GW - 28

FARM FIELDS STAGE I ABATEMENT PLAN

2019

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Second Quarterly Progress Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Prepared for:

HollyFrontier Navajo Refining LLC
501 East Main Street, Artesia, New Mexico 88210

Prepared by:

Wood Environment and Infrastructure Solutions, Inc.
17320 Katy Freeway, Houston, Texas 77094
Project 6703180022
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List of Acronyms

AP	Stage 1 Abatement Plan
bgs	below ground surface
CGWSL	Critical Groundwater Screening Level
COC	Constituent of Concern
EPA	United States Environmental Protection Agency
ft	feet
HFNR	HollyFrontier Navajo Refining LLC
MCL	Maximum Contaminant Level
mL/min	milliliters per minute
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
QA/QC	Quality Assurance/Quality Control
RO	Reverse Osmosis
TDS	Total Dissolved Solids
WQCC	Water Quality Control Commission
WQS	WQCC Standards

1.0 INTRODUCTION

HollyFrontier Navajo Refining LLC (HFNR) owns and operates the Navajo Refinery (Refinery), which is located in Artesia, New Mexico (**Figure 1**) and can process heavy, sour and light, sweet crude oils. The facility has been in operation since the 1920s, runs a predominant slate of Permian Basin crudes that are gathered in west Texas and southeast New Mexico, and can also source a variety of crude oils from Cushing, Oklahoma including Canadian crudes. The Refinery serves markets in the southwestern United States and northern Mexico.

HFNR utilizes reverse osmosis (RO) to remove minerals and salts from fresh water prior to use in the refining process. The fresh water is supplied from a blend of publicly supplied water from the City of Artesia and fresh groundwater obtained from the Refinery's water supply wells. The treated water (permeate stream) is used in the Refinery process while the RO reject stream cannot be used in the Refinery process as it contains concentrated salts and minerals that do not pass through the RO membranes. Prior to January 24, 2019, this concentrated rejected stream was discharged to the surface of two fields located northeast of the Refinery operations area (**Figure 2**). The RO reject discharge fields are covered with native grass and discharged water was allowed to percolate or evaporate in those permitted areas. The discharge was performed under the jurisdiction of the State of New Mexico Energy, Minerals and Natural Resource Department Oil Conservation Division (OCD) in accordance with Discharge Permit GW-028 (Permit), which was initially issued in October 1991. The Permit has subsequently been modified and renewed several times with the most recent renewal issued in May 2017 (OCD 2017) and the most recent modification issued in December 2018 (OCD 2018).

In 2017, OCD renewed the Permit, which required that discharge of RO reject water to the surface cease upon operational completion of a Class I disposal well, but not later than October 31, 2018 (OCD 2017). An extension to the October 31, 2018 deadline was requested and approved by OCD due to delays in operational completion of the Class I disposal well (OCD 2018). The renewed Permit requires characterization and abatement of vadose zone and groundwater contamination due to the historical discharge of RO reject fluid. The Permit stipulated that a plan for characterization and abatement of such contamination should be submitted within 60 days after cessation of discharge of RO reject fluid. The disposal well became operational on January 16, 2019, and the discharge was discontinued on January 24, 2019. The Stage 1 Abatement Plan (AP) was submitted on March 21, 2019 (Wood 2019a), amended on May 24, 2019 (Wood 2019b) per OCD requests, and approved by OCD via email on June 7, 2019.

This second quarterly progress report provides a summary of the AP activities conducted through December 2019 including:

- Continued monitoring of soil moisture probes
- Collection of second quarterly groundwater samples from new and existing monitoring wells
- Laboratory analyses of groundwater samples

2.0 BACKGROUND

2.1 Soil Moisture Probe Monitoring

As described in the first quarterly monitoring report (Wood 2019c), soil moisture probes were placed at depths of 2, 5, and 10 feet below ground surface (ft bgs) in three locations within each of the two RO reject discharge fields at the locations shown on **Figure 3**.

2.2 Groundwater Sampling

Groundwater samples were collected from the 5 newly installed monitoring wells and from 12 existing monitoring wells located upgradient, within, and downgradient of each of the two RO reject discharge fields as shown in **Figure 3**. The wells included in the groundwater monitoring program for the AP are:

- North RO Reject Discharge Field:
  - Upgradient: MW-55, MW-140, MW-141
  - Within Field: MW-117, MW-118, MW-119
  - Downgradient: MW-142, MW-143
- South RO Reject Discharge Field:
  - Upgradient: MW-29, MW-40, MW-56
  - Within Field: MW-114, MW-115, MW-116
  - Downgradient: MW-125, RW-18A, MW-144

Prior to sampling, the water level was measured in each well. **Table 1** provides a summary of the water level measurements.

Low-flow groundwater sampling procedures using a peristaltic pump and dedicated tubing were utilized for all groundwater samples collected. The water was purged at a rate of 150 to 250 milliliters per minute (mL/min) until the field measurements of at least three of the five water quality parameters, including pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen, stabilized within 10% for three consecutive readings. Groundwater sampling logs are included in **Appendix A**.

Following the completion of purging, groundwater samples were collected directly into the laboratory-provided sample containers from the dedicated tubing. Samples to be analyzed for dissolved metals were collected directly into the laboratory-provided sample containers from the dedicated tubing with a dedicated disposable filter attached to remove any particles greater than 0.45 microns in size. Containers were labeled and placed into appropriate containers (coolers) with ice for shipment to the analytical laboratory under the proper chain of custody.

QA/QC samples were collected to monitor the validity of the groundwater sample collection procedures. The following samples were collected for QA/QC purposes:

- Field duplicates were collected at a rate of 10%, or 1 field duplicate for every 10 groundwater samples. Field duplicates were analyzed for the same constituents as the parent sample.
- Equipment blanks were collected from non-dedicated sampling apparatus at a frequency of 5%, or one for every 20 groundwater samples collected, with a minimum of 1 equipment blank per day. Equipment blank samples were analyzed for the same constituents as the sample associated with the equipment blank (sample collected immediately prior to the equipment blank).

3.0 REGULATORY CRITERIA

HFNR has followed statewide and federal risk assessment guidance, including the risk assessment guidelines provided by New Mexico Environment Department (NMED), to develop a critical groundwater screening level (CGWSL) to determine which potential constituents of concern (COCs) require additional evaluation, risk assessment or cleanup. The CGWSL was determined as follows:

- New Mexico Water Quality Control Commission (WQCC) Standards (WQS) found in New Mexico Administrative Code (NMAC) 20.6.2.3103, updated December 28, 2018.
- The United States Environmental Protection Agency (EPA) Federal Maximum Contaminant Levels (MCL).
- If no value for the WQS or MCL was available, then Tap Water value from Table A-1 of the Risk Assessment Guidance for Site Investigations and Remediation (NMED 2019), if available.

4.0 ANALYTICAL RESULTS AND DISCUSSION

4.1 Soil Moisture Monitoring

Soil moisture monitoring within the vadose zone at MP-1 through MP-8 started on July 16, 2019. Remotely recorded data from the probes was downloaded periodically and has been tabulated for evaluation of the soil conditions.

Data recording ceased from the 10 ft bgs probe at location MP-2 in early October 2019. The manufacturer was contacted to determine the possible cause. Additional data loss began in mid-October and personnel were sent to the field to inspect the probes. It was determined that cattle had broken through the fencing that had been installed around 6 of the 8 moisture probes and chewed on the wires, causing many of the probes to cease recording data for a period of time. The probe locations, depths, and dates of unrecorded data include:

- MP-1: no data loss
- MP-2: 10/2/19 to 11/11/19 no data recorded from the 10 ft bgs probe, 11/15/19 to 12/13/19 no data recorded from the 5 ft bgs probe
- MP-3: 10/19/19 to 11/11/19 no data recorded from the 5 ft bgs probe
- MP-4: 10/20/19 to 11/11/19 no data recorded from the 2 ft bgs probe
- MP-5: 10/22/19 to 11/11/19 no data recorded from the 2 ft bgs, 5 ft bgs, and 10 ft bgs probes; 11/11/19 to 11/13/19 no data recorded from the 2 ft bgs probe
- MP-6: 11/10/19 to 11/11/19 no data recorded from the 5 ft bgs probe and 10/17/19 to 11/11/19 no data recorded from the 10 ft bgs probe
- MP-7: no data loss
- MP-8: 10/13/19 to 11/11/19 no data recorded from the 5 ft bgs probe

The wires were repaired on November 11 and 13, 2019, and more robust measures were instituted to reduce the chance of future damage to the wires from livestock. The wires on the 5 ft bgs probe from MP-2 were repaired again on December 13, 2019 and additional changes were made to reduce the ability for livestock to damage the wires.

Precipitation data for Artesia was obtained from www.usclimatedata.com for the period of July 16, 2019 through December 31, 2019. The weather station that provides the precipitation data to this website is located approximately 6 miles south of the RO reject discharge fields.

An evaluation of the data trends for soil moisture from July 16 through December 31, 2019 was performed. The data trends are presented in **Appendix B**, with graphs that depict the soil moisture data at the three probe depths as line graphs and the precipitation data as a vertical bar graph. Gaps in the line graphs reflect time periods when the probes were not recording data due to damaged wires. In general, the data suggests that the moisture content is stabilizing at the 10 ft depth. The moisture content at locations MP-3 and MP-6 at the 10 ft depth does not appear to be as stable as the moisture content at the other locations. The moisture probe data did reflect a response to significant precipitation events, as expected.

Soil moisture probes will remain in place throughout the implementation of the AP and data will continue to be collected to evaluate the vadose zone moisture including observed effects from extended dry periods and precipitation events.

4.2 Groundwater Analytical Results

4.2.1 Analytical Results

Groundwater samples were analyzed during this quarterly monitoring event for the following parameters:

- Total Metals (Arsenic, Boron, Cobalt, Iron, Lead, Manganese, and Uranium) by Methods 6010 or 6020
- Dissolved (field-filtered) Metals (Arsenic, Boron, Cobalt, Iron, Lead, Manganese, and Uranium) by Methods 6010 or 6020
- Total Cations (Calcium, Magnesium, Potassium, and Sodium) by Methods 6010 or 6020
- Total Anions (Chloride, Fluoride, Sulfate, Carbonate, Bicarbonate, and Nitrate/Nitrite as N) by Method 300
- Total Dissolved Solids (TDS)

Groundwater analytical results are included in **Appendix C** (in electronic format), along with a data assessment summary. The data was determined to be usable for the purposes of this investigation.

Table 3 provides a summary of the groundwater analytical data. The analytes with reported concentrations above the applicable standards listed in Section 3.2 include:

- Total Metals:
  - Arsenic – in MW-29 only
  - Boron – in MW-29, MW-55, MW-115, and MW-143
  - Iron – in MW-29 and MW-142
  - Manganese – in MW-29, MW-56, MW-114, and MW-125
  - Uranium – in MW-55, MW-115, MW-118, MW-119, MW-125, MW-140, MW-142, MW-143, and RW-18A
- Dissolved Metals:
  - Arsenic – in MW-29 only
  - Boron – in MW-55, MW-143, MW-29, and MW-115
  - Iron – in MW-29 only
  - Manganese – in MW-29, MW-56, MW-114, and MW-125
  - Uranium – in MW-55, MW-115, MW-118, MW-119, MW-125, MW-140, MW-142, MW-143, and RW-18A
- General Chemistry Parameters:
  - Chloride – in at least one sample from all of the wells except MW-40 and RW-18A
  - Fluoride – in at least one sample from all of the wells except MW-56, MW-125, and MW-143
  - Nitrate/Nitrite – in one sample from MW-140
  - Sulfate – in all samples from all wells
  - TDS – in all samples from all wells

4.2.2 Groundwater Classification

The ionic data obtained during the second quarterly sampling event was used to construct Stiff and Piper diagrams to classify the groundwater upgradient, beneath, and downgradient from the two RO reject discharge fields. The data and diagrams are provided in **Appendix D,** along with the diagrams constructed for the first quarterly monitoring event. These diagrams will be updated with future data from the planned quarterly monitoring events to evaluate any changes in groundwater characteristics.

5.0 SUMMARY AND CONCLUSIONS

The AP continues to be implemented according to the approved work plan. This second quarterly monitoring event included the following activities:

- Soil moisture:
  - Continued monitoring of soil moisture at three different depths at eight different locations.
  - Repairs to the wires connecting the probes to the data connectors were conducted after the wires were damaged by livestock. More robust measures were implemented to prevent future damage by livestock.
  - Graphs of data collected between July 16 and December 31, 2019 indicate that the fields are draining, and are responsive to significant precipitation events as observed during October 2019.
- Groundwater sampling:
  - Groundwater samples were collected from the 17 monitoring wells along with 2 duplicate samples.
  - Groundwater analytical data indicates:
    - The CGWSL is exceeded in at least one well for the following metals: Arsenic, Boron, Iron, Manganese, Uranium
    - The CGWSL is exceeded in at least one well for the following general chemistry parameters: Chloride, Fluoride, Nitrate/Nitrite, Sulfate, TDS.
  - Water classification diagrams have been constructed for samples collected from each well and will continue to be used to evaluate changes to the groundwater following cessation of discharge of the RO reject stream.

Based on the preliminary data, it appears that the constituents detected in groundwater samples are relatively consistent between upgradient and downgradient samples. A more thorough evaluation of the data will be provided following completion of the fourth quarterly monitoring event.

The next sampling event will be conducted during the first quarter of 2020. Additional conclusions and recommendations will be provided with the Final Report, which will be submitted after the fourth quarterly sampling event is completed.

6.0 REFERENCES

NMED 2019. Risk Assessment Guidance for Site Investigations and Remediation. March 2019.

OCD 2017. Discharge Permit GW-028. May 25, 2017.

OCD 2018. Discharge Permit (GW-28) Modification. December 14, 2018.

Wood 2019a. Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields Discharge Permit GW-028. March 21, 2019.

Wood 2019b. Amendment of the March 2019 Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields. May 24, 2019.

Wood 2019c. Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – First Quarterly Progress Report. August 28, 2019.

TABLES

Table 1 - Water Level Measurements

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Field	Area	Well	Event	Date	Depth to Water (ft btoc)	Top of Casing (ft amsl)	Groundwater Elevation (ft amsl)
North RO Field	Upgradient	MW-55	Quarter 1	7/17/2019	13.10	3364.77	3351.67
			Quarter 2	10/22/2019	12.51	3364.77	3352.26
		MW-140	Quarter 1	7/15/2019	9.46	3361.23	3351.77
			Quarter 2	10/22/2019	9.31	3361.23	3351.92
		MW-141	Quarter 1	7/15/2019	10.62	3359.89	3349.27
			Quarter 2	10/22/2019	9.95	3359.89	3349.94
	In Field	MW-117	Quarter 1	7/17/2019	12.58	3363.01	3350.43
			Quarter 2	10/22/2019	11.78	3363.01	3351.23
		MW-118	Quarter 1	7/17/2019	15.23	3361.95	3346.72
			Quarter 2	10/22/2019	15.19	3361.95	3346.76
		MW-119	Quarter 1	7/17/2019	13.75	3356.11	3342.36
			Quarter 2	10/22/2019	13.70	3356.11	3342.41
	Downgradient	MW-142	Quarter 1	7/12/2019	13.16	3355.78	3342.62
			Quarter 2	10/22/2019	13.13	3355.78	3342.65
		MW-143	Quarter 1	7/12/2019	13.51	3355.85	3342.34
			Quarter 2	10/22/2019	13.58	3355.85	3342.27
South RO Field	Upgradient	MW-29	Quarter 1	7/17/2019	18.61	3360.64	3342.03
			Quarter 2	10/22/2019	18.21	3360.64	3342.43
		MW-40	Quarter 1	7/17/2019	11.87	3356.93	3345.06
			Quarter 2	10/22/2019	11.44	3356.93	3345.49
		MW-56	Quarter 1	7/17/2019	14.00	3357.44	3343.44
			Quarter 2	10/22/2019	13.21	3357.44	3344.23
	In Field	MW-114	Quarter 1	7/17/2019	13.96	3361.68	3347.72
			Quarter 2	10/22/2019	13.47	3361.68	3348.21
		MW-115	Quarter 1	7/17/2019	13.75	3359.31	3345.56
			Quarter 2	10/22/2019	12.95	3359.31	3346.36
		MW-116	Quarter 1	7/17/2019	14.06	3353.77	3339.71
			Quarter 2	10/22/2019	12.77	3353.77	3341.00
	Downgradient	MW-125	Quarter 1	7/17/2019	17.02	3358.81	3341.79
			Quarter 2	10/22/2019	16.11	3358.81	3342.70
		MW-144	Quarter 1	7/16/2019	14.51	3351.12	3336.61
			Quarter 2	10/22/2019	13.13	3351.12	3337.99
		RW-18A	Quarter 1	7/17/2019	15.99	3350.84	3334.85
			Quarter 2	10/22/2019	14.02	3350.84	3336.82

Notes and Abbreviations

ft	feet
ft amsl	feet above mean sea level
ft btoc	feet below top of casing
RO	Reverse Osmosis

Table 2 - Purge Paramaters

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Field	Area	Well	Event	Date	Volume Purged (gallons)	Temperature (°C)	pH (Standard units)	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Turbidity (NTU)	Clarity
North RO Field	Upgradient	MW-55	Quarter 1	7/17/2019	1.00	22.51	6.81	5.350	0	-259	0	Clear
			Quarter 2	10/22/2019	1.06	20.20	6.61	4.210	2.1	155.7	7.4	Clear
		MW-140	Quarter 1	7/15/2019	110.00	21.49	6.45	4.310	0.45	144	340	Clear
			Quarter 2	10/22/2019	1.32	18.80	6.75	3.570	1.7	70.4	30.7	Slightly Cloudy
		MW-141	Quarter 1	7/15/2019	110.00	19.40	6.33	3.480	0.14	138	7.5	Clear
			Quarter 2	10/22/2019	1.06	17.90	6.83	2.910	2.6	56.4	7.6	Clear
	In Field	MW-117	Quarter 1	7/17/2019	1.00	21.75	6.72	4.260	0	161	63.4	Clear
			Quarter 2	10/22/2019	1.06	20.10	6.22	2.700	2	43.1	14.3	Clear
		MW-118	Quarter 1	7/17/2019	0.70	20.58	6.77	4.870	3.55	171	67.3	Clear
			Quarter 2	10/22/2019	1.06	18.90	6.28	3.150	3.2	71.3	31.3	Clear
		MW-119	Quarter 1	7/17/2019	1.00	20.49	6.87	4.960	0	148	49.4	Clear
			Quarter 2	10/22/2019	1.06	19.60	6.41	3.260	2.7	47.6	28.3	Clear
	Downgradient	MW-142	Quarter 1	7/12/2019	110.00	18.29	6.63	4.310	0	110	65.1	Clear
			Quarter 2	10/22/2019	1.06	19.00	6.84	4.240	0.9	121.8	75.9	Slightly Cloudy
		MW-143	Quarter 1	7/12/2019	110.00	17.84	6.76	4.540	0	81	375	Clear
			Quarter 2	10/22/2019	1.06	19.30	6.98	4.490	1.4	81.7	55.4	Slightly Cloudy
South RO Field	Upgradient	MW-29	Quarter 1	7/17/2019	1.00	23.72	6.89	5.780	0	-173	0	Clear
			Quarter 2	10/22/2019	1.06	20.40	6.67	4.200	1.6	-203	8.1	Clear
		MW-40	Quarter 1	7/17/2019	0.85	24.95	6.83	3.220	0.35	-347	0	Clear
			Quarter 2	10/22/2019	1.06	22.30	6.80	2.470	1.3	-336.8	9.7	Clear
		MW-56	Quarter 1	7/17/2019	1.00	23.35	6.56	4.260	0	70	0	Clear
			Quarter 2	10/22/2019	1.06	21.10	6.70	4.110	1.6	-43.8	0.6	Clear
	In Field	MW-114	Quarter 1	7/17/2019	1.00	21.81	6.74	4.190	0	153	1.8	Clear
			Quarter 2	10/22/2019	1.06	19.90	6.70	3.375	1.4	78.4	1.9	Clear
		MW-115	Quarter 1	7/17/2019	1.00	19.90	6.94	4.970	0	134	13.2	Clear
			Quarter 2	10/22/2019	1.06	18.80	6.78	3.798	2.7	53.2	1.1	Clear
		MW-116	Quarter 1	7/17/2019	1.30	21.17	6.85	4.300	0	125	124	Clear
			Quarter 2	10/22/2019	1.06	18.40	6.81	3.820	1.1	72.9	10.8	Clear
	Downgradient	MW-125	Quarter 1	7/17/2019	0.80	22.47	6.61	5.010	0	149	0	Clear
			Quarter 2	10/22/2019	1.06	18.20	6.81	4.131	2.3	65.1	3.9	Clear
		MW-144	Quarter 1	7/16/2019	55.00	15.64	6.49	3.620	0	128	1000+	Clear/Tan
			Quarter 2	10/22/2019	1.06	21.10	6.82	4.100	2	140.3	59.2	Slightly Cloudy
		RW-18A	Quarter 1	7/17/2019	1.05	20.02	6.72	4.460	0	102	0	Clear
			Quarter 2	10/22/2019	1.06	21.40	6.79	4.520	2.1	69.4	16.8	Clear

Notes and Abbreviations

All samples collected using a peristaltic pump

°C = degrees Celsius

mg/L = milligrams per liter

mS/cm = milliSiemens per centimeter

mV = millivolts

NTU = Nephelometric Turbidity Unit

Table 3 - Summary of Groundwater Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

				Total Metals							Dissolved Metals						
Analyte:				Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
Units:				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:				0.01	0.75	0.05	1.0	0.015	0.2	0.03	0.01	0.75	0.05	1.0	0.015	0.2	0.03
CGWSL Source:				WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH
Location	**Well**	**Date**	**Type**														
North RO Field																	
Upgradient	MW-55	07/17/2019	N														
		10/22/2019	N	0.00615	**1.07**	<0.000260	0.0207 J	<0.0020 BJU	0.132	**0.0513**	0.00595	**1.00**	<0.000260	<0.0141	<0.0020 BJU	0.126	**0.0504**
		10/22/2019	FD	0.00618	**1.03**	<0.000260	0.0288 J	<0.000240	0.133	**0.0511**	0.00605	**1.01**	<0.000260	<0.0141	<0.0020 BJU	0.128	**0.0528**
	MW-140	07/15/2019	N														
		10/22/2019	N	0.00241	0.412	<0.000260	0.224	<0.0020 BJU	0.102	**0.0318**	0.00247	0.395	<0.000260	<0.0141	<0.0020 BJU	0.0975	**0.0325**
	MW-141	07/15/2019	N														
		07/15/2019	FD														
		10/22/2019	N	0.00389	0.215	0.000333 J	0.132	<0.0020 BJU	0.00939	0.0280	0.00360	0.218	0.000308 J	0.0159 J	<0.000240	0.00925	0.0288
In Field	MW-117	07/17/2019	N														
		10/22/2019	N	0.0025	0.145 J	<0.000260	0.0611 J	<0.000240	<0.0050 BJU	0.0176	0.00243	0.147 J	<0.000260	0.0195 J	<0.000240	<0.0050 BJU	0.0172
	MW-118	07/17/2019	N														
		10/22/2019	N	0.00871	0.352	<0.000260	0.127	<0.000240	<0.0050 BJU	**0.0371**	0.00863	0.366	<0.000260	<0.0141	<0.0020 BJU	<0.0050 BJU	**0.037**
	MW-119	07/17/2019	N														
		10/22/2019	N	0.00430	0.334	0.000429 J	0.805	<0.0020 BJU	0.0188	**0.0322**	0.00388	0.338	<0.000260	0.0215 J	<0.0020 BJU	0.00524	**0.0325**
Downgradient	MW-142	07/12/2019	N														
		10/22/2019	N	0.00364	0.381	0.000744 J	**1.55**	<0.0020 BJU	0.0257	**0.0371**	0.00317	0.380	0.000525 J	0.0160 J	<0.000240	0.0177	**0.0369**
	MW-143	07/12/2019	N														
		10/22/2019	N	0.00338	**0.870**	0.00239	0.419	<0.0020 BJU	0.109	**0.0491**	0.00336	**0.848**	0.00248	0.0249 J	<0.0020 BJU	0.107	**0.0484**
South RO Field																	
Upgradient	MW-29	07/17/2019	N														
		10/22/2019	N	**0.0157**	**1.33**	<0.000260	**4.37**	0.00892	**0.579 V**	0.0190	**0.0143**	**1.26**	<0.000260	**4.05**	<0.0020 BJU	**0.574 V**	0.0189
	MW-40	07/17/2019	N														
		10/22/2019	N	0.00106 J	0.311	<0.000260	0.270 J	<0.0020 BJU	0.0233	0.000622 J	0.000851 J	0.292	<0.000260	0.0179 J	<0.0020 BJU	0.0238	0.000544 J
		10/22/2019	FD	0.000878 J	0.300	<0.000260	0.135 J	<0.0020 BJU	0.0239	0.000602 J	0.000829 J	0.305	<0.000260	0.0236 J	<0.0020 BJU	0.0243	0.000538 J
	MW-56	07/17/2019	N														
		10/22/2019	N	0.00515	0.284	0.00698	<0.0141	<0.0020 BJU	**0.306**	0.0178	0.00524	0.269	0.00699	<0.0141	<0.0020 BJU	**0.304**	0.0173
In Field	MW-114	07/17/2019	N														
		10/22/2019	N	0.00295	0.118 J	0.00643	<0.0141	<0.000240	**1.03**	0.0107	0.00286	0.122 J	0.00604	<0.0141	<0.0020 BJU	**0.972**	0.0108
	MW-115	07/17/2019	N														
		10/22/2019	N	0.00443	**0.780**	0.00109 J	0.286	<0.0020 BJU	0.155	**0.0793**	0.00405	**0.767**	0.000362 J	<0.0141	<0.0020 BJU	0.120	**0.0825**
	MW-116	07/17/2019	N														
		07/17/2019	FD														
		10/22/2019	N	0.00314	0.215	0.00231	0.0285 J	<0.000240	0.00834	0.0268	0.00323	0.205	0.00233	<0.0141	<0.000240	0.00748	0.0271

Table 3 - Summary of Groundwater Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

				Analyte Group:	Total Metals							Dissolved Metals						
				Analyte:	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.01	0.75	0.05	1.0	0.015	0.2	0.03	0.01	0.75	0.05	1.0	0.015	0.2	0.03
				CGWSL Source:	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH	WQCC Irr	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	WQCC HH
Location	**Well**	**Date**	**Type**															
Downgradient	MW-125	07/17/2019	N															
		10/22/2019	N	0.00363	0.519	0.00633	0.0167 J	<0.000240	**0.418**	**0.0383**	0.00362	0.509	0.00526	<0.0141	<0.000240	**0.399**	**0.0382**	
	MW-144	07/11/2019	N															
		10/22/2019	N	0.00338	0.216	0.000788 J	0.468	<0.0020 BJU	0.0365	0.0180	0.00320	0.211	0.000698 J	<0.0141	<0.0020 BJU	0.0272	0.0185	
	RW-18A	07/17/2019	N															
		10/22/2019	N	0.00281	0.675	<0.000260	0.556	<0.0020 BJU	0.00933	**0.0583**	0.00271	0.648	<0.000260	0.0519 J	<0.0020 BJU	0.00668	**0.0566**	

Table 3 - Summary of Groundwater Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:				General Chemistry											
Analyte:				Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Units:				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:				--	250	1.6	--	10	--	--	600	--	--	--	1,000
CGWSL Source:				--	WQCC Dom	WQCC HH	--	EPA MCL	--	--	WQCC Dom	--	--	--	WQCC Dom
Location	**Well**	**Date**	**Type**												
North RO Field															
Upgradient	MW-55	07/17/2019	N	492	**498**	**1.83**	364	1.65	1.11	247	**2,100**	446	<2.71	446	**4,680**
		10/22/2019	N	418	**514**	1.53	312	0.469	<1.00 BJU	237	**1,570**	489	<2.71	489	**3,390**
		10/22/2019	FD	413	**523**	**1.67**	305	0.453	<1.00 BJU	235	**1,590**	496	<2.71	496	**3,350**
	MW-140	07/15/2019	N	659	**293**	**1.82**	241	**15.5**	39.6	168	**2,430**	295	<2.71	295	**3,970**
		10/22/2019	N	639	**310**	1.44	240	9.29	45.2	170	**2,220**	311	<2.71	311	**3,390**
	MW-141	07/15/2019	N	593	**288**	**1.95**	168	9.36	4.27	57.5	**1,770**	229	<2.71	229	**2,660**
		07/15/2019	FD	607	**285**	**1.83**	171	9.53	4.20	57.7	**1,680**	227	<2.71	227	**2,900**
		10/22/2019	N	632	**284**	**3.02**	163	9.71	8.52	69.4	**1,690**	223	<2.71	223	**2,880**
In Field	MW-117	07/17/2019	N	597	**284**	**3.40**	268	0.191	6.54	107	**2,230**	344	<2.71	344	**3,740**
		10/22/2019	N	583	**305**	**3.02**	264	0.395	6.81	108	**2,260**	344	<2.71	344	**3,490**
	MW-118	07/17/2019	N	600	**301**	**6.16**	378	1.02	5.31	146	**2,860**	360	<2.71	360	**4,180**
		10/22/2019	N	585	**274**	**4.39**	389	1.80	4.15	167	**2,480**	365	<2.71	365	**4,240**
	MW-119	07/17/2019	N	623	**443**	**2.79**	288	0.308	1.71	243	**2,570**	319	<2.71	319	**3,980**
		10/22/2019	N	625	**388**	**2.36**	304	0.174	1.39	217	**2,330**	331	<2.71	331	**3,820**
Downgradient	MW-142	07/12/2019	N	633	**380**	**2.22**	311	0.159	1.74	195	**2,610**	334	<2.71	334	**4,580**
		10/22/2019	N	645	**369**	**1.87**	304	0.091 J	1.84	188	**2,280**	343	<2.71	343	**4,000**
	MW-143	07/12/2019	N	583	**264**	1.54	430	0.0980 J	1.78	233	**3,170**	328	<2.71	328	**4,870**
		10/22/2019	N	550	**296**	1.20	446	0.127	1.22 B	220	**2,970**	333	<2.71	333	**4,500**
South RO Field															
Upgradient	MW-29	07/17/2019	N	578	**383**	**2.00**	446	<0.985	2.48	384	**3,300**	503	<2.71	503	**4,820**
		10/22/2019	N	527	**354**	**1.84**	345	<0.0197	2.43	376	**2,480**	577	<2.71	577	**3,910**
	MW-40	07/17/2019	N	588	87.7	**1.93**	205	<1.97	2.54	104	**1,730**	309	<2.71	309	**2,580**
		10/22/2019	N	435 V	68.2	**2.18**	198 V	0.033 J	2.11	98.7 V	**1,570**	299	<2.71	299	**2,610**
		10/22/2019	FD	428	67.1	**2.29**	195	<0.0197	1.91	97.6	**1,910**	294	<2.71	294	**2,410**
	MW-56	07/17/2019	N	525	**273**	1.20	268	<0.0197	2.21	184	**2,180**	375	<2.71	375	**3,430**
		10/22/2019	N	508	**286**	1.10	261	<0.0197	2.07	155	**1,890**	363	<2.71	363	**3,120**
In Field	MW-114	07/17/2019	N	604	219	**2.10**	239	0.375	3.08	137	**2,320**	377	<2.71	377	**3,000**
		10/22/2019	N	611	**252**	1.50	234	0.613	2.83	136	**2,170**	376	<2.71	376	**3,650**
	MW-115	07/17/2019	N	477	**254**	**2.33**	451	<0.0197	0.765 J	217	**2,940**	410	<2.71	410	**4,510**
		10/22/2019	N	444	**270**	**2.04**	405	0.145	0.608 BJ	195	**2,390**	417	<2.71	417	**3,870**
	MW-116	07/17/2019	N	576	**265**	**2.01**	289	0.371	2.10	189	**2,550**	341	<2.71	341	**3,700**
		07/17/2019	FD	570	**266**	**2.00**	289	0.35	2.01	189	**2,570**	346	<2.71	346	**3,490**
		10/22/2019	N	567	**309**	**1.99**	282	0.403	1.71	187	**2,380**	336	<2.71	336	**3,490**

Table 3 - Summary of Groundwater Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:				General Chemistry										
Analyte:				Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Units:				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:				--	250	1.6	--	10	--	--	600	--	--	--	1,000
CGWSL Source:				--	WQCC Dom	WQCC HH	--	EPA MCL	--	--	WQCC Dom	--	--	--	WQCC Dom
Location	**Well**	**Date**	**Type**												
Downgradient	MW-125	07/17/2019	N	557	**298**	1.26	392	0.587	1.67	231	**2,750**	407	<2.71	407	**4,380**
		10/22/2019	N	553	**327**	1.08	390	0.544	1.47	229	**2,810**	406	<2.71	406	**3,920**
	MW-144	07/11/2019	N	787	222	**2.57**	220	0.290	2.36	137	**2,360**	344	<2.71	344	**3,740**
		10/22/2019	N	687	**274**	**2.36**	235	0.201	1.71	143	**2,530**	313	<2.71	313	**3,330**
	RW-18A	07/17/2019	N	521	247	**2.10**	375	0.256	0.884 J	126	**3,090**	293	<2.71	293	**4,150**
		10/22/2019	N	525	235	**2.07**	384	0.258	<1.00 BJU	124	**2,750**	298	<2.71	298	**3,740**

Notes and Abbreviations

"--"	CGWSL not available for this analyte
X	Reported concentration equal to X was above the CGWSL
<X	Analyte was not detected at reporting limit equal to X. If italicized, reporting limit is greater than CGWSL.
CGWSL	Critical Groundwater Screening Level
CGWSL Source	Critical Groundwater Screening Level Source
EPA	United States Environmental Protection Agency
EPA MCL	EPA Maximum Contaminant Level
FD	Field DupIcate
mg/L	milligrams per Liter
N	Normal
NMAC	New Mexico Administrative Code
WQCC	New Mexico Water Quality Control Commission
WQCC Dom	Groundwater standard for domestic exposure from 20.6.2.3103.B NMAC
WQCC HH	Groundwater standard for human health exposure from 20.6.2.3103.A NMAC
WQCC Irr	Groundwater standard for irrigation use from 20.6.2.3103.C NMAC

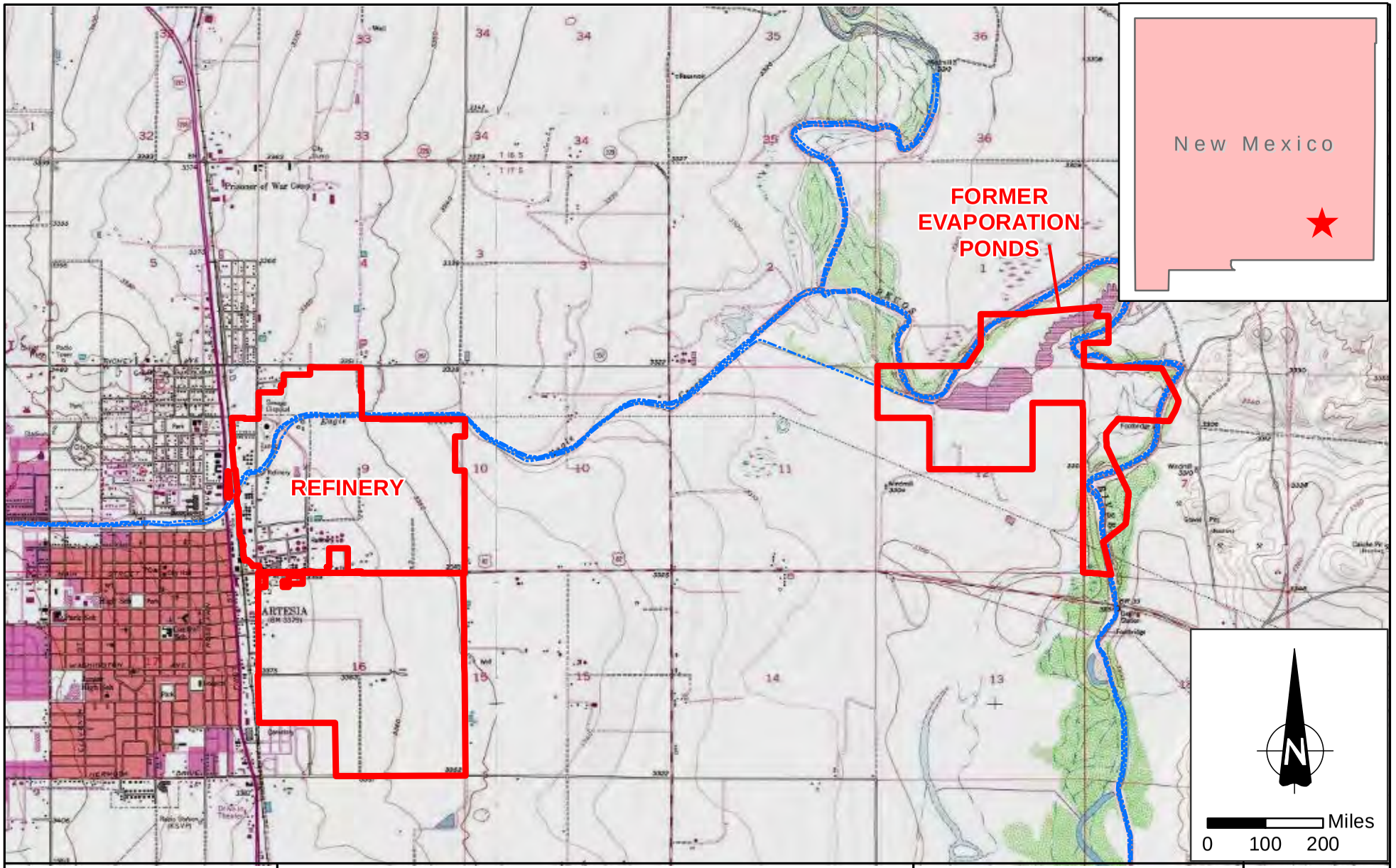
Lab Footnotes

B	Analyte reported in associated method blank
J	Reported value is an estimate.
V	Sample concentration too high to evaluate accurate spike recoveries

Data Validation Qualifier

U	Result qualified as not detected at the reporting limit. See data validation report for more detail.

FIGURES



HOLLYFRONTIER

wood.

Legend

Property Boundary

Water Way

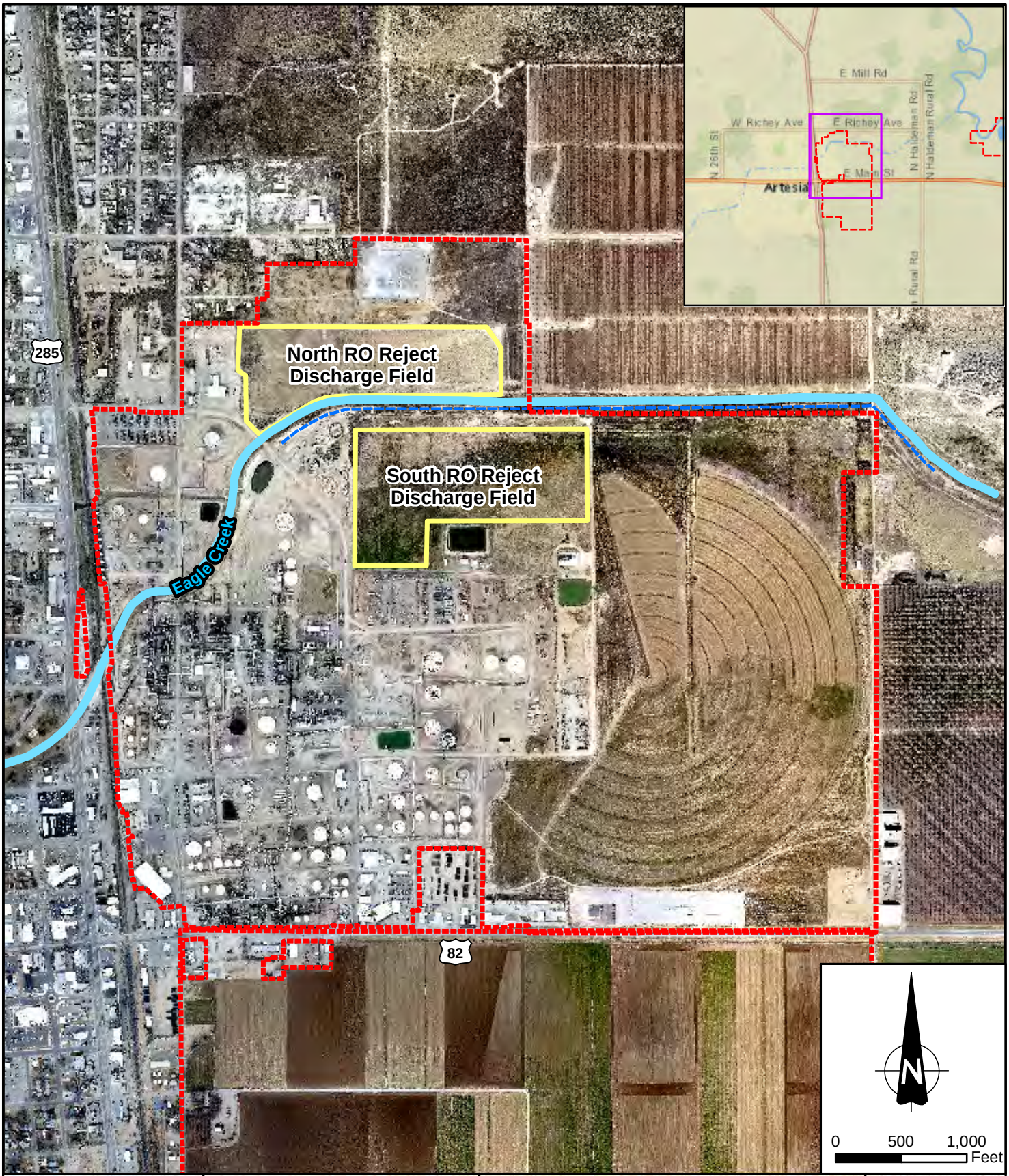
HollyFrontier Navajo Refining LLC
RO Reject Discharge Fields
Stage 1 Abatement

Site Location Map

DATE	MARCH 2019
SCALE	1 " = 3,500 '
PROJECT NO.	6703180022
FIGURE	1

DRAWN BY: LK CHECKED BY: JKH

X:\Client\HollyFrontier\Navajo\6703180022 - Abatement WP RO Reject Discharge Field\MXD\1.SiteLocationMap.mxd - casey.richards - 3/19/2019 - 3:19:35 PM



HollyFrontier

wood.

Property Boundary

Three-Mile Ditch

RO Reject Discharge Field Boundary

HollyFrontier Navajo Refining LLC
RO Reject Discharge Fields
Stage 1 Abatement

RO Reject Discharge Field Locations

DATE: MARCH 2019

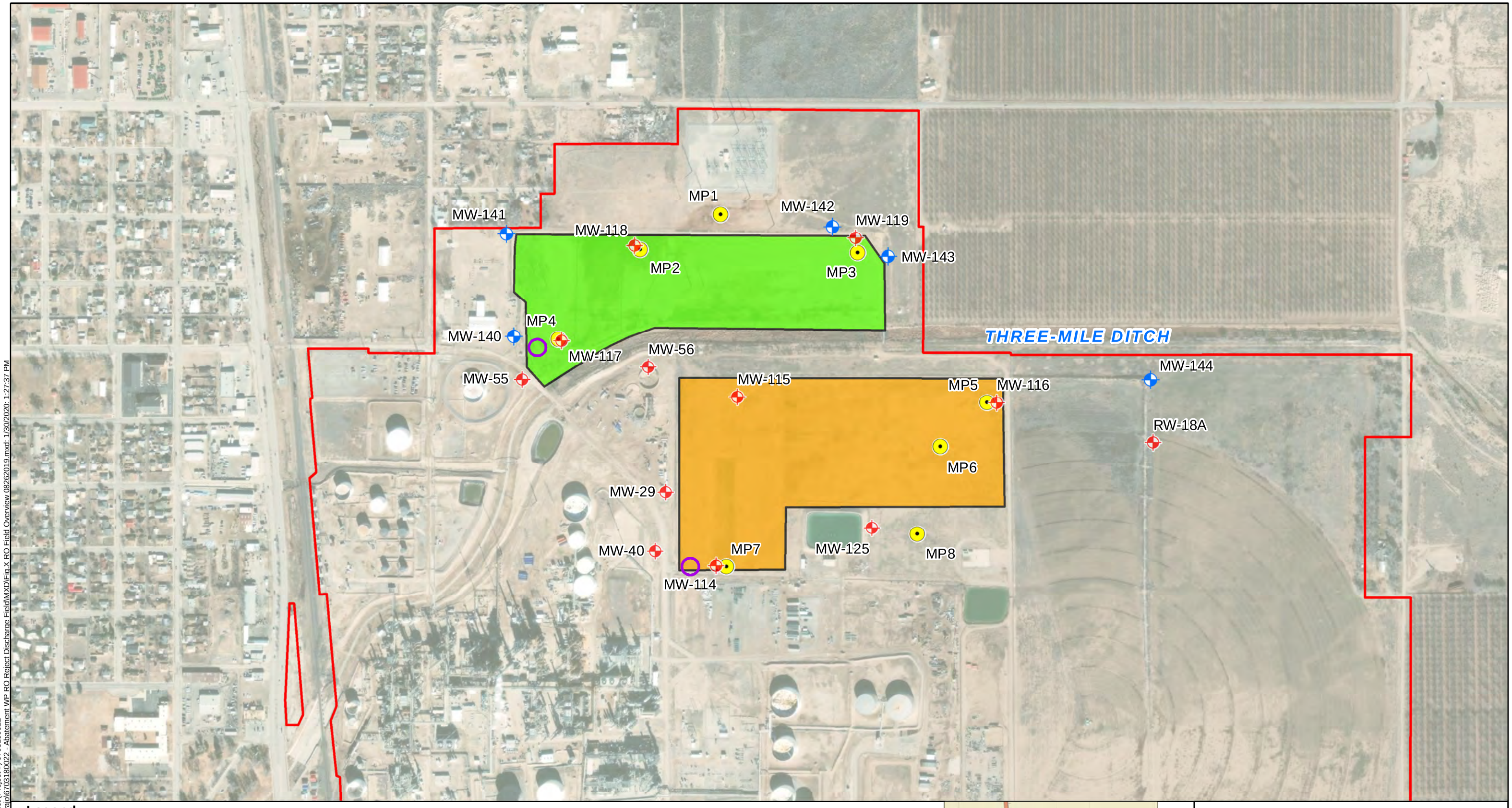
SCALE: 1 " = 1,000 feet

PROJECT NO.: 6703180022

FIGURE: 2

DRAWN BY: SD CHECKED BY: JHK

X:\Client\HollyFrontier\Navajo\6703180022 - Abatement WP RO Reject Discharge Field\MXD\2.ROReject FieldLocations.mxd - casey.richards - 3/21/2019 - 2:40:43 PM

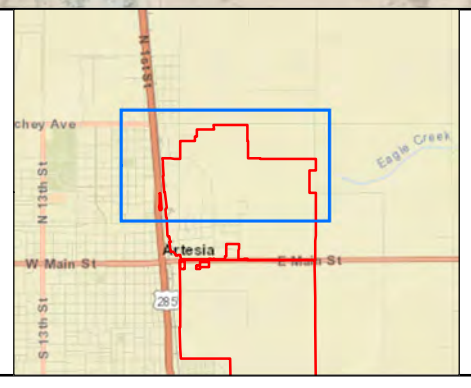


Legend

- Property Boundary
- South RO Reject Discharge Field
- North RO Reject Discharge Field
- Moisture Probes Installed July 2019
- Monitoring Wells Installed July 2019
- Former Discharge Point
- Existing Monitoring Well

0 500 1,000 Feet

GRAPHIC SCALE



HollyFrontier Navajo Refining LLC
Artesia, New Mexico

RO Reject Discharge Fields
Stage 1 Abatement
Monitoring Well & Soil Moisture Probe Locations

Prepared By: RB	
Date Prepared: 1/30/2020	
Project Number: 6703180022	

wood.

FIGURE 3

DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160022
Path: \\hou4-fs4\gis\Client\HollyFrontierNavajo\6703180022 - Abatement WP RO Reject Discharge Field\MXD\Fig.X RO Field Overview 08262019.mxd 1/30/2020 1:27:37 PM

APPENDIX A
GROUNDWATER SAMPLING FORMS

HMI
Groundwater

Hydrologic Monitoring
1654 W. Sam Houston Pkwy. N.
Houston, Texas 77043

Phone 713.464.5206
Fax 713.464.5207

November 3, 2019

Ms. Pam Krueger
Senior Associate
Wood Environment & Infrastructure Solutions
17325 Park Row
Houston, Texas 77084

Subject: 4Q19 RO Field Groundwater Sampling, October 22, 2019
Navajo Refining Company, Artesia, New Mexico

Dear Ms. Krueger:

This document summarizes the 4Q19 RO Field Program groundwater sampling conducted by Hydrologic Monitoring, LLC (HMI) on behalf of Wood at the Navajo-Artesia Refinery, Artesia, New Mexico.

Contents

Field Activities Narrative
Table 1: (Gauging Data, Groundwater Field Parameters, Well Inspections)
Groundwater Sampling Forms and Field Instrument Calibration Log
Chain-of-Custody Form
Lab Bottle Order (Wood Analytical Scope Summary)
Groundwater Sampling SOP Memo

Field Activities Narrative

1. HMI conducted low-flow groundwater sampling in accordance with the Site Sampling and Analysis Plan, and EPA guidance (*Puls and Barcelona, 1996 EPA Guidance on Low-Flow Groundwater Sampling, REV No. 4, September 19, 2017*).

2. Samples were shipped overnight FedEx to Pace National, Mt. Juliet, TN, for analysis per the attached COC. Proper chain-of-custody was maintained. The groundwater sampling process is documented on the attached groundwater sampling forms.

3. Per Wood, the 4Q19 RO Field sampling program included the sampling of 17 wells. 12 of the 17 wells were existing monitoring (or recovery) wells in the Artesia Refinery's well network. Five wells were installed by Wood in 2019 to support the RO Field Investigation. Field QA/QC program (with parent well locations) is shown below:

   1. MW-40 + Duplicate (Dup-RO-01)
   2. MW-29
   3. MW-56
   4. MW-55 + Duplicate (Dup-RO-02)
   5. MW-140 (access support as needed – Navajo's Domingo Torres)
   6. MW-141 (access support as needed – Navajo's Domingo Torres)
   7. MW-115
   8. MW-114
   9. MW-125
   10. MW-117
   11. MW-118
   12. MW-119
   13. MW-142 (…horses in Mr. King's field, access through northside gate, & close)
   14. MW-143 (…horses in Mr. King's field, access through northside gate, & close)
   15. MW-116 + Equipment Blank (EB-RO-01)
   16. RW-#18A
   17. MW-144

4. Notes:

   Training modules: "24HFNAV HOLLYFRONTIER SITE SPECIFIC ORIENTATION ARTESIA-NM", and the additional "LPS" module, both @ HASC, annually.
   HMI's DISA 2-yr backgound check/drug/alcohol requirements approved by safety-trailer personnel on 10-3-17 (updated 2019), as reported through HASC system. HMI to maintain its status.
   Per Navajo, purgewater is disposed in the pad sump (inside/left of Main Gate entrance). Alternately, purgewater is disposed in the North Bundle Pad sump (fenced area of drums, etc.), notifying FCC control room prior to entrance.
   Sitewide well and gate lock combinations: "2013" (less often "2002").
   With suggested telephone notification, FedEx pickup from locked shed (35-25-39 combination) no earlier than approximately 14:00 daily, across from Artesia Wool Co (access area from "inside" Refinery).

North side of Hwy 82, east of site, gate with cable and combination lock (8810).
POTW bldg, check-in as needed, to borrow a key or get gate unlocked.
Navajo's Robert Combs, Richard Orosco, Randy Dade for daily safety meeting, permit-issuance, per HMI team member.

HMI appreciates the opportunity to assist Wood with this project. If you have any questions or would like additional information please feel free to call us at 713.464.5206.

Sincerely,

HYDROLOGIC MONITORING

Scott C. Ude

Scott C. Ude, P.G.

The seal appearing on this document was authorized by Scott C. Ude, P.G. 353 on November 3, 2019.

Attachments

cc: Greg Scherbenske, P.G., HMI

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 4Q19 RO Field Program

Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	QA/QC	HMI Use	HMI Use (# Samp Wells)	n			Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																
					Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	T (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label
MW-40	Dup-RO-01		1	REST	10/22/19	9:50	NP	11.44	0.00	24.75	10/22/19	10:15	6.80	22.3	2,470	1.3	-336.8	9.7	Clear	Yes	Yes	Yes	Yes
MW-29			2	REST	10/22/19	9:00	NP	18.21	0.00	24.22	10/22/19	9:25	6.67	20.4	4,200	1.6	-203.0	8.1	Clear	Yes	Yes	Yes	Yes
MW-56			3	NCL	10/22/19	9:00	NP	13.21	0.00	26.50	10/22/19	9:25	6.70	21.1	4,110	1.6	-43.8	0.6	Clear	Yes	Yes	Yes	Yes
MW-55	Dup-RO-02		4	NCL	10/22/19	9:20	NP	12.51	0.00	26.85	10/22/19	9:45	6.61	20.2	4,210	2.1	155.7	7.4	Clear	Yes	Yes	Yes	Yes
MW-140			5	RO Field	10/22/19	10:10	NP	9.31	0.00	29.76	10/22/19	10:40	6.75	18.8	3,570	1.7	70.4	30.7	Sl. Cloudy	Yes	Yes	Yes	Yes
MW-141			6	RO Field	10/22/19	9:25	NP	9.95	0.00	29.68	10/22/19	9:50	6.83	17.9	2,910	2.6	56.4	7.6	Clear	Yes	Yes	Yes	Yes
MW-115			7	REST	10/22/19	11:30	NP	12.95	0.00	27.50	10/22/19	11:55	6.78	18.8	3,798	2.7	53.2	1.1	Clear	Yes	Yes	Yes	Yes
MW-114			8	REST	10/22/19	10:35	NP	13.47	0.00	38.25	10/22/19	11:00	6.70	19.9	3,375	1.4	78.4	1.9	Clear	Yes	Yes	Yes	Yes
MW-125			9	REST	10/22/19	9:35	NP	16.11	0.00	28.31	10/22/19	10:00	6.81	18.2	4,131	2.3	65.1	3.9	Clear	Yes	Yes	Yes	Yes
MW-117			10	REST	10/22/19	11:40	NP	11.78	0.00	27.22	10/22/19	12:05	6.22	20.1	2,700	2.0	43.1	14.3	Clear	Yes	Yes	Yes	Yes
MW-118			11	REST	10/22/19	10:25	NP	15.19	0.00	28.29	10/22/19	10:50	6.28	18.9	3,150	3.2	71.3	31.3	Clear	Yes	Yes	Yes	Yes
MW-119			12	REST	10/22/19	9:30	NP	13.70	0.00	28.11	10/22/19	9:55	6.41	19.6	3,260	2.7	47.6	28.3	Clear	Yes	Yes	Yes	Yes
MW-142			13	RO Field	10/22/19	9:40	NP	13.13	0.00	32.75	10/22/19	10:05	6.84	19.0	4,240	0.9	121.8	75.9	Sl. Cloudy	Yes	Yes	Yes	Yes
MW-143			14	RO Field	10/22/19	10:30	NP	13.58	0.00	32.71	10/22/19	10:55	6.98	19.3	4,490	1.4	81.7	55.4	Sl. Cloudy	Yes	Yes	Yes	Yes
MW-116	EB-RO-01		15	REST	10/22/19	9:00	NP	12.77	0.00	27.63	10/22/19	9:25	6.81	18.4	3,820	1.1	72.9	10.8	Clear	Yes	Yes	Yes	Yes
RW-#18A			16	REST	10/22/19	9:40	NP	14.02	0.00	17.78	10/22/19	10:00	6.79	21.4	4,520	2.1	69.4	16.8	Clear	Yes	Yes	Yes	Yes
MW-144			17	RO Field	10/22/19	10:35	NP	13.13	0.00	32.75	10/22/19	11:00	6.82	21.1	4,100	2.0	140.3	59.2	Sl. Cloudy	Yes	Yes	Yes	Yes

= Existing monitoring or recovery well (included in the RO Field program)

= Monitoring well included in the RO Field program, installed by Wood in 2019

This is scheduled for RO Field in 4Q19 ; (it is a gauge only well for 2H19 pgm) + Dup-RO-01

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-40
Event: 4Q19 RO Field
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

Initials: From TAB — to SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	950	NP	11.44	0.00	24.75	21.8	Yes	Yes	Yes	Yes		Weather: Clear 50's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	955	11.55	0.5	6.89	21.9	2670	2.1	-307.2	106.5	sl. Cloudy w/ black particles	Low-flow groundwater sample:
	957	11.55	1.0	6.87	21.9	2610	1.7	-315.5	79.1	↓	(A) peristaltic pump w/ ded tubing
	1000	11.55	1.5	6.84	22.1	2550	1.5	-327.2	39.4	Clear w/ black particles	B) ded bladder pump
	1002	11.55	2.0	6.82	22.2	2530	1.4	-331.8	20.7		C) non-ded bladder pump; or
	1005	11.56	2.5	6.81	22.2	2510	1.4	-334.8	13.2		Standard groundwater sample:
	1007	11.56	3.0	6.81	22.3	2490	1.3	-335.9	11.2		D) bailer due to limited column; or
	1010	11.56	3.5	6.80	22.3	2480	1.3	-336.2	10.5		E) recovery well cycling sample
↓	1012	11.56	4.0	6.80	22.3	2470	1.3	-336.8	9.7	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	1015	MW-40	11.56	6.80	22.3	2470	1.3	-336.8	9.7			Lab: Pace National, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
10/22/19	1000	Dup-RO-01	collected for		Same	analysis				RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-29
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in __	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other 6-in	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: Fran TAB – to SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	900	NP	18.21	0.00	24.22	19.2	Yes	Yes	Yes	Yes		Weather: Clear 50's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	905	18.28	0.5	6.68	18.9	4250	2.7	-158.1	13.2	clear/colorless	*Low-flow groundwater sample:*
	907	18.28	1.0	6.67	19.6	4240	2.3	-165.7	10.9		(A) peristaltic pump w/ ded tubing
	910	18.28	1.5	6.67	20.0	4230	2.0	-181.1	10.1		B) ded bladder pump
	912	18.28	2.0	6.67	20.2	4220	1.8	-194.9	9.6		C) non-ded bladder pump; or
	915	18.28	2.5	6.66	20.3	4210	1.7	-198.3	9.3		*Standard groundwater sample:*
	917	18.28	3.0	6.66	20.3	4210	1.7	-201.5	8.9		D) bailer due to limited column; or
	920	18.28	3.5	6.67	20.4	4200	1.6	-202.6	8.5		E) recovery well cycling sample
	922	18.28	4.0	6.67	20.4	4200	1.6	-203.0	8.1		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	925	MW-29	18.28	6.67	20.4	4200	1.6	-203.0	8.1			Lab: Pace National, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+ 20 Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

This is scheduled for RO Field in 4Q19; (it is a gauge only well for 2H19 prgm)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-56
Event: 4Q19 RO Field
Area of Concern: NCL

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: TAB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	900	NP	13.21	0.00	26.50	21.4	yes	yes	yes	yes		Weather: partly cloudy 40s

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	905	13.25	0.5	6.87	21.0	4100	2.1	-85.2	2.6	clear	*Low-flow groundwater sample:*
	907	13.25	1.0	6.78	21.0	4150	1.5	-71.2	1.8		(A) peristaltic pump w/ ded tubing
	910	13.25	1.5	6.75	21.0	4130	1.5	-61.7	1.5		B) ded bladder pump
	913	13.25	2.0	6.73	21.1	4120	1.6	-51.1	1.2		C) non-ded bladder pump; or
	915	13.25	2.5	6.72	21.1	4120	1.6	-48.3	1.0		*Standard groundwater sample:*
	917	13.25	3.0	6.71	21.1	4120	1.6	-46.7	0.9		D) bailer due to limited column; or
	920	13.25	3.5	6.71	21.1	4110	1.6	-44.3	0.7		E) recovery well cycling sample
↓	923	13.25	4.0	6.70	21.1	4110	1.6	-43.8	0.6	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	925	MW-56	13.25	6.70	21.1	4110	1.6	-43.8	0.6	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

+ Dup - RO - 02

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-55
Event: 2Q19
Area of Concern: NCL

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: From CJH - To BRH

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10.22.19	920	NP	12.51	0.00	26.85	21.7	Yes	Yes	Yes	Yes		Weather: Clear, 50's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10.22.19	925	12.53	0.5	6.50	20.0	4210	2.0	104.8	12.6	Colorless; Clear	*Low-flow groundwater sample:*
↓	927	12.53	1.0	6.52	20.0	4210	2.6	109.1	11.2	↓	(A) peristaltic pump w/ ded tubing
	930	12.54	1.5	6.52	20.1	4220	2.5	137.4	9.6		B) ded bladder pump
	932	12.54	2.0	6.53	20.2	4220	2.4	142.6	9.0		C) non-ded bladder pump; or
	935	12.54	2.5	6.59	20.2	4230	2.4	146.5	8.7		*Standard groundwater sample:*
	937	12.54	3.0	6.60	20.2	4220	2.3	150.1	8.1		D) bailer due to limited column; or
	940	12.54	3.5	6.61	20.1	4220	2.2	153.6	7.7		E) recovery well cycling sample
↓	942	12.54	4.0	6.61	20.2	4210	2.1	155.7	7.4		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10.22.19	945	MW-55	12.54	6.61	20.2	4210	2.1	155.7	7.4			Lab: Pace National, Mt. Juliet, TN
↓										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
↓	1000	DUP-RO-02	12.54	6.61	20.2	4210	2.1	155.7	7.4	+ RO Field		

If <0.03 feet LNAPL present, remove LNAPL and

BRH

Bagged dedicated tubing

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-140
Event: 4Q19 (RO Fields) (2nd)
Area of Concern: RO Fields

Completion	Casing Diam.	Casing Material
At-Grade ✓	2-in ✓	PVC ✓
Upright __	4-in __	SS __
Vault __	Other __	Other __

located inside North Warehouse fenced-in area. If gate is closed, Domingo can facilitate access.

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

Initials: BRH

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	1010	NP	9.31	0.00	29.76	24.76 (5' off base)	Yes	Yes	Yes	Yes		Weather: Clear, 50s

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1015	9.40	0.5	6.84	18.7	3480	3.0	67.9	38.6	SI. cloudy, colorless	*Low-flow groundwater sample:*
	1018	9.41	1.0	6.79	18.7	3550	2.5	70.7	51.8		(A) peristaltic pump w/ ded tubing
	1020	9.41	1.5	6.75	18.7	3590	2.3	73.6	52.3		B) ded bladder pump
	1023	9.41	2.0	6.74	18.7	3610	2.1	74.0	49.7		C) non-ded bladder pump; or
	1025	9.41	2.5	6.75	18.7	3630	2.0	74.2	42.11		*Standard groundwater sample:*
	1028	9.41	3.0	6.75	18.8	3630	1.9	73.9	36.9		D) bailer due to limited column; or
	1030	9.41	3.5	6.75	18.8	3620	1.9	73.5	33.2		E) recovery well cycling sample
	1033	9.41	4.0	6.75	18.8	3600	1.8	72.6	31.8		F) irrigation well grab sample
	1035	9.41	4.5	6.75	18.8	3580	1.8	71.2	31.2		
↓	1038	9.41	5.0	6.75	18.8	3570	1.7	70.4	30.7	↓	

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	1040	MW-140	9.41	6.75	18.8	3570	1.7	70.4	30.7	per Wood	Per Pace	(see COC)

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

BRH

Bagged dedicated tubing

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-141
Event: 4Q19 (RO Fields) (2H)
Area of Concern: RO Fields

Completion	Casing Diam.	Casing Material
At-Grade ✓	2-in ✓	PVC ✓
Upright __	4-in __	SS __
Vault __	Other __	Other __

*See access note on MW-140.

