Review of 2020 Annual Groundwater Monitoring Report: Content satisfactory

1. Continue sampling well MW-2 for dissolved iron during 2021 quarterly sampling
2. OCD approves eliminating dissolved iron lab analysis from all other wells
3. Install an upgradient groundwater monitoring well in the location previously attempted in 2019 (location MW-8) to assess upgradient groundwater conditions and background concentrations of dissolved iron, dissolved manganese, sulfate, and TDS
4. Continue quarterly monitoring of all Site wells for BTEX constituents
5. Submit the Annual Monitoring Report to the OCD no later than March 31, 2022

March 25, 2021

Ms. Clara Cardoza
Hilcorp Energy Company
PO Box 61229
Houston, TX 77208

Subject: **2020 Annual Groundwater Monitoring Report**
Mangum #1
San Juan County, New Mexico
NMOCD Incident Number: NCS1602631162
NMOCD Administrative Order: 3R-1038

Dear Ms. Cardoza:

WSP USA Inc. (WSP) presents this annual report on behalf of Hilcorp Energy Company (Hilcorp) to the New Mexico Oil Conservation Division (NMOCD) to document groundwater monitoring activities conducted at the Mangum #1 natural gas production well (Site) during 2020. The Site is located approximately 1 mile south of the City of Bloomfield, New Mexico and is located on Bureau of Land Management (BLM) land within Unit L, Section 27, Township 29 North and Range 11 West, San Juan County, New Mexico (Figures 1 and 2).

SITE BACKGROUND

In April of 2015, ConocoPhillips Company (well owner/operator at that time) conducted a site assessment as part of internal due diligence activities. Seven potholes were advanced to depths of 7.5 to 8 feet below ground surface (bgs) using a backhoe. Soil within the potholes was field screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and total-petroleum hydrocarbon (TPH) field test kits. Several soil samples were collected and submitted for laboratory analysis of TPH, with one soil sample result indicating concentrations of 3,180 milligrams per kilogram (mg/kg). The location of this sample coincided with a former aboveground tank used and removed by a previous well owner/operator.

Following the site assessment, ConocoPhillips Company began excavating impacted soil in February 2016. The final excavation measured approximately 100 feet by 38 feet by 9 to 17 feet deep. Approximately 1,400 cubic yards of impacted soil were transported for off-site disposal at Industrial Ecosystems, Inc in Aztec, New Mexico. Groundwater was encountered in the bottom of the excavation at a depth of 16 feet bgs. One foot of groundwater-saturated soil was removed from the excavation in the deepest extents. Approximately 275 barrels (bbl) of impacted groundwater was then removed from the bottom of the excavation and transported for off-site disposal to Industrial Ecosystems, Inc. Five-point composite soil samples were collected from the sidewalls and shallow floor area (area excavated to 9 feet). In total, five sidewall samples and one floor sample were collected to confirm the removal of impacted soil. All soil analytical results were below the site closure standards for TPH, chloride, and benzene, toluene, ethylbenzene, and xylenes (BTEX). The NMOCD approved backfill of the excavation via email communications on February 22, 2016.

Four groundwater monitoring wells were subsequently installed in May 2016 to assess and monitor groundwater conditions at the Site (Figure 2). Based on initial analysis, the following contaminants of concern were determined for groundwater at the Site: benzene, xylenes, dissolved iron, dissolved manganese, sulfate, and total dissolved solids (TDS). Quarterly sampling has been performed since June 2016 from wells MW-1 through MW-4.

GHD Services, Inc. (GHD) prepared the report *2018 Annual Groundwater Monitoring Report* (dated January 2019) summarizing groundwater sampling activities performed in 2018. Based on their review of the report, the NMOCD required that Hilcorp "fully delineate the groundwater plume" at the Site. In response, Hilcorp/GHD installed three new groundwater monitoring wells (MW-5, MW-6, and MW-7) in locations downgradient of the release in June 2019 (Figure 2). The installation of one additional well was attempted in an upgradient location (MW-8 on Figure 2) but encountered shallow refusal in two separate locations and was finally abandoned. During drilling, soils were field screened for VOCs using a PID. Field screening results from well MW-6 did not indicate

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petroleum hydrocarbon impacts, therefore soil samples were not collected for laboratory analysis. Two soil samples were collected from well MW-5 at 17 and 21 feet bgs during drilling. TPH was detected at 17 feet bgs at a concentration of 99 mg/kg. TPH was not detected in the sample collected at 21 feet bgs. BTEX concentrations were not detected in either sample from well MW-5. One soil sample collected from well MW-7 at 26 feet bgs had a TPH concentration of 74 mg/kg. BTEX was not detected in this sample.

GHD incorporated the newly-installed wells into their quarterly sampling program starting in the third quarter of 2019. Results from the 2019 quarterly sampling indicated that BTEX constituents, dissolved iron, dissolved manganese, sulfate, and TDS were present in the Site groundwater at concentrations above New Mexico Water Quality Control Commission (NMWQCC) standards, as described below.

SITE GROUNDWATER CLEANUP STANDARDS

NMOCD requires that groundwater quality standards presented by the NMWQCC in 20.6.2.3103 of the New Mexico Administrative Code (NMAC) be met. The following standards are presented for the constituents of concern at the Site in milligrams per liter (mg/L).

ANALYTE	LIMIT
Benzene	0.005 mg/L
Toluene	1.0 mg/L
Ethylbenzene	0.7 mg/L
Xylenes	0.62 mg/L
Dissolved Iron	1.0 mg/L
Dissolved Manganese	0.2 mg/L
Sulfate	600 mg/L
Total Dissolved Solids	1,000 mg/L

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

GROUNDWATER SAMPLING ACTIVITIES AND RESULTS

Groundwater monitoring at the Site includes quarterly monitoring of all on-site wells MW-1 through MW-7. The following sections summarize the sampling procedures and results gathered during these events.

GROUNDWATER-LEVEL MEASUREMENTS

Static groundwater-level monitoring included recording depth-to-groundwater measurements in each monitoring well using a Keck oil/water interface probe. The interface probe was decontaminated with Alconox™ soap and rinsed with de-ionized water prior to each measurement to prevent cross-contamination.

Groundwater elevations measured in monitoring wells during the 2020 sampling event are presented in Table 1 and were used to develop quarterly groundwater potentiometric surface maps (Figures 3, 4, 5, and 6). The inferred groundwater flow direction is to the north with a hydraulic gradient ranging from 0.036 to 0.039 feet/foot. No product was detected in any of the groundwater monitoring wells.

GROUNDWATER SAMPLING

Groundwater was purged and sampled using a disposable bailer. Purging was accomplished by removing stagnant groundwater from the monitoring well prior to collecting a sample. Field measurements of groundwater quality parameters, including temperature, pH, turbidity, electrical conductivity, dissolved oxygen, and oxidation-reduction potential, were collected during the purging process and are presented in Table 2. In general, groundwater is generally low in dissolved oxygen with oxidation-reduction potential values ranging from -47.4 to +12.4. These conditions are common in groundwater where microbial-degradation processes are occurring.

Following well purging, groundwater samples were placed directly into laboratory-provided jars and labeled with the date and time of collection, well designation, project name, sample collector's name, and parameters to be analyzed. They were immediately sealed, packed on ice, and submitted to Pace Analytical for analysis of BTEX by Environmental Protection Agency (EPA) Method 8260B,

dissolved iron and manganese by EPA Method 6010B, sulfate by EPA Method 9056A, and TDS by EPA Method 2540. Proper chain-of-custody (COC) procedures were followed documenting the date and time sampled, sample number, type of sample, sample collector's name, preservative used, analyses required, and sample collector's signature. Analytical laboratory reports from the sampling events are included as Enclosure A.

GROUNDWATER ANALYTICAL RESULTS

Benzene was detected during one or more quarters at concentrations above the NMWQCC standard in wells MW-2, MW-3, MW-4, and MW-6. However, benzene was not detected during the third and fourth quarters in well MW-2 and was detected at a concentration below the standard in well MW-6 during the second quarter sampling event. Ethylbenzene and toluene were not detected above the NMWQCC standards in any well during the 2020 sampling events. Xylenes were only detected above the NMWQCC standard in well MW-4 in 2020.

Dissolved manganese and TDS were detected at concentrations above the NMWQCC standards in all wells and during all four quarterly sampling events in 2020. Sulfate was detected at concentrations above the NMWQCC standard during one or more sampling events in wells MW-1, MW-3, MW-4, MW-5, and MW-7. Dissolved iron was not detected above the NMWQCC standards in any well during the 2020 sampling events.

A summary of analytical results are presented in Table 3 and on Figure 7.

CONCLUSIONS AND RECOMMENDATIONS

Based on the groundwater analytical data collected since 2016, groundwater conditions have improved over time, with BTEX concentrations decreasing in all wells from 2016 to 2020. Benzene concentrations have decreased by approximately 80% in wells MW-3 and MW-4 since 2016. Xylene concentrations also have decreased by 93% in well MW-3 and were below NMWQCC standards during the second, third, and fourth quarters of 2020. In addition, BTEX concentrations in wells MW-1 and MW-2 have decreased to below NMWQCC standards since 2016. The attached graphs in Enclosure B depict benzene concentrations in wells MW-1, MW-2, MW-3, MW-4, and MW-6 and illustrate the reduction in concentrations over time at the Site. Based on these data, natural attenuation through biodegradation processes is occurring in all on-site wells. Additionally, BTEX-impacted groundwater has been delineated in the downgradient location, with no exceedances in well MW-7.

Conversely, dissolved manganese, sulfate, and TDS concentrations detected in all wells have largely remained unchanged since they were first analyzed in 2016. Additionally, dissolved manganese and TDS concentrations have consistently exceeded the NMWQCC standards during all sampling events since 2016. Although concentrations of manganese, sulfate, and TDS could be elevated as a biproduct of petroleum degradation, these constituents are often naturally occurring at elevated concentrations in areas with shallow, perched groundwater. Dissolved iron was not detected above NMWQCC standards in any of the wells during the 2020 quarterly sampling events.

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

- Continue sampling well MW-2 for dissolved iron during 2021 quarterly sampling. All other wells have complied with NMWQCC standards for at least eight quarters and will cease to be sampled for dissolved iron in future events.
- Install an upgradient groundwater monitoring well in the location previously attempted in 2019 (location MW-8). This well would be used to assess upgradient groundwater conditions and background concentrations of dissolved iron, dissolved manganese, sulfate, and TDS. The continued sampling of these constituents will be reassessed once background samples have been collected and analyzed.
- Continue quarterly monitoring of all Site wells for BTEX constituents. BTEX concentrations have continuously decreased since 2016 and it is anticipated that they will continue to attenuate to below NMWQCC standards. The necessity for active remediation will be reassessed during the preparation of the 2021 annual report.

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

Kind regards,

Stuart Hyde, L.G.
Environmental Geologist

Ashley Ager, M.S., P.G.
Regional Manager, Geologist

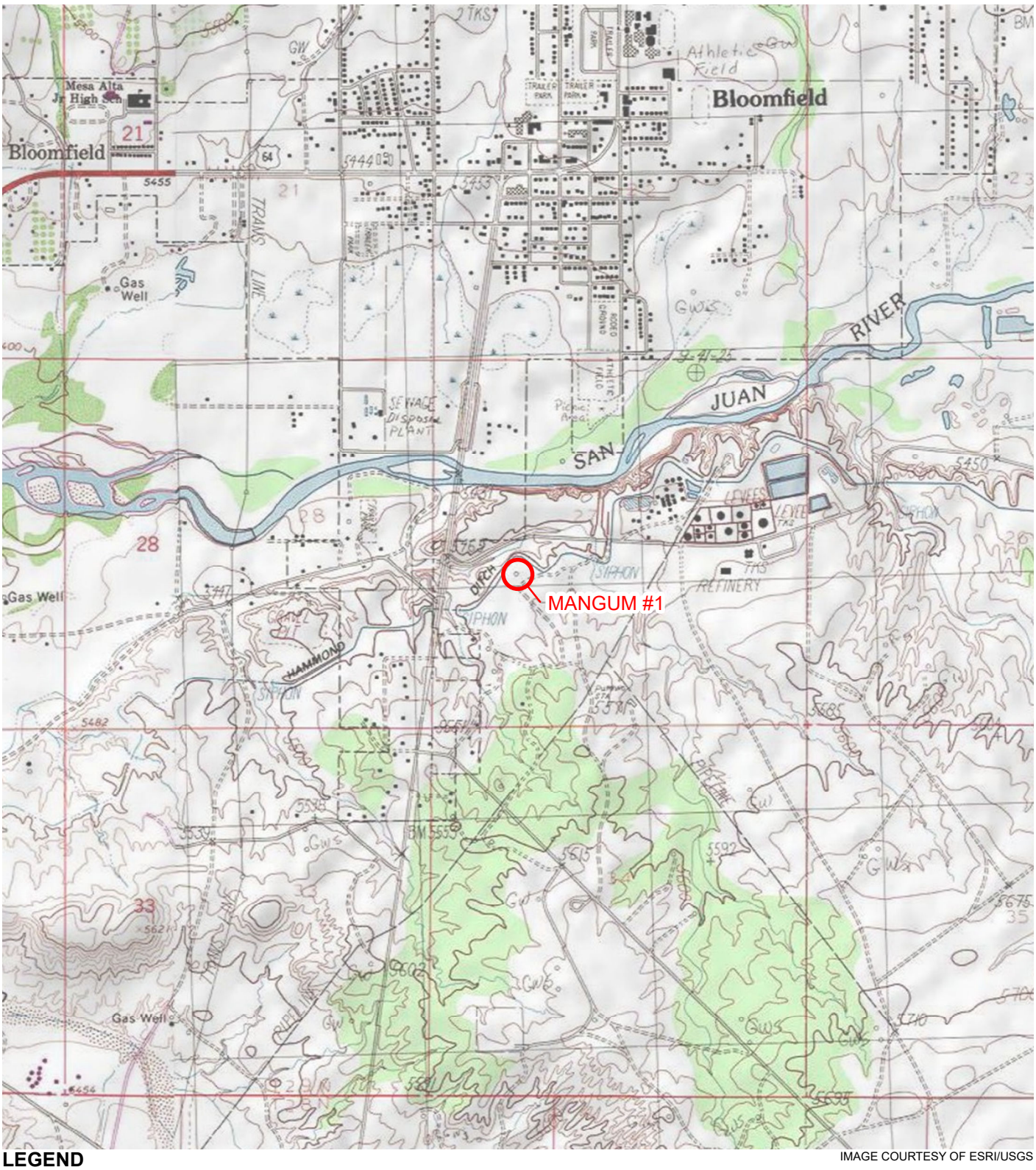
Enclosed:

Figure 1: Site Location Map
Figure 2: Site Map
Figure 3: Q1 Groundwater Elevation Map
Figure 4: Q2 Groundwater Elevation Map
Figure 5: Q3 Groundwater Elevation Map
Figure 6: Q4 Groundwater Elevation Map
Figure 7: Groundwater Analytical Results

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

Enclosure A: Analytical Laboratory Reports
Enclosure B: Benzene Concentration Graphs

FIGURES



LEGEND

SITE LOCATION

IMAGE COURTESY OF ESRI/USGS

0 2,000 4,000

Feet

N

NEW MEXICO

FIGURE 1
SITE LOCATION MAP
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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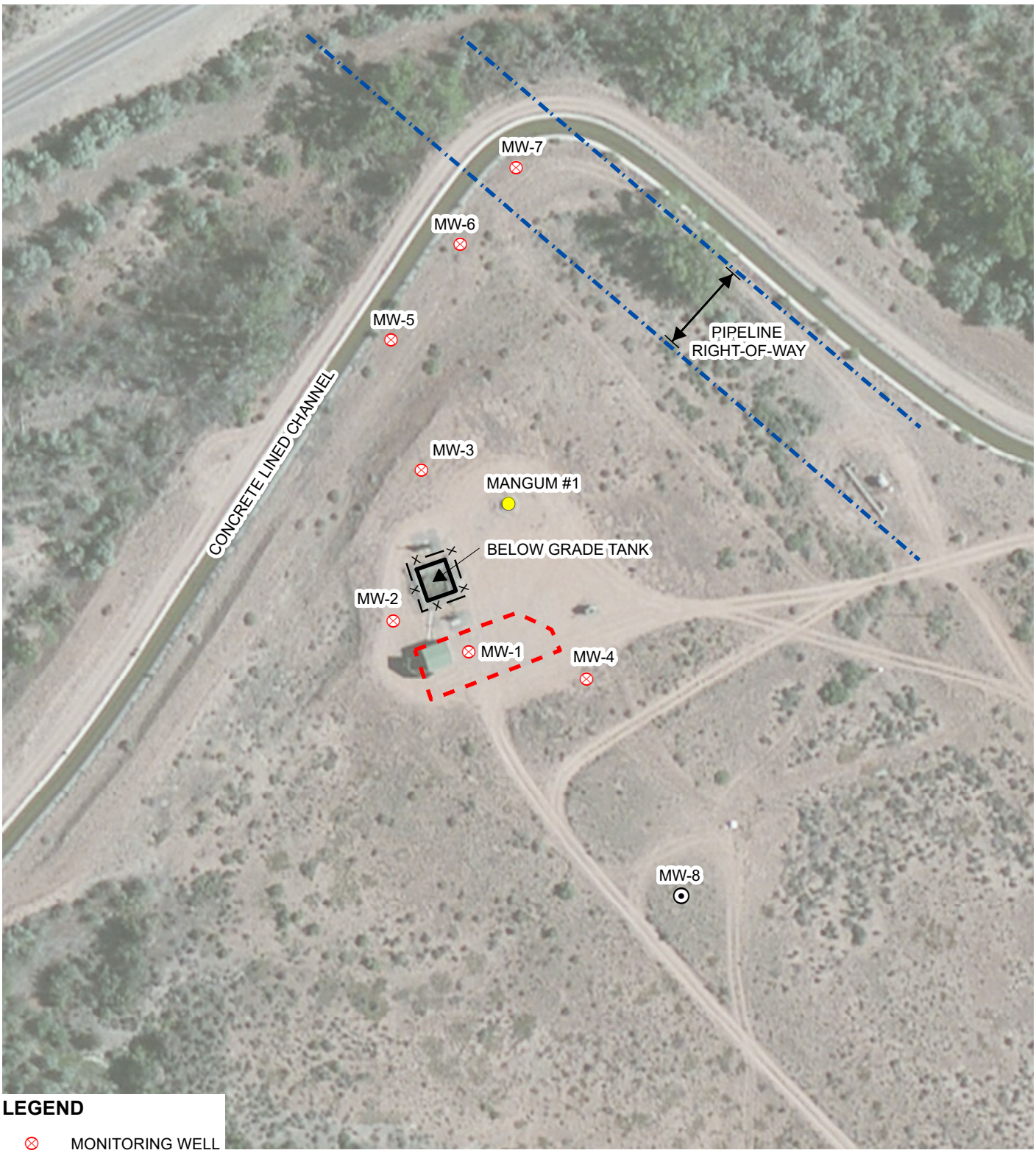

