000	--	46.91	--	53.09
		12/20/2000	--	46.88	--	53.12
		3/27/2001	--	NM	--	NM
		6/27/2001	--	47.05	--	52.95
		9/17/2001	--	46.93	--	53.07
		12/19/2001	--	46.97	--	53.03
		3/25/2002	--	46.99	--	53.01
		6/25/2002	--	47.01	--	52.99
		9/24/2002	--	46.98	--	53.02
		12/30/2002	--	47.40	--	52.60
		3/27/2003	--	NM	--	NM
		6/27/2003	--	NM	--	NM
		10/10/2003	--	NM	--	NM
		12/10/2003	--	NM	--	NM
		3/16/2004	--	47.28	--	52.72
		6/22/2004	--	47.06	--	52.94
		9/30/2004	--	47.24	--	52.76
		12/13/2004	--	47.14	--	52.86
		3/23/2005	--	46.91	--	53.09
		6/22/2005	--	46.93	--	53.07
		10/28/2005	--	46.87	--	53.13
		12/14/2005	--	46.72	--	53.28
		3/20/2006	--	46.75	--	53.25
		6/21/2006	--	46.84	--	53.16
		10/20/2006	--	46.89	--	53.11
		12/13/2006	--	46.92	--	53.08
		11/9/2007	--	NM	--	NM
		1/15/2008	--	NM	--	NM
		4/30/2008	--	46.45	--	53.55
		7/23/2008	--	46.63	--	53.37
		10/24/2008	--	46.60	--	53.40
		1/29/2009	--	46.57	--	53.43
		4/23/2009	--	46.40	--	53.60
		9/25/2009	--	46.52	--	53.48



TABLE 1
GROUNDWATER ELEVATIONS

Johnston Federal #4
Hilcorp Energy Company
San Juan County, New Mexico

Well Identification	Top of Casing Elevation (1)	Date	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Adjusted Groundwater Elevation (2)
MW-1	100	9/22/2010	--	46.60	--	53.40
		9/28/2011	--	46.65	--	53.35
		9/26/2012	--	46.80	--	53.20
		9/17/2013	--	46.88	--	53.12
		9/23/2014	--	46.94	--	53.06
		12/17/2014	--	46.94	--	53.06
		1/8/2015	--	46.92	--	53.08
		6/18/2015	--	46.94	--	53.06
		9/22/2015	--	46.91	--	53.09
		9/14/2016	46.70	46.71	0.01	53.30
		9/27/2017	--	46.78	--	53.22
		9/6/2018	--	46.79	--	53.21
		8/12/2019	46.77	46.87	0.10	53.21
		8/12/2020	46.81	47.00	0.19	53.15
		9/21/2021	47.00	47.10	0.10	52.98
		9/16/2022	--	46.94	--	53.06
		3/20/2023	46.92	46.96	0.04	53.07
		8/3/2023	46.81	46.86	0.05	53.18
		8/16/2024	46.73	46.76	0.03	53.26
MW-2	97.71	10/24/2008	--	42.85	--	54.86
		1/29/2009	--	42.83	--	54.88
		4/23/2009	--	42.75	--	54.96
		9/25/2009	--	42.82	--	54.89
		9/22/2010	--	43.01	--	54.70
		9/28/2011	--	43.14	--	54.57
		9/26/2012	--	43.33	--	54.38
		9/17/2013	--	43.51	--	54.20
		9/23/2014	--	43.56	--	54.15
		12/17/2014	--	43.59	--	54.12
		6/18/2015	--	43.57	--	54.14
		9/22/2015	--	43.58	--	54.13
		9/14/2016	--	43.51	--	54.20
		9/27/2017	--	43.56	--	54.15
		9/6/2018	--	43.50	--	54.21
		8/15/2019	--	43.56	--	54.15
		8/12/2020	--	43.62	--	54.09
		9/23/2021	--	43.80	--	53.91
		9/16/2022*	43.80	43.81	0.01	53.91
		3/20/2023	--	43.67	--	54.04