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: BRH

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	925	NP	9.95	0.00	29.68	24.68 (5' off base)	Yes	Yes	Yes	Yes		Weather: Clear, 50s

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	930	10.04	0.5	7.00	16.8	2890	4.9	52.6	14.9	colorless, clear	*Low-flow groundwater sample:*
	933	10.04	1.0	6.89	17.2	2960	4.0	51.3	10.8		(A) peristaltic pump w/ ded tubing
	935	10.04	1.5	6.86	17.4	2930	3.4	51.7	9.4		B) ded bladder pump
	938	10.04	2.0	6.80	17.6	2920	3.0	52.8	9.1		C) non-ded bladder pump; or
	940	10.04	2.5	6.82	17.7	2920	2.8	54.2	8.7		*Standard groundwater sample:*
	943	10.04	3.0	6.81	17.8	2920	2.7	55.3	8.3		D) bailer due to limited column; or
	945	10.04	3.5	6.82	17.8	2910	2.7	56.0	7.9		E) recovery well cycling sample
	948	10.04	4.0	6.83	17.9	2910	2.6	56.4	7.6		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	950	MW-141	10.04	6.83	17.9	2910	2.6	56.4	7.6	per Wood	Per Pace	

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

ATV 5. Field RO-Reject water field

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-115
Event: 2Q19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: BB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	1130	NP	12.95	0.00	27.50	19.8	Yes	Yes	Yes	Yes		Weather: Sunny 60's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1135	12.98	0.5	6.87	19.8	3696	3.8	26.9	2.5	Colorless, clear	*Low-flow groundwater sample:*
	1138	12.99	1.0	6.84	19.4	3747	3.5	35.1	2.1	" "	(A) peristaltic pump w/ ded tubing
	1140	12.99	1.5	6.82	19.2	3785	3.3	42.6	1.6	" "	B) ded bladder pump
	1143	12.99	2.0	6.80	19.1	3789	3.1	48.9	1.4	" "	C) non-ded bladder pump; or
	1145	12.99	2.5	6.79	18.9	3793	2.9	51.6	1.2	" "	*Standard groundwater sample:*
	1148	12.99	3.0	6.78	18.8	3795	2.8	52.3	1.1	" "	D) bailer due to limited column; or
	1150	12.99	3.5	6.78	18.8	3797	2.8	52.9	1.1	" "	E) recovery well cycling sample
↓	1153	12.99	4.0	6.78	18.8	3798	2.7	53.2	1.1	" "	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	1155	MW-115	12.99	6.78	18.8	3798	2.7	53.2	1.1	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO_3	6010/6020
										Nitrate-Nitrite	H_2SO_4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO_3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO_3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO_3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO_3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+ RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

ATV 5" Field RO-Reject water Field

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-114
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: BS

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	1035	NP	13.47	0.00	38.25	30.5	Yes	yes	yes	YES		Weather: Sunny 50's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1040	13.49	0.5	6.83	20.3	3370	3.7	60.5	5.8	Colorless, Clear	*Low-flow groundwater sample:*
	1043	13.50	1.0	6.78	20.1	3369	2.9	68.2	4.1	" "	(A) peristaltic pump w/ ded tubing
	1045	13.50	1.5	6.74	20.0	3370	2.3	71.4	3.0	" "	B) ded bladder pump
	1048	13.50	2.0	6.72	20.0	3373	1.9	73.9	2.5	" "	C) non-ded bladder pump; or
	1050	13.50	2.5	6.71	20.0	3374	1.6	75.6	2.2	" "	*Standard groundwater sample:*
	1053	13.50	3.0	6.71	20.0	3374	1.5	77.1	2.0	" "	D) bailer due to limited column; or
	1055	13.50	3.5	6.70	19.9	3375	1.5	78.0	2.0	" "	E) recovery well cycling sample
	1055	13.50	4.0	6.70	19.9	3375	1.4	78.4	1.9	" "	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	1100	MW-114	13.50	6.70	19.9	3375	1.4	78.4	1.9			Lab: Pace National, Mt. Juliet, TN
	1100									DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

[Careful driving; tires vs. small mesquite thorns, even though pasture may appear to be cut]

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-125
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: BS

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	935	NP	16.11	0.00	28.31	23.5	Yes	Yes	Yes	Yes		Weather: Sunny 50's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	940	16.17	0.5	6.89	14.5	4136	3.3	53.4	9.6	Colorless, clear	*Low-flow groundwater sample:*
	943	16.17	1.0	6.86	18.3	4148	2.7	57.5	7.1	" "	(A) peristaltic pump w/ ded tubing
	945	16.17	1.5	6.83	18.1	4139	2.5	63.1	6.2	" "	B) ded bladder pump
	948	16.17	2.0	6.82	18.1	4135	2.4	63.8	4.5	" "	C) non-ded bladder pump; or
	950	16.17	2.5	6.81	18.2	4133	2.3	64.3	4.1	" "	*Standard groundwater sample:*
	953	16.17	3.0	6.81	18.2	4132	2.3	64.6	4.1	" "	D) bailer due to limited column; or
	955	16.17	3.5	6.81	18.2	4132	2.3	64.8	4.0	" "	E) recovery well cycling sample
	958	16.17	4.0	6.81	18.2	4131	2.3	65.1	3.9	" "	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	1000	MW-125	16.17	6.81	18.2	4131	2.3	65.1	3.9			Lab: Pace National, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-117
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: JAC

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	1140	NP	11.78	0.00	27.22	19.7	yes	yes	yes	yes		Weather: Clear, 60's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1145	11.78	0.5	6.45	21.2	2,760	3.1	48.3	43.3	Colorless/Sl. Cloudy	*Low-flow groundwater sample:*
	1148	11.79	1.0	6.33	20.9	2,740	2.7	46.2	34.5	" "	(A) peristaltic pump w/ ded tubing
	1150	11.79	1.5	6.29	20.7	2,730	2.5	45.6	28.6	" "	B) ded bladder pump
	1153	11.79	2.0	6.27	20.5	2,720	2.3	45.4	24.9	" "	C) non-ded bladder pump; or
	1155	11.79	2.5	6.25	20.4	2,710	2.2	44.5	21.6	Colorless / Clear	*Standard groundwater sample:*
	1158	11.79	3.0	6.24	20.3	2,710	2.1	43.9	18.7	" "	D) bailer due to limited column; or
	1200	11.79	3.5	6.23	20.2	2,700	2.0	43.3	15.1	" "	E) recovery well cycling sample
↓	1203	11.79	4.0	6.22	20.1	2,700	2.0	43.1	14.3	" "	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	1205	MW-117	11.79	6.22	20.1	2,700	2.0	43.1	14.3			Lab: Pace National, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+ RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-118
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: JAC

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	1025	NP	15.19	0.00	28.29	21.0	yes	yes	yes	yes		Weather: Clear, 60's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1030	15.23	0.5	6.56	20.2	3,240	4.5	54.7	126	Colorless / Cloudy	*Low-flow groundwater sample:*
	1033	15.23	1.0	6.44	19.7	3,210	4.1	60.3	93	" "	(A) peristaltic pump w/ ded tubing
	1035	15.24	1.5	6.41	19.5	3,200	3.8	66.2	76	" "	B) ded bladder pump
	1038	15.24	2.0	6.35	19.3	3,180	3.5	67.4	59	Colorless / Sl. Cloudy	C) non-ded bladder pump; or
	1040	15.24	2.5	6.32	19.2	3,170	3.4	68.6	43.2	" "	*Standard groundwater sample:*
	1043	15.25	3.0	6.30	19.1	3,160	3.3	69.9	38.5	Colorless / Clear	D) bailer due to limited column; or
	1045	15.25	3.5	6.29	19.0	3,150	3.2	70.1	36.9	" "	E) recovery well cycling sample
↓	1048	15.25	4.0	6.28	18.9	3,150	3.2	71.3	31.3	" "	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	1050	MW-118	15.25	6.28	18.9	3,150	3.2	71.3	31.3	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO_3	6010/6020
										Nitrate-Nitrite	H_2SO_4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO_3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO_3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO_3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO_3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+ Ro Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-119
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: JAC

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	930	NP	13.70	0.00	28.11	20.8	yes	yes	yes	yes		Weather: Clear, 60's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	935	13.70	0.5	6.89	18.6	3,150	4.1	42.5	114	Colorless/Cloudy	*Low-flow groundwater sample:*
	938	13.70	1.0	6.69	18.9	3,180	3.7	44.1	96	" "	A) peristaltic pump w/ ded tubing
	940	13.71	1.5	6.61	19.1	3,200	3.4	45.3	80	" "	B) ded bladder pump
	943	13.71	2.0	6.56	19.2	3,220	3.1	46.9	67	" "	C) non-ded bladder pump; or
	945	13.71	2.5	6.48	19.3	3,230	2.9	46.7	41.8	Colorless/Sl. Cloudy	*Standard groundwater sample:*
	948	13.71	3.0	6.44	19.4	3,240	2.8	46.2	35.3	" "	D) bailer due to limited column; or
	950	13.71	3.5	6.42	19.5	3,250	2.7	47.0	31.5	" "	E) recovery well cycling sample
↓	953	13.71	4.0	6.41	19.6	3,260	2.7	47.6	28.3	Colorless/Clear	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	955	MW-119	13.71	6.41	19.6	3,260	2.7	47.6	28.3			Lab: Pace National, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO_3	6010/6020
										Nitrate-Nitrite	H_2SO_4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO_3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO_3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO_3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO_3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+DO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

GDS

Bagged dedicated tubing

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-142
Event: 4Q19 (RO Fields) (2H)
Area of Concern: RO Fields

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Artesia - lock on Mr. King's lock chain to access; close gate to contain possible horses

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: GDS

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	940	NP	13.13	0.00	32.75	27.75	Yes	Yes	* NO	Yes		Weather: Sunny, 50's
						(5' off base)			* NEEDS lock			

Well Purging Record

2.6' stick-up

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	945	13.17	0.5	7.00	18.7	4280	3.0	119.4	63.1	Colorless / Sl. Cloudy	*Low-flow groundwater sample:*
↓	947	13.18	1.0	6.89	18.8	4260	1.8	128.6	64.1		(A) peristaltic pump w/ ded tubing
	950	13.18	1.5	6.87	18.8	4250	1.2	128.8	70.0		B) ded bladder pump
	953	13.18	2.0	6.85	18.9	4250	1.1	128.9	76.1		C) non-ded bladder pump; or
	955	13.18	2.5	6.84	18.9	4250	1.0	129.4	78.2		*Standard groundwater sample:*
	957	13.18	3.0	6.84	18.8	4240	1.0	130.0	76.8		D) bailer due to limited column; or
	1000	13.18	3.5	6.84	18.9	4240	0.9	124.9	77.4		E) recovery well cycling sample
↓	1003	13.18	4.0	6.84	19.0	4240	0.9	121.8	75.9		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	1005	MW-142	13.18	6.84	19.0	4240	0.9	121.8	75.9	per Wood	Per Pace	

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

GDS

Bagged dedicated tubing

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-143
Event: 4Q19 (RO Fields) (2H)
Area of Concern: RO Fields

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Artesia-lock on Mr. King's lock chain to access; close gate to contain possible horses

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: GDS

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	1030	NP	13.58	0.00	32.71	27.71	Yes	Yes	* No	Yes		Weather: Sunny, 50's
						(5' off base)			* NEEDS lock			

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1035	13.61	0.5	7.14	19.6	4480	3.5	17.6	123	colorless / cloudy	*Low-flow groundwater sample:*
	1037	13.61	1.0	7.04	19.3	4490	2.4	26.9	101	↓	(A) peristaltic pump w/ ded tubing
	1040	13.61	1.5	7.00	19.2	4490	1.8	69.7	82.6	colorless / sl. cloudy	B) ded bladder pump
	1043	13.61	2.0	6.99	19.1	4490	1.6	77.5	70.5		C) non-ded bladder pump; or
	1045	13.61	2.5	6.99	19.1	4500	1.5	79.5	65.1		*Standard groundwater sample:*
	1047	13.61	3.0	6.98	19.2	4500	1.5	82.2	58.5		D) bailer due to limited column; or
	1050	13.61	3.5	6.98	19.3	4500	1.5	82.4	56.1		E) recovery well cycling sample
	1053	13.61	4.0	6.98	19.3	4490	1.4	81.7	55.4	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	1055	MW-143	13.61	6.98	19.3	4490	1.4	81.7	55.4	per Wood	Per Pace	Lab: Pace National, Mt. Juliet, TN

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

[Bagged tube extension]

Monitoring Well Purging and Sampling Record

+ EB-RO-01

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-116
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

Initials: MDB

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10-22-19	900	NP	12.77	0.00	27.63	20.0	Yes	Yes	Yes	Yes		Weather: Clear

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10-22-19	905	12.85	0.5	6.80	17.3	3760	2.0	46.9	18.7	Clear / colorless	*Low-flow groundwater sample:*
	907	12.85	1.0	6.81	17.7	3810	1.8	56.0	16.2		(A) peristaltic pump w/ ded tubing
	910	12.85	1.5	6.80	18.0	3830	1.6	62.4	15.1		B) ded bladder pump
	912	12.85	2.0	6.81	18.3	3820	1.5	65.6	14.7		C) non-ded bladder pump; or
	915	12.85	2.5	6.81	18.4	3810	1.3	67.8	13.6		*Standard groundwater sample:*
	917	12.85	3.0	6.82	18.5	3810	1.2	69.0	12.5		D) bailer due to limited column; or
	920	12.85	3.5	6.82	18.4	3820	1.1	70.7	11.1		E) recovery well cycling sample
	922	12.85	4.0	6.81	18.4	3820	1.1	72.9	10.8		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10-22-19	925	MW-116	12.85	6.81	18.4	3820	1.1	72.9	10.8			Lab: Pace National, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
	945	EB-RO-1	NA							+ RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

(Annual Frequency for site-wide prgm)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: RW-#18A
Event: 2H19
Area of Concern: REST

Completion	Casing Diam.	Casing Material
At-Grade __	2-in __	PVC ✓
Upright ✓	4-in ✓	SS __
Vault __	Other __	Other __

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCH

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection					Comments
							Cap	Casing	Well Secured	Label	Other	
10/22/19	940	NP	14.02	0.00	17.78	~~12.7~~ 16.7 (permanently lowered in 1H19)	Yes	Yes	Yes	Yes		Weather: clear, 60s

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	945	14.04	0.5	6.42	21.5	4700	2.4	64.8	45.6	colorless / clear	*Low-flow groundwater sample:*
	947	14.04	1.0	6.59	21.6	4690	2.3	64.6	36.2		(A) peristaltic pump w/ ded tubing
	950	14.04	1.5	6.64	21.6	4680	2.3	64.4	24.5		B) ded bladder pump
	952	14.04	2.0	6.66	21.6	4660	2.2	65.2	20.4		C) non-ded bladder pump; or
	955	14.04	2.5	6.73	21.5	4620	2.2	65.5	18.8		*Standard groundwater sample:*
	957	14.04	3.0	6.77	21.5	4550	2.2	67.9	17.2		D) bailer due to limited column; or
	1000	14.04	3.5	6.78	21.4	4530	2.1	68.8	17.0		E) recovery well cycling sample
	1002	14.04	4.0	6.79	21.4	4520	2.1	69.4	16.8		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
												Lab: Pace National, Mt. Juliet, TN
10/22/19	1005	RW-#18A	14.04	6.79	21.4	4520	2.1	69.4	16.8	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Cations (Ca,K,Na), taken from total metals bottle	HNO3	6010/6020
										Nitrate-Nitrite	H2SO4	per historical, Pace National
										TDS	Neat	2540C
										Short List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	6010/6020
										Short List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Long List Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Long List Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se,Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+ RO Field		

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

SCU
(Bagged dedicated tubing)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-144
Event: 4Q19 (RO Fields) (2M)
Area of Concern: RO Fields

Completion	Casing Diam.	Casing Material
At-Grade __	2-in ✓	PVC ✓
Upright ✓	4-in __	SS __
Vault __	Other __	Other __

Access by driving west from Bolton Rd - turn off North of RW-#18A

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCU

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
10/22/19	1035	NP	13.13	0.00	32.75	27.75 (5' off base)	Yes	Yes	Yes* (needs lock)	Yes (MW) labeled		Weather: clear, 60s
									* no lock			* Secured w/ tie-wrap

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
10/22/19	1040	13.16	0.5	7.06	22.2	4100	2.9	129.4	70.0	colorless / sl. cloudy	*Low-flow groundwater sample:*
	1042	13.16	1.0	6.94	21.6	4100	2.4	134.6	68.4		(A) peristaltic pump w/ ded tubing
	1045	13.16	1.5	6.87	21.2	4100	2.2	137.4	63.7		B) ded bladder pump
	1047	13.16	2.0	6.84	21.0	4100	2.1	139.3	61.4		C) non-ded bladder pump; or
	1050	13.16	2.5	6.83	21.0	4100	2.0	139.8	59.8		*Standard groundwater sample:*
	1052	13.16	3.0	6.83	21.1	4100	2.0	140.1	59.5		D) bailer due to limited column; or
	1055	13.16	3.5	6.83	21.0	4100	2.0	140.2	59.5		E) recovery well cycling sample
↓	1057	13.16	4.0	6.82	21.1	4100	2.0	140.3	59.2	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments
10/22/19	1100	MW-144	13.16	6.82	21.1	4100	2.0	140.3	59.2	per Wood	Per Pace	Lab: Pace National, Mt. Juliet, TN

If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

Instrument Calibration Log

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Hydrologic Monitoring
for TRC
Houston, Texas

Date	Time	pH Hanna (Std. units)	Specific Conductivity Hanna (umho/cm)	Dissolved Oxygen Hanna (Slope Cal. in saturated air)	Turbidity Lamotte (NTU)	ORP Hanna HI 7020 Soln (200-275 mV)	PID Thermo Environmental 100 ppm Isobutylene	Initials / Comments
10/22/19	630	4.01 / 7.00	1,000	100%	10.0	241.5	NA	SCM
10/22/19	650	4.01 / 7.00	1,000	100%	10.0	256.9	NA	JAC
10/22/19	653	4.01 / 7.00	1,000	100%	10.0	250.1	NA	TAB
10/22/19	655	4.01 / 7.00	1,000	100%	10.0	258.6	NA	BG
10/22/19	659	4.01 / 7.00	1,000	100%	10.0	221.4	NA	BRH
10/22/19	701	4.01 / 7.00	1,000	100%	10.0	238.1	NA	MDB
10.22.19	703	4.01 / 7.00	1,000	100%	10.0	246.9	NA	CJH
10-22-19	707	4.01 / 7.00	1,000	100%	10.0	241.7	NA	SCD
10/22/19	711	4.01 / 7.00	1,000	100%	10.0	229.1	NA	CWS
10/23/19	700	4.01 / 7.00	1,000	100%	10.0	239.9	NA	SCM
10/23/19	703	4.01 / 7.00	1,000	100%	10.0	226.8	NA	JAC
10/23/19	705	4.01 / 7.00	1000	100%	10.0	248.9	NA	TAB
10/23/19	708	4.01 / 7.00	1,000	100%	10.0	251.3	NA	BG
10/23/19	711	4.01 / 7.00	1,000	100%	10.0	219.7	NA	BRH
10/23/19	714	4.01 / 7.00	1,000	100%	10.0	223.8	NA	MDB
10.23.19	716	4.01 / 7.00	1,000	100%	10.0	242.7	NA	CJH
10-23-19	720	4.01 / 7.00	1,000	100%	10.0	238.6	NA	SCD
10/23/19	724	4.01 / 7.00	1,000	100%	10.0	231.9	NA	CWS

Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected: Artesia, NM

Please Circle: PT MT CT ET

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Scott Hale + HSI Team

Site/Facility ID #

P.O. #

Collected by (signature): Scott Hale

Immediately Packed on Ice N ____ Y ✓

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

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 1 of 2

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 #

Table #

Acctnum: AMECFWHTX

Template: T156731

Prelogin: P735653

PM: 526 - Chris McCord

PB: LC 10.15.19

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss. Metals-FF 250mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Metals 250mlHDPE-HNO3	WetChem 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-40	G	GW		10/22/19	1015	4	X	X	X	X		
MW-29		GW			925	4	X	X	X	X		
MW-56		GW			925	4	X	X	X	X		
MW-55		GW			945	4	X	X	X	X		
MW-140		GW			1040	4	X	X	X	X		
MW-141		GW			950	4	X	X	X	X		
MW-115		GW			1155	4	X	X	X	X		
MW-114		GW			1100	4	X	X	X	X		
MW-125		GW			1000	4	X	X	X	X		
MW-117		GW			1205	4	X	X	X	X		

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

Remarks: WetChem=ALKBI,ALKCA,CHLORIDE,FLUORIDE,SULFATE,TDS.
Total Metals=As,Co,Mn,Pb,U by 6020;B,Ca,Fe,K,Mg,Na by 6010.
Diss.Metals=As,Co,Mn,Pb,U by 6020;B,Fe by 6010. Field Filtered. (lab added HNO3-preserved bottle for diss.metals)

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: ___UPS ✓FedEx ___Courier _____

Tracking #

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
Scott Hale	10/22/19	1300			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected: Artesia, NM

Please Circle: PT MT CT ET

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Scott Udle + Hun Team

Site/Facility ID #

P.O. #

Collected by (signature): Scott Udle

Immediately Packed on Ice N____ Y ✓

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

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss. Metals-FF 250mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Metals 250mlHDPE-HNO3	WetChem 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-118	G	GW		10/22/19	1050	4	X	X	X	X		
MW-119		GW			955	4	X	X	X	X		
MW-142		GW			1005	4	X	X	X	X		
MW-143		GW			1055	4	X	X	X	X		
MW-116		GW			925	4	X	X	X	X		
~~MW-#18A~~ RW-#18A		GW			1005	4	X	X	X	X		
MW-144		GW			1100	4	X	X	X	X		
DUP-RO-01		GW			1000	4	X	X	X	X		
DUP-RO-02		GW			1000	4	X	X	X	X		
EB-RO-01	↓	GW		↓	945	4	X	X	X	X		

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

Remarks:WetChem=ALKBI,ALKCA,CHLORIDE,FLUORIDE,SULFATE,TDS.
Total Metals=As,Co,Mn,Pb,U by 6020;B,Ca,Fe,K,Mg,Na by 6010.
Diss.Metals=As,Co,Mn,Pb,U by 6020;B,Fe by 6010. Field Filtered.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __UPS ✓FedEx ~~✓~~ Courier _____

Tracking #

Relinquished by : (Signature): Scott Udle
Date: 10/22/19
Time: 1300
Received by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: °C Bottles Received:

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature)

Date: Time:

Hold:

Condition: NCF / OK

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

Chain of Custody Page 2 of 2

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 #

Table #

Acctnum: AMECFWHTX
Template: T156731
Prelogin: P735653
PM: 526 - Chris McCord
PB: KC 10/15/19

Shipped Via: FedEx Ground

				Navajo-Artesia, Wood-RO Field, Quarterly Groundwater Program, 4Q19															
		HMI Team List	# wells planned for sampling	Total Metals (6010) (B, Ca, Fe, Mg, K, Na)	Dissolved Metals (6010) (B, Fe) (field-filtered, 0.45 micron)		Total Metals (6020) (As, Co, Pb, Mn, U)	Dissolved Metals (6020) (As, Co, Pb, Mn, U) (field-filtered, 0.45 micron)	Anions (Method 300) (Chloride, Fluoride, Sulfate)	Nitrate-Nitrite as Nitrogen (353.2)	Alkalinity (2320) (Carbonate, Bicarbonate)	Total Dissolved Solids (2540C)							
Team B																			
MW-40	Monitoring	TAB to SCD	1	x	x		x	x	x	x	x	x							*…taken away from TAB list*
MW-29	Monitoring	TAB to SCD	2	x	x		x	x	x	x	x	x							*…taken away from TAB list*
MW-56	Monitoring	TAB to SCD	3	x	x		x	x	x	x	x	x							*…taken away from TAB list*
Team B - QA/QC:																			
Dup-RO-01	mw40	SCD		x	x		x	x	x	x	x	x							
Team C																			
MW-55	Monitoring	CJH to BRH	4	x	x		x	x	x	x	x	x							*…taken away from CJH list*
MW-140	RO Fields	BRH	5	x	x		x	x	x	x	x	x							*Wood-installed well, 2019…Domingo for access, per Pam Krueger*
MW-141	RO Fields	BRH	6	x	x		x	x	x	x	x	x							*Wood-installed well, 2019…Domingo for access, per Pam Krueger*
Team C - QA/QC:																			
Dup-RO-02	mw55	BRH		x	x		x	x	x	x	x	x							
Team D																			
MW-115	Monitoring	BTB	7	x	x		x	x	x	x	x	x							
MW-114	Monitoring	BTB	8	x	x		x	x	x	x	x	x							
MW-125	Monitoring	BTB	9	x	x		x	x	x	x	x	x							
Team E																			
MW-117	Monitoring	GDS	10	x	x		x	x	x	x	x	x							
MW-118	Monitoring	GDS	11	x	x		x	x	x	x	x	x							
MW-119	Monitoring	GDS	12	x	x		x	x	x	x	x	x							
MW-142	RO Fields	GDS	13	x	x		x	x	x	x	x	x							*Wood-installed well, 2019…Mr. King's horses in field? (special access, possible...)*
MW-143	RO Fields	GDS	14	x	x		x	x	x	x	x	x							*Wood-installed well, 2019…Mr. King's horses in field? (special access, possible...)*
Team F																			
MW-116	Monitoring	SCU	15	x	x		x	x	x	x	x	x							
RW-#18A	Recovery	GDS to SCU	16	x	x		x	x	x	x	x	x							*…taken away from GDS list*
MW-144	RO Fields	SCU	17	x	x		x	x	x	x	x	x							*Wood-installed well, 2019*
Team F - QA/QC:																			
EB-RO-01	mw116	SCU		x	x		x	x	x	x	x	x							
Team G																			
MW-40	Monitoring	TAB																	*…moved to SCD list*
MW-29	Monitoring	TAB																	*…moved to SCD list*
MW-56	Monitoring	TAB																	*…moved to SCD list*
Team H																			
MW-55	Monitoring	CJH																	*…moved to BRH list*

Instructions for Pace National:

Please send kits directly to Pace-Houston. Pace-Houston to transfer to HMI on or before October 1, 2019.

Sampling scheduled - week of October 21, 2019

No COCs are needed; HMI produces COCs using Pace's writable PDF, as arranged with Chris McCord

Preprinted labels (including QA/QC samples); labels affixed to bottles and bagged-per-well

Pack 5 wells per cooler as possible; coolers labeled by Team (Team A, Team B, etc. through Team H)

Lab-grade DI water provided by Pace for all Equipment Blank samples

Analytical Suite:

1. Field-Measured Parameters - pH, temp, SC, DO, ORP, and turbidity
2. Total Metals *Select List* (6010)
3. Dissolved Metals *Select List* (6010) (field-filtered, 0.45 micron)
4. Total Metals *Select List* (6020)
5. Dissolved Metals *Select List* (6020) (field-filtered, 0.45 micron)
6. Anions (Method 300) (Chloride, Fluoride, Sulfate)
7. Nitrate-Nitrite as Nitrogen (353.2)
8. Alkalinity (2320)
   - Carbonate
   - Bicarbonate
9. Total Dissolved Solids (2540C)

= HMI only (field-strategy note)

= Existing well included in Wood-RO Field, Quarterly Groundwater Program

= Well installed by Wood in 2019, included in Wood-RO Field, Quarterly Groundwater Program

HMI
Groundwater

Hydrologic Monitoring
1654 W. Sam Houston Pkwy. N.
Houston, Texas 77043

Phone 713.464.5206
Fax 713.464.5207

M E M O R A N D U M

Groundwater Monitoring Standard Operating Procedures
Navajo Refining LLC – Artesia, New Mexico

HMI conducts low-flow groundwater sampling in accordance with the site Sampling and Analysis Plan and EPA guidance (including Puls and Barcelona, 1996 EPA Guidance on Low-Flow Groundwater Sampling; REV No. 4, September 19, 2017, and Yeskis & Zavala, 2002, EPA/542:S-02/00, Groundwater Sampling Guidelines for Superfund and RCRA Project Managers).

Groundwater Sampling Methodology

HMI conducts low-flow groundwater sampling using a peristaltic pump and dedicated polyethylene tubing at wells with requisite depths-to-water. At a limited number of wells with depths-to-water greater than peristaltic range, low-flow groundwater sampling is conducted using dedicated or non-dedicated bladder pumps. In 2016, at no cost to TRC, HMI installed HMI-owned bladder pumps in a limited number of wells (approximately four). At such time that HMI no longer conducts routine groundwater monitoring at the site, it respectfully requests the opportunity to recover these dedicated bladder pumps. Sample intakes are set at midscreen, when possible (generally at least two feet from the base of the well). Sample intake depths are permanently marked, ensuring future sampling events consistently monitor the targeted water-bearing interval. During sampling with a peristaltic pump, the sample tube is attached to the pump using a one-foot section of dedicated, flexible silicone tubing (item #5703, Geotech Environmental Equipment, Inc.). A two-foot segment of polyethylene tubing connects the silicone tubing in the pump to the flow-through cell, using a disposable segment of silicone tubing. Purging commences through a sealed flow-through cell at EPA-recommended purge rates (generally 0.1 to 0.2 liters/minute), while well drawdown is monitored. Groundwater field parameter readings are measured at 0.5-liter intervals (generally an equivalent of one cell-volume "turnover"). Field parameters of pH, specific conductivity, temperature, dissolved oxygen, and oxidation-reduction potential are monitored inside the cell. Turbidity is monitored outside the cell. Groundwater field instrumentation is calibrated and recorded daily in accordance with manufacturer specifications.

Purging continues until a requisite volume of groundwater is purged (generally a minimum of 3,000 ml or six flow-through cell volumes), and field parameters have stabilized in accordance with EPA guidance:

> *Water Quality Parameters (Stabilization Parameters in Accordance with EPA (2002), Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, Yeskis & Zavala, EPA/542:S-02/001)*

- pH +/- 0.1 units;
- Temperature -
- Conductivity +/- 3%
- Dissolved Oxygen +/- 0.3 mg/L
- ORP +/- 10%
- Turbidity 10%

Immediately prior to sampling, the input tubing to the flow-through cell is disconnected from the disposable silicone receiving tubing on the input barb on the flow-through cell, and groundwater samples are collected directly into lab-supplied containers. Groundwater samples are placed in iced coolers, and remain in HMI's custody until shipped to ESC Lab Sciences via FedEx-overnight. Peristaltic tubes and/or dedicated bladder pumps may be dedicated in respective wells. Alternatively, dedicated tubing may be retrieved, bagged, labeled, and stored in tubs maintained at HMI. Wells with very limited water column thicknesses may be sampled with disposable bailers. Active recovery well and irrigation wells are sampled using sample ports. The purging and sampling process is documented on groundwater sampling field forms.

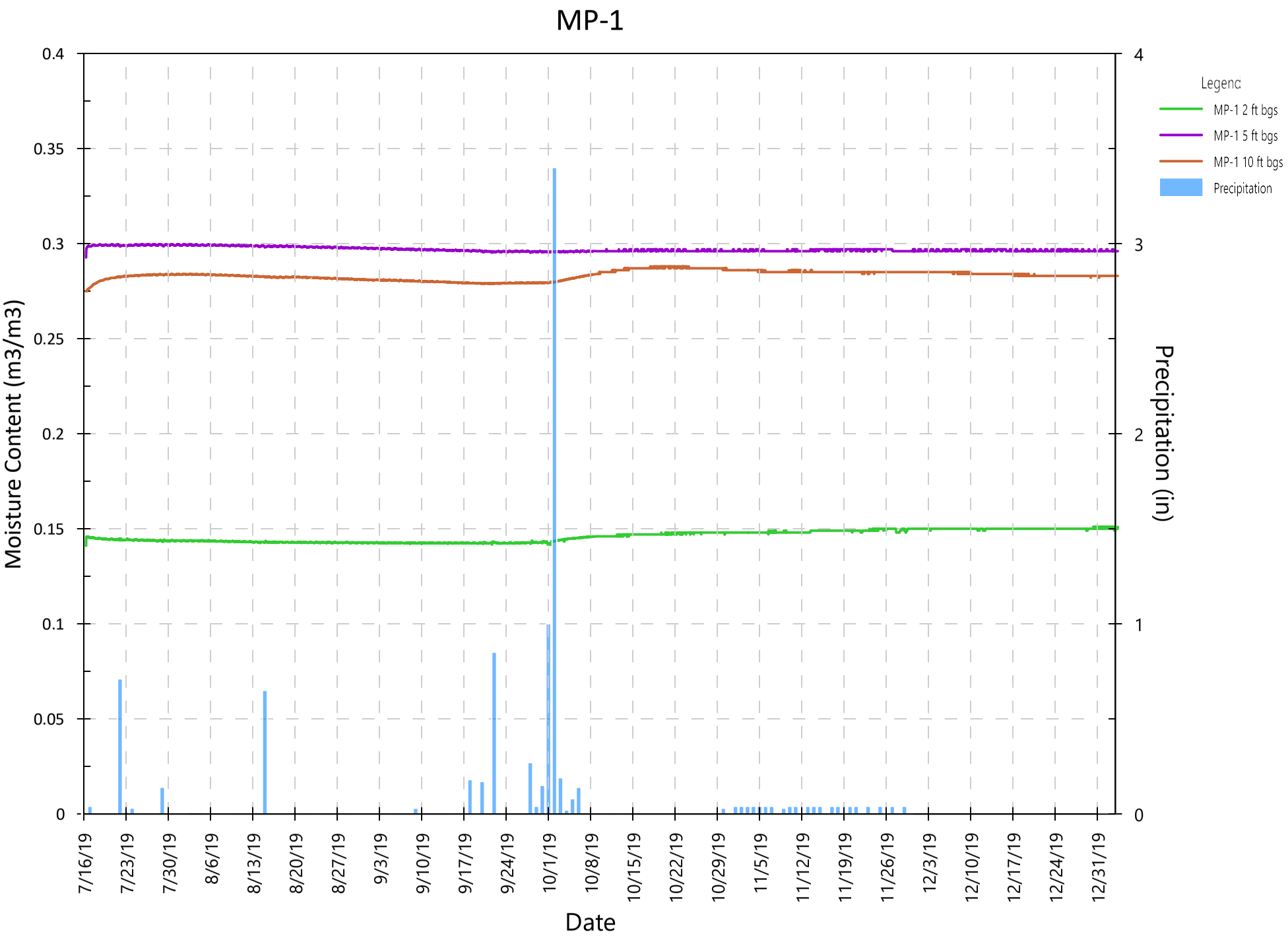
Cross-Contamination Prevention Program

Dedicated peristaltic tubing and dedicated bladder pumps are used as possible, to minimize any potential cross-contamination issues during the groundwater monitoring process. Remaining non-dedicated equipment (e.g., electronic gauging probes or non-dedicated bladder pumps, etc.) is properly decontaminated prior to use and between wells. The decontamination procedure may include a combination of chemical and mechanical decontamination. For example, scrubbing with ethyl alcohol (isopropanol) as warranted, followed by scrubbing using an Alconox-water solution, and distilled water rinse. The decontamination procedure for non-dedicated bladder pumps consists of cycling an Alconox-water solution through the pump bladder. Distilled water is cycled through the pump bladder, followed by decontaminating the exterior body of the pump, using the methods outlined above.

HMI Deliverables

HMI provides field documentation of groundwater monitoring activities in a deliverables package that includes a brief narrative, summary table (with gauging data, field parameters, well inspection data, and required analytical scope), groundwater sampling forms, field instrument calibration log, and chain-of-custody forms (by Refinery "Area"), and a groundwater sampling SOP memo.

APPENDIX B
SOIL MOISTURE DATA GRAPHS


MP-1
Moisture Content (m3/m3)
Precipitation (in)
Date
Legend
MP-1 2 ft bgs
MP-1 5 ft bgs
MP-1 10 ft bgs
Precipitation
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3
2
1
0
7/16/19
7/23/19
7/30/19
8/6/19
8/13/19
8/20/19
8/27/19
9/3/19
9/10/19
9/17/19
9/24/19
10/1/19
10/8/19
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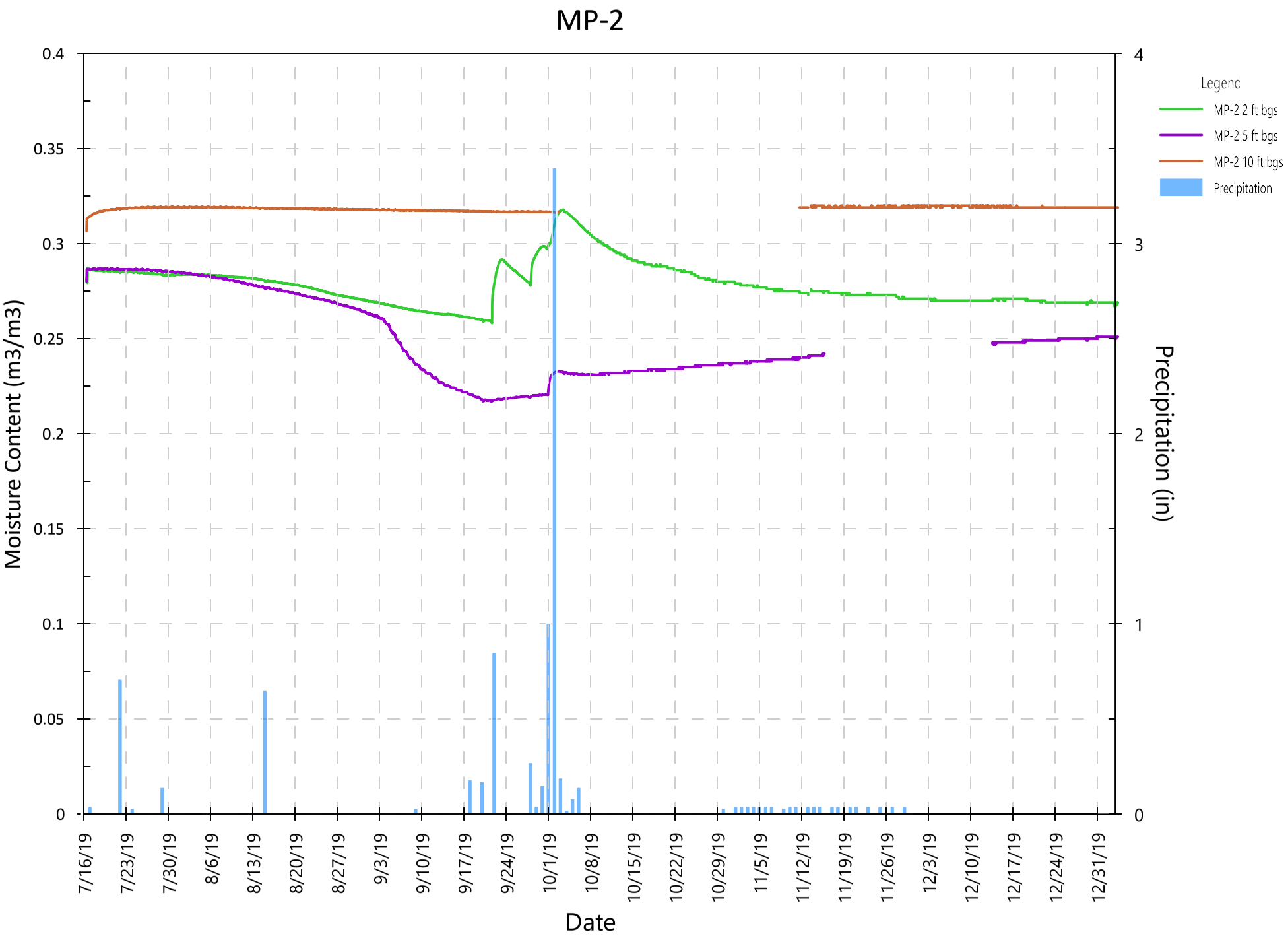
12/24/19
12/31/19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Moisture Content (m3/m3)
Precipitation (in)
Date
Legend
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MP-2 5 ft bgs
MP-2 10 ft bgs
Precipitation
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3
2
1
0
7/16/19
7/23/19
7/30/19
8/6/19
8/13/19
8/20/19
8/27/19
9/3/19
9/10/19
9/17/19
9/24/19
10/1/19
10/8/19
10/15/19
10/22/19
10/29/19
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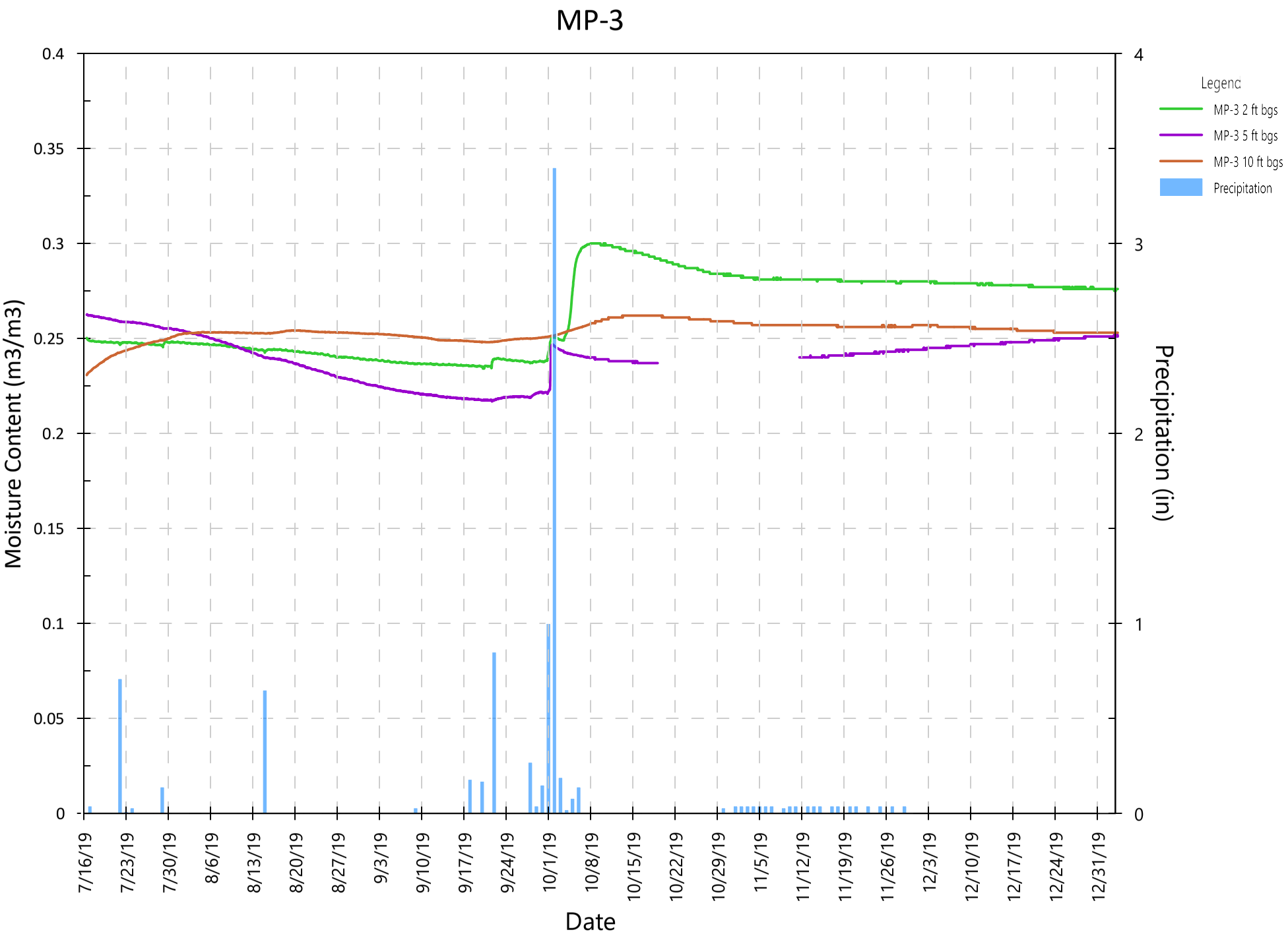
12/24/19
12/31/19


MP-3
Moisture Content (m3/m3)
Precipitation (in)
Date
Legend
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MP-3 5 ft bgs
MP-3 10 ft bgs
Precipitation
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3
2
1
0
7/16/19
7/23/19
7/30/19
8/6/19
8/13/19
8/20/19
8/27/19
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9/10/19
9/17/19
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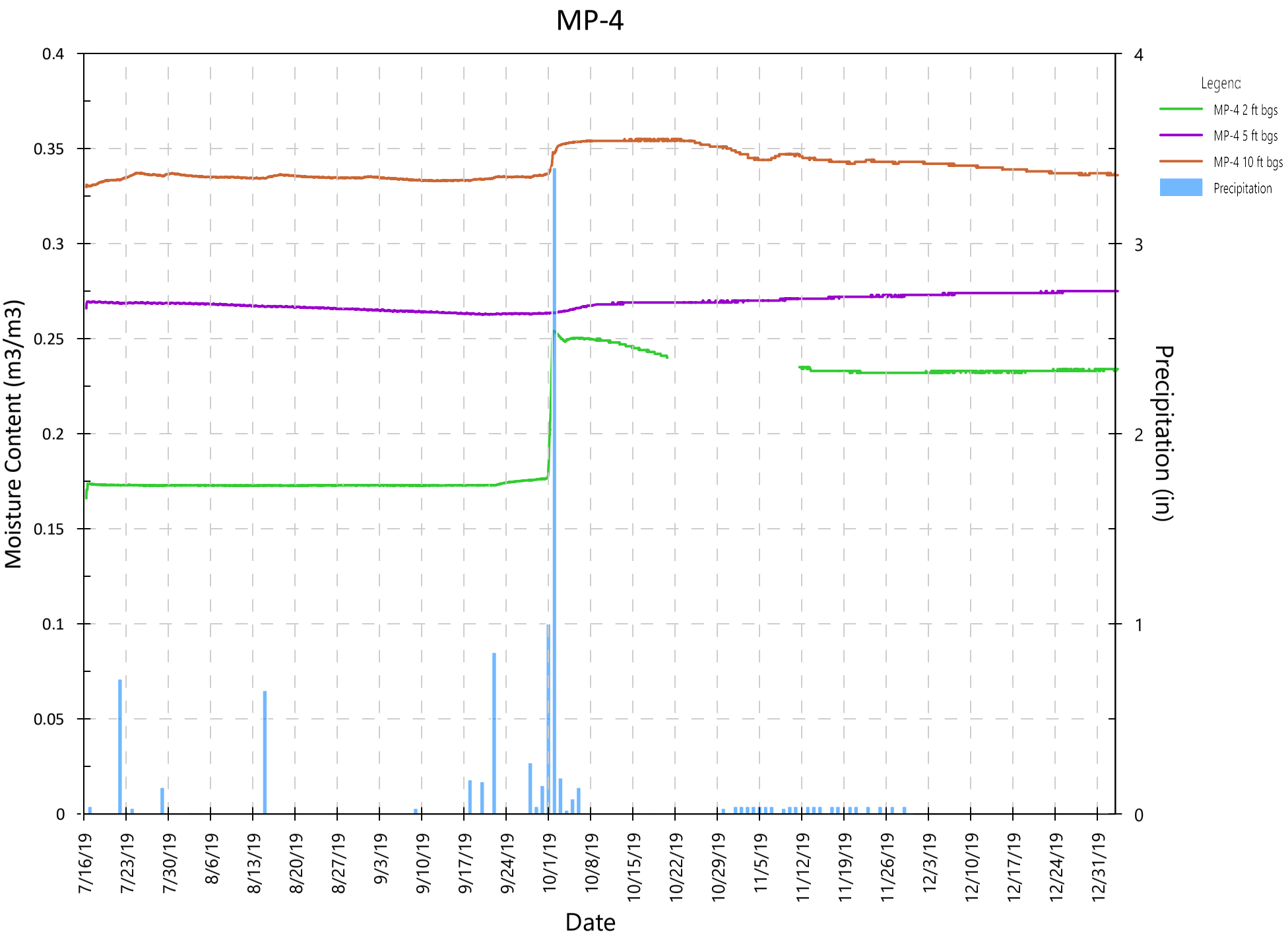
12/31/19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Precipitation (in)
Date
Legend
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MP-4 5 ft bgs
MP-4 10 ft bgs
Precipitation
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3
2
1
0
7/16/19
7/23/19
7/30/19
8/6/19
8/13/19
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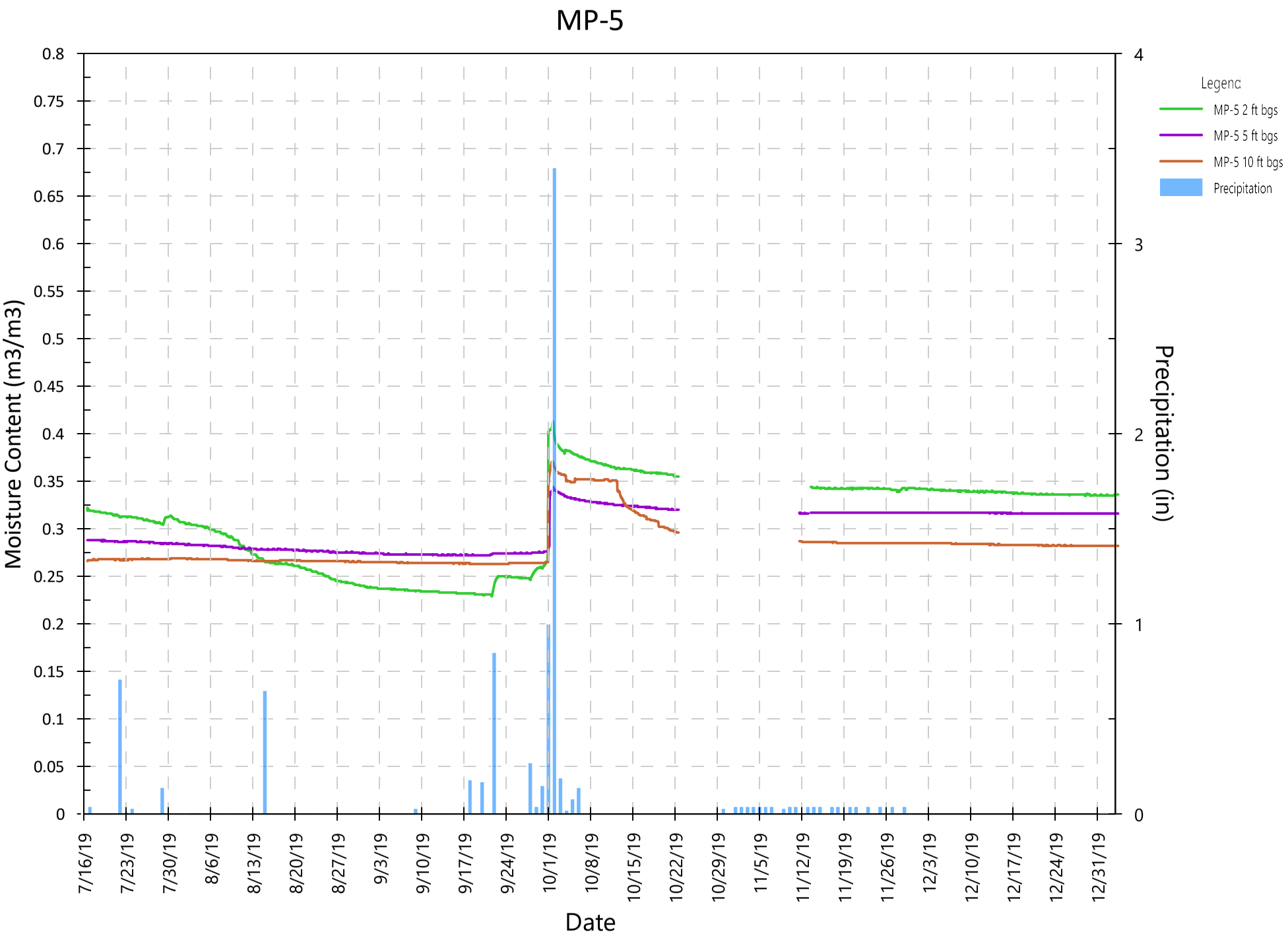
12/31/19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Moisture Content (m3/m3)
Precipitation (in)
Date
Legend
MP-5 2 ft bgs
MP-5 5 ft bgs
MP-5 10 ft bgs
Precipitation
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3
2
1
0
7/16/19
7/23/19
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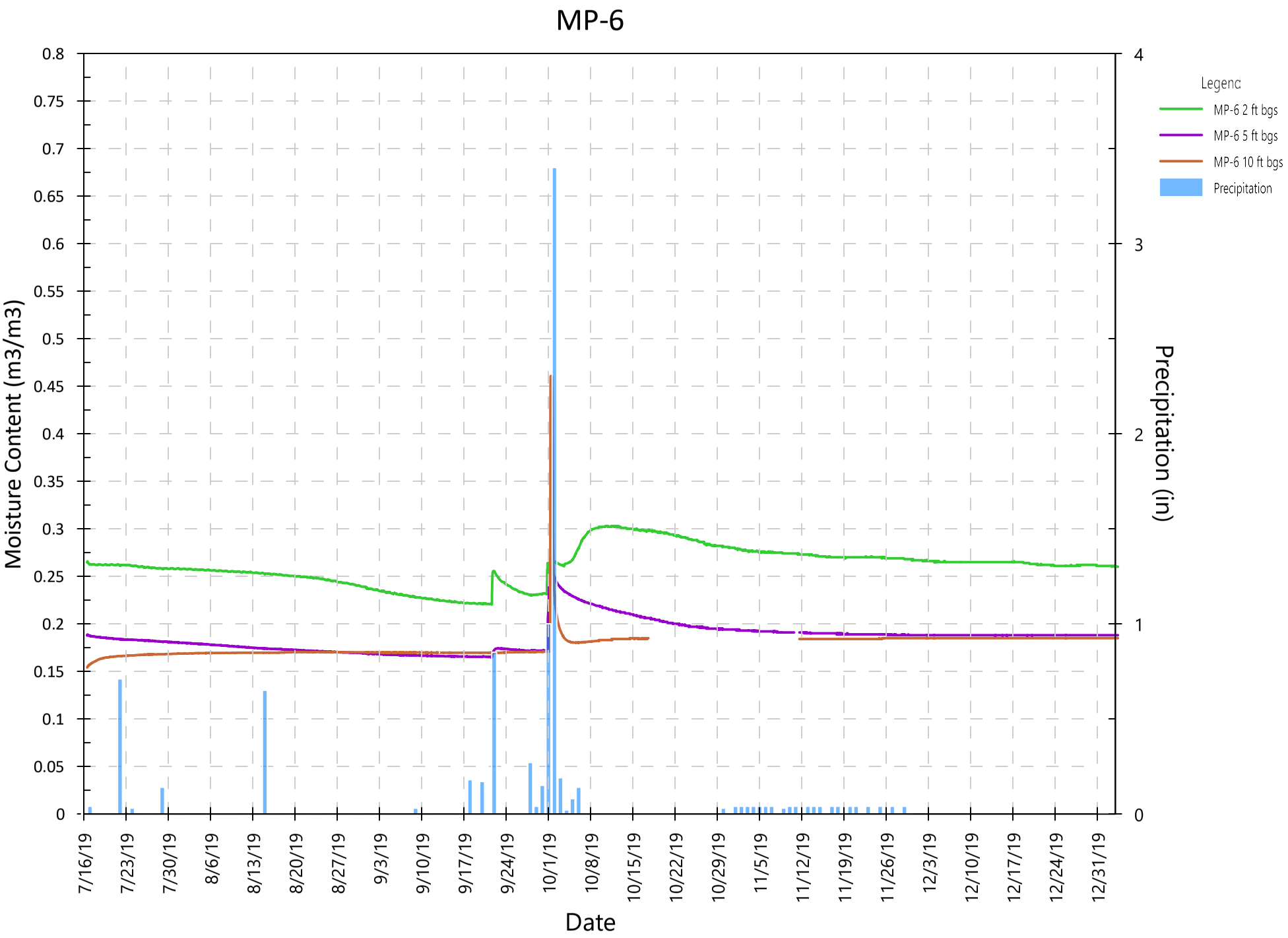
12/24/19
12/31/19


MP-6
Moisture Content (m3/m3)
Precipitation (in)
Date
Legend
MP-6 2 ft bgs
MP-6 5 ft bgs
MP-6 10 ft bgs
Precipitation
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
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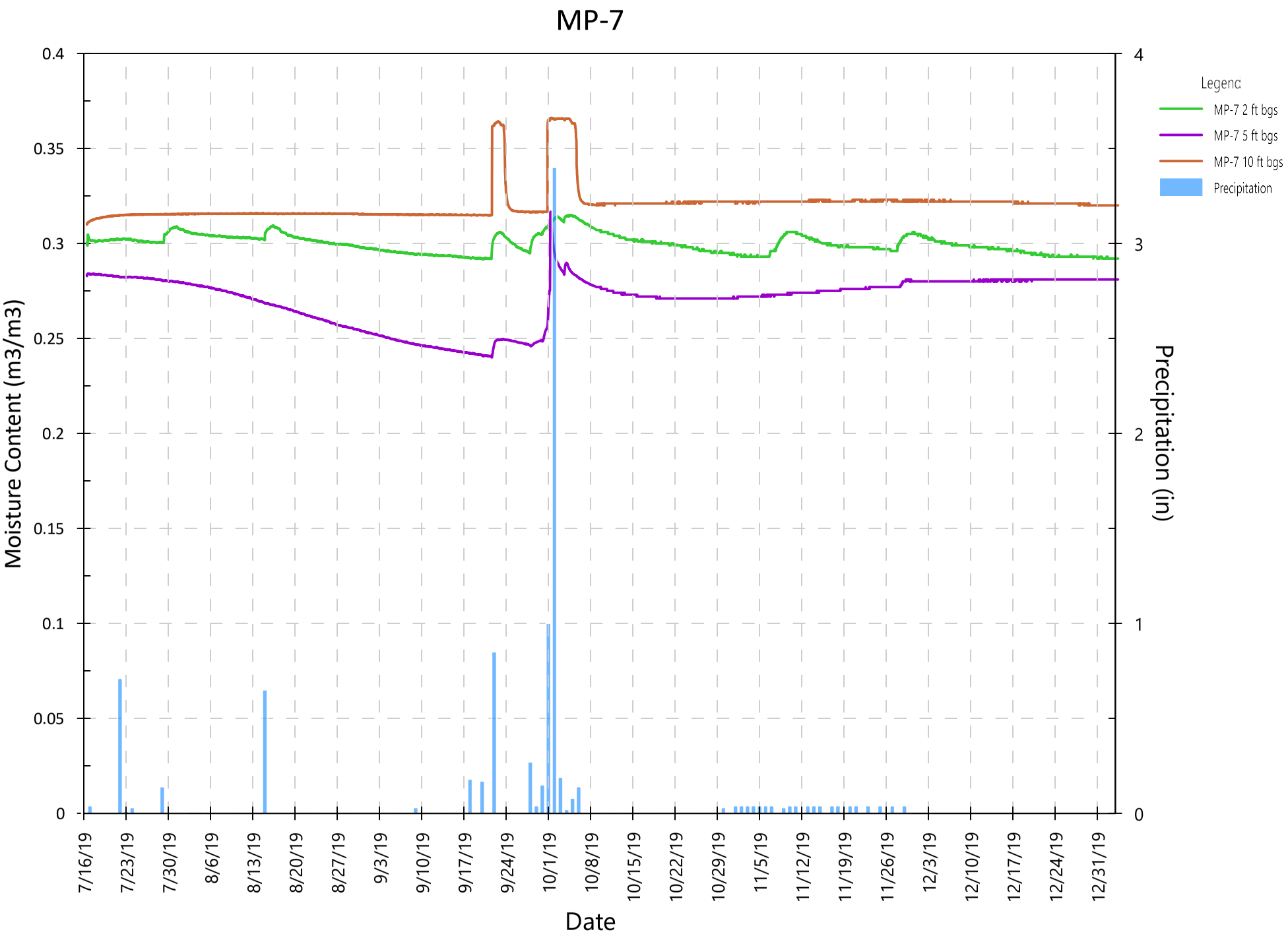
12/31/19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Legend
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MP-7 5 ft bgs
MP-7 10 ft bgs
Precipitation
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3
2
1
0
7/16/19
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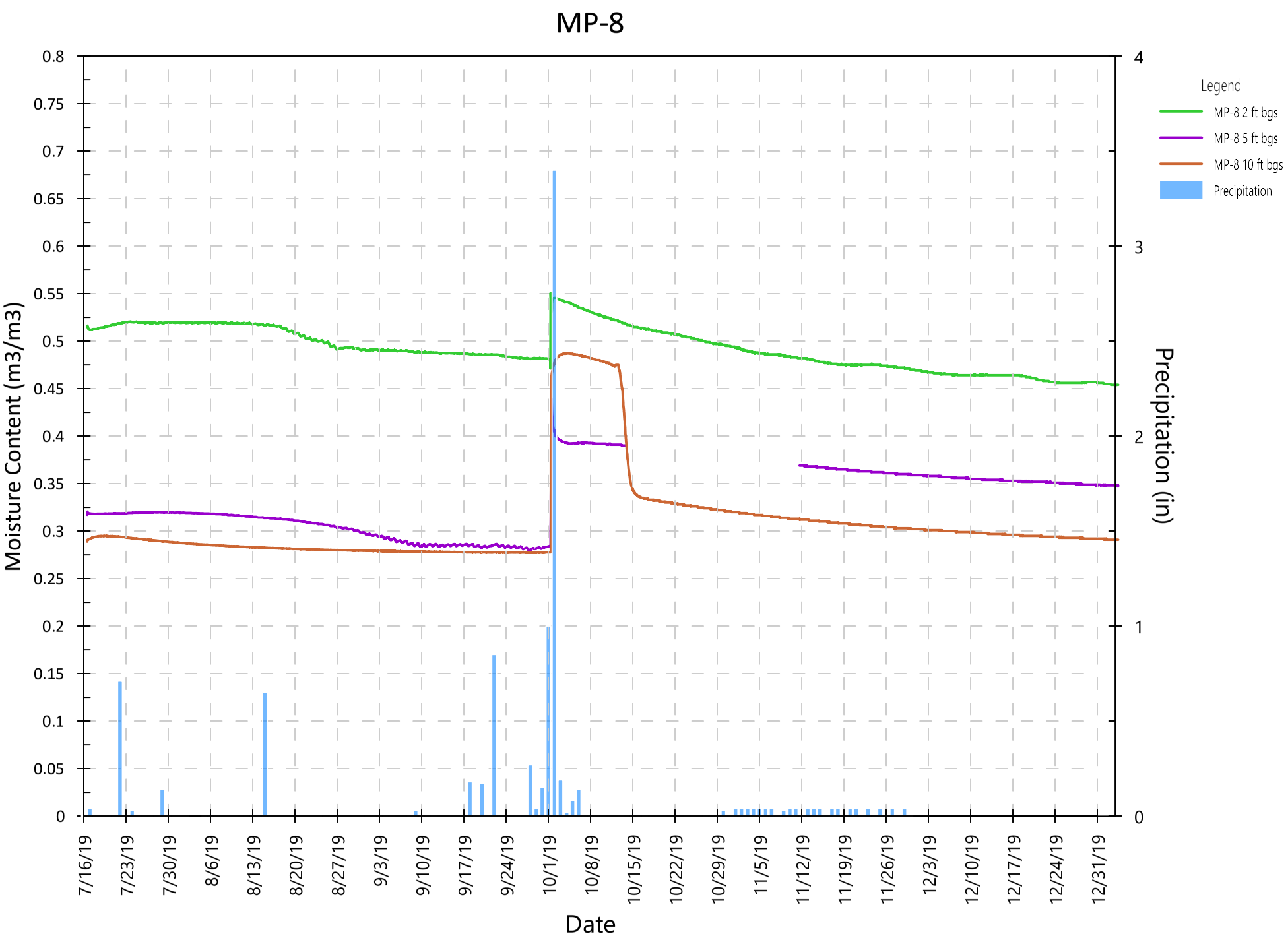
MP-8
Moisture Content (m3/m3)
Precipitation (in)
Date
Legend
MP-8 2 ft bgs
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MP-8 10 ft bgs
Precipitation
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
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0
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7/16/19
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12/24/19
12/31/19

APPENDIX C
LABORATORY ANALYTICAL REPORTS and DATA ASSESSMENT SUMMARY
(electronic)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

October 31, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1152946
Samples Received:	10/23/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Chris McCord
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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MW-115 L1152946-07 15

MW-114 L1152946-08 16

MW-125 L1152946-09 17

MW-117 L1152946-10 18

MW-118 L1152946-11 19

MW-119 L1152946-12 20

MW-142 L1152946-13 21

MW-143 L1152946-14 22

MW-116 L1152946-15 23

RW-#18A L1152946-16 24

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Al: Accreditations & Locations 43

Sc: Sample Chain of Custody 44

MW-40 L1152946-01 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:15 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 19:32	10/25/19 19:32	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/23/19 23:49	10/23/19 23:49	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	50	10/24/19 00:02	10/24/19 00:02	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:16	10/26/19 15:16	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:04	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:18	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:24	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:08	LD	Mt. Juliet, TN

MW-29 L1152946-02 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:25 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 19:39	10/25/19 19:39	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 00:15	10/24/19 00:15	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	100	10/24/19 00:27	10/24/19 00:27	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:19	10/26/19 15:19	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:15	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:30	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:09	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 20:55	LD	Mt. Juliet, TN

MW-56 L1152946-03 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:25 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 19:46	10/25/19 19:46	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 00:40	10/24/19 00:40	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	50	10/24/19 01:21	10/24/19 01:21	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:23	10/26/19 15:23	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:18	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:33	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:27	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:12	LD	Mt. Juliet, TN

MW-55 L1152946-04 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:45 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 19:52	10/25/19 19:52	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 01:34	10/24/19 01:34	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	50	10/24/19 01:47	10/24/19 01:47	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:25	10/26/19 15:25	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:21	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:36	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:31	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:15	LD	Mt. Juliet, TN

MW-140 L1152946-05 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:40 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 19:59	10/25/19 19:59	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 02:00	10/24/19 02:00	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	50	10/24/19 02:12	10/24/19 02:12	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	5	10/26/19 15:26	10/26/19 15:26	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:29	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:44	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:42	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:38	LD	Mt. Juliet, TN

MW-141 L1152946-06 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:50 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:06	10/25/19 20:06	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 02:25	10/24/19 02:25	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	50	10/24/19 02:38	10/24/19 02:38	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	5	10/26/19 15:34	10/26/19 15:34	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:32	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:47	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:46	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:41	LD	Mt. Juliet, TN

MW-115 L1152946-07 GW

Collected by: SC / HT | Collected date/time: 10/22/19 11:55 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:20	10/25/19 20:20	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 02:51	10/24/19 02:51	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	50	10/24/19 03:04	10/24/19 03:04	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:35	10/26/19 15:35	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:35	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:50	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:50	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:44	LD	Mt. Juliet, TN

MW-114 L1152946-08 GW

Collected by: SC / HT | Collected date/time: 10/22/19 11:00 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:27	10/25/19 20:27	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 03:16	10/24/19 03:16	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	100	10/24/19 03:55	10/24/19 03:55	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:37	10/26/19 15:37	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:38	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:53	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:53	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:48	LD	Mt. Juliet, TN

MW-125 L1152946-09 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:00 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:34	10/25/19 20:34	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 04:07	10/24/19 04:07	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	100	10/24/19 04:20	10/24/19 04:20	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:38	10/26/19 15:38	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:41	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:56	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 02:57	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:51	LD	Mt. Juliet, TN

MW-117 L1152946-10 GW

Collected by: SC / HT | Collected date/time: 10/22/19 12:05 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368264	1	10/24/19 08:53	10/24/19 09:24	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:40	10/25/19 20:40	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	1	10/24/19 04:33	10/24/19 04:33	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368271	100	10/24/19 04:46	10/24/19 04:46	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:40	10/26/19 15:40	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:44	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 09:59	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:01	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:54	LD	Mt. Juliet, TN

MW-118 L1152946-11 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:50 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:47	10/25/19 20:47	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 01:35	10/24/19 01:35	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 01:47	10/24/19 01:47	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:41	10/26/19 15:41	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:47	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:02	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:04	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 21:58	LD	Mt. Juliet, TN

MW-119 L1152946-12 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:55 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 20:54	10/25/19 20:54	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 02:00	10/24/19 02:00	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 02:13	10/24/19 02:13	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:44	10/26/19 15:44	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:50	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:05	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:08	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:01	LD	Mt. Juliet, TN

MW-142 L1152946-13 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:05 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 21:00	10/25/19 21:00	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 02:51	10/24/19 02:51	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 03:04	10/24/19 03:04	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:47	10/26/19 15:47	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:53	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:08	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:12	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:04	LD	Mt. Juliet, TN

MW-143 L1152946-14 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:55 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 21:07	10/25/19 21:07	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 03:17	10/24/19 03:17	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 03:30	10/24/19 03:30	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:55	10/26/19 15:55	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 18:56	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:11	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:16	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:08	LD	Mt. Juliet, TN

MW-116 L1152946-15 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:25 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 21:14	10/25/19 21:14	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 03:42	10/24/19 03:42	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 03:55	10/24/19 03:55	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:56	10/26/19 15:56	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 19:07	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:19	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:27	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:18	LD	Mt. Juliet, TN

RW-#18A L1152946-16 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:05 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 21:20	10/25/19 21:20	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 09:51	10/24/19 09:51	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 04:21	10/24/19 04:21	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:58	10/26/19 15:58	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 19:10	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:22	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:32	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:21	LD	Mt. Juliet, TN

MW-144 L1152946-17 GW

Collected by: SC / HT | Collected date/time: 10/22/19 11:00 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 21:34	10/25/19 21:34	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 10:06	10/24/19 10:06	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	100	10/24/19 04:46	10/24/19 04:46	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 15:59	10/26/19 15:59	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 19:13	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:25	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:35	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:25	LD	Mt. Juliet, TN

DUP-RO-01 L1152946-18 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:00 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369567	1	10/25/19 21:41	10/25/19 21:41	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 05:25	10/24/19 05:25	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	50	10/24/19 05:38	10/24/19 05:38	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 16:01	10/26/19 16:01	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 19:16	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:28	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:39	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:28	LD	Mt. Juliet, TN

DUP-RO-02 L1152946-19 GW

Collected by: SC / HT | Collected date/time: 10/22/19 10:00 | Received date/time: 10/23/19 08:45

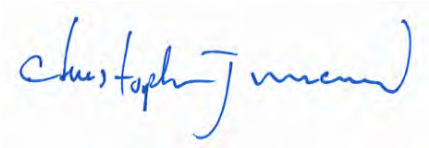
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369568	1	10/27/19 11:24	10/27/19 11:24	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 05:50	10/24/19 05:50	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	50	10/24/19 06:03	10/24/19 06:03	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 16:02	10/26/19 16:02	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 19:19	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:31	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:43	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:31	LD	Mt. Juliet, TN

EB-RO-01 L1152946-20 GW

Collected by: SC / HT | Collected date/time: 10/22/19 09:45 | Received date/time: 10/23/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1368265	1	10/24/19 09:02	10/24/19 09:39	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1369568	1	10/27/19 11:40	10/27/19 11:40	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1368507	1	10/24/19 00:43	10/24/19 00:43	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1369963	1	10/26/19 16:04	10/26/19 16:04	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368577	1	10/26/19 16:28	10/27/19 19:22	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1368585	1	10/27/19 21:20	10/28/19 10:34	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368581	1	10/26/19 16:30	10/28/19 03:47	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1368589	1	10/28/19 07:21	10/28/19 22:35	LD	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.