LEGEND

- MONITORING WELL
- ATTEMPTED MONITORING WELL
- WELLHEAD
- BERM
- FENCE
- PIPELINE RIGHT-OF-WAY
- EXCAVATION EXTENT

IMAGE COURTESY OF ESRI

0 100 200
Feet

N

FIGURE 2
SITE MAP
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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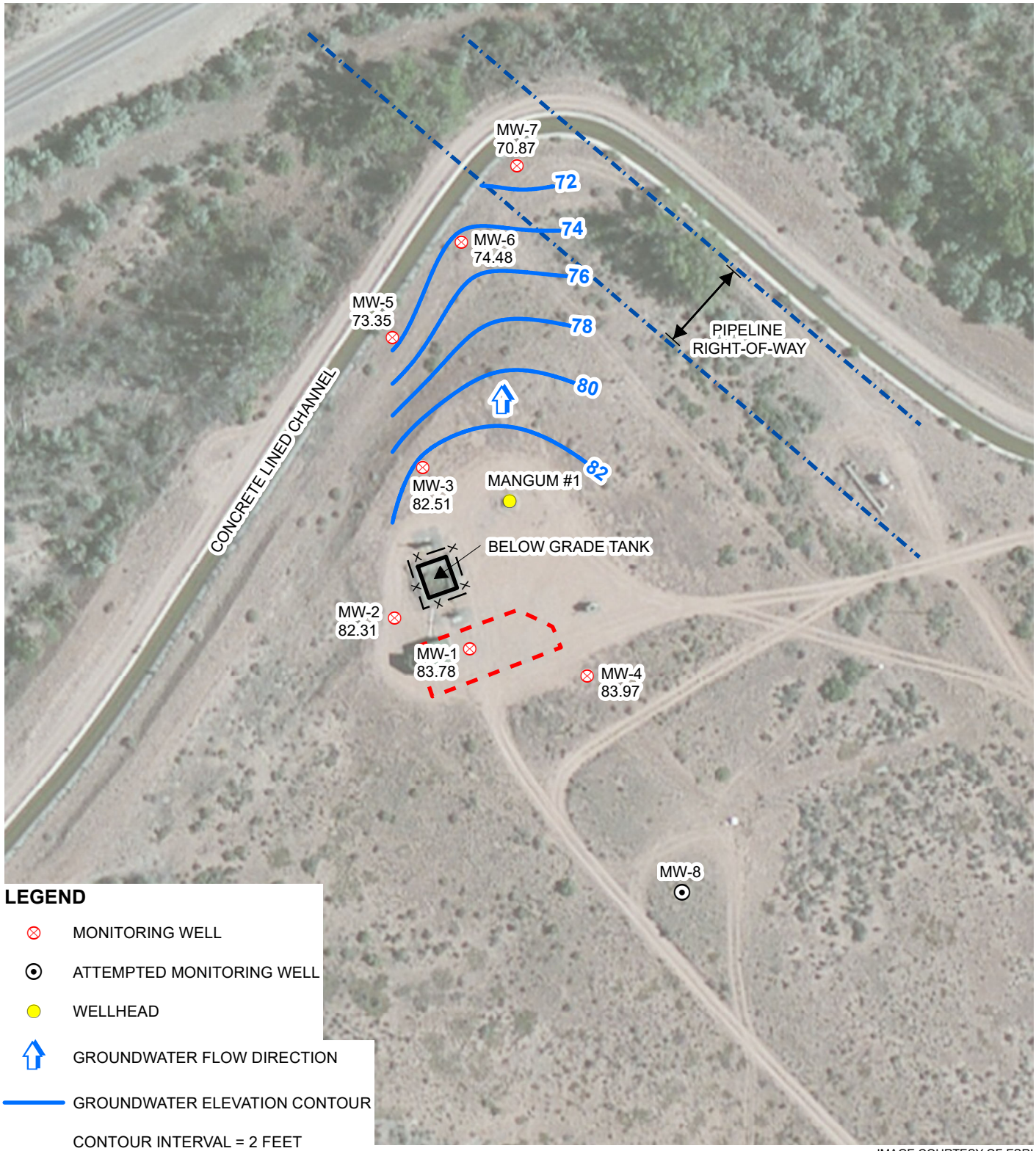

FIGURE 3
Q1 GROUNDWATER ELEVATION MAP
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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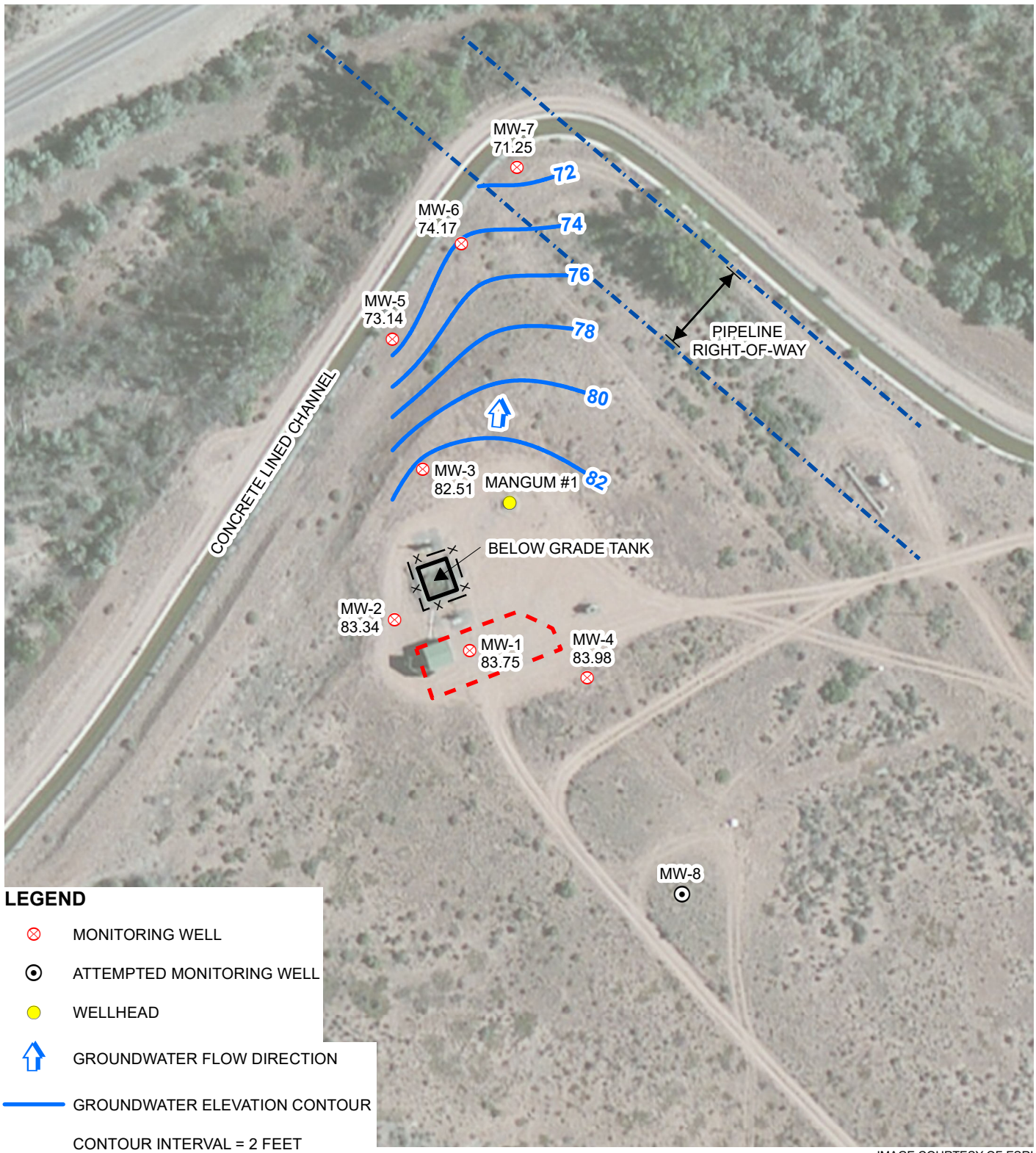

FIGURE 4
Q2 GROUNDWATER ELEVATION MAP
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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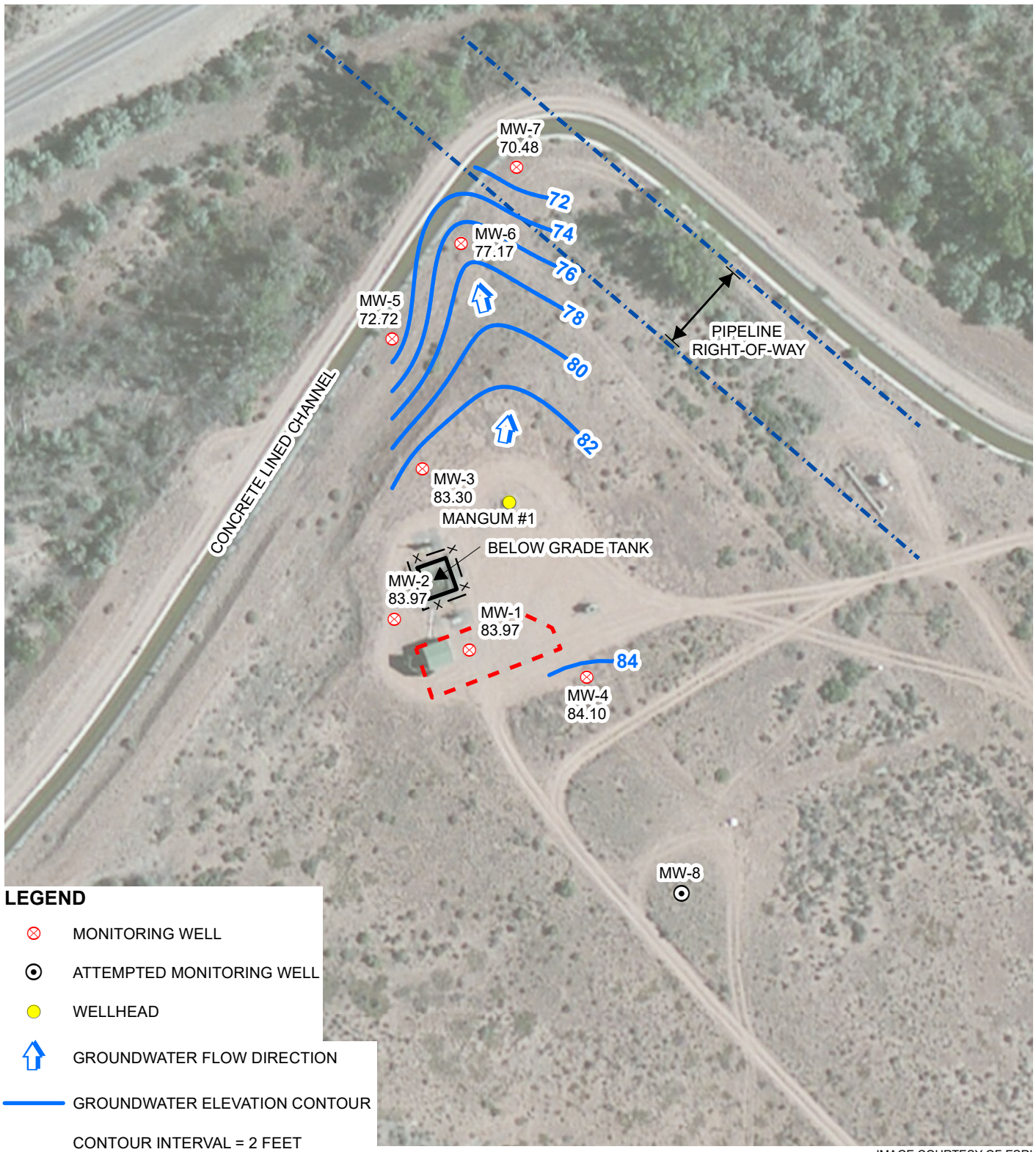

LEGEND

- MONITORING WELL
- ATTEMPTED MONITORING WELL
- WELLHEAD
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR
- CONTOUR INTERVAL = 2 FEET
- GRADIENT = 0.039 FEET/FOOT
- BERM
- x — x FENCE
- PIPELINE RIGHT-OF-WAY
- EXCAVATION EXTENT

GROUNDWATER ELEVATIONS WERE MEASURED ON JULY 23 AND 24, 2020.

FIGURE 5
Q3 GROUNDWATER ELEVATION MAP
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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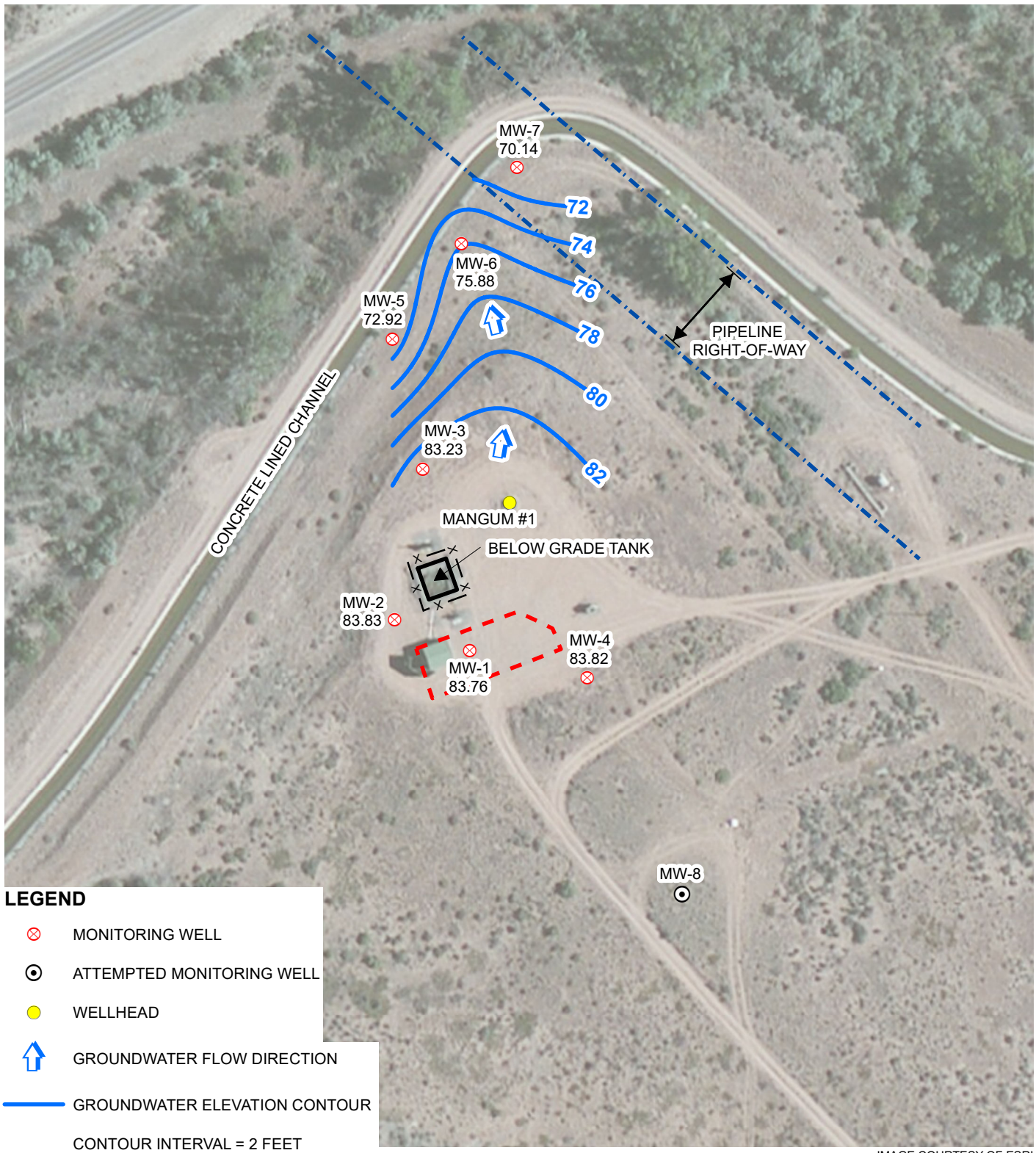

FIGURE 6
Q4 GROUNDWATER ELEVATION MAP
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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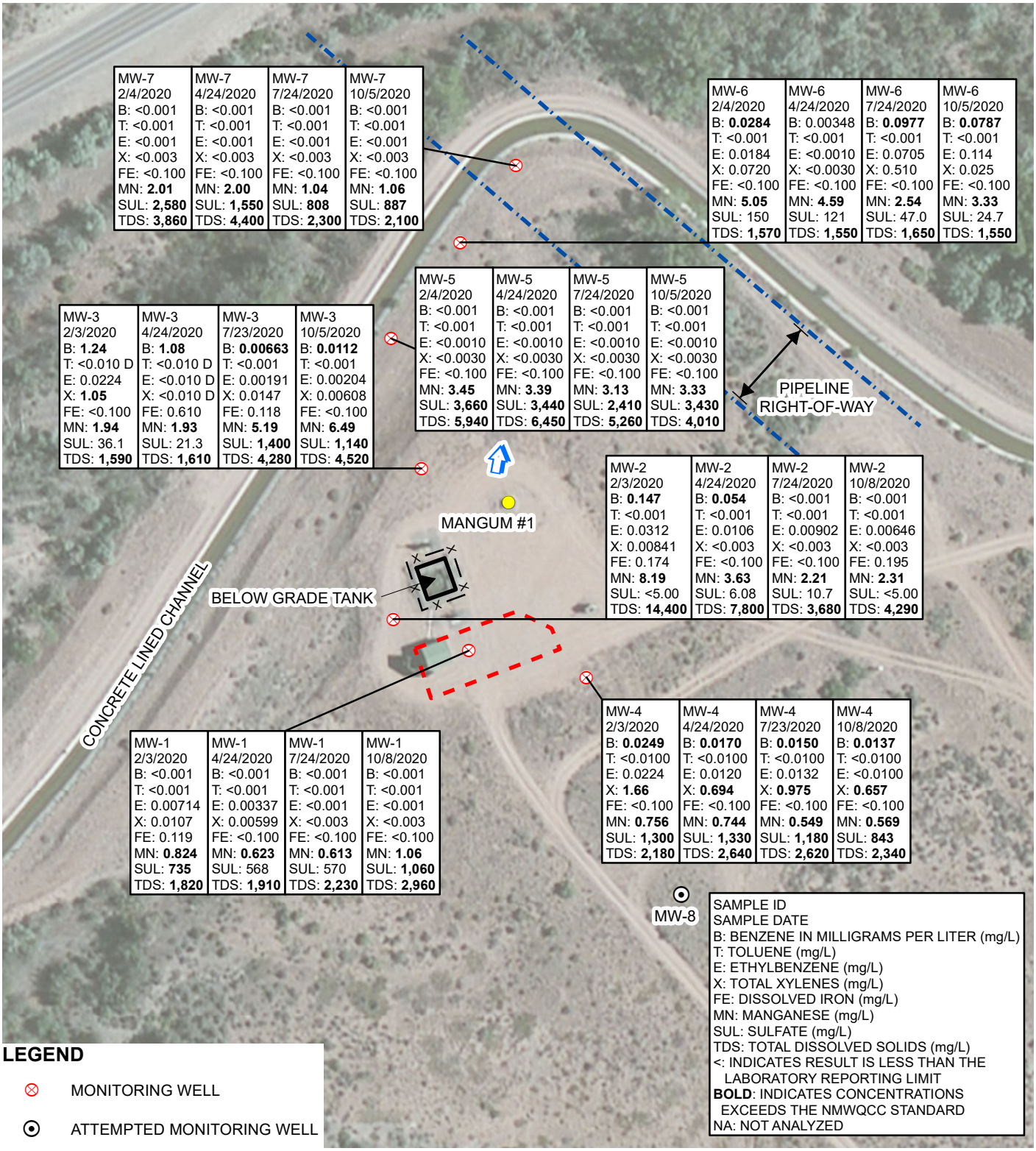