TABLE 1
GROUNDWATER ELEVATIONS

Johnston Federal #4
Hilcorp Energy Company
San Juan County, New Mexico

Well Identification	Top of Casing Elevation (1)	Date	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Adjusted Groundwater Elevation (2)
MW-2	97.71	8/3/2023	--	43.65	--	54.06
		8/16/2024	--	43.52	--	54.19
MW-3	94.65	10/24/2008	--	43.91	--	50.74
		1/29/2009	--	41.97	--	52.68
		4/23/2009	--	41.87	--	52.78
		9/25/2009	--	42.04	--	52.61
		9/22/2010	--	42.17	--	52.48
		9/28/2011	--	42.22	--	52.43
		9/26/2012	--	42.36	--	52.29
		9/17/2013	--	42.47	--	52.18
		9/23/2014	--	42.70	--	51.95
		12/17/2014	--	42.62	--	52.03
		6/18/2015	--	43.67	--	50.98
		9/22/2015	--	42.65	--	52.00
		9/14/2016	--	42.47	--	52.18
		9/27/2017	--	42.54	--	52.11
		9/6/2018	--	42.45	--	52.20
		8/12/2019	--	42.48	--	52.17
		8/12/2020	--	42.53	--	52.12
		9/23/2021	--	42.70	--	51.95
		9/16/2022	--	42.63	--	52.02
		3/20/2023	--	42.40	--	52.25
		8/3/2023	--	42.55	--	52.10
		8/16/2024	Not Measured			
MW-4	94.79	10/24/2008	--	43.11	--	51.68
		1/29/2009	--	43.11	--	51.68
		4/23/2009	--	43.06	--	51.73
		9/25/2009	--	43.20	--	51.59
		9/22/2010	--	43.39	--	51.40
		9/28/2011	--	43.45	--	51.34
		9/26/2012	--	43.57	--	51.22
		9/17/2013	--	43.65	--	51.14
		9/23/2014	--	44.81	--	49.98
		12/17/2014	--	44.80	--	49.99
		6/18/2015	--	45.85	--	48.94
		9/22/2015	--	44.73	--	50.06
		9/14/2016	--	44.16	--	50.63
MW-4	94.79	9/27/2017	--	44.15	--	50.64



TABLE 1
GROUNDWATER ELEVATIONS

Johnston Federal #4
Hilcorp Energy Company
San Juan County, New Mexico

Well Identification	Top of Casing Elevation (1)	Date	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Adjusted Groundwater Elevation (2)
MW-4	94.79	9/6/2018	--	44.00	--	50.79
		8/16/2019	--	44.27	--	50.52
		8/13/2020	--	44.36	--	50.43
		9/23/2021	--	44.30	--	50.49
		9/16/2022	Not Measured - Well Damaged			
		3/20/2023	--	44.35	--	50.44
		8/3/2023	--	44.24	--	50.55
		8/16/2024	--	44.15	--	50.64

Notes:

(1): surface elevation based on an arbitrary datum of 100 feet based on top of casing of MW-1

*: anomalous data based on historical results

bgs - below ground surface

BTOC: below top of casing

NM = Not measured

--: indicates no GWEL or PSH measured

Groundwater elevation is adjusted using a density correction factor of 0.8 when product is present