Chris McCord
Project Manager

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	2610		7.05	25.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	299		2.71	20.0	1	10/25/2019 19:32	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 19:32	WG1369567

Sample Narrative:

L1152946-01 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	68.2		0.0519	1.00	1	10/23/2019 23:49	WG1368271
Fluoride	2.18		0.00990	0.100	1	10/23/2019 23:49	WG1368271
Sulfate	1570		3.87	250	50	10/24/2019 00:02	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0330	J	0.0197	0.100	1	10/26/2019 15:16	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.311		0.0126	0.200	1	10/28/2019 09:18	WG1368585
Boron,Dissolved	0.292		0.0126	0.200	1	10/27/2019 18:04	WG1368577
Calcium	435	V	0.0463	1.00	1	10/28/2019 09:18	WG1368585
Iron	0.270		0.0141	0.100	1	10/28/2019 09:18	WG1368585
Iron,Dissolved	0.0179	J	0.0141	0.100	1	10/27/2019 18:04	WG1368577
Magnesium	198	V	0.0111	1.00	1	10/28/2019 09:18	WG1368585
Potassium	2.11		0.102	1.00	1	10/28/2019 09:18	WG1368585
Sodium	98.7	V	0.0985	1.00	1	10/28/2019 09:18	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00106	J	0.000250	0.00200	1	10/28/2019 21:08	WG1368589
Arsenic,Dissolved	0.000851	J	0.000250	0.00200	1	10/28/2019 02:24	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 21:08	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 02:24	WG1368581
Lead	0.00184	B J	0.000240	0.00200	1	10/28/2019 21:08	WG1368589
Lead,Dissolved	0.000284	B J	0.000240	0.00200	1	10/28/2019 02:24	WG1368581
Manganese	0.0233		0.000250	0.00500	1	10/28/2019 21:08	WG1368589
Manganese,Dissolved	0.0238		0.000250	0.00500	1	10/28/2019 02:24	WG1368581
Uranium	0.000622	J	0.000330	0.0100	1	10/28/2019 21:08	WG1368589
Uranium,Dissolved	0.000544	J	0.000330	0.0100	1	10/28/2019 02:24	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3910		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	577		2.71	20.0	1	10/25/2019 19:39	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 19:39	WG1369567

Sample Narrative:

L1152946-02 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	354		5.19	100	100	10/24/2019 00:27	WG1368271
Fluoride	1.84		0.00990	0.100	1	10/24/2019 00:15	WG1368271
Sulfate	2480		7.74	500	100	10/24/2019 00:27	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	10/26/2019 15:19	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	1.33		0.0126	0.200	1	10/28/2019 09:30	WG1368585
Boron,Dissolved	1.26		0.0126	0.200	1	10/27/2019 18:15	WG1368577
Calcium	527		0.0463	1.00	1	10/28/2019 09:30	WG1368585
Iron	4.37		0.0141	0.100	1	10/28/2019 09:30	WG1368585
Iron,Dissolved	4.05		0.0141	0.100	1	10/27/2019 18:15	WG1368577
Magnesium	345		0.0111	1.00	1	10/28/2019 09:30	WG1368585
Potassium	2.43		0.102	1.00	1	10/28/2019 09:30	WG1368585
Sodium	376		0.0985	1.00	1	10/28/2019 09:30	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0157		0.000250	0.00200	1	10/28/2019 20:55	WG1368589
Arsenic,Dissolved	0.0143		0.000250	0.00200	1	10/28/2019 02:09	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 20:55	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 02:09	WG1368581
Lead	0.00892		0.000240	0.00200	1	10/28/2019 20:55	WG1368589
Lead,Dissolved	0.000291	B J	0.000240	0.00200	1	10/28/2019 02:09	WG1368581
Manganese	0.579	V	0.000250	0.00500	1	10/28/2019 20:55	WG1368589
Manganese,Dissolved	0.574	V	0.000250	0.00500	1	10/28/2019 02:09	WG1368581
Uranium	0.0190		0.000330	0.0100	1	10/28/2019 20:55	WG1368589
Uranium,Dissolved	0.0189		0.000330	0.0100	1	10/28/2019 02:09	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3120		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	363		2.71	20.0	1	10/25/2019 19:46	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 19:46	WG1369567

Sample Narrative:

L1152946-03 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	286		2.60	50.0	50	10/24/2019 01:21	WG1368271
Fluoride	1.10		0.00990	0.100	1	10/24/2019 00:40	WG1368271
Sulfate	1890		3.87	250	50	10/24/2019 01:21	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	10/26/2019 15:23	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.284		0.0126	0.200	1	10/28/2019 09:33	WG1368585
Boron,Dissolved	0.269		0.0126	0.200	1	10/27/2019 18:18	WG1368577
Calcium	508		0.0463	1.00	1	10/28/2019 09:33	WG1368585
Iron	U		0.0141	0.100	1	10/28/2019 09:33	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:18	WG1368577
Magnesium	261		0.0111	1.00	1	10/28/2019 09:33	WG1368585
Potassium	2.07		0.102	1.00	1	10/28/2019 09:33	WG1368585
Sodium	155		0.0985	1.00	1	10/28/2019 09:33	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00515		0.000250	0.00200	1	10/28/2019 21:12	WG1368589
Arsenic,Dissolved	0.00524		0.000250	0.00200	1	10/28/2019 02:27	WG1368581
Cobalt	0.00698		0.000260	0.00200	1	10/28/2019 21:12	WG1368589
Cobalt,Dissolved	0.00699		0.000260	0.00200	1	10/28/2019 02:27	WG1368581
Lead	0.000701	B J	0.000240	0.00200	1	10/28/2019 21:12	WG1368589
Lead,Dissolved	0.000529	B J	0.000240	0.00200	1	10/28/2019 02:27	WG1368581
Manganese	0.306		0.000250	0.00500	1	10/28/2019 21:12	WG1368589
Manganese,Dissolved	0.304		0.000250	0.00500	1	10/28/2019 02:27	WG1368581
Uranium	0.0178		0.000330	0.0100	1	10/28/2019 21:12	WG1368589
Uranium,Dissolved	0.0173		0.000330	0.0100	1	10/28/2019 02:27	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3390		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	489		2.71	20.0	1	10/25/2019 19:52	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 19:52	WG1369567

Sample Narrative:

L1152946-04 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	514		2.60	50.0	50	10/24/2019 01:47	WG1368271
Fluoride	1.53		0.00990	0.100	1	10/24/2019 01:34	WG1368271
Sulfate	1570		3.87	250	50	10/24/2019 01:47	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.469		0.0197	0.100	1	10/26/2019 15:25	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	1.07		0.0126	0.200	1	10/28/2019 09:36	WG1368585
Boron,Dissolved	1.00		0.0126	0.200	1	10/27/2019 18:21	WG1368577
Calcium	418		0.0463	1.00	1	10/28/2019 09:36	WG1368585
Iron	0.0207	J	0.0141	0.100	1	10/28/2019 09:36	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:21	WG1368577
Magnesium	312		0.0111	1.00	1	10/28/2019 09:36	WG1368585
Potassium	0.862	B J	0.102	1.00	1	10/28/2019 09:36	WG1368585
Sodium	237		0.0985	1.00	1	10/28/2019 09:36	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00615		0.000250	0.00200	1	10/28/2019 21:15	WG1368589
Arsenic,Dissolved	0.00595		0.000250	0.00200	1	10/28/2019 02:31	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 21:15	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 02:31	WG1368581
Lead	0.000783	B J	0.000240	0.00200	1	10/28/2019 21:15	WG1368589
Lead,Dissolved	0.000263	B J	0.000240	0.00200	1	10/28/2019 02:31	WG1368581
Manganese	0.132		0.000250	0.00500	1	10/28/2019 21:15	WG1368589
Manganese,Dissolved	0.126		0.000250	0.00500	1	10/28/2019 02:31	WG1368581
Uranium	0.0513		0.000330	0.0100	1	10/28/2019 21:15	WG1368589
Uranium,Dissolved	0.0504		0.000330	0.0100	1	10/28/2019 02:31	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3390		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	311		2.71	20.0	1	10/25/2019 19:59	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 19:59	WG1369567

Sample Narrative:

L1152946-05 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	310		2.60	50.0	50	10/24/2019 02:12	WG1368271
Fluoride	1.44		0.00990	0.100	1	10/24/2019 02:00	WG1368271
Sulfate	2220		3.87	250	50	10/24/2019 02:12	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	9.29		0.0985	0.500	5	10/26/2019 15:26	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.412		0.0126	0.200	1	10/28/2019 09:44	WG1368585
Boron,Dissolved	0.395		0.0126	0.200	1	10/27/2019 18:29	WG1368577
Calcium	639		0.0463	1.00	1	10/28/2019 09:44	WG1368585
Iron	0.224		0.0141	0.100	1	10/28/2019 09:44	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:29	WG1368577
Magnesium	240		0.0111	1.00	1	10/28/2019 09:44	WG1368585
Potassium	45.2		0.102	1.00	1	10/28/2019 09:44	WG1368585
Sodium	170		0.0985	1.00	1	10/28/2019 09:44	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00241		0.000250	0.00200	1	10/28/2019 21:38	WG1368589
Arsenic,Dissolved	0.00247		0.000250	0.00200	1	10/28/2019 02:42	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 21:38	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 02:42	WG1368581
Lead	0.000867	B J	0.000240	0.00200	1	10/28/2019 21:38	WG1368589
Lead,Dissolved	0.000378	B J	0.000240	0.00200	1	10/28/2019 02:42	WG1368581
Manganese	0.102		0.000250	0.00500	1	10/28/2019 21:38	WG1368589
Manganese,Dissolved	0.0975		0.000250	0.00500	1	10/28/2019 02:42	WG1368581
Uranium	0.0318		0.000330	0.0100	1	10/28/2019 21:38	WG1368589
Uranium,Dissolved	0.0325		0.000330	0.0100	1	10/28/2019 02:42	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	2880		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	223		2.71	20.0	1	10/25/2019 20:06	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:06	WG1369567

Sample Narrative:

L1152946-06 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	284		2.60	50.0	50	10/24/2019 02:38	WG1368271
Fluoride	3.02		0.00990	0.100	1	10/24/2019 02:25	WG1368271
Sulfate	1690		3.87	250	50	10/24/2019 02:38	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	9.71		0.0985	0.500	5	10/26/2019 15:34	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.215		0.0126	0.200	1	10/28/2019 09:47	WG1368585
Boron,Dissolved	0.218		0.0126	0.200	1	10/27/2019 18:32	WG1368577
Calcium	632		0.0463	1.00	1	10/28/2019 09:47	WG1368585
Iron	0.132		0.0141	0.100	1	10/28/2019 09:47	WG1368585
Iron,Dissolved	0.0159	J	0.0141	0.100	1	10/27/2019 18:32	WG1368577
Magnesium	163		0.0111	1.00	1	10/28/2019 09:47	WG1368585
Potassium	8.52		0.102	1.00	1	10/28/2019 09:47	WG1368585
Sodium	69.4		0.0985	1.00	1	10/28/2019 09:47	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00389		0.000250	0.00200	1	10/28/2019 21:41	WG1368589
Arsenic,Dissolved	0.00360		0.000250	0.00200	1	10/28/2019 02:46	WG1368581
Cobalt	0.000333	J	0.000260	0.00200	1	10/28/2019 21:41	WG1368589
Cobalt,Dissolved	0.000308	J	0.000260	0.00200	1	10/28/2019 02:46	WG1368581
Lead	0.000245	B J	0.000240	0.00200	1	10/28/2019 21:41	WG1368589
Lead,Dissolved	U		0.000240	0.00200	1	10/28/2019 02:46	WG1368581
Manganese	0.00939		0.000250	0.00500	1	10/28/2019 21:41	WG1368589
Manganese,Dissolved	0.00925		0.000250	0.00500	1	10/28/2019 02:46	WG1368581
Uranium	0.0280		0.000330	0.0100	1	10/28/2019 21:41	WG1368589
Uranium,Dissolved	0.0288		0.000330	0.0100	1	10/28/2019 02:46	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3870		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	417		2.71	20.0	1	10/25/2019 20:20	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:20	WG1369567

Sample Narrative:

L1152946-07 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	270		2.60	50.0	50	10/24/2019 03:04	WG1368271
Fluoride	2.04		0.00990	0.100	1	10/24/2019 02:51	WG1368271
Sulfate	2390		3.87	250	50	10/24/2019 03:04	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.145		0.0197	0.100	1	10/26/2019 15:35	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.780		0.0126	0.200	1	10/28/2019 09:50	WG1368585
Boron,Dissolved	0.767		0.0126	0.200	1	10/27/2019 18:35	WG1368577
Calcium	444		0.0463	1.00	1	10/28/2019 09:50	WG1368585
Iron	0.286		0.0141	0.100	1	10/28/2019 09:50	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:35	WG1368577
Magnesium	405		0.0111	1.00	1	10/28/2019 09:50	WG1368585
Potassium	0.608	B J	0.102	1.00	1	10/28/2019 09:50	WG1368585
Sodium	195		0.0985	1.00	1	10/28/2019 09:50	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00443		0.000250	0.00200	1	10/28/2019 21:44	WG1368589
Arsenic,Dissolved	0.00405		0.000250	0.00200	1	10/28/2019 02:50	WG1368581
Cobalt	0.00109	J	0.000260	0.00200	1	10/28/2019 21:44	WG1368589
Cobalt,Dissolved	0.000362	J	0.000260	0.00200	1	10/28/2019 02:50	WG1368581
Lead	0.000471	B J	0.000240	0.00200	1	10/28/2019 21:44	WG1368589
Lead,Dissolved	0.000414	B J	0.000240	0.00200	1	10/28/2019 02:50	WG1368581
Manganese	0.155		0.000250	0.00500	1	10/28/2019 21:44	WG1368589
Manganese,Dissolved	0.120		0.000250	0.00500	1	10/28/2019 02:50	WG1368581
Uranium	0.0793		0.000330	0.0100	1	10/28/2019 21:44	WG1368589
Uranium,Dissolved	0.0825		0.000330	0.0100	1	10/28/2019 02:50	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3650		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	376		2.71	20.0	1	10/25/2019 20:27	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:27	WG1369567

Sample Narrative:

L1152946-08 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	252		5.19	100	100	10/24/2019 03:55	WG1368271
Fluoride	1.50		0.00990	0.100	1	10/24/2019 03:16	WG1368271
Sulfate	2170		7.74	500	100	10/24/2019 03:55	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.613		0.0197	0.100	1	10/26/2019 15:37	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.118	J	0.0126	0.200	1	10/28/2019 09:53	WG1368585
Boron,Dissolved	0.122	J	0.0126	0.200	1	10/27/2019 18:38	WG1368577
Calcium	611		0.0463	1.00	1	10/28/2019 09:53	WG1368585
Iron	U		0.0141	0.100	1	10/28/2019 09:53	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:38	WG1368577
Magnesium	234		0.0111	1.00	1	10/28/2019 09:53	WG1368585
Potassium	2.83		0.102	1.00	1	10/28/2019 09:53	WG1368585
Sodium	136		0.0985	1.00	1	10/28/2019 09:53	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00295		0.000250	0.00200	1	10/28/2019 21:48	WG1368589
Arsenic,Dissolved	0.00286		0.000250	0.00200	1	10/28/2019 02:53	WG1368581
Cobalt	0.00643		0.000260	0.00200	1	10/28/2019 21:48	WG1368589
Cobalt,Dissolved	0.00604		0.000260	0.00200	1	10/28/2019 02:53	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 21:48	WG1368589
Lead,Dissolved	0.000352	B J	0.000240	0.00200	1	10/28/2019 02:53	WG1368581
Manganese	1.03		0.000250	0.00500	1	10/28/2019 21:48	WG1368589
Manganese,Dissolved	0.972		0.000250	0.00500	1	10/28/2019 02:53	WG1368581
Uranium	0.0107		0.000330	0.0100	1	10/28/2019 21:48	WG1368589
Uranium,Dissolved	0.0108		0.000330	0.0100	1	10/28/2019 02:53	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Dissolved Solids	3920		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	406		2.71	20.0	1	10/25/2019 20:34	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:34	WG1369567

Sample Narrative:

L1152946-09 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	327		5.19	100	100	10/24/2019 04:20	WG1368271
Fluoride	1.08		0.00990	0.100	1	10/24/2019 04:07	WG1368271
Sulfate	2810		7.74	500	100	10/24/2019 04:20	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Nitrate-Nitrite	0.544		0.0197	0.100	1	10/26/2019 15:38	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron	0.519		0.0126	0.200	1	10/28/2019 09:56	WG1368585
Boron,Dissolved	0.509		0.0126	0.200	1	10/27/2019 18:41	WG1368577
Calcium	553		0.0463	1.00	1	10/28/2019 09:56	WG1368585
Iron	0.0167	J	0.0141	0.100	1	10/28/2019 09:56	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:41	WG1368577
Magnesium	390		0.0111	1.00	1	10/28/2019 09:56	WG1368585
Potassium	1.47		0.102	1.00	1	10/28/2019 09:56	WG1368585
Sodium	229		0.0985	1.00	1	10/28/2019 09:56	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	0.00363		0.000250	0.00200	1	10/28/2019 21:51	WG1368589
Arsenic,Dissolved	0.00362		0.000250	0.00200	1	10/28/2019 02:57	WG1368581
Cobalt	0.00633		0.000260	0.00200	1	10/28/2019 21:51	WG1368589
Cobalt,Dissolved	0.00526		0.000260	0.00200	1	10/28/2019 02:57	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 21:51	WG1368589
Lead,Dissolved	U		0.000240	0.00200	1	10/28/2019 02:57	WG1368581
Manganese	0.418		0.000250	0.00500	1	10/28/2019 21:51	WG1368589
Manganese,Dissolved	0.399		0.000250	0.00500	1	10/28/2019 02:57	WG1368581
Uranium	0.0383		0.000330	0.0100	1	10/28/2019 21:51	WG1368589
Uranium,Dissolved	0.0382		0.000330	0.0100	1	10/28/2019 02:57	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3490		14.1	50.0	1	10/24/2019 09:24	WG1368264

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	344		2.71	20.0	1	10/25/2019 20:40	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:40	WG1369567

Sample Narrative:

L1152946-10 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	305		5.19	100	100	10/24/2019 04:46	WG1368271
Fluoride	3.02		0.00990	0.100	1	10/24/2019 04:33	WG1368271
Sulfate	2260		7.74	500	100	10/24/2019 04:46	WG1368271

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.395		0.0197	0.100	1	10/26/2019 15:40	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.145	J	0.0126	0.200	1	10/28/2019 09:59	WG1368585
Boron,Dissolved	0.147	J	0.0126	0.200	1	10/27/2019 18:44	WG1368577
Calcium	583		0.0463	1.00	1	10/28/2019 09:59	WG1368585
Iron	0.0611	J	0.0141	0.100	1	10/28/2019 09:59	WG1368585
Iron,Dissolved	0.0195	J	0.0141	0.100	1	10/27/2019 18:44	WG1368577
Magnesium	264		0.0111	1.00	1	10/28/2019 09:59	WG1368585
Potassium	6.81		0.102	1.00	1	10/28/2019 09:59	WG1368585
Sodium	108		0.0985	1.00	1	10/28/2019 09:59	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00250		0.000250	0.00200	1	10/28/2019 21:54	WG1368589
Arsenic,Dissolved	0.00243		0.000250	0.00200	1	10/28/2019 03:01	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 21:54	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:01	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 21:54	WG1368589
Lead,Dissolved	U		0.000240	0.00200	1	10/28/2019 03:01	WG1368581
Manganese	0.00173	B J	0.000250	0.00500	1	10/28/2019 21:54	WG1368589
Manganese,Dissolved	0.00222	B J	0.000250	0.00500	1	10/28/2019 03:01	WG1368581
Uranium	0.0176		0.000330	0.0100	1	10/28/2019 21:54	WG1368589
Uranium,Dissolved	0.0172		0.000330	0.0100	1	10/28/2019 03:01	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Dissolved Solids	4240		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	365		2.71	20.0	1	10/25/2019 20:47	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:47	WG1369567

Sample Narrative:

L1152946-11 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	274		5.19	100	100	10/24/2019 01:47	WG1368507
Fluoride	4.39		0.00990	0.100	1	10/24/2019 01:35	WG1368507
Sulfate	2480		7.74	500	100	10/24/2019 01:47	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Nitrate-Nitrite	1.80		0.0197	0.100	1	10/26/2019 15:41	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron	0.352		0.0126	0.200	1	10/28/2019 10:02	WG1368585
Boron,Dissolved	0.366		0.0126	0.200	1	10/27/2019 18:47	WG1368577
Calcium	585		0.0463	1.00	1	10/28/2019 10:02	WG1368585
Iron	0.127		0.0141	0.100	1	10/28/2019 10:02	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 18:47	WG1368577
Magnesium	389		0.0111	1.00	1	10/28/2019 10:02	WG1368585
Potassium	4.15		0.102	1.00	1	10/28/2019 10:02	WG1368585
Sodium	167		0.0985	1.00	1	10/28/2019 10:02	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	0.00871		0.000250	0.00200	1	10/28/2019 21:58	WG1368589
Arsenic,Dissolved	0.00863		0.000250	0.00200	1	10/28/2019 03:04	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 21:58	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:04	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 21:58	WG1368589
Lead,Dissolved	0.000248	B J	0.000240	0.00200	1	10/28/2019 03:04	WG1368581
Manganese	0.00139	B J	0.000250	0.00500	1	10/28/2019 21:58	WG1368589
Manganese,Dissolved	0.000558	B J	0.000250	0.00500	1	10/28/2019 03:04	WG1368581
Uranium	0.0371		0.000330	0.0100	1	10/28/2019 21:58	WG1368589
Uranium,Dissolved	0.0370		0.000330	0.0100	1	10/28/2019 03:04	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3820		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	331		2.71	20.0	1	10/25/2019 20:54	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 20:54	WG1369567

Sample Narrative:

L1152946-12 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	388		5.19	100	100	10/24/2019 02:13	WG1368507
Fluoride	2.36		0.00990	0.100	1	10/24/2019 02:00	WG1368507
Sulfate	2330		7.74	500	100	10/24/2019 02:13	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.174		0.0197	0.100	1	10/26/2019 15:44	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.334		0.0126	0.200	1	10/28/2019 10:05	WG1368585
Boron,Dissolved	0.338		0.0126	0.200	1	10/27/2019 18:50	WG1368577
Calcium	625		0.0463	1.00	1	10/28/2019 10:05	WG1368585
Iron	0.805		0.0141	0.100	1	10/28/2019 10:05	WG1368585
Iron,Dissolved	0.0215	J	0.0141	0.100	1	10/27/2019 18:50	WG1368577
Magnesium	304		0.0111	1.00	1	10/28/2019 10:05	WG1368585
Potassium	1.39		0.102	1.00	1	10/28/2019 10:05	WG1368585
Sodium	217		0.0985	1.00	1	10/28/2019 10:05	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00430		0.000250	0.00200	1	10/28/2019 22:01	WG1368589
Arsenic,Dissolved	0.00388		0.000250	0.00200	1	10/28/2019 03:08	WG1368581
Cobalt	0.000429	J	0.000260	0.00200	1	10/28/2019 22:01	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:08	WG1368581
Lead	0.000967	B J	0.000240	0.00200	1	10/28/2019 22:01	WG1368589
Lead,Dissolved	0.000394	B J	0.000240	0.00200	1	10/28/2019 03:08	WG1368581
Manganese	0.0188		0.000250	0.00500	1	10/28/2019 22:01	WG1368589
Manganese,Dissolved	0.00524		0.000250	0.00500	1	10/28/2019 03:08	WG1368581
Uranium	0.0322		0.000330	0.0100	1	10/28/2019 22:01	WG1368589
Uranium,Dissolved	0.0325		0.000330	0.0100	1	10/28/2019 03:08	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	4000		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	343		2.71	20.0	1	10/25/2019 21:00	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 21:00	WG1369567

Sample Narrative:

L1152946-13 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	369		5.19	100	100	10/24/2019 03:04	WG1368507
Fluoride	1.87		0.00990	0.100	1	10/24/2019 02:51	WG1368507
Sulfate	2280		7.74	500	100	10/24/2019 03:04	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0910	J	0.0197	0.100	1	10/26/2019 15:47	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.381		0.0126	0.200	1	10/28/2019 10:08	WG1368585
Boron,Dissolved	0.380		0.0126	0.200	1	10/27/2019 18:53	WG1368577
Calcium	645		0.0463	1.00	1	10/28/2019 10:08	WG1368585
Iron	1.55		0.0141	0.100	1	10/28/2019 10:08	WG1368585
Iron,Dissolved	0.0160	J	0.0141	0.100	1	10/27/2019 18:53	WG1368577
Magnesium	304		0.0111	1.00	1	10/28/2019 10:08	WG1368585
Potassium	1.84		0.102	1.00	1	10/28/2019 10:08	WG1368585
Sodium	188		0.0985	1.00	1	10/28/2019 10:08	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00364		0.000250	0.00200	1	10/28/2019 22:04	WG1368589
Arsenic,Dissolved	0.00317		0.000250	0.00200	1	10/28/2019 03:12	WG1368581
Cobalt	0.000744	J	0.000260	0.00200	1	10/28/2019 22:04	WG1368589
Cobalt,Dissolved	0.000525	J	0.000260	0.00200	1	10/28/2019 03:12	WG1368581
Lead	0.00145	B J	0.000240	0.00200	1	10/28/2019 22:04	WG1368589
Lead,Dissolved	U		0.000240	0.00200	1	10/28/2019 03:12	WG1368581
Manganese	0.0257		0.000250	0.00500	1	10/28/2019 22:04	WG1368589
Manganese,Dissolved	0.0177		0.000250	0.00500	1	10/28/2019 03:12	WG1368581
Uranium	0.0371		0.000330	0.0100	1	10/28/2019 22:04	WG1368589
Uranium,Dissolved	0.0369		0.000330	0.0100	1	10/28/2019 03:12	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	4500		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	333		2.71	20.0	1	10/25/2019 21:07	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 21:07	WG1369567

Sample Narrative:

L1152946-14 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	296		5.19	100	100	10/24/2019 03:30	WG1368507
Fluoride	1.20		0.00990	0.100	1	10/24/2019 03:17	WG1368507
Sulfate	2970		7.74	500	100	10/24/2019 03:30	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.127		0.0197	0.100	1	10/26/2019 15:55	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.870		0.0126	0.200	1	10/28/2019 10:11	WG1368585
Boron,Dissolved	0.848		0.0126	0.200	1	10/27/2019 18:56	WG1368577
Calcium	550		0.0463	1.00	1	10/28/2019 10:11	WG1368585
Iron	0.419		0.0141	0.100	1	10/28/2019 10:11	WG1368585
Iron,Dissolved	0.0249	J	0.0141	0.100	1	10/27/2019 18:56	WG1368577
Magnesium	446		0.0111	1.00	1	10/28/2019 10:11	WG1368585
Potassium	1.22	B	0.102	1.00	1	10/28/2019 10:11	WG1368585
Sodium	220		0.0985	1.00	1	10/28/2019 10:11	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00338		0.000250	0.00200	1	10/28/2019 22:08	WG1368589
Arsenic,Dissolved	0.00336		0.000250	0.00200	1	10/28/2019 03:16	WG1368581
Cobalt	0.00239		0.000260	0.00200	1	10/28/2019 22:08	WG1368589
Cobalt,Dissolved	0.00248		0.000260	0.00200	1	10/28/2019 03:16	WG1368581
Lead	0.000975	B J	0.000240	0.00200	1	10/28/2019 22:08	WG1368589
Lead,Dissolved	0.000379	B J	0.000240	0.00200	1	10/28/2019 03:16	WG1368581
Manganese	0.109		0.000250	0.00500	1	10/28/2019 22:08	WG1368589
Manganese,Dissolved	0.107		0.000250	0.00500	1	10/28/2019 03:16	WG1368581
Uranium	0.0491		0.000330	0.0100	1	10/28/2019 22:08	WG1368589
Uranium,Dissolved	0.0484		0.000330	0.0100	1	10/28/2019 03:16	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Dissolved Solids	3490		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	336		2.71	20.0	1	10/25/2019 21:14	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 21:14	WG1369567

Sample Narrative:

L1152946-15 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	309		5.19	100	100	10/24/2019 03:55	WG1368507
Fluoride	1.99		0.00990	0.100	1	10/24/2019 03:42	WG1368507
Sulfate	2380		7.74	500	100	10/24/2019 03:55	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Nitrate-Nitrite	0.403		0.0197	0.100	1	10/26/2019 15:56	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron	0.215		0.0126	0.200	1	10/28/2019 10:19	WG1368585
Boron,Dissolved	0.205		0.0126	0.200	1	10/27/2019 19:07	WG1368577
Calcium	567		0.0463	1.00	1	10/28/2019 10:19	WG1368585
Iron	0.0285	J	0.0141	0.100	1	10/28/2019 10:19	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 19:07	WG1368577
Magnesium	282		0.0111	1.00	1	10/28/2019 10:19	WG1368585
Potassium	1.71		0.102	1.00	1	10/28/2019 10:19	WG1368585
Sodium	187		0.0985	1.00	1	10/28/2019 10:19	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	0.00314		0.000250	0.00200	1	10/28/2019 22:18	WG1368589
Arsenic,Dissolved	0.00323		0.000250	0.00200	1	10/28/2019 03:27	WG1368581
Cobalt	0.00231		0.000260	0.00200	1	10/28/2019 22:18	WG1368589
Cobalt,Dissolved	0.00233		0.000260	0.00200	1	10/28/2019 03:27	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 22:18	WG1368589
Lead,Dissolved	U		0.000240	0.00200	1	10/28/2019 03:27	WG1368581
Manganese	0.00834		0.000250	0.00500	1	10/28/2019 22:18	WG1368589
Manganese,Dissolved	0.00748		0.000250	0.00500	1	10/28/2019 03:27	WG1368581
Uranium	0.0268		0.000330	0.0100	1	10/28/2019 22:18	WG1368589
Uranium,Dissolved	0.0271		0.000330	0.0100	1	10/28/2019 03:27	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3740		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	298		2.71	20.0	1	10/25/2019 21:20	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 21:20	WG1369567

Sample Narrative:

L1152946-16 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	235		5.19	100	100	10/24/2019 04:21	WG1368507
Fluoride	2.07		0.00990	0.100	1	10/24/2019 09:51	WG1368507
Sulfate	2750		7.74	500	100	10/24/2019 04:21	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.258		0.0197	0.100	1	10/26/2019 15:58	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.675		0.0126	0.200	1	10/28/2019 10:22	WG1368585
Boron,Dissolved	0.648		0.0126	0.200	1	10/27/2019 19:10	WG1368577
Calcium	525		0.0463	1.00	1	10/28/2019 10:22	WG1368585
Iron	0.556		0.0141	0.100	1	10/28/2019 10:22	WG1368585
Iron,Dissolved	0.0519	J	0.0141	0.100	1	10/27/2019 19:10	WG1368577
Magnesium	384		0.0111	1.00	1	10/28/2019 10:22	WG1368585
Potassium	0.799	B J	0.102	1.00	1	10/28/2019 10:22	WG1368585
Sodium	124		0.0985	1.00	1	10/28/2019 10:22	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00281		0.000250	0.00200	1	10/28/2019 22:21	WG1368589
Arsenic,Dissolved	0.00271		0.000250	0.00200	1	10/28/2019 03:32	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 22:21	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:32	WG1368581
Lead	0.000856	B J	0.000240	0.00200	1	10/28/2019 22:21	WG1368589
Lead,Dissolved	0.000360	B J	0.000240	0.00200	1	10/28/2019 03:32	WG1368581
Manganese	0.00933		0.000250	0.00500	1	10/28/2019 22:21	WG1368589
Manganese,Dissolved	0.00668		0.000250	0.00500	1	10/28/2019 03:32	WG1368581
Uranium	0.0583		0.000330	0.0100	1	10/28/2019 22:21	WG1368589
Uranium,Dissolved	0.0566		0.000330	0.0100	1	10/28/2019 03:32	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3330		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	313		2.71	20.0	1	10/25/2019 21:34	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 21:34	WG1369567

Sample Narrative:

L1152946-17 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	274		5.19	100	100	10/24/2019 04:46	WG1368507
Fluoride	2.36		0.00990	0.100	1	10/24/2019 10:06	WG1368507
Sulfate	2530		7.74	500	100	10/24/2019 04:46	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.201		0.0197	0.100	1	10/26/2019 15:59	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.216		0.0126	0.200	1	10/28/2019 10:25	WG1368585
Boron,Dissolved	0.211		0.0126	0.200	1	10/27/2019 19:13	WG1368577
Calcium	687		0.0463	1.00	1	10/28/2019 10:25	WG1368585
Iron	0.468		0.0141	0.100	1	10/28/2019 10:25	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 19:13	WG1368577
Magnesium	235		0.0111	1.00	1	10/28/2019 10:25	WG1368585
Potassium	1.71		0.102	1.00	1	10/28/2019 10:25	WG1368585
Sodium	143		0.0985	1.00	1	10/28/2019 10:25	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00338		0.000250	0.00200	1	10/28/2019 22:25	WG1368589
Arsenic,Dissolved	0.00320		0.000250	0.00200	1	10/28/2019 03:35	WG1368581
Cobalt	0.000788	J	0.000260	0.00200	1	10/28/2019 22:25	WG1368589
Cobalt,Dissolved	0.000698	J	0.000260	0.00200	1	10/28/2019 03:35	WG1368581
Lead	0.000399	B J	0.000240	0.00200	1	10/28/2019 22:25	WG1368589
Lead,Dissolved	0.000314	B J	0.000240	0.00200	1	10/28/2019 03:35	WG1368581
Manganese	0.0365		0.000250	0.00500	1	10/28/2019 22:25	WG1368589
Manganese,Dissolved	0.0272		0.000250	0.00500	1	10/28/2019 03:35	WG1368581
Uranium	0.0180		0.000330	0.0100	1	10/28/2019 22:25	WG1368589
Uranium,Dissolved	0.0185		0.000330	0.0100	1	10/28/2019 03:35	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Dissolved Solids	2410		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	294		2.71	20.0	1	10/25/2019 21:41	WG1369567
Alkalinity,Carbonate	U		2.71	20.0	1	10/25/2019 21:41	WG1369567

Sample Narrative:

L1152946-18 WG1369567: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	67.1		0.0519	1.00	1	10/24/2019 05:25	WG1368507
Fluoride	2.29		0.00990	0.100	1	10/24/2019 05:25	WG1368507
Sulfate	1910		3.87	250	50	10/24/2019 05:38	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	1	10/26/2019 16:01	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron	0.300		0.0126	0.200	1	10/28/2019 10:28	WG1368585
Boron,Dissolved	0.305		0.0126	0.200	1	10/27/2019 19:16	WG1368577
Calcium	428		0.0463	1.00	1	10/28/2019 10:28	WG1368585
Iron	0.135		0.0141	0.100	1	10/28/2019 10:28	WG1368585
Iron,Dissolved	0.0236	J	0.0141	0.100	1	10/27/2019 19:16	WG1368577
Magnesium	195		0.0111	1.00	1	10/28/2019 10:28	WG1368585
Potassium	1.91		0.102	1.00	1	10/28/2019 10:28	WG1368585
Sodium	97.6		0.0985	1.00	1	10/28/2019 10:28	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	0.000878	J	0.000250	0.00200	1	10/28/2019 22:28	WG1368589
Arsenic,Dissolved	0.000829	J	0.000250	0.00200	1	10/28/2019 03:39	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 22:28	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:39	WG1368581
Lead	0.000658	B J	0.000240	0.00200	1	10/28/2019 22:28	WG1368589
Lead,Dissolved	0.000602	B J	0.000240	0.00200	1	10/28/2019 03:39	WG1368581
Manganese	0.0239		0.000250	0.00500	1	10/28/2019 22:28	WG1368589
Manganese,Dissolved	0.0243		0.000250	0.00500	1	10/28/2019 03:39	WG1368581
Uranium	0.000602	J	0.000330	0.0100	1	10/28/2019 22:28	WG1368589
Uranium,Dissolved	0.000538	J	0.000330	0.0100	1	10/28/2019 03:39	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Dissolved Solids	3350		14.1	50.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	496		2.71	20.0	1	10/27/2019 11:24	WG1369568
Alkalinity,Carbonate	U		2.71	20.0	1	10/27/2019 11:24	WG1369568

Sample Narrative:

L1152946-19 WG1369568: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	523		2.60	50.0	50	10/24/2019 06:03	WG1368507
Fluoride	1.67		0.00990	0.100	1	10/24/2019 05:50	WG1368507
Sulfate	1590		3.87	250	50	10/24/2019 06:03	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Nitrate-Nitrite	0.453		0.0197	0.100	1	10/26/2019 16:02	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron	1.03		0.0126	0.200	1	10/28/2019 10:31	WG1368585
Boron,Dissolved	1.01		0.0126	0.200	1	10/27/2019 19:19	WG1368577
Calcium	413		0.0463	1.00	1	10/28/2019 10:31	WG1368585
Iron	0.0288	J	0.0141	0.100	1	10/28/2019 10:31	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 19:19	WG1368577
Magnesium	305		0.0111	1.00	1	10/28/2019 10:31	WG1368585
Potassium	0.783	B J	0.102	1.00	1	10/28/2019 10:31	WG1368585
Sodium	235		0.0985	1.00	1	10/28/2019 10:31	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	0.00618		0.000250	0.00200	1	10/28/2019 22:31	WG1368589
Arsenic,Dissolved	0.00605		0.000250	0.00200	1	10/28/2019 03:43	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 22:31	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:43	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 22:31	WG1368589
Lead,Dissolved	0.000271	B J	0.000240	0.00200	1	10/28/2019 03:43	WG1368581
Manganese	0.133		0.000250	0.00500	1	10/28/2019 22:31	WG1368589
Manganese,Dissolved	0.128		0.000250	0.00500	1	10/28/2019 03:43	WG1368581
Uranium	0.0511		0.000330	0.0100	1	10/28/2019 22:31	WG1368589
Uranium,Dissolved	0.0528		0.000330	0.0100	1	10/28/2019 03:43	WG1368581

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	7.00	J	2.82	10.0	1	10/24/2019 09:39	WG1368265

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	4.68	B J	2.71	20.0	1	10/27/2019 11:40	WG1369568
Alkalinity,Carbonate	U		2.71	20.0	1	10/27/2019 11:40	WG1369568

Sample Narrative:

L1152946-20 WG1369568: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	U		0.0519	1.00	1	10/24/2019 00:43	WG1368507
Fluoride	U		0.00990	0.100	1	10/24/2019 00:43	WG1368507
Sulfate	U		0.0774	5.00	1	10/24/2019 00:43	WG1368507

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	10/26/2019 16:04	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	U		0.0126	0.200	1	10/28/2019 10:34	WG1368585
Boron,Dissolved	U		0.0126	0.200	1	10/27/2019 19:22	WG1368577
Calcium	0.126	J	0.0463	1.00	1	10/28/2019 10:34	WG1368585
Iron	U		0.0141	0.100	1	10/28/2019 10:34	WG1368585
Iron,Dissolved	U		0.0141	0.100	1	10/27/2019 19:22	WG1368577
Magnesium	0.0775	B J	0.0111	1.00	1	10/28/2019 10:34	WG1368585
Potassium	U		0.102	1.00	1	10/28/2019 10:34	WG1368585
Sodium	0.233	B J	0.0985	1.00	1	10/28/2019 10:34	WG1368585

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	U		0.000250	0.00200	1	10/28/2019 22:35	WG1368589
Arsenic,Dissolved	U		0.000250	0.00200	1	10/28/2019 03:47	WG1368581
Cobalt	U		0.000260	0.00200	1	10/28/2019 22:35	WG1368589
Cobalt,Dissolved	U		0.000260	0.00200	1	10/28/2019 03:47	WG1368581
Lead	U		0.000240	0.00200	1	10/28/2019 22:35	WG1368589
Lead,Dissolved	0.000320	B J	0.000240	0.00200	1	10/28/2019 03:47	WG1368581
Manganese	0.000260	B J	0.000250	0.00500	1	10/28/2019 22:35	WG1368589
Manganese,Dissolved	U		0.000250	0.00500	1	10/28/2019 03:47	WG1368581
Uranium	U		0.000330	0.0100	1	10/28/2019 22:35	WG1368589
Uranium,Dissolved	U		0.000330	0.0100	1	10/28/2019 03:47	WG1368581

Method Blank (MB)

(MB) R3465123-1 10/24/19 09:24

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

L1152946-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-10 10/24/19 09:24 • (DUP) R3465123-3 10/24/19 09:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	3490	3660	1	4.90		5

Laboratory Control Sample (LCS)

(LCS) R3465123-2 10/24/19 09:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8650	98.3	85.0-115	

Method Blank (MB)

(MB) R3465131-1 10/24/19 09:39

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

L1152946-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-11 10/24/19 09:39 • (DUP) R3465131-3 10/24/19 09:39

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	4240	4360	1	2.79		5

Laboratory Control Sample (LCS)

(LCS) R3465131-2 10/24/19 09:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8210	93.3	85.0-115	

Method Blank (MB)

(MB) R3465278-1 10/25/19 18:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	U		2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1152717-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1152717-03 10/25/19 19:16 • (DUP) R3465278-2 10/25/19 19:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	76.5	75.9	1	0.795		20
Alkalinity,Carbonate	25.6	25.9	1	1.18		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

L1152946-18 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-18 10/25/19 21:41 • (DUP) R3465278-4 10/25/19 21:48

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	294	293	1	0.186		20
Alkalinity,Carbonate	U	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

Method Blank (MB)

(MB) R3465566-1 10/27/19 11:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	3.23	J	2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1152946-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-19 10/27/19 11:24 • (DUP) R3465566-3 10/27/19 11:33

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	496	476	1	4.21		20
Alkalinity,Carbonate	U	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 HEADSPACE

DUP: Endpoint pH 4.5

L1153256-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1153256-04 10/27/19 14:04 • (DUP) R3465566-6 10/27/19 14:11

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	119	115	1	3.23		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

Method Blank (MB)

(MB) R3464380-1 10/23/19 10:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	0.0525	J	0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	0.0872	J	0.0774	5.00

L1152750-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1152750-01 10/23/19 20:25 • (DUP) R3464380-3 10/23/19 20:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	10.2	10.4	1	2.61		20
Fluoride	0.159	0.165	1	3.76		20
Sulfate	ND	1.67	1	0.000		20

L1152851-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1152851-01 10/23/19 23:11 • (DUP) R3464380-6 10/23/19 23:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	24.4	23.3	1	4.49		20
Fluoride	0.730	0.696	1	4.81		20
Sulfate	5.63	5.46	1	3.05		20

Laboratory Control Sample (LCS)

(LCS) R3464380-2 10/23/19 11:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.0	97.5	90.0-110	
Fluoride	8.00	7.76	97.0	90.0-110	
Sulfate	40.0	39.4	98.6	90.0-110	

L1152750-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152750-01 10/23/19 20:25 • (MS) R3464380-4 10/23/19 20:50 • (MSD) R3464380-5 10/23/19 21:03

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 %
Chloride	50.0	10.2	61.7	62.4	103	104	1	80.0-120			1.03	20
Fluoride	5.00	0.159	5.20	5.25	101	102	1	80.0-120			1.06	20
Sulfate	50.0	ND	52.6	53.1	102	103	1	80.0-120			0.968	20

L1152851-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1152851-01 10/23/19 23:11 • (MS) R3464380-7 10/23/19 23:36

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	24.4	68.1	87.4	1	80.0-120	
Fluoride	5.00	0.730	5.20	89.3	1	80.0-120	
Sulfate	50.0	5.63	49.3	87.4	1	80.0-120	

Method Blank (MB)

(MB) R3464490-1 10/23/19 23:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	0.110	J	0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1152946-20 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-20 10/24/19 00:43 • (DUP) R3464490-3 10/24/19 00:56

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	U	0.000	1	0.000		20
Fluoride	U	0.000	1	0.000		20
Sulfate	U	0.000	1	0.000		20

L1152993-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1152993-02 10/24/19 08:37 • (DUP) R3464490-6 10/24/19 08:49

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	43.8	45.0	1	2.59		20
Fluoride	0.334	0.346	1	3.50		20

L1152993-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1152993-02 10/24/19 10:56 • (DUP) R3464490-8 10/24/19 11:09

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	125	127	5	1.55		20

Laboratory Control Sample (LCS)

(LCS) R3464490-2 10/23/19 23:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.1	97.7	90.0-110	
Fluoride	8.00	7.82	97.8	90.0-110	
Sulfate	40.0	39.4	98.5	90.0-110	

L1152946-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152946-20 10/24/19 00:43 • (MS) R3464490-4 10/24/19 01:09 • (MSD) R3464490-5 10/24/19 01:22

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 %
Chloride	50.0	U	51.9	51.1	104	102	1	80.0-120			1.40	20
Fluoride	5.00	U	5.25	5.16	105	103	1	80.0-120			1.78	20
Sulfate	50.0	U	51.5	50.6	103	101	1	80.0-120			1.79	20

L1152993-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1152993-02 10/24/19 08:37 • (MS) R3464490-7 10/24/19 09:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	43.8	92.6	97.6	1	80.0-120	
Fluoride	5.00	0.334	5.25	98.4	1	80.0-120	
Sulfate	50.0	120	166	91.1	1	80.0-120	E

Method Blank (MB)

(MB) R3465374-1 10/26/19 15:13

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1152946-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-01 10/26/19 15:16 • (DUP) R3465374-3 10/26/19 15:17

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.0330	0.0380	1	14.1	J	20

L1152946-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1152946-11 10/26/19 15:41 • (DUP) R3465374-6 10/26/19 15:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	1.80	1.79	1	0.723		20

Laboratory Control Sample (LCS)

(LCS) R3465374-2 10/26/19 15:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.71	92.8	90.0-110	

L1152946-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152946-02 10/26/19 15:19 • (MS) R3465374-4 10/26/19 15:20 • (MSD) R3465374-5 10/26/19 15:22

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 %
Nitrate-Nitrite	2.50	U	2.43	2.42	97.3	96.9	1	90.0-110			0.412	20

L1152946-12 Original Sample (OS) • Matrix Spike (MS)

(OS) L1152946-12 10/26/19 15:44 • (MS) R3465374-7 10/26/19 15:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	0.174	2.63	98.3	1	90.0-110	

Method Blank (MB)

(MB) R3465684-1 10/27/19 17:56

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0126	0.200
Iron,Dissolved	U		0.0141	0.100

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

(LCS) R3465684-2 10/27/19 17:58 • (LCSD) R3465684-3 10/27/19 18:01

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 %
Boron,Dissolved	1.00	0.972	0.941	97.2	94.1	80.0-120			3.30	20
Iron,Dissolved	10.0	9.64	9.40	96.4	94.0	80.0-120			2.55	20

L1152946-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152946-01 10/27/19 18:04 • (MS) R3465684-5 10/27/19 18:09 • (MSD) R3465684-6 10/27/19 18:12

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 %
Boron,Dissolved	1.00	0.292	1.28	1.28	99.2	98.4	1	75.0-125			0.648	20
Iron,Dissolved	10.0	0.0179	9.63	9.53	96.2	95.1	1	75.0-125			1.08	20

Method Blank (MB)

(MB) R3465834-1 10/28/19 09:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200
Calcium	U		0.0463	1.00
Iron	U		0.0141	0.100
Magnesium	0.0370	J	0.0111	1.00
Potassium	0.136	J	0.102	1.00
Sodium	0.284	J	0.0985	1.00

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

(LCS) R3465834-2 10/28/19 09:13 • (LCSD) R3465834-3 10/28/19 09:15

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 %
Boron	1.00	1.01	0.999	101	99.9	80.0-120			1.02	20
Calcium	10.0	10.0	9.98	100	99.8	80.0-120			0.206	20
Iron	10.0	9.94	9.89	99.4	98.9	80.0-120			0.447	20
Magnesium	10.0	10.3	10.3	103	103	80.0-120			0.179	20
Potassium	10.0	9.67	9.69	96.7	96.9	80.0-120			0.176	20
Sodium	10.0	10.0	9.96	100	99.6	80.0-120			0.809	20

L1152946-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152946-01 10/28/19 09:18 • (MS) R3465834-5 10/28/19 09:24 • (MSD) R3465834-6 10/28/19 09:27

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 %
Boron	1.00	0.311	1.34	1.31	103	100	1	75.0-125			1.85	20
Calcium	10.0	435	438	437	29.2	20.8	1	75.0-125	V	V	0.192	20
Iron	10.0	0.270	10.1	10.1	98.7	97.8	1	75.0-125			0.923	20
Magnesium	10.0	198	204	204	61.0	59.4	1	75.0-125	V	V	0.0780	20
Potassium	10.0	2.11	11.9	11.9	97.9	97.7	1	75.0-125			0.194	20
Sodium	10.0	98.7	104	105	57.4	67.0	1	75.0-125	V	V	0.910	20

Method Blank (MB)

(MB) R3465726-1 10/28/19 01:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.000250	0.00200
Cobalt,Dissolved	U		0.000260	0.00200
Lead,Dissolved	0.000254	J	0.000240	0.00200
Manganese,Dissolved	0.000397	J	0.000250	0.00500
Uranium,Dissolved	U		0.000330	0.0100

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

(LCS) R3465726-2 10/28/19 02:01 • (LCSD) R3465726-3 10/28/19 02:05

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 %
Arsenic,Dissolved	0.0500	0.0480	0.0474	96.0	94.8	80.0-120			1.28	20
Cobalt,Dissolved	0.0500	0.0490	0.0489	97.9	97.7	80.0-120			0.187	20
Lead,Dissolved	0.0500	0.0463	0.0475	92.6	94.9	80.0-120			2.45	20
Manganese,Dissolved	0.0500	0.0485	0.0480	96.9	96.0	80.0-120			0.921	20
Uranium,Dissolved	0.0500	0.0471	0.0478	94.3	95.6	80.0-120			1.36	20

L1152946-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152946-02 10/28/19 02:09 • (MS) R3465726-5 10/28/19 02:17 • (MSD) R3465726-6 10/28/19 02:20

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 %
Arsenic,Dissolved	0.0500	0.0143	0.0625	0.0618	96.5	95.0	1	75.0-125			1.19	20
Cobalt,Dissolved	0.0500	U	0.0465	0.0464	93.0	92.8	1	75.0-125			0.141	20
Lead,Dissolved	0.0500	0.000291	0.0482	0.0479	95.9	95.1	1	75.0-125			0.777	20
Manganese,Dissolved	0.0500	0.574	0.612	0.605	75.1	62.8	1	75.0-125		V	1.02	20
Uranium,Dissolved	0.0500	0.0189	0.0685	0.0675	99.2	97.1	1	75.0-125			1.53	20

Method Blank (MB)

(MB) R3466053-1 10/28/19 20:45

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200
Cobalt	U		0.000260	0.00200
Lead	0.000680	J	0.000240	0.00200
Manganese	0.000470	J	0.000250	0.00500
Uranium	U		0.000330	0.0100

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

(LCS) R3466053-2 10/28/19 20:48 • (LCSD) R3466053-3 10/28/19 20:52

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 %
Arsenic	0.0500	0.0502	0.0486	100	97.3	80.0-120			3.19	20
Cobalt	0.0500	0.0513	0.0499	103	99.8	80.0-120			2.79	20
Lead	0.0500	0.0514	0.0496	103	99.2	80.0-120			3.56	20
Manganese	0.0500	0.0509	0.0492	102	98.4	80.0-120			3.37	20
Uranium	0.0500	0.0491	0.0475	98.2	95.0	80.0-120			3.27	20

L1152946-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1152946-02 10/28/19 20:55 • (MS) R3466053-5 10/28/19 21:02 • (MSD) R3466053-6 10/28/19 21:05

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 %
Arsenic	0.0500	0.0157	0.0649	0.0644	98.3	97.3	1	75.0-125			0.777	20
Cobalt	0.0500	U	0.0478	0.0476	95.6	95.2	1	75.0-125			0.451	20
Lead	0.0500	0.00892	0.0526	0.0498	87.3	81.7	1	75.0-125			5.46	20
Manganese	0.0500	0.579	0.614	0.620	69.5	80.9	1	75.0-125	V		0.926	20
Uranium	0.0500	0.0190	0.0713	0.0686	105	99.1	1	75.0-125			3.97	20

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.
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.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
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

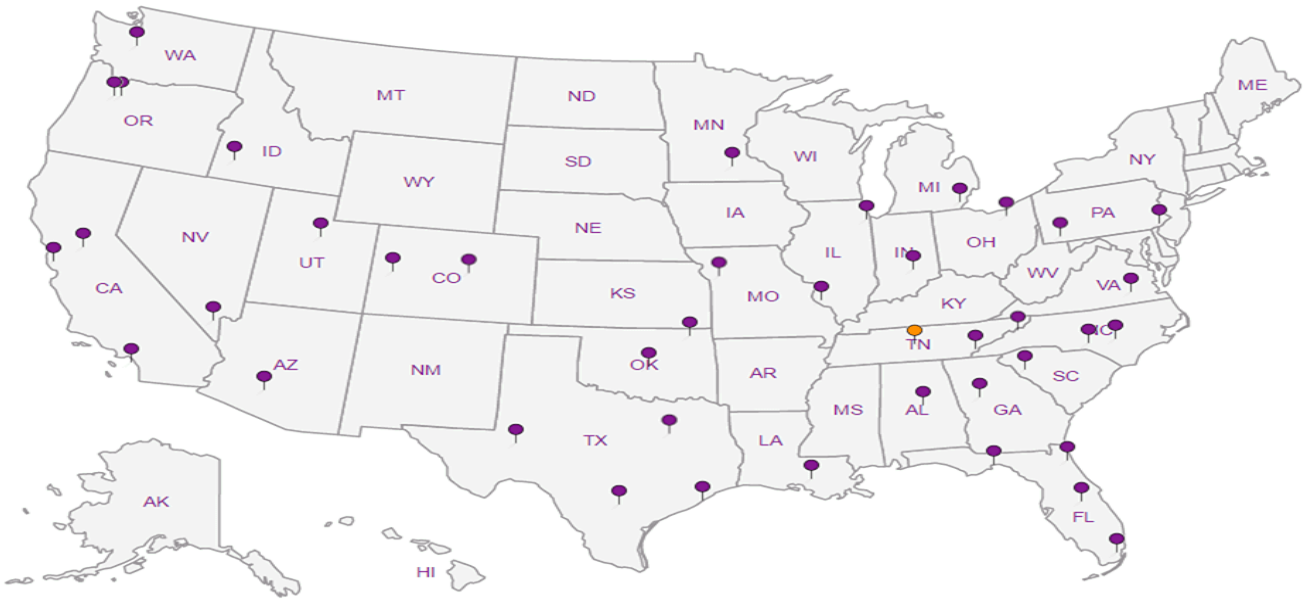
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected: Artesia, NM

Please Circle: PT MT CT ET

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Scott Ude + HWI Team

Site/Facility ID #

P.O. #

Collected by (signature): Scott Ude
Immediately Packed on Ice N ___ Y ✓

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

Quote #

Date Results Needed

Chain of Custody Page 1 of 2

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 # 1152946

F213

Acctnum: AMEC...

Template: T156731

Prelogin: P735653

PM: 526 - Chris McCord

PB: LC 10-15-19

Shipped Via: FedEX Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pres Chk	Diss. Metals-FF 250mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Metals 250mlHDPE-HNO3	WetChem 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-40	G	GW		10/22/19	1015	5	✓	X	X	X	X		-01
MW-29		GW			925		✓	X	X	X	X		02
MW-56		GW			925		✓	X	X	X	X		03
MW-55		GW			945		✓	X	X	X	X		04
MW-140		GW			1040		✓	X	X	X	X		05
MW-141		GW			950		✓	X	X	X	X		06
MW-115		GW			1155		✓	X	X	X	X		07
MW-114		GW			1100		✓	X	X	X	X		08
MW-125		GW			1000		✓	X	X	X	X		09
MW-117		GW			1205		✓	X	X	X	X		10

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

Remarks: WetChem=ALKBI,ALKCA,CHLORIDE,FLUORIDE,SULFATE,TDS.
Total Metals=As,Co,Mn,Pb,U by 6020;B,Ca,Fe,K,Mg,Na by 6010.
Diss.Metals=As,Co,Mn,Pb,U by 6020;B,Fe by 6010. Field Filtered. (HWI added HNO3-preserved bottle for diss. metals)

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: ___ UPS ✓ FedEx ___ Courier _____

Tracking # 1275 8602 5344
1275 8602 5355 1275 8602 5333

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) Scott Ude	Date: 10/22/19	Time: 1300	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.1 °C Bottles Received: 100
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Hanley Mu	Date: 10/23/19 Time: 8:45

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected: Artesia, NM

Please Circle: PT MT CT ET

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Scott Uhl + Hwy Team

Site/Facility ID #

P.O. #

Collected by (signature): Scott Uhl
Immediately Packed on Ice N ___ Y ✓

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

Quote #

Date Results Needed

Chain of Custody Page 2 of 2

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 # 1152946

Table #

Acctnum: AMECFWHTX

Template: T156731

Prelogin: P735653

PM: 526 - Chris McCord

PB: LC 10-15-19

Shipped Via: FedEX Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss. Metals-FF 250mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Metals 250mlHDPE-HNO3	WetChem 250mlHDPE-NoPres	Remarks	Sample # (lab only)
MW-118	G	GW		10/22/19	1050	5 ~~4~~	X	X	X	X		11
MW-119		GW			955	~~4~~	X	X	X	X		12
MW-142		GW			1005	~~4~~	X	X	X	X		13
MW-143		GW			1055	~~4~~	X	X	X	X		14
MW-116		GW			925	~~4~~	X	X	X	X		15
~~MW-#18A~~ RW-#18A		GW			1005	~~4~~	X	X	X	X		16
MW-144		GW			1100	~~4~~	X	X	X	X		17
DUP-RO-01		GW			1000	~~4~~	X	X	X	X		18
DUP-RO-02		GW			1000	~~4~~	X	X	X	X		19
EB-RO-01	↓	GW		↓	945 ↓	~~4~~	X	X	X	X		20

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

Remarks:WetChem=ALKBI,ALKCA,CHLORIDE,FLUORIDE,SULFATE,TDS.
Total Metals=As,Co,Mn,Pb,U by 6020;B,Ca,Fe,K,Mg,Na by 6010.
Diss.Metals=As,Co,Mn,Pb,U by 6020;B,Fe by 6010. Field Filtered.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS ✓ FedEx ~~✓~~ SH Courier _____

Tracking #

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
Scott Uhl	10/22/19	1300		✓ / ~~✓~~	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.1°C=2.1°C Bottles Received: 100	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Hailey Lin	Date: 10/23/19 Time: 8:45	Hold: Condition: NCF / OK

DATA ASSESSMENT SUMMARY

Project Information			
Project Name:	Navajo RO Fields	Lab Name:	Pace Analytical
Project Number:	6703180022	Lab Report Number:	L1152946
Reviewer's Signature:	Crystal Thimsen	Number of Samples:	17 primary, 2 field duplicates, 1 equipment blank
Review Date:	November 4, 2019	Matrix:	groundwater

Assessment Summary

Using the codes O, M, Z, and X described below, complete the table for a single quality control batch or sample delivery group. Identify comments by means of a footnote, e.g. M(2), describe in the space provided.

Method Name:	Dissolved Solids	Alkalinity	Anions	$NO_2 - NO_3$	Metals	Metals
Method Number:	SM 2450 C-2011	SM 2320 B-2011	EPA 300.0	EPA 353.2	EPA 6010B	EPA 6020
1. Preservation/hold times	O	O	O	O	O	O
2. Blanks	O	O	O	O	M(1)	M(2)(3)
3. Matrix spike/dup	NA	NA	O	O	O	O
4. Lab QC samples	O	O	O	O	O	M(4)
5. Field QC samples	O	O	O	O	X(1)	X(2)(3)(4)
6. Overall assessment	O	O	O	O	O	O

Assessment Codes:

O = No quality controls (QC) problems were identified for these criteria.

M = The results are qualified due to QC problems. The quantitative results will be qualified with a QC flag indicating that the results are estimated due to error greater than specified in the method.

Z = The results are unacceptable due to gross QC problems. The results will be qualified as rejected (R).

X = QC problems were identified, but they do not affect the results, or the reviewer is not certain of the effect on the results; or supporting documentation or data is not present in the laboratory data package.

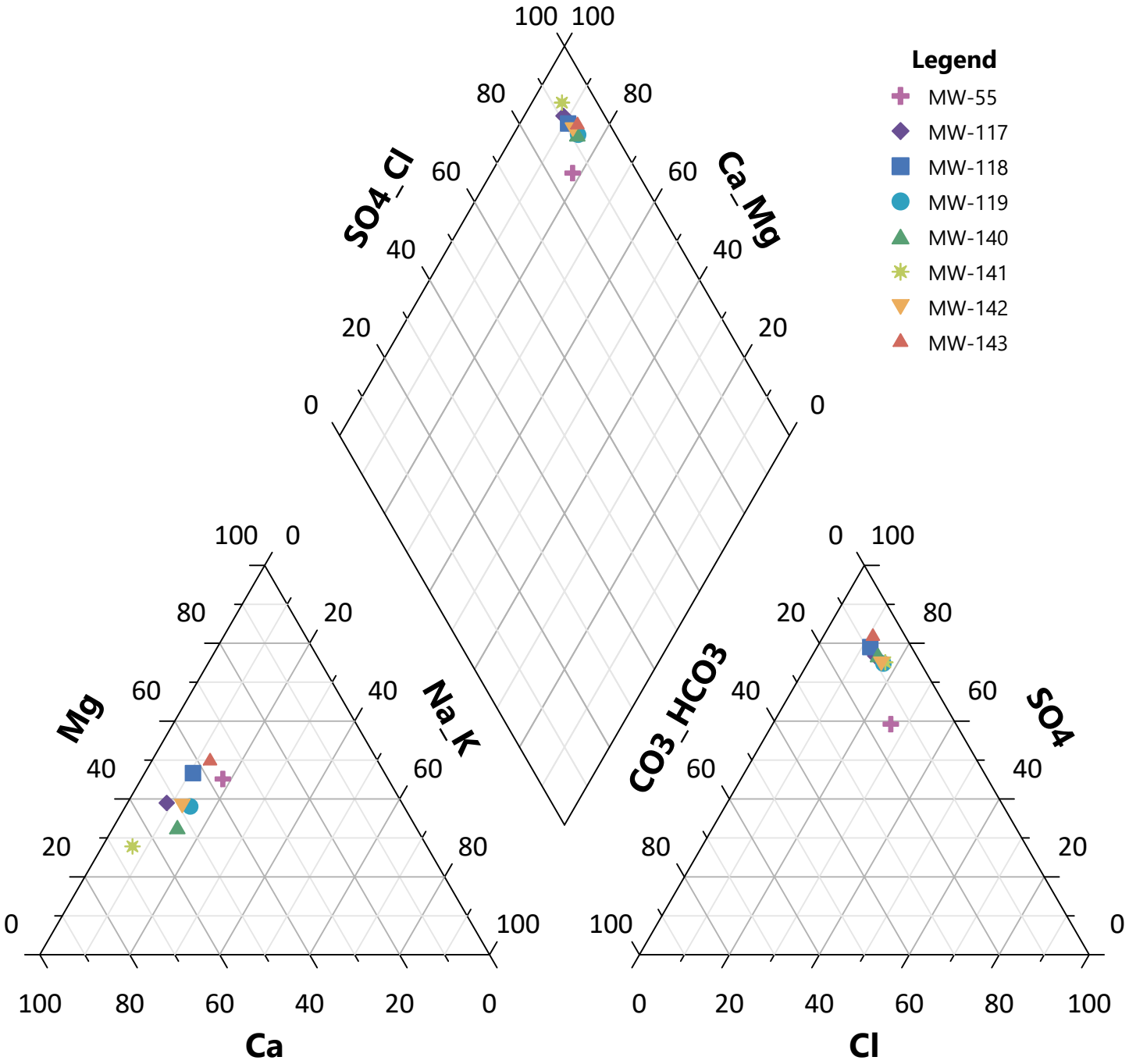
NA = Not applicable

Assessment Code	Description	Action Required
M(1)	Magnesium, potassium, and sodium were detected in the method blank associated with batch WG1368585 at concentrations between the method detection limit (MDL) and reporting limit (RL) of 0.0370, 0.136, and 0.284 mg/L, respectively.	Magnesium, potassium, and sodium results in the associated samples were not qualified if the results were greater than the RL. Sample results that were reported at concentrations between the MDL and RL were reported as not-detected at the RL. Affected sample results are as follows: MW-55, MW-115, RW-#18A, and DUP-RO-02: Potassium 1.00 U mg/L
X(1)	Calcium, magnesium, and sodium were detected in the equipment blank at concentrations between the MDL and RL of 0.126, 0.0775, and 0.233 mg/L, respectively.	The concentrations of the affected compounds in the associated samples were greater than the RL; therefore, sample results are not affected by the potential high bias and are not qualified.
X(2)	The recoveries for calcium, magnesium, and sodium were below the control limits in the MS and MSD performed with sample MW-40.	The concentrations of these compounds in the spiked sample were greater than 4 times the concentration of the spike added. Therefore, the control limits are not applicable and sample results are not affected and are not qualified.
M(2)	Total lead and manganese were detected in the method blank associated with batch WG1368589 at concentrations between the MDL and RL of 0.000680 and 0.000470 mg/L, respectively.	Total lead and manganese results in the associated samples were not qualified if the results were greater than the RL. Sample results that were reported at concentrations between the MDL and RL were reported as not detected at the RL. Affected sample results are as follows: MW-40, MW-56, MW-55, MW-140, MW-141, MW-115, MW-119, MW-142, MW-143, RW-#18A, MW-144, and DUP-RO-01: total lead = 0.0020 U mg/L MW-117, and MW-118: total manganese = 0.0050 U mg/L
X(2)	Dissolved lead and total manganese were detected in the equipment blank at concentrations between the MDL and RL of 0.000320 and 0.000260 mg/L, respectively. Total calcium, magnesium, and sodium were detected in the equipment blank at concentrations of 0.126, 0.0775, and 0.233 mg/L respectively.	The dissolved lead and total manganese results in the associated samples were previously qualified due to method blank contamination and are not qualified further. The calcium, magnesium, and sodium results in the associated samples were greater than 10 times the concentrations in the blanks. Therefore, sample results are not affected by the potential high bias and are not qualified.
M(3)	Dissolved lead and manganese were detected in the method blank associated with batch WG1368581 at concentrations between the MDL and RL of 0.000254 and 0.000397 mg/L, respectively.	Dissolved lead and manganese results in the associated samples were not qualified if the results were greater than the RL. Sample results that were reported at concentrations between the MDL and RL were reported as not detected at the RL. Affected sample results are as follows: MW-40, MW-29, MW-56, MW-55, MW-140, MW-115, MW-114, MW-118, MW-119, MW-143, RW-#18A, MW-144, DUP-RO-01, and DUP-RO-02 dissolved lead = 0.0020 U mg/L MW-117, MW-118 dissolved manganese = 0.0050 U mg/L

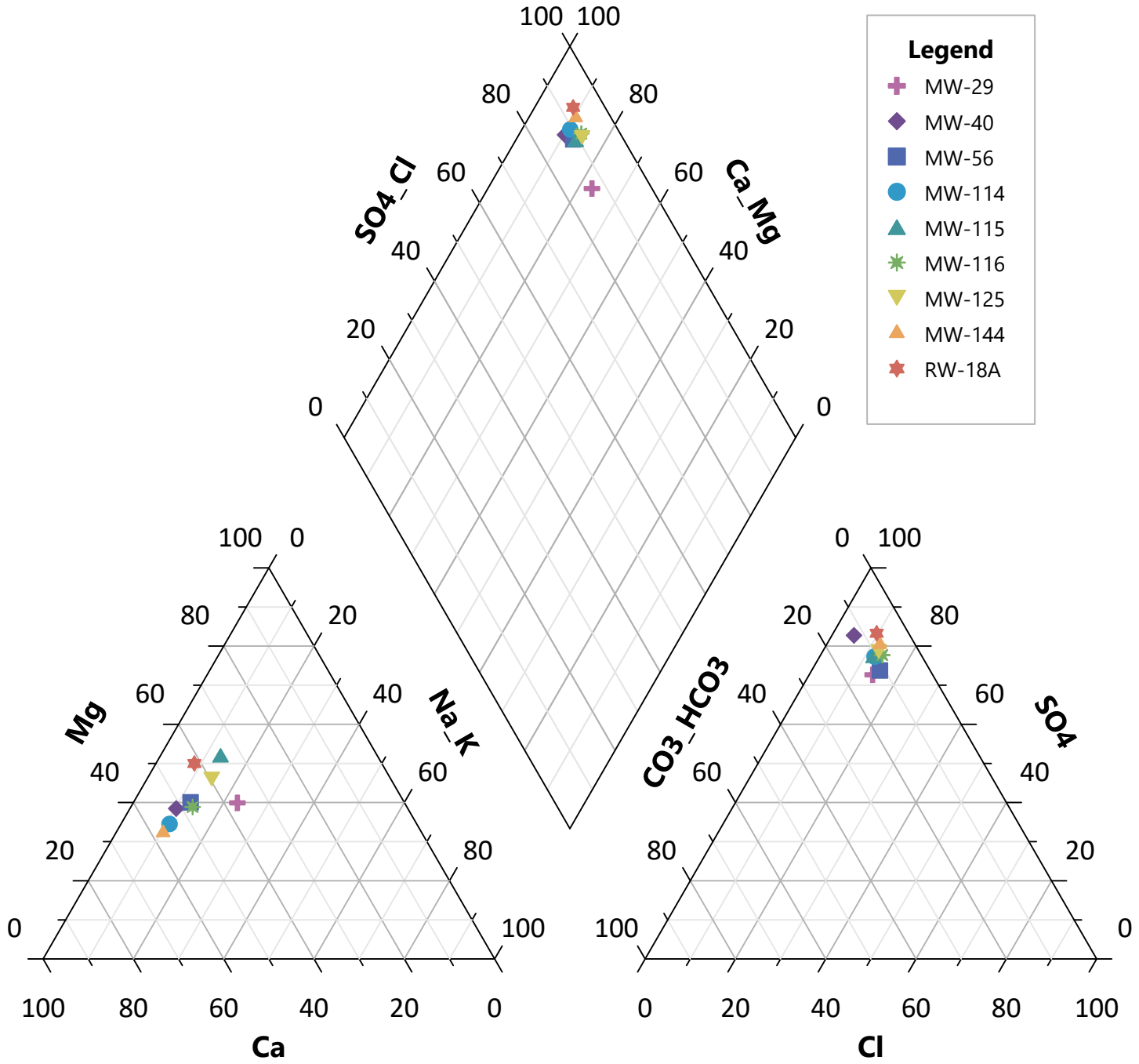
Assessment Code	Description	Action Required
X(3)	The recoveries for dissolved manganese in the MS/MSD performed with sample MW-29 were 75.1 and 62.8 percent, below the control limits of 75 to 125 percent.	The concentration of dissolved manganese in the spiked sample was 4X greater than the spike added. Therefore, control limits are not applicable and sample results are not affected or qualified.
X(4)	The recoveries for total manganese in the MS/MSD performed with sample MW-29 were 69.5 and 80.9 percent, below the control limits of 75 to 125 percent.	The concentration of total manganese in the spiked sample was 4X greater than the spike added. Therefore, control limits are not applicable and sample results are not affected or qualified.
M(4)	The relative percent difference for total iron in the primary and field duplicate sample pair MW-40 and DUP-RO-01 was not calculated because the total iron concentrations in the primary and field duplicate samples were not greater than five times the RL. In these cases an alternate evaluation is if the difference between the primary and duplicate concentrations exceed the value of the reporting limit. The difference in the total iron concentrations for primary sample MW-40 and duplicate DUP-RO-01 exceed the value of the reporting limit.	The total iron results for samples MW-40 and DUP-RO-01 are qualified as estimated and flagged with a “J”.