FIGURE 7
GROUNDWATER ANALYTICAL RESULTS
MANGUM #1
SEC 27-T29N-R11W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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TABLES

TABLE 1

WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

Well ID	Top of Casing Elevation (1)	Sample Date	Depth to Groundwater (ft BTOC)	Groundwater Elevation (1)
MW-1	98.97	6/8/2016	15.12	83.85
		9/12/2016	14.75	84.22
		11/29/2016	15.06	83.91
		3/6/2017	14.91	84.06
		6/12/2017	14.96	84.01
		10/26/2017	15.00	83.97
		12/4/2017	15.08	83.89
		3/13/2018	15.22	83.75
		6/25/2018	15.23	83.74
		9/4/2018	15.39	83.58
		12/10/2018	15.12	83.85
		3/12/2019	15.04	83.93
		5/22/2019	14.93	84.04
		8/22/2019	15.19	83.78
		12/2/2019	15.21	83.76
		2/3/2020	15.19	83.78
		4/24/2020	15.22	83.75
		7/24/2020	15.00	83.97
		10/8/3030	15.21	83.76
MW-2	101.05	6/8/2016	17.49	83.56
		9/12/2016	17.28	83.77
		11/29/2016	17.62	83.43
		3/6/2017	17.49	83.56
		6/12/2017	17.40	83.65
		10/26/2017	17.49	83.56
		12/4/2017	17.57	83.48
		3/13/2018	17.74	83.31
		6/25/2018	17.32	83.73
		9/5/2018	17.64	83.41
		12/10/2018	17.58	83.47
		3/12/2019	17.56	83.49
		5/22/2019	17.18	83.87
		8/22/2019	17.30	83.75
		12/2/2019	17.65	83.40
		2/3/2020	18.74	82.31
		4/24/2020	17.71	83.34
		7/24/2020	17.08	83.97
		10/8/2020	17.22	83.83

TABLE 1

WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

MW-3	101.35	6/8/2016	18.47	82.88
		9/12/2016	18.41	82.94
		11/29/2016	18.84	82.51
		3/6/2017	19.01	82.34
		6/12/2017	18.32	83.03
		10/26/2017	18.50	82.85
		12/4/2017	18.87	82.48
		3/13/2018	19.13	82.22
		6/25/2018	18.14	83.21
		9/5/2018	18.54	82.81
		12/10/2018	18.71	82.64
		3/11/2019	18.69	82.66
		5/22/2019	18.19	83.16
		8/22/2019	18.28	83.07
		12/22/2019	18.62	82.73
		2/3/2020	18.84	82.51
		4/24/2020	18.84	82.51
		7/23/2020	18.05	83.30
		10/5/2020	18.12	83.23
MW-4	103.76	6/8/2016	19.72	84.04
		9/12/2016	19.43	84.33
		11/29/2016	19.62	84.14
		3/6/2017	19.50	84.26
		6/21/2017	19.76	84.00
		10/26/2017	19.59	84.17
		12/4/2017	19.62	84.14
		3/13/2018	19.76	84.00
		6/25/2018	19.89	83.87
		9/4/2018	19.03	84.73
		12/10/2018	19.69	84.07
		3/12/2019	19.63	84.13
		5/22/2019	19.57	84.19
		8/22/2019	19.92	83.84
		12/2/2019	19.81	83.95
		2/3/2020	19.79	83.97
		4/24/2020	19.78	83.98
		7/23/2020	19.66	84.10
		10/8/2020	19.94	83.82
MW-5	95.77	8/23/2019	23.32	72.45
		9/19/2019	23.13	72.64
		12/4/2019	22.51	73.26
		2/4/2020	22.42	73.35
		4/27/2020	22.63	73.14
		7/24/2020	23.05	72.72
		10/5/2020	22.85	72.92

TABLE 1

WELL CONSTRUCTION INFORMATION AND GROUNDWATER ELEVATIONS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

MW-6	94.70	8/23/2019	19.98	74.72
		9/19/2019	18.63	76.07
		12/4/2019	19.09	75.61
		2/4/2020	20.22	74.48
		4/27/2020	20.53	74.17
		7/24/2020	17.53	77.17
		10/5/2020	18.82	75.88
MW-7	94.49	8/23/2019	24.04	70.45
		9/19/2019	23.66	70.83
		12/4/2019	23.69	70.80
		2/4/2020	23.62	70.87
		4/27/2020	23.24	71.25
		7/24/2020	24.01	70.48
		10/5/2020	24.35	70.14

Notes:
(1) - surface elevation based on an arbitrary datum of 100 feet
bgs - below ground surface
BTOC - below top of casing
ft = feet
NM = Not measured

TABLE 2

FIELD PARAMETER RESULTS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample Date	Temperature (°C)	pH	TDS (g/L)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)	Volume (gallons)
MW-1	11/29/2016	16.54	7.42	--	2,607	1.52	-155.3	--
	3/6/2017	13.37	7.37	1.993	3,057	1.48	-262.6	2
	6/12/2017	14.35	7.14	1.820	2,800	0.89	-197.6	2
	10/26/2017	18.00	7.19	--	2,600	1.85	-156	2.25
	12/4/2017	15.47	7.07	1.787	2,748	1.30	-209.9	2
	3/13/2018	19.94	7.31	--	2,502	-0.02	-203.6	1.7
	6/25/2018	15.81	7.22	--	2,110	0.51	-198.3	1.75
	3/12/2019	13.10	7.57	1.370	2,720	NA	-24.9	--
	5/22/2019	16.80	7.29	1.450	2,920	0.00	-27.5	--
	8/22/2019	21.10	7.20	2.010	4,030	--	-16.1	--
	12/2/2019	13.60	6.80	1.530	3,050	--	-26.5	--
	2/3/2020	15.30	6.81	1.510	3,020	7.3	-28.5	--
	4/24/2020	16.00	6.98	1.360	2,710	3.47	-34.5	--
	7/24/2020	19.10	7.04	1.410	2,810	2.15	-32.7	--
	10/8/2020	18.30	6.99	1.630	3,260	3.57	-20.4	--
MW-2	11/29/2016	16.04	7.20	--	2,299	2.21	-109.3	--
	3/6/2017	12.74	7.15	1.744	2,683	2.05	-171.7	1.5
	6/12/2017	13.50	6.95	1.558	2,396	1.61	-155.8	1.5
	10/26/2017	18.70	7.01	--	2,264	1.74	-92.8	1.5
	12/4/2017	15.41	7.00	1.517	2,333	1.11	-178.0	1.5
	3/13/2018	14.67	7.21	--	2,334	-0.08	-180.7	1.3
	6/25/2018	17.63	6.62	--	1,905	0.94	-187.2	1.75
	3/12/2019	13.70	7.57	9.500	1,886	NA	7.3	--
	5/22/2019	13.70	6.67	9.540	1,907	--	5.0	--
	8/22/2019	23.00	6.49	8.630	1,727	--	10.0	--
	12/2/2019	16.20	5.84	10.000	2,000	--	9.2	--
	2/3/2020	12.80	5.93	9.710	18,320	6.22	-0.1	--
	4/24/2020	16.50	6.25	5.810	11,630	2.28	0.9	--
	7/24/2020	21.40	6.55	2.790	5,580	1.73	-8.6	--
	10/8/2020	21.00	6.61	2.810	5,600	2.69	6.0	--
MW-3	11/29/2016	15.01	7.09	--	3,091	2.52	-91	--
	3/6/2017	12.74	7.05	2.193	3,376	4.17	-151.6	1
	6/12/2017	15.40	7.18	2.189	3,360	6.70	-136.0	0.5
	10/26/2017	17.71	7.06	--	2,653	1.80	-177.4	1.25
	12/4/2017	14.19	7.04	1.838	2,835	3.05	-153.5	0.25
	3/13/2018	14.84	7.18	--	2,641	0.17	-167.0	1.6
	6/25/2018	**No parameters due to low volume**						
	3/11/2019	14.30	7.24	1.410	2,830	NA	-31.5	--
	5/22/2019	13.30	7.11	1.360	2,730	5.80	-35.6	--
	8/22/2019	20.80	7.19	1.430	2,860	--	-25.2	--
	12/2/2019	15.20	6.55	1.490	2,960	--	-25.4	--
	2/3/2020	13.30	6.44	1.420	2,930	--	-16.5	--
	4/24/2020	19.60	6.71	1.440	2,890	2.80	-27.0	--
	7/23/2020	24.00	6.36	2.570	5,090	1.26	-12.5	--
	10/5/2020	16.50	6.49	3.030	6,070	3.76	-2.9	--

TABLE 2

FIELD PARAMETER RESULTS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample Date	Temperature (°C)	pH	TDS (g/L)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)	Volume (gallons)
MW-4	6/23/2016	15.10	7.29	--	2,950	1.04	-148.5	1.5
	11/29/2016	16.01	7.40	--	2,396	1.59	-127.5	--
	3/6/2017	13.01	7.39	2.337	3,608	2.01	-237.2	2
	6/21/2017	14.49	7.08	1.917	2,955	1.36	-188.7	1.25
	10/26/2017	17.37	7.29	--	2,830	1.74	-193.2	1.75
	12/4/2017	15.26	3.33	2.055	3,161	0.66	-244.2	1.5
	3/13/2018	15.08	7.41	--	3,437	-0.07	-214.9	1.5
	6/25/2018	15.85	7.33	--	2,580	0.97	-224.9	1.75
	3/12/2019	14.10	7.49	1.480	2,960	NA	-31.5	--
	5/22/2019	15.40	7.35	1.670	3,300	1.44	-33.6	--
	8/22/2019	19.50	7.35	1.550	3,090	6.90	-22.4	--
	12/2/2019	15.30	6.65	1.690	3,310	--	-32.7	--
	2/3/2020	15.00	6.81	1.570	3,140	6.51	-37.4	--
	4/24/2020	13.90	6.84	1.640	3,270	1.59	-47.4	--
	7/23/2020	24.50	6.67	1.470	2,910	0.87	-33.4	--
	10/8/2020	15.90	7.00	1.320	2,630	3.78	-43.2	--
MW-5	8/23/2019	18.20	6.79	3.540	7,100	--	6.6	--
	12/4/2019	12.60	6.11	3.280	6,540	--	-1.1	--
	2/4/2020	8.50	6.25	3.240	6,520	--	-5.1	--
	4/27/2020	21.20	6.01	3.250	6,550	3.81	8.0	--
	7/24/2020	20.20	6.15	3.020	5,980	1.78	6.2	--
	10/5/2020	20.30	6.35	2.910	5,810	2.36	12.4	--
MW-6	8/23/2019	21.10	6.96	1.290	2,590	--	0.7	--
	12/4/2019	12.70	6.29	1.210	2,430	--	-5.0	--
	2/4/2020	8.50	6.52	1.270	2,540	--	-3.1	--
	4/27/2020	18.30	6.04	1.360	2,700	3.85	7.3	--
	7/24/2020	20.00	6.47	1.150	2,290	1.54	4.2	--
	10/5/2020	20.20	6.30	1.070	2,140	2.80	10.1	--
MW-7	8/23/2019	21.80	6.95	2.630	5,240	--	-12.2	--
	12/4/2019	12.80	6.11	2.400	4,800	--	-8.0	--
	2/4/2020	11.00	6.39	2.260	4,390	--	-17.5	--
	4/27/2020	17.20	6.34	1.960	3,950	4.56	-11.7	--
	7/24/2020	20.70	6.43	1.370	2,760	2.94	-8.9	--
	10/5/2020	18.50	6.55	1.260	2,530	4.23	-6.1	--

Notes:

mg/L - milligrams per liter

uS/cm - microsiemens per centimeter

mg/L - milligrams per liter

°C - degrees Celcius
DO - dissolved oxygen
mV - millivolts
ORP - oxidation-reduction potential
TDS - total dissolved solids
-- - data not collected

TABLE 3

PETROLEUM HYDROCARBON GROUNDWATER ANALYTICAL RESULTS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Iron (dissolved) (mg/L)	Manganese (dissolved) (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
NMWQCC Standards			**0.005**	**1.00**	**0.70**	**0.62**	**1.0**	**0.20**	**600**	**1,000**
MW-1	WT-11102646-060816-JWMW1	6/8/2016	**0.0388**	<0.020	0.358	**4.01**	--	**1.69**	**1,170**	**2,590**
	GW-11102646-091216-CM-MW-1	9/12/2016	**0.0111**	< 0.001	0.0946	0.382	--	**0.925**	577	--
	GW-11102646-112916-CN-MW-1	11/29/2016	**0.0132**	< 0.001	0.119	0.445	--	**0.99**	240	--
	GW-11102646-030617-CN-MW-1	3/6/2017	0.0041	< 0.001	0.0481	0.167	--	**0.876**	387	**1,920**
	GW-11102646-061217-CN-MW-1	6/12/2017	0.002	< 0.001	0.0265	0.12	--	**0.8**	312	**1,830**
	GW-11146006-102617-CM-MW-1	10/26/2017	< 0.001	< 0.001	0.0081	0.0307	0.256	**0.71**	424	**1,940**
	GW-11145006-120417-SP-MW-1	12/4/2017	<0.005	< 0.005	0.021	0.0814	--	**0.674**	321	**1,710**
	GW-11146006-031318-CN-MW-1	3/13/2018	< 0.001	< 0.001	0.008	0.0353		**0.68**	319	**1,410**
	GW-11146006-062518-CN-MW-1	6/25/2018	< 0.001	< 0.001	0.0067	0.0229	--	**0.705**	349	**1,820**
	GW-11146006-090418-JP-MW-1	9/4/2018	<0.005	<0.005	0.0154	0.0499	--	**0.694**	481	**2,000**
	MW-1	12/10/2018	<0.001	<0.001	<0.001	<0.003	<0.10	**0.712**	343	**1,980**
	MW-1	3/12/2019	<0.001	<0.001	<0.001	<.300	0.143	**0.89**	578	**2,040**
	MW-1	5/22/2019	<0.001	<0.001	0.00619	0.0119	<0.100	**0.732**	598	**2,210**
	MW-1	8/22/2019	<0.001	<0.001	0.0053	0.0095	<0.100	**1.59**	**1,260**	**3,010**
	MW-1	12/2/2019	<0.001	<0.001	0.0029	0.0045	<0.100	**0.940**	**697**	**1,930**
	MW-1	2/3/2020	<0.001	<0.001	0.00714	0.0107	0.119	**0.824**	**735**	**1,820**
	MW-1	4/24/2020	<0.001	<0.001	0.00337	0.00599	<0.100	**0.623**	568	**1,910**
	MW-1	7/24/2020	<0.001	<0.001	<0.001	<0.003	<0.100	**0.613**	570	**2,230**
	MW1	10/8/2020	<0.001	<0.001	<0.001	<0.003	<0.100	**1.06**	**1,060**	**2,960**
MW-2	WT-11102646-060816-JW-MW-2	6/8/2016	**0.103**	< 0.001	0.0072	0.0448	--	**1.06**	3.00	**1,580**
	GW-11102646-091216-CM-MW-2	9/12/2016	**0.0647**	< 0.001	0.0021	0.00320	--	**1.73**	2.80	--
	GW-11102646-112916-CN-MW-2	11/29/2016	**0.0257**	< 0.001	0.0021	< 0.003	--	**1.41**	2.60	--
	GW-11102646-030617-CN-MW-2	3/6/2017	**0.0347**	< 0.001	0.0022	< 0.003	--	**1.45**	7.90	**1,510**
	GW-11102646-061217-CN-MW-2	6/12/2017	0.009	< 0.001	0.0011	< 0.003	--	**1.39**	3.10	**1,550**
	GW-11146006-102617-CM-MW-2	10/26/2017	0.0013	< 0.001	< 0.001	< 0.003	**5.1**	**1.26**	4.50	**1,560**
	GW-11145006-120417-SP-MW-2	12/4/2017	0.0039	< 0.001	0.0011	< 0.003	--	**1.23**	14.3	**1,470**
	GW-11146006-031318-CN-MW-2	3/13/2018	0.0036	< 0.001	0.0011	< 0.003	--	**1.25**	154	**1,450**
	GW-11146006-062518-CN-MW-2	6/25/2018	**0.0079**	< 0.001	< 0.001	< 0.003	--	**1.37**	31.3	**1,600**
	GW-11146006-090418-JP-MW-2	9/4/2018	< 0.001	< 0.001	< 0.001	< 0.003	--	**1.13**	87.0	**1,730**
	MW-2	12/10/2018	**0.0543**	< 0.001	0.0015	< 0.003	<0.1	**1.15**	27.7	**1,470**
	MW-2	3/12/2019	**0.779**	< 0.001	0.0317	0.0519	1.59	**11.4**	64.7	**15,300**
	MW-2	5/22/2019	**0.435**	< 0.005	0.0245	0.0533	**4.30**	**7.77**	29.6	**15,300**
	MW-2	8/22/2019	**0.170**	< 0.001	0.0265	0.0153	0.426	**7.27**	8.01	**12,700**
	MW-2	12/2/2019	**0.130**	< 0.001	0.0304	0.00870	<0.100	**10.2**	<5.00	**15,700**
	MW-2	2/3/2020	**0.147**	<0.001	0.0312	0.00841	0.174	**8.19**	<5.00	**14,400**
	MW-2	4/24/2020	**0.054**	<0.001	0.0106	<0.003	<0.100	**3.63**	6.08	**7,800**
	MW-2	7/24/2020	<0.001	<0.001	0.00902	<0.003	<0.100	**2.21**	10.7	**3,680**
	MW2	10/8/2020	<0.001	<0.001	0.00646	<0.003	0.195	**2.31**	<5.00	**4,290**