TABLE 2 GROUNDWATER QUALITY MEASUREMENTS Johnston Federal #4 Hilcorp Energy Company San Juan County, New Mexico							
Well Identification	Date	Temperature (°C)	pH	TDS (g/L)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)
MW-1	9/23/2014	No parameters collected due to PSH sheen					
	9/22/2015	No parameters collected due to PSH sheen					
	9/14/2016	No parameters collected due to presence of PSH					
	9/27/2017	14.06	6.55	--	1,662	--	--
	9/6/2018	16.45	7.32	--	1,797	0.80	-349.5
	8/12/2019	20.00	7.40	0.99	--	4.80	-11.3
	8/12/2020	24.90	7.01	1.02	2,160	0.13	-18.9
	9/21/2021	No parameters collected due to presence of PSH					
	9/16/2022	18.00	6.56	0.83	1,660	--	--
	8/3/2023	No parameters collected due to presence of PSH					
MW-2	9/23/2014	15.00	7.22	1.50	2,310	11.30	57.0
	9/22/2015	13.55	6.64	1.48	2,273	5.05	93.0
	9/14/2016	13.53	7.26	1.53	2,368	5.10	6.9
	9/27/2016	12.52	7.13	--	1,884	--	--
	9/6/2018	--	--	--	--	--	--
	8/15/2019	19.80	7.35	1.05	--	--	-45.8
	8/12/2020	18.90	6.45	1.02	2,060	2.72	-24.2
	9/23/2021	17.40	7.24	--	5,320	--	--
	9/21/2022*	--	--	--	--	--	--
	8/3/2023	--	--	--	--	--	--
MW-3	9/23/2014	15.70	7.01	1.20	1,820	10.13	-104.0
	12/17/2014	14.78	7.49	1.44	2,218	2.39	-164.0
	9/22/2015	15.07	7.32	1.31	2,021	2.34	-79.2
	9/14/2016	14.91	7.21	1.21	1,856	2.01	-158.8
	9/27/2017	13.91	6.79	--	1,534	--	--
	9/6/2018	17.17	7.36	--	1,637	1.15	-68.7
	8/12/2019	20.10	7.24	0.38	--	--	7.2
	8/12/2020	22.20	6.47	0.50	1,020	1.66	2.6
	9/23/2021	19.20	7.06	--	2,870	--	--
	9/16/2022	18.70	6.62	0.44	890	--	--
MW-4	8/3/2023	32.47	7.43	1.03	1,585	2.38	-30.5
	9/23/2014	16.40	6.65	1.40	2,130	10.81	-124.0
	12/17/2014	14.98	7.37	1.51	2,323	2.94	-166.6
	6/18/2015	15.37	6.73	1.42	2,184	2.05	-140.1
	9/22/2015	15.13	6.82	1.33	2,041	2.04	-126.5
	9/14/2016	14.92	7.23	1.36	2,096	7.69	-205.4
	9/27/2017	14.01	6.95	--	1,671	--	--
	9/6/2018	--	--	--	--	--	--
	8/16/2019	18.10	7.21	0.90	--	--	-22.5
	8/13/2020	20.80	6.72	0.89	1,770	1.66	2.6
	9/23/2021	18.80	7.15	--	4,270	--	--
	9/16/2022	No parameters collected - well damaged					
	8/3/2023	36.14	7.36	1.27	1,957	2.38	-68.9
	8/16/2024	35.41	7.83	0.01	11.37	1.26	-97.9

Notes:

°C: degrees Celcius

DO: dissolved oxygen

g/L: grams per liter

uS/cm: microsiemens per centimeter

mg/L: milligrams per liter

mV: millivolts

ORP: oxidation-reduction potential

PSH: phase separated hydrocarbons

TDS: total dissolved solids

--: data not collected

*: PSH present during sampling, anomalous data based on historical results



TABLE 3 GROUNDWATER ANALYTICAL RESULTS Johnston Federal #4 Hilcorp Energy Company San Juan County, New Mexico							
Well Identification	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Manganese (dissolved) (mg/L)
NMWQCC Standards			0.005	1.00	0.70	0.62	0.20
MW-1	5/25/1999	(orig)	8.7	2.9	2.8	2.9	--
	12/1/1999	(orig)	4.7	1.3	0.9	10	--
	1/18/2000	(orig)	3.6	0.82	0.84	7.5	--
	5/17/2000	(orig)	6.9	1.1	1.5	17	--
	9/8/2000	(orig)	4.6	0.62	0.93	10	--
	12/20/2000	(orig)	< 0.0002	0.0005	0.034	0.061	--
	3/27/2001	(orig)	5.43	0.641	0.991	9.83	--
	6/27/2001	(orig)	5.87	0.9	0.99	10.4	--
	9/17/2001	(orig)	5.91	0.75	0.98	10.7	--
	12/19/2001	(orig)	7.2	0.65	1.02	11.3	--
	3/25/2002	(orig)	5.52	0.83	1.19	10.5	--
	6/26/2002	(orig)	0.516	0.0662	0.0787	0.863	--
	9/24/2002	(orig)	5.31	8	0.88	13.96	--
	12/30/2002	(orig)	7.66	10.2	0.76	14.14	--
	6/22/2004	(orig)	6.16	8.1	0.47	15.84	--
	3/20/2006	(orig)	3.17	3.74	1.06	30.13	--
	6/21/2006	(orig)	4.9	3.28	0.448	2.39	--
	12/13/2006	(orig)	5.3	7.2	0.87	15.45	--
	3/27/2007	(orig)	6.87	5.72	0.21	12.16	--
	6/25/2007	(orig)	5.68	1.83	0.4	9.48	--
	4/30/2008	(orig)	6.3	1.8	0.28	8.6	--
	7/23/2008	(orig)	7.1	2.2	0.45	10.6	--
	10/24/2008	(orig)	6	2.1	0.4	9.0	--
	1/29/2009	(orig)	6.7	2.2	0.63	14.5	--
	9/25/2009	(orig)	3.9	1.5	0.68	9.8	1.11
	9/22/2010	(orig)	3.5	0.98	0.63	7.5	0.752
	9/28/2011	(orig)	3.36	1.05	0.667	6.81	0.774
	9/28/2011	(Duplicate)	3.43	1.12	0.779	8.29	--
	9/26/2012	(orig)	3.07	0.599	0.577	5.16	0.67
	---	August 2013 Mobile Dual Phase Extraction Event					
	9/17/2013	(orig)	4.69	7.55	1.17	9.0	0.89
	9/17/2013	(Duplicate)	4.7	7.21	1.04	9.97	--
	9/23/2014	(orig)	2.97	4.25	0.778	6.89	0.85
	9/23/2014	(Duplicate)	2.82	3.88	0.754	6.69	--
	---	November 2014 Mobile Dual Phase Extraction Event					
	1/8/2015	(orig)	4.35	6.15	1.07	10.0	--
	6/18/2015	(orig)	4.05	6.26	1.04	10.8	--
	6/18/2015	(Duplicate)	4.34	6.46	0.933	11.1	--
	---	April 2015 Mobile Dual Phase Extraction Event					
	9/22/2015	(orig)	3.36	4.57	0.741	8.62	0.72
	9/22/2015	(Duplicate)	3.37	4.28	0.724	7.98	--
	9/14/2016	Not sampled due to presense of PSH					
	9/27/2017	(orig)	2.34	2.86	0.949	9.5	0.739
	---	November 2017 Mobile Dual Phase Extraction Event					
	9/6/2018	(orig)	2.86	2.65	0.747	7.59	0.802
	8/12/2019	(orig)	2.19	1.61	0.944	7.0	0.395
	8/12/2020	(orig)	2.13	1.25	0.815	5.9	0.297
	9/21/2021	Not sampled due to presense of PSH					
	9/16/2022	(orig)	1.8	0.66	0.52	5.1	0.71
	8/3/2023	Not sampled due to presense of PSH					