APPENDIX D
WATER CLASSIFICATION DIAGRAMS

Piper Diagram
RO Reject Fields Stage 1 Abatement - Second Quarterly Progress Report
North RO Field Monitoring Wells - October 2019

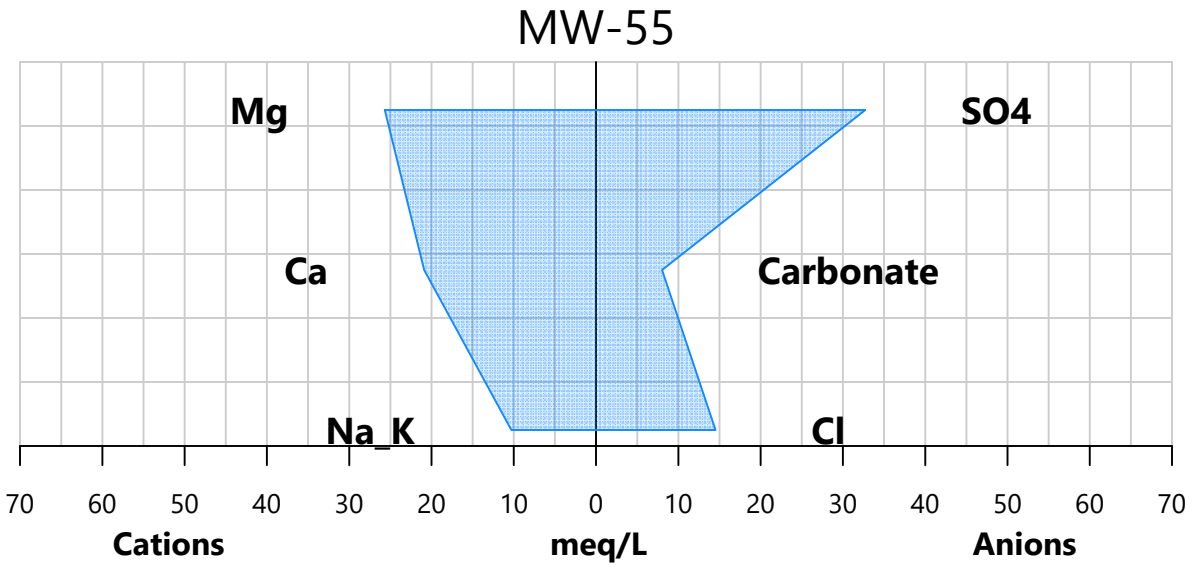


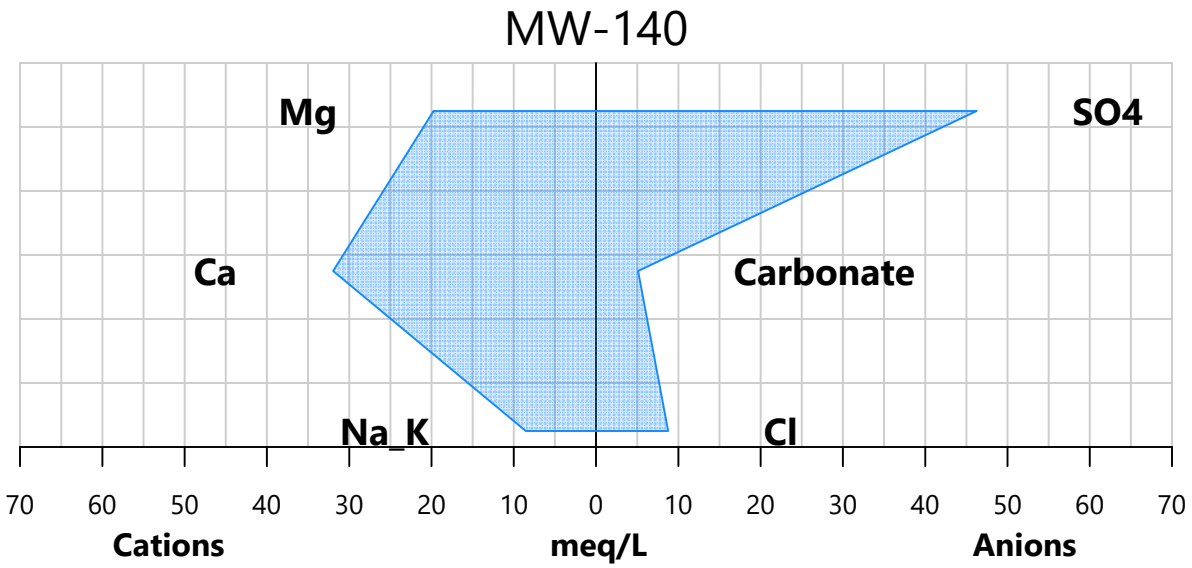
Piper Diagram
RO Reject Fields Stage 1 Abatement - Second Quarterly Progress Report
South RO Field Monitoring Wells - October 2019

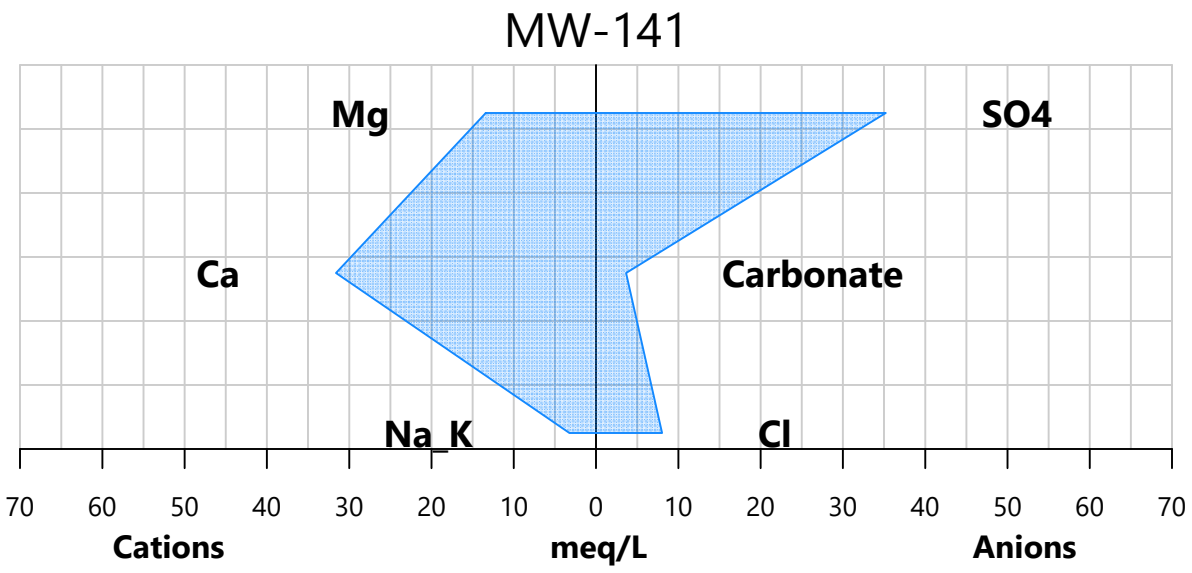


STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Second Quarterly Progress Report
North RO Field - Upgradient Monitoring Wells - October 2019

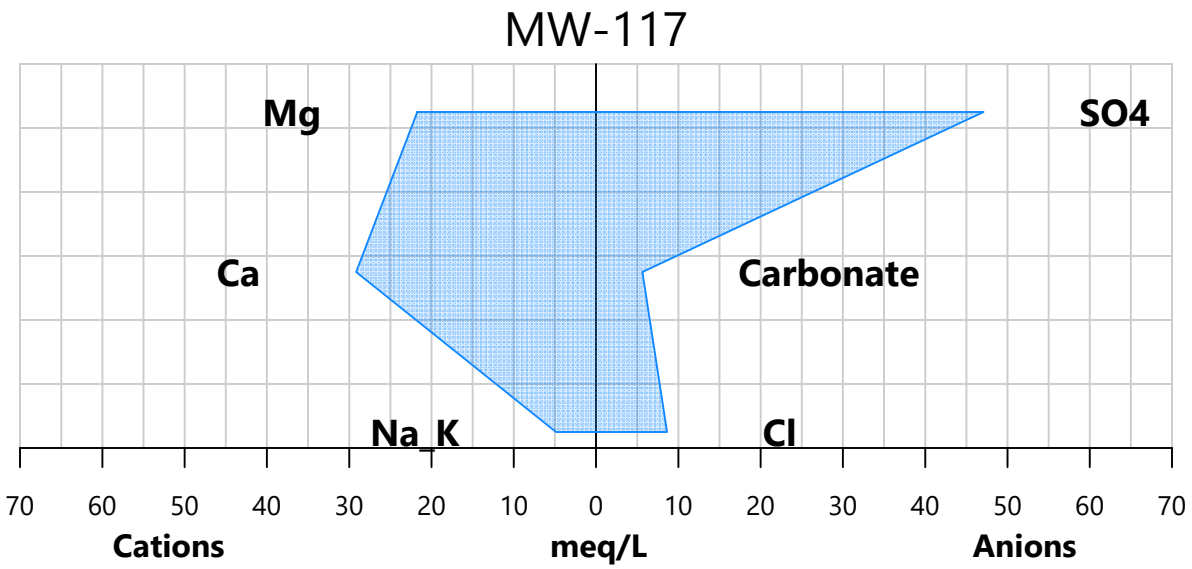


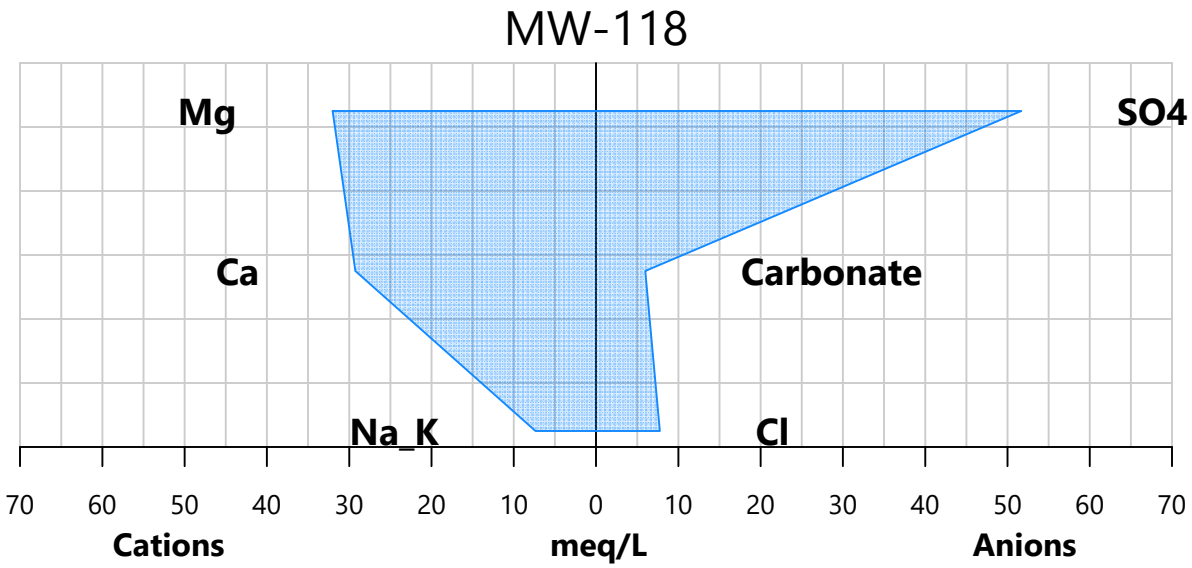


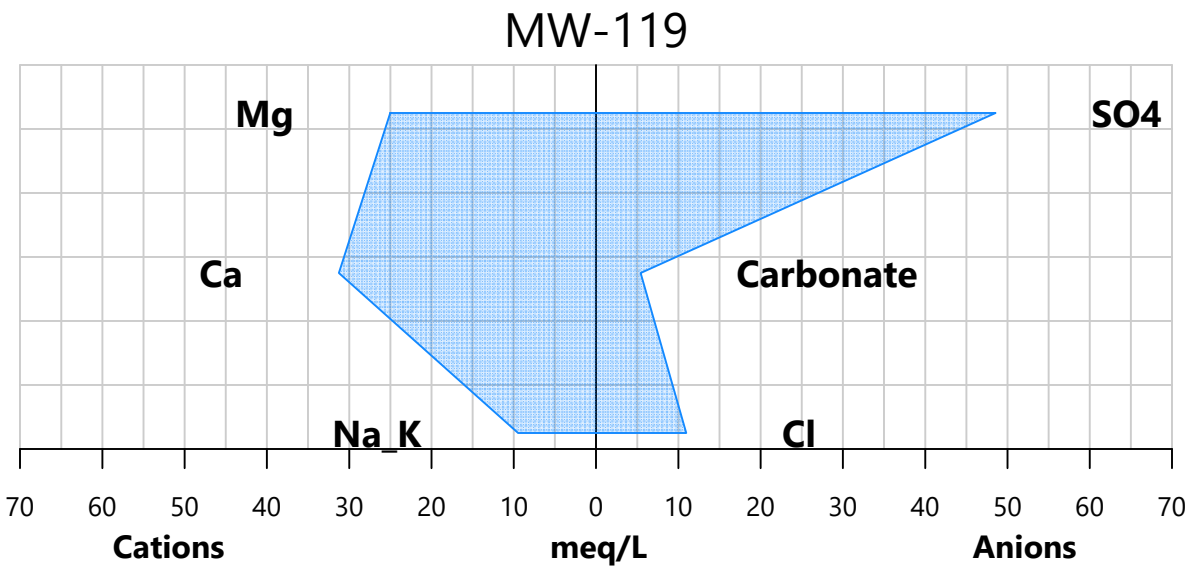


STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Second Quarterly Progress Report
North RO Field - In Field Monitoring Wells - October 2019







STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Second Quarterly Progress Report
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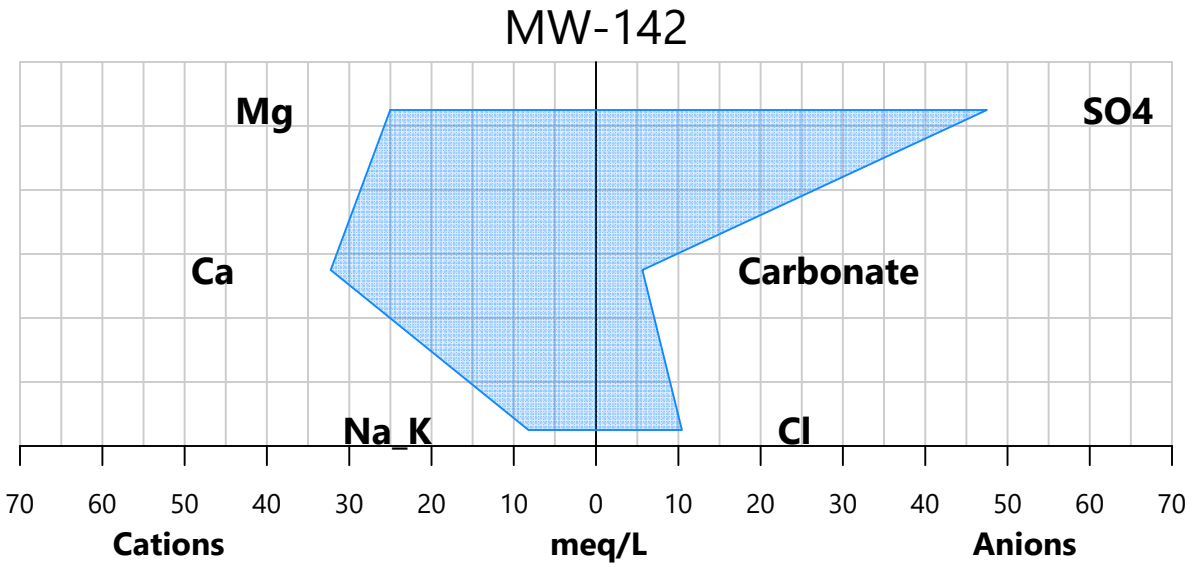

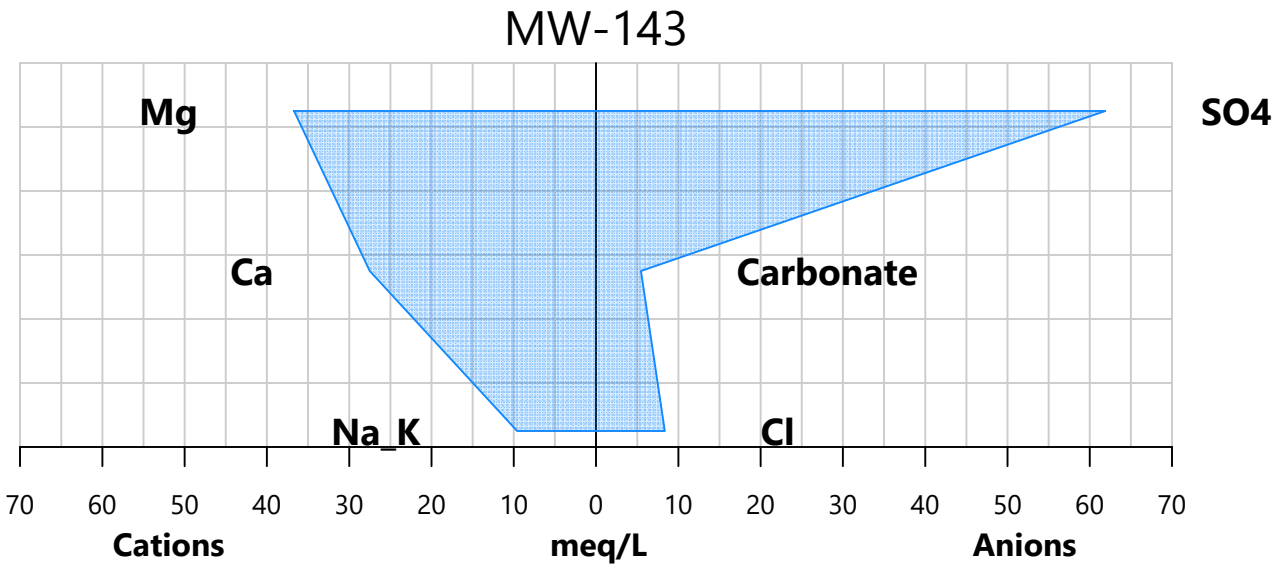

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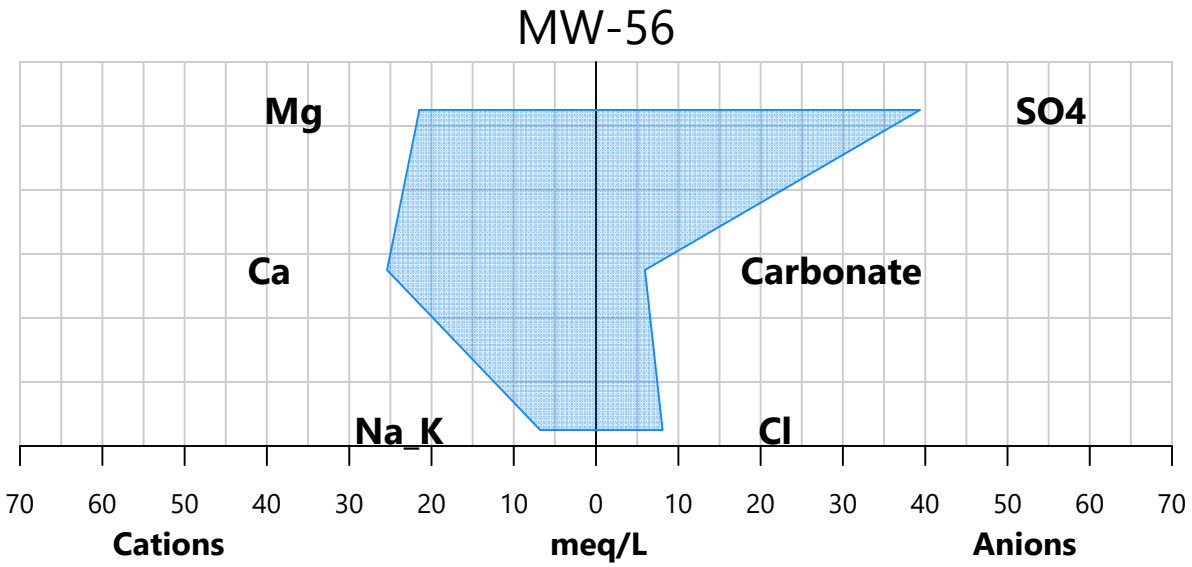
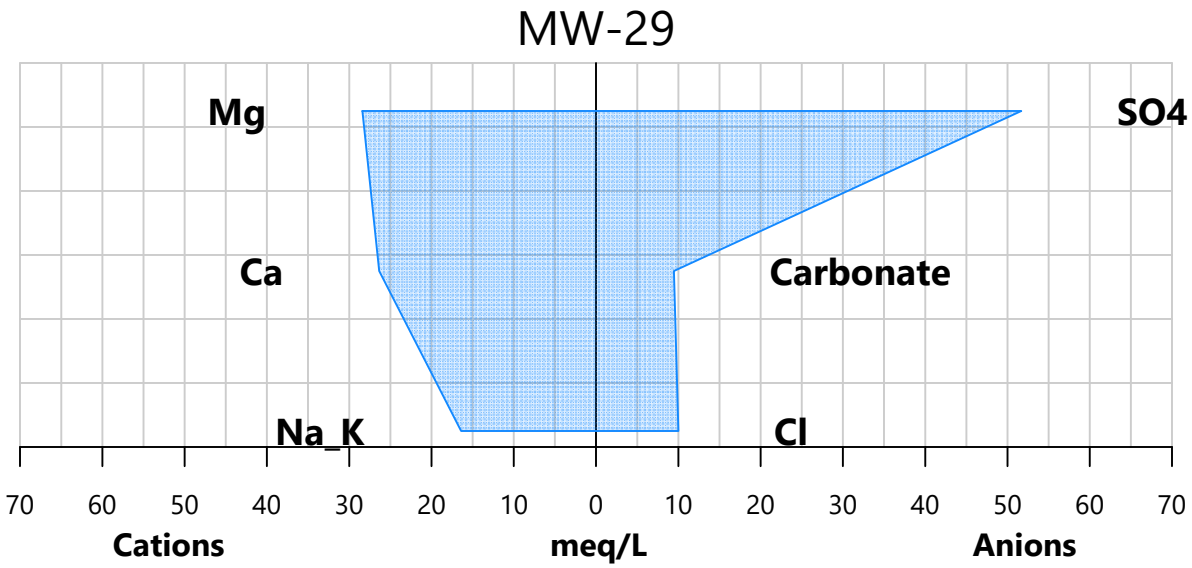
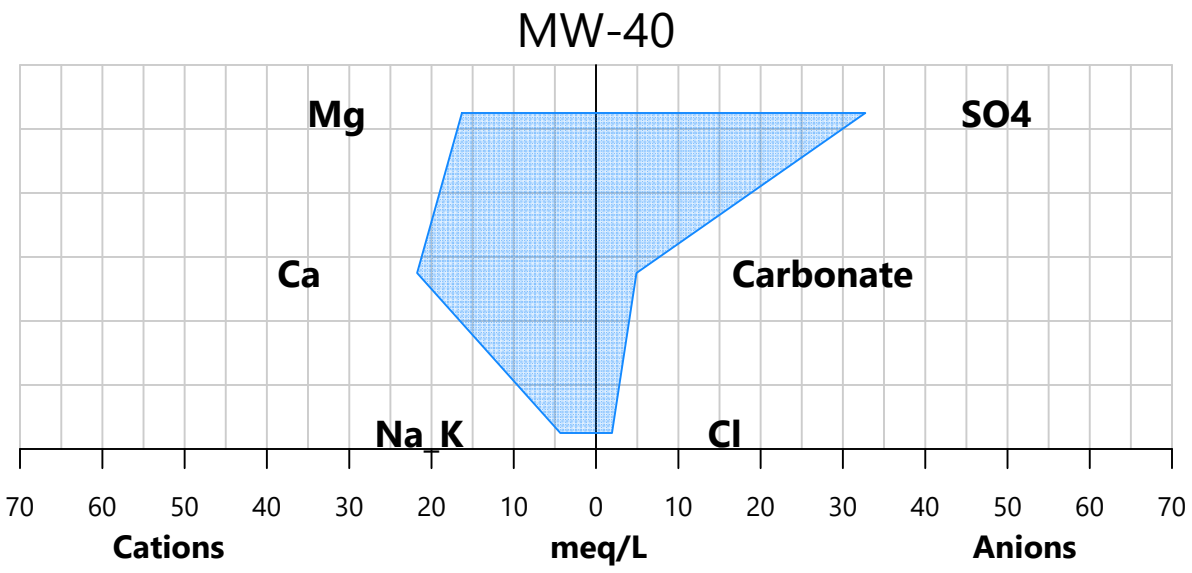
RO Reject Discharge Fields Stage 1 Abatement - Second Quarterly Progress Report
South RO Field - Upgradient Monitoring Wells - October 2019







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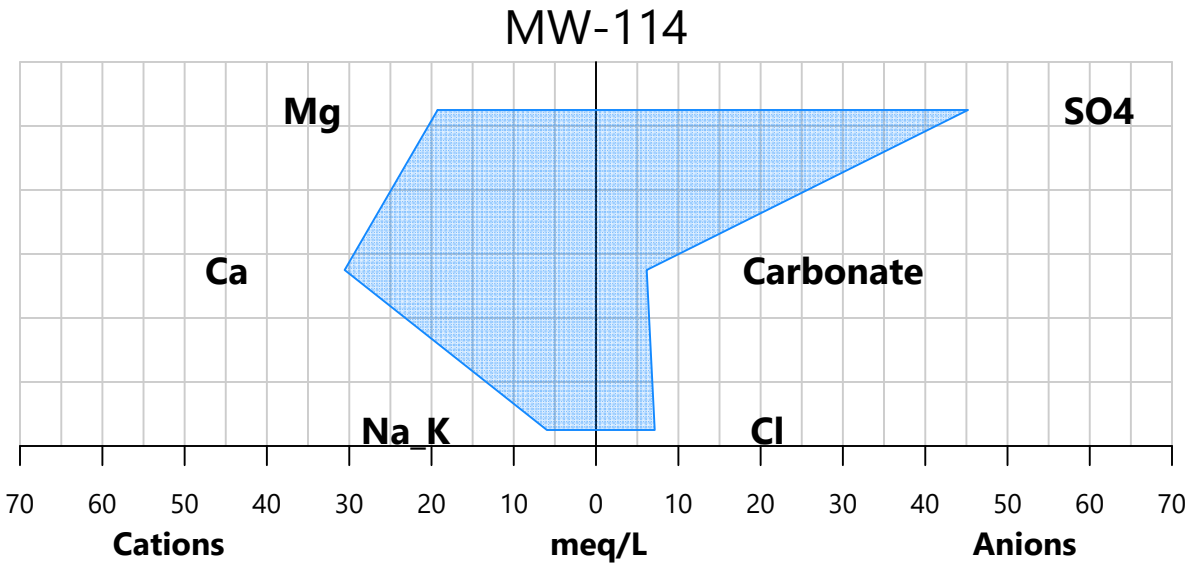
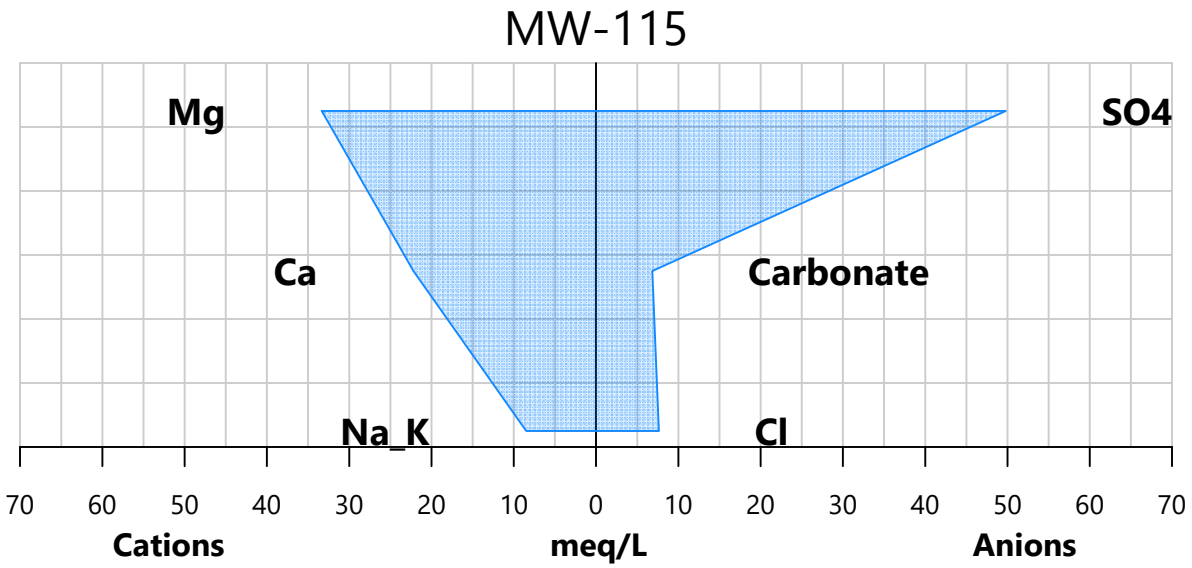
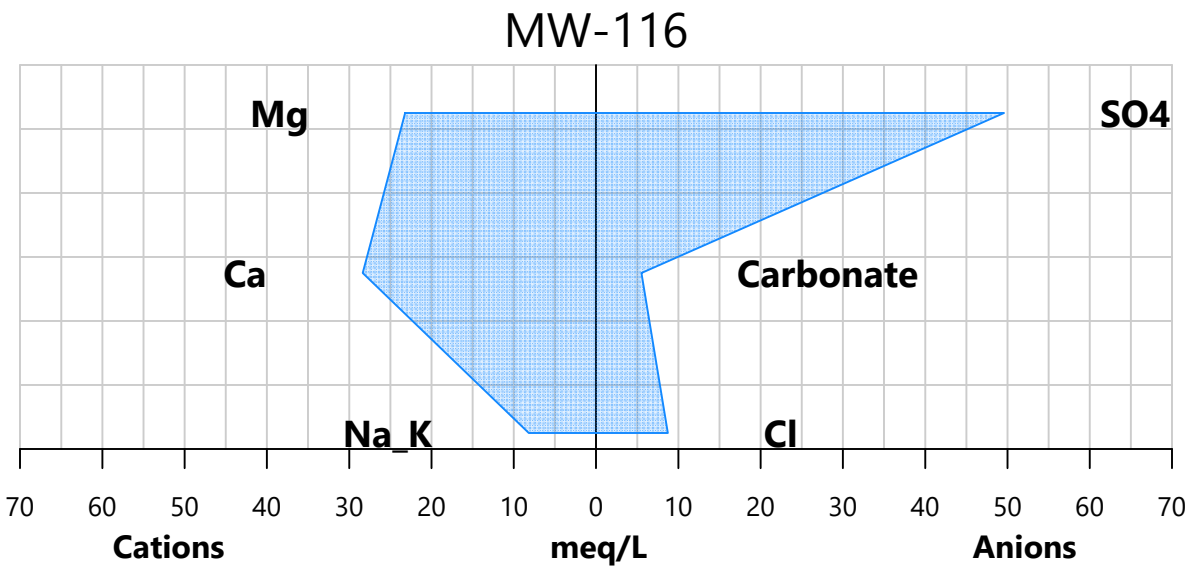
RO Reject Discharge Fields Stage 1 Abatement - Second Quarterly Progress Report
South RO Field - In Field Monitoring Wells - October 2019

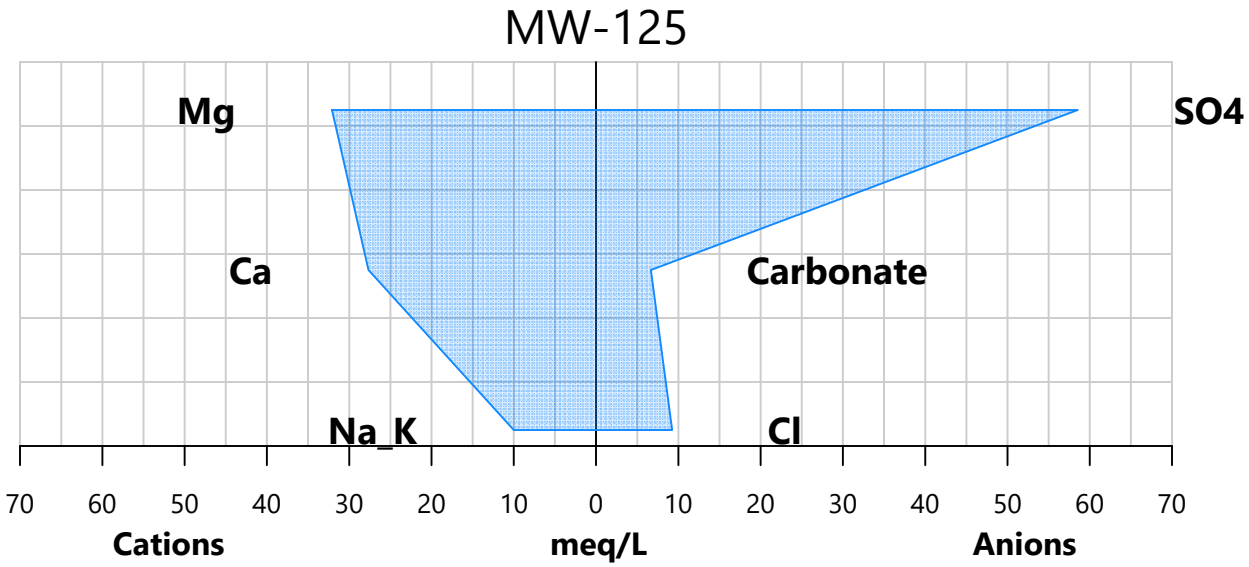


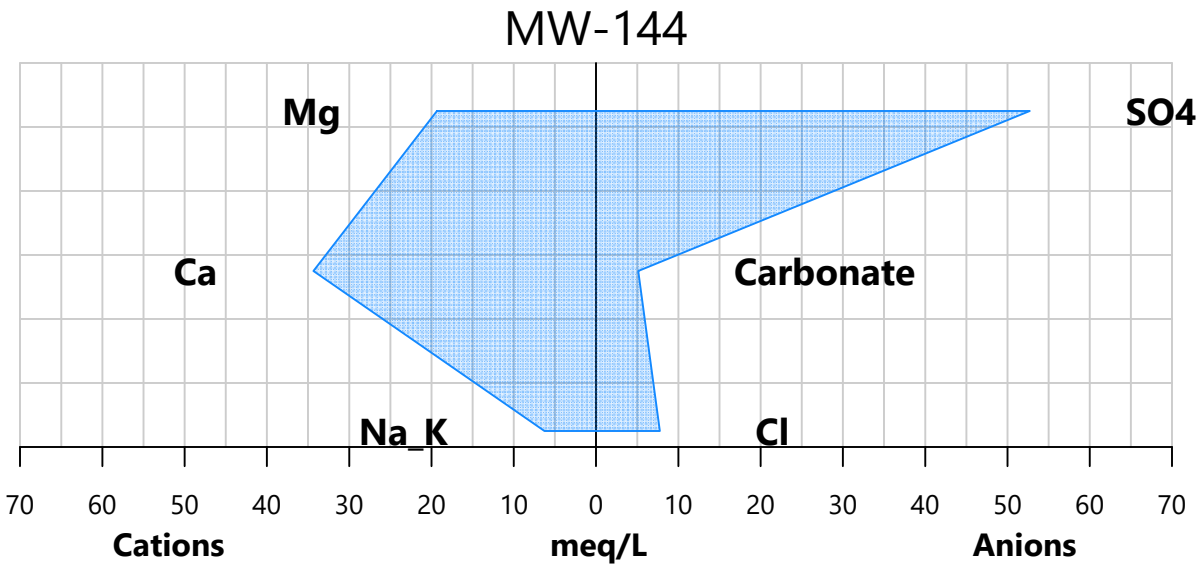


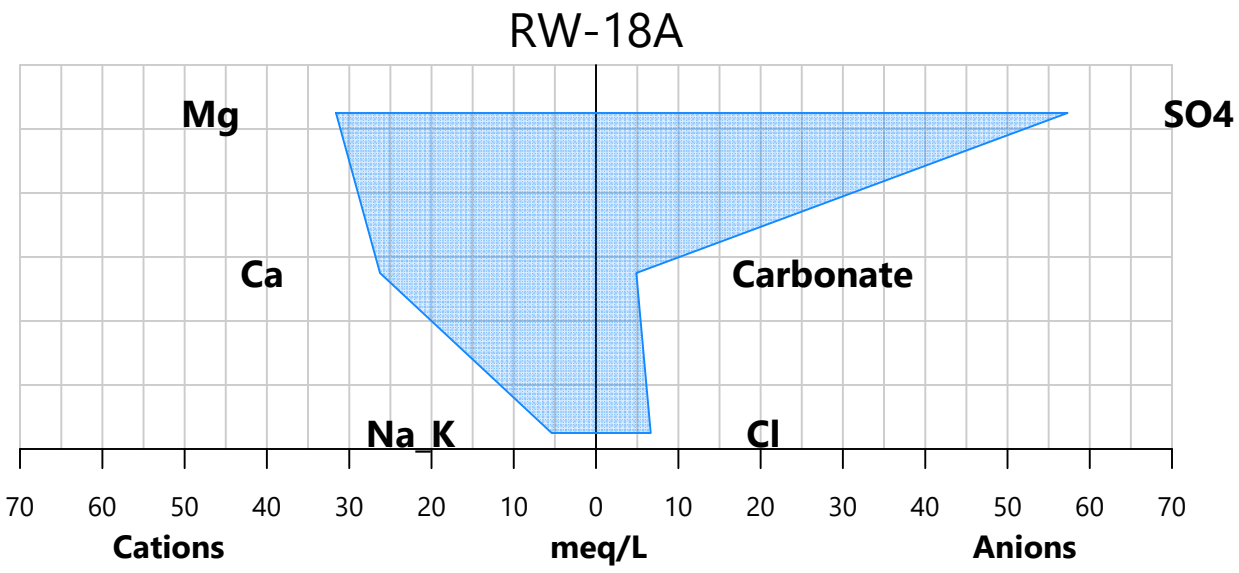


STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Second Quarterly Progress Report
South RO Field - Downgradient Monitoring Wells - October 2019







Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Wednesday, August 28, 2019 3:06 PM
To: Chavez, Carl J, EMNRD
Cc: Griswold, Jim, EMNRD; Denton, Scott; Leik, Jason; Sahba, Arsin M.
Subject: [EXT] RO Reject Stage 1 AP 1st Qtly Report
Attachments: 2019-08-28 RO Stage 1 Q1 Progress Report Transmittal.pdf

Carl,

We will be submitting the 1st quarterly report for the RO Reject Stage 1 Abatement Plan your review. The entire submittal is too large to email, but a hardcopy and CD with the electronic files will be delivered to you tomorrow.

If you have any questions, please let us know.

Thanks,
Robert

Robert Combs
Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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HOLLYFRONTIER.

August 28, 2019

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

RE: Reverse Osmosis Reject Discharge Fields Stage 1 Abatement
First Quarterly Progress Report
HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Dear Mr. Chavez:

Enclosed is one paper copy and one electronic copy of the above-referenced report. If you have any questions or comments regarding this request, please feel free to contact me at 575-746-5487 or Robert Combs at 575-746-5382.

Sincerely,

Scott M. Denton
Environmental Manager
HollyFrontier Navajo Refining LLC

c: HollyFrontier: R. Combs, J. Leik, A. Sahba

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – First Quarterly Progress Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Prepared for:

HollyFrontier Navajo Refining LLC
501 East Main Street, Artesia, New Mexico 88210

Prepared by:

Wood Environment and Infrastructure Solutions, Inc.
17320 Katy Freeway, Houston, Texas 77094
Project 6703180022
August 28, 2019

Third-party disclaimer

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B Well Development and Sampling Forms
C Soil Moisture Data Graphs
D Laboratory Analytical Reports and Data Usability Summary
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List of Acronyms

AP	Stage 1 Abatement Plan
bgs	below ground surface
CGWSL	Critical Groundwater Screening Level
COC	Constituent of Concern
CSSL	critical soil screening level
CW	construction worker
DAF	Dilution Attenuation Factor
EPA	United States Environmental Protection Agency
ft	feet
HFNR	HollyFrontier Navajo Refining LLC
Ind/Occ	Industrial/Occupational
MCL	Maximum Contaminant Level
mL/min	milliliters per minute
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
ORP	oxidation-reduction potential
PID	Photoionization Detector
PVC	polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
RO	Reverse Osmosis
RSL	Regional Screening Level
SPLP	Synthetic Precipitation Leaching Procedure
SSL	Soil Screening Level
TDS	Total Dissolved Solids
WQCC	Water Quality Control Commission
WQS	WQCC Standards

1.0 INTRODUCTION

HollyFrontier Navajo Refining LLC (HFNR) owns and operates the Navajo Refinery (Refinery), which is located in Artesia, New Mexico (**Figure 1**) and can process heavy, sour and light, sweet crude oils. The facility has been in operation since the 1920s, runs a predominant slate of Permian Basin crudes that are gathered in west Texas and southeast New Mexico, and can also source a variety of crude oils from Cushing, Oklahoma including Canadian crudes. The Refinery serves markets in the southwestern United States and northern Mexico.

HFNR utilizes reverse osmosis (RO) to remove minerals and salts from fresh water prior to use in the refining process. The fresh water is supplied from a blend of publicly supplied water from the City of Artesia and fresh groundwater obtained from the Refinery's water supply wells. The treated water (permeate stream) is used in the Refinery process while the RO reject stream cannot be used in the Refinery process as it contains concentrated salts and minerals that do not pass through the RO membranes. Prior to January 24, 2019, this concentrated rejected stream was discharged to the surface of two fields located northeast of the Refinery operations area (**Figure 2**). The RO reject discharge fields are covered with native grass and discharged water was allowed to percolate or evaporate in those permitted areas. The discharge was performed under the jurisdiction of the State of New Mexico Energy, Minerals and Natural Resource Department Oil Conservation Division (OCD) in accordance with Discharge Permit GW-028 (Permit), which was initially issued in October 1991. The Permit has subsequently been modified and renewed several times with the most recent renewal issued in May 2017 (OCD 2017) and the most recent modification issued in December 2018 (OCD 2018).

In 2017, OCD renewed the Permit, which included a stipulation that discharge of RO reject water to the surface cease upon operational completion of a Class I disposal well, but not later than October 31, 2018. An extension to the October 31, 2018, deadline was requested and approved by OCD due to delays in operational completion of the Class I disposal well (OCD 2018). The renewed Permit requires characterization and abatement of vadose zone and groundwater contamination due to the historical discharge of RO reject fluid. The Permit stipulated that a plan for characterization and abatement of such contamination should be submitted within 60 days after cessation of discharge of RO reject fluid. The disposal well became operational on January 16, 2019, and the discharge was discontinued on January 24, 2019. The Stage 1 Abatement Plan (AP) was submitted on March 21, 2019 (Wood 2019a), amended on May 24, 2019 (Wood 2019b) per OCD requests, and approved by OCD via email on June 7, 2019.

This quarterly progress report provides a summary of the AP activities conducted through August 2019 including:

- Installation of soil moisture probes
- Collection of soil samples from moisture probe borings
- Installation of additional groundwater monitoring wells
- Collection of groundwater samples from new and existing monitoring wells
- Laboratory analyses for soil and groundwater samples
- Soil moisture data throughout the vadose zone within each of the two RO reject discharge fields
- Updated schedule for two years of investigation and monitoring implementation

2.0 BACKGROUND

2.1 Soil Moisture Probe Installation

Soil moisture probes were placed at depths of 2, 5, and 10 feet below ground surface (ft bgs) in three locations within each of the two RO reject discharge fields at the locations shown on **Figure 3**. One probe was placed near the discharge location for each field and the remaining two were located across the field in such a manner as to provide information across each of the two RO reject discharge fields. One additional probe was installed in a location outside, but near, each of the two RO reject discharge fields to provide a measure of "background" soil moisture. Thus, a total of 8 moisture probes were installed for this investigation and the locations were designated as MP-1 through MP-8 (**Figure 3**).

2.2 Drilling Activities

The drilling activities associated with the soil moisture probe borings were conducted by Tolunay-Wong Engineers (WD-1766) between the dates of July 10 and July 15, 2019. A direct-push drill rig was used to advance a boring to a depth of 10 ft bgs at each location. Each boring was backfilled with a combination of the soil cuttings and sand after the probes were installed and confirmed to be functioning properly.

The soil borings were located by a registered surveyor on July 17, 2019. The locations of each boring were measured to the nearest 0.1 ft and converted to state plane coordinates. The ground surface elevation was measured to the nearest 0.01 ft relative to known benchmarks. The survey data is included on the boring logs in **Appendix A**.

2.2.1 Soil Sample Collection Methods

Continuous soil cores were collected, logged by a qualified geoscientist, and screened using a calibrated photoionization detector (PID). Discrete soil samples were selected from each boring for laboratory analyses from the 1 to 2 ft bgs, 4 to 5 ft bgs, and 9 to 10 ft bgs intervals, which correspond to the depths at which the soil moisture probes were installed.

Soil samples submitted for laboratory analyses were placed into laboratory provided containers, labeled, and then placed in a cooler with ice. Nitrile gloves were replaced between each sample to prevent cross-contamination.

Quality assurance/quality control (QA/QC) samples were collected to monitor the validity of the soil sample collection procedures. The following samples were collected for QA/QC purposes:

- Field duplicates were collected at a rate of 10%, or 1 field duplicate for every 10 soil samples. Field duplicates were analyzed for the same constituents as the parent sample.
- Equipment blanks were collected from the sampling apparatus at a frequency of 5%, or 1 equipment blank for every 20 soil samples collected, with a minimum of 1 equipment blank per day. Equipment blank samples were analyzed for the same constituents as the sample associated with the equipment blank (sample collected immediately prior to the equipment blank).

2.2.2 Moisture Probe Installation and Programming

The probes were installed at depths of 2, 5, and 10 ft bgs inside the borings according to the manufacturer's installation instructions. The devices utilized for this monitoring are manufactured by Meter Group and include:

- TEROS 12 (Soil moisture sensing)
- ZL6 (data logger)
- Zentra Cloud (cellular data storage system)

The ZL6 data loggers were programmed to collect readings from the TEROS 12 sensors every 30 minutes and upload data every 60 minutes to the Zentra Cloud system for the following constituents:

- Soil Moisture (m^3/m^3)
- Soil Temperature (°C)
- Saturation Extract Electrical Conductivity (mS/cm)

2.3 Monitoring Well Installation

2.3.1 Drilling Activities

As shown on **Figure 3,** five new groundwater monitoring wells were installed upgradient and downgradient of the RO reject discharge fields between the dates of July 9 and July 15, 2019. The monitoring wells installed as part of this AP include:

- North RO Reject Discharge Field:
  - Upgradient: MW-140, MW-141
  - Downgradient: MW-142, MW-143
- South RO Reject Discharge Field:
  - Downgradient: MW-144

A direct-push drill rig was used to collect continuous soil cores to a depth of 30 ft bgs at each location. The soil cores were logged by a qualified geoscientist and screened using a calibrated PID, but no samples were collected for laboratory analyses, according to the approved work plan. Upon completion of the logging, each boring was converted into a permanent groundwater monitoring well using hollow-stem auger drilling methods.

The installation of MW-140 through MW-144 were performed by a Tolunay-Wong Engineers (WD-1766). The New Mexico Office of the State Engineer issued permits to drill these wells on July 5, 2019 (RA-12753 POD2-6). The drilling permits and plugging plans are included in **Appendix A.**

2.3.2 Well Construction Details

The depth of each monitoring well was approximately 30 ft bgs with a borehole diameter of approximately 8.5 inches. MW-140 through MW-144 were constructed with a 20-ft section of 2-inch diameter polyvinyl chloride (PVC) well screen with 0.010-inch slots installed in the borings from 10 to 30 ft bgs. Solid 2-inch PVC casing was attached to the screen interval and extended to the surface completion. A 16/30-grade sand pack was placed in the annular space to 3 ft above the screen interval and a 2 ft bentonite seal was placed on top of the sand pack. A cement/bentonite grout seal was placed from the bentonite seal to the surface.

MW-140 and MW-141 were constructed with flush-mount surface completions while MW-142, MW-143, and MW-144 were constructed with stick-up surface completions. In both cases, a protective steel surface casing was installed around the PVC well casing and a 4-ft by 4-ft by 4-inch thick concrete pad was installed around each outer casing. Protective bollards were placed around MW-142, MW-143, and MW-144.

Well materials, including end caps, casings and screens were pre-cleaned and had threaded connections. Well construction materials were kept wrapped in original packaging or plastic sheeting until used. The field geologist recorded measurements of various well dimensions, including distance from the top of the well casings to the:

- Bottom of the well
- Top of the sand pack
- Top of the bentonite seal

- Top of the screen
- Land surface

The well construction details for MW-140 through MW-144 are shown in **Appendix A**.

The monitoring wells were located by a registered surveyor on July 17, 2019. The locations of each well were measured to the nearest 0.1 ft and converted to state plane coordinates. The ground surface and top of casing elevations were measured to the nearest 0.01 ft relative to known benchmarks. The survey data is included on the boring logs in **Appendix A**.

2.4 Groundwater Sampling

2.4.1 Well Development

Each newly installed monitoring well was developed using a submersible electronic pump to remove fine-grained material accumulated in the well casing. Specific conductance, dissolved oxygen, pH, turbidity, temperature, and oxidation-reduction potential (ORP) of the purged groundwater was monitored throughout the development process using a properly calibrated Horiba U-52 water quality meter. The development process was considered complete after the parameters stabilized, at least three well casing volumes had been purged, and fine-grained material accumulated in the casing had been removed. Development forms are included in **Appendix B**.

2.4.2 Sample Collection Methods

Groundwater samples were collected from the 5 newly installed monitoring wells and from 12 existing monitoring wells located upgradient, within, and downgradient of each of the two RO reject discharge fields as shown in **Figure 3**. The wells included in the groundwater monitoring program for the AP are:

- North RO Reject Discharge Field:
  - Upgradient: MW-55, MW-140, MW-141
  - Within Field: MW-117, MW-118, MW-119
  - Downgradient: MW-142, MW-143
- South RO Reject Discharge Field:
  - Upgradient: MW-29, MW-40, MW-56
  - Within Field: MW-114, MW-115, MW-116
  - Downgradient: MW-125, RW-18A, MW-144

Prior to sampling, the water level was measured in each well. **Table 1** provides a summary of the water level measurements.

Low-flow groundwater sampling procedures using a peristaltic pump and dedicated tubing were utilized for all groundwater samples collected. The water was purged at a rate of 150 to 200 milliliters per minute (mL/min) until the field measurements of at least three of the five water quality parameters, including pH, temperature, specific conductance, ORP, and dissolved oxygen, stabilized within 10% for three consecutive readings. Groundwater sampling logs are included in **Appendix B**.

Following the completion of purging, groundwater samples were collected directly into the laboratory-provided sample containers. Containers were labeled and placed into appropriate containers (coolers) with ice for shipment to the analytical laboratory under the proper chain of custody.

QA/QC samples were collected to monitor the validity of the groundwater sample collection procedures. The following samples were collected for QA/QC purposes:

- Field duplicates were collected at a rate of 10%, or 1 field duplicate for every 10 groundwater samples. Field duplicates were analyzed for the same constituents as the parent sample.
- Equipment blanks were collected from non-dedicated sampling apparatus at a frequency of 5%, or one for every 20 groundwater samples collected, with a minimum of 1 equipment blank per day. Equipment blank samples were analyzed for the same constituents as the sample associated with the equipment blank (sample collected immediately prior to the equipment blank).

3.0 REGULATORY CRITERIA

3.1 Soil Screening Levels

HFNR has followed guidance provided by the New Mexico Environment Department (NMED) to develop critical soil screening levels (CSSLs) to evaluate which potential contaminants of concern (COCs) require additional evaluation, risk assessment or cleanup. The primary source of soil screening levels is the NMED risk-based soil screening guidance document *Risk Assessment Guidance for Site Investigations and Remediation* (NMED 2019).

The RO reject discharge fields are located within the active Refinery and access to these areas is limited to personnel approved to enter the refinery, which includes employees and contractors who have met the safety and security requirements for entry into the Refinery. The purpose of this investigation is to determine whether there is a current risk of exposure. Thus, the screening levels were selected based on exposure pathways including soil to groundwater leaching as well as direct exposure to industrial and construction workers. The CSSLs were used according to the following hierarchy:

- The lowest value of the Industrial/Occupational (Ind/Occ) or Construction Worker (CW) soil screening levels (SSLs) for both cancer and non-cancer end-points (when both are published) was used to screen shallow soil samples (0 to 10 ft bgs). If no NMED SSL is published for a specific compound, the United States Environmental Protection Agency (EPA) Industrial Regional Screening Level (RSL) was used, if available, to screen shallow soil samples (0 to 10 ft bgs). When used, the EPA Industrial RSL for carcinogenic compounds were adjusted to a cancer risk level of $1x10^{-5}$ to be comparable to the NMED SSLs.
- The lowest value of the Concentration in Water (Cw) with Dilution Attenuation Factor (DAF) 20 SSLs was used to screen soil samples from greater than 10 ft bgs. If no NMED Cw DAF 20 SSL is published for a specific compound, the lowest value of the EPA protection of groundwater SSL was used. The EPA SSLs are based on a DAF = 1 so the values were adjusted to a DAF = 20 when the EPA SSLs were used. When used, the EPA risk-based DAF 20 SSLs for carcinogenic compounds were adjusted to a cancer risk level of $1x10^{-5}$ to be comparable to the NMED DAF 20 SSLs.

The data screening evaluation did not include residential SSLs and thus, is not intended to allow for future unrestricted land use. HFNR does not currently intend to close the RO reject discharge fields included in this investigation without land use controls. In the future, if HFNR wishes to close any of these areas without controls, it is understood that residential SSLs may be applicable.

3.2 Groundwater Screening Levels

HFNR has followed guidance provided by NMED to develop a critical groundwater screening level (CGWSL) to determine which potential COCs require additional evaluation, risk assessment or cleanup. The CGWSL was determined as follows:

- New Mexico Water Quality Control Commission (WQCC) Standards (WQS) found in New Mexico Administrative Code (NMAC) 20.6.2.3103, updated December 28, 2018.
- EPA's Federal Maximum Contaminant Levels (MCL).
- If no value for the WQS or MCL was available, then Tap Water value from Table A-1 of the Risk Assessment Guidance for Site Investigations and Remediation (NMED 2019), if available.

Screening standards for the soil to groundwater leaching pathway are not available for Calcium, Chloride, Potassium, Sodium, and Sulfate; thus, the lowest of the applicable direct contact screening standards will be used for these COCs. There is no direct contact screening standard for Sulfate.

4.0 ANALYTICAL RESULTS AND DISCUSSION

4.1 Soil Moisture Monitoring

Soil moisture monitoring within the vadose zone at MP-1 through MP-8 started on July 16, 2019. Precipitation data for Artesia was obtained from www.usclimatedata.com for the month of July 16, 2019 and for August 1 to August 16, 2019. The weather station that provides the precipitation data to this website is located approximatley 6 miles south of the RO reject discharge fields. A graph of precipitation data is provided in **Appendix C**. Three rainfall events of greater than 0.1 inches were recorded during the period of July 16, 2019 to August 16, 2019:

- 0.71 inches on July 22, 2019
- 0.14 inches on July 29, 2019
- 0.65 inches on August 15, 2019

An evaluation of the data trends for soil moisture and electrical conductivity at each location from July 16 to August 14, 2019 was performed. The data suggests that while moisture and conductivity are declining at the 2 ft and 5 ft depths, moisture and conductivity are increasing in the 10 ft depths, indicating that the RO reject discharge fields may still be in the process of draining and have not yet drained to field capacity. The data trends are presented in Graphs 1a though 8b in **Appendix C**.

This initial soil moisture and conductivity data serve as establishing baselines conditions. Soil moisture probes will remain in place throughout the implementation of the AP and data will continue to be collected to evaluate the vadose zone moisture including observed effects from extended dry periods and precipitation events.

4.2 Soil Analytical Results

The soil samples were analyzed for COCs that have been present in previous soil, vadose zone, and groundwater samples at concentrations above the screening standards as well as for cations. Both the total COC concentrations and the leachable concentrations, using the synthetic precipitation leaching procedure (SPLP) method, were measured to evaluate the potential for mobilization of these compounds from the soils to groundwater.

Each soil sample was submitted for analyses including:

- Total Metals (arsenic, boron, cobalt, iron, lead, manganese, and uranium) by Methods 6010 or 6020
- Leachable Metals (arsenic, boron, cobalt, iron, lead, manganese, and uranium) by Methods 6010 or 6020 using the SPLP method
- Total Cations and Anions by Methods 6010 or 6020 for Calcium, Magnesium, Potassium, and Sodium and Method 300 for Sulfate, Chloride, Nitrate/Nitrite (as N), and Fluoride
- Leachable Cations and Anions by Methods 6010 or 6020 for Calcium, Magnesium, Potassium, and Sodium and Method 300 for Sulfate, Chloride, Nitrate/Nitrite (as N), and Fluoride using the SPLP method

Analytical results are included in **Appendix D** (in electronic format), along with a data usability summary. The data was determined to be usable for the purposes of this investigation.

Table 2 provides a summary of the soil analytical data The analytes with reported concentrations above the applicable standards listed in Section 3.1 include:

- Leachable Cations/Anions:
  - Fluoride
  - Sulfate

- Total Metals:
  - Arsenic
  - Cobalt
  - Iron
  - Manganese
- Leachable Metals:
  - Iron
  - Manganese

4.3 Groundwater Analytical Results

4.3.1 Analytical Results

Groundwater samples were analyzed during this quarterly monitoring event for the following parameters:

- Total Cations (Calcium, Magnesium, Potassium, and Sodium) by Methods 6010 or 6020
- Total Anions (Chloride, Fluoride, Sulfate, Carbonate, Bicarbonate, and Nitrate/Nitrite as N) by Method 300
- Total Dissolved Solids (TDS)

Groundwater analytical results are included in **Appendix D** (in electronic format) , along with a data usability summary. The data was determined to be usable for the purposes of this investigation.

Table 3 provides a summary of the groundwater analytical data. The analytes with reported concentrations above the applicable standards listed in Section 3.2 include:

- Chloride
- Fluoride
- Nitrate/Nitrite
- Sulfate
- TDS

4.3.2 Groundwater Classification

The ionic data obtained during the first quarterly sampling event was used to construct Stiff and Piper diagrams to classify the groundwater upgradient, beneath, and downgradient from the two RO reject discharge fields. The data and diagrams are provided in **Appendix E**. These diagrams will be updated with future data from the planned quarterly monitoring events to evaluate any changes in groundwater characteristics.

5.0 SUMMARY AND CONCLUSIONS

The AP was implemented according to the approved work plan, and included the following activities:

- Soil sampling:
  - 24 samples and 3 duplicate samples were collected during the installation of soil moisture probe borings, at three depth intervals from eight locations.
  - Soil analytical data indicates:
    - Leachable Fluoride concentrations exceed the WQS in 16 of the 27 samples.
    - Leachable Sulfate concentrations exceed the WQS in 10 of the 27 samples.
    - Total Arsenic concentrations exceed the CW, DAF 20 SSL in 2 of the 27 samples.
    - Total Cobalt concentrations exceed the CW, DAF 20 SSL in 16 of the 27 samples.
    - Total Iron concentrations exceed the CW, DAF 20 SSL in 25 of the 27 samples.
    - Total Manganese concentrations exceed the CW SSL in 5 of the 27 samples.
    - Leachable Iron concentrations exceed the EPA MCL in 2 of the 27 samples.
    - Leachable Manganese concentrations exceed the EPA MCL in 2 of the 27 samples.
- Soil moisture:
  - Moisture probes were installed at three depths at each of eight locations.
  - Graphs of data collected between July 16 and August 14, 2019 indicate that the fields are draining, but have not yet drained to field capacity.
- Groundwater sampling:
  - Five new monitoring wells were installed, as per the approved work plan.
  - Groundwater samples were collected from the 5 new and 12 existing monitoring wells along with 2 duplicate samples.
  - Groundwater analytical data indicates:
    - Chloride concentrations exceed the WQS in 15 of the 19 samples.
    - Fluoride concentrations exceed the WQS in 16 of the 19 samples.
    - Nitrate/Nitrite concentrations exceed the WQS in 1 of the 19 samples.
    - Sulfate and TDS exceed the WQS in all 19 of the samples.
  - Water classification diagrams have been constructed for samples collected from each well and will be used to evaluate changes to the groundwater following cessation of discharge of the RO reject stream.

The next sampling event will coincide with the semiannual facility-wide groundwater monitoring event and will include additional groundwater analyses. Additional conclusions and recommendations will be provided with the Final Report, which will be submitted after the fourth quarterly sampling event is completed.

Figure 4 provides an updated schedule for the continuation of the AP activities.

6.0 REFERENCES

NMED 2019. Risk Assessment Guidance for Site Investigations and Remediation. March 2019.

OCD 2017. Discharge Permit GW-028. May 25, 2017.

OCD 2018. Discharge Permit (GW-28) Modification. December 14, 2018.

Wood 2019a. Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields Discharge Permit GW-028. March 21, 2019.

Wood 2019b. Amendment of the March 2019 Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields. May 24, 2019.

TABLES

Table 1 - Water Level Measurements

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Field	Area	Well	Event	Date	Depth to Water (ft btoc)	Top of Casing (ft amsl)	Groundwater Elevation (ft amsl)
North RO Field	Upgradient	MW-55	Quarter 1	7/17/2019	13.10	3364.77	3351.67
		MW-140	Quarter 1	7/15/2019	9.46	3361.23	3351.77
		MW-141	Quarter 1	7/15/2019	10.62	3359.89	3349.27
	In Field	MW-117	Quarter 1	7/17/2019	12.58	3363.01	3350.43
		MW-118	Quarter 1	7/17/2019	15.23	3361.95	3346.72
		MW-119	Quarter 1	7/17/2019	13.75	3356.11	3342.36
	Downgradient	MW-142	Quarter 1	7/12/2019	13.16	3355.78	3342.62
		MW-143	Quarter 1	7/12/2019	13.51	3355.85	3342.34
South RO Field	Upgradient	MW-29	Quarter 1	7/17/2019	18.61	3360.64	3342.03
		MW-40	Quarter 1	7/17/2019	11.87	3356.93	3345.06
		MW-56	Quarter 1	7/17/2019	14.00	3357.44	3343.44
	In Field	MW-114	Quarter 1	7/17/2019	13.96	3361.68	3347.72
		MW-115	Quarter 1	7/17/2019	13.75	3359.31	3345.56
		MW-116	Quarter 1	7/17/2019	14.06	3353.77	3339.71
	Downgradient	MW-125	Quarter 1	7/17/2019	17.02	3358.81	3341.79
		MW-144	Quarter 1	7/16/2019	14.51	3351.12	3336.61
		RW-18A	Quarter 1	7/17/2019	15.99	3350.84	3334.85

Notes and Abbreviations

ft	feet
ft amsl	feet above mean sea level
ft btoc	feet below top of casing
RO	Reverse Osmosis

Table 2 - Summary of Soil Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Location:			MP-1			MP-2			MP-3			MP-4			
Depth Range (ft bgs):			2	5	10	2	5	10	2	5	10	2	DUP-1 (MP-4 2')	5	10
Date:			7/10/2019	7/10/2019	7/10/2019	7/11/2019	7/11/2019	7/11/2019	7/11/2019	7/11/2019	7/11/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019
Analyte	**Screening Level**	**Screening Level Source**													
Total Cations/Anions (mg/kg)															
Chloride	1.59E+07	CW SSL, Noncancer	99.6	34.6	77.7	20.7	55.5	47.9	60.4	45.9	60.7	488	467	19.9	56.3
Fluoride	1.20E+04	Cw, DAF 20	31.9	20.9	13.8	49.9	26	24.8	30.9	20.3 J6	15.2	32.2	31.4	23.8	13
Nitrate-Nitrite	4.25E+02	Cw, DAF 20	<0.135	<0.137	<0.126	7.91	<0.122	<0.158	8.82	<0.139	<0.124	0.583 J	<0.123	<0.136	<0.125
Sulfate	--	--	8560	21200	18400	1670	2640	19700	2030	3380	4210	19700	19600	16100	5120
Calcium	8.85E+06	CW SSL, Noncancer	100000 O1 V	179000	145000	73800	114000	215000	71800	113000	246000	154000	154000	208000	260000
Magnesium	1.55E+06	CW SSL, Noncancer	11700 O1	6270	5650	12800	10600	8980	13200	9730	6240	10900	10700	9450	5180
Potassium	2.08E+07	CW SSL, Noncancer	5770 O1	2500	1690	6260	4670	2520	5600	3850	2250	4470	4660	3110	1690
Sodium	1.02E+07	CW SSL, Noncancer	327	246 B	217 B	251 B	310	199 B	309	260 B	255 B	607	581	357	194 B
Leachable Cations/Anions (mg/L)															
Chloride	2.50E+02	WQCC Dom	4.16	2.35	3.79	1.76	2.7	2.29	3.11	2.05	3.08	20.3	20	4.41	2.64
Fluoride	1.60E+00	WQCC HH	**2.05**	1.3	1.02	**3.3**	**2.06**	1.49	**2.55**	1.21	1.34	**2.21**	**2.17**	1.94	1.3
Nitrate-Nitrite	1.00E+01	EPA MCL	0.041 J	0.256	<0.0197	0.102	<0.0197	<0.0197	0.076 J	0.021 J	<0.0197	0.068 J	0.058 J	<0.0197	<0.0197
Sulfate	6.00E+02	WQCC Dom	452	**1600**	**1320**	88.2	121	**1160**	99	353	485	**1690**	**1680**	1390	441
Calcium	--	--	147	587	561	29	34.7	350	30.7	139	184 O1 V	615	615	509	167
Magnesium	--	--	21.7	17	18.9	6.51	7.74	13.1	8.34	14.1	14.5	35	35.3	19.2	13.3
Potassium	--	--	2.99	1.13	1.03	0.845 J	0.491 J	1.52	2.25	1.27	0.518 J	2.81	3.36	0.595 B J	0.558 B J
Sodium	--	--	21.5	16.6	17	27.6	48.1	15.9	15.5	17.4	16.6	42.3	30	47.9	18.5
Total Metals (mg/kg)															
Arsenic	5.83E+00	Cw, DAF 20	4.26	1.87 J	**7.56**	4.31	3.06	1.2 J	3.4	2.36 J	3.09	3.61	3.14	3.25	1.44 J
Boron	2.51E+02	Cw, DAF 20	13.3	5.78 J	4.41 J	12.3 J	9.57 J	7.44 J	9.9 J	8.47 J	5.79 J	9.12 J	7.35 J	7.1 J	3.23 J
Cobalt	5.40E+00	Cw, DAF 20	**7.5**	3.9	4.88	**8.39**	**6.18**	2.22	**7.89**	5.1	3.5	**5.41**	**5.53**	4.18	2.55
Iron	6.96E+03	Cw, DAF 20	**17100** O1 V	**7650**	**9360**	**18500**	**13700**	**7410**	**17100**	**11200**	6600	**12900**	**12800**	8400	5660
Lead	2.70E+02	Cw, DAF 20	39.2 O1	8.22	3.45	201	17.5	5.56	30.4	12.2	4.41	9.36	14	5.54	2.77
Manganese	4.64E+02	CW SSL, Noncancer	346 O1	121	90.6	454	263	73.3	415	261	181	286	291	208	143
Uranium	2.30E+02	EPA Ind RSL	2.52 J O1	3.15 J	1.22 J	0.757 J	0.615 J	0.321 J	0.602 J	0.539 J	3.64 J	0.631 J	0.563 J	0.76 J	0.444 J
Leachable Metals (mg/L)															
Arsenic	1.00E-02	EPA MCL	0.00163 J	0.0011 J	0.0024	0.00257	0.00141 J	0.00108 J	0.00108 J	0.00053 J	0.00102 J	0.00157 J	0.00162 J	0.000915 J	0.00107 J
Boron	7.50E-01	WQCC Irr	0.0892 J	0.0775 J	0.0781 J	0.151 J	0.161 J	0.068 J	0.0354 J	0.0401 J	0.0342 J	0.193 J	0.113 B J	0.191 J	0.151 B J
Cobalt	5.00E-02	WQCC Irr	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026	<0.00026
Iron	3.00E-01	EPA MCL	<0.0141	0.0325 J	<0.0141	0.0317 J	0.0151 J	0.0303 J	<0.0141	<0.0141	0.0278 J	0.02 J	<0.0141	<0.0141	0.0221 J
Lead	1.50E-02	EPA MCL	0.000278 J	0.000444 J	0.000357 J	0.000638 J	0.000253 J	<0.00024	<0.00024	<0.00024	0.000424 J	0.000394 B J	<0.00024	0.000475 B J	0.000332 B J
Manganese	5.00E-02	EPA MCL	0.000518 B J	0.00149 B J	0.00283 B J	0.000993 B J	0.00049 B J	0.00121 B J	0.000372 B J	0.000284 B J	0.00154 B J	0.00149 J	0.001 J	0.00085 J	0.0015 J
Uranium	3.00E-02	EPA MCL	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	<0.00033	0.000332 J	<0.00033
Total Solids (%)	--	--	79.3	78.2	84.9	74.1	87.8	67.8	87.3	77.5	86.3	87.1	87.2	79	85.9
Moisture (%)	--	--	20.7	21.8	15.1	25.9	12.2	32.2	12.7	22.5	13.7	12.9	12.8	21	14.1

Table 2 - Summary of Soil Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Location:			MP-5			MP-6			MP-7				
Depth Range (ft bgs):			2	5	10	2	5	10	2	5	DUP-2 (MP-7 5')	10	DUP-3 (MP-7 10')
Date:			7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019	7/12/2019
Analyte	**Screening Level**	**Screening Level Source**											
Total Cations/Anions (mg/kg)													
Chloride	1.59E+07	CW SSL, Noncancer	26.4	40 P1	50.8	434	45.9	41.3	66.3	102	96.6	42.5	39.5
Fluoride	1.20E+04	Cw, DAF 20	24.4 J6	15.6	14.5	12.2	14.1	16.7	20.2	14.9 J3	21.1	26.9	21.9
Nitrate-Nitrite	4.25E+02	Cw, DAF 20	5.86	3.87	<0.128	<0.125	<0.143	<0.122	0.974 J	0.888 J P1	12.7	<0.127	<0.127
Sulfate	--	--	560	668	1070	9950	4840	14900	1980	2370 J3	4050	18800	14700
Calcium	8.85E+06	CW SSL, Noncancer	81600 O1 V	144000	156000	81200	103000	200000	78000	91700	85600	208000	231000
Magnesium	1.55E+06	CW SSL, Noncancer	12500 O1 V	8970	6850	14400	11100	7390	12600	10700	11300	8120	7340
Potassium	2.08E+07	CW SSL, Noncancer	6830 O1 V	4590	2920	7080	5550	2920	6520	5790	5950	3520	2940
Sodium	1.02E+07	CW SSL, Noncancer	269 B	289 B	204 B	895	320 B	275 B	299	294 B	308	259 B	220 B
Leachable Cations/Anions (mg/L)													
Chloride	2.50E+02	WQCC Dom	1.51	4.5	2.27	18.2	3.67	1.92	6.66	4.5	4.69	1.94	2
Fluoride	1.60E+00	WQCC HH	**2.83**	**2.11**	**1.83**	1.14	1.28	1.46	**2.61**	**1.8**	**1.77**	**1.82**	**1.89**
Nitrate-Nitrite	1.00E+01	EPA MCL	0.198	0.037 J	<0.0197	0.045 J	<0.0197	<0.0197	0.231	0.131	0.106	<0.0197	<0.0197
Sulfate	6.00E+02	WQCC Dom	45.5	72.3	156	**647**	459	**1390**	267	285	278	**1570**	**1590**
Calcium	--	--	23.5	31.3	48.8	155	114	475	101	102	97.4	596	691
Magnesium	--	--	5.8	7.55	9.35	46.6	29.4	35.2	16.5	18	17.4	29.8	34.1
Potassium	--	--	1.34 B	0.45 B J	0.646 B J	5.02	1.86	5.14	2.21	1.43 B	2.16	2.24	4.31
Sodium	--	--	19.3	55.2	14.8	50.6	25.6	11.8	20.2	20	17.9	16.7	20.4
Total Metals (mg/kg)													
Arsenic	5.83E+00	Cw, DAF 20	4.43	3.96	4.05	4.48	3.49	3.6	3.02	3.71	3.65	**6.18**	4.6
Boron	2.51E+02	Cw, DAF 20	9.13 J	7.08 J	5.2 J	12.1	9.56 J	4.92 J	7.62 J	8.68 J	10.2 J	7.7 J	6.83 J
Cobalt	5.40E+00	Cw, DAF 20	**7.67**	**5.46**	4.02	**8.89**	**7.28**	3.46	**8.23**	**6.96**	**6.98**	5.11	4.82
Iron	6.96E+03	Cw, DAF 20	**18100** O1 V	**11700**	**8520**	**19600**	**15500**	**8290**	**18700**	**16000**	**16500**	**11400**	**10800**
Lead	2.70E+02	Cw, DAF 20	14.4 O1	7.09	3.86	13.1	7.8	3.57	14.3	12.3	18.7	5.69	5.09
Manganese	4.64E+02	CW SSL, Noncancer	381 O1	309	316	**489**	404	**476**	**469**	331	321	329	292
Uranium	2.30E+02	EPA Ind RSL	0.786 J	0.771 J	0.643 J	0.767 J	0.777 J	0.641 J	0.645 J	0.618 J	0.589 J	0.586 J	0.568 J
Leachable Metals (mg/L)													
Arsenic	1.00E-02	EPA MCL	0.00383	0.00121 J	0.00171 J	0.00121 J	0.00063 J	0.00156 J	0.00141 J	0.000814 J	0.000946 J	0.00192 J	0.00436
Boron	7.50E-01	WQCC Irr	0.119 B J	0.378	0.0877 B J	0.167 J	0.136 B J	0.0775 B J	0.124 B J	0.103 B J	0.104 B J	0.095 B J	0.126 B J
Cobalt	5.00E-02	WQCC Irr	<0.00026	0.000266 J	<0.00026	0.00035 J	<0.00026	0.000503 J	<0.00026	<0.00026	<0.00026	<0.00026	0.00154 J
Iron	3.00E-01	EPA MCL	0.174	0.0308 J	0.016 J	0.058 J	<0.0141	**0.652**	0.0146 J	0.0162 J	0.0144 J	<0.0141 J	**4.93**
Lead	1.50E-02	EPA MCL	0.00107 B J	0.00176 B J	0.00046 B J	0.000523 B J	0.000423 B J	0.00273	0.000315 B J	0.000586 B J	0.000272 B J	0.000283 B J	0.00365
Manganese	5.00E-02	EPA MCL	0.00385 J	0.000721 J	0.00111 J	0.00241 J	0.000607 J	0.0218	0.000454 J	0.000384 J	0.000389 J	0.00205 J	**0.0763**
Uranium	3.00E-02	EPA MCL	<0.00033	<0.00033	<0.00033	0.000391 J	0.000417 J	0.000561 J	<0.00033	<0.00033	<0.00033	<0.00033	0.000399 J
Total Solids (%)	--	--	84.2	83.8	83.7	86.2	74.8	87.9	84.5	85.4	83.5	84.4	84.8
Moisture (%)	--	--	15.8	16.2	16.3	13.8	25.2	12.1	15.5	14.6	16.5	15.6	15.2

Table 2 - Summary of Soil Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

			Location:	MP-8		
			Depth Range (ft bgs):	2	5	10
			Date:	7/12/2019	7/12/2019	7/12/2019
Analyte	**Screening Level**	**Screening Level Source**				
Total Cations/Anions (mg/kg)						
Chloride	1.59E+07	CW SSL, Noncancer	4600	301	2290	
Fluoride	1.20E+04	Cw, DAF 20	8.58	12.2	4.58	
Nitrate-Nitrite	4.25E+02	Cw, DAF 20	74.9	<0.119	43.4	
Sulfate	--	--	1420	2420	2440	
Calcium	8.85E+06	CW SSL, Noncancer	69900	79900	63800	
Magnesium	1.55E+06	CW SSL, Noncancer	15200	14400	14700	
Potassium	2.08E+07	CW SSL, Noncancer	8180	3400	6920	
Sodium	1.02E+07	CW SSL, Noncancer	1220	546	1180	
Leachable Cations/Anions (mg/L)						
Chloride	2.50E+02	WQCC Dom	211	19.4	84.3	
Fluoride	1.60E+00	WQCC HH	0.763	**1.65**	0.511	
Nitrate-Nitrite	1.00E+01	EPA MCL	2.07	0.089 J	0.807	
Sulfate	6.00E+02	WQCC Dom	250	361	415	
Calcium	--	--	117	86.1	114	
Magnesium	--	--	46.9	28.8	54.5	O1
Potassium	--	--	10.2	1.42 B	5.94	O1
Sodium	--	--	63.7	29	61.4	
Total Metals (mg/kg)						
Arsenic	5.83E+00	Cw, DAF 20	4.35	4.57	3.12	
Boron	2.51E+02	Cw, DAF 20	9.39 J	10.8 J	11 J	
Cobalt	5.40E+00	Cw, DAF 20	**9.84**	**6.96**	**9.3**	
Iron	6.96E+03	Cw, DAF 20	**21400**	**13100**	**20900**	
Lead	2.70E+02	Cw, DAF 20	15.5	6.27	11.6	
Manganese	4.64E+02	CW SSL, Noncancer	**525**	260	**487**	
Uranium	2.30E+02	EPA Ind RSL	0.703 J	0.873 J	0.777 J	
Leachable Metals (mg/L)						
Arsenic	1.00E-02	EPA MCL	0.00116 J	0.00207	0.000779 J	
Boron	7.50E-01	WQCC Irr	0.146 B J	0.143 B J	0.18 J	
Cobalt	5.00E-02	WQCC Irr	0.000662 J	<0.00026	<0.00026	
Iron	3.00E-01	EPA MCL	0.0171 J	<0.0141	0.0508 J	
Lead	1.50E-02	EPA MCL	0.000368 B J	<0.00024	0.000303 B J	
Manganese	5.00E-02	EPA MCL	0.00202 J	0.00622	0.00178 J	
Uranium	3.00E-02	EPA MCL	<0.00033	0.00035 J	<0.00033	
Total Solids (%)	--	--	84.3	90	80.2	
Moisture (%)	--	--	15.7	10	19.8	

Notes and Definitions

X	Reported concentration, X, exceeds the WQS of 0.10 mg/L.
X	Analyte detected above the detection limit at a concentration equal to X
<x	Analyte not detected at detection limit equal to x
<*x*	Analyte not detected at detection limit equal to x, but x exceeds the CGWSL
CW	Construction Worker
Cw	Concentration in water
DAF	Dilution Attenuation Factor
EPA	United States Environmental Protection Agency
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
QC	Quality Control
RPD	Relative Percent Difference
SSL	NMED Soil Screening Level, from Table A-1 of the *Risk Assessment Guidance for Site Investigation and Remediation* , March 2019.
WQCC	Water Quality Control Commission
WQCC Dom	WQCC Domestic Use (NMAC 20.3.2.3103.B)
WQCC HH	WQCC Human Health (NMAC 20.3.2.3103.A)
WQCC Irr	WQCC Irrigation Use (NMAC 20.3.2.3103.C)

Lab Footnotes

J	Reported value is an estimate.
J3	Associated batch QC was outside established range for precision.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
B	The same analyte is found in the associated blank.
O1	Matrix interference indicated.
V	Sample concentration too hight to evaluate accurate spike recoveries.

