

**REVIEWED**

By Mike Buchanan at 9:17 am, May 23, 2024

**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**  
OH Randel #007  
San Juan County, New Mexico  
Hilcorp Energy Company  
NMOCD Incident Number: NAUTOFWCO00434

2022 Annual  
Groundwater  
Monitoring Report for  
OH Randel #007 is  
accepted for the  
record. Located on the  
Navajo Nation.

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) to document groundwater monitoring activities conducted at the OH Randel #007 natural gas production site (Site) during 2022. The Site is located on the Navajo Nation, in Unit D, Section 15, Township 26 North, Range 11 West, San Juan County, New Mexico (Figure 1).

**SITE BACKGROUND**

Comprehensive Site background history, work plans, and reports prepared for the Site are available on the NMOCD database. In December of 2017, Hilcorp acquired the Site from XTO Energy, Inc. and continued to perform semi-annual monitoring of groundwater. Previous annual groundwater reports submitted by Hilcorp to the NMOCD recommended semi-annual gauging of all Site wells and groundwater sampling from well MW-7 for benzene, toluene, ethylbenzene and total xylenes (BTEX) analysis. A summary of historical and current groundwater elevations are presented in Table 1, with laboratory analytical results presented in Table 2.

**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 the constituents of concern (COCs) at the Site in micrograms per liter (µg/L).

- Benzene: 5.0 µg/L
- Toluene: 1,000 µg/L
- Ethylbenzene: 700 µg/L
- Total Xylenes: 620 µg/L

## GROUNDWATER SAMPLING ACTIVITIES AND RESULTS

Groundwater-level measurements were collected in June and December 2022 from wells MW-3, MW-4, MW-5, MW-7, MW-8, and MW-9. Groundwater samples were also collected from well MW-7 during these events for laboratory analysis. Static groundwater-level monitoring included recording depth-to-groundwater using an oil/water interface probe. The interface probe was decontaminated with Alconox™ soap and rinsed with distilled water prior to each measurement to prevent cross-contamination. Based on quarterly measurements, groundwater elevations are relatively stable. Measured depths-to-groundwater and calculated groundwater elevations are presented in Table 1. The inferred groundwater flow direction is to the north-northeast as indicated on the groundwater potentiometric surface maps presented on Figures 2 and 3.

### GROUNDWATER SAMPLING

Groundwater from MW-7 was purged and sampled using a disposable bailer. Purging was accomplished by removing stagnant groundwater from the monitoring well prior to collecting a sample. Field measurements of groundwater quality parameters, including temperature, pH, electrical conductivity, and total dissolved solids were collected during the purging process and 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 and packed on ice to preserve samples. Samples were submitted to Hall Environmental Analysis Laboratory in Albuquerque, New Mexico, for analysis of BTEX by United State Environmental Protection Agency (EPA) Method 8021B or 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 June and December 2022 sampling events, benzene and total xylenes were detected in groundwater from well MW-7 at concentrations exceeding the NMWQCC standards. Toluene and ethylbenzene concentrations in groundwater were below the NMWQCC standards during both sampling events. Analytical results are summarized in Table 2 and depicted on Figures 2 and 3, with complete laboratory analytical reports attached as Appendix A.

## CONCLUSIONS AND RECOMMENDATIONS

Overall, BTEX concentrations in groundwater from MW-7 have decreased since 2019. Concentrations of dissolved benzene and total xylenes continue to exceed the NMWQCC standards, while concentrations of toluene and ethylbenzene continue to be in compliance with the NMWQCC standards. Based on historical sampling results and groundwater flow direction, elevated chemicals of concern appear to be confined to groundwater in a limited area surrounding MW-7.

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

- Install Oxygen Release Compound (ORC®) socks in well MW-7. Regenesi ORC® socks produce a controlled release of molecular oxygen to increase oxygen levels in the groundwater, thus contributing to aerobic groundwater conditions and stimulating through enhanced microbial action and biodegradation of petroleum hydrocarbon.
- Continue semi-annual gauging of all monitoring wells and semi-annual sampling of MW-7.

- Field screen for oxidation-reduction potential (ORP) and dissolved oxygen (DO) values in well MW-7 during semi-annual sampling events to assess if the installation of ORC® socks is effective in contributing to aerobic groundwater conditions at the Site.

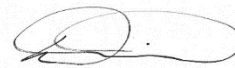
Ensolum appreciates the opportunity to provide these environmental services to Hilcorp. Please contact either of the undersigned with any questions.