TABLE 3 GROUNDWATER ANALYTICAL RESULTS Johnston Federal #4 Hilcorp Energy Company San Juan County, New Mexico							
Well Identification	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Manganese (dissolved) (mg/L)
NMWQCC Standards			0.005	1.00	0.70	0.62	0.20
MW-2	10/24/2008	(orig)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--
	1/29/2009	(orig)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--
	9/25/2009	(orig)	< 0.001	< 0.001	< 0.001	< 0.002	0.04
	9/22/2010	(orig)	< 0.001	< 0.001	< 0.001	< 0.001	0.0074
	9/28/2011	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.0956
	9/26/2012	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	9/17/2013	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	9/23/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	9/22/2015	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	9/14/2016	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	9/27/2017	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	9/6/2018	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.005
	8/15/2019	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.0344
	8/12/2020	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	< 0.010
	9/23/2021	(orig)	< 0.001	< 0.001	< 0.001	< 0.002	0.0057
	9/16/2022*	--	--	--	--	--	--
	8/3/2023	--	--	--	--	--	--
MW-3	10/24/2008	(orig)	0.02	< 0.0005	< 0.0005	0.024	--
	1/29/2009	(orig)	0.012	< 0.0005	< 0.0005	0.005	--
	9/25/2009	(orig)	0.0021	< 0.001	< 0.001	< 0.002	1.24
	9/22/2010	(orig)	0.0042	< 0.001	< 0.001	< 0.001	1.11
	9/28/2011	(orig)	0.0038	< 0.001	< 0.001	< 0.003	0.704
	9/26/2012	(orig)	0.0016	< 0.001	< 0.001	< 0.003	0.67
	9/17/2013	(orig)	0.0012	< 0.001	< 0.001	< 0.003	0.67
	9/23/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.65
	12/17/2014	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	--
	9/22/2015	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.79
	09/14/2016	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.48
	9/27/2017	(orig)	0.0031	< 0.001	< 0.001	< 0.003	0.471
	9/6/2018	(orig)	0.001	< 0.001	< 0.001	< 0.003	0.477
	8/12/2019	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.496
	8/12/2020	(orig)	< 0.001	< 0.001	< 0.001	< 0.003	0.55
	9/23/2021	(orig)	< 0.001	< 0.001	< 0.001	< 0.002	0.47
	9/16/2022	(orig)	< 0.001	< 0.001	< 0.001	< 0.0015	0.57
	8/3/2023	(orig)	--	--	--	--	0.67
MW-4	10/24/2008	(orig)	0.024	< 0.0005	0.006	0.01	--
	1/29/2009	(orig)	0.11	0.006	0.009	0.147	--
	9/25/2009	(orig)	0.0088	< 0.001	0.0057	0.002	1.24
	9/22/2010	(orig)	0.019	0.005	0.0069	0.0057	1.27
	9/28/2011	(orig)	0.0256	0.0078	0.0017	0.0106	1.82
	9/26/2012	(orig)	0.0124	0.0023	< 0.001	< 0.003	1.5
	9/26/2012	(Duplicate)	0.013	0.0022	< 0.001	0.0031	--
	---	August 2013 Mobile Dual Phase Extraction Event					
	9/17/2013	(orig)	0.0065	< 0.001	< 0.001	< 0.003	1.6
	9/23/2014	(orig)	0.0068	< 0.001	0.0011	< 0.003	2.2
	---	November 2014 Mobile Dual Phase Extraction Event					
	12/17/2014	(orig)	0.003	< 0.001	< 0.001	< 0.003	--
	12/17/2014	(Duplicate)	0.0039	< 0.001	< 0.001	< 0.003	--
	---	April 2015 Mobile Dual Phase Extraction Event					



TABLE 3 GROUNDWATER ANALYTICAL RESULTS Johnston Federal #4 Hilcorp Energy Company San Juan County, New Mexico							
Well Identification	Sample Date	Sample Type	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Manganese (dissolved) (mg/L)
NMWQCC Standards			0.005	1.00	0.70	0.62	0.20
MW-4	6/18/2015	(orig)	0.0039	< 0.001	< 0.001	< 0.003	--
	9/22/2015	(orig)	0.0018	< 0.001	< 0.001	< 0.003	1.9
	9/14/2016	(orig)	0.0047	< 0.001	< 0.001	< 0.003	2.0
	9/27/2017	(orig)	0.0266	< 0.001	< 0.001	0.004	2.46
	---	November 2017 Mobile Dual Phase Extraction Event					
	9/6/2018	(orig)	0.132	<0.001	<0.001	0.0165	1.74
	8/16/2019	(orig)	0.0087	< 0.001	< 0.001	< 0.003	1.57
	8/13/2020	(orig)	0.0184	< 0.001	< 0.001	< 0.003	1.65
	9/23/2021	(orig)	0.027	< 0.001	< 0.001	0.0053	1.9
	9/16/2022	Not Sampled - Well Damaged					
	8/3/2023	(orig)	0.0085	< 0.002	< 0.002	0.0095	1.8
	8/16/2024	(orig)	0.0029	< 0.001	< 0.001	0.0031	1.5