Table 3 - Summary of Groundwater Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:				General Chemistry											
Analyte:				Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Units:				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CGWSL:				--	250	1.6	--	10	--	--	600	--	--	--	1,000
CGWSL Source:				--	WQCC Dom	WQCC HH	--	EPA MCL	--	--	WQCC Dom	--	--	--	WQCC Dom
Location	**Well**	**Date**	**Type**												
North RO Field															
Upgradient	MW-55	07/17/2019	N	492	**498**	**1.83**	364	1.65	1.11	247	**2,100**	446	<2.71	446	**4,680**
	MW-140	07/15/2019	N	659	**293**	**1.82**	241	**15.5**	39.6	168	**2,430**	295	<2.71	295	**3,970**
	MW-141	07/15/2019	N	593	**288**	**1.95**	168	9.36	4.27	57.5	**1,770**	229	<2.71	229	**2,660**
	MW-141 (DUP)	07/15/2019	FD	607	**285**	**1.83**	171	9.53	4.2	57.7	**1,680**	227	<2.71	227	**2,900**
In Field	MW-117	07/17/2019	N	597	**284**	**3.40**	268	0.191	6.54	107	**2,230**	344	<2.71	344	**3,740**
	MW-118	07/17/2019	N	600	**301**	**6.16**	378	1.02	5.31	146	**2,860**	360	<2.71	360	**4,180**
	MW-119	07/17/2019	N	623	**443**	**2.79**	288	0.308	1.71	243	**2,570**	319	<2.71	319	**3,980**
Downgradient	MW-142	07/12/2019	N	633	**380**	**2.22**	311	0.159	1.74	195	**2,610**	334	<2.71	334	**4,580**
	MW-143	07/12/2019	N	583	**264**	1.54	430	0.098 J	1.78	233	**3,170**	328	<2.71	328	**4,870**
South RO Field															
Upgradient	MW-29	07/17/2019	N	578	**383**	**2.00**	446	<0.985	2.48	384	**3,300**	503	<2.71	503	**4,820**
	MW-40	07/17/2019	N	588	87.7	**1.93**	205	<1.97	2.54	104	**1,730**	309	<2.71	309	**2,580**
	MW-56	07/17/2019	N	525	**273**	1.20	268	<0.0197	2.21	184	**2,180**	375	<2.71	375	**3,430**
In Field	MW-114	07/17/2019	N	604	219	**2.10**	239	0.375	3.08	137	**2,320**	377	<2.71	377	**3,000**
	MW-115	07/17/2019	N	477	**254**	**2.33**	451	<0.0197	0.765 J	217	**2,940**	410	<2.71	410	**4,510**
	MW-116	07/17/2019	N	576	**265**	**2.01**	289	0.371	2.1	189	**2,550**	341	<2.71	341	**3,700**
	MW-116 (DUP)	07/17/2019	FD	570	**266**	**2.00**	289	0.35	2.01	189	**2,570**	346	<2.71	346	**3,490**
Downgradient	MW-125	07/17/2019	N	557	**298**	1.26	392	0.587	1.67	231	**2,750**	407	<2.71	407	**4,380**
	MW-144	07/11/2019	N	787	222	**2.57**	220	0.29	2.36	137	**2,360**	344	<2.71	344	**3,740**
	RW-18A	07/17/2019	N	521	247	**2.10**	375	0.256	0.884 J	126	**3,090**	293	<2.71	293	**4,150**

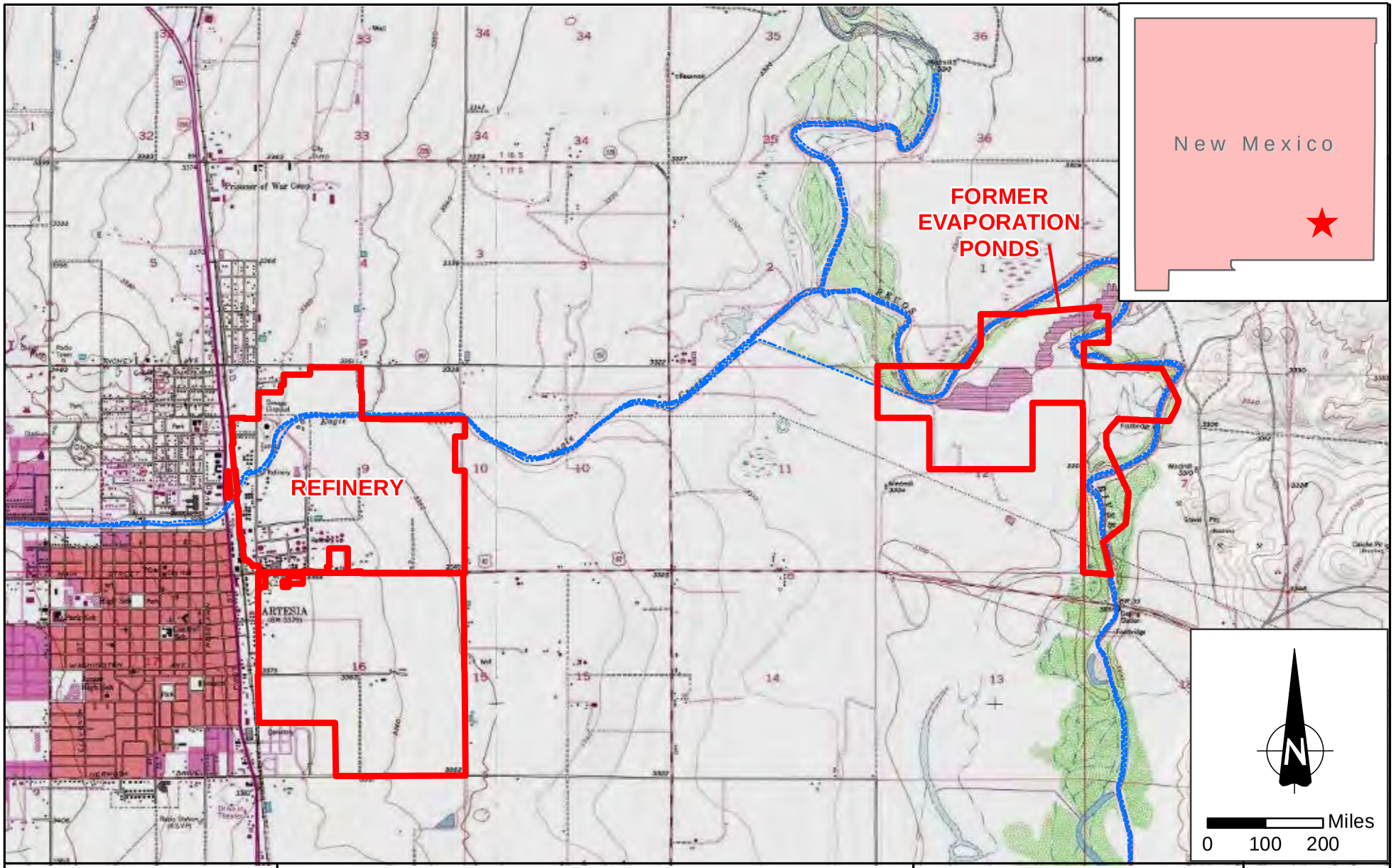
Notes and Abbreviations

"--"	CGWSL not available for this analyte
X	Reported concentration equal to X was above the CGWSL
<X	Analyte was not detected at reporting limit equal to X. If italicized, reporting limit is greater than CGWSL.
CGWSL	Critical Groundwater Screening Level
CGWSL Source	Critical Groundwater Screening Level Source
EPA	United States Environmental Protection Agency
EPA MCL	EPA Maximum Contaminant Level
FD	Field Duplcate
mg/L	milligrams per Liter
N	Normal
NMAC	New Mexico Administrative Code
WQCC	New Mexico Water Quality Control Commission
WQCC Dom	Groundwater standard for domestic exposure from 20.6.2.3103.B NMAC
WQCC HH	Groundwater standard for human health exposure from 20.6.2.3103.A NMAC

Lab Footnotes

J	Reported value is an estimate.

FIGURES



HOLLYFRONTIER

wood.

Legend

Property Boundary

Water Way

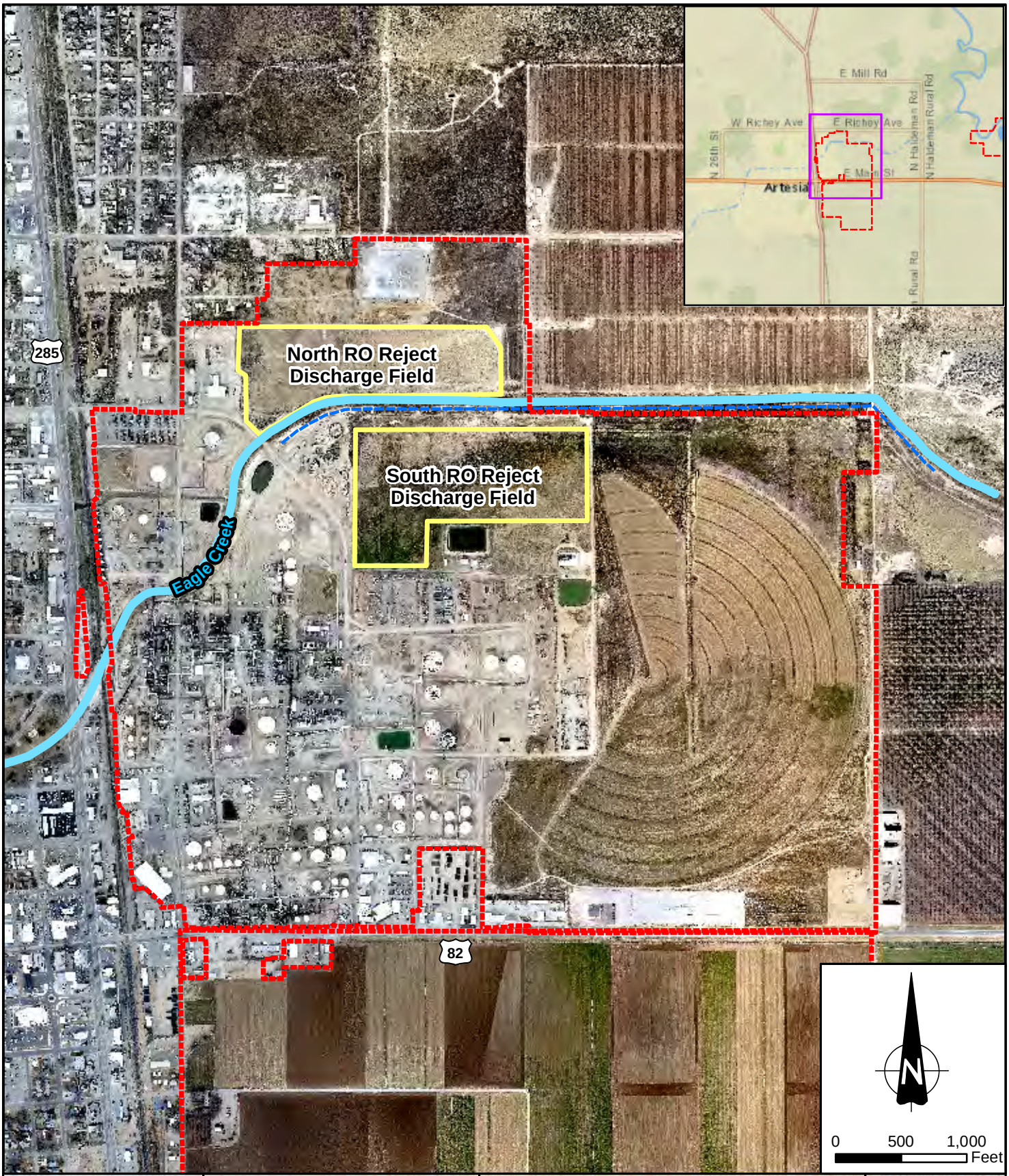
HollyFrontier Navajo Refining LLC
RO Reject Discharge Fields
Stage 1 Abatement

Site Location Map

DATE	MARCH 2019
SCALE	1 " = 3,500 '
PROJECT NO.	6703180022
FIGURE	1

DRAWN BY: LK CHECKED BY: JKH

X:\Client\HollyFrontier\Navajo\6703180022 - Abatement WP RO Reject Discharge Field\MXD\1.SiteLocationMap.mxd - casey.richards - 3/19/2019 - 3:19:35 PM



HollyFrontier

wood.

Property Boundary

Three-Mile Ditch

RO Reject Discharge Field Boundary

HollyFrontier Navajo Refining LLC
RO Reject Discharge Fields
Stage 1 Abatement

RO Reject Discharge Field Locations

DATE: MARCH 2019

SCALE: 1 " = 1,000 feet

PROJECT NO.: 6703180022

FIGURE: 2

DRAWN BY: SD CHECKED BY: JHK

X:\Client\HollyFrontier\Navajo\6703180022 - Abatement WP RO Reject Discharge Field\MXD\2.ROReject FieldLocations.mxd - casey.richards - 3/21/2019 - 2:40:43 PM

MP1
MW-142
MW-141
MW-119
MW-118
MW-143
MP2
MP3
MP4
MW-140
THREE-MILE DITCH
MW-117
MW-56
MW-144
MW-55
MW-115
MP5
MW-116
RW-18A
MP6
MW-29
MW-40
MP7
MW-125
MP8
MW-114

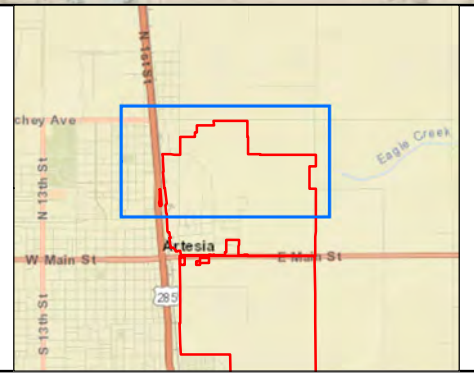
DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160022
Path: X:\Client\HollyFrontier\Navajo\6703180022 - Abatement WP\RO Reject Discharge Field\MXD\Fig X RO Field Overview.mxd 8/26/2019, 3:20:45 PM

Legend

- Property Boundary
- South RO Reject Discharge Field
- North RO Reject Discharge Field
- 07/2019 Moisture Probe
- 07/2019 Installed Monitoring Well
- Former Discharge Point
- Existing Monitoring Well

0 500 1,000 Feet

GRAPHIC SCALE



HollyFrontier Navajo Refining LLC
Artesia, New Mexico

RO Reject Discharge Fields
Stage 1 Abatement
Monitoring Well & Soil Moisture Probe Locations

Prepared By: RB	
Date Prepared: 8/26/2019	
Project Number: 6703180022	

wood.

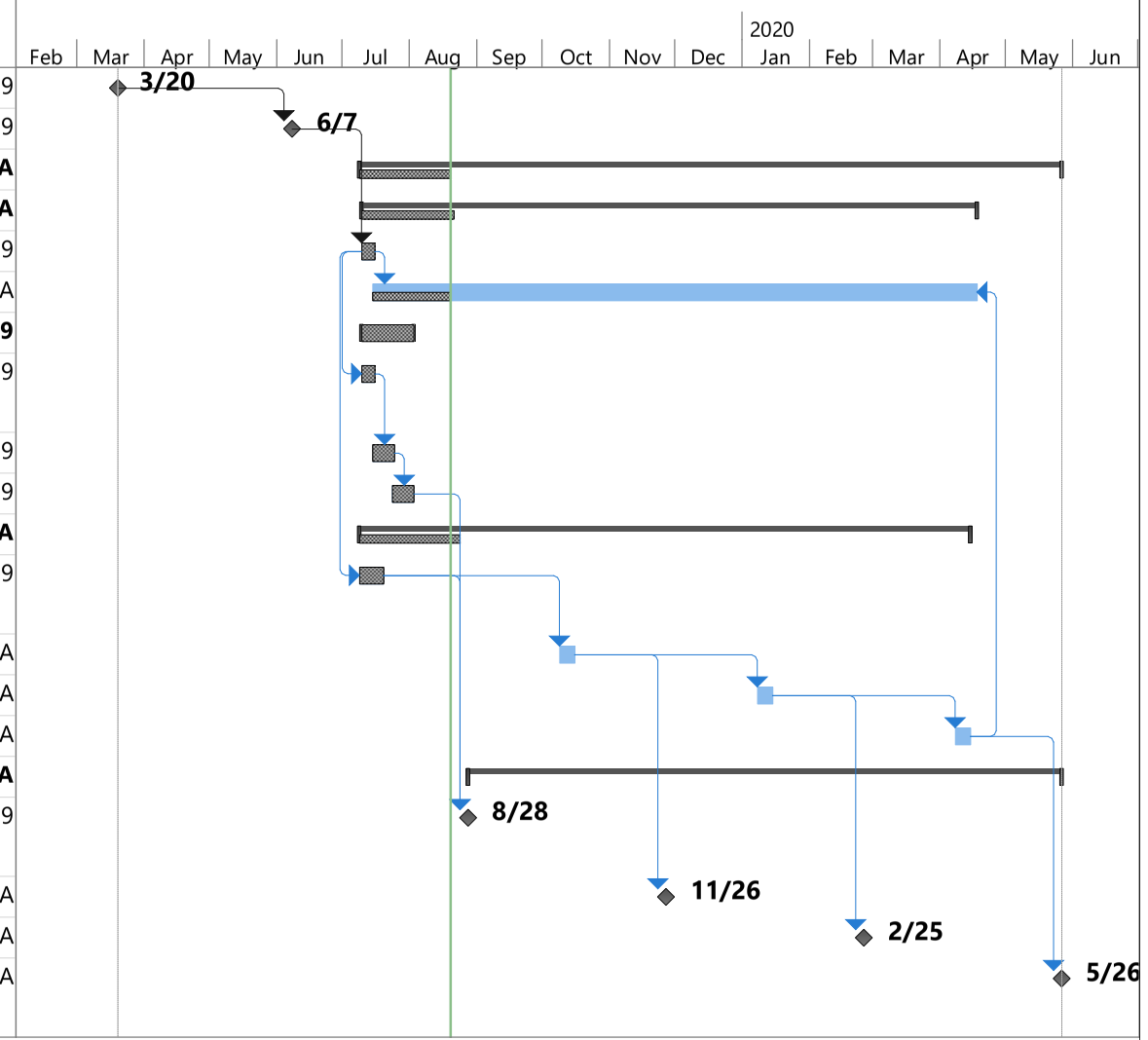
FIGURE 3

Figure 4 - Implementation Schedule

HollyFrontier Navajo Refining LLC

RO Reject Discharge Fields Stage 1 Abatement

ID	% Compl	Task Name	Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish
1	100%	Stage 1 AP Submitted to OCD	0 days	Wed 3/20/19	Wed 3/20/19	Wed 3/20/19	Wed 3/20/19
2	100%	OCD Approval of Stage 1 AP (projected)	0 days	Fri 6/7/19	Fri 6/7/19	Fri 6/7/19	Fri 6/7/19
3	**24%**	**Implement Stage 1 AP**	**231 days**	**Mon 7/8/19**	**Fri 5/22/20**	**Tue 7/9/19**	**NA**
4	**15%**	**Soil Moisture Evaluation**	**203 days**	**Mon 7/8/19**	**Fri 4/17/20**	**Wed 7/10/19**	**NA**
5	100%	Install Soil Moisture Probes	4 days	Mon 7/8/19	Tue 7/9/19	Wed 7/10/19	Mon 7/15/19
6	13%	Monitor Soil Moisture Throughout Stage 1 AP	10 mons	Mon 7/15/19	Fri 4/17/20	Mon 7/15/19	NA
7	**100%**	**Soil Evaluation**	**18 days**	**Mon 7/8/19**	**Tue 8/6/19**	**Wed 7/10/19**	**Fri 8/2/19**
8	100%	Collect Soil Samples (during moisture probe installation)	4 days	Mon 7/8/19	Tue 7/9/19	Wed 7/10/19	Mon 7/15/19
9	100%	Laboratory Analyses of Soil Samples	8 days	Wed 7/10/19	Tue 7/16/19	Mon 7/15/19	Wed 7/24/19
10	100%	Summarize Soil Data for Progress Report	8 days	Wed 7/24/19	Tue 8/6/19	Wed 7/24/19	Fri 8/2/19
11	**38%**	**Groundwater Monitoring**	**201 days**	**Mon 7/8/19**	**Fri 4/10/20**	**Tue 7/9/19**	**NA**
12	100%	Install Additional Monitoring Wells, Collect Initial GW Samples for Stage 1 AP Parameters (Q1)	9 days	Mon 7/8/19	Wed 7/17/19	Tue 7/9/19	Fri 7/19/19
13	0%	Collect GW Samples (Q2)	5 days	Mon 10/7/19	Fri 10/11/19	NA	NA
14	0%	Collect GW Samples (Q3)	5 days	Mon 1/6/20	Fri 1/10/20	NA	NA
15	0%	Collect GW Samples (Q4)	5 days	Mon 4/6/20	Fri 4/10/20	NA	NA
16	**0%**	**Report Submittal Dates**	**195 days**	**Wed 8/28/19**	**Fri 5/22/20**	**Wed 8/28/19**	**NA**
17	100%	Progress Report 1 (soil moisture, boring and well installation summary, soil and Q1 groundwater results)	0 days	Wed 8/28/19	Wed 8/28/19	Wed 8/28/19	Wed 8/28/19
18	0%	Progress Report 2 (Q2 GW and moisture data)	0 days	Fri 11/22/19	Fri 11/22/19	NA	NA
19	0%	Progress Report 3 (Q3 GW and moisture data)	0 days	Fri 2/21/20	Fri 2/21/20	NA	NA
20	0%	Final Report (Q4 GW, overall summary and recommendations)	0 days	Fri 5/22/20	Fri 5/22/20	NA	NA



Schedule Updated August 2019

Task | Milestone | Summary | Progress | Completed

APPENDIX A

BORING LOGS, DRILLING PERMITS, and WELL COMPLETION LOGS

SOIL MOISTURE PROBE BORING LOGS

MP-1

wood.

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/10/19 **COMPLETED** 7/10/19
GROUND ELEVATION 3355.16 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 674987.9 Easting: 523841.6
				(CL) Brown Loamy Top Soil, Loose, Dry	PID = 0	
	MP-1 (2')	CL				Moisture Probe @ 2'
				3.0 3352.2	PID = 0	
				(CL) Light Greyish Brown Silty CLAY, Loose, Dry, CaCO3 material		
5	MP-1 (5')	CL			PID = 0	Moisture Probe @ 5'
				6.0 3349.2		
				(CL) Olive Sandy CLAY, Soft, Moist	PID = 0	
		CL				
					PID = 0	
10	MP-1 (10')			10.0 3345.2		Moisture Probe @ 10'

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 14:12 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-1.GPJ

MP-2

wood.

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/11/19 **COMPLETED** 7/11/19
GROUND ELEVATION 3358.38 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 674797.6 Easting: 523405.8
	MP-2 (2')	CL		(CL) Brown Clayey Top Soil, Very Loose, Dry/Moist	PID = 1.7	Moisture Probe @ 2'
				4.0 3354.4		
5	MP-2 (5')	ML		(ML) Light Brown Sandy Silt, Very Loose, Dry	PID = 0.7	Moisture Probe @ 5'
				7.0 3351.4		
		CL		(CL) Light Brown/Grey Sandy CLAY, Moist, Soft, CaCO3 nodues	PID = 0.2	
10	MP-2 (10')			10.0 3348.4		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 14:41 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-2.GPJ

MP-3

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/11/19 **COMPLETED** 7/11/19
GROUND ELEVATION 3352.91 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 674779.8 Easting: 524584.4
	MP-3 (2')	ML		(ML) Brown Silty Top Soil, Dry, Very Loose, Fine Sand	PID = 1.2	Moisture Probe @ 2'
				4.0 3348.9		
5	MP-3 (5')	CL		(CL) Brown Sandy CLAY, Very Soft, Moist	PID = 0.6	Moisture Probe @ 5'
				8.0 3344.9		
		CL		(CL) Greyish Brown Sandy CLAY, Very Soft, Moist	PID = 0.1	
10	MP-3 (10')			10.0 3342.9		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 14:56 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-3.GPJ

MP-4

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/12/19 **COMPLETED** 7/12/19
GROUND ELEVATION 3360.14 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 674309.8 Easting: 522961.4
	MP-4 (2')	ML		(ML) Olive Silty Top Soil, Very Loose, Dry, CaCO3 nodules	PID = 1.8	Moisture Probe @ 2'
4.0				3356.1		
5	MP-4 (5')	ML		(ML) Light Olive Sandy SILT, Dry, Very Loose	PID = 0.8	Moisture Probe @ 5'
6.0				3354.1		
		CL		(CL) Light Brown/Grey Sandy CLAY, Soft, Moist, CaCO3 nodules	PID = 1.3	
10	MP-4 (10')					
10.0				3350.1		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 15:39 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-4.GPJ

MP-5

wood.

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/12/19 **COMPLETED** 7/12/19
GROUND ELEVATION 3351.2 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 673967.7 Easting: 525286.2
	MP-5 (2')	CL		(CL) Brown Clayey Top Soil, Dry/Moist, Firm	PID = 2.8	Moisture Probe @ 2'
				4.0 3347.2		
5	MP-5 (5')	CL		(CL) Brown Sandy CLAY, Moist, Soft	PID = 4.6	Moisture Probe @ 5'
				6.0 3345.2		
		CL		(CL) Greyish Brown Sandy CLAY, Moist, Soft	PID = 5.5	
10	MP-5 (10')			10.0 3341.2		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 15:48 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-5.GPJ

MP-6

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/12/19 **COMPLETED** 7/12/19
GROUND ELEVATION 3352.92 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 673728.3 Easting: 525032.6
		CL		(CL) Brown Clayey Top Soil, Firm, Dry	PID = 6.6	
	MP-6 (2')					Moisture Probe @ 2'
				4.0 3348.9		
5	MP-6 (5')	CL		(CL) Brown Sandy CLAY, Dry, Firm	PID = 5.7	Moisture Probe @ 5'
				6.0 3346.9		
		CL		(CL) Greyish Brown Sandy CLAY, Soft, Moist	PID = 4.9	
10	MP-6 (10')			10.0 3342.9		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 15:55 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-6.GPJ

MP-7

wood.

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/12/19 **COMPLETED** 7/12/19
GROUND ELEVATION 3358.6 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 673076.9 Easting: 523874.2
	MP-7 (2')	CL		(CL) Brown Clayey Top Soil, Firm, Dry/Moist	PID = 2.1	Moisture Probe @ 2'
				4.0 3354.6		
5	MP-7 (5')	CL		(CL) Brown Sandy CLAY, Firm, Moist, Trace CaCO3 nodules	PID = 3	Moisture Probe @ 5'
				7.0 3351.6		
		CL		(CL) Pinkish Brown Sandy Clay, Soft, Moist, CaCO3 nodules	PID = 2.3	
10	MP-7 (10')			10.0 3348.6		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 16:07 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-7.GPJ

MP-8

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Field
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/12/19 **COMPLETED** 7/12/19
GROUND ELEVATION 3354.53 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES Soil Moisture Probe Boring
AFTER DRILLING ---

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million	REMARKS
0						Northing: 673254.1 Easting: 524908.6
		CL		(CL) Brown Sandy CLAY, Firm, Dry/Moist, Trace CaCO3 nodules	PID = 7	
	MP-8 (2')					Moisture Probe @ 2'
5	MP-8 (5')				PID = 8.3	Moisture Probe @ 5'
				7.0 3347.5		
		CL		(CL) Greyish Brown Sandy CLAY, Soft, Moist	PID = 3.2	
10	MP-8 (10')			10.0 3344.5		

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 16:16 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HF NAVAJO\RO FIELDS\MP-8.GPJ

wood.

Wood Environment & Infrastructure Solutions, Inc.

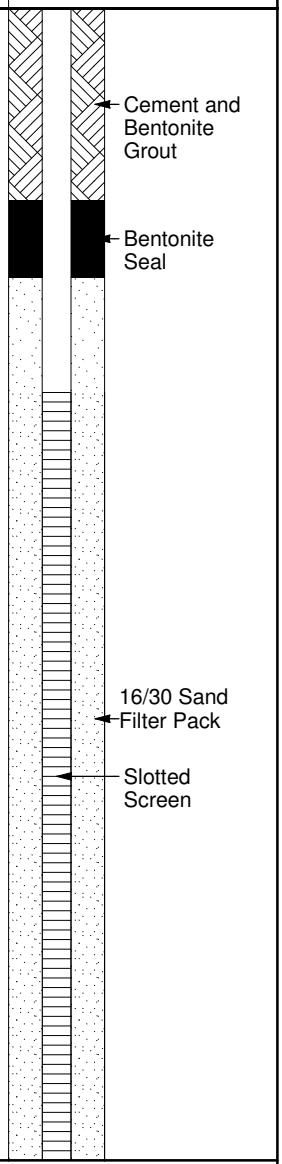
CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/10/19 **COMPLETED** 7/10/19
GROUND ELEVATION 3361.37 ft **HOLE SIZE** 8.5 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES 4'x4'x4" Concrete Flush-Mount Surface Completion
2hrs AFTER DRILLING 9.86 ft / Elev 3351.51 ft

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) Measurements parts per million
0					
	N/A	CL		(CL) Olive Brown Sandy CLAY with pea-sized gravel, dry, medium dense	PID = 0
5				5.0 3356.4	
		ML		(ML) Light Greyish Brown Sandy SILT with clay, dry, very hard, Iron and Manganese staining, trace pea-sized pebbles & CaCO3 nodules. Gypsum observed.	PID = 0
10				▼	PID = 0
				14.0 3347.4	
15		ML		15.0 (ML) White / Light Grey Sandy SILT w/ clay, soft, moist 3346.4	
		ML		(ML) Same as above with thin pebble beds, wet	PID = 0
				17.0 3344.4	
		ML		18.0 (ML) Same as above, hard, dry, CaCO3 material, no pebbles 3343.4	
		CL		(CL) Reddish Brown Sandy CLAY, firm, moist	
20				20.0 3341.4	
		CL		(CL) Olive Brown Sandy CLAY, soft, wet pea-sized gravel	PID = 0
				23.0 3338.4	
		CL		(CL) Reddish Brown Sandy CLAY, firm, moist	
25				26.0 3335.4	PID = 0
		SC		(SC) Reddish Brown Clayey SAND, fine grained, saturated, loose	
				28.0 3333.4	
		CL		(CL) Reddish Brown Sandy CLAY, firm, moist	
30				30.0 3331.4	

Bottom of borehole at 30.0 feet.

WELL DIAGRAM

Casing Top Elev: 3361.23 (ft)
Northing: 674324.9
Easting: 522721.5
Casing Type: 2" PVC



GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/25/19 15:09 - \\HOU4-FS4\DEPTDATA\CLIENT\HOLLYFRONTIER\ARTESIANM\6703180022 - ABATEMT WK PLAN FOR RO REJECT DISCHARGE FIELD\9.0 DRAFT REPORTS\1ST QUARTERLY REPORT

OFFICE OF THE STATE ENGINEER FORMS

John R. D Antonio, Jr., P.E.
State Engineer

Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER

Trn Nbr: 654131
File Nbr: RA 12753 POD2-6

Jul. 05, 2019

ROBERT COMBS
HOLLYFRONTIER NAVAJO REFINING
501 EAST MAIN STREET
ARTESIA, NM 88210

Greetings:

Your approved copy of the above numbered permit to drill a well for non-consumptive purposes is enclosed. You must obtain an additional permit if you intend to use the water. It is your responsibility to provide the contracted well driller with a copy of the permit that must be made available during well drilling activities.

Carefully review the attached conditions of approval for all specific permit requirements.

* If use of this well is temporary in nature and the well will be plugged at the end of the well usage, the OSE must initially approve of the plugging. If plugging approval is not conditioned in this permit, the applicant must submit a Plugging Plan of Operations for approval prior to the well being plugged. The Plugging Record must be properly completed and submitted to the OSE within 30 days of the well plugging.

* If the final intended purpose and condition requires a well ID tag and meter installation, the applicant must immediately send a completed meter report form to this office.

* The well record and log must be submitted within 30 days of the completion of the well or if the attempt was a dry hole.

* This permit expires and will be cancelled if no well is drilled and/or a well log is not received by the date set forth in the conditions of approval.

Appropriate forms can be downloaded from the OSE website www.ose.state.nm.us.

Sincerely,

Tim Williams
(575)622-6521

Enclosure

explore

File No. RA-12753 POD2-6

NEW MEXICO OFFICE OF THE STATE ENGINEER

WR-07 APPLICATION FOR PERMIT TO DRILL

A WELL WITH NO WATER RIGHT

(check applicable box):

For fees, see State Engineer website: http://www.ose.state.nm.us/

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:36

Purpose:	☐	Pollution Control And/Or Recovery	☐	Ground Source Heat Pump
☐ Exploratory Well (Pump test)	☐	Construction Site/Public Works Dewatering	☐	Other(Describe):
☒ Monitoring Well	☐	Mine Dewatering		

A separate permit will be required to apply water to beneficial use regardless if use is consumptive or nonconsumptive.

☒ Temporary Request - Requested Start Date: 6/24/2019 Requested End Date: 7/31/2019

Plugging Plan of Operations Submitted? ☒ Yes ☐ No

1. APPLICANT(S)

Name: HollyFrontier Navajo Refining LLC	Name: HollyFrontier Navajo Refining LLC
Contact or Agent: check here if Agent ☐ Scott Denton	Contact or Agent: check here if Agent ☐ Robert Combs
Mailing Address: 501 East Main Street	Mailing Address: 501 East Main Street
City: Artesia	City: Artesia
State: NM Zip Code: 88210	State: NM Zip Code: 88210
Phone: 575-746-5487 ☐ Home ☐ Cell Phone (Work):	Phone: 575-308-2718 ☐ Home ☒ Cell Phone (Work):
E-mail (optional): scott.denton@hollyfrontier.com	E-mail (optional): robert.combs@hollyfrontier.com

FOR OSE INTERNAL USE Application for Permit, Form WR-07, Rev 11/17/16

File No.: RA-12753 POD2-6	Trn. No.: 654131	Receipt No.: 2-40197
Trans Description (optional):		
Sub-Basin: RA	PCW/LOG Due Date: 7-31-20	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84).
District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.

☐ NM State Plane (NAD83) (Feet)
☐ NM West Zone
☐ NM East Zone
☐ NM Central Zone

☐ UTM (NAD83) (Meters)
☐ Zone 12N
☐ Zone 13N

■ Lat/Long (WGS84) (to the nearest 1/10th of second)

Well Number (If known):	X or Easting or Longitude:	Y or Northing or Latitude:	Provide if known: -Public Land Survey System (PLSS) (*Quarters or Halves , Section, Township, Range*) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
RA-12753 POD 2 MW-140	104 23' 38.17" W	32 51' 13.87" N	T17S, R26E, S9, Q1
MW-141 3	104 23' 28.70" W	32 51' 18.22" N	T17S, R26E, S9, Q1
MW-142 4	104 23' 18.35" W	32 51' 19.52" N	T17S, R26E, S9, Q1
MW-143 5	104 23' 14.45" W	32 51' 17.68" N	T17S, R26E, S9, Q1
MW-144 6	104 23' 57.04" W	32 51' 10.86" N	T17S, R26E, S9, Q2

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO 2019 JUN 21 PM 3:36

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)
Additional well descriptions are attached: ☐ **Yes** ■ **No** **If yes, how many** _____

Other description relating well to common landmarks, streets, or other:
Monitoring well to be installed at the southwest corner of the Loudon Building within the Refinery.

Well is on land owned by: HollyFrontier Navajo Refining LLC

Well Information: NOTE: If more than one (1) well needs to be described, provide attachment. Attached? ☐ **Yes** ■ **No**
If yes, how many_____

Approximate depth of well (feet): 30	Outside diameter of well casing (inches): 2
Driller Name: Tolunay Wong Engineers - Keith Barge	Driller License Number: WD-1766

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

Monitoring wells are being installed upgradient and downgradient of former reverse osmosis reject water discharge fields for groundwater characterization at the request of the OCD. These wells will be monitored quarterly for a period of at least one year.

FOR OSE INTERNAL USE — Application for Permit, Form WR-07

File No.: RA-12753 POD2-6	Trn No.: 654131

4. SPECIFIC REQUIREMENTS: The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

Exploratory: ☐ Include a description of any proposed pump test, if applicable.	**Pollution Control and/or Recovery:** ☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for the pollution control or recovery operation. ☐ The estimated maximum period of time for completion of the operation. ☐ The annual diversion amount. ☐ The annual consumptive use amount. ☐ The maximum amount of water to be diverted and injected for the duration of the operation. ☐ The method and place of discharge.	**Construction De-Watering:** ☐ Include a description of the proposed dewatering operation, ☐ The estimated duration of the operation, ☐ The maximum amount of water to be diverted, ☐ A description of the need for the dewatering operation, and, ☐ A description of how the diverted water will be disposed of.	**Mine De-Watering:** ☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for mine dewatering. ☐ The estimated maximum period of time for completion of the operation. ☐ The source(s) of the water to be diverted. ☐ The geohydrologic characteristics of the aquifer(s). ☐ The maximum amount of water to be diverted per annum. ☐ The maximum amount of water to be diverted for the duration of the operation. ☐ The quality of the water. ☐ The method of measurement of water diverted. ☐ The recharge of water to the aquifer. ☐ Description of the estimated area of hydrologic effect of the project. ☐ The method and place of discharge. ☐ An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. ☐ A description of the methods employed to estimate effects on surface water rights and underground water rights. ☐ Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: ■ Include the reason for the monitoring well, and, ■ The duration of the planned monitoring.	☐ The method of measurement of water produced and discharged. ☐ The source of water to be injected. ☐ The method of measurement of water injected. ☐ The characteristics of the aquifer. ☐ The method of determining the resulting annual consumptive use of water and depletion from any related stream system. ☐ Proof of any permit required from the New Mexico Environment Department. ☐ An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	**Ground Source Heat Pump:** ☐ Include a description of the geothermal heat exchange project, ☐ The number of boreholes for the completed project and required depths. ☐ The time frame for constructing the geothermal heat exchange project, and, ☐ The duration of the project. ☐ Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	

ACKNOWLEDGEMENT

I, We (name of applicant(s)), HollyFrontier Navajo Refining LLC
Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

Applicant Signature

Applicant Signature

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:36

ACTION OF THE STATE ENGINEER

This application is:

☒ approved ☐ partially approved ☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this 8 day of July 20 19, for the State Engineer,

John R. D'Antonio, Jr., P.E., State Engineer

By: Tim Williams
Signature Print

Title: Tim Williams, Supervisor/Pecos River Watermaster
Print

FOR OSE INTERNAL USE

Application for Permit, Form WR-07

File No.: RA-12753 POD2-6 Trn No.:

NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE

SPECIFIC CONDITIONS OF APPROVAL

17-1A Depth of the well shall not exceed the thickness of the valley fill.

17-4 No water shall be appropriated and beneficially used under this permit.

17-6 The well authorized by this permit shall be plugged completely using the following method per Rules and Regulations Governing Well Driller Licensing, Construction, Repair and Plugging of Wells; Subsection C of 19.27.4.30 NMAC unless an alternative plugging method is proposed by the well owner and approved by the State Engineer upon completion of the permitted use. All pumping appurtenance shall be removed from the well prior to plugging. To plug a well, the entire well shall be filled from the bottom upwards to ground surface using a tremie pipe. The bottom of the tremie shall remain submerged in the sealant throughout the entire sealing process; other placement methods may be acceptable and approved by the state engineer. The well shall be plugged with an office of the state engineer approved sealant for use in the plugging of non-artesian wells. The well driller shall cut the casing off at least four (4) feet below ground surface and fill the open hole with at least two vertical feet of approved sealant. The driller must fill or cover any open annulus with sealant. Once the sealant has cured, the well driller or well owner may cover the seal with soil. A Plugging Report for said well shall be filed with the Office of the State Engineer in a District Office within 30 days of completion of the plugging.

17-7 The Permittee shall utilize the highest and best technology available to ensure conservation of water to the maximum extent practical.

NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE

SPECIFIC CONDITIONS OF APPROVAL (Continued)

17-B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with 72-12-12 NMSA 1978. A licensed driller shall not be required for the construction of a well driven without the use of a drill rig, provided that the casing shall not exceed two and three-eighths (2 3/8) inches outside diameter.

17-C The well driller must file the well record with the State Engineer and the applicant within 30 days after the well is drilled or driven. It is the well owner's responsibility to ensure that the well driller files the well record.
The well driller may obtain the well record form from any District Office or the Office of the State Engineer website.

17-P The well shall be constructed, maintained, and operated to prevent inter-aquifer exchange of water and to prevent loss of hydraulic head between hydrogeologic zones.

17-Q The State Engineer retains jurisdiction over this permit.

17-R Pursuant to section 72-8-1 NMSA 1978, the permittee shall allow the State Engineer and OSE representatives entry upon private property for the performance of their respective duties, including access to the ditch or acequia to measure flow and also to the well for meter reading and water level measurement.

LOG The Point of Diversion RA 12753 POD2 must be completed and the Well Log filed on or before 07/31/2020.

LOG The Point of Diversion RA 12753 POD3 must be completed and the Well Log filed on or before 07/31/2020.

NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE

SPECIFIC CONDITIONS OF APPROVAL (Continued)

LOG The Point of Diversion RA 12753 POD4 must be completed and the Well Log filed on or before 07/31/2020.

LOG The Point of Diversion RA 12753 POD5 must be completed and the Well Log filed on or before 07/31/2020.

LOG The Point of Diversion RA 12753 POD6 must be completed and the Well Log filed on or before 07/31/2020.

IT IS THE PERMITTEES RESPONSIBILITY TO OBTAIN ALL AUTHORIZATIONS AND PERMISSIONS TO DRILL ON PROPERTY OF OTHER OWNERSHIP BEFORE COMMENCING ACTIVITIES UNDER THIS PERMIT.

SHOULD THE PERMITTEE CHANGE THE PURPOSE OF USE TO OTHER THAN MONITORING PURPOSES, AN APPLICATION SHALL BE ACQUIRED FROM THE OFFICE OF THE STATE ENGINEER.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:	Date Rcvd. Corrected:
Formal Application Rcvd: 06/21/2019	Pub. of Notice Ordered:
Date Returned - Correction:	Affidavit of Pub. Filed:

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

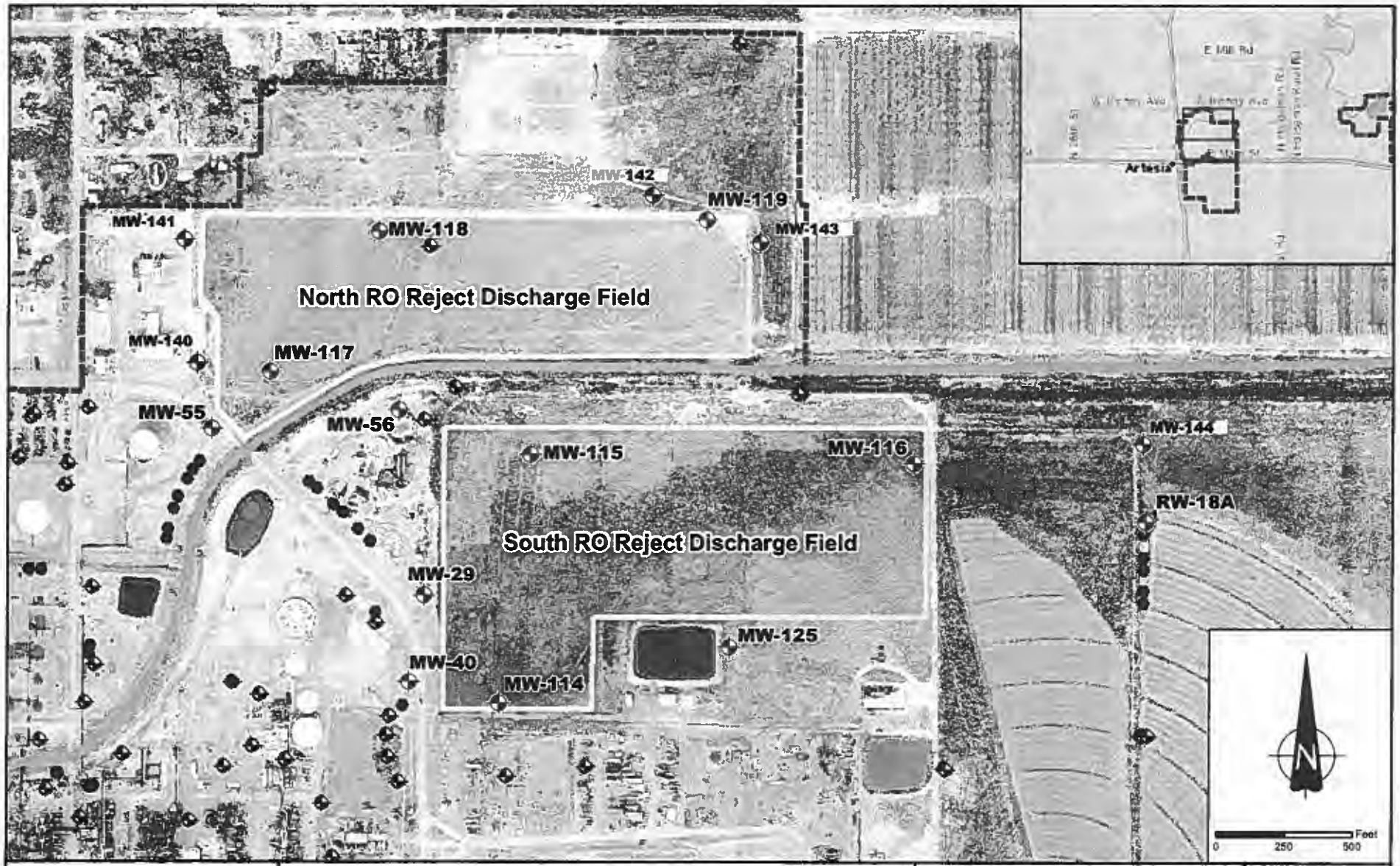
Witness my hand and seal this 8 day of Jul A.D., 2019

John R. D Antonio, Jr., P.E. , State Engineer

By: Tim Williams

Trn Desc: RA 12753 POD2-6

File Number: RA 12753
Trn Number: 654131



HOLLYFRONTIER

wood.

- Proposed Wells in Proposed Monitoring Plan
- Existing Wells in Proposed Monitoring Plan
- ABANDONED WELL
- IRRIGATION WELL
- MONITORING WELL
- RECOVERY WELL
- North RO Reject Discharge Field
- South RO Reject Discharge Field
- Property Boundary

HollyFrontier Navajo Refining LLC
RO Reject Discharge Fields
Stage 1 Abatement Plan

Proposed Groundwater Monitoring Well Locations

DATE	MARCH 2019
SCALE	1" = 500'
PROJECT NO.	6703180022
FIGURE	6

Date Start/Finish: 1/30/2013
Drilling Company: National Drilling
Drilling Method: Hollow Stem Auger

Sampling Method: Split Spoon
Rig Type: CME 85

Northing: 673966.06
Easting: 525339.63
Casing Elevation: 3353.77

Borehole Depth: 25' bgs
Surface Elevation: 3350.99

Descriptions By: Ben McKenna

Well/Boring ID: MW-116

Client: Navajo Refining Company

Location: Navajo Refinery
Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0								Stick-up (3" ags)
								SILTY CLAY (0,0,20,80), dark reddish brown (2.5YR2/3), loose, dry, low plasticity, no odor, trace organics	
		1	HA	5				Silty Clay (0,0,35,65), light reddish brown (3.5YR6/4), damp, soft, high plasticity, no odor	2" OD PVC Casing
5	-5							Silty Clay (0,0,40,60), pink (7.5YR8/1), soft, moist, low-medium plasticity, no odor	PVC Riser (0'-10' bgs)
								No Recovery	Bentonite Seal (4'-8' bgs)
		2	HA	3.5				GRAVELLY CLAY (35, 0, 10, 55), pink (7.5YR8/4), moist, loose, no plasticity, caliche gravels 0.5-6 cm, no odor	
					0.4				
10	-10							Gravelly Clay (45,0,0,55), caliche cobbles 1-8 cm	
		3	SS	5	0.4				
					0.6			Clayey Gravels (65,0,0,35), black (10YR2/1), wet, loose, poorly sorted, angular to subangular, no odor	
								SILTY CLAY (0,0,10,90), light reddish brown (5YR6/4), stiff, dry, low-medium plasticity, pink mottling	
15	-15							Silty Clay (5,0,15,80), reddish brown (5YR4/4), firm, dry, medium plasticity, no odor, trace gravels 0.5-3 centimeters	20/40 Silica Sand Pack (8'-25' bgs)
		4	SS	5	0.8				2" OD 0.010" Slot Screen (10'-25' bgs)
20	-20							Silty Clay (0,0,10,90), light reddish brown (5YR6/4), stiff, dry, low plasticity, pink mottling, no odor	
		5	SS	5	0.2			Silty Clay (0,0,40,60), light reddish brown (5YR6/3), soft, damp, low-medium plasticity, no odor	
25	-25				0.3			Silty Clay (0,0,20,80), pinkish gray (7.5YR7/2), dry, firm, med-high plasticity, no odor, brown mottling	

STATE OFFICE
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ARCADIS

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 1/30/2013 **Drilling Company:** National Drilling **Drilling Method:** Hollow Stem Auger **Sampling Method:** Split Spoon **Rig Type:** CME 85	**Northing:** 673966.06 **Easting:** 525339.63 **Casing Elevation:** 3353.77 **Borehole Depth:** 25' bgs **Surface Elevation:** 3350.99 **Descriptions By:** Ben McKenna	**Well/Boring ID:** MW-116 **Client:** Navajo Refining Company **Location:** Navajo Refinery Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
25	-25								

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 1/31/2013
Drilling Company: National Drilling
Drilling Method: Hollow Stem Auger

Sampling Method: Split Spoon
Rig Type: CME 85

Northing: 674301.52
Easting: 522979.73
Casing Elevation: 3363.01

Borehole Depth: 25' bgs
Surface Elevation: 3360.07

Descriptions By: Eric Bergersen

Well/Boring ID: MW-117

Client: Navajo Refining Company

Location: Navajo Refinery
Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0								Stick-up (3" ags)
					0.6			CLAY (0,0,0,100), dark brown (10YR3/3), moist, soft, high plasticity, no odor, trace organics	
		1	HA	5	0.4			SILTY CLAY (0,0,70,30), very pale brown (10YR7/4), very moist, soft, no plasticity, no odor	2" OD PVC Casing
5	-5				0.1			Silty Clay with gravel (5,0,70,25), very pale brown (10YR 8/2), wet, no plasticity, no odor, orange mottling	PVC Riser (0'-10' bgs)
									Bentonite Seal (4'-8' bgs)
		2	HA	5					
					0			Silty Clay (0,0,90,10), light gray (10YR 7/2), moist, no plasticity, no odor	
10	-10								
								Silty Clay (0,0,40,60), reddish brown (5YR5/4) moist, no plasticity, no odor	
		3	SS	5				Silty Clay with caliche (0,0,70,30), brown (7.5YR 5/2), moist, no plasticity, no odor	
15	-15								
								Silty Clay (0,0,50,50), light reddish brown (5YR 6/4), moist, medium plasticity, no odor	
		4	SS	5				Silty Clay (0,0,65,35), light brownish gray (10YR 6/2), slightly moist, no plasticity, no odor, light brown mottling	20/40 Silica Sand Pack (8'-25' bgs)
									2" OD 0.010" Slot Screen (10'-25' bgs)
20	-20							GRAVELY CLAY (50,0,10,40), light brownish gray (10YR 6/2), moist, no plasticity, no odor, angular to subrounded 1-2 cm	
								SILTY CLAY (0,0,90,10), light gray (10YR 7/2), saturated, no plasticity, no odor, very soft	
		5	SS	5				Silty Clay (0,0,10,90), light reddish brown (5YR 6/3), very stiff, medium plasticity, no odor, moist	
25	-25								

STATE ENGINEER OFFICE
ROSWELL, NM
2019 JUN 21 P 3:35

ARCADIS

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 1/31/2013 **Drilling Company:** National Drilling **Drilling Method:** Hollow Stem Auger **Sampling Method:** Split Spoon **Rig Type:** CME 85	**Northing:** 674301.52 **Easting:** 522979.73 **Casing Elevation:** 3363.01 **Borehole Depth:** 25' bgs **Surface Elevation:** 3360.07 **Descriptions By:** Eric Bergersen	**Well/Boring ID:** MW-117 **Client:** Navajo Refining Company **Location:** Navajo Refinery Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
25	-25								

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 2/4/2013
Drilling Company: National Drilling
Drilling Method: Hollow Stem Auger

Sampling Method: Split Spoon
Rig Type: CME 85

Northing: 674819.18
Easting: 523375.94
Casing Elevation: 3361.95

Borehole Depth: 25' bgs
Surface Elevation: 3359.62

Descriptions By: Ben McKenna

Well/Boring ID: **MW-118**

Client: Navajo Refining Company

Location: Navajo Refinery
Artesia, New Mexico

DEPTH ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0							SILTY CLAY (0,0,30,70), dark brown (7.5YR 3/4), medium plasticity, moist, no odor	Stick-up (3" ags)
	1	HA	5					2" OD PVC Casing
-5							Silty Clay with trace caliche (0,0,65,35), brown (7.5YR5/4), saturated, loose, no plasticity, no odor	PVC Riser (0'-10' bgs)
	2	HA	5					Bentonite Seal (4'-8' bgs)
-10				0			Silty Clay (0,0,20,80), white (5YR 8/1), firm, moist, medium plasticity	
	3	SS	5	0 0 0 0 0			Silty Clay (0,0,40,60) light reddish brown (5YR 6/3), loose, damp, no plasticity, no odor, trace caliche gravels	
-15				0			Silty Clay (0,0,10,90), reddish yellow (5YR 6/6), dry, stiff, no plasticity, no odor	
	4	SS	5	0 0 0 0 0			Silty Clay (0,0,30,70), reddish brown (5YR 4/4), moist, firm, low-medium plasticity, no odor	20/40 Silica Sand Pack (8'-25' bgs)
-20				0			Silty Clay with gravels (5,0,5,90), reddish yellow (5YR 6/6), dry stiff, no plastiicty, no odor, caliche 0.5-3 cm	2" OD 0.010" Slot Screen (10'-25' bgs)
	5	SS	5	0 0 0 0 0			Silty Clay with gravels (5,0,10,85), yellowish red (5YR 5/6), stiff, dry, no plasticity, no odor, gravels subangular 0.5-3 cm	
-25							SILTY SAND (0,60,40,0), yellowish red (5YR 5/6), loose, damp, poorly sorted, fine grained, no odor	

STATE OF NEW MEXICO
ROSWELL, NEW MEXICO
2013 JUN 25 AM 8:35

ARCADIS

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 2/4/2013 **Drilling Company:** National Drilling **Drilling Method:** Hollow Stem Auger **Sampling Method:** Split Spoon **Rig Type:** CME 85	**Northing:** 674819.18 **Easting:** 523375.94 **Casing Elevation:** 3361.95 **Borehole Depth:** 25' bgs **Surface Elevation:** 3359.62 **Descriptions By:** Ben McKenna	**Well/Boring ID: MW-118** **Client:** Navajo Refining Company **Location:** Navajo Refinery Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
25	25								

Remarks: bgs = below ground surface; amsl = above mean sea level, HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 2/4/2013
Drilling Company: National Drilling
Drilling Method: Hollow Stem Auger

Sampling Method: Split Spoon
Rig Type: CME 85

Northing: 674860.11
Easting: 524575.80
Casing Elevation: 3356.11

Borehole Depth: 25' bgs
Surface Elevation: 3353.83

Descriptions By: Ben McKenna

Well/Boring ID: MW-119

Client: Navajo Refining Company

Location: Navajo Refinery
Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0							SILTY CLAY (0,0,30,70), pink (7.5YR 5/4), wet, no plasticity, no odor	Stick-up (3" ags)
		1	HA	5					2" OD PVC Casing
5	-5								PVC Riser (0'-10' bgs)
		2	HA	5				Silty Clay (0,0,80,20), pink (7.5YR 7/4), loose, wet, no plasticity, no odor	Bentonite Seal (4'-8' bgs)
10	-10				0				
		3	SS	5	0			Silty Clay (0,0,15,85), light reddish brown (5YR6/4), firm, moist, med-high plasticity, no odor	
					0			Silty Clay (0,0,40,60), reddish brown (5YR 4/4), loose, dry, no plasticity, no odor	
15	-15				0			Silty Clay (0,0,20,80), dark reddish brown (5YR3/4), firm, moist, medium plasticity, no odor	20/40 Silica Sand Pack (8'-25' bgs)
		4	SS	5	0				2" OD 0.010" Slot Screen (10'-25' bgs)
					0			Silty Clay (0,0,35,65), reddish brown (5YR4/4), firm, moist, low plasticity, no odor	
20	-20				0			Silty Clay (0,0,20,80), dark reddish brown (5YR4/4), stiff, low plasticity, moist, no odor	
		5	SS	5	0			Silty Clay (0,0,40,60), light reddish brown (5YR6/4), moist, loose, medium plasticity, no odor	
					0				
25	-25				0			CLAY (0,0,0,100), light reddish brown (5YR 6/4), dry, very stiff, low plasticity, no odor, white mottling	

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2010 JUN 21 P 3:35

ARCADIS

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

Date Start/Finish: 2/4/2013 **Drilling Company:** National Drilling **Drilling Method:** Hollow Stem Auger **Sampling Method:** Split Spoon **Rig Type:** CME 85	**Northing:** 674860.11 **Easting:** 524575.80 **Casing Elevation:** 3356.11 **Borehole Depth:** 25' bgs **Surface Elevation:** 3353.83 **Descriptions By:** Ben McKenna	**Well/Boring ID:** MW-119 **Client:** Navajo Refining Company **Location:** Navajo Refinery Artesia, New Mexico

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description	Well/Boring Construction
25	-23								

Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon, ags = above ground surface

Lithology is described as percentage of (Gravel, Sand, Silt, Clay)

HOLLYFRONTIER.

June 21, 2019

New Mexico Office of the State Engineer
Water Rights District 2
1900 West Second Street
Roswell, NM 88201

Hand Delivered

Re: **Monitor Well Permit Forms Submittal**

Water Rights Office:

HollyFrontier Navajo Refining LLC (HFNR) has been requested to perform additional groundwater investigation as part of corrective actions programs for the refinery by the New Mexico Environment Department, Hazardous Waste Bureau (HWB) and Energy Minerals and Natural Resources Department, Oil Conservation Division (OCD). Attached are well permits for six new monitoring wells associated with those investigations, one adjacent to the Loudon Building (MW-139, attached Figures 1 and 4) and five adjacent to the former reverse osmosis reject discharge fields (MW-140 to MW-144, attached Figure 6). Also attached are plugging plans in the event that conditions are encountered that prevent the completion of these wells. HFNR has scheduled the well installation work to begin the week of July 8, 2019, upon OSE approval, in order to meet the requested investigation schedule.

If you have any questions or comments regarding this request, please feel free to contact me at 575-746-5382 or Scott Denton at 575-746-5487.

Sincerely,

Robert Combs
Environmental Specialist
HollyFrontier Navajo Refining LLC

c: HollyFrontier: S. Denton, A. Sahba, J. Leik

2019 JUN 27 PM 3:32
STATE ENGR
ROSWELL, NEW MEXICO

WELL PLUGGING PLAN OF OPERATIONS

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO 2021 JUN 21 PM 2 40

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: ~~TBD~~ RA-12753 POD6

Name of well owner: HollyFrontier Navajo Refining LLC MW-144

Mailing address: 501 East Main Street

City: Artesia State: NM Zip code: 88210

Phone number: 575-746-5487 E-mail: scott.denton@hollyfrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Tolunay Wong Engineers

New Mexico Well Driller License No.: WD-1766 Expiration Date: 12/6/2020

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

1) GPS Well Location: Latitude: 32 deg, 51 min, 10.86 sec
Longitude: 104 deg, 23 min, 57.04 sec, WGS84
☐ Check if seconds are decimal format

2) Reason(s) for plugging well:

A new monitoring is scheduled to be installed at this location. The well will only be plugged if it cannot be completed as planned, or at some point in the future when OCD no longer requires groundwater monitoring at this location.

3) Was well used for any type of monitoring program? No If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Based on nearby existing monitoring wells, groundwater is expected to have elevated concentrations of TDS and chloride.

5) Static water level: 15 feet below land surface / feet above land surface (circle one)

6) Depth of the well: 30 feet

7) Inside diameter of innermost casing: 2 inches.