Sincerely,

**Ensolum, LLC**



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Senior Geologist  
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Daniel R. Moir, PG  
Senior Managing Geologist  
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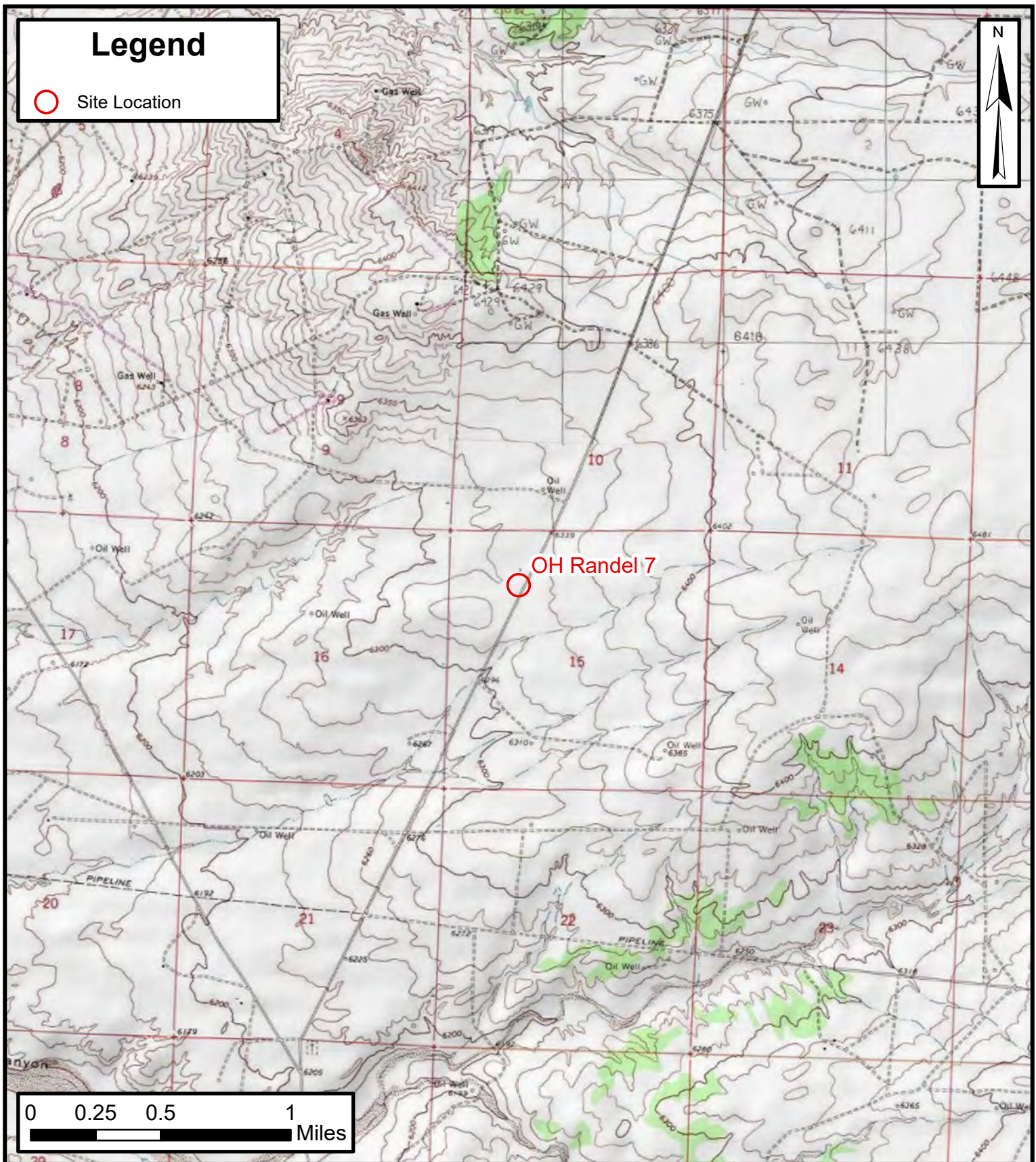
**Attachments:**

Figure 1	Site Location Map
Figure 2	Groundwater Elevation and Analytical Results (June 2022)
Figure 3	Groundwater Elevation and Analytical Results (December 2022)
Table 1	Groundwater Elevations
Table 2	Groundwater Analytical Results
Appendix A	Laboratory Analytical Reports