TABLE 3

PETROLEUM HYDROCARBON GROUNDWATER ANALYTICAL RESULTS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Iron (dissolved) (mg/L)	Manganese (dissolved) (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
NMWQCC Standards			**0.005**	**1.00**	**0.70**	**0.62**	**1.0**	**0.20**	**600**	**1,000**
MW-3	WT-11102646-060816-JW-MW-3	6/8/2016	**2.95**	< 0.020	**0.813**	**7.78**	--	**2.65**	110	**2,190**
	GW-11102646-091216-CM-MW-3	9/12/2016	**2.27**	< 0.001	0.44	**2.49**	--	**3.62**	112	--
	GW-11102646-091216-CN-MW-3	11/29/2016	**2.97**	< 0.001	**0.845**	**5.44**	--	**3.12**	22.5	--
	GW-11102646-030617-CN-MW-3	3/6/2017	**1.89**	< 0.02	0.259	**3.06**	--	**2.52**	14.7	**1,880**
	GW-11102646-061217-CN-MW-3	6/12/2017	**1.68**	< 0.02	0.329	**1.93**	--	**3.09**	372	**2,280**
	GW-11146006-102617-CM-MW-3	10/26/2017	**1.88**	< 0.001	0.417	**2.91**	**3.58**	**2.15**	65.6	**2,000**
	GW-11145006-120417-SP-MW-3	12/4/2017	**2.00**	< 0.025	0.346	**2.43**	--	**2.36**	35.5	**1,750**
	GW-11146006-031318-CN	3/13/2018	**1.43**	< 0.025	0.107	**1.93**	--	**2.34**	24.6	**1,530**
	GW-11146006-062618-CN-MW-3	6/26/2018	**2.02**	< 0.025	0.287	**2.69**	--	**3.52**	**606**	**2,560**
	GW-11146006-090518-JP-MW-3	9/5/2018	**1.82**	<0.005	0.160	**1.40**	--	**2.08**	241	**2,300**
	MW-3	12/10/2018	**1.49**	<0.10	0.133	**0.639**	0.142	**1.94**	170	**2,050**
	MW-3	3/11/2019	**1.45**	<0.001	0.015	**0.655**	<0.100	**2.01**	95.6	**1,940**
	MW-3	5/22/2019	**1.84**	<0.001	0.120	**1.17**	0.278	**1.03**	23.7	**2,540**
	MW-3	8/22/2019	**0.623**	<0.001	0.0193	0.387	<0.100	**1.62**	119	**1,860**
	MW-3	12/2/2019	**0.114**	<0.001	0.006	0.184	<0.100	**1.55**	129	**1,800**
	MW-3	2/3/2020	**1.24**	<0.010 D	0.0224	**1.05**	<0.100	**1.94**	36.1	**1,590**
	MW-3	4/24/2020	**1.08**	<0.010 D	<0.010 D	<0.010 D	0.610	**1.93**	21.3	**1,610**
	MW-3	7/23/2020	**0.00663**	<0.001	0.00191	0.0147	0.118	**5.19**	**1,400**	**4,280**
	MW3	10/5/2020	**0.0112**	<0.001	0.00204	0.00608	<0.100	**6.49**	**1,140**	**4,520**
MW-4	GW-11102646-062316-SP-MW-4	6/23/2016	**0.118**	< 0.001	0.186	**1.06**	--	**0.983**	**838**	--
	GW-11102646-091216-CM-MW-4	9/12/2016	**0.0742**	< 0.001	0.114	**0.803**	--	**1.32**	**735**	--
	GW-11102646-112916-CN-MW-4	11/29/2016	**0.0853**	< 0.001	0.0929	**0.967**	--	**1.26**	382	--
	GW-11102646-030617-CN-MW-4	3/6/2017	**0.0886**	< 0.02	0.0804	**1.23**	--	**1.22**	**814**	**2,260**
	GW-11102646-061217-CN-MW-4	6/12/2017	**0.100**	< 0.005	0.0747	**1.44**	--	**1.01**	**738**	**2,140**
	GW-11146006-102617-CM-MW-4	10/26/2017	**0.0462**	< 0.001	0.0226	**0.849**	0.507	**0.73**	**1,120**	**2,370**
	GW-11145006-120417-SP-MW-4	12/4/2017	**0.0632**	<0 .020	0.0386	**1.45**	--	**0.893**	**993**	**2,150**
	GW-11145006-120417-SP-DUP	12/4/2017	**0.064**	<0.020	0.0421	**1.7**	--	--	--	--
	GW-11146006-031318-CN-MW-4	3/13/2018	**0.0467**	<0.10	0.0292	**1.33**	--	**0.827**	**1,370**	**2,350**
	GW-11146006-062518-CN-MW-4	6/25/2018	**0.0561**	<0.020	<0.020	**1.74**	--	**0.888**	**1,230**	**2,540**
	GW-11146006-090418-JP-MW-4	9/4/2018	**0.0257**	< 0.005	< 0.005	**0.848**	--	**0.889**	**1,450**	**2,410**
	MW-4	12/10/2018	**0.108**	<0.020	0.0484	**2.93**	0.209	**0.801**	439	**1,900**
	MW-4	3/12/2019	**0.0488**	<0.0100	0.0265	**1.85**	<0.100	**0.843**	**1,240**	**2,390**
	MW-4	5/22/2019	**0.0496**	<0.0100	0.0309	**1.84**	<0.100	**0.867**	**1,090**	**2,700**
	MW-4	8/22/2019	**0.0336**	0.0013	0.0113	**1.05**	<0.100	**0.737**	**1,270**	**2,290**
	MW-4	12/2/2019	**0.0172**	<0.0100	<0.0100	**0.937**	<0.100	**0.752**	**1,390**	**2,480**
	MW-4	2/3/2020	**0.0249**	<0.0100	0.0224	**1.66**	<0.100	**0.756**	**1,300**	**2,180**
	MW-4	4/24/2020	**0.0170**	<0.0100	0.0120	**0.694**	<0.100	**0.744**	**1,330**	**2,640**
	MW-4	7/23/2020	**0.0150**	<0.0100	0.0132	**0.975**	<0.100	**0.549**	**1,180**	**2,620**
	MW4	10/8/2020	**0.0137**	<0.0100	<0.0100	**0.657**	<0.100	**0.569**	**843**	**2,340**

TABLE 3

PETROLEUM HYDROCARBON GROUNDWATER ANALYTICAL RESULTS
MANGUM #1
SAN JUAN COUNTY, NEW MEXICO

Well ID	Sample ID	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Iron (dissolved) (mg/L)	Manganese (dissolved) (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
NMWQCC Standards			**0.005**	**1.00**	**0.70**	**0.62**	**1.0**	**0.20**	**600**	**1,000**
MW-5	MW-5	8/23/2019	<0.001	<0.001	<0.001	0.0067	<0.100	**3.33**	**3,660**	**6,620**
	MW-5	12/2/2019	<0.001	<0.001	<0.0010	<0.0030	0.185	**3.26**	**3,730**	**6,350**
	MW-5	2/4/2020	<0.001	<0.001	<0.0010	<0.0030	<0.100	**3.45**	**3,660**	**5,940**
	MW-5	4/24/2020	<0.001	<0.001	<0.0010	<0.0030	<0.100	**3.39**	**3,440**	**6,450**
	MW-5	7/24/2020	<0.001	<0.001	<0.0010	<0.0030	<0.100	**3.13**	**2,410**	**5,260**
	MW5	10/5/2020	<0.001	<0.001	<0.0010	<0.0030	<0.100	**3.33**	**3,430**	**4,010**
MW-6	MW-6	8/23/2019	**0.213**	<0.001	0.145	**0.806**	<0.100	**2.51**	168	**1,750**
	MW-6	12/2/2019	**0.0741**	<0.001	0.168	0.170	<0.100	**3.11**	86.1	**1,630**
	MW-6	2/4/2020	**0.0284**	<0.001	0.0184	0.0720	<0.100	**5.05**	150	**1,570**
	MW-6	4/24/2020	0.00348	<0.001	<0.0010	<0.0030	<0.100	**4.59**	121	**1,550**
	MW-6	7/24/2020	**0.0977**	<0.001	0.0705	0.510	<0.100	**2.54**	47.0	**1,650**
	MW-6	10/5/2020	**0.0787**	<0.0100	0.114	0.025	<0.100	**3.33**	24.7	**1,550**
MW-7	MW-7	8/23/2019	<0.001	<0.001	<0.001	0.004	<0.100	**1.75**	**2,950**	**4,930**
	MW-7	12/2/2019	<0.001	<0.001	<0.001	<0.003	<0.100	**1.98**	**2,830**	**3,990**
	MW-7	2/4/2020	<0.001	<0.001	<0.001	<0.003	<0.100	**2.01**	**2,580**	**3,860**
	MW-7	4/24/2020	<0.001	<0.001	<0.001	<0.003	<0.100	**2.00**	**1,550**	**4,400**
	MW-7	7/24/2020	<0.001	<0.001	<0.001	<0.003	<0.100	**1.04**	**808**	**2,300**
	MW-7	10/5/2020	<0.001	<0.001	<0.001	<0.003	<0.100	**1.06**	**887**	**2,100**

Notes:

mg/L - milligrams per liter

NMWQCC - New Mexico Water Quality Control Commission

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

BOLD - indicates concentration exceeds the NNEPA standard

-- - not analyzed

ENCLOSURE A – ANALYTICAL LABORATORY REPORT

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

February 12, 2020

HilCorp-Farmington, NM

Sample Delivery Group:	L1186808
Samples Received:	02/06/2020
Project Number:	MANGUM 1
Description:	Mangum 1
Site:	MANGUM 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By:

Olivia Studebaker
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

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MW1 L1186808-01 GW

Collected by: Kurt | Collected date/time: 02/03/20 11:45 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	20	02/07/20 18:34	02/07/20 18:34	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 11:27	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424330	1	02/07/20 14:25	02/07/20 14:25	DWR	Mt. Juliet, TN

MW2 L1186808-02 GW

Collected by: Kurt | Collected date/time: 02/03/20 13:10 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	1	02/07/20 18:47	02/07/20 18:47	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 11:44	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424330	1	02/07/20 14:45	02/07/20 14:45	DWR	Mt. Juliet, TN

MW3 L1186808-03 GW

Collected by: Kurt | Collected date/time: 02/03/20 14:40 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	1	02/08/20 10:14	02/08/20 10:14	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 11:47	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424330	10	02/07/20 15:06	02/07/20 15:06	DWR	Mt. Juliet, TN

MW4 L1186808-04 GW

Collected by: Kurt | Collected date/time: 02/03/20 10:30 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	50	02/07/20 19:13	02/07/20 19:13	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 11:50	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424330	10	02/07/20 15:27	02/07/20 15:27	DWR	Mt. Juliet, TN

MW5 L1186808-05 GW

Collected by: Kurt | Collected date/time: 02/04/20 12:00 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	100	02/07/20 19:25	02/07/20 19:25	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 11:54	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424330	1	02/07/20 15:47	02/07/20 15:47	DWR	Mt. Juliet, TN

MW6 L1186808-06 GW

Collected by: Kurt | Collected date/time: 02/04/20 10:35 | Received date/time: 02/06/20 08:45

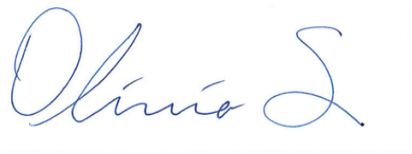
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	10	02/07/20 19:38	02/07/20 19:38	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 11:57	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424975	1	02/09/20 17:32	02/09/20 17:32	ACG	Mt. Juliet, TN

MW7 L1186808-07 GW

			Collected by	Collected date/time	Received date/time
			Kurt	02/04/20 09:30	02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1424240	1	02/09/20 09:15	02/09/20 09:49	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1424106	100	02/07/20 19:51	02/07/20 19:51	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1424148	1	02/07/20 12:06	02/08/20 12:00	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1424330	1	02/07/20 16:28	02/07/20 16:28	DWR	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Olivia Studebaker
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1820	J3	50.0	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	735		100	20	02/07/2020 18:34	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	0.119	B	0.100	1	02/08/2020 11:27	WG1424148
Manganese,Dissolved	0.824		0.00500	1	02/08/2020 11:27	WG1424148

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	02/07/2020 14:25	WG1424330
Toluene	ND		0.00100	1	02/07/2020 14:25	WG1424330
Ethylbenzene	0.00714		0.00100	1	02/07/2020 14:25	WG1424330
Total Xylenes	0.0107		0.00300	1	02/07/2020 14:25	WG1424330
(S) Toluene-d8	*106*		*80.0-120*		*02/07/2020 14:25*	WG1424330
(S) 4-Bromofluorobenzene	*144*	J1	*77.0-126*		*02/07/2020 14:25*	WG1424330
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*02/07/2020 14:25*	WG1424330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	14400		200	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	ND		5.00	1	02/07/2020 18:47	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	0.174	B	0.100	1	02/08/2020 11:44	WG1424148
Manganese,Dissolved	8.19		0.00500	1	02/08/2020 11:44	WG1424148

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	0.147		0.00100	1	02/07/2020 14:45	WG1424330
Toluene	ND		0.00100	1	02/07/2020 14:45	WG1424330
Ethylbenzene	0.0312		0.00100	1	02/07/2020 14:45	WG1424330
Total Xylenes	0.00841		0.00300	1	02/07/2020 14:45	WG1424330
(S) Toluene-d8	*102*		*80.0-120*		*02/07/2020 14:45*	WG1424330
(S) 4-Bromofluorobenzene	*148*	J1	*77.0-126*		*02/07/2020 14:45*	WG1424330
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*02/07/2020 14:45*	WG1424330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1590		50.0	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	36.1		5.00	1	02/08/2020 10:14	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	02/08/2020 11:47	WG1424148
Manganese,Dissolved	1.94		0.00500	1	02/08/2020 11:47	WG1424148

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	1.24		0.0100	10	02/07/2020 15:06	WG1424330
Toluene	ND		0.0100	10	02/07/2020 15:06	WG1424330
Ethylbenzene	0.0224		0.0100	10	02/07/2020 15:06	WG1424330
Total Xylenes	1.05		0.0300	10	02/07/2020 15:06	WG1424330
(S) Toluene-d8	*95.4*		*80.0-120*		*02/07/2020 15:06*	WG1424330
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*02/07/2020 15:06*	WG1424330
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*02/07/2020 15:06*	WG1424330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2180		50.0	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1300		250	50	02/07/2020 19:13	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	02/08/2020 11:50	WG1424148
Manganese,Dissolved	0.756		0.00500	1	02/08/2020 11:50	WG1424148

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0249		0.0100	10	02/07/2020 15:27	WG1424330
Toluene	ND		0.0100	10	02/07/2020 15:27	WG1424330
Ethylbenzene	0.0224		0.0100	10	02/07/2020 15:27	WG1424330
Total Xylenes	1.66		0.0300	10	02/07/2020 15:27	WG1424330
(S) Toluene-d8	*127*	J1	*80.0-120*		*02/07/2020 15:27*	WG1424330
(S) 4-Bromofluorobenzene	*129*	J1	*77.0-126*		*02/07/2020 15:27*	WG1424330
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*02/07/2020 15:27*	WG1424330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	5940		100	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	3660		500	100	02/07/2020 19:25	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	02/08/2020 11:54	WG1424148
Manganese,Dissolved	3.45		0.00500	1	02/08/2020 11:54	WG1424148

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	02/07/2020 15:47	WG1424330
Toluene	ND		0.00100	1	02/07/2020 15:47	WG1424330
Ethylbenzene	ND		0.00100	1	02/07/2020 15:47	WG1424330
Total Xylenes	ND		0.00300	1	02/07/2020 15:47	WG1424330
(S) Toluene-d8	*98.2*		*80.0-120*		*02/07/2020 15:47*	WG1424330
(S) 4-Bromofluorobenzene	*103*		*77.0-126*		*02/07/2020 15:47*	WG1424330
(S) 1,2-Dichloroethane-d4	*103*		*70.0-130*		*02/07/2020 15:47*	WG1424330

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1570		25.0	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	150		50.0	10	02/07/2020 19:38	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	02/08/2020 11:57	WG1424148
Manganese,Dissolved	5.05		0.00500	1	02/08/2020 11:57	WG1424148

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0284		0.00100	1	02/09/2020 17:32	WG1424975
Toluene	ND		0.00100	1	02/09/2020 17:32	WG1424975
Ethylbenzene	0.0184		0.00100	1	02/09/2020 17:32	WG1424975
Total Xylenes	0.0720		0.00300	1	02/09/2020 17:32	WG1424975
(S) Toluene-d8	*104*		*80.0-120*		*02/09/2020 17:32*	WG1424975
(S) 4-Bromofluorobenzene	*106*		*77.0-126*		*02/09/2020 17:32*	WG1424975
(S) 1,2-Dichloroethane-d4	*115*		*70.0-130*		*02/09/2020 17:32*	WG1424975

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	3860		50.0	1	02/09/2020 09:49	WG1424240

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	2580		500	100	02/07/2020 19:51	WG1424106

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	02/08/2020 12:00	WG1424148
Manganese,Dissolved	2.01		0.00500	1	02/08/2020 12:00	WG1424148

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	02/07/2020 16:28	WG1424330
Toluene	ND		0.00100	1	02/07/2020 16:28	WG1424330
Ethylbenzene	ND		0.00100	1	02/07/2020 16:28	WG1424330
Total Xylenes	ND		0.00300	1	02/07/2020 16:28	WG1424330
(S) Toluene-d8	*99.2*		*80.0-120*		*02/07/2020 16:28*	WG1424330
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*02/07/2020 16:28*	WG1424330
(S) 1,2-Dichloroethane-d4	*101*		*70.0-130*		*02/07/2020 16:28*	WG1424330

Method Blank (MB)

(MB) R3498359-1 02/09/20 09:49

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

L1186808-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1186808-01 02/09/20 09:49 • (DUP) R3498359-3 02/09/20 09:49

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1820	2320	1	24.2	J3	5

Laboratory Control Sample (LCS)