8) Casing material: PVC

9) The well was constructed with:

☐ an open-hole production interval, state the open interval: _____

☒ a well screen or perforated pipe, state the screened interval(s): expected 10-30 ft bgs

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:48

10) What annular interval surrounding the artesian casing of this well is cement-grouted? NA

11) Was the well built with surface casing? Yes If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? Grouted If yes, please describe:

Grout will be placed from above the well screen to the ground surface during well installation

12) Has all pumping equipment and associated piping been removed from the well? NA If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Casing will be removed, if possible, and grout will be placed into the boring using a tremie pipe.

2) Will well head be cut-off below land surface after plugging? No

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: 10 gallons

4) Type of Cement proposed: bentonite-grout mixture

5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

7) Grout additives requested, and percent by dry weight relative to cement:

25 lbs high yield bentonite to 470 lb portland cement

8) Additional notes and calculations:

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:40

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Robert Combs, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Signature of Applicant — Date: 6/21/19

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
_____ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 8 day of July, 2019

John R. D'Antonio, Jr., P.E., State Engineer

By: Tim Williams

Tim Williams, Supervisor/Pecos River Watermaster

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			
Bottom of proposed interval of grout placement (ft bgl)			TD of well
Theoretical volume of grout required per interval (gallons)			10 gallons
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			Mix on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

STATE OF NEW MEXICO OCD
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:10

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:40

WELL PLUGGING PLAN OF OPERATIONS

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: ~~TBD~~ RA-12753 POD5

Name of well owner: HollyFrontier Navajo Refining LLC MW-143

Mailing address: 501 East Main Street

City: Artesia State: NM Zip code: 88210

Phone number: 575-746-5487 E-mail: scott.denton@hollyfrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Tolunay Wong Engineers

New Mexico Well Driller License No.: WD-1766 Expiration Date: 12/6/2020

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

1) GPS Well Location: Latitude: 32 deg, 51 min, 17.68 sec
Longitude: 104 deg, 23 min, 14.45 sec, WGS84
☐ Check if seconds are decimal format

2) Reason(s) for plugging well:

A new monitoring is scheduled to be installed at this location. The well will only be plugged if it cannot be completed as planned, or at some point in the future when OCD no longer requires groundwater monitoring at this location.

3) Was well used for any type of monitoring program? No If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Based on nearby existing monitoring wells, groundwater is expected to have elevated concentrations of TDS and chloride.

5) Static water level: 15 feet below land surface / feet above land surface (circle one)

6) Depth of the well: 30 feet

7) Inside diameter of innermost casing: 2 inches.

8) Casing material: PVC

9) The well was constructed with:

☐ an open-hole production interval, state the open interval: _____

☒ a well screen or perforated pipe, state the screened interval(s): expected 10-30 ft bgs

10) What annular interval surrounding the artesian casing of this well is cement-grouted? NA

11) Was the well built with surface casing? Yes If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? Grouted If yes, please describe:

Grout will be placed from above the well screen to the ground surface during well installation

12) Has all pumping equipment and associated piping been removed from the well? NA If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO 2019 JUN 21 PM 3:47

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Casing will be removed, if possible, and grout will be placed into the boring using a tremie pipe.

2) Will well head be cut-off below land surface after plugging? No

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: 10 gallons

4) Type of Cement proposed: bentonite-grout mixture

5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

7) Grout additives requested, and percent by dry weight relative to cement:

25 lbs high yield bentonite to 470 lb portland cement

8) Additional notes and calculations:

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:3

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Robert Combs, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Signature of Applicant — Date: 6/21/19

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
_____ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 8 day of July 2019

John R. D'Antonio, Jr., P.E., State Engineer

By: Tim Williams

Tim Williams, Supervisor/Pecos River Watermaster

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			
Bottom of proposed interval of grout placement (ft bgl)			TD of well
Theoretical volume of grout required per interval (gallons)			10 gallons
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			Mix on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

STATE OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:37

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:34

WELL PLUGGING PLAN OF OPERATIONS

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN - PM 3:

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: ~~RA~~ RA-12753 POD4

Name of well owner: HollyFrontier Navajo Refining LLC MW-142

Mailing address: 501 East Main Street

City: Artesia State: NM Zip code: 88210

Phone number: 575-746-5487 E-mail: scott.denton@hollyfrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Tolunay Wong Engineers

New Mexico Well Driller License No.: WD-1766 Expiration Date: 12/6/2020

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

1) GPS Well Location: Latitude: 32 deg, 51 min, 19.52 sec
Longitude: 104 deg, 23 min, 18.35 sec, WGS84
☐ Check if seconds are decimal format

2) Reason(s) for plugging well:

A new monitoring is scheduled to be installed at this location. The well will only be plugged if it cannot be completed as planned, or at some point in the future when OCD no longer requires groundwater monitoring at this location.

3) Was well used for any type of monitoring program? No If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Based on nearby existing monitoring wells, groundwater is expected to have elevated concentrations of TDS and chloride.

5) Static water level: 15 feet below land surface / feet above land surface (circle one)

6) Depth of the well: 30 feet

7) Inside diameter of innermost casing: 2 inches.

8) Casing material: PVC

9) The well was constructed with:

☐ an open-hole production interval, state the open interval: _____

☒ a well screen or perforated pipe, state the screened interval(s): expected 10-30 ft bgs

10) What annular interval surrounding the artesian casing of this well is cement-grouted? NA

11) Was the well built with surface casing? Yes If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? Grouted If yes, please describe:

Grout will be placed from above the well screen to the ground surface during well installation

12) Has all pumping equipment and associated piping been removed from the well? NA If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Casing will be removed, if possible, and grout will be placed into the boring using a tremie pipe.

2) Will well head be cut-off below land surface after plugging? No

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: 10 gallons

4) Type of Cement proposed: bentonite-grout mixture

5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:38

7) Grout additives requested, and percent by dry weight relative to cement:

25 lbs high yield bentonite to 470 lb portland cement

8) Additional notes and calculations:

STATE ENGINEER OFFICE
2019 JUN 21 PM 3:38

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Robert Combs, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Signature of Applicant — Date: 6/21/19

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
_____ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 8 day of July, 2019

John R. D'Antonio, Jr., P.E., State Engineer

By: Tim Williams

Tim Williams, Supervisor/Pecos River Watermaster

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			
Bottom of proposed interval of grout placement (ft bgl)			TD of well
Theoretical volume of grout required per interval (gallons)			10 gallons
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			Mix on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:34

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3 34

WELL PLUGGING PLAN OF OPERATIONS

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO 2019 JUN 21 P 3:37

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: ~~TBD~~ RA-12753 POD3

Name of well owner: HollyFrontier Navajo Refining LLC MW-141

Mailing address: 501 East Main Street

City: Artesia State: NM Zip code: 88210

Phone number: 575-746-5487 E-mail: scott.denton@hollyfrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Tolunay Wong Engineers

New Mexico Well Driller License No.: WD-1766 Expiration Date: 12/6/2020

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

1) GPS Well Location: Latitude: 32 deg, 51 min, 18.22 sec
Longitude: 104 deg, 23 min, 28.70 sec, WGS84
☒ Check if seconds are decimal format.

2) Reason(s) for plugging well:

A new monitoring is scheduled to be installed at this location. The well will only be plugged if it cannot be completed as planned, or at some point in the future when OCD no longer requires groundwater monitoring at this location.

3) Was well used for any type of monitoring program? No If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Based on nearby existing monitoring wells, groundwater is expected to have elevated concentrations of TDS and chloride.

5) Static water level: 15 feet below land surface / feet above land surface (circle one)

6) Depth of the well: 30 feet

7) Inside diameter of innermost casing: 2 inches.

8) Casing material: PVC

9) The well was constructed with:

☐ an open-hole production interval, state the open interval: _____

☒ a well screen or perforated pipe, state the screened interval(s): expected 10-30 ft bgs

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:38

10) What annular interval surrounding the artesian casing of this well is cement-grouted? NA

11) Was the well built with surface casing? Yes If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? Grouted If yes, please describe:

Grout will be placed from above the well screen to the ground surface during well installation

12) Has all pumping equipment and associated piping been removed from the well? NA If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Casing will be removed, if possible, and grout will be placed into the boring using a tremie pipe.

2) Will well head be cut-off below land surface after plugging? No

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: 10 gallons

4) Type of Cement proposed: bentonite-grout mixture

5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

7) Grout additives requested, and percent by dry weight relative to cement:

25 lbs high yield bentonite to 470 lb portland cement

8) Additional notes and calculations:

2019 JUN 21 PM 3:37

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Robert Combs, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Signature of Applicant — Date: 6/21/19

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

__X__ Approved subject to the attached conditions.
_____ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 8 day of July, 2019

John R. D'Antonio, Jr., P.E., State Engineer

By: Tim Williams

Tim Williams, Supervisor/Pecos River Watermaster

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			
Bottom of proposed interval of grout placement (ft bgl)			TD of well
Theoretical volume of grout required per interval (gallons)			10 gallons
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			Mix on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2019 JUN 21 PM 3:38

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

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WELL PLUGGING PLAN OF OPERATIONS

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO 2019 JUN 21 PM 3:37

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: ~~TBD~~ RA-12753 POD2

Name of well owner: HollyFrontier Navajo Refining LLC MW-140

Mailing address: 501 East Main Street

City: Artesia State: NM Zip code: 88210

Phone number: 575-746-5487 E-mail: scott.denton@hollyfrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Tolunay Wong Engineers

New Mexico Well Driller License No.: WD-1766 Expiration Date: 12/6/2020

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

1) GPS Well Location: Latitude: 32 deg, 51 min, 13.87 sec
Longitude: 104 deg, 23 min, 38.17 sec, WGS84
☐ Check if seconds are decimal format.

2) Reason(s) for plugging well:

A new monitoring is scheduled to be installed at this location. The well will only be plugged if it cannot be completed as planned, or at some point in the future when OCD no longer requires groundwater monitoring at this location.

3) Was well used for any type of monitoring program? No If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Based on nearby existing monitoring wells, groundwater is expected to have elevated concentrations of TDS and chloride.

5) Static water level: 15 feet below land surface / feet above land surface (circle one)

6) Depth of the well: 30 feet

7) Inside diameter of innermost casing: 2 inches.

8) Casing material: PVC

9) The well was constructed with:

☐ an open-hole production interval, state the open interval: _____

☒ a well screen or perforated pipe, state the screened interval(s): expected 10-30 ft bgs

10) What annular interval surrounding the artesian casing of this well is cement-grouted? NA

11) Was the well built with surface casing? Yes If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? Grouted If yes, please describe:

Grout will be placed from above the well screen to the ground surface during well installation

12) Has all pumping equipment and associated piping been removed from the well? NA If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

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V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Casing will be removed, if possible, and grout will be placed into the boring using a tremie pipe.

2) Will well head be cut-off below land surface after plugging? No

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: 10 gallons

4) Type of Cement proposed: bentonite-grout mixture

5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be: _____ batch-mixed and delivered to the site

X mixed on site

7) Grout additives requested, and percent by dry weight relative to cement:

25 lbs high yield bentonite to 470 lb portland cement

8) Additional notes and calculations:

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2019 JUN 21 PM 3:36

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Robert Combs, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Signature of Applicant — Date: 6/21/19

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
_____ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 8 day of July, 2019

John R. D'Antonio, Jr., P.E., State Engineer

By: Tim Williams

Tim Williams, Supervisor/Pecos River Watermaster

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			
Bottom of proposed interval of grout placement (ft bgl)			TD of well
Theoretical volume of grout required per interval (gallons)			10 gallons
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			Mix on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

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TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

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WELL COMPLETION LOGS

MW-141

wood.

Wood Environment & Infrastructure Solutions, Inc.

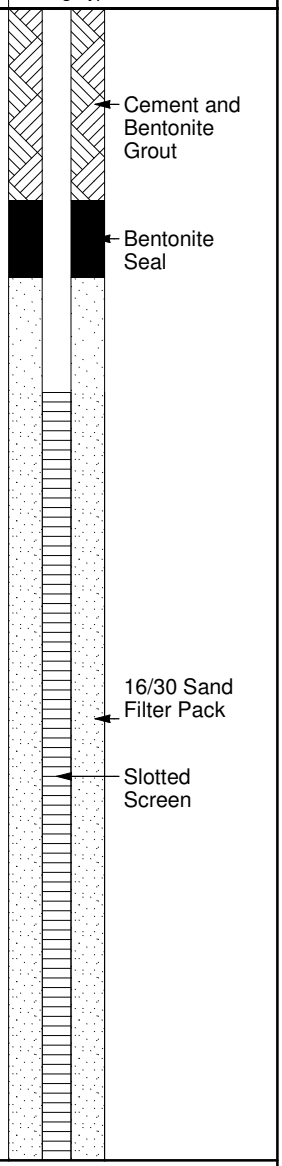
CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/10/19 **COMPLETED** 7/10/19
GROUND ELEVATION 3360.19 ft **HOLE SIZE** 8.5 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES 4'x4'x4" Concrete Flush-Mount Surface Completion
2.5hrs AFTER DRILLING 10.80 ft / Elev 3349.39 ft

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million
0	N/A	SW		(SW) Light Brown gravelly SAND Fill material	PID = 0
				3.0 / 3357.2	
		ML		(ML) Light Yellowish Brown Sandy SILT with little clay, soft, moist, CaCO3 material	
5					PID = 0
10					PID = 0
				13.0 / 3347.2	
		ML		14.0 / 3346.2 (ML) Same as above with pebbles	
15		ML		(ML) Same as above, saturated at 15', iron staining at 18'	PID = 0
				19.0 / 3341.2	
20		CL		(CL) Reddish Brown CLAY with fine Sand, moist, hard	PID = 0
				24.0 / 3336.2	
25		SP		(SP) Reddish Brown fine SAND, loose, saturated	PID = 0
				27.0 / 3333.2	
		CL		(CL) Olive Sandy CLAY, hard, moist	
30				30.0 / 3330.2	

Bottom of borehole at 30.0 feet.

WELL DIAGRAM

Casing Top Elev: 3359.89 (ft)
Northing:674881.5
Easting: 522681.7
Casing Type: 2" PVC



GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 09:29 - I:\CLIENT\HOLLYFRONTIER\ARTESIANM\6703180022 - ABATEMT WK PLAN FOR RO REJECT DISCHARGE FIELD\9.0 DRAFT REPORTS\1ST QUARTERLY REPORT

MW-142

wood.

Wood Environment & Infrastructure Solutions, Inc.

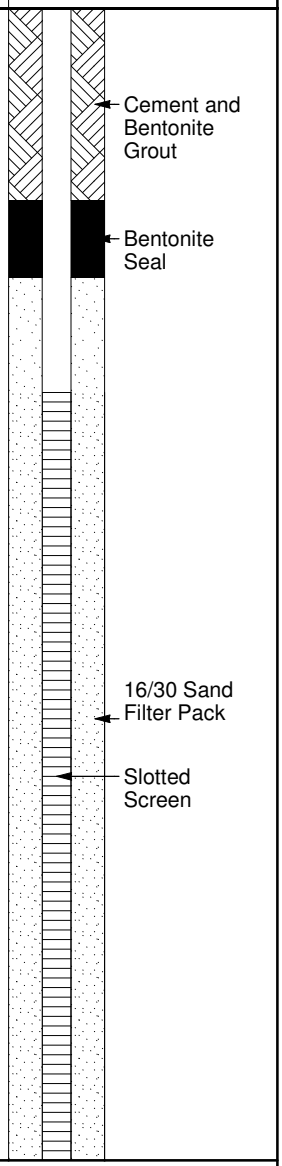
CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/11/19 **COMPLETED** 7/11/19
GROUND ELEVATION 3352.88 ft **HOLE SIZE** 8.5 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES 4'x4'x4" Concrete Stick-Up Surface Completion
24hrs AFTER DRILLING 10.26 ft / Elev 3342.62 ft

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION		Photoionization Detector (PID) parts per million
0						
	N/A	ML		(ML) Olive Sandy SILT, Firm, Dry, CaCO3 material		PID = 0.3
				2.0	3350.9	
		ML		(ML) Same as above, Light Brownish Grey		
5				6.0	3346.9	PID = 0
		CL		(CL) Light Brownish Grey Sandy CLAY, Firm, Moist, CaCO3 material, Iron and Manganese staining		
10						PID = 0
				12.0	3340.9	
		CL		(CL) Same as above, Olive color		
15						PID = 0
				19.0	3333.9	
		CL		(CL) Pinkish White Sandy CLAY with CaCO3 nodules, Soft, Wet		
20				22.0	3330.9	PID = 0
		SC		(SC) Pinkish Brown Clayey Fine SAND, dense, moist, CaCO3 nodules		
25				26.0	3326.9	PID = 0
		SC		(SC) Same as above, Loose, Saturated at 26'		
				29.0	3323.9	
30		CL		30.0 (CL) Pinkish Brown Sandy CLAY, Firm, Moist	3322.9	

Bottom of borehole at 30.0 feet.

WELL DIAGRAM

Casing Top Elev: 3355.78 (ft)
Northing: 674921.3
Easting: 524450.8
Casing Type: 2" PVC



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MW-143

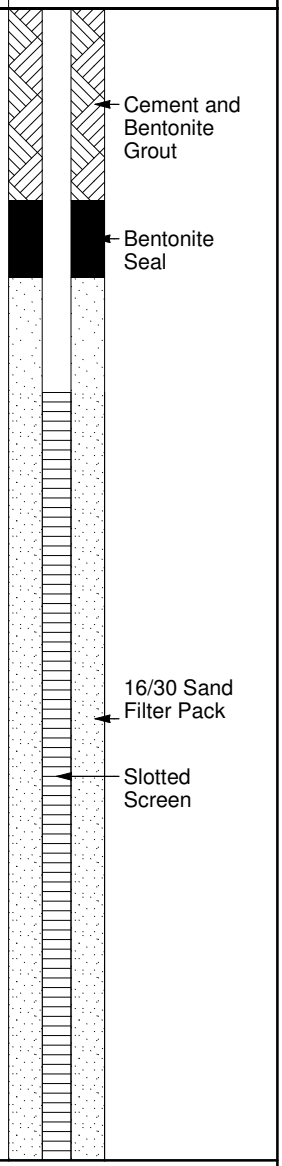
Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/11/19 **COMPLETED** 7/11/19
GROUND ELEVATION 3352.78 ft **HOLE SIZE** 8.5 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES 4'x4'x4" Concrete Stick-Up Surface Completion
24hrs AFTER DRILLING 10.45 ft / Elev 3342.33 ft

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Photoionization Detector (PID) parts per million
0	NA	ML		(ML) Olive Brown Sandy SILT, Firm, Dry, Trace CaCO3 nodules	PID = 0.3
7.0 (3345.8)		CL		(CL) Olive Brown Sandy CLAY, Soft, Dry/Moist, CaCO3 nodules, Iron and Manganese staining	PID = 0.1
11.0 (3341.8)		CL		(CL) Pinkish Brown Sandy CLAY, Firm, Moist, CaCO3 nodules	PID = 0
16.0 (3336.8)		CL		(CL) Pinkish Grey Sandy CLAY, Firm, Moist, Iron and Manganese staining, Trace CaCO3 material	PID = 0
25.0 (3327.8)		SC		(SC) Pinkish Grey Clayey SAND, Saturated, Loose, CaCO3 nodules	PID = 0
26.0 (3326.8)		CL		(CL) Pinkish Grey Sandy CLAY, Firm, Moist	
30.0 (3322.8)				Bottom of borehole at 30.0 feet.	

WELL DIAGRAM

Casing Top Elev: 3355.85 (ft)
Northing: 674759.7
Easting: 524752.0
Casing Type: 2" PVC



GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 12:17 - I:\CLIENT\HOLLYFRONTIER\ARTESIANM\6703180022 - ABATEMT WK PLAN FOR RO REJECT DISCHARGE FIELD\9.0 DRAFT REPORTS\1ST QUARTERLY REPORT

MW-144

wood.

Wood Environment & Infrastructure Solutions, Inc.

CLIENT Holly Frontier Navajo Refinery
PROJECT NAME RO Reject Discharge Fields
PROJECT NUMBER 6703180022
PROJECT LOCATION Artesia, NM
DATE STARTED 7/10/19 **COMPLETED** 7/10/19
GROUND ELEVATION 3348.10 ft **HOLE SIZE** 8.5 inches
DRILLING CONTRACTOR Tolunay-Wong Engineers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SHM **CHECKED BY** RB
AT END OF DRILLING ---
NOTES 4'x4'x4" Concrete Stick-Up Surface Completion
168hrs AFTER DRILLING 11.48 ft / Elev 3336.61 ft

DEPTH (ft)	SAMPLE ID	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION		Photoionization Detector (PID) parts per million	WELL DIAGRAM
0							Casing Top Elev: 3351.12 (ft) Northing: 674091.1 Easting: 526174.6 Casing Type: 2" PVC
	N/A	CL		(CL) Olive Silty CLAY with Trace Fine sand, Trace CaCO3 nodules, Firm, Dry		PID = 8.6 PID = 3.6	
				2.0	3346.1		
		CL		(CL) Same as above, Pink, Dry, Firm		PID = 4.0	Cement and Bentonite Grout
5				5.0	3343.1		
		CL		(CL) Light Pinkish Brown, Silty CLAY with CaCO3 material and Gypsum, Firm, Dry		PID = 4.6	Bentonite Seal
10				11.0	3337.1	PID = 5.5	
		ML		(ML) Yellowish Brown Clayey SILT with Fine sand, Soft, Moist/Wet, Gypsum and CaCO3 material			
15				17.0	3331.1	PID = 1.9	
		CL		(CL) Reddish Brown Silty CLAY with Fine Sand, Firm, Moist/Wet, CaCO3 material			16/30 Sand Filter Pack
20				20.0	3328.1		
		SM		(SM) Olive Brown Fine Silty SAND, Medium Dense, Saturated		PID = 0	Slotted Screen
				23.0	3325.1		
25		CL		(CL) Olice Brown CLAY, Hard, Moist		PID = 0	
				27.0	3321.1		
		CL		(CL) White CLAY, Hard, Dry, CaCO3 material			
30				30.0	3318.1		

Bottom of borehole at 30.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/29/19 13:15 - I:\CLIENT\HOLLYFRONTIER\ARTESIANM\6703180022 - ABATEMT WK PLAN FOR RO REJECT DISCHARGE FIELD\9.0 DRAFT REPORTS\1ST QUARTERLY REPORT

APPENDIX B
WELL DEVELOPMENT and SAMPLING FORMS

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-29
Sample ID: MW-29 Duplicate ID: _____
Sample Depth: _____
Project and Task No.: _____
Project Name: RO Fields
Date: 7-17-19
Sampled By: SAM
Method of Purging: Peri pump
Method of Sampling: Low Flow

Initial Depth to Water: 18.61
Depth to Water after Sampling: _____
Total Depth to Well: _____
Well Diameter: 2" 6"
1 Casing/Borehole Volume: _____ (Circle one)
4 Casing/Borehole Volumes: _____ (Circle one)
Total Casing/Borehole Volumes Removed: _____

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (µS/cm) mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	Color
1528	18.78	200	0.10	24.84	6.67	5.94	0.12	-110	0.0	clear
1531	18.80	200	0.25	26.56	6.66	5.83	0.00	-141	0.0	clear
1534	18.81	200	0.40	23.99	6.70	5.82	0.00	-150	0.0	clear
1537	18.81	200	0.55	23.30	6.82	5.81	0.00	-159	0.0	clear
1540	18.81	200	0.70	23.52	6.86	5.80	0.00	-167	0.0	clear
1543	18.81	200	0.85	23.78	6.88	5.78	0.00	-170	0.0	clear
1548	18.81	200	1.0	23.72	6.89	5.78	0.00	-173	0.0	clear
1549	Sample									

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-40
Sample ID: MW-40 Duplicate ID: _____
Sample Depth: _____
Project and Task No.: _____
Project Name: RO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri pump
Method of Sampling: low Flow

Initial Depth to Water: 11.87
Depth to Water after Sampling: 12.10
Total Depth to Well: _____
Well Diameter: 2"
1 Casing/Borehole Volume: _____ (Circle one)
4 Casing/Borehole Volumes: _____ (Circle one)
Total Casing/Borehole Volumes Removed: _____

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (µS/cm) mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1556	12.21	200	0.1	25.07	6.72	3.26	0.29	-308	149	clear
1559	12.13	200	0.25	25.21	6.75	3.24	0.36	-321	80.1	clear
1602	12.10	200	0.40	25.38	6.78	3.22	0.34	-333	39.2	clear
1605	12.10	200	0.55	25.55	6.79	3.20	0.40	-340	19.6	clear
1608	12.10	200	0.70	25.21	6.81	3.21	0.37	-343	11.2	clear
1611	12.10	200	0.85	24.95	6.83	3.22	0.35	-347	0.0	clear
~~1614~~ 1614	Sample									

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-55
Sample ID: MW-55 Duplicate ID: _____
Sample Depth: _____
Project and Task No.: _____
Project Name: Bo Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri Pump
Method of Sampling: Low Flow

Initial Depth to Water: 13.10
Depth to Water after Sampling: 13.15
Total Depth to Well: _____
Well Diameter: 2"
1 Casing/Borehole Volume: _____ (Circle one)
4 Casing/Borehole Volumes: _____ (Circle one)
Total Casing/Borehole Volumes Removed: _____

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	Color
1621	13.13	200	0.10	25.02	6.85	5.21	1.15	-228	8.3	clear
1624	13.15	200	0.25	22.52	6.77	5.39	0.00	-246	0.0	clear
1627	13.15	200	0.40	22.88	6.78	5.35	0.00	-249	0.0	clear
1630	13.15	200	0.55	22.46	6.81	5.29	0.00	-254	0.0	clear
1633	13.15	200	0.70	22.62	6.82	5.30	0.00	-256	0.0	clear
1636	13.15	200	0.85	22.43	6.82	5.33	0.00	-257	0.0	clear
1639	13.15	200	1.0	22.51	6.81	5.35	0.00	-259	0.0	clear
1642	Sample									

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-56
Sample ID: MW-56 Duplicate ID:
Sample Depth:
Project and Task No.:
Project Name: RO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri Pump
Method of Sampling: Low Flow

Initial Depth to Water: 14.00
Depth to Water after Sampling: 14.07
Total Depth to Well:
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	Color
1459	14.02	200	0.10	25.26	6.96	4.25	0.43	-37	0.0	clear
1502	14.05	200	0.25	23.45	6.64	4.32	0.00	12	0.0	clear
1505	14.07	200	0.40	23.45	6.64	4.32	0.00	44	0.0	clear
1508	14.07	200	0.55	23.68	6.63	4.31	0.00	53	0.0	clear
1511	14.07	200	0.70	23.38	6.60	4.29	0.00	63	0.0	clear
1514	14.07	200	0.85	23.42	6.58	4.27	0.00	67	0.0	clear
1517	14.07	200	1.0	23.35	6.56	4.26	0.00	70	0.0	clear
1520	Sample									

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-114
Sample ID: MW-114 Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name: BO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri. pump
Method of Sampling: Low Flow

Initial Depth to Water: 13.96'
Depth to Water after Sampling: 14.00'
Total Depth to Well: #
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
0925	13.98'	200	0.10	21.61	6.75	4.21	0.00	149	56.4	clear
0930	13.99'	200	0.25	21.57	6.75	4.21	0.00	149	59.1	clear
0935	14.00'	200	0.40	21.75	6.74	4.21	0.00	149	28.8	clear
0938	14.00	200	0.55	21.70	6.74	4.22	0.00	151	13.3	clear
0941	14.00	200	0.70	21.83	6.74	4.21	0.00	152	3.2	clear
0944	14.00	200	0.85	21.82	6.74	4.20	0.00	153	2.0	clear
0947	14.00	200	1.0	21.81	6.74	4.19	0.00	153	1.8	clear
0950	Sample									

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:
EB-071719-GW collected @ 0940 after water level meter

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-115
Sample ID: MW-115 Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name: RD Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri Pump
Method of Sampling: Low Flow

Initial Depth to Water: 13.75'
Depth to Water after Sampling: 13.83'
Total Depth to Well:
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (~~µS/cm~~ mS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
0850	Pump	on							~~12.~~	~~clear~~
0853	13.82	200	0.10	21.32	7.03	4.79	0.00	116	12.8	clear
0858	13.83	200	0.25	20.11	6.95	4.89	0.00	125	11.0	clear
0903	13.83	200	0.40	19.68	6.93	4.93	0.00	130	19.4	clear
0906	13.83	200	0.55	19.62	6.92	4.95	0.00	133	22.6	clear
0909	13.83	200	0.70	19.87	6.94	4.94	0.00	133	21.2	clear
0912	13.83	200	0.85	19.92	6.94	4.96	0.00	134	16.1	clear
0915	13.83	200	1.0	19.90	6.94	4.97	0.00	134	13.2	clear
0918	Sample									

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:
~~EB 071719 GW~~
~~off water~~
~~level meter~~
~~QA/QC~~

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-116
Sample ID: MW-116 Duplicate ID: Dup-GW-2
Sample Depth:
Project and Task No.:
Project Name: Navajo Bo Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri Pump
Method of Sampling: Low Flow

Initial Depth to Water: 14.06
Depth to Water after Sampling: 14.10
Total Depth to Well:
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	Color
0740	14.10	200	0.10	23.46	6.41	3.91	0.80	240	83.3	clear
0744	14.10	200	0.25	22.21	6.62	3.99	0.19	214	87.8	clear
0748	14.10	200	0.40	21.58	6.70	4.11	0.00	107	127	clear
0751	14.10	200	0.55	21.19	6.73	4.16	0.00	100	135	clear
0754	14.10	200	0.70	21.12	6.76	4.18	0.00	101	139	clear
0757	14.10	200	0.85	21.12	6.80	4.20	0.00	108	139	clear
0800	14.10	200	1.0	21.25	6.83	4.23	0.00	119	132	clear
0803	14.10	200	1.15	21.20	6.84	4.27	0.00	123	128	clear
0806	14.10	200	1.30	21.17	6.85	4.30	0.00	125	124	clear
0809	Sample									

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-117
Sample ID: MW-117 Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name:
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri Pump
Method of Sampling: Low Flow

Initial Depth to Water: 12.58
Depth to Water after Sampling: 12.60
Total Depth to Well:
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1709	12.60	200	0.10	23.97	6.84	4.25	1.21	157	112	clear
1712	12.60	200	0.25	22.13	6.66	4.26	0.00	162	82.3	clear
1715	12.60	200	0.40	21.88	6.67	4.27	0.00	162	85.3	clear
1718	12.60	200	0.55	21.70	6.69	4.28	0.00	162	77.2	clear
1721	12.60	200	0.70	21.81	6.70	4.27	0.00	162	70.7	clear
1724	12.60	200	0.85	21.77	6.71	4.27	0.00	161	62.7	clear
1727	12.60	200	1.0	21.75	6.72	4.26	0.00	161	63.4	clear
1730	Sample									

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-118
Sample ID: MW-118 Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name: RO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri pump
Method of Sampling: Low Flow

Initial Depth to Water: 15.23
Depth to Water after Sampling: 15.81
Total Depth to Well:
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1038	15.68	200	0.10	23.51	6.95	4.69	4.16	150	101	clear
1041	15.76	200	0.20	21.26	6.79	4.77	3.70	162	49.0	clear
1044	15.81	150	0.30	20.76	6.77	4.84	3.68	167	63.3	clear
1047	15.81	150	0.40	20.59	6.77	4.85	3.56	168	70.7	clear
1050	15.81	150	0.50	20.65	6.74	4.85	3.59	172	67.3	clear
1053	15.81	150	0.60	20.60	6.76	4.85	3.56	172	70.0	clear
1056	15.81	150	0.70	20.58	6.77	4.87	3.55	171	67.3	clear
1059	Sample									

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-119
Sample ID: MW-119 Duplicate ID: _____
Sample Depth: _____
Project and Task No.: _____
Project Name: RO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri pump
Method of Sampling: Low Flow

Initial Depth to Water: 13.75'
Depth to Water after Sampling: 13.80
Total Depth to Well: _____
Well Diameter: 2"
1 Casing/Borehole Volume: _____ (Circle one)
4 Casing/Borehole Volumes: _____ (Circle one)
Total Casing/Borehole Volumes Removed: _____

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (~~µS/cm~~ mS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1006	13.81	200	0.10	23.02	6.86	4.79	1.00	144	193	clear
1011	13.80	200	0.25	20.97	6.74	4.89	0.00	154	101	clear
1016	13.80	200	0.40	20.50	6.77	4.95	0.00	152	78.3	clear
1019	13.80	200	0.55	20.48	6.82	4.96	0.00	150	58.2	clear
1022	13.80	200	0.70	20.47	6.85	4.96	0.00	149	57.8	clear
1025	13.80	200	0.85	20.54	6.86	4.96	0.00	149	52.1	clear
1028	13.80	200	1.0	20.49	6.87	4.96	0.00	148	49.4	clear
1031	Sample									

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-125
Sample ID: MW-125 Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name: RO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri pump
Method of Sampling: Low Flow

Initial Depth to Water: 17.02
Depth to Water after Sampling: 17.12
Total Depth to Well:
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1419	17.12	200	0.1	26.65	6.94	4.74	0.57	119	23.2	clear
1422	17.12	200	0.25	22.69	6.74	5.00	0.00	135	4.1	clear
1425	17.12	200	0.35	22.57	6.70	4.98	0.00	139	0.0	clear
1428	17.12	200	0.45	22.27	6.67	5.04	0.00	142	0.0	clear
1431	17.12	200	0.65	22.31	6.65	5.02	0.00	145	0.0	clear
1434	17.12	200	0.80	22.47	6.81	5.01	0.00	149	0.0	clear
1437	Sample									

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: RW-18 A
Sample ID: RW-18 A Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name: RO Fields
Date: 7-17-19
Sampled By: SHM
Method of Purging: Peri Pump
Method of Sampling: Low Flow

Initial Depth to Water: 15.99'
Depth to Water after Sampling: 15.99'
Total Depth to Well:
Well Diameter: 4"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1307	15.99	250	0.15	24.73	7.20	4.17	0.63	98	2.9	clear
1310	15.99	200	0.30	20.87	7.05	4.44	0.00	84	0.00	clear
1313	15.99	200	0.45	20.59	6.90	4.45	0.00	85	0.00	clear
1316	15.99	200	0.60	20.43	6.80	4.46	0.00	92	0.0	clear
1319	15.99	200	0.75	20.51	6.76	4.46	0.00	97	0.0	clear
1322	15.99	200	0.90	20.59	6.74	4.46	0.00	99	0.0	clear
1325	15.99	200	1.05	20.62	6.72	4.46	0.00	102	0.0	clear
1328	15.99	Sample		20.65						

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-140
Sample ID: MW-140 Duplicate ID: —
Sample Depth:
Project and Task No.:
Project Name: Navajo RD Fields
Date: 7-15-19
Sampled By: SHM
Method of Purging: sub pump
Method of Sampling: Low Flow

Initial Depth to Water: 9.96
Depth to Water after Sampling: 10.10
Total Depth to Well: 23.21' → 29.90'
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm) mS/cm~~	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1418	Pump	on for development							1000+	tan
1450		3000	20	19.72	6.46	4.23	1.87	130	1000+	tan
1506		4250	40	19.96	6.44	4.18	5.62	146	1000+	tan
1522		4000	55	19.71	6.39	4.15	1.28	147	1000+	tan
1532		5000	70	19.69	6.36	4.28	2.63	151	1000+	light tan
1542		4000	80	19.76	6.42	4.17	0.52	141	1000+	tan
1554		4500	95	19.60	6.43	4.26	0.54	143	1000+	light tan
1605		5000	110	19.59	6.44	4.24	0.51	145	1000+	light tan
Switch to low flow w/ peri pump										
1615	10.41	150	110	21.12	6.44	4.26	0.49	147	327	clear
1618	10.24	150	110	21.40	6.45	4.29	0.48	146	299	clear
1621	10.10	150	110	21.49	6.45	4.31	0.45	144	340	clear

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:
Going dry intermittently while development
Sample @ 1624

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-141
Sample ID: MW-141 Duplicate ID: Dup-GW
Sample Depth:
Project and Task No.:
Project Name: Navajo BO Fields
Date: 7-15-19
Sampled By: SHM
Method of Purging: sub pump
Method of Sampling:

Initial Depth to Water: 10.62'
Depth to Water after Sampling: 10.74'
Total Depth to Well: 29.70'
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance ~~(µS/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1014	pump on for development								1000+	tan
1024		6000	150	19.14	6.18	3.28	3.57	201	1000+	light tan
1033		6500	30	19.09	6.35	3.41	1.06	169	65.5	clear
1042		7000	50	19.11	6.30	3.41	0.69	163	175	clear
1051		7000	65	19.14	6.22	3.43	0.32	151	79.4	clear
1050		7000	80	19.18	6.30	3.44	0.26	141	20.0	clear
1059		7000	95	19.19	6.31	3.45	0.16	138	10.3	clear
1108		7000	110	19.20	6.31	3.45	0.15	138	9.8	clear
switch to low flow sampling w/ peri pump										
1115	10.75	150	110	19.29	6.32	3.47	0.14	138	9.1	clear
1118	10.74	150	110	19.34	6.32	3.47	0.14	138	8.2	clear
1121	10.74	150	110	19.40	6.33	3.48	0.14	138	7.5	clear

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes:
Sample @ 1124

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-142
Sample ID: MW-142 Duplicate ID: —
Sample Depth: 20'
Project and Task No.:
Project Name: Navajo RU Fields
Date: 7-12-19
Sampled By: SHM
Method of Purging: sub pump / peri pump
Method of Sampling: low flow

Initial Depth to Water: 13.16'
Depth to Water after Sampling: 13.16
Total Depth to Well: 32.45' → 32.75
Well Diameter: 2"
1 Casing/Borehole Volume: ~~3~~ 3.19 gal (Circle one)
4 Casing/Borehole Volumes: 12.77 gal (Circle one)
Total Casing/Borehole Volumes Removed: 110 gal

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (µS/cm) mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1400	Pump on	For development							1000+	Tan
1410		6000	15	17.95	6.58	4.14	0.88	106	1000+	light tan
1420		6000	30	17.87	6.65	4.19	0.00	104	1000+	light tan
1427		7500	45	18.06	6.64	4.18	0.00	109	1000+	light tan
1434		7500	60	17.73	6.63	4.25	0.00	111	1000+	light tan
1440		7500	85	17.79	6.62	4.28	0.00	111	151	clear
1446		7500	110	17.74	6.63	4.29	0.00	109	74.6	clear
Switch to peri pump for low flow sampling										
1459	13.16	150	110	17.91	6.63	4.30	0.00	109	69.1	clear
~~14~~ 1502	13.16	150	110	18.15	6.63	4.30	0.00	110	66.2	clear
1505	13.16	150	110	18.29	6.63	4.31	0.00	110	65.1	clear
1508	Sample									clear

pH CALIBRATION (choose two)					Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0		
Field Temperature °C					
Instrument Reading					

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		Final TOC
Field Temperature °C		Field Temperature °C		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-143
Sample ID: MW-143 Duplicate ID:
Sample Depth: 25'
Project and Task No.:
Project Name: Navajo RD fields
Date: 7-12-19
Sampled By: SHM
Method of Purging: ~~Sb~~ sub pump / peripump
Method of Sampling: low flow

Initial Depth to Water: 9.44'
Depth to Water after Sampling: 9.52
Total Depth to Well: 24.75' → 30.30'
Well Diameter: 2"
1 Casing/Borehole Volume: 3.40
(Circle one)
4 Casing/Borehole Volumes: 13.60
(Circle one)
Total Casing/Borehole Volumes Removed: 110 gal

Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (µS/cm) mS/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	color
1136	9.44	5000	0	Pump on for development					1000+	brown/tan
1148		5000	15	17.93	6.83	4.38	1.76	110	1000+	light tan
1158		5000	30	17.86	6.78	4.43	0.06	107	1000+	light tan
1208		6000	50	17.78	6.75	4.49	0.00	96	660	clearish tan
1218		6000	70	17.79	6.76	4.51	0.00	91	874	clearish tan
1225		7500	90	17.76	6.76	4.52	0.00	86	417	clearish tan
1232		7500	110	17.75	6.76	4.52	0.00	85	407	clearish tan
Development complete - Begin low flow sampling w/ peri pump										
1242	9.52	150	110	17.79	6.76	4.53	0.01	85	391	clear
1245	9.52	150	110	17.81	6.76	4.53	0.00	83	370	clear
1248	9.52	150	110	17.84	6.76	4.54	0.00	81	375	clear
1251	Sample									

pH CALIBRATION (choose two)				
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

Model or Unit No.:

SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION			
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C	
Field Temperature °C			
Instrument Reading			

Model or Unit No.:

ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION	
Standard Solution (mV)		Altitude / Salinity %	
Field Temperature °C		Field Temperature °C	
Instrument Reading (mV)		Instrument Reading (mg/L)	
Model or Unit No.:		Model or Unit No.:	

Notes: Not final TOC

wood.

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-144
Sample ID: MW-144 Duplicate ID: —
Sample Depth: 20'
Project and Task No.:
Project Name: Navajo Ro fields
Date: 7-11-19
Sampled By: JHM
Method of Purging: Sub pmp / peri pump
Method of Sampling: Low Flow

Initial Depth to Water: 12.20
Depth to Water after Sampling: 17.35
Total Depth to Well: 22.71' -> 30.31' after dev
Well Diameter: 2"
1 Casing/Borehole Volume: (Circle one)
4 Casing/Borehole Volumes: (Circle one)
Total Casing/Borehole Volumes Removed:

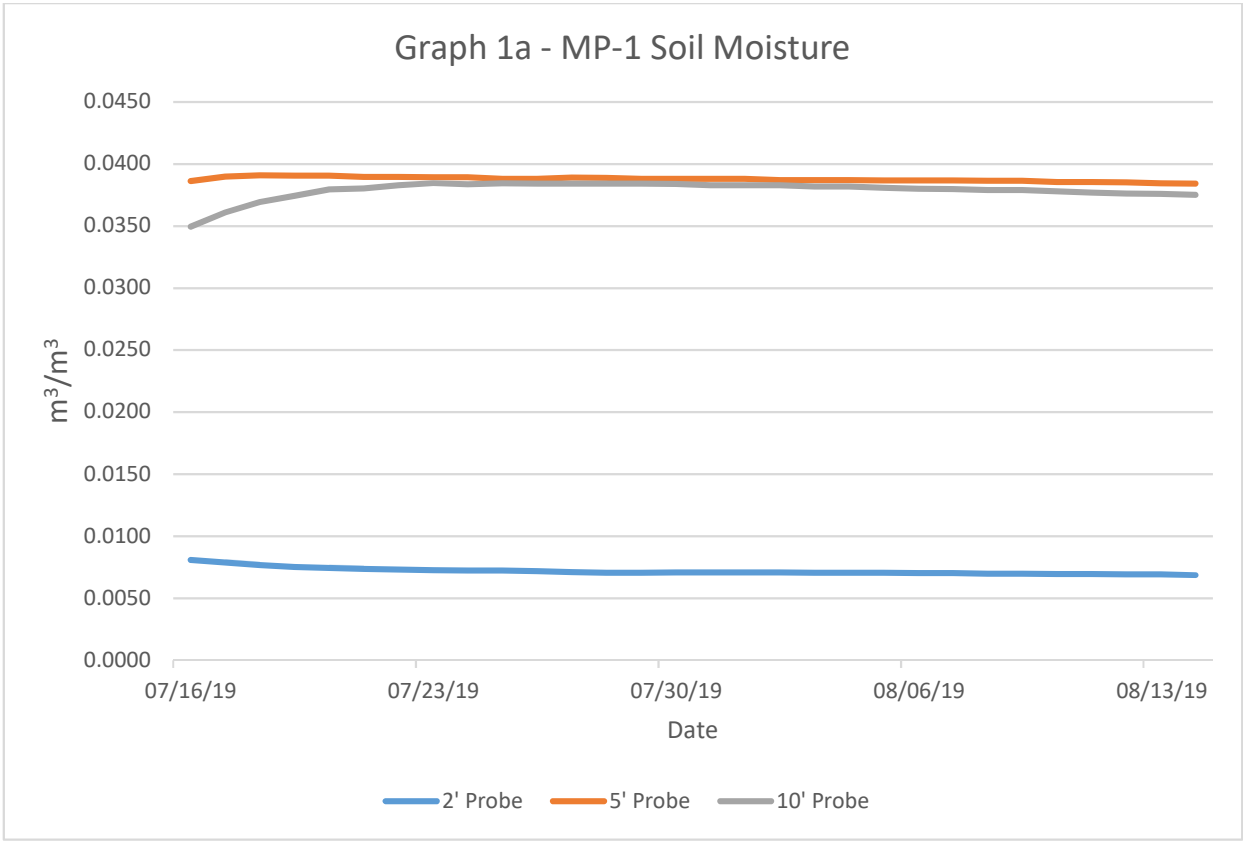
Time	Water level	Rate (ml/min)	Cum. Vol. (gal.)	Temp. (°C)	pH (units)	Specific Electrical Conductance (µS/cm) MS/CM	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment) NTU	Color
1855	pump	on for development							1000+	Pinkish brown
1910		2000	10	16.68	7.11	3.45	1.00	95	1000+	tight tan
1920		2000	15.0	16.60	6.80	3.37	0.00	107	1000+	light tan
1930		2000	20.0	15.85	6.71	3.56	0.94	119	1000+	light tan
1940		2000	30	15.61	6.63	3.61	0.00	120	1000+	light tan
1950		3000	40	15.60	6.52	3.59	0.00	127	1000+	light tan
2000		2500	~~8~~ 47	15.59	6.51	3.61	0.00	127	990	clear/tan
2010		2500	55	15.59	6.50	3.62	0.00	128	1000+	clear/tan
Switch to		low flow peri pump								
2018	18.41	150	55	15.59	6.50	3.60	0.00	128	1000+	clear/tan
2021	17.91	150	55	15.62	6.50	3.62	0.00	128	1000+	clear/tan
2024	17.35	150	55	15.64	6.49	3.62	0.00	128	1000+	clear/tan

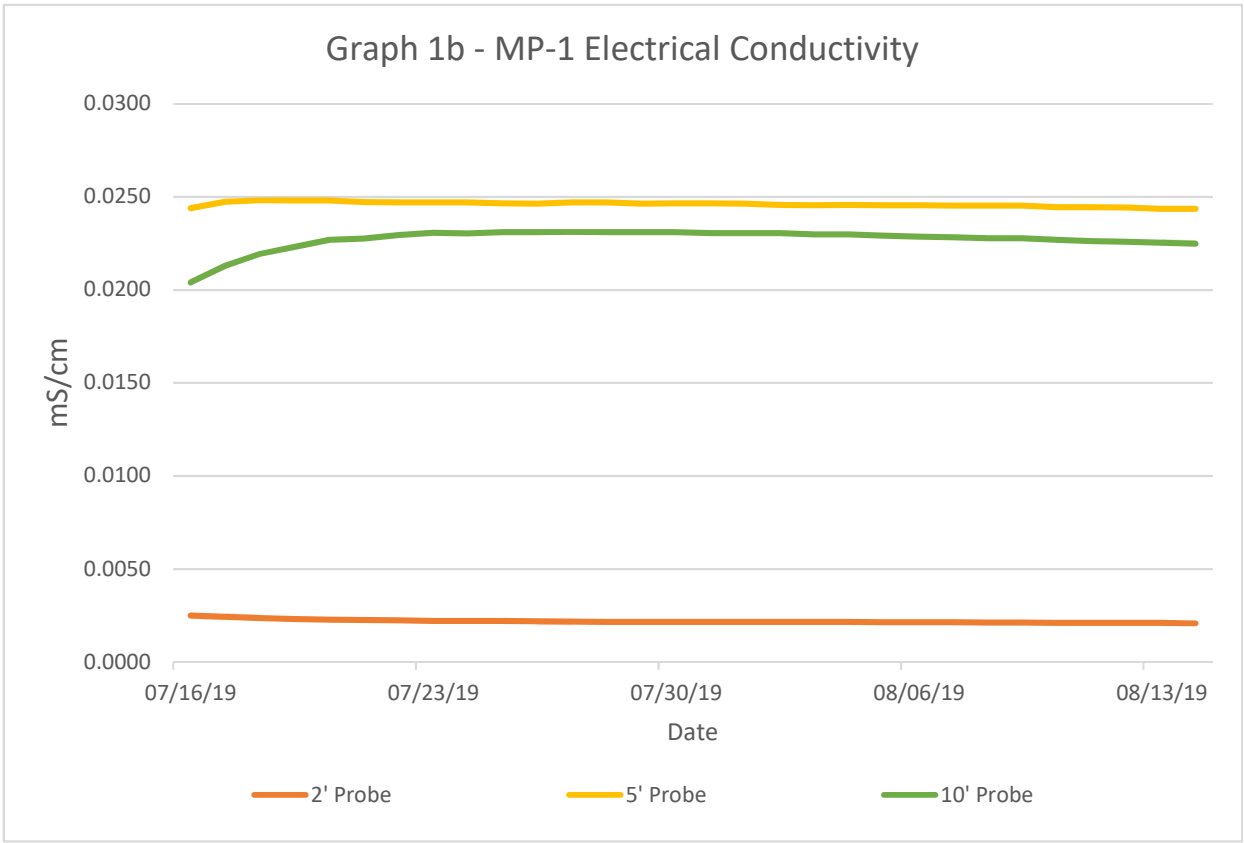
pH CALIBRATION (choose two)				Model or Unit No.:
Buffer Solution	pH 4.0	pH 7.0	pH 10.0	
Field Temperature °C				
Instrument Reading				

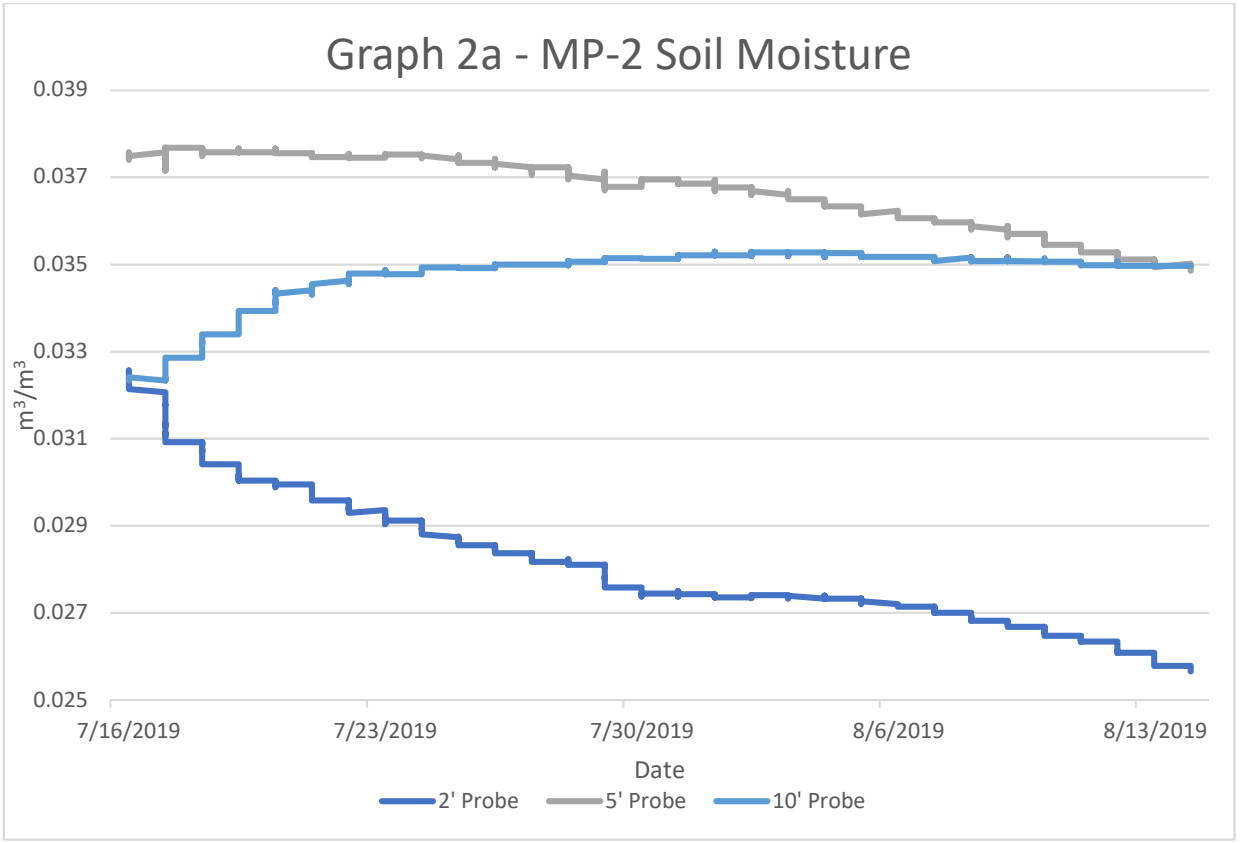
SPECIFIC ELECTRICAL CONDUCTANCE (SEC) – CALIBRATION				Model or Unit No.:
KCl Solution (µS/cm=µmhos/cm)	1413 at 25°C	12880 at 25°C		
Field Temperature °C				
Instrument Reading				

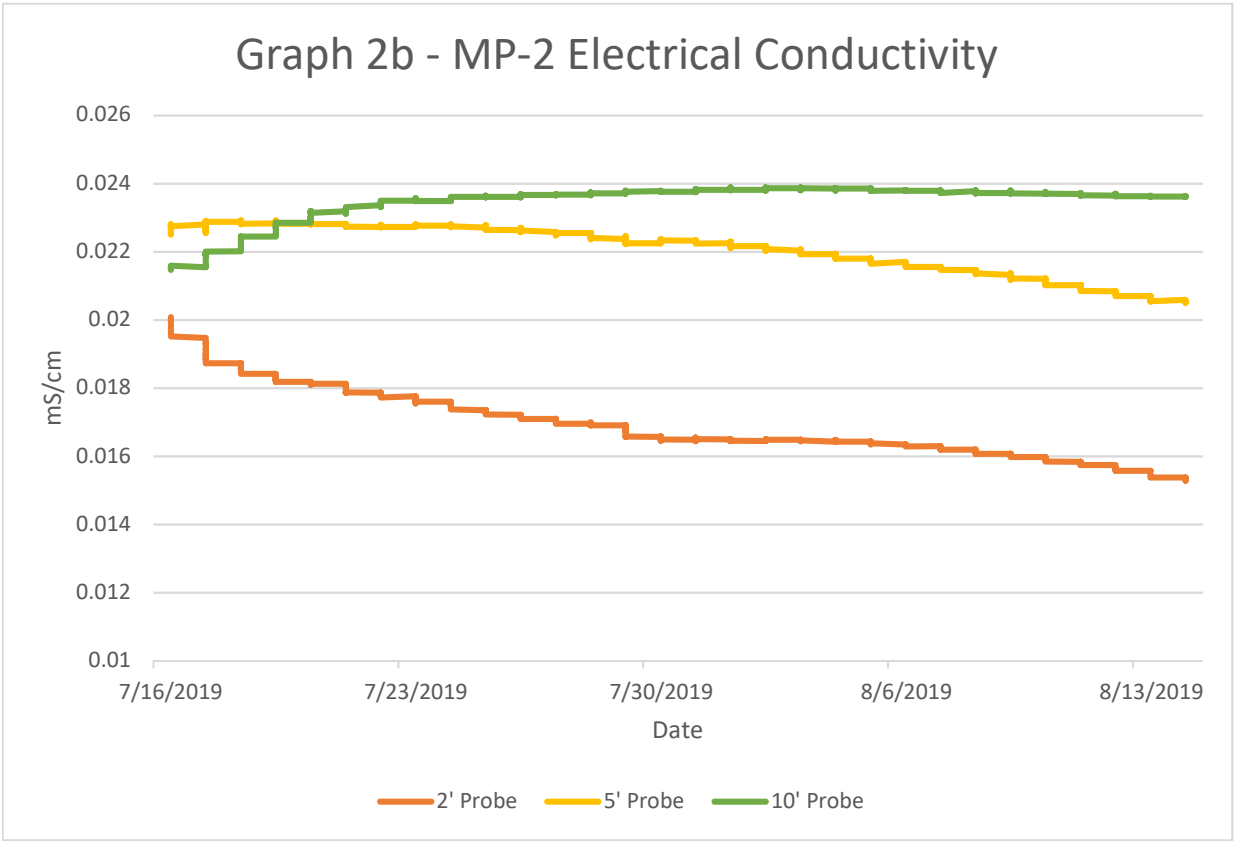
ORP/REDOX CALIBRATION		DISSOLVED OXYGEN CALIBRATION		Notes:
Standard Solution (mV)		Altitude / Salinity %		Not Final TOC
Field Temperature °C		Field Temperature °C		measurement
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		Sample @ 2027

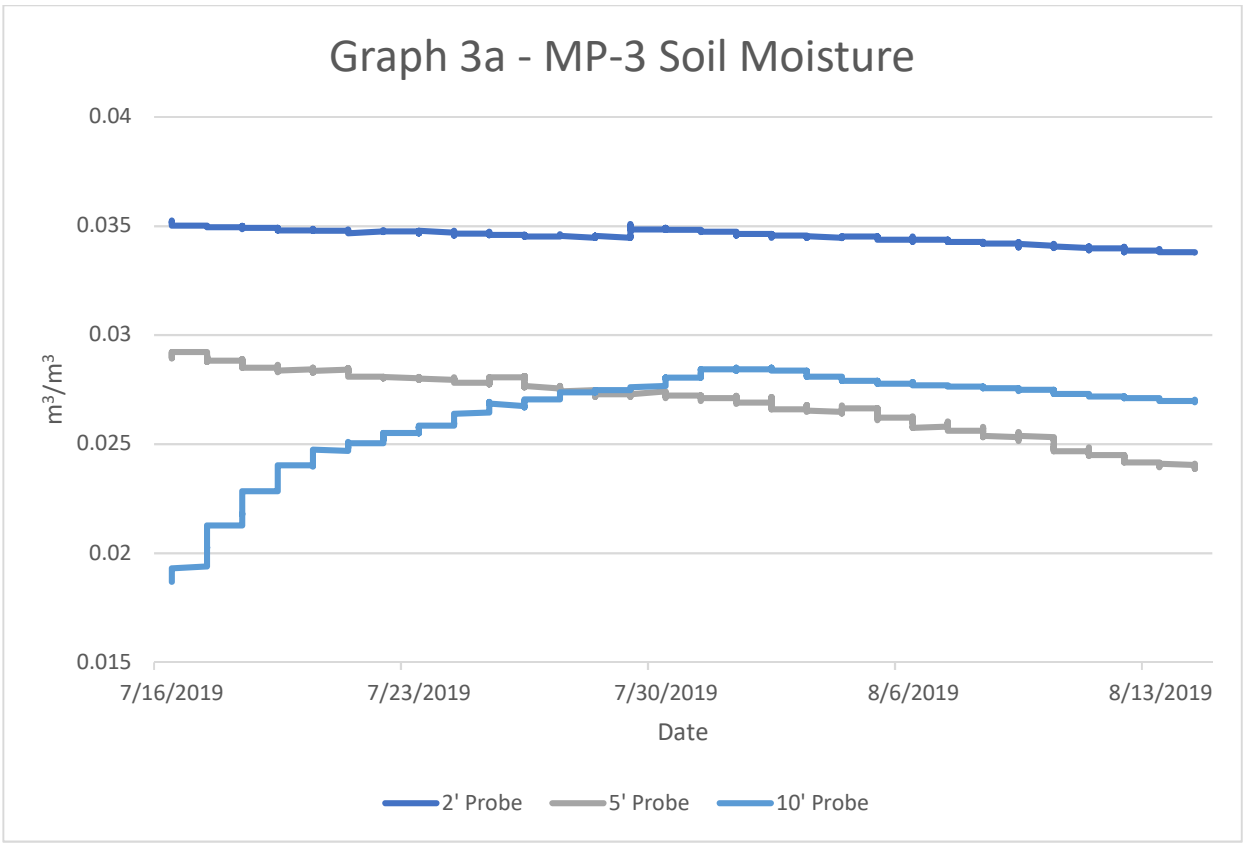
APPENDIX C
SOIL MOISTURE DATA GRAPHS

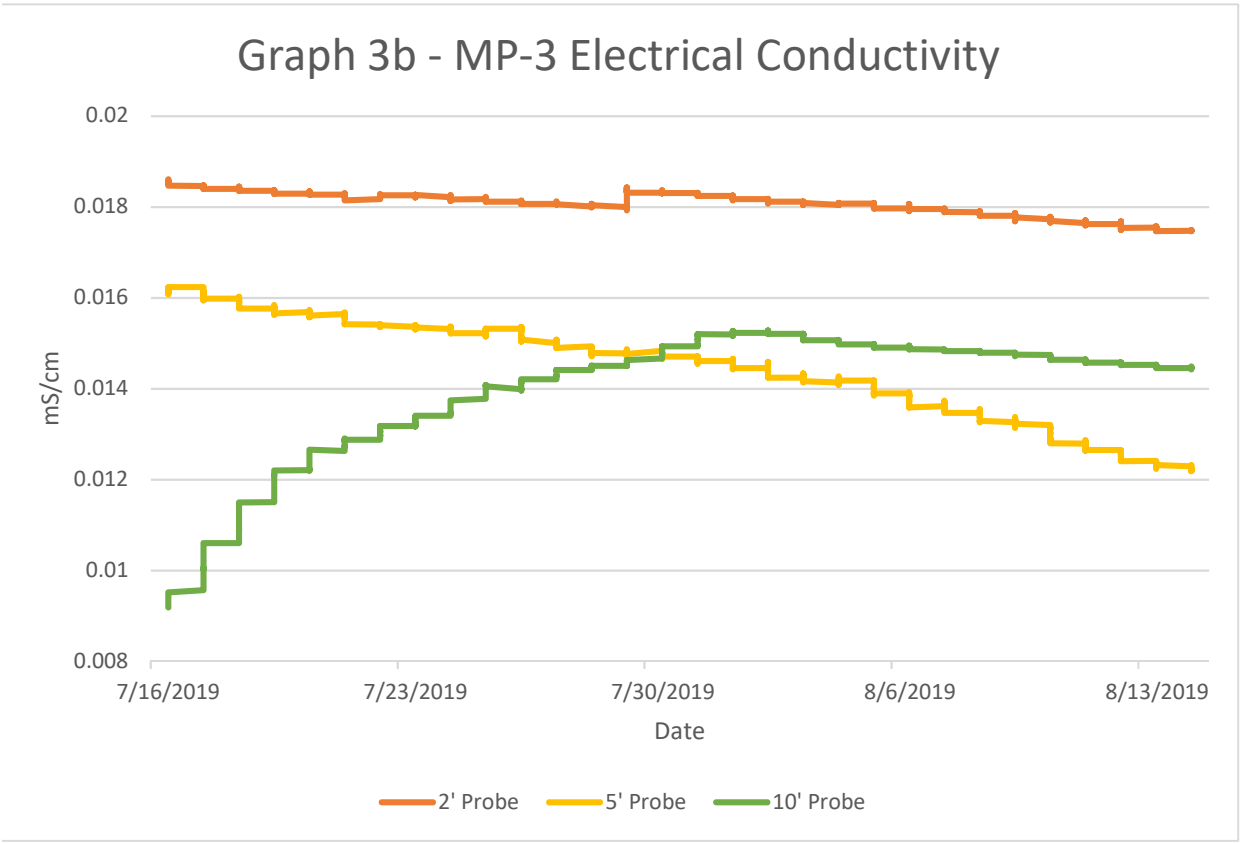

Graph 1a - MP-1 Soil Moisture
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
m³/m³
07/16/19
07/23/19
07/30/19
08/06/19
08/13/19
Date
2' Probe
5' Probe
10' Probe

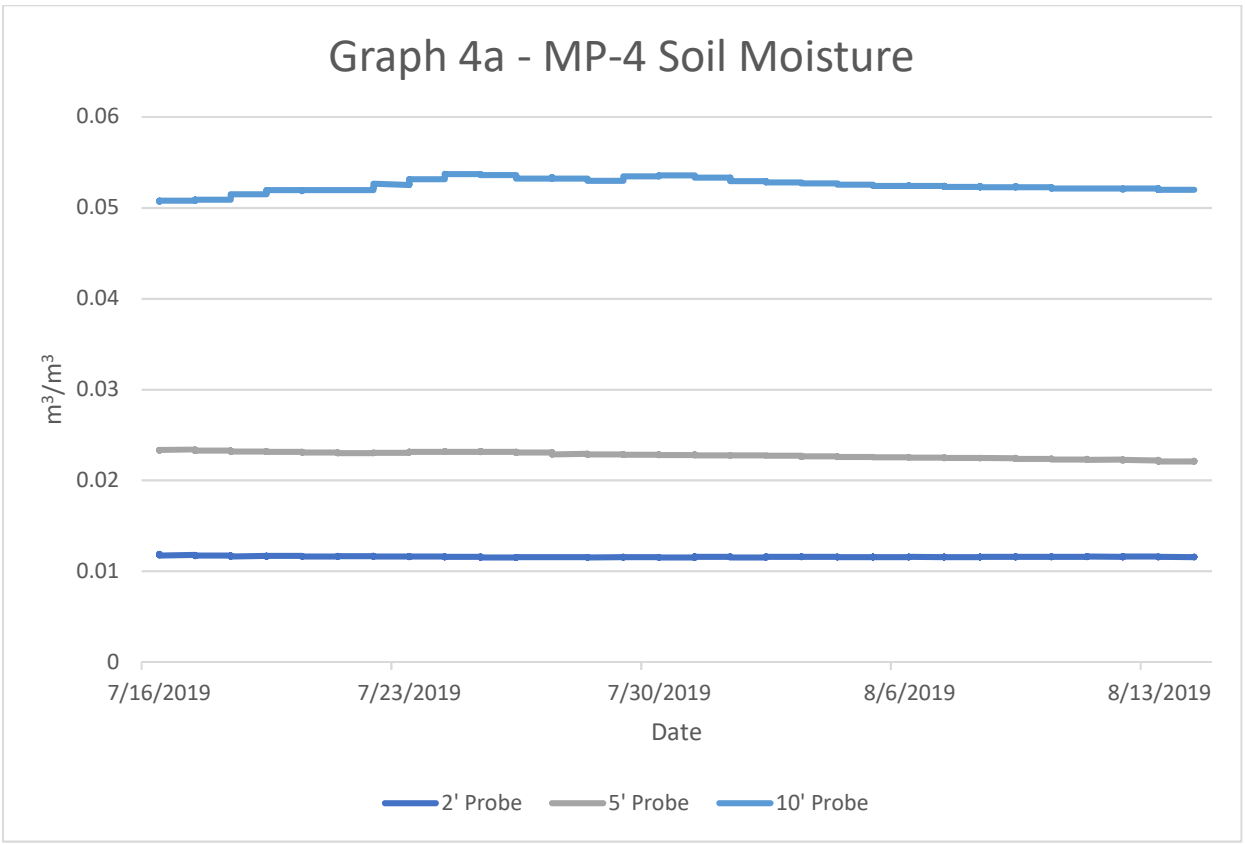

Graph 1b - MP-1 Electrical Conductivity
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
mS/cm
07/16/19
07/23/19
07/30/19
08/06/19
08/13/19
Date
2' Probe
5' Probe
10' Probe

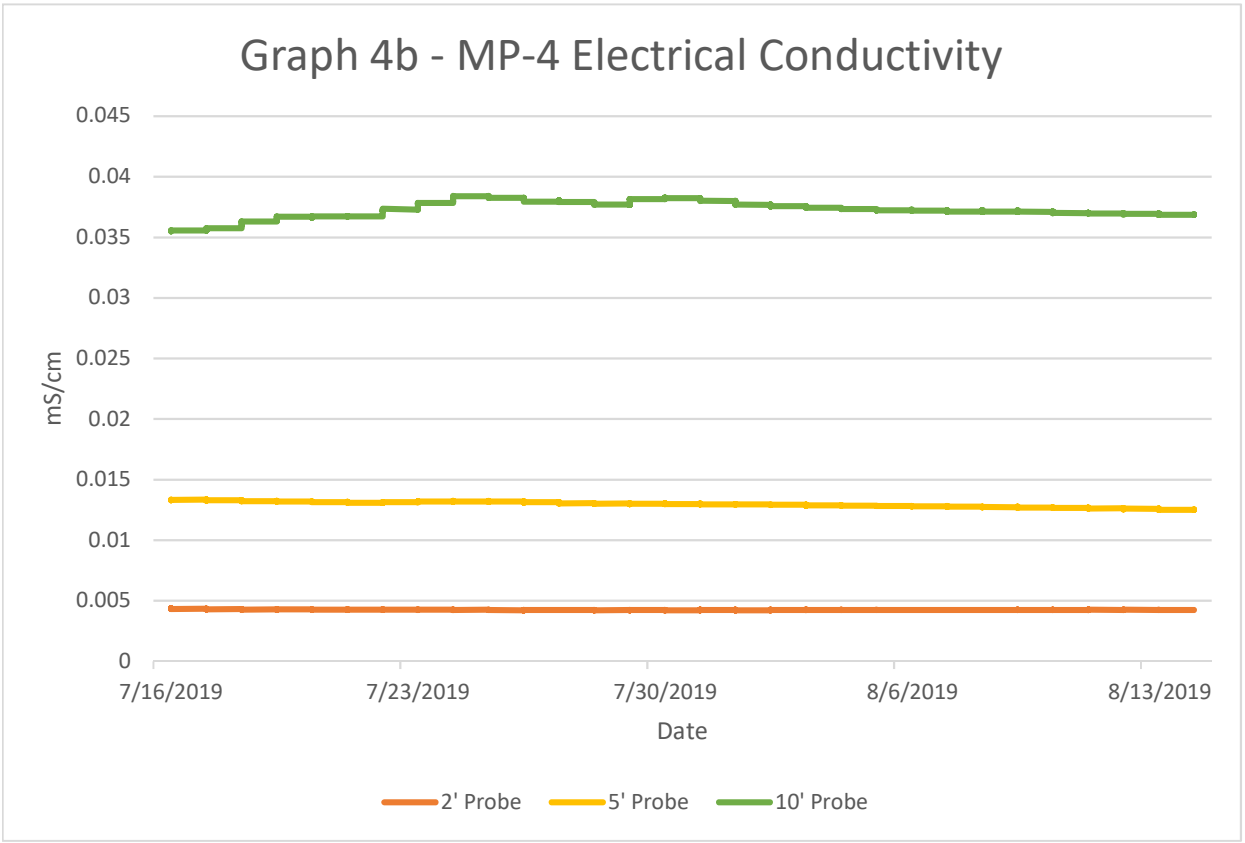

Graph 2a - MP-2 Soil Moisture
0.039
0.037
0.035
0.033
0.031
0.029
0.027
0.025
m³/m³
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