FIGURES



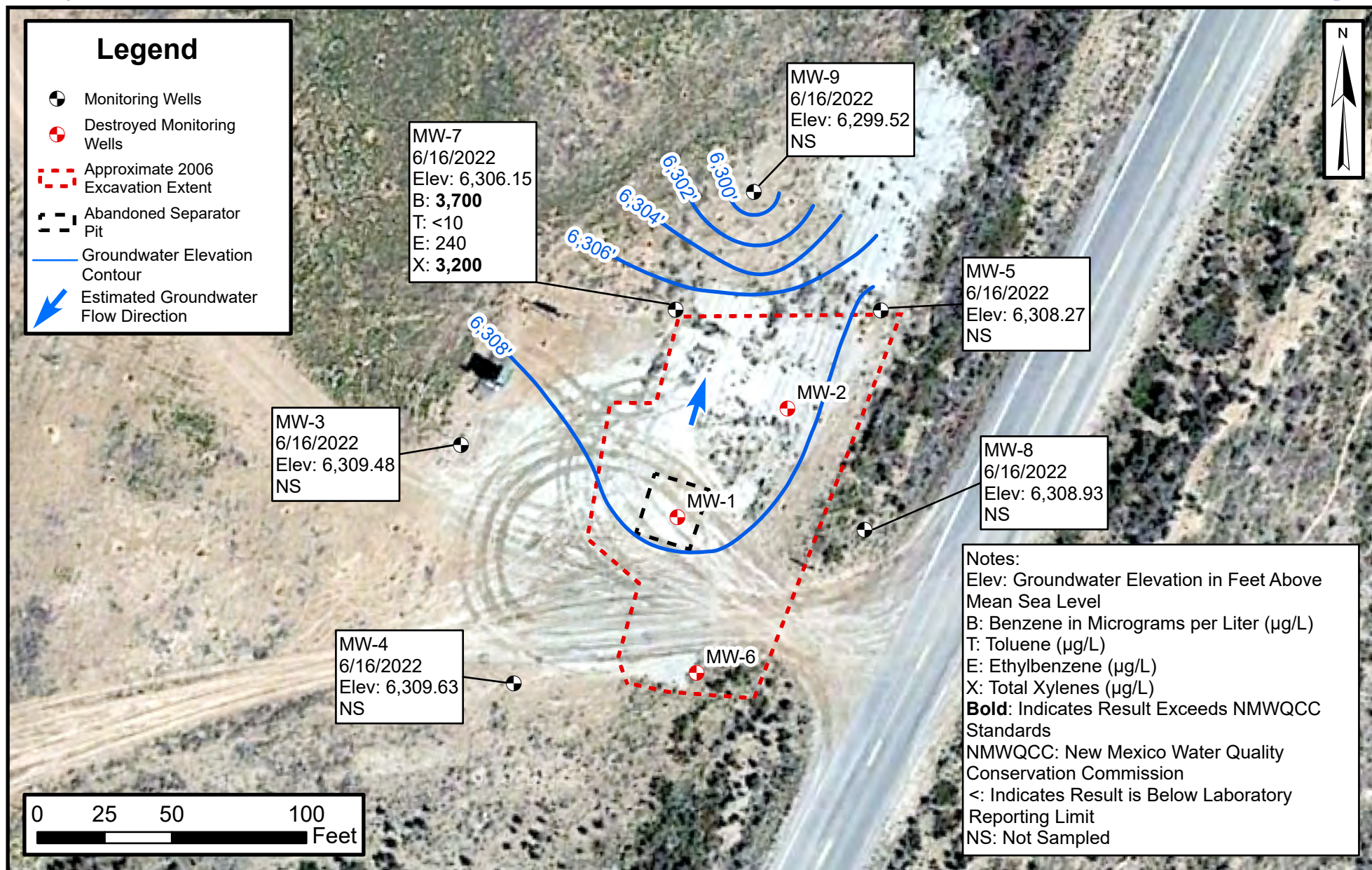


## Site Location Map

OH Randel #007  
 Hilcorp Energy Company  
 36.49196, -107.99549  
 San Juan County, New Mexico

**FIGURE**  
**1**





## Groundwater Elevation and Analytical Results (June 2022)

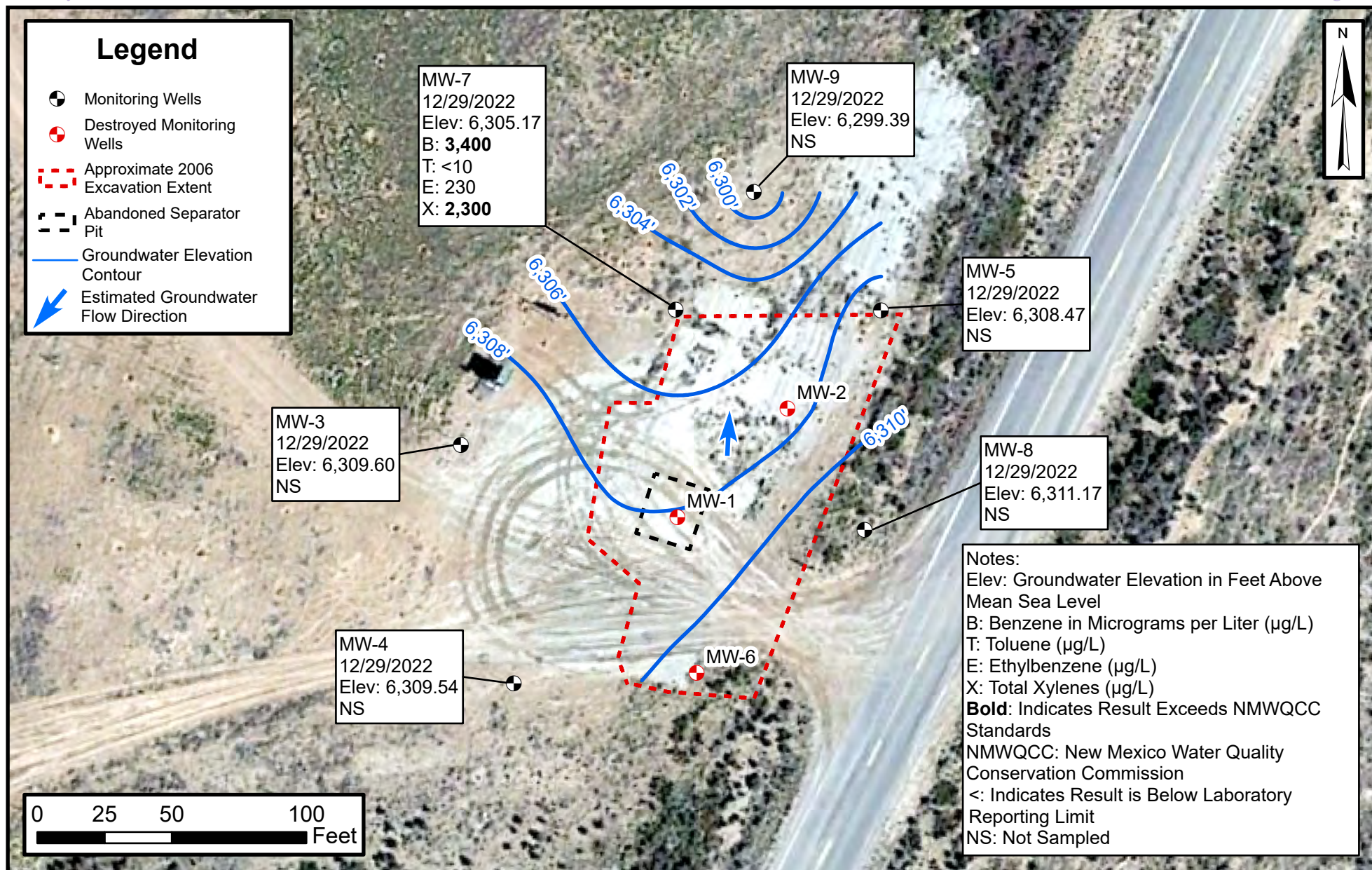
OH Randel #007  
 Hilcorp Energy Company  
 36.49196, -107.99549  
 San Juan County, New Mexico

FIGURE

2







## Groundwater Elevation and Analytical Results (December 2022)

OH Randel #007  
 Hilcorp Energy Company  
 36.49196, -107.99549  
 San Juan County, New Mexico