Notes:

mg/L: milligrams per liter

NMWQCC: New Mexico Water Quality Control Commission

PSH: phase separated hydrocarbons

*: PSH present during sampling, anomalous data based on historical results

--: not analyzed

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

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



APPENDIX A

Laboratory Analytical Reports



Environment Testing

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ANALYTICAL REPORT

PREPARED FOR

Attn: Kate Kaufman
Hilcorp Energy
PO BOX 4700
Farmington, New Mexico 87499

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JOB DESCRIPTION

Johnston Fed 4

JOB NUMBER

885-10253-1

Eurofins Albuquerque
4901 Hawkins NE
Albuquerque NM 87109

Eurofins Albuquerque

Job Notes

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing South Central, LLC Project Manager.

Authorization



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9/16/2024 3:36:52 PM

Authorized for release by
Michelle Garcia, Project Manager
michelle.garcia@et.eurofinsus.com
(505)345-3975

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Laboratory Job ID: 885-10253-1

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Definitions/Glossary

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

Qualifiers

Metals	
Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Hilcorp Energy
Project: Johnston Fed 4

Job ID: 885-10253-1

Job ID: 885-10253-1Eurofins Albuquerque

Job Narrative
885-10253-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The sample was received on 8/21/2024 8:37 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 1.7°C.

GC/MS VOA

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Albuquerque

Client Sample Results

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

Client Sample ID: MW-4
Date Collected: 08/16/24 13:50
Date Received: 08/21/24 08:37

Lab Sample ID: 885-10253-1
Matrix: Water

Method: SW846 8260B - Volatile Organic Compounds (GC/MS)									
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil	Fac
Benzene	2.9		1.0	ug/L			08/23/24 23:36	1	
Ethylbenzene	ND		1.0	ug/L			08/23/24 23:36	1	
Toluene	ND		1.0	ug/L			08/23/24 23:36	1	
Xylenes, Total	3.1		1.5	ug/L			08/23/24 23:36	1	
Surrogate	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil	Fac
1,2-Dichloroethane-d4 (Surr)	95		70 - 130				08/23/24 23:36	1	
4-Bromofluorobenzene (Surr)	103		70 - 130				08/23/24 23:36	1	
Dibromofluoromethane (Surr)	103		70 - 130				08/23/24 23:36	1	
Toluene-d8 (Surr)	100		70 - 130				08/23/24 23:36	1	
Method: EPA 200.7 Rev 4.4 - Metals (ICP) - Dissolved									
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil	Fac
Manganese	1.5		0.020	mg/L			09/13/24 09:37	10	

QC Sample Results

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 885-10872/5

Matrix: Water

Analysis Batch: 10872

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	ug/L			08/23/24 15:03	1
Ethylbenzene	ND		1.0	ug/L			08/23/24 15:03	1
Toluene	ND		1.0	ug/L			08/23/24 15:03	1
Xylenes, Total	ND		1.5	ug/L			08/23/24 15:03	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	98		70 - 130		08/23/24 15:03	1
4-Bromofluorobenzene (Surr)	101		70 - 130		08/23/24 15:03	1
Dibromofluoromethane (Surr)	102		70 - 130		08/23/24 15:03	1
Toluene-d8 (Surr)	97		70 - 130		08/23/24 15:03	1

Lab Sample ID: LCS 885-10872/4

Matrix: Water

Analysis Batch: 10872

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Benzene	20.1	21.9		ug/L		109	70 - 130
Toluene	20.2	19.5		ug/L		97	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	99		70 - 130
4-Bromofluorobenzene (Surr)	100		70 - 130
Dibromofluoromethane (Surr)	102		70 - 130
Toluene-d8 (Surr)	96		70 - 130

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 885-12223/29

Matrix: Water

Analysis Batch: 12223

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	ND		0.0020	mg/L			09/13/24 08:22	1

Lab Sample ID: LCS 885-12223/31

Matrix: Water

Analysis Batch: 12223

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	0.500	0.448		mg/L		90	85 - 115

Lab Sample ID: LCSD 885-12223/32

Matrix: Water

Analysis Batch: 12223

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Manganese	0.500	0.454		mg/L		91	85 - 115	1	20