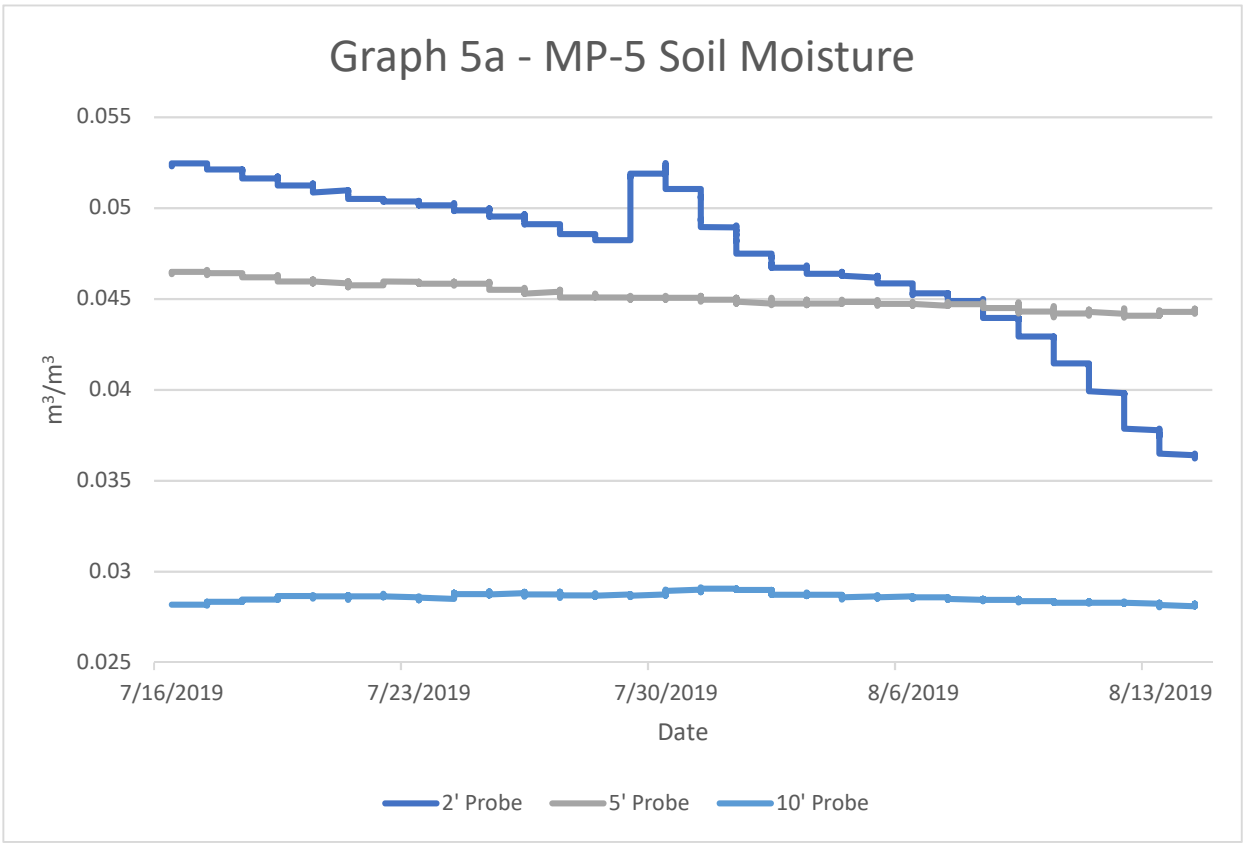

Graph 2b - MP-2 Electrical Conductivity
0.026
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

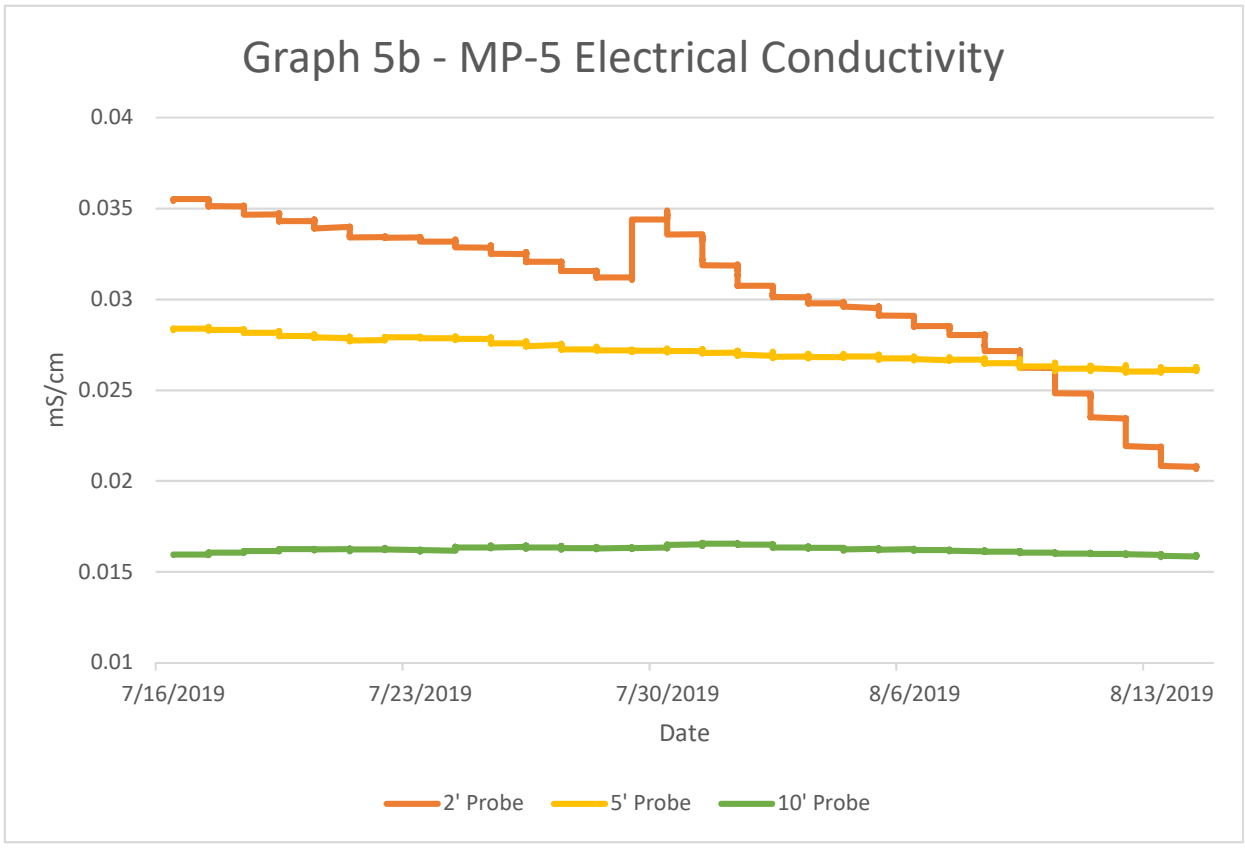

Graph 3a - MP-3 Soil Moisture
0.04
0.035
0.03
0.025
0.02
0.015
m3/m3
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

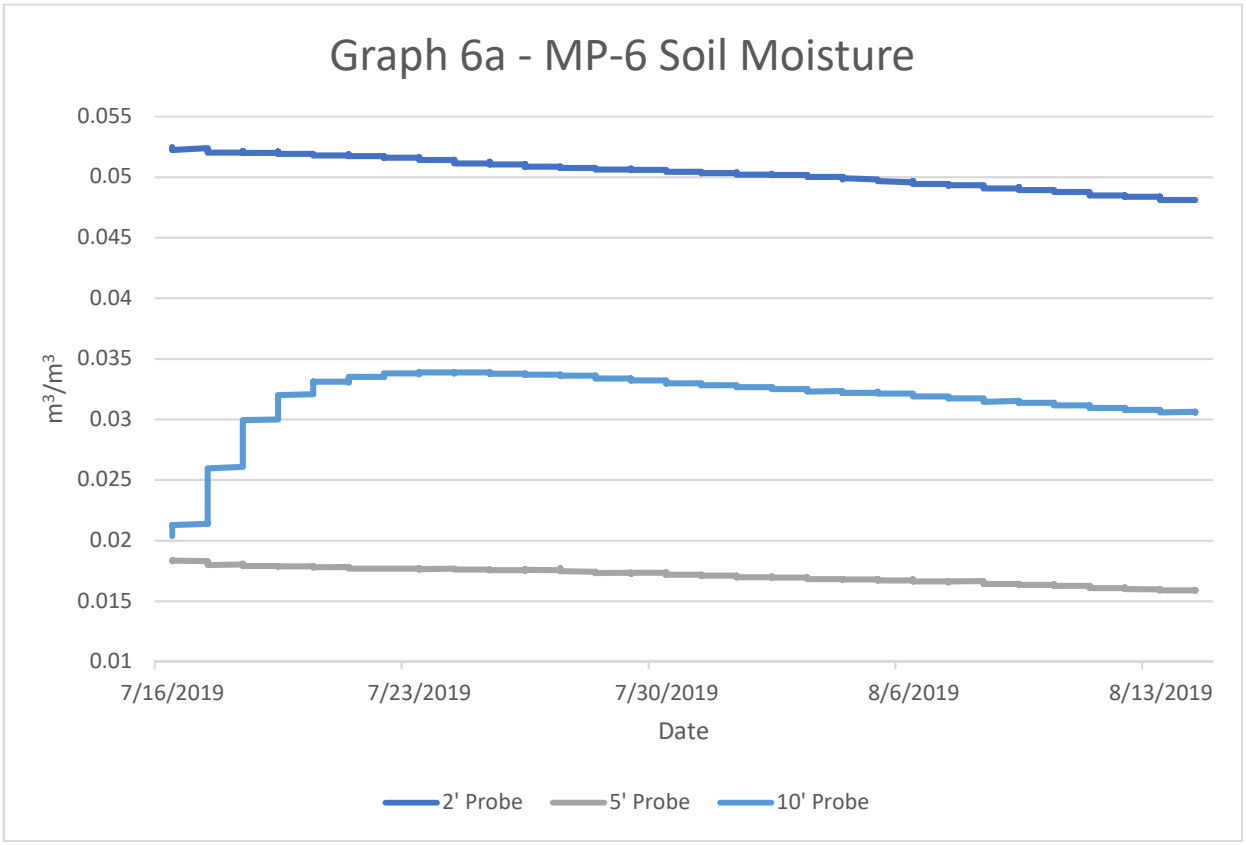

Graph 3b - MP-3 Electrical Conductivity
0.02
0.018
0.016
0.014
0.012
0.01
0.008
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

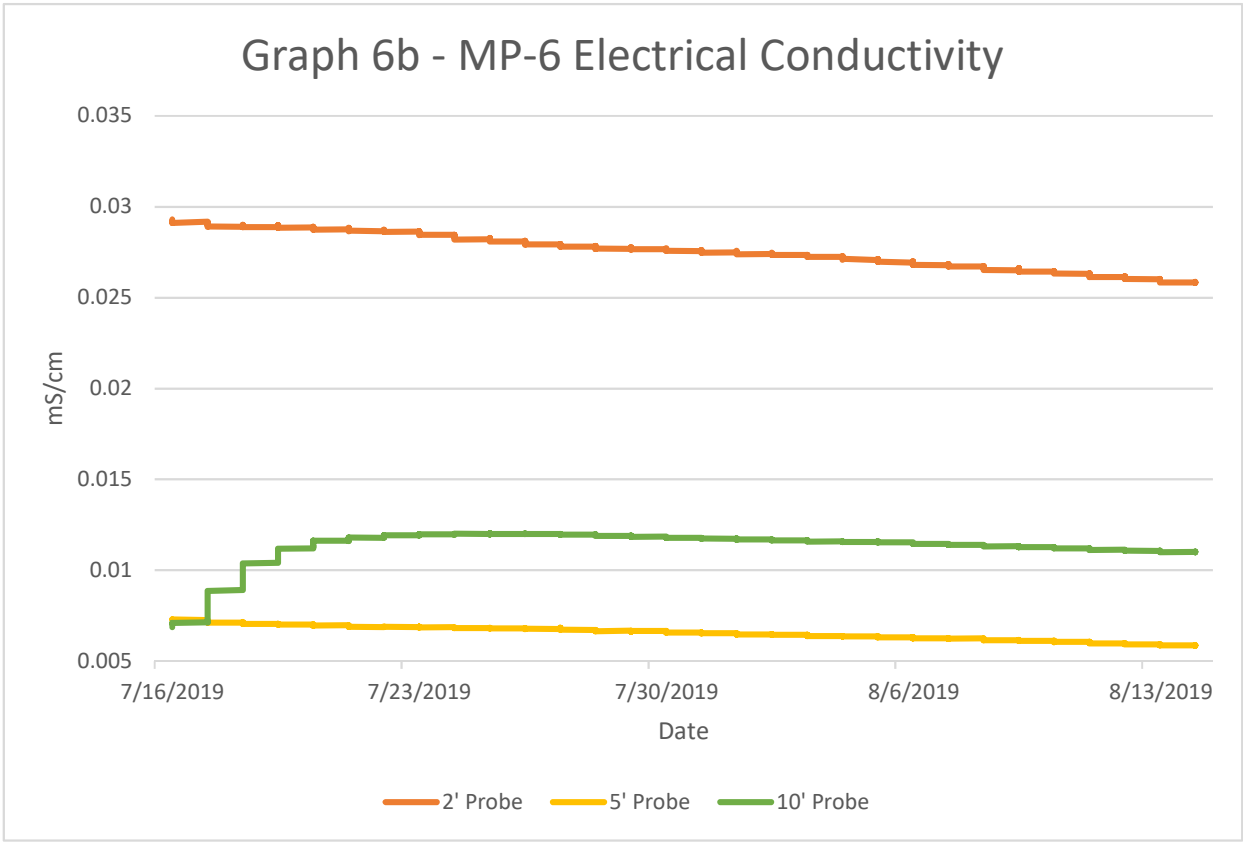

Graph 4a - MP-4 Soil Moisture
0.06
0.05
0.04
0.03
0.02
0.01
0
m³/m³
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

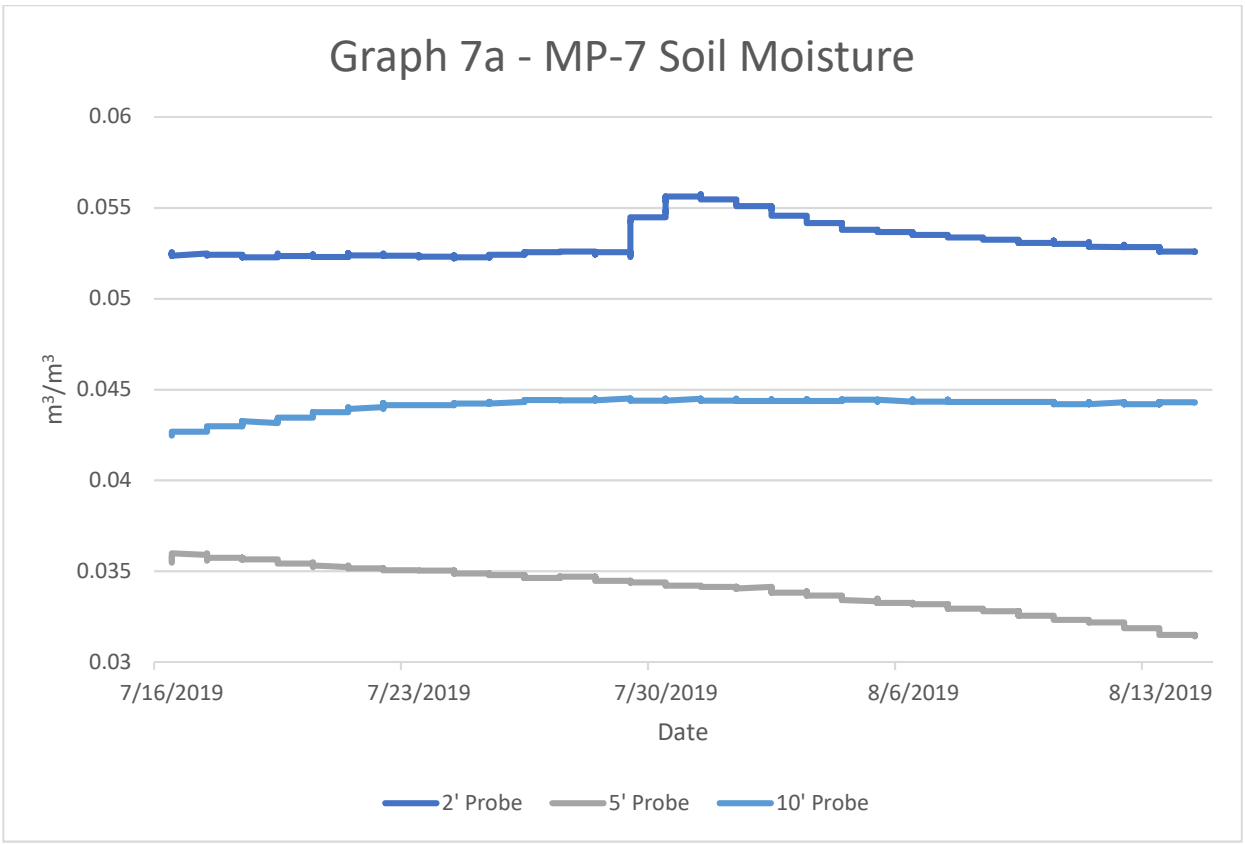

Graph 4b - MP-4 Electrical Conductivity
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

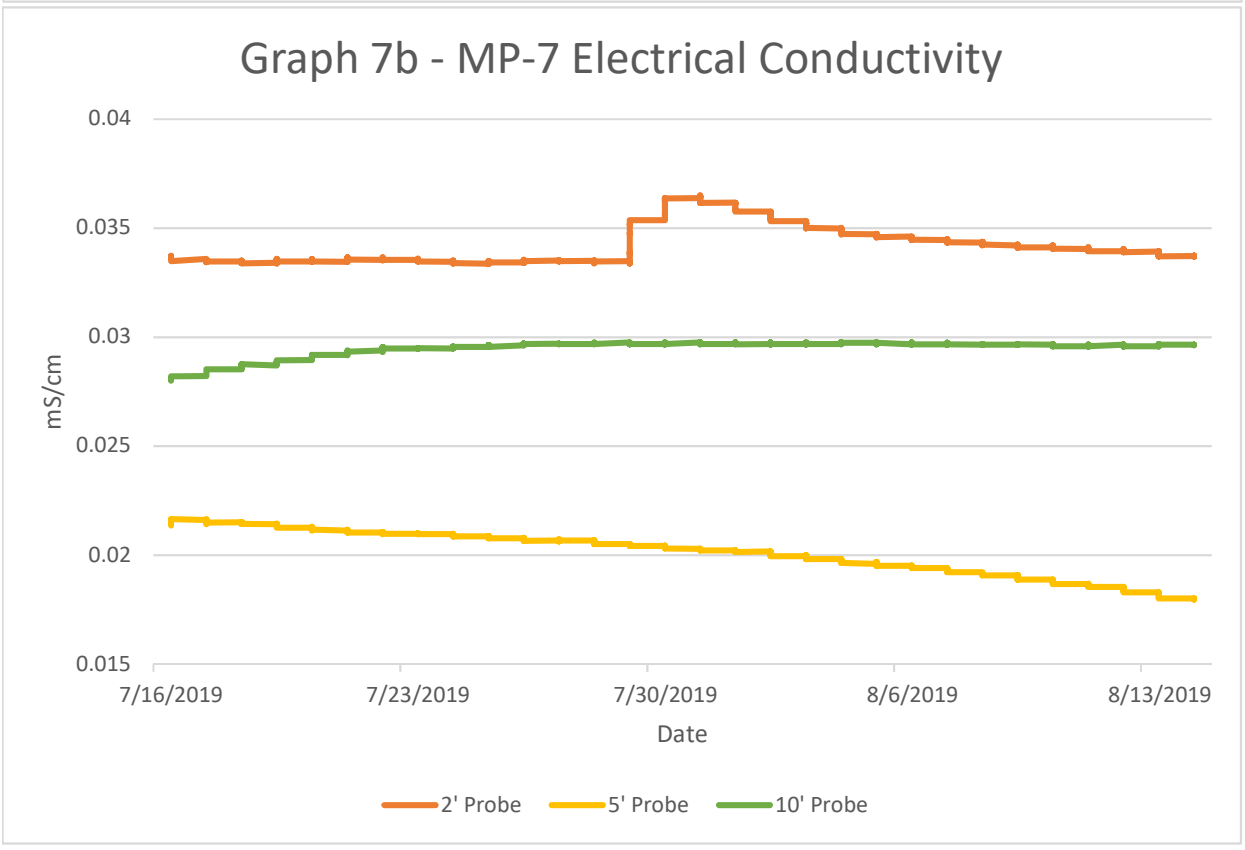

Graph 5a - MP-5 Soil Moisture
0.055
0.05
0.045
0.04
0.035
0.03
0.025
m³/m³
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

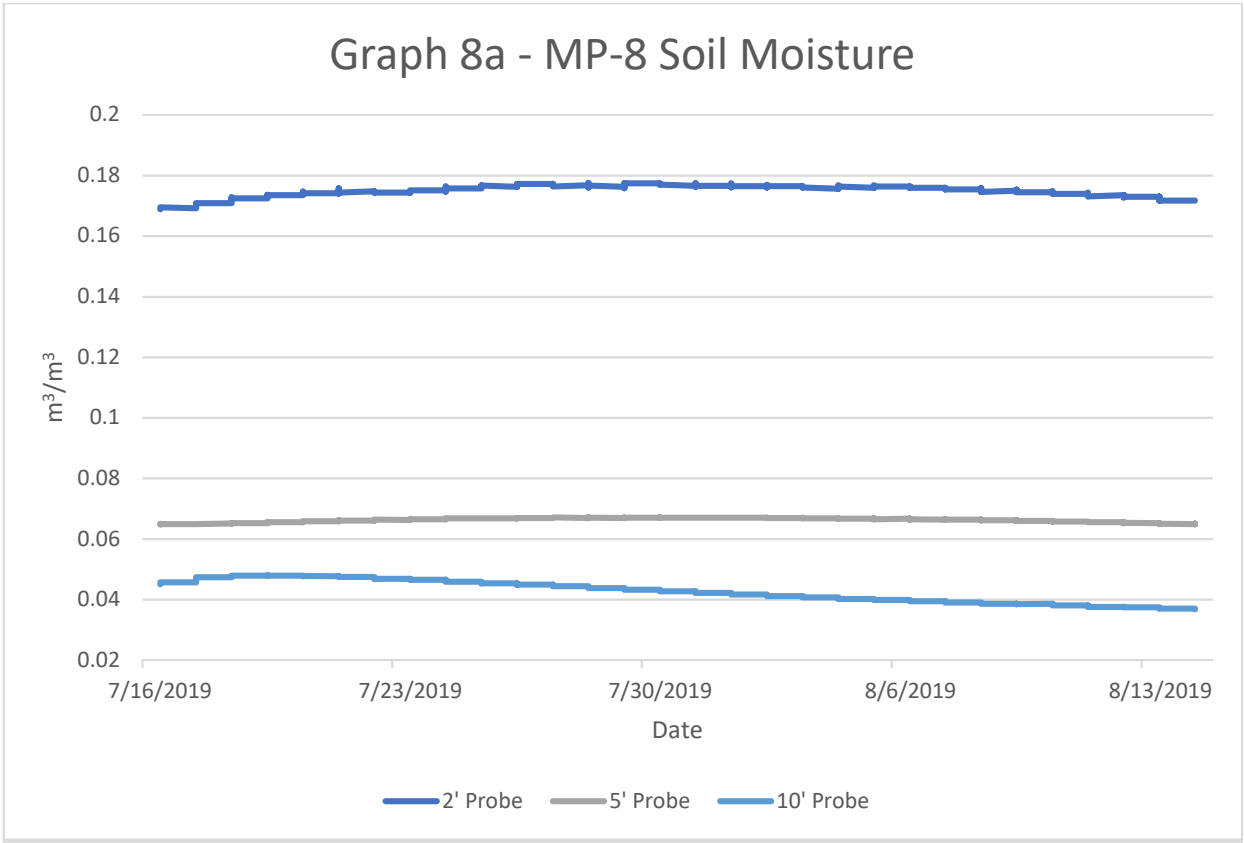

Graph 5b - MP-5 Electrical Conductivity
0.04
0.035
0.03
0.025
0.02
0.015
0.01
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

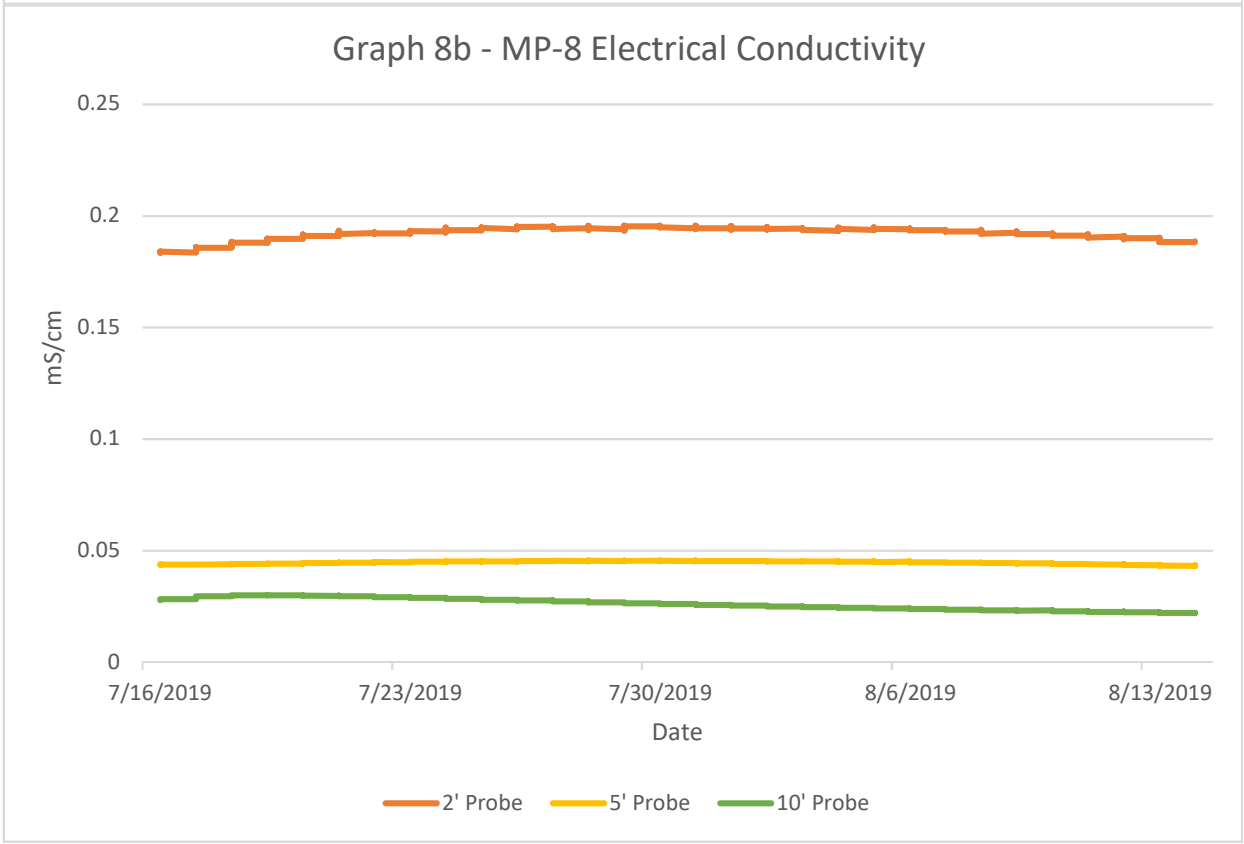

Graph 6a - MP-6 Soil Moisture
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
m3/m3
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe


Graph 6b - MP-6 Electrical Conductivity
0.035
0.03
0.025
0.02
0.015
0.01
0.005
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe


Graph 7a - MP-7 Soil Moisture
0.06
0.055
0.05
0.045
0.04
0.035
0.03
m³/m³
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe


Graph 7b - MP-7 Electrical Conductivity
0.04
0.035
0.03
0.025
0.02
0.015
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe


Graph 8a - MP-8 Soil Moisture
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
m3/m3
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe


Graph 8b - MP-8 Electrical Conductivity
0.25
0.2
0.15
0.1
0.05
0
mS/cm
7/16/2019
7/23/2019
7/30/2019
8/6/2019
8/13/2019
Date
2' Probe
5' Probe
10' Probe

APPENDIX D
LABORATORY ANALYTICAL REPORTS and DATA USABILITY SUMMARY
(electronic)

Data Review Checklist for Groundwater and Soil Samples

Analytical Data Review Checklist				
	Laboratory Name: Pace Analytical			
	Review Date: 8/26/2019			
Project Number/Name: 670318002				
Laboratory Reports Reviewed: L1119017 (Soil) and L1119789 (Groundwater)				
Sample Date(s): July 8 – 17, 2019	Sample matrix: Groundwater and Soil			
Custody Information	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Date and time of sample collection recorded on COC?	Y			
Date and time of sample receipt recorded on COC?	Y			
Field IDs assigned to each sample on COC?	Y			
Sample preservatives correctly?	Y			
Receipt temp between 2 and 6°C?	Y			
Samples received intact and not broken?	Y			
Laboratory Data Package	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Laboratory NELAP accreditation referenced on report?	Y			
Is each sample cross-referenced to laboratory ID?	Y			
Are case narratives, laboratory review checklists, and/or exception reports included, if applicable?	Y			
Analytical & prep methods listed on the report?	Y			
Analytical results reported as quantified or when below MQL reported as estimated concentrations?	Y			
Are MQLs listed for each analyte?	Y			
Are soil samples reported on a dry weight basis?	Y			
Are surrogate recoveries reported?	Y			
Are matrix spike (MS/MSD) results reported from project samples?	Y			
Field blank or trip blank samples submitted?	Y			No trip blanks
Field duplicate samples submitted?	Y			

Analytical Data Review Checklist			Laboratory Name: Pace Analytical	
			Review Date: 8/26/2019	
Project Number/Name: 670318002				
Laboratory Reports Reviewed: L1119017 (Soil) and L1119789 (Groundwater)				
Sample Date(s): July 8 – 17, 2019	Sample matrix: Groundwater and Soil			
Holding times within limits?	Y			
Project Samples	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Are laboratory results sufficient to meet the purpose(s) for which the samples were collected?	Y			
Surrogate recovery (%R) within the lab-defined range?	Y			
Is the RPD, or absolute difference, between field duplicate results within the acceptance criteria?	Y			
Are any project sample results flagged by the laboratory indicating unresolved issues or questionable/unreliable data?	N			
Were there problems or anomalies in the receipt, handling, prep, or analysis of samples?	N			
Did lab take corrective actions in response to problems or anomalies in the receipt/handling/prep/analysis of samples?		NA		
Does the data review address issues identified in the case narrative, laboratory review checklists, or exception reports?		NA		
Field / Laboratory Method Blanks	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Are analytes detected in any blanks?	Y		No	
Are sample results flagged to indicate analytes were detected in an associated blank?	Y		No	
Laboratory Control Samples (LCS/LCSD)	**Y/N**	**NA**	**Affects Usability?**	**Comments**
LCS/LCSD recoveries (%R) within the laboratory defined range?	Y			
LCS/LCSD RPDs within laboratory defined range?	Y			
LCS/LCSD results flagged indicating problems/anomalies not corrected by laboratory?		NA		
Matrix Spike Samples (MS/MSD)	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Were samples from the site used for MS/MSD analysis?	Y			
MS/MSD recoveries (%R) within the laboratory defined range?	N		No	1.
MS/MSD RPDs within laboratory defined range?	Y			

Analytical Data Review Checklist	Laboratory Name: Pace Analytical Review Date: 8/26/2019
Project Number/Name: 670318002	
Laboratory Reports Reviewed: L1119017 (Soil) and L1119789 (Groundwater)	
Sample Date(s): July 8 – 17, 2019	Sample matrix: Groundwater and Soil

MS/MSD results flagged indicating problems/anomalies not corrected by laboratory?		NA		
Laboratory Duplicates	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Are laboratory duplicates within laboratory defined range?	Y			
Are laboratory duplicate results flagged indicating problems and/or anomalies not corrected by laboratory?	N			
Supplemental Review	**Y/N**	**NA**	**Affects Usability?**	**Comments**
Does the above review indicate systematic problems warrant supplemental review of raw data to determine the data usability?	N			
Were other data usability checklists used to perform further or supplemental review?	N			

Comments / Qualifiers Attached to Data

Data Qualifiers:
B: The same analyte is found in the associated blank.
E: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J: The identification of the analyte is acceptable; the reported value is an estimate.
J3: The associated batch QC was outside the established quality control range for precision.
J6: The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
P1: RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V: The sample concentration is too high to evaluate accurate spike recoveries.
Notes:
1. Batches outside establish control limits listed on Laboratory Review Checklist: Exception Reports

Laboratory Usability Review Attachments	Y/N	NA	Affects Usability?	Comments
Laboratory Data Package	Y			
Data Package Review Conducted By: Casey Richards	Review Date: 8/26/2019			

Revised: 11-17-14

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 24, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1119009
Samples Received:	07/16/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Jordan N Zito
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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MP-5 (2') L1119009-01 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1314814	1	07/22/19 08:25	07/22/19 08:36	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 13:00	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 20:51	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 17:49	JPD	Mt. Juliet, TN

MP-5 (2') L1119009-02 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:32	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 14:52	JPD	Mt. Juliet, TN

MP-5 (5') L1119009-03 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1314814	1	07/22/19 08:25	07/22/19 08:36	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 14:05	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:02	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:22	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:05	JPD	Mt. Juliet, TN

MP-5 (5') L1119009-04 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:35	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 14:55	JPD	Mt. Juliet, TN

MP-5 (10') L1119009-05 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1314814	1	07/22/19 08:25	07/22/19 08:36	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 14:31	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:05	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:25	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:08	JPD	Mt. Juliet, TN

MP-5 (10') L1119009-06 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:37	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 14:58	JPD	Mt. Juliet, TN

MP-6 (2') L1119009-07 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:50 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1314814	1	07/22/19 08:25	07/22/19 08:36	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 14:44	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	20	07/18/19 09:30	07/18/19 14:57	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:12	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:18	JPD	Mt. Juliet, TN

MP-6 (2') L1119009-08 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:50 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:45	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:08	JPD	Mt. Juliet, TN

MP-6 (5') L1119009-09 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1314814	1	07/22/19 08:25	07/22/19 08:36	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 15:10	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	10	07/18/19 09:30	07/18/19 19:55	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:15	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:22	JPD	Mt. Juliet, TN

MP-6 (5') L1119009-10 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:48	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:12	JPD	Mt. Juliet, TN

MP-6 (10') L1119009-11 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315306	1	07/22/19 15:03	07/22/19 15:13	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 15:23	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	20	07/18/19 09:30	07/18/19 15:36	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:18	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:28	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:25	JPD	Mt. Juliet, TN

MP-6 (10') L1119009-12 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:50	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:15	JPD	Mt. Juliet, TN

MP-8 (2') L1119009-13 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:10 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315306	1	07/22/19 15:03	07/22/19 15:13	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 15:49	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	5	07/18/19 09:30	07/18/19 16:02	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:20	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:28	JPD	Mt. Juliet, TN

MP-8 (2') L1119009-14 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:10 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:53	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:18	JPD	Mt. Juliet, TN

MP-8 (5') L1119009-15 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:15 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315306	1	07/22/19 15:03	07/22/19 15:13	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 16:40	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	5	07/18/19 09:30	07/18/19 20:08	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:22	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:32	JPD	Mt. Juliet, TN

MP-8 (5') L1119009-16 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:15 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:55	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:22	JPD	Mt. Juliet, TN

MP-8 (10') L1119009-17 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315306	1	07/22/19 15:03	07/22/19 15:13	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 16:53	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	5	07/18/19 09:30	07/18/19 17:06	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:25	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:35	JPD	Mt. Juliet, TN

MP-8 (10') L1119009-18 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:23	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:25	JPD	Mt. Juliet, TN

MP-5 (2') L1119009-19 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 17:42	07/20/19 17:42	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:17	07/22/19 20:17	JER	Mt. Juliet, TN

MP-5 (5') L1119009-20 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 18:27	07/20/19 18:27	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:20	07/22/19 20:20	JER	Mt. Juliet, TN

MP-5 (10') L1119009-21 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 18:42	07/20/19 18:42	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	5	07/20/19 18:57	07/20/19 18:57	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:23	07/22/19 20:23	JER	Mt. Juliet, TN

MP-6 (2') L1119009-22 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:50 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 19:12	07/20/19 19:12	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	10	07/21/19 19:48	07/21/19 19:48	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:24	07/22/19 20:24	JER	Mt. Juliet, TN

MP-6 (5') L1119009-23 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 08:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 19:42	07/20/19 19:42	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	10	07/20/19 19:57	07/20/19 19:57	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:26	07/22/19 20:26	JER	Mt. Juliet, TN

MP-6 (10') L1119009-24 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 20:12	07/20/19 20:12	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	20	07/21/19 20:03	07/21/19 20:03	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:33	07/22/19 20:33	JER	Mt. Juliet, TN

MP-8 (2') L1119009-25 WW

Collected by: Sam McMahan
Collected date/time: 07/12/19 09:10
Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 20:41	07/20/19 20:41	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	5	07/20/19 21:26	07/20/19 21:26	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:35	07/22/19 20:35	JER	Mt. Juliet, TN

MP-8 (5') L1119009-26 WW

Collected by: Sam McMahan
Collected date/time: 07/12/19 09:15
Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 21:41	07/20/19 21:41	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	5	07/20/19 21:56	07/20/19 21:56	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:36	07/22/19 20:36	JER	Mt. Juliet, TN

MP-8 (10') L1119009-27 WW

Collected by: Sam McMahan
Collected date/time: 07/12/19 09:20
Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313885	1	07/18/19 16:46	07/18/19 16:46	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 22:11	07/20/19 22:11	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	5	07/20/19 22:26	07/20/19 22:26	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:38	07/22/19 20:38	JER	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.

Jordan N Zito
Project Manager

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Jordan N Zito
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:48
Project Name: Navajo RO Fields	Laboratory Job Number: L1119009-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1312635, WG1313961, WG1313999, WG1314000, WG1314701, WG1313957, WG1314626, WG1314814, WG1315306, WG1312814 and WG1313885

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		X			1
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?	X				
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?	X				
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			2
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?		X			3
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:48
Project Name: Navajo RO Fields	Laboratory Job Number: L1119009-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1312635, WG1313961, WG1313999, WG1314000, WG1314701, WG1313957, WG1314626, WG1314814, WG1315306, WG1312814 and WG1313885

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?			X		
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?			X		
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		X			4
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:48
Project Name: Navajo RO Fields	Laboratory Job Number: L1119009-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1312635, WG1313961, WG1313999, WG1314000, WG1314701, WG1313957, WG1314626, WG1314814, WG1315306, WG1312814 and WG1313885

ER #[1]	Description
1	WG1312635 R3432130-3: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
2	6010B WG1314000 Calcium, Iron, Magnesium, Potassium: Percent Recovery is outside of established control limits. 300.0 WG1312635 Fluoride: Percent Recovery is outside of established control limits.
3	300.0 WG1312635 Chloride, Fluoride, Nitrate-Nitrite, Sulfate: Relative Percent Difference is outside of established control limits. 300.0 WG1314701 Chloride, Sulfate: Relative Percent Difference is outside of established control limits.
4	6010B WG1313957 Magnesium, Potassium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits. 6010B WG1314000 Calcium, Iron, Lead, Magnesium, Manganese, Potassium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits.

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.2		1	07/22/2019 08:36	WG1314814

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	26.4		0.945	10.0	11.9	1	07/18/2019 13:00	WG1312635
Fluoride	24.4	J6	0.310	1.00	1.19	1	07/18/2019 13:00	WG1312635
Nitrate-Nitrite	5.86		0.128	2.00	2.38	1	07/18/2019 13:00	WG1312635
Sulfate	560		0.677	50.0	59.4	1	07/18/2019 13:00	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.43		0.546	2.00	2.38	1	07/19/2019 20:51	WG1314000
Boron	9.13	J	1.50	10.0	11.9	1	07/19/2019 20:51	WG1314000
Calcium	81600	O1 V	5.50	100	119	1	07/19/2019 20:51	WG1314000
Cobalt	7.67		0.273	1.00	1.19	1	07/19/2019 20:51	WG1314000
Iron	18100	O1 V	1.67	10.0	11.9	1	07/19/2019 20:51	WG1314000
Lead	14.4	O1	0.226	0.500	0.594	1	07/19/2019 20:51	WG1314000
Magnesium	12500	O1 V	1.32	100	119	1	07/19/2019 20:51	WG1314000
Manganese	381	O1	0.143	1.00	1.19	1	07/19/2019 20:51	WG1314000
Potassium	6830	O1 V	12.2	100	119	1	07/19/2019 20:51	WG1314000
Sodium	269	B	11.7	100	119	1	07/19/2019 20:51	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.786	J	0.0950	1.00	5.94	5	07/19/2019 17:49	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.16		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.119	B J	0.0126	0.200	0.200	1	07/21/2019 22:32	WG1313957
Calcium	23.5		0.0463	1.00	1.00	1	07/21/2019 22:32	WG1313957
Iron	0.174		0.0141	0.100	0.100	1	07/21/2019 22:32	WG1313957
Magnesium	5.80		0.0111	1.00	1.00	1	07/21/2019 22:32	WG1313957
Potassium	1.34	B	0.102	1.00	1.00	1	07/21/2019 22:32	WG1313957
Sodium	19.3		0.0985	1.00	1.00	1	07/21/2019 22:32	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00383		0.000250	0.00200	0.00200	1	07/19/2019 14:52	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 14:52	WG1313961
Lead	0.00107	B J	0.000240	0.00200	0.00200	1	07/19/2019 14:52	WG1313961
Manganese	0.00385	J	0.000250	0.00500	0.00500	1	07/19/2019 14:52	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 14:52	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.8		1	07/22/2019 08:36	WG1314814

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	40.0	P1	0.949	10.0	11.9	1	07/18/2019 14:05	WG1312635
Fluoride	15.6		0.311	1.00	1.19	1	07/18/2019 14:05	WG1312635
Nitrate-Nitrite	3.87		0.128	2.00	2.39	1	07/18/2019 14:05	WG1312635
Sulfate	668		0.680	50.0	59.7	1	07/18/2019 14:05	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.96		0.549	2.00	2.39	1	07/19/2019 21:02	WG1314000
Boron	7.08	J	1.50	10.0	11.9	1	07/19/2019 21:02	WG1314000
Calcium	144000		27.6	100	597	5	07/21/2019 14:22	WG1314000
Cobalt	5.46		0.274	1.00	1.19	1	07/19/2019 21:02	WG1314000
Iron	11700		1.68	10.0	11.9	1	07/19/2019 21:02	WG1314000
Lead	7.09		0.227	0.500	0.597	1	07/19/2019 21:02	WG1314000
Magnesium	8970		1.32	100	119	1	07/19/2019 21:02	WG1314000
Manganese	309		0.143	1.00	1.19	1	07/19/2019 21:02	WG1314000
Potassium	4590		12.2	100	119	1	07/19/2019 21:02	WG1314000
Sodium	289	B	11.8	100	119	1	07/19/2019 21:02	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.771	J	0.0954	1.00	5.97	5	07/19/2019 18:05	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.32		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.378		0.0126	0.200	0.200	1	07/21/2019 22:35	WG1313957
Calcium	31.3		0.0463	1.00	1.00	1	07/21/2019 22:35	WG1313957
Iron	0.0308	J	0.0141	0.100	0.100	1	07/21/2019 22:35	WG1313957
Magnesium	7.55		0.0111	1.00	1.00	1	07/21/2019 22:35	WG1313957
Potassium	0.450	B J	0.102	1.00	1.00	1	07/21/2019 22:35	WG1313957
Sodium	55.2		0.0985	1.00	1.00	1	07/21/2019 22:35	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00121	J	0.000250	0.00200	0.00200	1	07/19/2019 14:55	WG1313961
Cobalt	0.000266	J	0.000260	0.00200	0.00200	1	07/19/2019 14:55	WG1313961
Lead	0.00176	B J	0.000240	0.00200	0.00200	1	07/19/2019 14:55	WG1313961
Manganese	0.000721	J	0.000250	0.00500	0.00500	1	07/19/2019 14:55	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 14:55	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.7		1	07/22/2019 08:36	WG1314814

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	50.8		0.950	10.0	11.9	1	07/18/2019 14:31	WG1312635
Fluoride	14.5		0.312	1.00	1.19	1	07/18/2019 14:31	WG1312635
Nitrate-Nitrite	U		0.128	2.00	2.39	1	07/18/2019 14:31	WG1312635
Sulfate	1070		0.681	50.0	59.7	1	07/18/2019 14:31	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.05		0.549	2.00	2.39	1	07/19/2019 21:05	WG1314000
Boron	5.20	J	1.51	10.0	11.9	1	07/19/2019 21:05	WG1314000
Calcium	156000		27.7	100	597	5	07/21/2019 14:25	WG1314000
Cobalt	4.02		0.275	1.00	1.19	1	07/19/2019 21:05	WG1314000
Iron	8520		1.68	10.0	11.9	1	07/19/2019 21:05	WG1314000
Lead	3.86		0.227	0.500	0.597	1	07/19/2019 21:05	WG1314000
Magnesium	6850		1.33	100	119	1	07/19/2019 21:05	WG1314000
Manganese	316		0.143	1.00	1.19	1	07/19/2019 21:05	WG1314000
Potassium	2920		12.2	100	119	1	07/19/2019 21:05	WG1314000
Sodium	204	B	11.8	100	119	1	07/19/2019 21:05	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.643	J	0.0956	1.00	5.97	5	07/19/2019 18:08	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.68		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0877	B J	0.0126	0.200	0.200	1	07/21/2019 22:37	WG1313957
Calcium	48.8		0.0463	1.00	1.00	1	07/21/2019 22:37	WG1313957
Iron	0.0160	J	0.0141	0.100	0.100	1	07/21/2019 22:37	WG1313957
Magnesium	9.35		0.0111	1.00	1.00	1	07/21/2019 22:37	WG1313957
Potassium	0.646	B J	0.102	1.00	1.00	1	07/21/2019 22:37	WG1313957
Sodium	14.8		0.0985	1.00	1.00	1	07/21/2019 22:37	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00171	J	0.000250	0.00200	0.00200	1	07/19/2019 14:58	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 14:58	WG1313961
Lead	0.000460	B J	0.000240	0.00200	0.00200	1	07/19/2019 14:58	WG1313961
Manganese	0.00111	J	0.000250	0.00500	0.00500	1	07/19/2019 14:58	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 14:58	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.2		1	07/22/2019 08:36	WG1314814

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	434		0.923	10.0	11.6	1	07/18/2019 14:44	WG1312635
Fluoride	12.2		0.303	1.00	1.16	1	07/18/2019 14:44	WG1312635
Nitrate-Nitrite	U		0.125	2.00	2.32	1	07/18/2019 14:44	WG1312635
Sulfate	9950		13.2	50.0	1160	20	07/18/2019 14:57	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.48		0.534	2.00	2.32	1	07/19/2019 21:12	WG1314000
Boron	12.1		1.46	10.0	11.6	1	07/19/2019 21:12	WG1314000
Calcium	81200		5.37	100	116	1	07/19/2019 21:12	WG1314000
Cobalt	8.89		0.267	1.00	1.16	1	07/19/2019 21:12	WG1314000
Iron	19600		1.64	10.0	11.6	1	07/19/2019 21:12	WG1314000
Lead	13.1		0.220	0.500	0.580	1	07/19/2019 21:12	WG1314000
Magnesium	14400		1.29	100	116	1	07/19/2019 21:12	WG1314000
Manganese	489		0.139	1.00	1.16	1	07/19/2019 21:12	WG1314000
Potassium	7080		11.9	100	116	1	07/19/2019 21:12	WG1314000
Sodium	895		11.4	100	116	1	07/19/2019 21:12	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.767	J	0.0928	1.00	5.80	5	07/19/2019 18:18	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.33		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.167	J	0.0126	0.200	0.200	1	07/21/2019 22:45	WG1313957
Calcium	155		0.0463	1.00	1.00	1	07/21/2019 22:45	WG1313957
Iron	0.0580	J	0.0141	0.100	0.100	1	07/21/2019 22:45	WG1313957
Magnesium	46.6		0.0111	1.00	1.00	1	07/21/2019 22:45	WG1313957
Potassium	5.02		0.102	1.00	1.00	1	07/21/2019 22:45	WG1313957
Sodium	50.6		0.0985	1.00	1.00	1	07/21/2019 22:45	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00121	J	0.000250	0.00200	0.00200	1	07/19/2019 15:08	WG1313961
Cobalt	0.000350	J	0.000260	0.00200	0.00200	1	07/19/2019 15:08	WG1313961
Lead	0.000523	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:08	WG1313961
Manganese	0.00241	J	0.000250	0.00500	0.00500	1	07/19/2019 15:08	WG1313961
Uranium	0.000391	J	0.000330	0.0100	0.0100	1	07/19/2019 15:08	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	74.8		1	07/22/2019 08:36	WG1314814

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	45.9		1.06	10.0	13.4	1	07/18/2019 15:10	WG1312635
Fluoride	14.1		0.349	1.00	1.34	1	07/18/2019 15:10	WG1312635
Nitrate-Nitrite	U		0.143	2.00	2.67	1	07/18/2019 15:10	WG1312635
Sulfate	4840		7.62	50.0	668	10	07/18/2019 19:55	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.49		0.615	2.00	2.67	1	07/19/2019 21:15	WG1314000
Boron	9.56	J	1.68	10.0	13.4	1	07/19/2019 21:15	WG1314000
Calcium	103000		6.19	100	134	1	07/19/2019 21:15	WG1314000
Cobalt	7.28		0.307	1.00	1.34	1	07/19/2019 21:15	WG1314000
Iron	15500		1.88	10.0	13.4	1	07/19/2019 21:15	WG1314000
Lead	7.80		0.254	0.500	0.668	1	07/19/2019 21:15	WG1314000
Magnesium	11100		1.48	100	134	1	07/19/2019 21:15	WG1314000
Manganese	404		0.160	1.00	1.34	1	07/19/2019 21:15	WG1314000
Potassium	5550		13.7	100	134	1	07/19/2019 21:15	WG1314000
Sodium	320	B	13.2	100	134	1	07/19/2019 21:15	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.777	J	0.107	1.00	6.68	5	07/19/2019 18:22	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.41		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.136	B J	0.0126	0.200	0.200	1	07/21/2019 22:48	WG1313957
Calcium	114		0.0463	1.00	1.00	1	07/21/2019 22:48	WG1313957
Iron	U		0.0141	0.100	0.100	1	07/21/2019 22:48	WG1313957
Magnesium	29.4		0.0111	1.00	1.00	1	07/21/2019 22:48	WG1313957
Potassium	1.86		0.102	1.00	1.00	1	07/21/2019 22:48	WG1313957
Sodium	25.6		0.0985	1.00	1.00	1	07/21/2019 22:48	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000630	J	0.000250	0.00200	0.00200	1	07/19/2019 15:12	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:12	WG1313961
Lead	0.000423	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:12	WG1313961
Manganese	0.000607	J	0.000250	0.00500	0.00500	1	07/19/2019 15:12	WG1313961
Uranium	0.000417	J	0.000330	0.0100	0.0100	1	07/19/2019 15:12	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.9		1	07/22/2019 15:13	WG1315306

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	41.3		0.904	10.0	11.4	1	07/18/2019 15:23	WG1312635
Fluoride	16.7		0.297	1.00	1.14	1	07/18/2019 15:23	WG1312635
Nitrate-Nitrite	U		0.122	2.00	2.27	1	07/18/2019 15:23	WG1312635
Sulfate	14900		13.0	50.0	1140	20	07/18/2019 15:36	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.60		0.523	2.00	2.27	1	07/19/2019 21:18	WG1314000
Boron	4.92	J	1.43	10.0	11.4	1	07/19/2019 21:18	WG1314000
Calcium	200000		26.3	100	569	5	07/21/2019 14:28	WG1314000
Cobalt	3.46		0.262	1.00	1.14	1	07/19/2019 21:18	WG1314000
Iron	8290		1.60	10.0	11.4	1	07/19/2019 21:18	WG1314000
Lead	3.57		0.216	0.500	0.569	1	07/19/2019 21:18	WG1314000
Magnesium	7390		1.26	100	114	1	07/19/2019 21:18	WG1314000
Manganese	476		0.136	1.00	1.14	1	07/19/2019 21:18	WG1314000
Potassium	2920		11.6	100	114	1	07/19/2019 21:18	WG1314000
Sodium	275	B	11.2	100	114	1	07/19/2019 21:18	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.641	J	0.0910	1.00	5.69	5	07/19/2019 18:25	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.23		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0775	B J	0.0126	0.200	0.200	1	07/21/2019 22:50	WG1313957
Calcium	475		0.0463	1.00	1.00	1	07/21/2019 22:50	WG1313957
Iron	0.652		0.0141	0.100	0.100	1	07/21/2019 22:50	WG1313957
Magnesium	35.2		0.0111	1.00	1.00	1	07/21/2019 22:50	WG1313957
Potassium	5.14		0.102	1.00	1.00	1	07/21/2019 22:50	WG1313957
Sodium	11.8		0.0985	1.00	1.00	1	07/21/2019 22:50	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00156	J	0.000250	0.00200	0.00200	1	07/19/2019 15:15	WG1313961
Cobalt	0.000503	J	0.000260	0.00200	0.00200	1	07/19/2019 15:15	WG1313961
Lead	0.00273		0.000240	0.00200	0.00200	1	07/19/2019 15:15	WG1313961
Manganese	0.0218		0.000250	0.00500	0.00500	1	07/19/2019 15:15	WG1313961
Uranium	0.000561	J	0.000330	0.0100	0.0100	1	07/19/2019 15:15	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.3		1	07/22/2019 15:13	WG1315306

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	4600		4.71	10.0	59.3	5	07/18/2019 16:02	WG1312635
Fluoride	8.58		0.309	1.00	1.19	1	07/18/2019 15:49	WG1312635
Nitrate-Nitrite	74.9		0.127	2.00	2.37	1	07/18/2019 15:49	WG1312635
Sulfate	1420		3.38	50.0	296	5	07/18/2019 16:02	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.35		0.545	2.00	2.37	1	07/19/2019 21:20	WG1314000
Boron	9.39	J	1.49	10.0	11.9	1	07/19/2019 21:20	WG1314000
Calcium	69900		5.49	100	119	1	07/19/2019 21:20	WG1314000
Cobalt	9.84		0.273	1.00	1.19	1	07/19/2019 21:20	WG1314000
Iron	21400		1.67	10.0	11.9	1	07/19/2019 21:20	WG1314000
Lead	15.5		0.225	0.500	0.593	1	07/19/2019 21:20	WG1314000
Magnesium	15200		1.32	100	119	1	07/19/2019 21:20	WG1314000
Manganese	525		0.142	1.00	1.19	1	07/19/2019 21:20	WG1314000
Potassium	8180		12.1	100	119	1	07/19/2019 21:20	WG1314000
Sodium	1220		11.7	100	119	1	07/19/2019 21:20	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.703	J	0.0949	1.00	5.93	5	07/19/2019 18:28	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.29		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.146	B J	0.0126	0.200	0.200	1	07/21/2019 22:53	WG1313957
Calcium	117		0.0463	1.00	1.00	1	07/21/2019 22:53	WG1313957
Iron	0.0171	J	0.0141	0.100	0.100	1	07/21/2019 22:53	WG1313957
Magnesium	46.9		0.0111	1.00	1.00	1	07/21/2019 22:53	WG1313957
Potassium	10.2		0.102	1.00	1.00	1	07/21/2019 22:53	WG1313957
Sodium	63.7		0.0985	1.00	1.00	1	07/21/2019 22:53	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00116	J	0.000250	0.00200	0.00200	1	07/19/2019 15:18	WG1313961
Cobalt	0.000662	J	0.000260	0.00200	0.00200	1	07/19/2019 15:18	WG1313961
Lead	0.000368	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:18	WG1313961
Manganese	0.00202	J	0.000250	0.00500	0.00500	1	07/19/2019 15:18	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 15:18	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.0		1	07/22/2019 15:13	WG1315306

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	301		0.883	10.0	11.1	1	07/18/2019 16:40	WG1312635
Fluoride	12.2		0.290	1.00	1.11	1	07/18/2019 16:40	WG1312635
Nitrate-Nitrite	U		0.119	2.00	2.22	1	07/18/2019 16:40	WG1312635
Sulfate	2420		3.17	50.0	278	5	07/18/2019 20:08	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.57		0.511	2.00	2.22	1	07/19/2019 21:22	WG1314000
Boron	10.8	J	1.40	10.0	11.1	1	07/19/2019 21:22	WG1314000
Calcium	79900		5.14	100	111	1	07/19/2019 21:22	WG1314000
Cobalt	6.96		0.255	1.00	1.11	1	07/19/2019 21:22	WG1314000
Iron	13100		1.57	10.0	11.1	1	07/19/2019 21:22	WG1314000
Lead	6.27		0.211	0.500	0.555	1	07/19/2019 21:22	WG1314000
Magnesium	14400		1.23	100	111	1	07/19/2019 21:22	WG1314000
Manganese	260		0.133	1.00	1.11	1	07/19/2019 21:22	WG1314000
Potassium	3400		11.4	100	111	1	07/19/2019 21:22	WG1314000
Sodium	546		10.9	100	111	1	07/19/2019 21:22	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.873	J	0.0888	1.00	5.55	5	07/19/2019 18:32	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.51		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.143	B J	0.0126	0.200	0.200	1	07/21/2019 22:55	WG1313957
Calcium	86.1		0.0463	1.00	1.00	1	07/21/2019 22:55	WG1313957
Iron	U		0.0141	0.100	0.100	1	07/21/2019 22:55	WG1313957
Magnesium	28.8		0.0111	1.00	1.00	1	07/21/2019 22:55	WG1313957
Potassium	1.42	B	0.102	1.00	1.00	1	07/21/2019 22:55	WG1313957
Sodium	29.0		0.0985	1.00	1.00	1	07/21/2019 22:55	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00207		0.000250	0.00200	0.00200	1	07/19/2019 15:22	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:22	WG1313961
Lead	U		0.000240	0.00200	0.00200	1	07/19/2019 15:22	WG1313961
Manganese	0.00622		0.000250	0.00500	0.00500	1	07/19/2019 15:22	WG1313961
Uranium	0.000350	J	0.000330	0.0100	0.0100	1	07/19/2019 15:22	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.2		1	07/22/2019 15:13	WG1315306

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	2290		4.96	10.0	62.3	5	07/18/2019 17:06	WG1312635
Fluoride	4.58		0.325	1.00	1.25	1	07/18/2019 16:53	WG1312635
Nitrate-Nitrite	43.4		0.134	2.00	2.49	1	07/18/2019 16:53	WG1312635
Sulfate	2440		3.55	50.0	312	5	07/18/2019 17:06	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.12		0.573	2.00	2.49	1	07/19/2019 21:25	WG1314000
Boron	11.0	J	1.57	10.0	12.5	1	07/19/2019 21:25	WG1314000
Calcium	63800		5.77	100	125	1	07/19/2019 21:25	WG1314000
Cobalt	9.30		0.287	1.00	1.25	1	07/19/2019 21:25	WG1314000
Iron	20900		1.76	10.0	12.5	1	07/19/2019 21:25	WG1314000
Lead	11.6		0.237	0.500	0.623	1	07/19/2019 21:25	WG1314000
Magnesium	14700		1.38	100	125	1	07/19/2019 21:25	WG1314000
Manganese	487		0.150	1.00	1.25	1	07/19/2019 21:25	WG1314000
Potassium	6920		12.8	100	125	1	07/19/2019 21:25	WG1314000
Sodium	1180		12.3	100	125	1	07/19/2019 21:25	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.777	J	0.0997	1.00	6.23	5	07/19/2019 18:35	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.30		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.180	J	0.0126	0.200	0.200	1	07/21/2019 22:23	WG1313957
Calcium	114		0.0463	1.00	1.00	1	07/21/2019 22:23	WG1313957
Iron	0.0508	J	0.0141	0.100	0.100	1	07/21/2019 22:23	WG1313957
Magnesium	54.5	O1	0.0111	1.00	1.00	1	07/21/2019 22:23	WG1313957
Potassium	5.94	O1	0.102	1.00	1.00	1	07/21/2019 22:23	WG1313957
Sodium	61.4		0.0985	1.00	1.00	1	07/21/2019 22:23	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000779	J	0.000250	0.00200	0.00200	1	07/19/2019 15:25	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:25	WG1313961
Lead	0.000303	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:25	WG1313961
Manganese	0.00178	J	0.000250	0.00500	0.00500	1	07/19/2019 15:25	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 15:25	WG1313961

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.10		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	1.51		0.0519	1.00	1.00	1	07/20/2019 17:42	WG1314701
Fluoride	2.83		0.00990	0.100	0.100	1	07/20/2019 17:42	WG1314701
Sulfate	45.5		0.0774	5.00	5.00	1	07/20/2019 17:42	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.198		0.0197	0.100	0.100	1	07/22/2019 20:17	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.52		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	4.50		0.0519	1.00	1.00	1	07/20/2019 18:27	WG1314701
Fluoride	2.11		0.00990	0.100	0.100	1	07/20/2019 18:27	WG1314701
Sulfate	72.3		0.0774	5.00	5.00	1	07/20/2019 18:27	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0370	J	0.0197	0.100	0.100	1	07/22/2019 20:20	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.15		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.27		0.0519	1.00	1.00	1	07/20/2019 18:42	WG1314701
Fluoride	1.83		0.00990	0.100	0.100	1	07/20/2019 18:42	WG1314701
Sulfate	156		0.387	5.00	25.0	5	07/20/2019 18:57	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:23	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	7.91		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	18.2		0.0519	1.00	1.00	1	07/20/2019 19:12	WG1314701
Fluoride	1.14		0.00990	0.100	0.100	1	07/20/2019 19:12	WG1314701
Sulfate	647		0.774	5.00	50.0	10	07/21/2019 19:48	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0450	J	0.0197	0.100	0.100	1	07/22/2019 20:24	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.18		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	3.67		0.0519	1.00	1.00	1	07/20/2019 19:42	WG1314701
Fluoride	1.28		0.00990	0.100	0.100	1	07/20/2019 19:42	WG1314701
Sulfate	459		0.774	5.00	50.0	10	07/20/2019 19:57	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:26	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.12		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	1.92		0.0519	1.00	1.00	1	07/20/2019 20:12	WG1314701
Fluoride	1.46		0.00990	0.100	0.100	1	07/20/2019 20:12	WG1314701
Sulfate	1390		1.55	5.00	100	20	07/21/2019 20:03	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:33	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.26		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	211		0.260	1.00	5.00	5	07/20/2019 21:26	WG1314701
Fluoride	0.763		0.00990	0.100	0.100	1	07/20/2019 20:41	WG1314701
Sulfate	250		0.387	5.00	25.0	5	07/20/2019 21:26	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	2.07		0.0197	0.100	0.100	1	07/22/2019 20:35	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.39		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	19.4		0.0519	1.00	1.00	1	07/20/2019 21:41	WG1314701
Fluoride	1.65		0.00990	0.100	0.100	1	07/20/2019 21:41	WG1314701
Sulfate	361		0.387	5.00	25.0	5	07/20/2019 21:56	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0890	J	0.0197	0.100	0.100	1	07/22/2019 20:36	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:46:56 PM	WG1313885
Fluid	3		7/18/2019 4:46:56 PM	WG1313885
Final pH	8.37		7/18/2019 4:46:56 PM	WG1313885

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	84.3		0.0519	1.00	1.00	1	07/20/2019 22:11	WG1314701
Fluoride	0.511		0.00990	0.100	0.100	1	07/20/2019 22:11	WG1314701
Sulfate	415		0.387	5.00	25.0	5	07/20/2019 22:26	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.807		0.0197	0.100	0.100	1	07/22/2019 20:38	WG1314626

Method Blank (MB)

(MB) R3433270-1 07/22/19 08:36

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1119009-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-07 07/22/19 08:36 • (DUP) R3433270-3 07/22/19 08:36

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	86.2	86.0	1	0.250		10

Laboratory Control Sample (LCS)

(LCS) R3433270-2 07/22/19 08:36

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3433307-1 07/22/19 15:13

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1119009-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-11 07/22/19 15:13 • (DUP) R3433307-3 07/22/19 15:13

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	87.9	87.7	1	0.271		10

Laboratory Control Sample (LCS)

(LCS) R3433307-2 07/22/19 15:13

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3432130-1 07/18/19 10:44

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	0.852	J	0.795	10.0
Fluoride	U		0.261	1.00
Nitrate-Nitrite	U		0.107	2.00
Sulfate	U		0.570	50.0

L1119009-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-03 07/18/19 14:05 • (DUP) R3432130-5 07/18/19 14:18

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	40.0	53.0	1	28.0	P1	20
Fluoride	15.6	17.4	1	10.8		20
Nitrate-Nitrite	3.87	3.80	1	1.57		20
Sulfate	668	752	1	11.8		20

L1119017-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-09 07/18/19 19:29 • (DUP) R3432130-6 07/18/19 19:42

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	102	96.4	1	5.28		20
Fluoride	14.9	11.9	1	22.5	J3	20
Nitrate-Nitrite	0.888	0.000	1	200	P1	20

L1119017-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-09 07/18/19 22:33 • (DUP) R3432130-7 07/18/19 22:46

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	2370	1900	5	21.7	J3	20

Laboratory Control Sample (LCS)

(LCS) R3432130-2 07/18/19 10:56

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	205	102	90.0-110	
Fluoride	20.0	20.7	103	90.0-110	
Nitrate-Nitrite	40.0	41.9	105	90.0-110	
Sulfate	200	201	101	90.0-110	

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/18/19 13:00 • (MS) R3432130-3 07/18/19 13:13 • (MSD) R3432130-4 07/18/19 13:26

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	594	26.4	616	617	99.2	99.5	1	80.0-120			0.222	20
Fluoride	59.4	24.4	67.8	68.5	73.0	74.2	1	80.0-120	J6	J6	1.03	20
Nitrate-Nitrite	119	5.86	124	124	99.3	99.5	1	80.0-120			0.264	20
Sulfate	594	560	1220	1180	112	104	1	80.0-120	E		3.67	20

Method Blank (MB)

(MB) R3432721-1 07/20/19 15:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1118327-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1118327-01 07/20/19 15:58 • (DUP) R3432721-3 07/20/19 16:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	9.03	9.08	1	0.585		20
Fluoride	0.773	0.772	1	0.181		20
Sulfate	9.63	9.60	1	0.367		20

L1119038-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-07 07/21/19 01:10 • (DUP) R3432721-6 07/21/19 01:25

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	0.428	0.332	1	25.5	J P1	20
Fluoride	U	0.000	1	0.000		20
Sulfate	0.669	0.540	1	21.3	J P1	20

Laboratory Control Sample (LCS)

(LCS) R3432721-2 07/20/19 15:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.7	99.2	90.0-110	
Fluoride	8.00	8.19	102	90.0-110	
Sulfate	40.0	41.4	104	90.0-110	

L1118327-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1118327-01 07/20/19 15:58 • (MS) R3432721-4 07/20/19 16:28 • (MSD) R3432721-5 07/20/19 16:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	9.03	59.7	59.7	101	101	1	80.0-120			0.0142	20
Fluoride	5.00	0.773	5.92	5.92	103	103	1	80.0-120			0.0169	20
Sulfate	50.0	9.63	60.3	60.4	101	101	1	80.0-120			0.185	20

L1119038-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119038-07 07/21/19 01:10 • (MS) R3432721-7 07/21/19 01:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	0.428	50.6	100	1	80.0-120	
Fluoride	5.00	U	5.04	101	1	80.0-120	
Sulfate	50.0	0.669	51.9	102	1	80.0-120	

Method Blank (MB)

(MB) R3433067-1 07/22/19 20:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1119009-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-19 07/22/19 20:17 • (DUP) R3433067-3 07/22/19 20:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.198	0.197	1	0.506		20

L1119038-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-04 07/22/19 21:00 • (DUP) R3433067-5 07/22/19 21:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.290	0.297	1	2.39		20

Laboratory Control Sample (LCS)

(LCS) R3433067-2 07/22/19 20:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.95	98.8	90.0-110	

L1119009-20 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119009-20 07/22/19 20:20 • (MS) R3433067-4 07/22/19 20:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	0.0370	2.51	98.8	1	90.0-110	

L1119038-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119038-05 07/22/19 21:03 • (MS) R3433067-6 07/22/19 21:05 • (MSD) R3433067-7 07/22/19 21:06