FIGURE

3





TABLES





**TABLE 1**  
**GROUNDWATER ELEVATIONS**

OH Randel #007  
Hilcorp Energy Company  
San Juan County, New Mexico

Well Identification	Top of Casing Elevation (feet AMSL)	Date	Depth to Groundwater (feet BTOC)	Depth to Product (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet AMSL)
MW-1	No Survey Data	4/22/2002	16.63	16.30	0.33	--
		4/24/2002	--	--	--	--
		8/27/2002	16.49	16.19	0.30	--
		10/08/2002	16.16	15.79	0.37	--
		5/23/2003	16.04	15.73	0.31	--
		5/28/2003	15.99	15.81	0.18	--
		6/6/2003	16.04	15.93	0.11	--
		6/18/2003	16.04	15.97	0.07	--
		6/26/2003	17.93	17.85	0.08	--
		7/31/2003	16.19	16.18	0.01	--
		8/29/2003	16.29	--	--	--
		6/21/2004	17.09	16.28	0.81	--
		9/20/2006	22.28	0.00	22.28	--
		12/5/2006 *	--	--	--	--
MW-2	No Survey Data	4/22/2002	18.32	--	--	--
		4/24/2002	18.38	18.35	0.03	--
		8/27/2002	19.86	18.92	0.94	--
		10/08/2002	18.02	17.50	0.52	--
		5/23/2003	17.83	17.30	0.53	--
		5/28/2003	17.78	17.62	0.16	--
		6/6/2003	17.83	17.71	0.12	--
		6/18/2003	17.88	17.79	0.09	--
		6/26/2003	16.09	16.05	0.04	--
		7/31/2003	15.86	--	--	--
		8/29/2003	15.99	--	--	--
		6/21/2004	16.83	16.10	0.73	--
		9/20/2006	17.15	0.00	17.15	--
		12/5/2006 *	--	--	--	--
MW-3	6,329.21	4/22/2002	16.26	--	--	6,312.95
		4/24/2002	16.25	--	--	6,312.96
		8/27/2002	15.28	--	--	6,313.93
		10/8/2002	14.74	--	--	6,314.47
		3/3/2003	15.17	--	--	6,314.04
		6/18/2003	15.16	--	--	6,314.05
		8/29/2003	15.39	--	--	6,313.82
		9/20/2006	--	--	--	--
		12/5/2006	13.85	--	--	6,315.36
		3/8/2007	13.40	--	--	6,315.81
		5/17/2007	12.87	--	--	6,316.34



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**GROUNDWATER ELEVATIONS**

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Well Identification	Top of Casing Elevation (feet AMSL)	Date	Depth to Groundwater (feet BTOC)	Depth to Product (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet AMSL)
MW-3	6,329.21	8/9/2007	12.37	--	--	6,316.84
		5/12/2008	14.83	--	--	6,314.38
		11/7/2008	13.92	--	--	6,315.29
		7/8/2009	14.14	--	--	6,315.07
		11/5/2009	14.53	--	--	6,314.68
		5/25/2010	14.21	--	--	6,315.00
		8/12/2010	--	--	--	--
		11/17/2010	15.30	--	--	6,313.91
		2/14/2011	--	--	--	--
		5/17/2011	15.74	--	--	6,313.47
		8/9/2011	15.87	--	--	6,313.34
		11/9/2011	16.21	--	--	6,313.00
		6/17/2013	17.32	--	--	6,311.89
		12/16/2013	16.88	--	--	6,312.33
		6/11/2014	18.60	--	--	6,310.61
		12/9/2014	17.37	--	--	6,311.84
		6/11/2015	18.45	--	--	6,310.76
		12/21/2015	17.55	--	--	6,311.66
		6/20/2016	18.86	--	--	6,310.35
		12/14/2016	17.86	--	--	6,311.35
		6/26/2017	18.11	--	--	6,311.10
		12/12/2017	18.28	--	--	6,310.93
		6/28/2018	18.65	--	--	6,310.56
		12/10/2018	18.77	--	--	6,310.44
		6/19/2019	19.25	--	--	6,309.96
		12/9/2019	18.90	--	--	6,310.31
		6/22/2020	19.30	--	--	6,309.91
		12/14/2020	19.16	--	--	6,310.05
		6/22/2021	19.51	--	--	6,309.70
		12/6/2021	19.35	--	--	6,309.86
		6/16/2022	19.73	--	--	6,309.48
		12/29/2022	19.61	--	--	6,309.60
MW-4	6,328.08	4/22/2002	16.63	--	--	6,311.45
		4/24/2002	16.66	--	--	6,311.42
		8/27/2002	16.47	--	--	6,311.61
		10/8/2002	16.03	--	--	6,312.05
		3/3/2003	15.94	--	--	6,312.14
		6/18/2003	16.03	--	--	6,312.05
		8/29/2003	16.29	--	--	6,311.79
		9/20/2006	--	--	--	--





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Well Identification	Top of Casing Elevation (feet AMSL)	Date	Depth to Groundwater (feet BTOC)	Depth to Product (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet AMSL)
MW-4	6,328.08	12/5/2006	13.75	--	--	6,314.33
		3/8/2007	12.55	--	--	6,315.53
		5/17/2007	13.03	--	--	6,315.05
		8/9/2007	12.59	--	--	6,315.49
		5/12/2008	12.57	--	--	6,315.51
		11/7/2008	13.68	--	--	6,314.40
		7/8/2009	13.72	--	--	6,314.36
		11/5/2009	14.12	--	--	6,313.96
		5/25/2010	13.86	--	--	6,314.22
		8/12/2010	14.39	--	--	6,313.69
		11/17/2010	14.60	--	--	6,313.48
		2/14/2011	15.55	--	--	6,312.53
		5/17/2011	14.95	--	--	6,313.13
		8/9/2011	15.11	--	--	6,312.97
		11/9/2011	15.38	--	--	6,312.70
		6/17/2013	16.33	--	--	6,311.75
		12/16/2013	15.99	--	--	6,312.09
		6/11/2014	16.30	--	--	6,311.78
		12/9/2014	16.48	--	--	6,311.60
		6/11/2015	16.14	--	--	6,311.94
		12/21/2015	16.75	--	--	6,311.33
		6/20/2016	16.98	--	--	6,311.10
		12/14/2016	16.95	--	--	6,311.13
		6/26/2017	17.09	--	--	6,310.99
		12/12/2017	17.27	--	--	6,310.81
		6/28/2018	17.53	--	--	6,310.55
		12/10/2018	17.66	--	--	6,310.42
		6/19/2019	17.89	--	--	6,310.19
		12/9/2019	17.83	--	--	6,310.25
		6/22/2020	18.09	--	--	6,309.99
		12/14/2020	18.06	--	--	6,310.02
		6/22/2021	18.31	--	--	6,309.77
		12/6/2021	18.32	--	--	6,309.76
		6/16/2022	18.45	--	--	6,309.63
		12/29/2022	18.54	--	--	6,309.54
MW-5	6,333.23	4/22/2002	19.11	--	--	6,314.12
		4/24/2002	19.14	--	--	6,314.09
		8/10/2002	19.10	--	--	6,314.13
		6/18/2003	18.86	--	--	6,314.37
		6/21/2004	19.64	--	--	6,313.59