(LCS) R3498359-2 02/09/20 09:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8740	99.3	85.0-115	

Method Blank (MB)

(MB) R3498026-1 02/07/20 10:22

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

L1186769-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1186769-01 02/07/20 16:00 • (DUP) R3498026-3 02/07/20 16:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	29.4	28.1	1	4.63		15

L1186844-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1186844-01 02/07/20 20:29 • (DUP) R3498026-6 02/07/20 20:42

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	42.6	43.7	1	2.55		15

Laboratory Control Sample (LCS)

(LCS) R3498026-2 02/07/20 10:35

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	40.4	101	80.0-120	

L1186769-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1186769-02 02/07/20 16:26 • (MS) R3498026-4 02/07/20 16:39 • (MSD) R3498026-5 02/07/20 16:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	ND	49.5	50.9	98.0	101	1	80.0-120			2.70	15

L1186844-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1186844-02 02/07/20 20:55 • (MS) R3498026-7 02/07/20 21:08

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	34.7	82.6	95.9	1	80.0-120	

Method Blank (MB)

(MB) R3498051-1 02/08/20 10:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron,Dissolved	0.0300	J	0.0150	0.100
Manganese,Dissolved	U		0.000250	0.00500

Laboratory Control Sample (LCS)

(LCS) R3498051-2 02/08/20 11:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron,Dissolved	5.00	4.63	92.6	80.0-120	
Manganese,Dissolved	0.0500	0.0485	96.9	80.0-120	

L1186786-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1186786-02 02/08/20 11:04 • (MS) R3498051-4 02/08/20 11:11 • (MSD) R3498051-5 02/08/20 11:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron,Dissolved	5.00	4.44	8.82	9.12	87.5	93.4	1	75.0-125			3.30	20
Manganese,Dissolved	0.0500	4.92	4.98	5.12	127	403	1	75.0-125	V	V	2.73	20

Method Blank (MB)

(MB) R3498135-2 02/07/20 13:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*104*			*80.0-120*
(S) 4-Bromofluorobenzene	*95.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*107*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3498135-1 02/07/20 12:40

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00480	96.0	70.0-123	
Ethylbenzene	0.00500	0.00497	99.4	79.0-123	
Toluene	0.00500	0.00489	97.8	79.0-120	
Xylenes, Total	0.0150	0.0146	97.3	79.0-123	
(S) Toluene-d8			*103*	*80.0-120*	
(S) 4-Bromofluorobenzene			*102*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*103*	*70.0-130*	

Method Blank (MB)

(MB) R3498470-3 02/09/20 13:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*96.1*			*80.0-120*
(S) 4-Bromofluorobenzene	*88.9*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*112*			*70.0-130*

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

(LCS) R3498470-1 02/09/20 12:01 • (LCSD) R3498470-2 02/09/20 12:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.00500	0.00472	0.00478	94.4	95.6	70.0-123			1.26	20
Ethylbenzene	0.00500	0.00489	0.00491	97.8	98.2	79.0-123			0.408	20
Toluene	0.00500	0.00474	0.00476	94.8	95.2	79.0-120			0.421	20
Xylenes, Total	0.0150	0.0139	0.0137	92.7	91.3	79.0-123			1.45	20
(S) Toluene-d8				*101*	*97.8*	*80.0-120*				
(S) 4-Bromofluorobenzene				*92.9*	*92.8*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*110*	*115*	*70.0-130*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

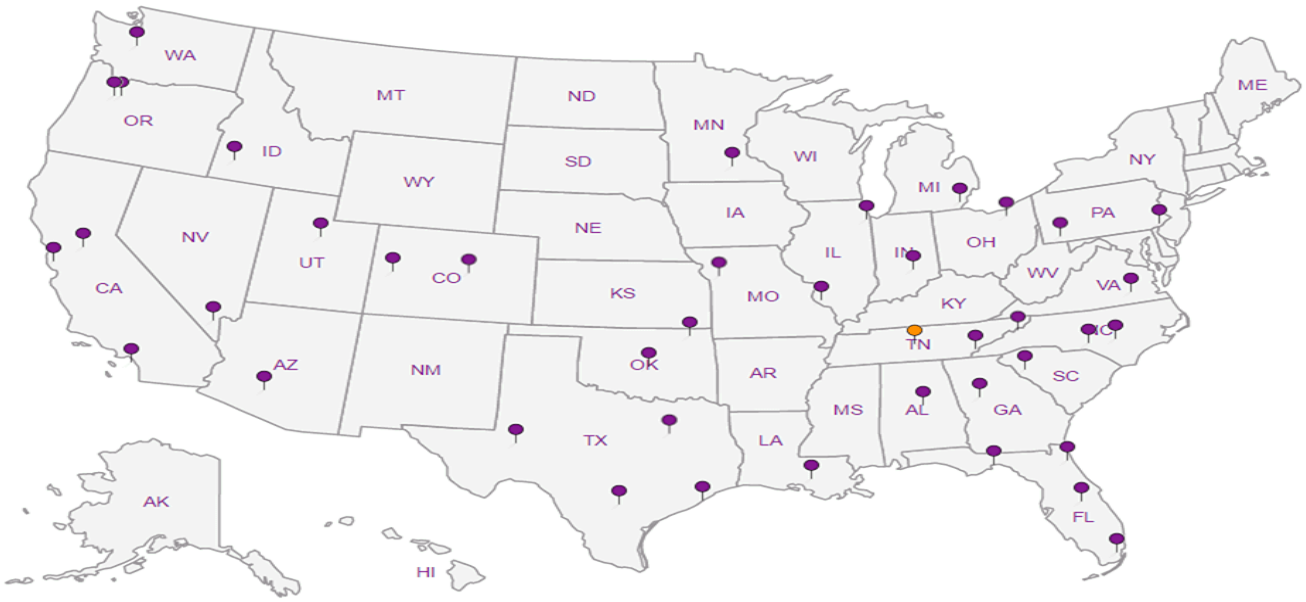
Third Party Federal Accreditations

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

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

Billing Information:

PO Box 61529
Houston, TX 77208

Pres Chk

Report to: **Kurt Hoekstra**

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

Project Description: **Mangum 1**

City/State Collected:

Please Circle: PT MT CT ET

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

Client Project # **MANGUM 1**

Lab Project # **HILCORANM-MANGUM**

Collected by (print): Kurt

Site/Facility ID # **MANGUM 1**

P.O. #

Collected by (signature): Kurt Hoekstra

Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved Fe, Mn 250mlHDPE-NoPres	SULFATE, TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	NO SAMPLES FIELD FILTERED	Remarks	Sample # (lab only)
MW1		GW		2-3	11:45	5	X	X	X	X		-01
MW2		GW		2-3	1:10	5	X	X	X	X		02
MW3		GW		2-3	2:40	5	X	X	X	X		03
MW4		GW		2-3	10:30	5	X	X	X	X		04
MW5		GW		2-4	12:00	5	X	X	X	X		05
MW6		GW		2-4	10:35	5	X	X	X	X		06
MW7		GW		2-4	9:30	5	X	X	X	X		07

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

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

SDG # L1186808

F134

Acctnum: **HILCORANM**

Template: **T153792**

Prelogin: **P750462**

PM: **823 - Olivia Studebaker**

PB:

Shipped Via:

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

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking # 443034228490

Sample Receipt Checklist

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
Kurt Hoekstra	2-5-20	8:20			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.1 °C 1.0+.2=1.2 Bottles Received: 35	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 2/6/20 Time: 845	Hold: Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 06, 2020

HilCorp-Farmington, NM

Sample Delivery Group:	L1213466
Samples Received:	04/29/2020
Project Number:	MANGUM 1
Description:	Mangum 1
Site:	MANGUM 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By:

Olivia Studebaker
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

MW1 L1213466-01 GW

Collected by: Kurt | Collected date/time: 04/24/20 11:20 | Received date/time: 04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	20	05/04/20 04:27	05/04/20 04:27	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:32	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	1	05/02/20 02:50	05/02/20 02:50	BMB	Mt. Juliet, TN

MW2 L1213466-02 GW

Collected by: Kurt | Collected date/time: 04/24/20 13:05 | Received date/time: 04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	1	05/04/20 12:23	05/04/20 12:23	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:35	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	1	05/02/20 03:10	05/02/20 03:10	BMB	Mt. Juliet, TN

MW3 L1213466-03 GW

Collected by: Kurt | Collected date/time: 04/24/20 13:55 | Received date/time: 04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	1	05/04/20 12:35	05/04/20 12:35	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:38	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	10	05/02/20 03:30	05/02/20 03:30	BMB	Mt. Juliet, TN

MW4 L1213466-04 GW

Collected by: Kurt | Collected date/time: 04/24/20 10:00 | Received date/time: 04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	50	05/04/20 05:06	05/04/20 05:06	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:41	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	10	05/02/20 03:51	05/02/20 03:51	BMB	Mt. Juliet, TN

MW5 L1213466-05 GW

Collected by: Kurt | Collected date/time: 04/24/20 15:00 | Received date/time: 04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	100	05/04/20 05:19	05/04/20 05:19	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:45	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	1	05/02/20 04:11	05/02/20 04:11	BMB	Mt. Juliet, TN

MW6 L1213466-06 GW

Collected by: Kurt | Collected date/time: 04/24/20 12:40 | Received date/time: 04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	10	05/04/20 05:32	05/04/20 05:32	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:48	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	1	05/02/20 04:31	05/02/20 04:31	BMB	Mt. Juliet, TN

SAMPLE SUMMARY

MW7 L1213466-07 GW

			Collected by	Collected date/time	Received date/time
			Kurt	04/24/20 10:30	04/29/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1468575	1	05/01/20 15:53	05/01/20 16:53	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1469208	100	05/04/20 06:10	05/04/20 06:10	GB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1468474	1	04/30/20 12:18	05/01/20 11:51	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1469590	1	05/02/20 04:52	05/02/20 04:52	BMB	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Olivia Studebaker
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1910		50.0	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	568		100	20	05/04/2020 04:27	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	05/01/2020 11:32	WG1468474
Manganese,Dissolved	0.623		0.00500	1	05/01/2020 11:32	WG1468474

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	05/02/2020 02:50	WG1469590
Toluene	ND		0.00100	1	05/02/2020 02:50	WG1469590
Ethylbenzene	0.00337		0.00100	1	05/02/2020 02:50	WG1469590
Total Xylenes	0.00599		0.00300	1	05/02/2020 02:50	WG1469590
(S) Toluene-d8	*100*		*80.0-120*		*05/02/2020 02:50*	WG1469590
(S) 4-Bromofluorobenzene	*128*	J1	*77.0-126*		*05/02/2020 02:50*	WG1469590
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*05/02/2020 02:50*	WG1469590

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	7800		200	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	6.08		5.00	1	05/04/2020 12:23	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	05/01/2020 11:35	WG1468474
Manganese,Dissolved	3.63		0.00500	1	05/01/2020 11:35	WG1468474

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0540		0.00100	1	05/02/2020 03:10	WG1469590
Toluene	ND		0.00100	1	05/02/2020 03:10	WG1469590
Ethylbenzene	0.0106		0.00100	1	05/02/2020 03:10	WG1469590
Total Xylenes	ND		0.00300	1	05/02/2020 03:10	WG1469590
(S) Toluene-d8	*111*		*80.0-120*		*05/02/2020 03:10*	WG1469590
(S) 4-Bromofluorobenzene	*148*	J1	*77.0-126*		*05/02/2020 03:10*	WG1469590
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*05/02/2020 03:10*	WG1469590

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1610		50.0	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	21.3		5.00	1	05/04/2020 12:35	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	0.610		0.100	1	05/01/2020 11:38	WG1468474
Manganese,Dissolved	1.93		0.00500	1	05/01/2020 11:38	WG1468474

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	1.08		0.0100	10	05/02/2020 03:30	WG1469590
Toluene	ND		0.0100	10	05/02/2020 03:30	WG1469590
Ethylbenzene	ND		0.0100	10	05/02/2020 03:30	WG1469590
Total Xylenes	0.882		0.0300	10	05/02/2020 03:30	WG1469590
(S) Toluene-d8	*100*		*80.0-120*		*05/02/2020 03:30*	WG1469590
(S) 4-Bromofluorobenzene	*114*		*77.0-126*		*05/02/2020 03:30*	WG1469590
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*05/02/2020 03:30*	WG1469590

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2640		50.0	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1330		250	50	05/04/2020 05:06	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	05/01/2020 11:41	WG1468474
Manganese,Dissolved	0.744		0.00500	1	05/01/2020 11:41	WG1468474

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0170		0.0100	10	05/02/2020 03:51	WG1469590
Toluene	ND		0.0100	10	05/02/2020 03:51	WG1469590
Ethylbenzene	0.0120		0.0100	10	05/02/2020 03:51	WG1469590
Total Xylenes	0.694		0.0300	10	05/02/2020 03:51	WG1469590
(S) Toluene-d8	*93.6*		*80.0-120*		*05/02/2020 03:51*	WG1469590
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*05/02/2020 03:51*	WG1469590
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*05/02/2020 03:51*	WG1469590

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	6450		100	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	3440		500	100	05/04/2020 05:19	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	05/01/2020 11:45	WG1468474
Manganese,Dissolved	3.39		0.00500	1	05/01/2020 11:45	WG1468474

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	05/02/2020 04:11	WG1469590
Toluene	ND		0.00100	1	05/02/2020 04:11	WG1469590
Ethylbenzene	ND		0.00100	1	05/02/2020 04:11	WG1469590
Total Xylenes	ND		0.00300	1	05/02/2020 04:11	WG1469590
(S) Toluene-d8	*99.8*		*80.0-120*		*05/02/2020 04:11*	WG1469590
(S) 4-Bromofluorobenzene	*103*		*77.0-126*		*05/02/2020 04:11*	WG1469590
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*05/02/2020 04:11*	WG1469590

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1550		50.0	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	121		50.0	10	05/04/2020 05:32	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	05/01/2020 11:48	WG1468474
Manganese,Dissolved	4.59		0.00500	1	05/01/2020 11:48	WG1468474

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.00348		0.00100	1	05/02/2020 04:31	WG1469590
Toluene	ND		0.00100	1	05/02/2020 04:31	WG1469590
Ethylbenzene	ND		0.00100	1	05/02/2020 04:31	WG1469590
Total Xylenes	ND		0.00300	1	05/02/2020 04:31	WG1469590
(S) Toluene-d8	*110*		*80.0-120*		*05/02/2020 04:31*	WG1469590
(S) 4-Bromofluorobenzene	*122*		*77.0-126*		*05/02/2020 04:31*	WG1469590
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*05/02/2020 04:31*	WG1469590

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	4400		50.0	1	05/01/2020 16:53	WG1468575

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1550		500	100	05/04/2020 06:10	WG1469208

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	05/01/2020 11:51	WG1468474
Manganese,Dissolved	2.00		0.00500	1	05/01/2020 11:51	WG1468474

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	05/02/2020 04:52	WG1469590
Toluene	ND		0.00100	1	05/02/2020 04:52	WG1469590
Ethylbenzene	ND		0.00100	1	05/02/2020 04:52	WG1469590
Total Xylenes	ND		0.00300	1	05/02/2020 04:52	WG1469590
(S) Toluene-d8	*101*		*80.0-120*		*05/02/2020 04:52*	WG1469590
(S) 4-Bromofluorobenzene	*112*		*77.0-126*		*05/02/2020 04:52*	WG1469590
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*05/02/2020 04:52*	WG1469590

Method Blank (MB)

(MB) R3524109-1 05/01/20 16:53

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

L1213095-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1213095-01 05/01/20 16:53 • (DUP) R3524109-3 05/01/20 16:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	297	305	1	2.66		5

Laboratory Control Sample (LCS)

(LCS) R3524109-2 05/01/20 16:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8560	97.3	85.0-115	

Method Blank (MB)

(MB) R3524401-1 05/03/20 21:54

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

L1212764-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1212764-01 05/04/20 04:01 • (DUP) R3524401-3 05/04/20 04:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	2.07	1	2.19	J	15

L1213880-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1213880-02 05/04/20 11:44 • (DUP) R3524401-6 05/04/20 11:57

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

Laboratory Control Sample (LCS)

(LCS) R3524401-2 05/03/20 22:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	40.1	100	80.0-120	

L1213579-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1213579-01 05/04/20 06:49 • (MS) R3524401-4 05/04/20 07:02 • (MSD) R3524401-5 05/04/20 07:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	22.1	72.5	72.4	101	100	1	80.0-120			0.128	15

L1213880-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1213880-02 05/04/20 11:44 • (MS) R3524401-7 05/04/20 12:10

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	U	51.7	103	1	80.0-120	

Method Blank (MB)

(MB) R3523827-1 05/01/20 09:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron,Dissolved	U		0.0489	0.100
Manganese,Dissolved	0.00204	J	0.00132	0.00500

Laboratory Control Sample (LCS)

(LCS) R3523827-2 05/01/20 09:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron,Dissolved	5.00	4.96	99.1	80.0-120	
Manganese,Dissolved	0.0500	0.0510	102	80.0-120	

L1213038-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1213038-02 05/01/20 09:28 • (MS) R3523827-4 05/01/20 09:34 • (MSD) R3523827-5 05/01/20 09:38

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron,Dissolved	5.00	ND	4.88	5.05	97.6	101	1	75.0-125			3.43	20
Manganese,Dissolved	0.0500	ND	0.0511	0.0515	98.9	99.7	1	75.0-125			0.802	20

Method Blank (MB)

(MB) R3524899-2 05/01/20 22:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	0.000147	J	0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*103*			*80.0-120*
(S) 4-Bromofluorobenzene	*112*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*108*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3524899-1 05/01/20 21:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00581	116	70.0-123	
Ethylbenzene	0.00500	0.00490	98.0	79.0-123	
Toluene	0.00500	0.00492	98.4	79.0-120	
Xylenes, Total	0.0150	0.0158	105	79.0-123	
(S) Toluene-d8			*101*	*80.0-120*	
(S) 4-Bromofluorobenzene			*109*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*107*	*70.0-130*	

L1213403-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1213403-06 05/02/20 01:29 • (MS) R3524899-3 05/02/20 08:33 • (MSD) R3524899-4 05/02/20 08:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.00500	U	0.00490	0.00352	98.0	70.4	1	17.0-158		J3	32.8	27
Ethylbenzene	0.00500	U	0.00437	0.00307	87.4	61.4	1	30.0-155		J3	34.9	27
Toluene	0.00500	U	0.00449	0.00318	89.8	63.6	1	26.0-154		J3	34.2	28
Xylenes, Total	0.0150	U	0.0141	0.0100	94.0	66.7	1	29.0-154		J3	34.0	28
(S) Toluene-d8					*100*	*100*		*80.0-120*				
(S) 4-Bromofluorobenzene					*110*	*112*		*77.0-126*				
(S) 1,2-Dichloroethane-d4					*106*	*108*		*70.0-130*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.