Eurofins Albuquerque

QC Sample Results

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: LLCS 885-12223/30				Client Sample ID: Lab Control Sample			
Matrix: Water				Prep Type: Total/NA			
Analysis Batch: 12223							
Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	0.00200	0.00193	J	mg/L		96	50 - 150

Lab Sample ID: MRL 885-12223/26				Client Sample ID: Lab Control Sample			
Matrix: Water				Prep Type: Total/NA			
Analysis Batch: 12223							
Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	0.00200	0.00188	J	mg/L		94	50 - 150

QC Association Summary

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

GC/MS VOA

Analysis Batch: 10872

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
885-10253-1	MW-4	Total/NA	Water	8260B	
MB 885-10872/5	Method Blank	Total/NA	Water	8260B	
LCS 885-10872/4	Lab Control Sample	Total/NA	Water	8260B	

Metals

Filtration Batch: 10661

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
885-10253-1	MW-4	Dissolved	Water	Filtration	

Analysis Batch: 12223

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
885-10253-1	MW-4	Dissolved	Water	200.7 Rev 4.4	10661
MB 885-12223/29	Method Blank	Total/NA	Water	200.7 Rev 4.4	
LCS 885-12223/31	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	
LCSD 885-12223/32	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	
LLCS 885-12223/30	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	
MRL 885-12223/26	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	

Lab Chronicle

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

Client Sample ID: MW-4
Date Collected: 08/16/24 13:50
Date Received: 08/21/24 08:37

Lab Sample ID: 885-10253-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	8260B		1	10872	RA	EET ALB	08/23/24 23:36
Dissolved	Filtration	Filtration			10661	TC	EET ALB	08/21/24 09:05
Dissolved	Analysis	200.7 Rev 4.4		10	12223	VP	EET ALB	09/13/24 09:37

Laboratory References:
EET ALB = Eurofins Albuquerque, 4901 Hawkins NE, Albuquerque, NM 87109, TEL (505)345-3975

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Accreditation/Certification Summary

Client: Hilcorp Energy
Project/Site: Johnston Fed 4

Job ID: 885-10253-1

Laboratory: Eurofins Albuquerque

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
New Mexico	State	NM9425, NM0901	02-26-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
200.7 Rev 4.4		Water	Manganese
8260B		Water	Benzene
8260B		Water	Ethylbenzene
8260B		Water	Toluene
8260B		Water	Xylenes, Total
Oregon	NELAP	NM100001	02-26-25

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:

☒ Standard ☐ Rush

Project Name:

Johnston Fed 4

Project #:

Project Manager:

Kate Keyfman

Sampler:

Brandon Sinclair

On Ice:

☒ Yes ☐ No *chuck*

of Coolers:

1

Cooler Temp (including CF):

1.0 to 1.7 °C

Date Time Matrix Sample Name

8-16 1350

Water

Water

Water

Date: 8/20/24 1641

Relinquished by: *M. J. J.*Received by: *W. J.*

Date: 8/21/24 1641

Time

Date: 8/20/24 1727

Relinquished by: *W. J.*Received by: *W. J.*

Date: 8/21/24 1740

Time

Remarks: *Dissolved Mn is to be filtered and preserved in the lab.
Special pricing see Andy.**HALL ENVIRONMENTAL
ANALYSIS LABORATORY**

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 871

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



Analysis Request

885-10253 COC

Dissolved Mn
BTX 8260

X X

X X

X X

Login Sample Receipt Checklist

Client: Hilcorp Energy

Job Number: 885-10253-1

Login Number: 10253

List Source: Eurofins Albuquerque

List Number: 1

Creator: Casarrubias, Tracy

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
<https://www.emnrd.nm.gov/ocd/contact-us>

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

CONDITIONS

Action 432361

CONDITIONS

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 432361
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
amaxwell	Report accepted for record.	10/1/2025
amaxwell	Continue to annually sample to assess BTEX concentrations in MW-1 and MW-4, and dissolved Mn concentration in MW-1, MW-3 and MW-4. Report findings and recommendations to NMOCD after assessment has been complete. Upload the 2024 Annual Groundwater Monitoring Report by April 1, 2026.	10/1/2025