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MW-5	6,333.23	6/28/2005	17.30	--	--	6,315.93
		9/20/2006	NM	--	--	--
		12/5/2006	18.65	--	--	6,314.58
		3/8/2007	18.15	--	--	6,315.08
		5/17/2007	17.78	--	--	6,315.45
		8/9/2007	NM	--	--	--
		5/12/2008	18.82	--	--	6,314.41
		11/7/2008	18.90	--	--	6,314.33
		7/8/2009	20.08	--	--	6,313.15
		11/5/2009	20.44	--	--	6,312.79
		5/25/2010	20.33	--	--	6,312.90
		8/12/2010	20.51	--	--	6,312.72
		11/17/2010	20.93	--	--	6,312.30
		2/14/2011	20.97	--	--	6,312.26
		5/17/2011	21.20	--	--	6,312.03
		8/9/2011	21.47	--	--	6,311.76
		11/9/2011	21.69	--	--	6,311.54
		6/17/2013	22.74	--	--	6,310.49
		12/16/2013	22.36	--	--	6,310.87
		6/11/2014	22.77	--	--	6,310.46
		12/9/2014	22.21	--	--	6,311.02
		6/11/2015	22.69	--	--	6,310.54
		12/21/2015	22.55	--	--	6,310.68
		6/20/2016	23.08	--	--	6,310.15
		12/14/2016	23.19	--	--	6,310.04
		6/26/2017	23.28	--	--	6,309.95
		12/12/2017	23.45	--	--	6,309.78
		6/28/2018	24.76	--	--	6,308.47
		12/10/2018	23.99	--	--	6,309.24
		6/19/2019	24.18	--	--	6,309.05
		12/9/2019	24.24	--	--	6,308.99
		3/13/2020	24.30	--	--	6,308.93
		6/22/2020	24.39	--	--	6,308.84
		12/14/2020	24.55	--	--	6,308.68
		6/22/2021	24.69	--	--	6,308.54
		12/6/2021	27.76	--	--	6,305.47
		6/16/2022	24.96	--	--	6,308.27
		12/29/2022	24.76	--	--	6,308.47





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**GROUNDWATER ELEVATIONS**

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San Juan County, New Mexico

Well Identification	Top of Casing Elevation (feet AMSL)	Date	Depth to Groundwater (feet BTOC)	Depth to Product (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet AMSL)
MW-6	No Survey Data	4/22/2002	18.31	--	--	--
		4/24/2002	18.32	--	--	--
		8/27/2002	--	--	--	--
		10/8/2002	18.13	16.84	1.29	--
		5/23/2003	17.95	16.62	1.33	--
		5/28/2003	17.90	16.68	1.22	--
		6/6/2003	18.00	16.80	1.20	--
		6/18/2003	18.02	16.78	1.24	--
		6/26/2003	18.10	16.88	1.22	--
		7/31/2003	19.13	17.77	1.36	--
		8/29/2003	18.34	16.88	1.46	--
		6/21/2004	18.95	17.78	1.17	--
		9/20/2006	16.87	15.79	1.08	--
		12/5/2006 *	--	--	--	--
MW-7	6,331.36	5/17/2007	15.46	--	--	6,315.90
		8/9/2007	14.72	--	--	6,316.64
		11/27/2007	14.91	--	--	6,316.45
		5/12/2008	15.12	--	--	6,316.24
		11/7/2008	15.82	--	--	6,315.54
		7/8/2009	16.44	--	--	6,314.92
		11/5/2009	16.76	--	--	6,314.60
		5/25/2010	16.63	--	--	6,314.73
		8/12/2010	16.82	--	--	6,314.54
		11/17/2010	17.65	--	--	6,313.71
		2/14/2011	17.74	--	--	6,313.62
		5/17/2011	17.92	--	--	6,313.44
		8/9/2011	18.11	--	--	6,313.25
		11/9/2011	18.46	--	--	6,312.90
		6/17/2013	19.45	--	--	6,311.91
		12/16/2013	19.39	--	--	6,311.97
		6/11/2014	19.56	--	--	6,311.80
		12/9/2014	19.67	--	--	6,311.69
		6/11/2015	19.40	--	--	6,311.96
		12/21/2015	19.50	--	--	6,311.86
		6/20/2016	19.91	--	--	6,311.45
		12/14/2016	20.04	--	--	6,311.32
		6/26/2017	20.33	--	--	6,311.03
		12/12/2017	20.44	--	--	6,310.92
		6/28/2018	20.91	--	--	6,310.45
		12/10/2018	20.94	--	--	6,310.42