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

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

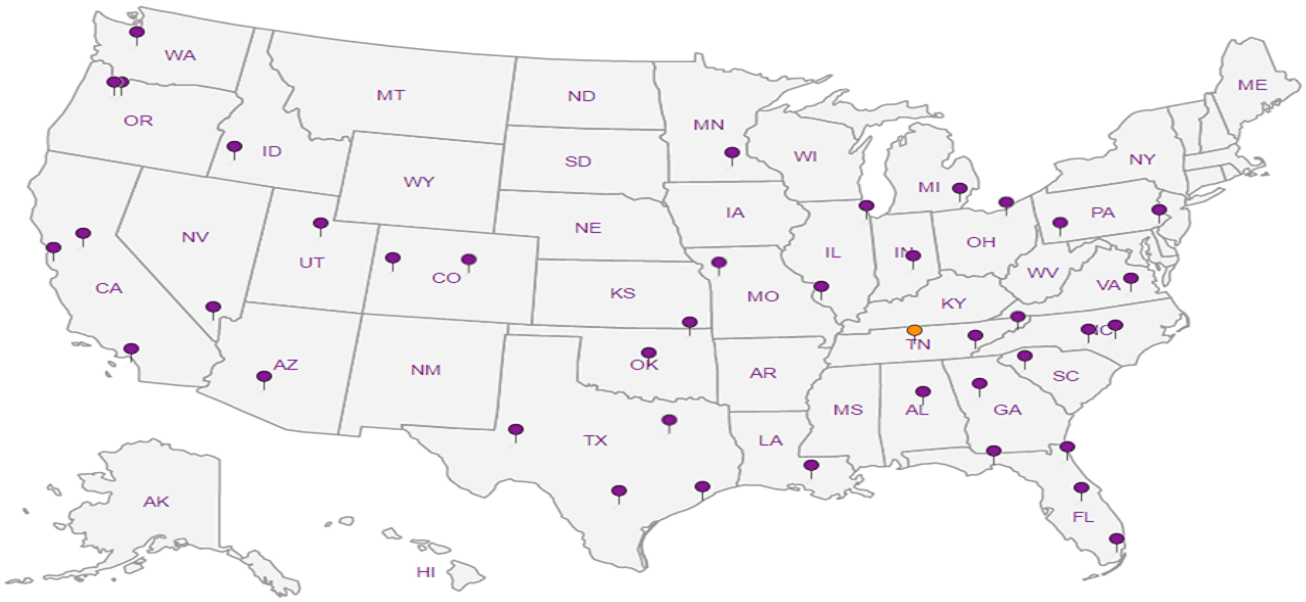
Third Party Federal Accreditations

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

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

Billing Information:

PO Box 61529
Houston, TX 77208

Pres Chk

Report to: Kurt Hoekstra

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

Project Description: Mangum 1

City/State Collected:

Please Circle: PT MT CT ET

Phone: 505-486-9543

Client Project # MANGUM 1

Lab Project # HILCORANM-MANGUM

Collected by (print): Kurt

Collected by (signature): Kurt Hoekstra

Immediately Packed on Ice N ___ Y X

Site/Facility ID # MANGUM 1

P.O. #

Quote #

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

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved Fe, Mn 250mlHDPE-NoPres	SULFATE, TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	NO SAMPLES FIELD FILTERED	Remarks	Sample # (lab only)
MW1		GW		4-24	11:20	5	X	X	X	X		-01
MW2		GW		4-24	1:05	5 4	X	X	X	X		-02
MW3		GW		4-24	1:55	5	X	X	X	X		-03
MW4		GW		4-24	10:00	5	X	X	X	X		-04
MW5		GW		4-27	3:00	5	X	X	X	X		-05
MW6		GW		4-27	12:40	5	X	X	X	X		-06
MW7		GW		4-27	10:30	5	X	X	X	X		-07

Chain of Custody Page ___ of ___

Pace Analytical
National Center for Testing & Innovation

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

SDG # L1213464

Tabl B111

Acctnum: HILCORANM

Template: T153792

Prelogin: P768587

PM: 823 - Olivia Studebaker

PB:

Shipped Via:

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

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 167677754973

Sample Receipt Checklist

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

	Date:	Time:		
Relinquished by : (Signature) Kurt Hoekstra	4-28-20	8:45	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: IMPA3 °C 4.1-.4=3.7 Bottles Received: 35
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4-29-20 Time: 0900

If preservation required by Login: Date/Time

Hold:

Condition: NCF X OK

Cole Medley

Login #:L1213466	Client: HILCORANM	Date:04/29/20	Evaluated by:Cole Medley

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time		Login Clarification Needed		**If Broken Container:**
	Temperature not in range		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	pH not in range.		Please specify TCLP requested.	X	Improper handling by carrier (FedEx / UPS / Cou
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
X	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments: Receive 1 broken 40mlAmb-HCl On ID: MW2

Client informed by:		Call		Email		Voice Mail		Date:	Time:
TSR Initials:	Client Contact:								

Login Instructions:

Please proceed with remaining 2 40mlAmb-HCl vials.

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

August 05, 2020

HilCorp-Farmington, NM

Sample Delivery Group:	L1244205
Samples Received:	07/28/2020
Project Number:	MANGUM 1
Description:	Mangum 1
Site:	MANGUM 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By:

Jason Romer
Project Manager

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MW1 L1244205-01 GW

Collected by: Kurt | Collected date/time: 07/24/20 09:45 | Received date/time: 07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1516778	1	07/29/20 01:38	07/29/20 03:22	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1517682	10	07/30/20 16:02	07/30/20 16:02	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 21:27	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1517478	1	07/30/20 08:12	07/30/20 08:12	BMB	Mt. Juliet, TN

MW2 L1244205-02 GW

Collected by: Kurt | Collected date/time: 07/24/20 10:35 | Received date/time: 07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1516778	1	07/29/20 01:38	07/29/20 03:22	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1517682	1	07/30/20 16:35	07/30/20 16:35	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 21:30	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1517478	1	07/30/20 08:32	07/30/20 08:32	BMB	Mt. Juliet, TN

MW3 L1244205-03 GW

Collected by: Kurt | Collected date/time: 07/23/20 13:30 | Received date/time: 07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1516778	1	07/29/20 01:38	07/29/20 03:22	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1518407	50	07/31/20 23:11	07/31/20 23:11	MSP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 21:10	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1518025	1	07/30/20 22:49	07/30/20 22:49	TJJ	Mt. Juliet, TN

MW4 L1244205-04 GW

Collected by: Kurt | Collected date/time: 07/23/20 14:30 | Received date/time: 07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1516778	1	07/29/20 01:38	07/29/20 03:22	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1517682	50	07/30/20 16:56	07/30/20 16:56	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 21:33	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1517478	10	07/30/20 13:47	07/30/20 13:47	BMB	Mt. Juliet, TN

MW5 L1244205-05 GW

Collected by: Kurt | Collected date/time: 07/24/20 13:50 | Received date/time: 07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1517107	1	07/29/20 15:51	07/29/20 16:31	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1517682	100	07/30/20 17:07	07/30/20 17:07	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 23:47	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1517478	1	07/30/20 08:52	07/30/20 08:52	BMB	Mt. Juliet, TN

MW6 L1244205-06 GW

Collected by: Kurt | Collected date/time: 07/24/20 13:00 | Received date/time: 07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1516778	1	07/29/20 01:38	07/29/20 03:22	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1518407	1	07/31/20 23:29	07/31/20 23:29	MSP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 23:50	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1517478	1	07/30/20 09:12	07/30/20 09:12	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1518025	10	07/30/20 23:29	07/30/20 23:29	TJJ	Mt. Juliet, TN

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

SAMPLE SUMMARY

MW7 L1244205-07 GW

			Collected by	Collected date/time	Received date/time
			Kurt	07/24/20 14:30	07/28/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1516778	1	07/29/20 01:38	07/29/20 03:22	VRP	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1517682	100	07/30/20 17:29	07/30/20 17:29	MCG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1517199	1	07/29/20 15:42	07/29/20 23:54	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1517478	1	07/30/20 09:33	07/30/20 09:33	BMB	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jason Romer
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2230		50.0	1	07/29/2020 03:22	WG1516778

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	570		50.0	10	07/30/2020 16:02	WG1517682

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	07/29/2020 21:27	WG1517199
Manganese,Dissolved	0.613		0.00500	1	07/29/2020 21:27	WG1517199

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	07/30/2020 08:12	WG1517478
Toluene	ND		0.00100	1	07/30/2020 08:12	WG1517478
Ethylbenzene	ND		0.00100	1	07/30/2020 08:12	WG1517478
Total Xylenes	ND		0.00300	1	07/30/2020 08:12	WG1517478
(S) Toluene-d8	*109*		*80.0-120*		*07/30/2020 08:12*	WG1517478
(S) 4-Bromofluorobenzene	*121*		*77.0-126*		*07/30/2020 08:12*	WG1517478
(S) 1,2-Dichloroethane-d4	*85.0*		*70.0-130*		*07/30/2020 08:12*	WG1517478

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3680		100	1	07/29/2020 03:22	WG1516778

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	10.7		5.00	1	07/30/2020 16:35	WG1517682

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	07/29/2020 21:30	WG1517199
Manganese,Dissolved	2.21		0.00500	1	07/29/2020 21:30	WG1517199

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	07/30/2020 08:32	WG1517478
Toluene	ND		0.00100	1	07/30/2020 08:32	WG1517478
Ethylbenzene	0.00902		0.00100	1	07/30/2020 08:32	WG1517478
Total Xylenes	ND		0.00300	1	07/30/2020 08:32	WG1517478
(S) Toluene-d8	*109*		*80.0-120*		*07/30/2020 08:32*	WG1517478
(S) 4-Bromofluorobenzene	*134*	J1	*77.0-126*		*07/30/2020 08:32*	WG1517478
(S) 1,2-Dichloroethane-d4	*85.4*		*70.0-130*		*07/30/2020 08:32*	WG1517478

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	4280		100	1	07/29/2020 03:22	WG1516778

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1400		250	50	07/31/2020 23:11	WG1518407

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	0.118		0.100	1	07/29/2020 21:10	WG1517199
Manganese,Dissolved	5.19	V	0.00500	1	07/29/2020 21:10	WG1517199

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.00663		0.00100	1	07/30/2020 22:49	WG1518025
Toluene	ND		0.00100	1	07/30/2020 22:49	WG1518025
Ethylbenzene	0.00191		0.00100	1	07/30/2020 22:49	WG1518025
Total Xylenes	0.0147		0.00300	1	07/30/2020 22:49	WG1518025
(S) Toluene-d8	*106*		*80.0-120*		*07/30/2020 22:49*	WG1518025
(S) 4-Bromofluorobenzene	*118*		*77.0-126*		*07/30/2020 22:49*	WG1518025
(S) 1,2-Dichloroethane-d4	*103*		*70.0-130*		*07/30/2020 22:49*	WG1518025

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2620		50.0	1	07/29/2020 03:22	WG1516778

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1180		250	50	07/30/2020 16:56	WG1517682

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	07/29/2020 21:33	WG1517199
Manganese,Dissolved	0.549		0.00500	1	07/29/2020 21:33	WG1517199

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0150		0.0100	10	07/30/2020 13:47	WG1517478
Toluene	ND		0.0100	10	07/30/2020 13:47	WG1517478
Ethylbenzene	0.0132		0.0100	10	07/30/2020 13:47	WG1517478
Total Xylenes	0.975		0.0300	10	07/30/2020 13:47	WG1517478
(S) Toluene-d8	*112*		*80.0-120*		*07/30/2020 13:47*	WG1517478
(S) 4-Bromofluorobenzene	*107*		*77.0-126*		*07/30/2020 13:47*	WG1517478
(S) 1,2-Dichloroethane-d4	*86.4*		*70.0-130*		*07/30/2020 13:47*	WG1517478

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

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	5260		100	1	07/29/2020 16:31	WG1517107

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	2410		500	100	07/30/2020 17:07	WG1517682

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	07/29/2020 23:47	WG1517199
Manganese,Dissolved	3.13		0.00500	1	07/29/2020 23:47	WG1517199

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	07/30/2020 08:52	WG1517478
Toluene	ND		0.00100	1	07/30/2020 08:52	WG1517478
Ethylbenzene	ND		0.00100	1	07/30/2020 08:52	WG1517478
Total Xylenes	ND		0.00300	1	07/30/2020 08:52	WG1517478
(S) Toluene-d8	*114*		*80.0-120*		*07/30/2020 08:52*	WG1517478
(S) 4-Bromofluorobenzene	*105*		*77.0-126*		*07/30/2020 08:52*	WG1517478
(S) 1,2-Dichloroethane-d4	*84.0*		*70.0-130*		*07/30/2020 08:52*	WG1517478

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	1650		25.0	1	07/29/2020 03:22	WG1516778

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	47.0		5.00	1	07/31/2020 23:29	WG1518407

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	07/29/2020 23:50	WG1517199
Manganese,Dissolved	2.54		0.00500	1	07/29/2020 23:50	WG1517199

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	0.0977		0.00100	1	07/30/2020 09:12	WG1517478
Toluene	ND		0.00100	1	07/30/2020 09:12	WG1517478
Ethylbenzene	0.0705		0.00100	1	07/30/2020 09:12	WG1517478
Total Xylenes	0.510		0.0300	10	07/30/2020 23:29	WG1518025
(S) Toluene-d8	*112*		*80.0-120*		*07/30/2020 09:12*	WG1517478
(S) Toluene-d8	*105*		*80.0-120*		*07/30/2020 23:29*	WG1518025
(S) 4-Bromofluorobenzene	*107*		*77.0-126*		*07/30/2020 09:12*	WG1517478
(S) 4-Bromofluorobenzene	*114*		*77.0-126*		*07/30/2020 23:29*	WG1518025
(S) 1,2-Dichloroethane-d4	*84.0*		*70.0-130*		*07/30/2020 09:12*	WG1517478
(S) 1,2-Dichloroethane-d4	*105*		*70.0-130*		*07/30/2020 23:29*	WG1518025

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2300		50.0	1	07/29/2020 03:22	WG1516778

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	808		500	100	07/30/2020 17:29	WG1517682

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	07/29/2020 23:54	WG1517199
Manganese,Dissolved	1.04		0.00500	1	07/29/2020 23:54	WG1517199

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	07/30/2020 09:33	WG1517478
Toluene	ND		0.00100	1	07/30/2020 09:33	WG1517478
Ethylbenzene	ND		0.00100	1	07/30/2020 09:33	WG1517478
Total Xylenes	ND		0.00300	1	07/30/2020 09:33	WG1517478
(S) Toluene-d8	*108*		*80.0-120*		*07/30/2020 09:33*	WG1517478
(S) 4-Bromofluorobenzene	*103*		*77.0-126*		*07/30/2020 09:33*	WG1517478
(S) 1,2-Dichloroethane-d4	*85.8*		*70.0-130*		*07/30/2020 09:33*	WG1517478

Method Blank (MB)

(MB) R3554870-1 07/29/20 03:22

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

L1243836-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1243836-04 07/29/20 03:22 • (DUP) R3554870-3 07/29/20 03:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	449	454	1	1.11		5

L1244205-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1244205-07 07/29/20 03:22 • (DUP) R3554870-4 07/29/20 03:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	2300	2320	1	0.650		5

Laboratory Control Sample (LCS)

(LCS) R3554870-2 07/29/20 03:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8770	99.7	77.4-123	

Method Blank (MB)

(MB) R3554867-1 07/29/20 16:31

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

L1243510-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1243510-01 07/29/20 16:31 • (DUP) R3554867-3 07/29/20 16:31

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	432	438	1	1.38		5

Laboratory Control Sample (LCS)

(LCS) R3554867-2 07/29/20 16:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8460	96.1	77.4-123	

Method Blank (MB)

(MB) R3555073-1 07/30/20 11:38

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

L1244086-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1244086-01 07/30/20 14:46 • (DUP) R3555073-3 07/30/20 14:57

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

L1244218-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1244218-01 07/30/20 18:02 • (DUP) R3555073-6 07/30/20 18:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	10.4	10.3	1	0.805		15

Laboratory Control Sample (LCS)

(LCS) R3555073-2 07/30/20 11:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	38.8	96.9	80.0-120	

L1244218-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1244218-02 07/30/20 18:45 • (MS) R3555073-7 07/30/20 18:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	14.0	65.9	104	1	80.0-120	

Method Blank (MB)

(MB) R3555428-1 07/31/20 09:22

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

Laboratory Control Sample (LCS)

(LCS) R3555428-2 07/31/20 09:41

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	40.5	101	80.0-120	

Method Blank (MB)

(MB) R3554520-1 07/29/20 21:03

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron,Dissolved	U		0.0489	0.100
Manganese,Dissolved	U		0.00132	0.00500

Laboratory Control Sample (LCS)

(LCS) R3554520-2 07/29/20 21:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron,Dissolved	5.00	4.90	98.1	80.0-120	
Manganese,Dissolved	0.0500	0.0494	98.8	80.0-120	

L1244205-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1244205-03 07/29/20 21:10 • (MS) R3554520-4 07/29/20 21:17 • (MSD) R3554520-5 07/29/20 21:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron,Dissolved	5.00	0.118	5.02	4.95	98.0	96.5	1	75.0-125			1.42	20
Manganese,Dissolved	0.0500	5.19	5.13	5.01	0.000	0.000	1	75.0-125	V	V	2.31	20

Method Blank (MB)

(MB) R3554926-2 07/30/20 05:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*111*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.8*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*86.6*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3554926-1 07/30/20 05:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00437	87.4	70.0-123	
Ethylbenzene	0.00500	0.00517	103	79.0-123	
Toluene	0.00500	0.00509	102	79.0-120	
Xylenes, Total	0.0150	0.0158	105	79.0-123	
(S) Toluene-d8			*111*	*80.0-120*	
(S) 4-Bromofluorobenzene			*103*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*86.2*	*70.0-130*	

Method Blank (MB)

(MB) R3555440-2 07/30/20 16:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*105*			*80.0-120*
(S) 4-Bromofluorobenzene	*108*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*114*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3555440-1 07/30/20 15:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00513	103	70.0-123	
Ethylbenzene	0.00500	0.00494	98.8	79.0-123	
Toluene	0.00500	0.00532	106	79.0-120	
Xylenes, Total	0.0150	0.0165	110	79.0-123	
(S) Toluene-d8			*106*	*80.0-120*	
(S) 4-Bromofluorobenzene			*115*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*117*	*70.0-130*	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