**TABLE 1**  
**GROUNDWATER ELEVATIONS**

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San Juan County, New Mexico

Well Identification	Top of Casing Elevation (feet AMSL)	Date	Depth to Groundwater (feet BTOC)	Depth to Product (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet AMSL)
MW-7	6,331.36	6/19/2019	21.15	--	--	6,310.21
		12/9/2019	20.95	--	--	6,310.41
		6/22/2020	21.21	--	--	6,310.15
		12/14/2020	21.16	--	--	6,310.20
		6/22/2021	21.38	--	--	6,309.98
		12/6/2021	21.34	--	--	6,310.02
		6/16/2022	25.21	--	--	6,306.15
		12/29/2022	26.19	--	--	6,305.17
MW-8	6,334.50	5/17/2007	19.64	--	--	6,314.86
		8/9/2007	18.94	--	--	6,315.56
		11/27/2007	19.20	--	--	6,315.30
		5/12/2008	19.97	--	--	6,314.53
		11/7/2008	19.55	--	--	6,314.95
		7/8/2009	20.01	--	--	6,314.49
		11/5/2009	20.41	--	--	6,314.09
		5/25/2010	20.31	--	--	6,314.19
		8/12/2010	20.41	--	--	6,314.09
		11/17/2010	20.63	--	--	6,313.87
		2/14/2011	20.35	--	--	6,314.15
		5/17/2011	20.30	--	--	6,314.20
		8/9/2011	20.83	--	--	6,313.67
		11/9/2011	21.00	--	--	6,313.50
		6/17/2013	22.17	--	--	6,312.33
		12/16/2013	21.40	--	--	6,313.10
		6/11/2014	22.09	--	--	6,312.41
		12/9/2014	22.80	--	--	6,311.70
		6/11/2015	21.76	--	--	6,312.74
		12/21/2015	22.83	--	--	6,311.67
		6/20/2016	22.40	--	--	6,312.10
		12/14/2016	23.54	--	--	6,310.96
		6/26/2017	22.28	--	--	6,312.22
		12/12/2017	22.70	--	--	6,311.80
		6/28/2018	23.02	--	--	6,311.48
		12/10/2018	23.21	--	--	6,311.29
		6/19/2019	23.28	--	--	6,311.22
		12/9/2019	23.50	--	--	6,311.00
		6/22/2020	23.85	--	--	6,310.65
		12/14/2020	24.27	--	--	6,310.23
		6/22/2021	24.82	--	--	6,309.68
		12/6/2021	25.51	--	--	6,308.99





**TABLE 1**  
**GROUNDWATER ELEVATIONS**

OH Randel #007  
Hilcorp Energy Company  
San Juan County, New Mexico

Well Identification	Top of Casing Elevation (feet AMSL)	Date	Depth to Groundwater (feet BTOC)	Depth to Product (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet AMSL)
MW-8	6,334.50	6/16/2022	25.57	--	--	6,308.93
		12/29/2022	23.33	--	--	6,311.17
MW-9	6,330.36	7/8/2009	35.26	--	--	6,295.10
		11/5/2009	33.08	--	--	6,297.28
		5/25/2010	29.28	--	--	6,301.08
		8/12/2010	31.12	--	--	6,299.24
		5/25/2010	20.31	--	--	6,310.05
		8/12/2010	20.41	--	--	6,309.95
		11/17/2010	30.49	--	--	6,299.87
		2/14/2011	31.60	--	--	6,298.76
		5/17/2011	30.39	--	--	6,299.97
		8/9/2011	29.84	--	--	6,300.52
		11/9/2011	28.76	--	--	6,301.60
		6/17/2013	28.36	--	--	6,302.00
		12/16/2013	27.97	--	--	6,302.39
		6/11/2014	28.68	--	--	6,301.68
		12/9/2014	28.45	--	--	6,301.91
		6/11/2015	28.98	--	--	6,301.38
		12/21/2015	28.22	--	--	6,302.14
		6/20/2016	28.66	--	--	6,301.70
		12/14/2016	28.42	--	--	6,301.94
		6/26/2017	29.05	--	--	6,301.31
		12/12/2017	29.00	--	--	6,301.36
		6/28/2018	29.48	--	--	6,300.88
		12/10/2018	29.48	--	--	6,300.88
		6/19/2019	30.09	--	--	6,300.27
		12/9/2019	30.20	--	--	6,300.16
		6/22/2020	30.50	--	--	6,299.86
		12/14/2020	30.32	--	--	6,300.04
		6/22/2021	30.54	--	--	6,299.82
		12/6/2021	30.63	--	--	6,299.73
		6/16/2022	30.84	--	--	6,299.52
		12/29/2022	30.97	--	--	6,299.39

**Notes:**

AMSL: above mean sea level

BTOC: below top of casing

--: indicates no GWEL or PSH measured

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

\* indicates that the well was destroyed



**TABLE 2**  
**GROUNDWATER ANALYTICAL RESULTS**

OH Randel #007  
Hilcorp Energy Company  
San Juan County, New Mexico

Well Identification	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
<b>NMWQCC Standards</b>		<b>5.0</b>	<b>1,000</b>	<b>700</b>	<b>620</b>
<b>MW-3</b>	4/24/2002	<b>24</b>	2.4	0.58	200
	8/27/2002	<b>9.4</b>	ND	ND	150
	3/3/2003	<b>5.5</b>	ND	ND	43
	6/18/2003	<b>6.1</b>	0.97	ND	43
	8/29/2003	3.2	0.53	ND	24
	12/5/2006	<1.0	<1.0	<1.0	<3.0
	5/17/2007	<1.0	<1.0	<1.0	<2.0
	8/9/2007	<1.0	<1.0	<1.0	<2.0
<b>MW-4</b>	4/24/2002	ND	0.59	ND	2.1
	8/27/2002	1.3	ND	ND	3.5
	3/3/2003	4.2	ND	ND	5
	6/18/2003	<b>6.2</b>	ND	ND	4.5
	8/29/2003	<b>8.3</b>	ND	ND	4.3
	12/5/2006	<1.0	<1.0	<1.0	<3.0
	5/17/2007	<1.0	<1.0	<1.0	<2.0
	8/9/2007	<1.0	<1.0	<1.0	<2.0
<b>MW-5</b>	4/24/2002	<b>510</b>	0.64	8.9	240
	6/18/2003	<b>1,100</b>	20	ND	<b>660</b>
	6/21/2004	<b>2,000</b>	ND	ND	260
	6/28/2005	<b>1,100</b>	15	ND	160
	12/5/2006	<b>37</b>	<1.0	<1.0	4.1
	5/17/2007	<1.0	<1.0	<1.0	<2.0
<b>MW-6</b>	4/24/2002	<b>6,100</b>	<b>4,800</b>	<b>920</b>	<b>6,600</b>
<b>MW-7</b>	5/17/2007	<b>8,500</b>	<b>17,000</b>	<b>980</b>	<b>16,000</b>
	8/9/2007	<b>9,800</b>	<b>11,000</b>	<b>770</b>	<b>12,000</b>
	11/27/2007	<b>12,000</b>	<b>9,000</b>	<b>940</b>	<b>13,000</b>
	5/12/2008	<b>7,900</b>	<b>11,000</b>	<b>830</b>	<b>12,000</b>
	11/7/2008	<b>12,000</b>	<b>16,000</b>	<b>1,100</b>	<b>17,000</b>
	7/8/2009	<b>9,800</b>	<b>8,200</b>	<100	<b>12,000</b>
	11/5/2009	<b>9,800</b>	<b>7,900</b>	570	<b>13,000</b>
	5/25/2010	<b>7,200</b>	<b>3,800</b>	440	<b>11,000</b>
	8/12/2010	<b>82</b>	58	9.2	200



**TABLE 2**  
**GROUNDWATER ANALYTICAL RESULTS**

OH Randel #007  
Hilcorp Energy Company  
San Juan County, New Mexico

Well Identification	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
<b>NMWQCC Standards</b>		<b>5.0</b>	<b>1,000</b>	<b>700</b>	<b>620</b>
<b>MW-7</b>	11/17/2010	5,200	5,500	76	3,400
	2/14/2011	2,200	1,000	<120	1,800
	5/17/2011	500	190	16	180
	8/9/2011	81.3	36.9	5.3	39.4
	11/9/2011	26	16	2.3	20
	6/17/2013	0.72	<5.0	<0.50	<1.5
	12/16/2013	130	<50	7.6	62
	6/11/2014	7,600	6,400	100	5,900
	12/9/2014	9,400	2,600	250	6,100
	6/11/2015	8,300	960	410	7,200
	12/21/2015	9,040	67.6	465	7,310
	6/20/2016	9,160	412	615	8,750
	12/14/2016	8,400	368	284	6,950
	6/26/2017	6,580	<10.0	126	3,950
	12/12/2017	9,050	<50.0	406	7,020
	6/28/2018	8,300	6.2	220	6,100
	12/10/2018	8,400	<10.0	320	6,200
	6/19/2019	14,000	<50	540	12,000
	12/9/2019	6,800	<50	330	5,700
	6/22/2020	830	<5.0	22	640
	12/14/2020	9,400	<20	470	6,600
	6/22/2021	5,400	<5.0	250	4,000
	12/6/2021	7,400	<10	460	5,900
	6/16/2022	3,700	<10	240	3,200
	12/29/2022	3,400	<10	230	2,300
<b>MW-8</b>	5/17/2007	<1.0	1.9	<1.0	3.7
	8/9/2007	<1.0	<1.0	<1.0	<2.0
	11/27/2007	21.0	<1.0	<1.0	<2.0
	5/12/2008	1.4	<1.0	<1.0	<2.0
	11/7/2008	1.2	<1.0	<1.0	<2.0
	7/8/2009	<1.0	<1.0	<1.0	<2.0
	11/5/2009	1.1	<1.0	<1.0	<2.0





**TABLE 2**  
**GROUNDWATER ANALYTICAL RESULTS**

OH Randel #007  
Hilcorp Energy Company  
San Juan County, New Mexico

Well Identification	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
<b>NMWQCC Standards</b>		<b>5.0</b>	<b>1,000</b>	<b>700</b>	<b>620</b>
<b>MW-9</b>	7/8/2009	<b>91</b>	160	6.9	100
	11/30/2009	<1.0	<1.0	<1.0	<2.0
	5/25/2010	<1.0	<1.0	<1.0	<2.0
	8/12/2010	<0.5	<5.0	<0.5	<1.5
	11/17/2010	2.4	<5.0	<0.5	<1.5

**Notes:**

µg/L: micrograms per liter

ND: not detected above laboratory reporting limit

NMWQCC: New Mexico Water Quality Control Commission

--: not analyzed

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

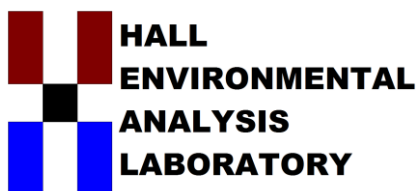
Concentrations in **bold** and highlighted exceed the New Mexico Water Quality Control Commission Standards, 20.6.2 of the New Mexico Administrative Code



## APPENDIX A

### Laboratory Analytical Reports

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

June 22, 2022

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

RE: OH Randel 7

OrderNo.: 2206947

Dear Kate Kaufman:

Hall Environmental Analysis Laboratory received 1 sample(s) on 6/17/2022 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](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

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

Sincerely,

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

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109



## Analytical Report

Lab Order 2206947

Date Reported: 6/22/2022

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY

Client Sample ID: MW-7

Project: OH Randel 7

Collection Date: 6/16/2022 10:30:00 AM

Lab ID: 2206947-001

Matrix: AQUEOUS

Received Date: 6/17/2022 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	3700	100		µg/L	100	6/21/2022 8:39:43 PM
Toluene	ND	10		µg/L	10	6/21/2022 9:03:13 PM
Ethylbenzene	240	10		µg/L	10	6/21/2022 9:03:13 PM
Xylenes, Total	3200	200		µg/L	100	6/21/2022 8:39:43 PM
Surr: 4-Bromofluorobenzene	94.0	70-130		%Rec	100	6/21/2022 8:39:43 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 Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Page 1 of 2