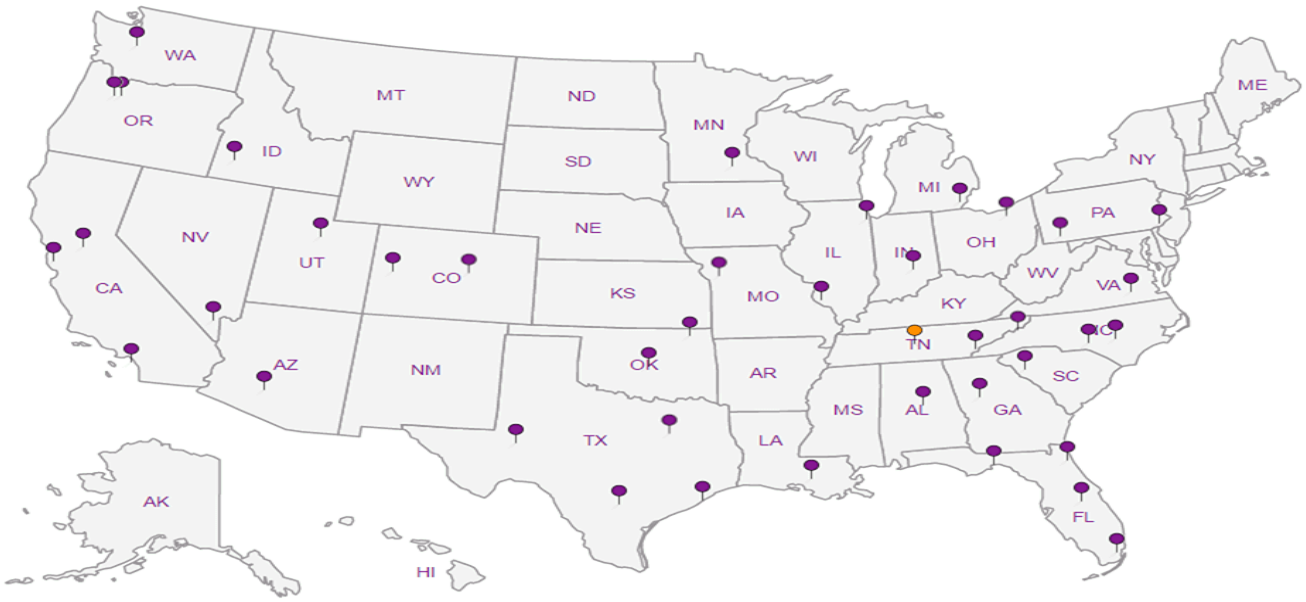
Third Party Federal Accreditations

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

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



HilCorp-Farmington, NM

382 Road 3100
Aztec, NM 87401

Billing Information:
Clara Cardoza
PO Box 61529
Houston, TX 77208

Pres Chk

Report to: Kurt Hoekstra

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

Project Description: Mangum 1

City/State Collected:

Please Circle: PT MT CT ET

Phone: 505-486-9543

Client Project # MANGUM 1

Lab Project # HILCORANM-MANGUM

Collected by (print): Kurt

Collected by (signature): Kurt Hoekstra

Immediately Packed on Ice N ___ Y X

Site/Facility ID # MANGUM 1

P.O. #

Quote #

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

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved Fe, Mn 250mlHDPE-NoPres	SULFATE, TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	No samples field filtered	Remarks	Sample # (lab only)
MW1		GW		7-24	9:45	5	X	X	X	X		-01
MW2		GW		7-24	10:35	5	X	X	X	X		02
MW3		GW		7-23	1:30	5	X	X	X	X		03
MW4		GW		7-23	2:30	5	X	X	X	X		04
MW5		GW		7-24	1:50	5	X	X	X	X		05
MW6		GW		7-24	1:00	5	X	X	X	X		06
MW7		GW		7-24	2:30	5	X	X	X	X		07

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

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

SDG # L1244205

J132

Acctnum: HILCORANM

Template: T153792

Prelogin: P784549

PM: 823 - Olivia Studebaker

PB:

Shipped Via:

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

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 1749 9996 9377

Sample Receipt Checklist
COC Seal Present/Intact: __NP X Y __N
COC Signed/Accurate: X Y __N
Bottles arrive intact: X Y __N
Correct bottles used: X Y __N
Sufficient volume sent: X Y __N
If Applicable
VOA Zero Headspace: X Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: X Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / (No) HCL / MeoH TBR
Kurt Hoekstra	7-27-20	7:45		0
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.0 °C Bottles Received: 35
				If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 07/28/2020 Time: 9:00
				Hold: Condition: NCF / (OK)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

October 19, 2020

HilCorp-Farmington, NM

Sample Delivery Group:	L1271945
Samples Received:	10/09/2020
Project Number:	MANGUM 1
Description:	Mangum 1
Site:	MANGUM 1
Report To:	Kurt Hoekstra 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By:

Olivia Studebaker
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

MW1 L1271945-01 GW

Collected by: Kurt | Collected date/time: 10/08/20 10:55 | Received date/time: 10/09/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1558086	1	10/14/20 01:24	10/14/20 02:47	AEC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	20	10/15/20 04:40	10/15/20 04:40	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:25	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559277	1	10/15/20 02:06	10/15/20 02:06	JCP	Mt. Juliet, TN

MW2 L1271945-02 GW

Collected by: Kurt | Collected date/time: 10/08/20 11:54 | Received date/time: 10/09/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1558086	1	10/14/20 01:24	10/14/20 02:47	AEC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	1	10/15/20 02:02	10/15/20 02:02	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:28	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559277	1	10/15/20 02:26	10/15/20 02:26	JCP	Mt. Juliet, TN

MW3 L1271945-03 GW

Collected by: Kurt | Collected date/time: 10/05/20 10:10 | Received date/time: 10/09/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1557546	1	10/11/20 17:09	10/11/20 17:50	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	50	10/15/20 03:08	10/15/20 03:08	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:31	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559277	1	10/15/20 02:46	10/15/20 02:46	JCP	Mt. Juliet, TN

MW4 L1271945-04 GW

Collected by: Kurt | Collected date/time: 10/08/20 10:12 | Received date/time: 10/09/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1558086	1	10/14/20 01:24	10/14/20 02:47	AEC	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	50	10/15/20 03:21	10/15/20 03:21	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:34	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559277	10	10/15/20 04:47	10/15/20 04:47	JCP	Mt. Juliet, TN

MW5 L1271945-05 GW

Collected by: Kurt | Collected date/time: 10/05/20 15:12 | Received date/time: 10/09/20 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1557546	1	10/11/20 17:09	10/11/20 17:50	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	100	10/15/20 03:35	10/15/20 03:35	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:37	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559277	1	10/15/20 03:06	10/15/20 03:06	JCP	Mt. Juliet, TN

MW6 L1271945-06 GW

Collected by: Kurt | Collected date/time: 10/05/20 13:10 | Received date/time: 10/09/20 09:00

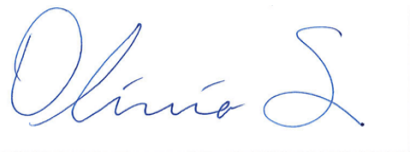
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1557546	1	10/11/20 17:09	10/11/20 17:50	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	1	10/15/20 13:43	10/15/20 13:43	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:41	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559928	10	10/15/20 22:03	10/15/20 22:03	DWR	Mt. Juliet, TN

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

MW7 L1271945-07 GW

			Collected by	Collected date/time	Received date/time	
			Kurt	10/05/20 11:12	10/09/20 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1557546	1	10/11/20 17:09	10/11/20 17:50	TH	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1558952	20	10/15/20 04:01	10/15/20 04:01	ELN	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1558040	1	10/12/20 21:39	10/13/20 02:44	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1559928	1	10/15/20 22:23	10/15/20 22:23	DWR	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Olivia Studebaker
Project Manager

Sample Delivery Group (SDG) Narrative

pH outside of method requirement.

Lab Sample ID	Project Sample ID	Method
L1271945-06	MW6	8260B
L1271945-07	MW7	8260B

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2960		20.0	1	10/14/2020 02:47	WG1558086

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	1060		100	20	10/15/2020 04:40	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	10/13/2020 02:25	WG1558040
Manganese,Dissolved	1.06		0.00500	1	10/13/2020 02:25	WG1558040

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	ND		0.00100	1	10/15/2020 02:06	WG1559277
Toluene	ND		0.00100	1	10/15/2020 02:06	WG1559277
Ethylbenzene	ND		0.00100	1	10/15/2020 02:06	WG1559277
Total Xylenes	ND		0.00300	1	10/15/2020 02:06	WG1559277
(S) Toluene-d8	*101*		*80.0-120*		*10/15/2020 02:06*	WG1559277
(S) 4-Bromofluorobenzene	*134*	J1	*77.0-126*		*10/15/2020 02:06*	WG1559277
(S) 1,2-Dichloroethane-d4	*95.9*		*70.0-130*		*10/15/2020 02:06*	WG1559277

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	4290		50.0	1	10/14/2020 02:47	WG1558086

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	ND		5.00	1	10/15/2020 02:02	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	0.195		0.100	1	10/13/2020 02:28	WG1558040
Manganese,Dissolved	2.31		0.00500	1	10/13/2020 02:28	WG1558040

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	10/15/2020 02:26	WG1559277
Toluene	ND		0.00100	1	10/15/2020 02:26	WG1559277
Ethylbenzene	0.00646		0.00100	1	10/15/2020 02:26	WG1559277
Total Xylenes	ND		0.00300	1	10/15/2020 02:26	WG1559277
(S) Toluene-d8	*96.4*		*80.0-120*		*10/15/2020 02:26*	WG1559277
(S) 4-Bromofluorobenzene	*138*	J1	*77.0-126*		*10/15/2020 02:26*	WG1559277
(S) 1,2-Dichloroethane-d4	*97.6*		*70.0-130*		*10/15/2020 02:26*	WG1559277

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	4520		100	1	10/11/2020 17:50	WG1557546

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	1140		250	50	10/15/2020 03:08	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	10/13/2020 02:31	WG1558040
Manganese,Dissolved	6.49		0.00500	1	10/13/2020 02:31	WG1558040

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	0.0112		0.00100	1	10/15/2020 02:46	WG1559277
Toluene	ND		0.00100	1	10/15/2020 02:46	WG1559277
Ethylbenzene	0.00204		0.00100	1	10/15/2020 02:46	WG1559277
Total Xylenes	0.00608		0.00300	1	10/15/2020 02:46	WG1559277
(S) Toluene-d8	*107*		*80.0-120*		*10/15/2020 02:46*	WG1559277
(S) 4-Bromofluorobenzene	*108*		*77.0-126*		*10/15/2020 02:46*	WG1559277
(S) 1,2-Dichloroethane-d4	*94.6*		*70.0-130*		*10/15/2020 02:46*	WG1559277

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	2340		20.0	1	10/14/2020 02:47	WG1558086

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	843		250	50	10/15/2020 03:21	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	10/13/2020 02:34	WG1558040
Manganese,Dissolved	0.569		0.00500	1	10/13/2020 02:34	WG1558040

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0137		0.0100	10	10/15/2020 04:47	WG1559277
Toluene	ND		0.0100	10	10/15/2020 04:47	WG1559277
Ethylbenzene	ND		0.0100	10	10/15/2020 04:47	WG1559277
Total Xylenes	0.657		0.0300	10	10/15/2020 04:47	WG1559277
(S) Toluene-d8	*106*		*80.0-120*		*10/15/2020 04:47*	WG1559277
(S) 4-Bromofluorobenzene	*116*		*77.0-126*		*10/15/2020 04:47*	WG1559277
(S) 1,2-Dichloroethane-d4	*96.8*		*70.0-130*		*10/15/2020 04:47*	WG1559277

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	4010		100	1	10/11/2020 17:50	WG1557546

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	3430		500	100	10/15/2020 03:35	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	10/13/2020 02:37	WG1558040
Manganese,Dissolved	3.33		0.00500	1	10/13/2020 02:37	WG1558040

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	10/15/2020 03:06	WG1559277
Toluene	ND		0.00100	1	10/15/2020 03:06	WG1559277
Ethylbenzene	ND		0.00100	1	10/15/2020 03:06	WG1559277
Total Xylenes	ND		0.00300	1	10/15/2020 03:06	WG1559277
(S) Toluene-d8	*102*		*80.0-120*		*10/15/2020 03:06*	WG1559277
(S) 4-Bromofluorobenzene	*96.4*		*77.0-126*		*10/15/2020 03:06*	WG1559277
(S) 1,2-Dichloroethane-d4	*95.3*		*70.0-130*		*10/15/2020 03:06*	WG1559277

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	1550		20.0	1	10/11/2020 17:50	WG1557546

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Sulfate	24.7		5.00	1	10/15/2020 13:43	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Iron,Dissolved	ND		0.100	1	10/13/2020 02:41	WG1558040
Manganese,Dissolved	3.33		0.00500	1	10/13/2020 02:41	WG1558040

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Benzene	0.0787		0.0100	10	10/15/2020 22:03	WG1559928
Toluene	ND		0.0100	10	10/15/2020 22:03	WG1559928
Ethylbenzene	0.114		0.0100	10	10/15/2020 22:03	WG1559928
Total Xylenes	0.245		0.0300	10	10/15/2020 22:03	WG1559928
(S) Toluene-d8	*97.0*		*80.0-120*		*10/15/2020 22:03*	WG1559928
(S) 4-Bromofluorobenzene	*94.8*		*77.0-126*		*10/15/2020 22:03*	WG1559928
(S) 1,2-Dichloroethane-d4	*124*		*70.0-130*		*10/15/2020 22:03*	WG1559928

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	2100		20.0	1	10/11/2020 17:50	WG1557546

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Sulfate	887		100	20	10/15/2020 04:01	WG1558952

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron,Dissolved	ND		0.100	1	10/13/2020 02:44	WG1558040
Manganese,Dissolved	1.06		0.00500	1	10/13/2020 02:44	WG1558040

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	10/15/2020 22:23	WG1559928
Toluene	ND		0.00100	1	10/15/2020 22:23	WG1559928
Ethylbenzene	ND		0.00100	1	10/15/2020 22:23	WG1559928
Total Xylenes	ND		0.00300	1	10/15/2020 22:23	WG1559928
(S) Toluene-d8	*102*		*80.0-120*		*10/15/2020 22:23*	WG1559928
(S) 4-Bromofluorobenzene	*98.9*		*77.0-126*		*10/15/2020 22:23*	WG1559928
(S) 1,2-Dichloroethane-d4	*122*		*70.0-130*		*10/15/2020 22:23*	WG1559928

Method Blank (MB)

(MB) R3580752-1 10/11/20 17:50

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

L1270419-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1270419-01 10/11/20 17:50 • (DUP) R3580752-3 10/11/20 17:50

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	30200	34200	1	12.4	J3	5

Laboratory Control Sample (LCS)

(LCS) R3580752-2 10/11/20 17:50

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	7810	88.8	77.4-123	

Method Blank (MB)

(MB) R3582135-1 10/14/20 02:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	3.00	J	2.82	10.0

L1271259-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1271259-01 10/14/20 02:47 • (DUP) R3582135-3 10/14/20 02:47

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	971	980	1	0.923		5

L1271609-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1271609-01 10/14/20 02:47 • (DUP) R3582135-4 10/14/20 02:47

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	900	911	1	1.21		5

Laboratory Control Sample (LCS)

(LCS) R3582135-2 10/14/20 02:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8810	100	77.4-123	

Method Blank (MB)

(MB) R3581995-1 10/14/20 16:43

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

L1271724-13 Original Sample (OS) • Duplicate (DUP)

(OS) L1271724-13 10/14/20 23:10 • (DUP) R3581995-3 10/14/20 23:24

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

L1271945-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1271945-02 10/15/20 02:02 • (DUP) R3581995-6 10/15/20 02:15

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	ND	1	2.35		15

Laboratory Control Sample (LCS)

(LCS) R3581995-2 10/14/20 16:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	40.4	101	80.0-120	

L1271724-14 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1271724-14 10/14/20 23:37 • (MS) R3581995-4 10/14/20 23:50 • (MSD) R3581995-5 10/15/20 00:30

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	ND	54.7	54.8	109	110	1	80.0-120			0.320	15

L1271945-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1271945-02 10/15/20 02:02 • (MS) R3581995-7 10/15/20 02:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	ND	54.9	106	1	80.0-120	

Method Blank (MB)

(MB) R3580868-1 10/13/20 01:16

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron,Dissolved	U		0.0281	0.100
Manganese,Dissolved	U		0.000704	0.00500

Laboratory Control Sample (LCS)

(LCS) R3580868-2 10/13/20 01:19

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron,Dissolved	5.00	5.47	109	80.0-120	
Manganese,Dissolved	0.0500	0.0521	104	80.0-120	

L1271785-37 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1271785-37 10/13/20 01:23 • (MS) R3580868-4 10/13/20 01:29 • (MSD) R3580868-5 10/13/20 01:33

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron,Dissolved	5.00	ND	5.06	5.12	101	102	1	75.0-125			1.25	20
Manganese,Dissolved	0.0500	ND	0.0491	0.0504	98.2	101	1	75.0-125			2.55	20

Method Blank (MB)

(MB) R3581998-2 10/14/20 21:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*103*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.1*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*97.1*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3581998-1 10/14/20 21:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00449	89.8	70.0-123	
Ethylbenzene	0.00500	0.00516	103	79.0-123	
Toluene	0.00500	0.00441	88.2	79.0-120	
Xylenes, Total	0.0150	0.0141	94.0	79.0-123	
(S) Toluene-d8			*100*	*80.0-120*	
(S) 4-Bromofluorobenzene			*95.7*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*97.6*	*70.0-130*	

Method Blank (MB)

(MB) R3581962-2 10/15/20 12:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	*101*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.5*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*121*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3581962-1 10/15/20 11:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00515	103	70.0-123	
Ethylbenzene	0.00500	0.00545	109	79.0-123	
Toluene	0.00500	0.00510	102	79.0-120	
Xylenes, Total	0.0150	0.0153	102	79.0-123	
(S) Toluene-d8			*97.9*	*80.0-120*	
(S) 4-Bromofluorobenzene			*101*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*130*	*70.0-130*	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