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 2206947

22-Jun-22

Client: HILCORP ENERGY

Project: OH Randel 7

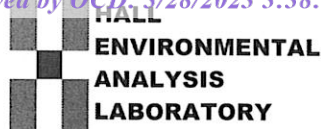
Sample ID: <b>mb</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 8021B: Volatiles</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R88920</b>		RunNo: <b>88920</b>							
Prep Date:	Analysis Date: <b>6/21/2022</b>		SeqNo: <b>3157711</b>		Units: <b>µg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	2.0								
Surr: 4-Bromofluorobenzene	18		20.00		91.2	70	130			

Sample ID: <b>100ng btex lcs</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 8021B: Volatiles</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R88920</b>		RunNo: <b>88920</b>							
Prep Date:	Analysis Date: <b>6/21/2022</b>		SeqNo: <b>3157712</b>		Units: <b>µg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	18	1.0	20.00	0	90.0	80	120			
Toluene	19	1.0	20.00	0	92.8	80	120			
Ethylbenzene	19	1.0	20.00	0	92.6	80	120			
Xylenes, Total	56	2.0	60.00	0	93.5	80	120			
Surr: 4-Bromofluorobenzene	18		20.00		91.9	70	130			

### 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 Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

Page 2 of 2



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: 2206947

RcptNo: 1

Received By: Juan Rojas

6/17/2022 7:00:00 AM

*Juan Rojas*

Completed By: Cheyenne Cason

6/17/2022 8:37:36 AM

*Cason*

Reviewed By:

*in 6/17/22***Chain of Custody**

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

**Log In**

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
4. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? 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: *Cmc 6/17/22*

**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: \_\_\_\_\_

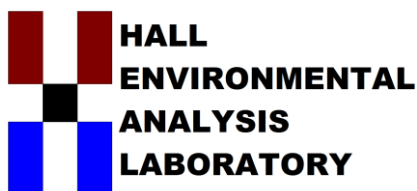
16. Additional remarks:

**17. Cooler Information**

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.5	Good	Yes			







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

January 12, 2023

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

RE: OH Randel 7

OrderNo.: 2301093

Dear Kate Kaufman:

Hall Environmental Analysis Laboratory received 1 sample(s) on 1/4/2023 for the analyses presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman".

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

CLIENT: HILCORP ENERGY

Client Sample ID: MW-7

Project: OH Randel 7

Collection Date: 12/29/2022 11:35:00 AM

Lab ID: 2301093-001

Matrix: AQUEOUS

Received Date: 1/4/2023 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: CCM
Benzene	3400	100		µg/L	100	1/9/2023 7:06:00 PM
Toluene	ND	10		µg/L	10	1/9/2023 7:30:00 PM
Ethylbenzene	230	10		µg/L	10	1/9/2023 7:30:00 PM
Xylenes, Total	2300	150		µg/L	100	1/9/2023 7:06:00 PM
Surr: 1,2-Dichloroethane-d4	107	70-130		%Rec	10	1/9/2023 7:30:00 PM
Surr: 4-Bromofluorobenzene	98.6	70-130		%Rec	10	1/9/2023 7:30:00 PM
Surr: Dibromofluoromethane	106	70-130		%Rec	10	1/9/2023 7:30:00 PM
Surr: Toluene-d8	101	70-130		%Rec	10	1/9/2023 7:30:00 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	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 Quantitative 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#: 2301093  
12-Jan-23

Client: HILCORP ENERGY  
Project: OH Randel 7

Sample ID: 100ng lcs	SampType: LCS		TestCode: EPA Method 8260: Volatiles Short List							
Client ID: LCSW	Batch ID: SL93805		RunNo: 93805							
Prep Date:	Analysis Date: 1/9/2023		SeqNo: 3387603		Units: µg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	104	70	130			
Toluene	21	1.0	20.00	0	103	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		104	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		99.6	70	130			
Surr: Dibromofluoromethane	10		10.00		102	70	130			
Surr: Toluene-d8	10		10.00		101	70	130			

Sample ID: mb	SampType: MBLK		TestCode: EPA Method 8260: Volatiles Short List							
Client ID: PBW	Batch ID: SL93805		RunNo: 93805							
Prep Date:	Analysis Date: 1/9/2023		SeqNo: 3387604		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	10		10.00		104	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		99.9	70	130			
Surr: Dibromofluoromethane	11		10.00		105	70	130			
Surr: Toluene-d8	10		10.00		99.9	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 Quantitative 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  
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: 2301093

RcptNo: 1

Received By: Juan Rojas 1/4/2023 7:00:00 AM

Completed By: Sean Livingston 1/4/2023 11:38:38 AM

Reviewed By: TME

1/4/22

*[Signature]*

*[Signature]*

### 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  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? 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? Yes ☒ No ☐

(Note discrepancies on chain of custody)

12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐

13. Is it clear what analyses were requested? Yes ☒ No ☐

14. Were all holding times able to be met? Yes ☒ No ☐

(If no, notify customer for authorization.)

# of preserved  
bottles checked  
for pH:

( $<2$  or  $>12$  unless noted)

Adjusted? \_\_\_\_\_

Checked by: \_\_\_\_\_

### 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:

Temp not recorded - Filtered ~100mL from 001-007B for 001-007C, adding ~0.4mL HNO<sub>3</sub> to all samples for dissolved metals analysis, checked for proper pH $<2$  - # 7051

17. Cooler Information



**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 201663

CONDITIONS

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 201663
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
michael.buchanan	2022 Annual Groundwater Monitoring Report for OH Randel #007 is accepted for the record. Located on the Navajo Nation.	5/23/2024