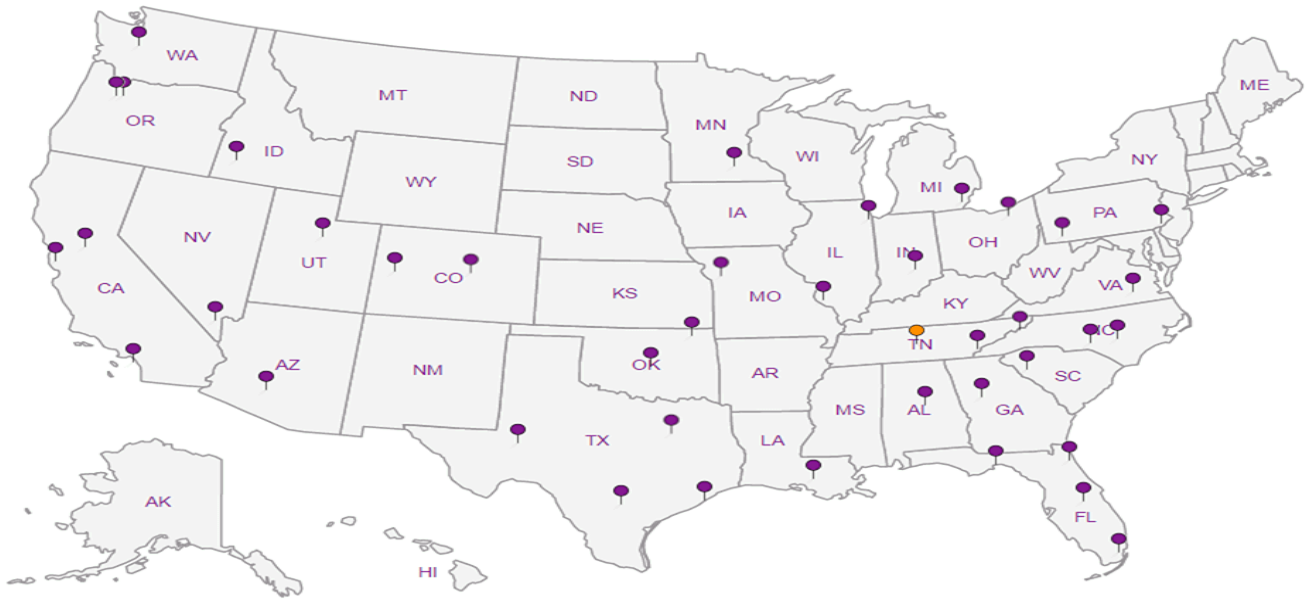
Third Party Federal Accreditations

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

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



HilCorp-Farmington, NM

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Aztec, NM 87401

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Pres Chk

Report to: Kurt Hoekstra

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

Project Description: Mangum 1

City/State Collected:

Please Circle: PT MT CT ET

Phone: 505-486-9543

Client Project # MANGUM 1

Lab Project # HILCORANM-MANGUM

Collected by (print): Kurt

Collected by (signature): Kurt Hoekstra

Immediately Packed on Ice N ___ Y X

Site/Facility ID # MANGUM 1

P.O. #

Quote #

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

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved Fe, Mn 250mlHDPE-NoPres	SULFATE, TDS 250mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	NO SAMPLES FIELD FILTERED	Remarks	Sample # (lab only)
MW1		GW		10-8	10:55	5	X	X	X	X		-01
MW2		GW		10-8	11:54	5	X	X	X	X		02
MW3		GW		10-5	10:10	5	X	X	X	X		03
MW4		GW		10-8	10:12	5	X	X	X	X		04
MW5		GW		10-5	3:12	5	X	X	X	X		05
MW6		GW		10-5	1:10	5	X	X	X	X		06
MW7		GW		10-5	11:12	5	X	X	X	X		07

Chain of Custody Page ___ of ___

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Prelogin: P800114
PM: 823 - Olivia Studebaker
PB: 9/25/20 mc
Shipped Via: FedEX Ground

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

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

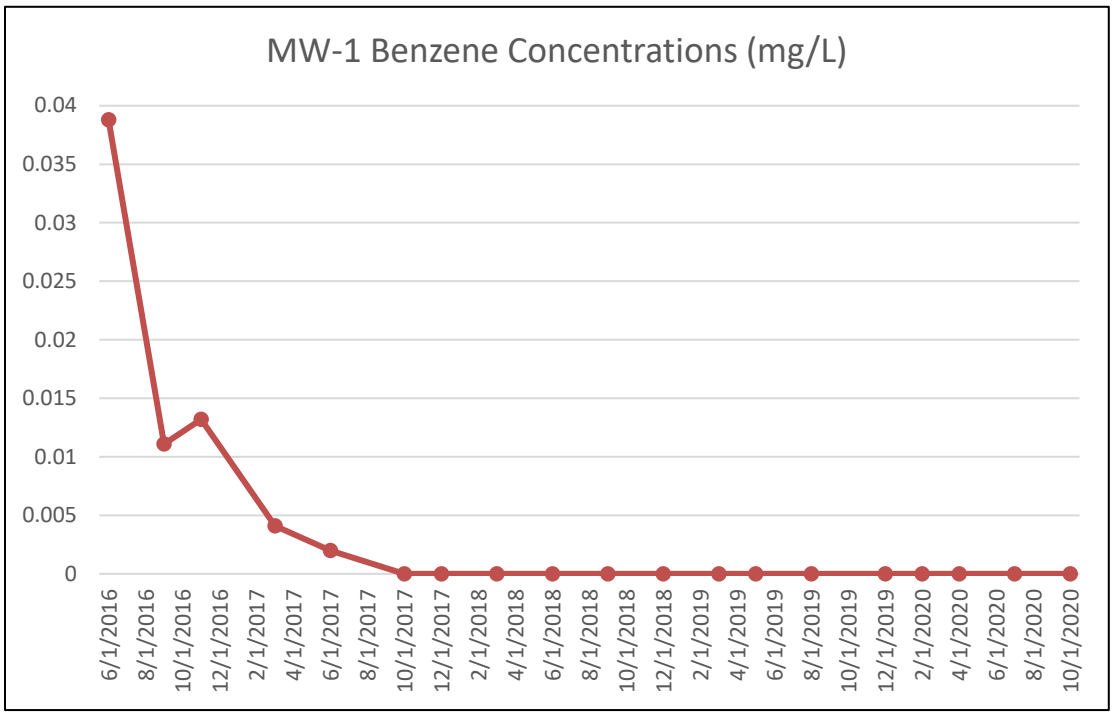
Tracking # 9186 2504 4039

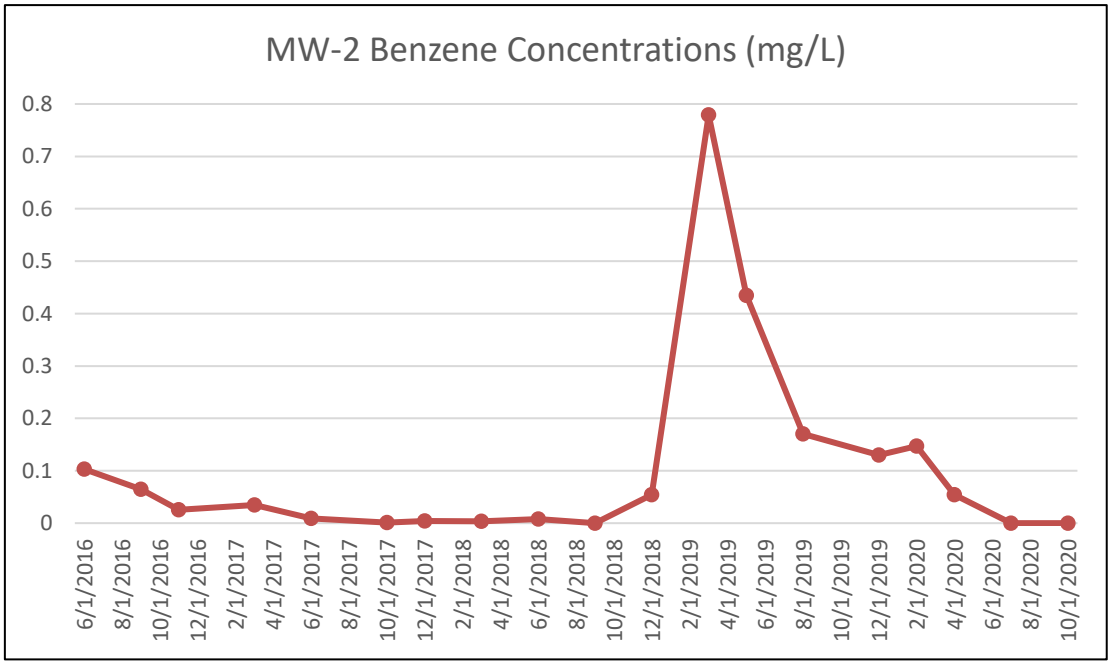
Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

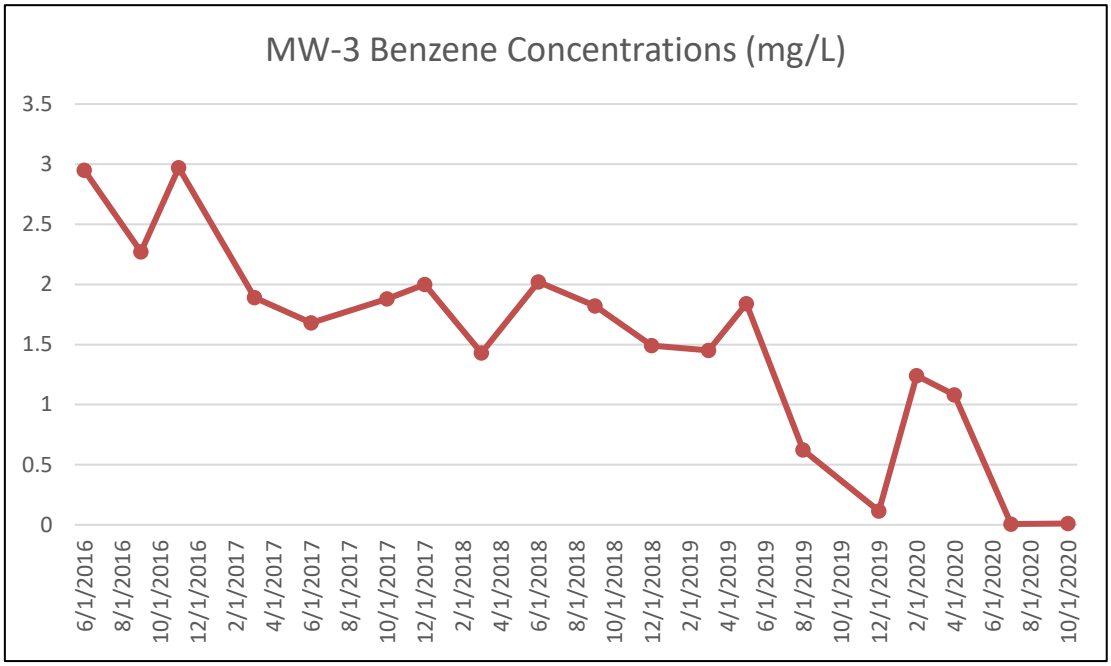
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
Kurt Hoekstra	10-8-20	2:30		0	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.9 °C	Bottles Received: 35
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/09/2020	Time: 09:00

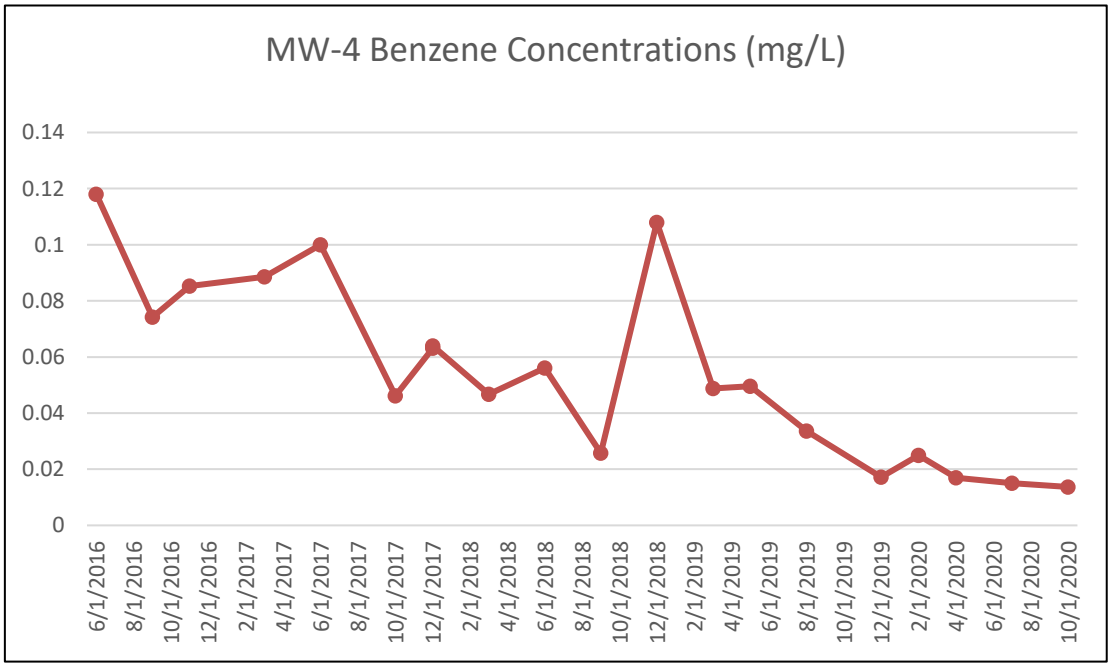
Hold: | Condition: NCF / OK

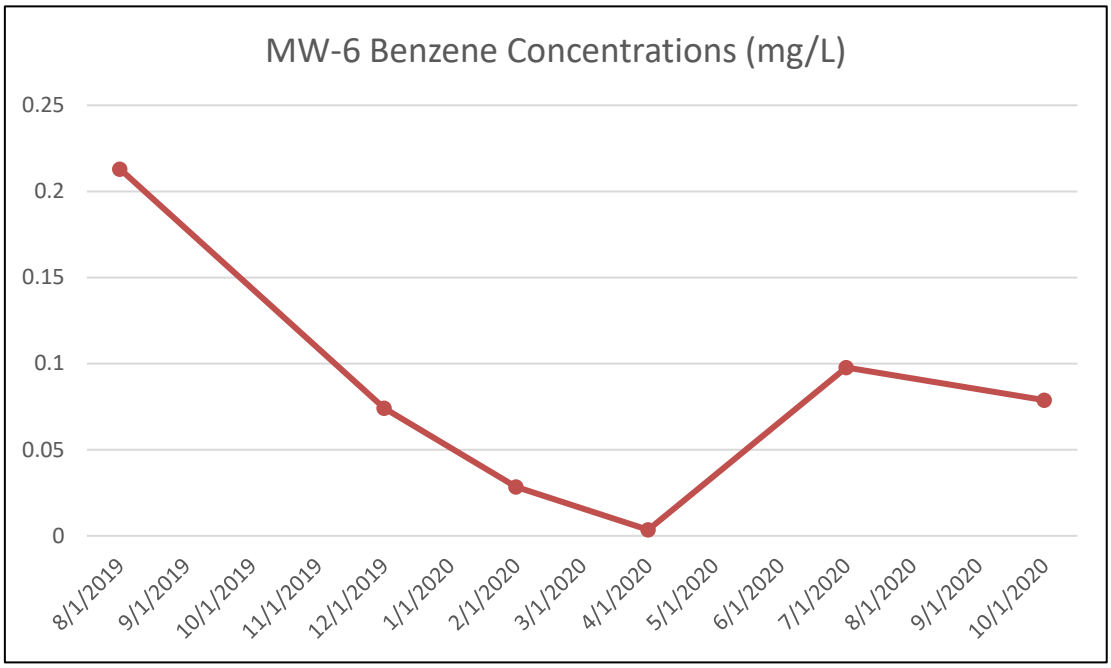
ENCLOSURE B – BENZENE CONCENTRATION GRAPHS


MW-1 Benzene Concentrations (mg/L)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
6/1/2016
8/1/2016
10/1/2016
12/1/2016
2/1/2017
4/1/2017
6/1/2017
8/1/2017
10/1/2017
12/1/2017
2/1/2018
4/1/2018
6/1/2018
8/1/2018
10/1/2018
12/1/2018
2/1/2019
4/1/2019
6/1/2019
8/1/2019
10/1/2019
12/1/2019
2/1/2020
4/1/2020
6/1/2020
8/1/2020
10/1/2020


MW-2 Benzene Concentrations (mg/L)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
6/1/2016
8/1/2016
10/1/2016
12/1/2016
2/1/2017
4/1/2017
6/1/2017
8/1/2017
10/1/2017
12/1/2017
2/1/2018
4/1/2018
6/1/2018
8/1/2018
10/1/2018
12/1/2018
2/1/2019
4/1/2019
6/1/2019
8/1/2019
10/1/2019
12/1/2019
2/1/2020
4/1/2020
6/1/2020
8/1/2020
10/1/2020


MW-3 Benzene Concentrations (mg/L)
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2016
8/1/2016
10/1/2016
12/1/2016
2/1/2017
4/1/2017
6/1/2017
8/1/2017
10/1/2017
12/1/2017
2/1/2018
4/1/2018
6/1/2018
8/1/2018
10/1/2018
12/1/2018
2/1/2019
4/1/2019
6/1/2019
8/1/2019
10/1/2019
12/1/2019
2/1/2020
4/1/2020
6/1/2020
8/1/2020
10/1/2020


MW-4 Benzene Concentrations (mg/L)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
6/1/2016
8/1/2016
10/1/2016
12/1/2016
2/1/2017
4/1/2017
6/1/2017
8/1/2017
10/1/2017
12/1/2017
2/1/2018
4/1/2018
6/1/2018
8/1/2018
10/1/2018
12/1/2018
2/1/2019
4/1/2019
6/1/2019
8/1/2019
10/1/2019
12/1/2019
2/1/2020
4/1/2020
6/1/2020
8/1/2020
10/1/2020


MW-6 Benzene Concentrations (mg/L)
0.25
0.2
0.15
0.1
0.05
0
8/1/2019
9/1/2019
10/1/2019
11/1/2019
12/1/2019
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020

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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 22148

CONDITIONS

Operator:	OGRID:
HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	372171
	Action Number: 22148
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
nvelez	Review of 2020 Annual Groundwater Monitoring Report: Content satisfactory 1. Continue sampling well MW-2 for dissolved iron during 2021 quarterly sampling 2. OCD approves eliminating dissolved iron lab analysis from all other wells 3. Install an upgradient groundwater monitoring well in the location previously attempted in 2019 (location MW-8) to assess upgradient groundwater conditions and background concentrations of dissolved iron, dissolved manganese, sulfate, and TDS 4. Continue quarterly monitoring of all Site wells for BTEX constituents 5. Submit the Annual Monitoring Report to the OCD no later than March 31, 2022	12/29/2021