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 %
Nitrate-Nitrite	2.50	0.0980	2.46	2.71	94.4	104	1	90.0-110			9.65	20

Method Blank (MB)

(MB) R3432747-1 07/21/19 22:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	0.0160	J	0.0126	0.200
Calcium	0.240	J	0.0463	1.00
Iron	U		0.0141	0.100
Magnesium	0.0232	J	0.0111	1.00
Potassium	0.176	J	0.102	1.00
Sodium	0.124	J	0.0985	1.00

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

(LCS) R3432747-2 07/21/19 22:18 • (LCSD) R3432747-3 07/21/19 22:20

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 %
Boron	1.00	0.959	1.01	95.9	101	80.0-120			5.34	20
Calcium	10.0	10.5	10.6	105	106	80.0-120			0.697	20
Iron	10.0	10.2	10.4	102	104	80.0-120			1.91	20
Magnesium	10.0	10.3	10.4	103	104	80.0-120			0.140	20
Potassium	10.0	9.93	10.0	99.3	100	80.0-120			0.989	20
Sodium	10.0	9.74	9.73	97.4	97.3	80.0-120			0.0913	20

L1119009-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-18 07/21/19 22:23 • (MS) R3432747-5 07/21/19 22:27 • (MSD) R3432747-6 07/21/19 22:30

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 %
Boron	1.00	0.180	1.18	1.15	99.7	97.2	1	75.0-125			2.20	20
Calcium	10.0	114	122	122	79.6	78.9	1	75.0-125			0.0615	20
Iron	10.0	0.0508	10.5	10.2	104	101	1	75.0-125			3.36	20
Magnesium	10.0	54.5	63.9	63.8	94.8	93.2	1	75.0-125			0.250	20
Potassium	10.0	5.94	16.0	15.8	100	99.0	1	75.0-125			0.877	20
Sodium	10.0	61.4	69.5	69.6	81.0	82.2	1	75.0-125			0.174	20

Method Blank (MB)

(MB) R3432673-1 07/19/19 20:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Boron	U		1.26	10.0
Calcium	U		4.63	100
Cobalt	U		0.230	1.00
Iron	25.0		1.41	10.0
Lead	U		0.190	0.500
Magnesium	U		1.11	100
Manganese	0.317	J	0.120	1.00
Potassium	U		10.2	100
Sodium	25.2	J	9.85	100

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

(LCS) R3432673-2 07/19/19 20:46 • (LCSD) R3432673-3 07/19/19 20:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	96.3	97.9	96.3	97.9	80.0-120			1.66	20
Boron	100	98.0	97.2	98.0	97.2	80.0-120			0.859	20
Calcium	1000	963	991	96.3	99.1	80.0-120			2.93	20
Cobalt	100	98.7	101	98.7	101	80.0-120			2.08	20
Iron	1000	963	992	96.3	99.2	80.0-120			2.93	20
Lead	100	95.4	97.8	95.4	97.8	80.0-120			2.53	20
Magnesium	1000	1010	1040	101	104	80.0-120			2.82	20
Manganese	100	97.2	99.2	97.2	99.2	80.0-120			2.03	20
Potassium	1000	972	997	97.2	99.7	80.0-120			2.51	20
Sodium	1000	1000	1030	100	103	80.0-120			2.67	20

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/19/19 20:51 • (MS) R3432673-6 07/19/19 20:58 • (MSD) R3432673-7 07/19/19 21:00

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	119	4.43	125	124	101	101	1	75.0-125			0.431	20
Boron	119	9.13	123	125	96.0	97.8	1	75.0-125			1.76	20
Calcium	1190	81600	80000	83400	0.000	149	1	75.0-125	V	V	4.13	20
Cobalt	119	7.67	128	129	101	102	1	75.0-125			0.857	20
Iron	1190	18100	19400	20200	111	174	1	75.0-125		V	3.81	20
Lead	119	14.4	132	134	99.2	101	1	75.0-125			1.44	20

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/19/19 20:51 • (MS) R3432673-6 07/19/19 20:58 • (MSD) R3432673-7 07/19/19 21:00

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Magnesium	1190	12500	13800	14300	109	149	1	75.0-125		V	3.37	20
Manganese	119	381	517	516	114	114	1	75.0-125			0.129	20
Potassium	1190	6830	8310	8540	125	144	1	75.0-125		V	2.71	20
Sodium	1190	269	1460	1480	100	102	1	75.0-125			1.43	20

Method Blank (MB)

(MB) R3432481-1 07/19/19 14:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200
Cobalt	U		0.000260	0.00200
Lead	0.000263	J	0.000240	0.00200
Manganese	U		0.000250	0.00500
Uranium	U		0.000330	0.0100

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

(LCS) R3432481-2 07/19/19 14:25 • (LCSD) R3432481-3 07/19/19 14:28

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 %
Arsenic	0.0500	0.0485	0.0508	97.1	102	80.0-120			4.63	20
Cobalt	0.0500	0.0497	0.0527	99.4	105	80.0-120			5.88	20
Lead	0.0500	0.0487	0.0507	97.5	101	80.0-120			4.01	20
Manganese	0.0500	0.0487	0.0512	97.5	102	80.0-120			4.94	20
Uranium	0.0500	0.0497	0.0505	99.5	101	80.0-120			1.57	20

L1119017-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119017-16 07/19/19 14:39 • (MS) R3432481-5 07/19/19 14:45 • (MSD) R3432481-6 07/19/19 14:48

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 %
Arsenic	0.0500	0.000946	0.0514	0.0537	101	106	1	75.0-125			4.43	20
Cobalt	0.0500	U	0.0507	0.0520	101	104	1	75.0-125			2.47	20
Lead	0.0500	0.000272	0.0487	0.0516	96.9	103	1	75.0-125			5.64	20
Manganese	0.0500	0.000389	0.0497	0.0506	98.6	100	1	75.0-125			1.79	20
Uranium	0.0500	U	0.0499	0.0523	99.9	105	1	75.0-125			4.56	20

Method Blank (MB)

(MB) R3432502-1 07/19/19 17:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Uranium	U		0.0800	5.00

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

(LCS) R3432502-2 07/19/19 17:42 • (LCSD) R3432502-3 07/19/19 17:45

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Uranium	100	91.9	96.4	91.9	96.4	80.0-120			4.76	20

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/19/19 17:49 • (MS) R3432502-6 07/19/19 17:59 • (MSD) R3432502-7 07/19/19 18:02

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	23.8	0.786	123	121	103	101	5	75.0-125			1.90	20

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

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MQL (dry)	Method Quantitation Limit.
MQL	Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
SDL	Sample Detection Limit.
SDL (dry)	Sample Detection Limit.
U	Not detected at the Sample Detection Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.
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.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

Qualifier	Description
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
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Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

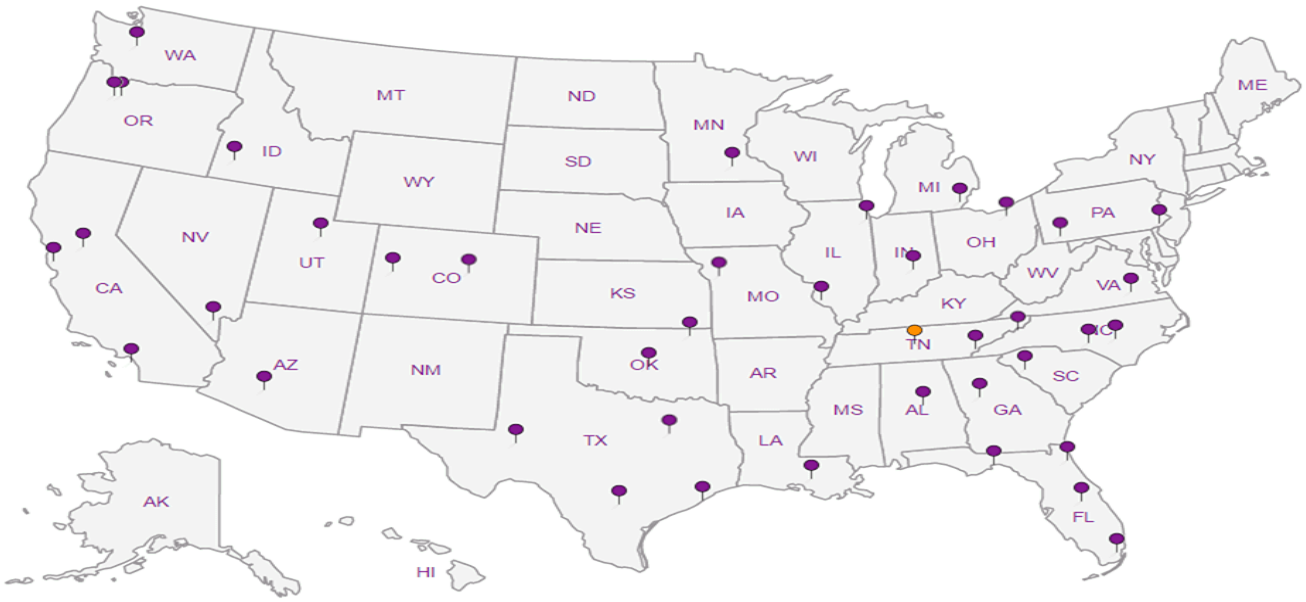
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahan

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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

L# L1119009

M021

Acctnum: AMECFWHTX
Template: T152381
Prelogin: P716917
TSR: 526 - Chris McCord
PB: 06-28-19 ES

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Total/SPLP Anions 4ozClr-NoPres	Total/SPLP Cations 4ozClr-NoPres	Total/SPLP Metals 4ozClr-NoPres	Remarks	Sample # (lab only)
MP-5 (2')	G	SS	—	7-12-19	0820	3	X	X	X		-01/02
MP-5 (5')		SS	—		0825	3	X	X	X		03/04
MP-5 (10')		SS	—		0830	3	X	X	X		05/06
MP-6 (2')		SS	—		0850	3	X	X	X		07/08
MP-6 (5')		SS	—		0855	3	X	X	X		09/10
MP-6 (10')		SS	—		0900	3	X	X	X		11/12
MP-8 (2')		SS	—		0910	3	X	X	X		13/14
MP-8 (5')		SS	—		0915	3	X	X	X		15/16
MP-8 (10')		SS	—		0920	3	X	X	X		17/18
		SS									

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

Remarks: Cations=Ca,K,Mg,Na by 6010.
Anions=Chloride,Fluoride,Sulfate,NO2NO3 by 300/353.2.
Metals=As,B,Co,Fe,Mn,Pb,U by 6010/6020.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier __ _____

Tracking # 1082 5987 2219

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	7-15-19	1500	Fedex 1082 5987 2219		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.3 °C Bottles Received: 3.0+1.1=3.1 27	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/16/19 Time: 0845	Hold: / Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 24, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1119017
Samples Received:	07/16/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Jason Romer
Project Manager

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MP-4 (2') L1119017-01 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 17:32	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	50	07/18/19 09:30	07/18/19 17:45	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:28	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:30	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:38	JPD	Mt. Juliet, TN

MP-4 (2') L1119017-02 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 22:58	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:28	JPD	Mt. Juliet, TN

MP-4 (5') L1119017-03 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 17:58	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	20	07/18/19 09:30	07/18/19 18:11	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:30	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:33	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:42	JPD	Mt. Juliet, TN

MP-4 (5') L1119017-04 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:01	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:31	JPD	Mt. Juliet, TN

MP-4 (10') L1119017-05 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 18:24	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	20	07/18/19 09:30	07/18/19 18:37	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:33	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:35	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:45	JPD	Mt. Juliet, TN

MP-4 (10') L1119017-06 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:03	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:35	JPD	Mt. Juliet, TN

MP-7 (2') L1119017-07 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:40 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 19:16	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	5	07/18/19 09:30	07/18/19 22:21	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:36	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:55	JPD	Mt. Juliet, TN

MP-7 (2') L1119017-08 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:40 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:06	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:38	JPD	Mt. Juliet, TN

MP-7 (5') L1119017-09 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	1	07/18/19 09:30	07/18/19 19:29	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312635	5	07/18/19 09:30	07/18/19 22:33	ST	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:43	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 18:58	JPD	Mt. Juliet, TN

MP-7 (5') L1119017-10 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:08	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 15:58	JPD	Mt. Juliet, TN

MP-7 (10') L1119017-11 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:50 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 01:36	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	50	07/19/19 00:10	07/19/19 01:48	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:46	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:38	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 19:01	JPD	Mt. Juliet, TN

MP-7 (10') L1119017-12 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:50 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:19	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 16:01	JPD	Mt. Juliet, TN

DUP-1-SOIL L1119017-13 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 02:01	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	50	07/19/19 00:10	07/19/19 02:14	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:49	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:40	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 19:05	JPD	Mt. Juliet, TN

DUP-1-SOIL L1119017-14 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:21	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 16:04	JPD	Mt. Juliet, TN

DUP-2-SOIL L1119017-15 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 02:27	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	5	07/19/19 00:10	07/19/19 02:40	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:51	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 19:08	JPD	Mt. Juliet, TN

DUP-2-SOIL L1119017-16 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:24	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 14:39	JPD	Mt. Juliet, TN

DUP-3-SOIL L1119017-17 Solid

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315307	1	07/22/19 14:47	07/22/19 14:55	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 02:53	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	20	07/19/19 00:10	07/19/19 03:44	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	1	07/18/19 22:19	07/19/19 21:54	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314000	5	07/18/19 22:19	07/21/19 14:43	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313999	5	07/18/19 22:17	07/19/19 19:11	JPD	Mt. Juliet, TN

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

DUP-3-SOIL L1119017-18 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312814	1	07/17/19 12:08	07/17/19 12:08	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313957	1	07/19/19 11:48	07/21/19 23:26	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313961	1	07/19/19 09:29	07/19/19 16:08	JPD	Mt. Juliet, TN

MP-4 (2') L1119017-19 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:20 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 15:35	07/20/19 15:35	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	50	07/20/19 15:53	07/20/19 15:53	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:41	07/22/19 20:41	JER	Mt. Juliet, TN

MP-4 (5') L1119017-20 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 16:11	07/20/19 16:11	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	20	07/20/19 16:28	07/20/19 16:28	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:42	07/22/19 20:42	JER	Mt. Juliet, TN

MP-4 (10') L1119017-21 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 16:46	07/20/19 16:46	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	10	07/20/19 17:39	07/20/19 17:39	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:44	07/22/19 20:44	JER	Mt. Juliet, TN

MP-7 (2') L1119017-22 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:40 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 17:56	07/20/19 17:56	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	5	07/21/19 18:40	07/21/19 18:40	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:45	07/22/19 20:45	JER	Mt. Juliet, TN

MP-7 (5') L1119017-23 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 19:07	07/20/19 19:07	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	5	07/21/19 19:15	07/21/19 19:15	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:47	07/22/19 20:47	JER	Mt. Juliet, TN

MP-7 (10') L1119017-24 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 07:50 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 19:25	07/20/19 19:25	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	20	07/20/19 19:42	07/20/19 19:42	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:54	07/22/19 20:54	JER	Mt. Juliet, TN

DUP-1-SOIL L1119017-25 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 20:00	07/20/19 20:00	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	50	07/20/19 20:17	07/20/19 20:17	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:56	07/22/19 20:56	JER	Mt. Juliet, TN

DUP-2-SOIL L1119017-26 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 21:10	07/20/19 21:10	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	5	07/21/19 19:33	07/21/19 19:33	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:57	07/22/19 20:57	JER	Mt. Juliet, TN

DUP-3-SOIL L1119017-27 WW

Collected by: Sam McMahan | Collected date/time: 07/12/19 00:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 21:28	07/20/19 21:28	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	50	07/20/19 21:46	07/20/19 21:46	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 20:59	07/22/19 20:59	JER	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

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Jason Romer
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 10:11
Project Name: Navajo RO Fields	Laboratory Job Number: L1119017-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jason Romer	Prep Batch Number(s): WG1312635, WG1313961, WG1312638, WG1313999, WG1314000, WG1314691, WG1313957, WG1314626, WG1315307, WG1312814 and WG1313869

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		X			1
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?	X				
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?	X				
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			2
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?		X			3
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 10:11
Project Name: Navajo RO Fields	Laboratory Job Number: L1119017-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jason Romer	Prep Batch Number(s): WG1312635, WG1313961, WG1312638, WG1313999, WG1314000, WG1314691, WG1313957, WG1314626, WG1315307, WG1312814 and WG1313869

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?			X		
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?			X		
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		X			4
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
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4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 10:11
Project Name: Navajo RO Fields	Laboratory Job Number: L1119017-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jason Romer	Prep Batch Number(s): WG1312635, WG1313961, WG1312638, WG1313999, WG1314000, WG1314691, WG1313957, WG1314626, WG1315307, WG1312814 and WG1313869

ER #[1]	Description
1	WG1312635 R3432130-3: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL). WG1312638 R3432485-6 and 7: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL). WG1314691 R3432717-3, 4, 5, 6 and 7: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
2	300.0 WG1312638 Sulfate: Percent Recovery is outside of established control limits. 300.0 WG1314691 Sulfate: Percent Recovery is outside of established control limits. 6010B WG1314000 Calcium, Iron, Magnesium, Potassium: Percent Recovery is outside of established control limits. 300.0 WG1312635 Fluoride: Percent Recovery is outside of established control limits. 300.0 WG1312638 Fluoride: Percent Recovery is outside of established control limits.
3	300.0 WG1312635 Chloride, Fluoride, Nitrate-Nitrite, Sulfate: Relative Percent Difference is outside of established control limits.
4	6010B WG1313957 Magnesium, Potassium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits. 6010B WG1314000 Calcium, Iron, Lead, Magnesium, Manganese, Potassium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits.

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
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4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.1		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	488		0.913	10.0	11.5	1	07/18/2019 17:32	WG1312635
Fluoride	32.2		0.300	1.00	1.15	1	07/18/2019 17:32	WG1312635
Nitrate-Nitrite	0.583	J	0.123	2.00	2.30	1	07/18/2019 17:32	WG1312635
Sulfate	19700		32.7	50.0	2870	50	07/18/2019 17:45	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.61		0.528	2.00	2.30	1	07/19/2019 21:28	WG1314000
Boron	9.12	J	1.45	10.0	11.5	1	07/19/2019 21:28	WG1314000
Calcium	154000		26.6	100	574	5	07/21/2019 14:30	WG1314000
Cobalt	5.41		0.264	1.00	1.15	1	07/19/2019 21:28	WG1314000
Iron	12900		1.62	10.0	11.5	1	07/19/2019 21:28	WG1314000
Lead	9.36		0.218	0.500	0.574	1	07/19/2019 21:28	WG1314000
Magnesium	10900		1.27	100	115	1	07/19/2019 21:28	WG1314000
Manganese	286		0.138	1.00	1.15	1	07/19/2019 21:28	WG1314000
Potassium	4470		11.8	100	115	1	07/19/2019 21:28	WG1314000
Sodium	607		11.3	100	115	1	07/19/2019 21:28	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.631	J	0.0918	1.00	5.74	5	07/19/2019 18:38	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.00		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.193	J	0.0126	0.200	0.200	1	07/21/2019 22:58	WG1313957
Calcium	615		0.0463	1.00	1.00	1	07/21/2019 22:58	WG1313957
Iron	0.0200	J	0.0141	0.100	0.100	1	07/21/2019 22:58	WG1313957
Magnesium	35.0		0.0111	1.00	1.00	1	07/21/2019 22:58	WG1313957
Potassium	2.81		0.102	1.00	1.00	1	07/21/2019 22:58	WG1313957
Sodium	42.3		0.0985	1.00	1.00	1	07/21/2019 22:58	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00157	J	0.000250	0.00200	0.00200	1	07/19/2019 15:28	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:28	WG1313961
Lead	0.000394	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:28	WG1313961
Manganese	0.00149	J	0.000250	0.00500	0.00500	1	07/19/2019 15:28	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 15:28	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.0		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	19.9		1.01	10.0	12.7	1	07/18/2019 17:58	WG1312635
Fluoride	23.8		0.330	1.00	1.27	1	07/18/2019 17:58	WG1312635
Nitrate-Nitrite	U		0.136	2.00	2.53	1	07/18/2019 17:58	WG1312635
Sulfate	16100		14.4	50.0	1270	20	07/18/2019 18:11	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.25		0.582	2.00	2.53	1	07/19/2019 21:30	WG1314000
Boron	7.10	J	1.60	10.0	12.7	1	07/19/2019 21:30	WG1314000
Calcium	208000		29.3	100	633	5	07/21/2019 14:33	WG1314000
Cobalt	4.18		0.291	1.00	1.27	1	07/19/2019 21:30	WG1314000
Iron	8400		1.79	10.0	12.7	1	07/19/2019 21:30	WG1314000
Lead	5.54		0.241	0.500	0.633	1	07/19/2019 21:30	WG1314000
Magnesium	9450		1.41	100	127	1	07/19/2019 21:30	WG1314000
Manganese	208		0.152	1.00	1.27	1	07/19/2019 21:30	WG1314000
Potassium	3110		13.0	100	127	1	07/19/2019 21:30	WG1314000
Sodium	357		12.5	100	127	1	07/19/2019 21:30	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.760	J	0.101	1.00	6.33	5	07/19/2019 18:42	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.11		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.191	J	0.0126	0.200	0.200	1	07/21/2019 23:01	WG1313957
Calcium	509		0.0463	1.00	1.00	1	07/21/2019 23:01	WG1313957
Iron	U		0.0141	0.100	0.100	1	07/21/2019 23:01	WG1313957
Magnesium	19.2		0.0111	1.00	1.00	1	07/21/2019 23:01	WG1313957
Potassium	0.595	B J	0.102	1.00	1.00	1	07/21/2019 23:01	WG1313957
Sodium	47.9		0.0985	1.00	1.00	1	07/21/2019 23:01	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000915	J	0.000250	0.00200	0.00200	1	07/19/2019 15:31	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:31	WG1313961
Lead	0.000475	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:31	WG1313961
Manganese	0.000850	J	0.000250	0.00500	0.00500	1	07/19/2019 15:31	WG1313961
Uranium	0.000332	J	0.000330	0.0100	0.0100	1	07/19/2019 15:31	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.9		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	56.3		0.926	10.0	11.6	1	07/18/2019 18:24	WG1312635
Fluoride	13.0		0.304	1.00	1.16	1	07/18/2019 18:24	WG1312635
Nitrate-Nitrite	U		0.125	2.00	2.33	1	07/18/2019 18:24	WG1312635
Sulfate	5120		13.3	50.0	1160	20	07/18/2019 18:37	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	1.44	J	0.536	2.00	2.33	1	07/19/2019 21:33	WG1314000
Boron	3.23	J	1.47	10.0	11.6	1	07/19/2019 21:33	WG1314000
Calcium	260000		27.0	100	582	5	07/21/2019 14:35	WG1314000
Cobalt	2.55		0.268	1.00	1.16	1	07/19/2019 21:33	WG1314000
Iron	5660		1.64	10.0	11.6	1	07/19/2019 21:33	WG1314000
Lead	2.77		0.221	0.500	0.582	1	07/19/2019 21:33	WG1314000
Magnesium	5180		1.29	100	116	1	07/19/2019 21:33	WG1314000
Manganese	143		0.140	1.00	1.16	1	07/19/2019 21:33	WG1314000
Potassium	1690		11.9	100	116	1	07/19/2019 21:33	WG1314000
Sodium	194	B	11.5	100	116	1	07/19/2019 21:33	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.444	J	0.0932	1.00	5.82	5	07/19/2019 18:45	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.35		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.151	B J	0.0126	0.200	0.200	1	07/21/2019 23:03	WG1313957
Calcium	167		0.0463	1.00	1.00	1	07/21/2019 23:03	WG1313957
Iron	0.0221	J	0.0141	0.100	0.100	1	07/21/2019 23:03	WG1313957
Magnesium	13.3		0.0111	1.00	1.00	1	07/21/2019 23:03	WG1313957
Potassium	0.558	B J	0.102	1.00	1.00	1	07/21/2019 23:03	WG1313957
Sodium	18.5		0.0985	1.00	1.00	1	07/21/2019 23:03	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00107	J	0.000250	0.00200	0.00200	1	07/19/2019 15:35	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:35	WG1313961
Lead	0.000332	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:35	WG1313961
Manganese	0.00150	J	0.000250	0.00500	0.00500	1	07/19/2019 15:35	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 15:35	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.5		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	66.3		0.941	10.0	11.8	1	07/18/2019 19:16	WG1312635
Fluoride	20.2		0.309	1.00	1.18	1	07/18/2019 19:16	WG1312635
Nitrate-Nitrite	0.974	J	0.127	2.00	2.37	1	07/18/2019 19:16	WG1312635
Sulfate	1980		3.37	50.0	296	5	07/18/2019 22:21	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.02		0.545	2.00	2.37	1	07/19/2019 21:36	WG1314000
Boron	7.62	J	1.49	10.0	11.8	1	07/19/2019 21:36	WG1314000
Calcium	78000		5.48	100	118	1	07/19/2019 21:36	WG1314000
Cobalt	8.23		0.272	1.00	1.18	1	07/19/2019 21:36	WG1314000
Iron	18700		1.67	10.0	11.8	1	07/19/2019 21:36	WG1314000
Lead	14.3		0.225	0.500	0.592	1	07/19/2019 21:36	WG1314000
Magnesium	12600		1.31	100	118	1	07/19/2019 21:36	WG1314000
Manganese	469		0.142	1.00	1.18	1	07/19/2019 21:36	WG1314000
Potassium	6520		12.1	100	118	1	07/19/2019 21:36	WG1314000
Sodium	299		11.7	100	118	1	07/19/2019 21:36	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.645	J	0.0947	1.00	5.92	5	07/19/2019 18:55	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.22		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.124	B J	0.0126	0.200	0.200	1	07/21/2019 23:06	WG1313957
Calcium	101		0.0463	1.00	1.00	1	07/21/2019 23:06	WG1313957
Iron	0.0146	J	0.0141	0.100	0.100	1	07/21/2019 23:06	WG1313957
Magnesium	16.5		0.0111	1.00	1.00	1	07/21/2019 23:06	WG1313957
Potassium	2.21		0.102	1.00	1.00	1	07/21/2019 23:06	WG1313957
Sodium	20.2		0.0985	1.00	1.00	1	07/21/2019 23:06	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00141	J	0.000250	0.00200	0.00200	1	07/19/2019 15:38	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:38	WG1313961
Lead	0.000315	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:38	WG1313961
Manganese	0.000454	J	0.000250	0.00500	0.00500	1	07/19/2019 15:38	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 15:38	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.4		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	102		0.931	10.0	11.7	1	07/18/2019 19:29	WG1312635
Fluoride	14.9	J3	0.306	1.00	1.17	1	07/18/2019 19:29	WG1312635
Nitrate-Nitrite	0.888	J P1	0.126	2.00	2.34	1	07/18/2019 19:29	WG1312635
Sulfate	2370	J3	3.34	50.0	293	5	07/18/2019 22:33	WG1312635

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.71		0.539	2.00	2.34	1	07/19/2019 21:43	WG1314000
Boron	8.68	J	1.48	10.0	11.7	1	07/19/2019 21:43	WG1314000
Calcium	91700		5.42	100	117	1	07/19/2019 21:43	WG1314000
Cobalt	6.96		0.269	1.00	1.17	1	07/19/2019 21:43	WG1314000
Iron	16000		1.65	10.0	11.7	1	07/19/2019 21:43	WG1314000
Lead	12.3		0.223	0.500	0.586	1	07/19/2019 21:43	WG1314000
Magnesium	10700		1.30	100	117	1	07/19/2019 21:43	WG1314000
Manganese	331		0.141	1.00	1.17	1	07/19/2019 21:43	WG1314000
Potassium	5790		12.0	100	117	1	07/19/2019 21:43	WG1314000
Sodium	294	B	11.5	100	117	1	07/19/2019 21:43	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.618	J	0.0937	1.00	5.86	5	07/19/2019 18:58	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.29		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.103	B J	0.0126	0.200	0.200	1	07/21/2019 23:08	WG1313957
Calcium	102		0.0463	1.00	1.00	1	07/21/2019 23:08	WG1313957
Iron	0.0162	J	0.0141	0.100	0.100	1	07/21/2019 23:08	WG1313957
Magnesium	18.0		0.0111	1.00	1.00	1	07/21/2019 23:08	WG1313957
Potassium	1.43	B	0.102	1.00	1.00	1	07/21/2019 23:08	WG1313957
Sodium	20.0		0.0985	1.00	1.00	1	07/21/2019 23:08	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000814	J	0.000250	0.00200	0.00200	1	07/19/2019 15:58	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 15:58	WG1313961
Lead	0.000586	B J	0.000240	0.00200	0.00200	1	07/19/2019 15:58	WG1313961
Manganese	0.000384	J	0.000250	0.00500	0.00500	1	07/19/2019 15:58	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 15:58	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.4		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	42.5		0.943	10.0	11.9	1	07/19/2019 01:36	WG1312638
Fluoride	26.9		0.309	1.00	1.19	1	07/19/2019 01:36	WG1312638
Nitrate-Nitrite	U		0.127	2.00	2.37	1	07/19/2019 01:36	WG1312638
Sulfate	18800		33.8	50.0	2960	50	07/19/2019 01:48	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	6.18		0.545	2.00	2.37	1	07/19/2019 21:46	WG1314000
Boron	7.70	J	1.49	10.0	11.9	1	07/19/2019 21:46	WG1314000
Calcium	208000		27.4	100	593	5	07/21/2019 14:38	WG1314000
Cobalt	5.11		0.273	1.00	1.19	1	07/19/2019 21:46	WG1314000
Iron	11400		1.67	10.0	11.9	1	07/19/2019 21:46	WG1314000
Lead	5.69		0.225	0.500	0.593	1	07/19/2019 21:46	WG1314000
Magnesium	8120		1.32	100	119	1	07/19/2019 21:46	WG1314000
Manganese	329		0.142	1.00	1.19	1	07/19/2019 21:46	WG1314000
Potassium	3520		12.1	100	119	1	07/19/2019 21:46	WG1314000
Sodium	259	B	11.7	100	119	1	07/19/2019 21:46	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.586	J	0.0948	1.00	5.93	5	07/19/2019 19:01	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.06		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0950	B J	0.0126	0.200	0.200	1	07/21/2019 23:19	WG1313957
Calcium	596		0.0463	1.00	1.00	1	07/21/2019 23:19	WG1313957
Iron	U		0.0141	0.100	0.100	1	07/21/2019 23:19	WG1313957
Magnesium	29.8		0.0111	1.00	1.00	1	07/21/2019 23:19	WG1313957
Potassium	2.24		0.102	1.00	1.00	1	07/21/2019 23:19	WG1313957
Sodium	16.7		0.0985	1.00	1.00	1	07/21/2019 23:19	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00192	J	0.000250	0.00200	0.00200	1	07/19/2019 16:01	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:01	WG1313961
Lead	0.000283	B J	0.000240	0.00200	0.00200	1	07/19/2019 16:01	WG1313961
Manganese	0.00205	J	0.000250	0.00500	0.00500	1	07/19/2019 16:01	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:01	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.2		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	467		0.911	10.0	11.5	1	07/19/2019 02:01	WG1312638
Fluoride	31.4		0.299	1.00	1.15	1	07/19/2019 02:01	WG1312638
Nitrate-Nitrite	U		0.123	2.00	2.29	1	07/19/2019 02:01	WG1312638
Sulfate	19600		32.7	50.0	2870	50	07/19/2019 02:14	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.14		0.527	2.00	2.29	1	07/19/2019 21:49	WG1314000
Boron	7.35	J	1.44	10.0	11.5	1	07/19/2019 21:49	WG1314000
Calcium	154000		26.5	100	573	5	07/21/2019 14:40	WG1314000
Cobalt	5.53		0.264	1.00	1.15	1	07/19/2019 21:49	WG1314000
Iron	12800		1.62	10.0	11.5	1	07/19/2019 21:49	WG1314000
Lead	14.0		0.218	0.500	0.573	1	07/19/2019 21:49	WG1314000
Magnesium	10700		1.27	100	115	1	07/19/2019 21:49	WG1314000
Manganese	291		0.138	1.00	1.15	1	07/19/2019 21:49	WG1314000
Potassium	4660		11.7	100	115	1	07/19/2019 21:49	WG1314000
Sodium	581		11.3	100	115	1	07/19/2019 21:49	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.563	J	0.0917	1.00	5.73	5	07/19/2019 19:05	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	7.95		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.113	B J	0.0126	0.200	0.200	1	07/21/2019 23:21	WG1313957
Calcium	615		0.0463	1.00	1.00	1	07/21/2019 23:21	WG1313957
Iron	U		0.0141	0.100	0.100	1	07/21/2019 23:21	WG1313957
Magnesium	35.3		0.0111	1.00	1.00	1	07/21/2019 23:21	WG1313957
Potassium	3.36		0.102	1.00	1.00	1	07/21/2019 23:21	WG1313957
Sodium	30.0		0.0985	1.00	1.00	1	07/21/2019 23:21	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00162	J	0.000250	0.00200	0.00200	1	07/19/2019 16:04	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:04	WG1313961
Lead	U		0.000240	0.00200	0.00200	1	07/19/2019 16:04	WG1313961
Manganese	0.00100	J	0.000250	0.00500	0.00500	1	07/19/2019 16:04	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:04	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.5		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	96.6		0.953	10.0	12.0	1	07/19/2019 02:27	WG1312638
Fluoride	21.1		0.313	1.00	1.20	1	07/19/2019 02:27	WG1312638
Nitrate-Nitrite	12.7		0.129	2.00	2.40	1	07/19/2019 02:27	WG1312638
Sulfate	4050		3.41	50.0	300	5	07/19/2019 02:40	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.65		0.551	2.00	2.40	1	07/19/2019 21:51	WG1314000
Boron	10.2	J	1.51	10.0	12.0	1	07/19/2019 21:51	WG1314000
Calcium	85600		5.55	100	120	1	07/19/2019 21:51	WG1314000
Cobalt	6.98		0.276	1.00	1.20	1	07/19/2019 21:51	WG1314000
Iron	16500		1.69	10.0	12.0	1	07/19/2019 21:51	WG1314000
Lead	18.7		0.228	0.500	0.599	1	07/19/2019 21:51	WG1314000
Magnesium	11300		1.33	100	120	1	07/19/2019 21:51	WG1314000
Manganese	321		0.144	1.00	1.20	1	07/19/2019 21:51	WG1314000
Potassium	5950		12.3	100	120	1	07/19/2019 21:51	WG1314000
Sodium	308		11.8	100	120	1	07/19/2019 21:51	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.589	J	0.0959	1.00	5.99	5	07/19/2019 19:08	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.24		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.104	B J	0.0126	0.200	0.200	1	07/21/2019 23:24	WG1313957
Calcium	97.4		0.0463	1.00	1.00	1	07/21/2019 23:24	WG1313957
Iron	0.0144	J	0.0141	0.100	0.100	1	07/21/2019 23:24	WG1313957
Magnesium	17.4		0.0111	1.00	1.00	1	07/21/2019 23:24	WG1313957
Potassium	2.16		0.102	1.00	1.00	1	07/21/2019 23:24	WG1313957
Sodium	17.9		0.0985	1.00	1.00	1	07/21/2019 23:24	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000946	J	0.000250	0.00200	0.00200	1	07/19/2019 14:39	WG1313961
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 14:39	WG1313961
Lead	0.000272	B J	0.000240	0.00200	0.00200	1	07/19/2019 14:39	WG1313961
Manganese	0.000389	J	0.000250	0.00500	0.00500	1	07/19/2019 14:39	WG1313961
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 14:39	WG1313961

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.8		1	07/22/2019 14:55	WG1315307

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	39.5		0.938	10.0	11.8	1	07/19/2019 02:53	WG1312638
Fluoride	21.9		0.308	1.00	1.18	1	07/19/2019 02:53	WG1312638
Nitrate-Nitrite	U		0.127	2.00	2.36	1	07/19/2019 02:53	WG1312638
Sulfate	14700		13.4	50.0	1180	20	07/19/2019 03:44	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.60		0.543	2.00	2.36	1	07/19/2019 21:54	WG1314000
Boron	6.83	J	1.49	10.0	11.8	1	07/19/2019 21:54	WG1314000
Calcium	231000		27.3	100	590	5	07/21/2019 14:43	WG1314000
Cobalt	4.82		0.271	1.00	1.18	1	07/19/2019 21:54	WG1314000
Iron	10800		1.66	10.0	11.8	1	07/19/2019 21:54	WG1314000
Lead	5.09		0.224	0.500	0.590	1	07/19/2019 21:54	WG1314000
Magnesium	7340		1.31	100	118	1	07/19/2019 21:54	WG1314000
Manganese	292		0.142	1.00	1.18	1	07/19/2019 21:54	WG1314000
Potassium	2940		12.1	100	118	1	07/19/2019 21:54	WG1314000
Sodium	220	B	11.6	100	118	1	07/19/2019 21:54	WG1314000

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.568	J	0.0944	1.00	5.90	5	07/19/2019 19:11	WG1313999

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 12:08:58 PM	WG1312814
Fluid	2		7/17/2019 12:08:58 PM	WG1312814
Final pH	8.01		7/17/2019 12:08:58 PM	WG1312814

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.126	B J	0.0126	0.200	0.200	1	07/21/2019 23:26	WG1313957
Calcium	691		0.0463	1.00	1.00	1	07/21/2019 23:26	WG1313957
Iron	4.93		0.0141	0.100	0.100	1	07/21/2019 23:26	WG1313957
Magnesium	34.1		0.0111	1.00	1.00	1	07/21/2019 23:26	WG1313957
Potassium	4.31		0.102	1.00	1.00	1	07/21/2019 23:26	WG1313957
Sodium	20.4		0.0985	1.00	1.00	1	07/21/2019 23:26	WG1313957

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00436		0.000250	0.00200	0.00200	1	07/19/2019 16:08	WG1313961
Cobalt	0.00154	J	0.000260	0.00200	0.00200	1	07/19/2019 16:08	WG1313961
Lead	0.00365		0.000240	0.00200	0.00200	1	07/19/2019 16:08	WG1313961
Manganese	0.0763		0.000250	0.00500	0.00500	1	07/19/2019 16:08	WG1313961
Uranium	0.000399	J	0.000330	0.0100	0.0100	1	07/19/2019 16:08	WG1313961

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	7.28		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	20.3		0.0519	1.00	1.00	1	07/20/2019 15:35	WG1314691
Fluoride	2.21		0.00990	0.100	0.100	1	07/20/2019 15:35	WG1314691
Sulfate	1690		3.87	5.00	250	50	07/20/2019 15:53	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0680	J	0.0197	0.100	0.100	1	07/22/2019 20:41	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	7.60		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	4.41		0.0519	1.00	1.00	1	07/20/2019 16:11	WG1314691
Fluoride	1.94		0.00990	0.100	0.100	1	07/20/2019 16:11	WG1314691
Sulfate	1390		1.55	5.00	100	20	07/20/2019 16:28	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:42	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.10		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.64		0.0519	1.00	1.00	1	07/20/2019 16:46	WG1314691
Fluoride	1.30		0.00990	0.100	0.100	1	07/20/2019 16:46	WG1314691
Sulfate	441		0.774	5.00	50.0	10	07/20/2019 17:39	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:44	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.17		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	6.66		0.0519	1.00	1.00	1	07/20/2019 17:56	WG1314691
Fluoride	2.61		0.00990	0.100	0.100	1	07/20/2019 17:56	WG1314691
Sulfate	267		0.387	5.00	25.0	5	07/21/2019 18:40	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.231		0.0197	0.100	0.100	1	07/22/2019 20:45	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.22		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	4.50		0.0519	1.00	1.00	1	07/20/2019 19:07	WG1314691
Fluoride	1.80		0.00990	0.100	0.100	1	07/20/2019 19:07	WG1314691
Sulfate	285		0.387	5.00	25.0	5	07/21/2019 19:15	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.131		0.0197	0.100	0.100	1	07/22/2019 20:47	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.01		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	1.94		0.0519	1.00	1.00	1	07/20/2019 19:25	WG1314691
Fluoride	1.82		0.00990	0.100	0.100	1	07/20/2019 19:25	WG1314691
Sulfate	1570		1.55	5.00	100	20	07/20/2019 19:42	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:54	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	7.92		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	20.0		0.0519	1.00	1.00	1	07/20/2019 20:00	WG1314691
Fluoride	2.17		0.00990	0.100	0.100	1	07/20/2019 20:00	WG1314691
Sulfate	1680		3.87	5.00	250	50	07/20/2019 20:17	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0580	J	0.0197	0.100	0.100	1	07/22/2019 20:56	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.25		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	4.69		0.0519	1.00	1.00	1	07/20/2019 21:10	WG1314691
Fluoride	1.77		0.00990	0.100	0.100	1	07/20/2019 21:10	WG1314691
Sulfate	278		0.387	5.00	25.0	5	07/21/2019 19:33	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.106		0.0197	0.100	0.100	1	07/22/2019 20:57	WG1314626

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.13		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.00		0.0519	1.00	1.00	1	07/20/2019 21:28	WG1314691
Fluoride	1.89		0.00990	0.100	0.100	1	07/20/2019 21:28	WG1314691
Sulfate	1590		3.87	5.00	250	50	07/20/2019 21:46	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 20:59	WG1314626

Method Blank (MB)

(MB) R3433304-1 07/22/19 14:55

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	%		%	%
Total Solids	0.000			

L1119017-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-15 07/22/19 14:55 • (DUP) R3433304-3 07/22/19 14:55

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	83.5	84.3	1	0.974		10

Laboratory Control Sample (LCS)

(LCS) R3433304-2 07/22/19 14:55

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3432130-1 07/18/19 10:44

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	0.852	J	0.795	10.0
Fluoride	U		0.261	1.00
Nitrate-Nitrite	U		0.107	2.00
Sulfate	U		0.570	50.0

L1119009-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-03 07/18/19 14:05 • (DUP) R3432130-5 07/18/19 14:18

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	40.0	53.0	1	28.0	P1	20
Fluoride	15.6	17.4	1	10.8		20
Nitrate-Nitrite	3.87	3.80	1	1.57		20
Sulfate	668	752	1	11.8		20

L1119017-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-09 07/18/19 19:29 • (DUP) R3432130-6 07/18/19 19:42

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	102	96.4	1	5.28		20
Fluoride	14.9	11.9	1	22.5	J3	20
Nitrate-Nitrite	0.888	0.000	1	200	P1	20

L1119017-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-09 07/18/19 22:33 • (DUP) R3432130-7 07/18/19 22:46

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	2370	1900	5	21.7	J3	20

Laboratory Control Sample (LCS)

(LCS) R3432130-2 07/18/19 10:56

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	205	102	90.0-110	
Fluoride	20.0	20.7	103	90.0-110	
Nitrate-Nitrite	40.0	41.9	105	90.0-110	
Sulfate	200	201	101	90.0-110	

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/18/19 13:00 • (MS) R3432130-3 07/18/19 13:13 • (MSD) R3432130-4 07/18/19 13:26

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	594	26.4	616	617	99.2	99.5	1	80.0-120			0.222	20
Fluoride	59.4	24.4	67.8	68.5	73.0	74.2	1	80.0-120	J6	J6	1.03	20
Nitrate-Nitrite	119	5.86	124	124	99.3	99.5	1	80.0-120			0.264	20
Sulfate	594	560	1220	1180	112	104	1	80.0-120	E		3.67	20

Method Blank (MB)

(MB) R3432485-1 07/19/19 00:49

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	1.33	J	0.795	10.0
Fluoride	U		0.261	1.00
Nitrate-Nitrite	U		0.107	2.00
Sulfate	U		0.570	50.0

L1119017-17 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-17 07/19/19 02:53 • (DUP) R3432485-3 07/19/19 03:06

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	39.5	40.3	1	2.11		20
Fluoride	21.9	23.0	1	4.83		20
Nitrate-Nitrite	U	0.000	1	0.000		20

L1119017-17 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-17 07/19/19 03:44 • (DUP) R3432485-4 07/19/19 03:57

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	14700	15100	20	2.67		20

L1119028-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-07 07/19/19 06:35 • (DUP) R3432485-5 07/19/19 06:48

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	20.7	20.1	1	2.75		20
Fluoride	49.9	52.8	1	5.59		20
Nitrate-Nitrite	7.91	7.01	1	12.1		20

L1119028-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-07 07/19/19 16:10 • (DUP) R3432485-8 07/19/19 16:23

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	1670	1660	5	0.606		20

Laboratory Control Sample (LCS)

(LCS) R3432485-2 07/19/19 01:02

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	205	102	90.0-110	
Fluoride	20.0	20.9	104	90.0-110	
Nitrate-Nitrite	40.0	42.0	105	90.0-110	
Sulfate	200	203	101	90.0-110	

L1119028-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-15 07/19/19 07:57 • (MS) R3432485-6 07/19/19 08:10 • (MSD) R3432485-7 07/19/19 08:22

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	645	45.9	692	689	100	99.7	1	80.0-120			0.462	20
Fluoride	64.5	20.3	62.4	63.4	65.1	66.7	1	80.0-120	J6	J6	1.63	20
Nitrate-Nitrite	129	U	142	141	110	109	1	80.0-120			1.16	20
Sulfate	645	3310	4990	4900	260	247	1	80.0-120	E V	E V	1.71	20

Method Blank (MB)

(MB) R3432717-1 07/20/19 11:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1119017-22 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-22 07/20/19 17:56 • (DUP) R3432717-3 07/20/19 18:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	6.66	6.67	1	0.0615		20
Fluoride	2.61	2.61	1	0.103		20
Sulfate	270	271	1	0.164	E	20

L1119028-23 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-23 07/21/19 00:42 • (DUP) R3432717-6 07/21/19 00:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	2.70	2.67	1	1.09		20
Fluoride	2.06	2.06	1	0.228		20
Sulfate	122	123	1	0.0757	E	20

L1119017-22 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-22 07/21/19 18:40 • (DUP) R3432717-8 07/21/19 18:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	267	262	5	2.20		20

L1119028-23 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-23 07/21/19 19:50 • (DUP) R3432717-9 07/21/19 20:08

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	121	120	5	0.850		20

Laboratory Control Sample (LCS)

(LCS) R3432717-2 07/20/19 11:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.9	99.8	90.0-110	
Fluoride	8.00	8.07	101	90.0-110	
Sulfate	40.0	40.5	101	90.0-110	

L1119017-22 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119017-22 07/20/19 17:56 • (MS) R3432717-4 07/20/19 18:32 • (MSD) R3432717-5 07/20/19 18:49

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 %
Chloride	50.0	6.66	57.9	57.9	103	102	1	80.0-120			0.0874	20
Fluoride	5.00	2.61	7.59	7.60	99.5	99.9	1	80.0-120			0.219	20
Sulfate	50.0	270	304	306	67.0	70.2	1	80.0-120	E V	E V	0.526	20

L1119028-23 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119028-23 07/21/19 00:42 • (MS) R3432717-7 07/21/19 01:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	2.70	53.8	102	1	80.0-120	
Fluoride	5.00	2.06	7.10	101	1	80.0-120	
Sulfate	50.0	122	164	82.7	1	80.0-120	E

Method Blank (MB)

(MB) R3433067-1 07/22/19 20:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1119009-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-19 07/22/19 20:17 • (DUP) R3433067-3 07/22/19 20:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.198	0.197	1	0.506		20

L1119038-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-04 07/22/19 21:00 • (DUP) R3433067-5 07/22/19 21:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.290	0.297	1	2.39		20

Laboratory Control Sample (LCS)

(LCS) R3433067-2 07/22/19 20:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.95	98.8	90.0-110	

L1119009-20 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119009-20 07/22/19 20:20 • (MS) R3433067-4 07/22/19 20:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	0.0370	2.51	98.8	1	90.0-110	

L1119038-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119038-05 07/22/19 21:03 • (MS) R3433067-6 07/22/19 21:05 • (MSD) R3433067-7 07/22/19 21:06

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 %
Nitrate-Nitrite	2.50	0.0980	2.46	2.71	94.4	104	1	90.0-110			9.65	20

Method Blank (MB)

(MB) R3432747-1 07/21/19 22:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	0.0160	J	0.0126	0.200
Calcium	0.240	J	0.0463	1.00
Iron	U		0.0141	0.100
Magnesium	0.0232	J	0.0111	1.00
Potassium	0.176	J	0.102	1.00
Sodium	0.124	J	0.0985	1.00

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

(LCS) R3432747-2 07/21/19 22:18 • (LCSD) R3432747-3 07/21/19 22:20

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 %
Boron	1.00	0.959	1.01	95.9	101	80.0-120			5.34	20
Calcium	10.0	10.5	10.6	105	106	80.0-120			0.697	20
Iron	10.0	10.2	10.4	102	104	80.0-120			1.91	20
Magnesium	10.0	10.3	10.4	103	104	80.0-120			0.140	20
Potassium	10.0	9.93	10.0	99.3	100	80.0-120			0.989	20
Sodium	10.0	9.74	9.73	97.4	97.3	80.0-120			0.0913	20

L1119009-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-18 07/21/19 22:23 • (MS) R3432747-5 07/21/19 22:27 • (MSD) R3432747-6 07/21/19 22:30

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 %
Boron	1.00	0.180	1.18	1.15	99.7	97.2	1	75.0-125			2.20	20
Calcium	10.0	114	122	122	79.6	78.9	1	75.0-125			0.0615	20
Iron	10.0	0.0508	10.5	10.2	104	101	1	75.0-125			3.36	20
Magnesium	10.0	54.5	63.9	63.8	94.8	93.2	1	75.0-125			0.250	20
Potassium	10.0	5.94	16.0	15.8	100	99.0	1	75.0-125			0.877	20
Sodium	10.0	61.4	69.5	69.6	81.0	82.2	1	75.0-125			0.174	20

Method Blank (MB)

(MB) R3432673-1 07/19/19 20:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Boron	U		1.26	10.0
Calcium	U		4.63	100
Cobalt	U		0.230	1.00
Iron	25.0		1.41	10.0
Lead	U		0.190	0.500
Magnesium	U		1.11	100
Manganese	0.317	J	0.120	1.00
Potassium	U		10.2	100
Sodium	25.2	J	9.85	100

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

(LCS) R3432673-2 07/19/19 20:46 • (LCSD) R3432673-3 07/19/19 20:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	96.3	97.9	96.3	97.9	80.0-120			1.66	20
Boron	100	98.0	97.2	98.0	97.2	80.0-120			0.859	20
Calcium	1000	963	991	96.3	99.1	80.0-120			2.93	20
Cobalt	100	98.7	101	98.7	101	80.0-120			2.08	20
Iron	1000	963	992	96.3	99.2	80.0-120			2.93	20
Lead	100	95.4	97.8	95.4	97.8	80.0-120			2.53	20
Magnesium	1000	1010	1040	101	104	80.0-120			2.82	20
Manganese	100	97.2	99.2	97.2	99.2	80.0-120			2.03	20
Potassium	1000	972	997	97.2	99.7	80.0-120			2.51	20
Sodium	1000	1000	1030	100	103	80.0-120			2.67	20

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/19/19 20:51 • (MS) R3432673-6 07/19/19 20:58 • (MSD) R3432673-7 07/19/19 21:00

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	119	4.43	125	124	101	101	1	75.0-125			0.431	20
Boron	119	9.13	123	125	96.0	97.8	1	75.0-125			1.76	20
Calcium	1190	81600	80000	83400	0.000	149	1	75.0-125	V	V	4.13	20
Cobalt	119	7.67	128	129	101	102	1	75.0-125			0.857	20
Iron	1190	18100	19400	20200	111	174	1	75.0-125		V	3.81	20
Lead	119	14.4	132	134	99.2	101	1	75.0-125			1.44	20

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/19/19 20:51 • (MS) R3432673-6 07/19/19 20:58 • (MSD) R3432673-7 07/19/19 21:00

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Magnesium	1190	12500	13800	14300	109	149	1	75.0-125		V	3.37	20
Manganese	119	381	517	516	114	114	1	75.0-125			0.129	20
Potassium	1190	6830	8310	8540	125	144	1	75.0-125		V	2.71	20
Sodium	1190	269	1460	1480	100	102	1	75.0-125			1.43	20

Method Blank (MB)

(MB) R3432481-1 07/19/19 14:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200
Cobalt	U		0.000260	0.00200
Lead	0.000263	J	0.000240	0.00200
Manganese	U		0.000250	0.00500
Uranium	U		0.000330	0.0100

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

(LCS) R3432481-2 07/19/19 14:25 • (LCSD) R3432481-3 07/19/19 14:28

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 %
Arsenic	0.0500	0.0485	0.0508	97.1	102	80.0-120			4.63	20
Cobalt	0.0500	0.0497	0.0527	99.4	105	80.0-120			5.88	20
Lead	0.0500	0.0487	0.0507	97.5	101	80.0-120			4.01	20
Manganese	0.0500	0.0487	0.0512	97.5	102	80.0-120			4.94	20
Uranium	0.0500	0.0497	0.0505	99.5	101	80.0-120			1.57	20

L1119017-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119017-16 07/19/19 14:39 • (MS) R3432481-5 07/19/19 14:45 • (MSD) R3432481-6 07/19/19 14:48

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 %
Arsenic	0.0500	0.000946	0.0514	0.0537	101	106	1	75.0-125			4.43	20
Cobalt	0.0500	U	0.0507	0.0520	101	104	1	75.0-125			2.47	20
Lead	0.0500	0.000272	0.0487	0.0516	96.9	103	1	75.0-125			5.64	20
Manganese	0.0500	0.000389	0.0497	0.0506	98.6	100	1	75.0-125			1.79	20
Uranium	0.0500	U	0.0499	0.0523	99.9	105	1	75.0-125			4.56	20

Method Blank (MB)

(MB) R3432502-1 07/19/19 17:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Uranium	U		0.0800	5.00

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

(LCS) R3432502-2 07/19/19 17:42 • (LCSD) R3432502-3 07/19/19 17:45

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Uranium	100	91.9	96.4	91.9	96.4	80.0-120			4.76	20

L1119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119009-01 07/19/19 17:49 • (MS) R3432502-6 07/19/19 17:59 • (MSD) R3432502-7 07/19/19 18:02

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	23.8	0.786	123	121	103	101	5	75.0-125			1.90	20

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

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MQL (dry)	Method Quantitation Limit.
MQL	Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
SDL	Sample Detection Limit.
SDL (dry)	Sample Detection Limit.
U	Not detected at the Sample Detection Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.
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.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
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
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Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

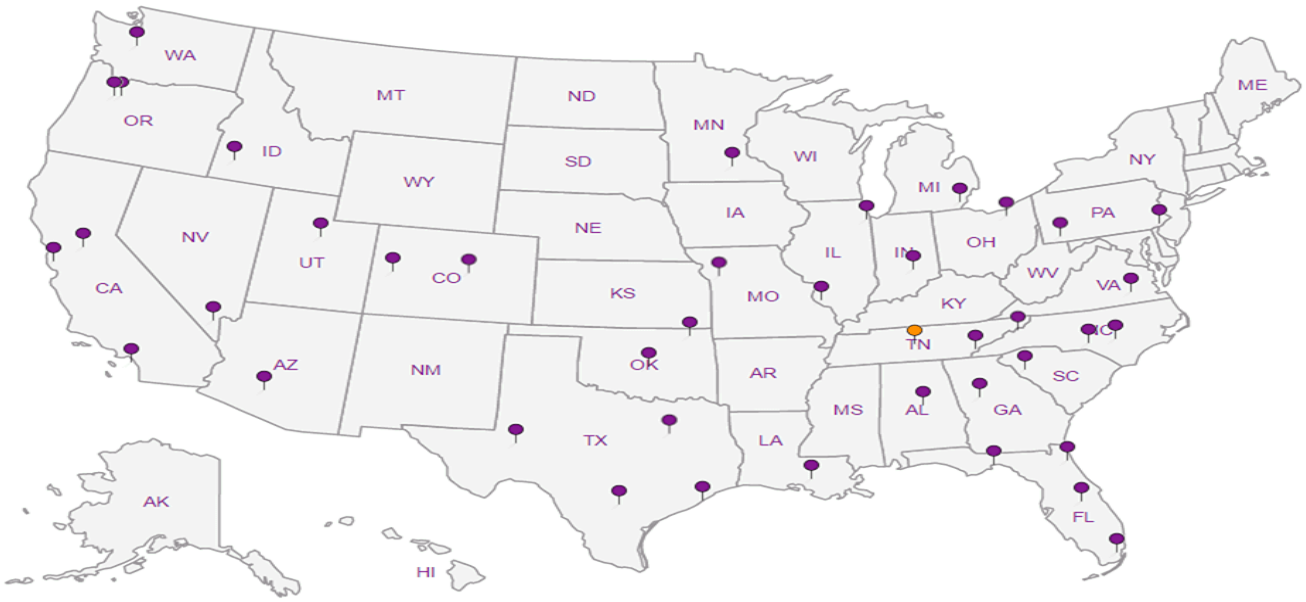
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahan

Site/Facility ID #

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y ___

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	Total/SPLP Anions 4ozClr-NoPres	Total/SPLP Cations 4ozClr-NoPres	Total/SPLP Metals 4ozClr-NoPres	Remarks	Sample # (lab only)
MP-4 (2')	G	SS	—	7-12-19	0720	3	X	X	X		-01/02
MP-4 (5')		SS	—		0725	3	X	X	X		03/04
MP-4 (10')		SS	—		0730	3	X	X	X		05/06
MP-7 (2')		SS	—		0740	3	X	X	X		07/08
MP-7 (5')		SS	—		0745	3	X	X	X		09/10
MP-7 (10')		SS	—		0750	3	X	X	X		11/12
~~MP-7~~ Dup-1-Soil		SS	—		—	3	X	X	X		13/14
Dup-2-Soil		SS	—		—	3	X	X	X		15/16
Dup-3-Soil		SS	—		—	3	X	X	X		17/18
		SS									

Chain of Custody Page 1 of 1

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

L# L119017

M022

Acctnum: AMECFWHTX

Template: T152381

Prelogin: P716917

TSR: 526 - Chris McCord

PB: 06-28-19 ES

Shipped Via: FedEX Ground

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

Remarks:Cations=Ca,K,Mg,Na by 6010.
Anions=Chloride,Fluoride,Sulfate,NO2NO3 by 300/353.2.
Metals=As,B,Co,Fe,Mn,Pb,U by 6010/6020.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier __ _____

Tracking #

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	7-15-19	1500	Fedex 108259872230		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: A3.3F°C 0.3+.1=0.4 Bottles Received: 29	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/16/19 Time: 0845	Hold: / Condition: NCF / (OK)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 24, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1119028
Samples Received:	07/16/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Jordan N Zito
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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Metals (ICPMS) by Method 6020 51
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MP-1 (2') L1119028-01 Solid

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315308	1	07/22/19 14:36	07/22/19 18:00	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 04:49	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	10	07/19/19 00:10	07/19/19 15:58	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:55	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 15:56	LD	Mt. Juliet, TN

MP-1 (2') L1119028-02 GW

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:19	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 16:25	JPD	Mt. Juliet, TN

MP-1 (5') L1119028-03 Solid

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315308	1	07/22/19 14:36	07/22/19 18:00	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 05:14	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	50	07/19/19 00:10	07/19/19 05:27	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 19:09	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	5	07/21/19 19:26	07/22/19 23:24	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 16:14	LD	Mt. Juliet, TN

MP-1 (5') L1119028-04 GW

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:21	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 16:46	JPD	Mt. Juliet, TN

MP-1 (10') L1119028-05 Solid

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315308	1	07/22/19 14:36	07/22/19 18:00	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 05:40	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	50	07/19/19 00:10	07/19/19 06:22	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 19:12	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	5	07/21/19 19:26	07/22/19 23:27	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 16:18	LD	Mt. Juliet, TN

MP-1 (10') L1119028-06 GW

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:24	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 16:49	JPD	Mt. Juliet, TN

MP-2 (2') L1119028-07 Solid

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315308	1	07/22/19 14:36	07/22/19 18:00	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 06:35	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	5	07/19/19 00:10	07/19/19 16:10	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:23	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 16:50	LD	Mt. Juliet, TN

MP-2 (2') L1119028-08 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:32	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 16:52	JPD	Mt. Juliet, TN

MP-2 (5') L1119028-09 Solid

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315309	1	07/22/19 14:23	07/22/19 14:31	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 07:01	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	5	07/19/19 00:10	07/19/19 16:36	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:26	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	5	07/21/19 19:26	07/22/19 23:30	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 16:53	LD	Mt. Juliet, TN

MP-2 (5') L1119028-10 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:34	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 16:56	JPD	Mt. Juliet, TN

MP-2 (10') L1119028-11 Solid

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:35 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315309	1	07/22/19 14:23	07/22/19 14:31	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 07:13	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	20	07/19/19 00:10	07/19/19 16:49	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:29	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	5	07/21/19 19:26	07/22/19 23:33	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 16:57	LD	Mt. Juliet, TN

MP-2 (10') L1119028-12 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:35 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:37	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 16:59	JPD	Mt. Juliet, TN

MP-3 (2') L1119028-13 Solid

Collected by: Sam McMahan | Collected date/time: 07/11/19 15:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315309	1	07/22/19 14:23	07/22/19 14:31	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 07:42	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	5	07/19/19 00:10	07/19/19 17:02	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:32	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 17:00	LD	Mt. Juliet, TN

MP-3 (2') L1119028-14 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 15:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:39	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 17:02	JPD	Mt. Juliet, TN

MP-3 (5') L1119028-15 Solid

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:05 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315309	1	07/22/19 14:23	07/22/19 14:31	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 07:57	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	5	07/19/19 00:10	07/19/19 17:15	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:35	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 17:04	LD	Mt. Juliet, TN

MP-3 (5') L1119028-16 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:05 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:42	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 17:06	JPD	Mt. Juliet, TN

MP-3 (10') L1119028-17 Solid

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:15 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1315309	1	07/22/19 14:23	07/22/19 14:31	KBC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	1	07/19/19 00:10	07/19/19 09:07	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1312638	5	07/19/19 00:10	07/19/19 17:28	ELN	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	1	07/21/19 19:26	07/22/19 18:38	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314527	5	07/21/19 19:26	07/22/19 23:36	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1314534	5	07/21/19 19:27	07/22/19 17:07	LD	Mt. Juliet, TN

MP-3 (10') L1119028-18 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:15 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1312868	1	07/17/19 13:30	07/17/19 13:30	BAA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313959	1	07/19/19 11:51	07/19/19 22:09	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1313966	1	07/19/19 09:26	07/19/19 17:09	JPD	Mt. Juliet, TN

MP-1 (2') L1119028-19 WW

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 22:03	07/20/19 22:03	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	10	07/20/19 22:21	07/20/19 22:21	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:28	07/23/19 10:28	JER	Mt. Juliet, TN

MP-1 (5') L1119028-20 WW

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 22:38	07/20/19 22:38	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	20	07/20/19 22:56	07/20/19 22:56	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:31	07/23/19 10:31	JER	Mt. Juliet, TN

MP-1 (10') L1119028-21 WW

Collected by: Sam McMahan | Collected date/time: 07/10/19 15:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 23:14	07/20/19 23:14	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	20	07/20/19 23:31	07/20/19 23:31	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:33	07/23/19 10:33	JER	Mt. Juliet, TN

MP-2 (2') L1119028-22 WW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:25 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/20/19 23:49	07/20/19 23:49	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:34	07/23/19 10:34	JER	Mt. Juliet, TN

MP-2 (5') L1119028-23 WW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/21/19 00:42	07/21/19 00:42	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	5	07/21/19 19:50	07/21/19 19:50	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:42	07/23/19 10:42	JER	Mt. Juliet, TN

MP-2 (10') L1119028-24 WW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:35 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/21/19 01:35	07/21/19 01:35	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	20	07/21/19 01:52	07/21/19 01:52	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:43	07/23/19 10:43	JER	Mt. Juliet, TN

MP-3 (2') L1119028-25 WW

Collected by: Sam McMahan | Collected date/time: 07/11/19 16:55 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/21/19 02:10	07/21/19 02:10	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:45	07/23/19 10:45	JER	Mt. Juliet, TN

MP-3 (5') L1119028-26 WW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:05 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/21/19 02:45	07/21/19 02:45	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	5	07/21/19 03:03	07/21/19 03:03	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:46	07/23/19 10:46	JER	Mt. Juliet, TN

MP-3 (10') L1119028-27 WW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:15 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1312	WG1313869	1	07/18/19 16:37	07/18/19 16:37	CGD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	1	07/21/19 03:20	07/21/19 03:20	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314691	5	07/21/19 04:13	07/21/19 04:13	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:48	07/23/19 10:48	JER	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.

Jordan N Zito
Project Manager

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Jordan N Zito
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:44
Project Name: Navajo RO Fields	Laboratory Job Number: L1119028-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1313966, WG1312638, WG1313959, WG1314691, WG1314534, WG1314527, WG1314627, WG1315309, WG1315308, WG1312868 and WG1313869

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		X			1
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?	X				
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?	X				
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			2
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?	X				
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:44
Project Name: Navajo RO Fields	Laboratory Job Number: L1119028-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1313966, WG1312638, WG1313959, WG1314691, WG1314534, WG1314527, WG1314627, WG1315309, WG1315308, WG1312868 and WG1313869

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?			X		
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?			X		
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		X			3
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

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Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:44
Project Name: Navajo RO Fields	Laboratory Job Number: L1119028-01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1313966, WG1312638, WG1313959, WG1314691, WG1314534, WG1314527, WG1314627, WG1315309, WG1315308, WG1312868 and WG1313869

ER #[1]	Description
1	WG1312638 R3432485-6 and 7: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL). WG1314691 R3432717-3, 4, 5, 6 and 7: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
2	300.0 WG1312638 Sulfate: Percent Recovery is outside of established control limits. 300.0 WG1314691 Sulfate: Percent Recovery is outside of established control limits. 6010B WG1313959 Calcium: Percent Recovery is outside of established control limits. 6010B WG1314527 Calcium, Iron: Percent Recovery is outside of established control limits. 300.0 WG1312638 Fluoride: Percent Recovery is outside of established control limits. 353.2 WG1314627 Nitrate-Nitrite: Percent Recovery is outside of established control limits.
3	6010B WG1313959 Calcium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits. 6010B WG1314527 Calcium, Iron, Lead, Magnesium, Manganese, Potassium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits. 6020 WG1314534 Uranium: Post Spike Percent Recovery and/or Serial Dilution Relative Percent Difference was outside of established control limits.

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Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	79.3		1	07/22/2019 18:00	WG1315308

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	99.6		1.00	10.0	12.6	1	07/19/2019 04:49	WG1312638
Fluoride	31.9		0.329	1.00	1.26	1	07/19/2019 04:49	WG1312638
Nitrate-Nitrite	U		0.135	2.00	2.52	1	07/19/2019 04:49	WG1312638
Sulfate	8560		7.19	50.0	630	10	07/19/2019 15:58	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.26		0.580	2.00	2.52	1	07/22/2019 18:55	WG1314527
Boron	13.3		1.59	10.0	12.6	1	07/22/2019 18:55	WG1314527
Calcium	100000	O1 V	5.84	100	126	1	07/22/2019 18:55	WG1314527
Cobalt	7.50		0.290	1.00	1.26	1	07/22/2019 18:55	WG1314527
Iron	17100	O1 V	1.78	10.0	12.6	1	07/22/2019 18:55	WG1314527
Lead	39.2	O1	0.240	0.500	0.630	1	07/22/2019 18:55	WG1314527
Magnesium	11700	O1	1.40	100	126	1	07/22/2019 18:55	WG1314527
Manganese	346	O1	0.151	1.00	1.26	1	07/22/2019 18:55	WG1314527
Potassium	5770	O1	12.9	100	126	1	07/22/2019 18:55	WG1314527
Sodium	327		12.4	100	126	1	07/22/2019 18:55	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	2.52	J O1	0.101	1.00	6.30	5	07/22/2019 15:56	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	7.83		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0892	J	0.0126	0.200	0.200	1	07/19/2019 22:19	WG1313959
Calcium	147		0.0463	1.00	1.00	1	07/19/2019 22:19	WG1313959
Iron	U		0.0141	0.100	0.100	1	07/19/2019 22:19	WG1313959
Magnesium	21.7		0.0111	1.00	1.00	1	07/19/2019 22:19	WG1313959
Potassium	2.99		0.102	1.00	1.00	1	07/19/2019 22:19	WG1313959
Sodium	21.5		0.0985	1.00	1.00	1	07/19/2019 22:19	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00163	J	0.000250	0.00200	0.00200	1	07/19/2019 16:25	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:25	WG1313966
Lead	0.000278	J	0.000240	0.00200	0.00200	1	07/19/2019 16:25	WG1313966
Manganese	0.000518	B J	0.000250	0.00500	0.00500	1	07/19/2019 16:25	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:25	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	78.2		1	07/22/2019 18:00	WG1315308

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	34.6		1.02	10.0	12.8	1	07/19/2019 05:14	WG1312638
Fluoride	20.9		0.334	1.00	1.28	1	07/19/2019 05:14	WG1312638
Nitrate-Nitrite	U		0.137	2.00	2.56	1	07/19/2019 05:14	WG1312638
Sulfate	21200		36.4	50.0	3200	50	07/19/2019 05:27	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	1.87	J	0.588	2.00	2.56	1	07/22/2019 19:09	WG1314527
Boron	5.78	J	1.61	10.0	12.8	1	07/22/2019 19:09	WG1314527
Calcium	179000		29.6	100	639	5	07/22/2019 23:24	WG1314527
Cobalt	3.90		0.294	1.00	1.28	1	07/22/2019 19:09	WG1314527
Iron	7650		1.80	10.0	12.8	1	07/22/2019 19:09	WG1314527
Lead	8.22		0.243	0.500	0.639	1	07/22/2019 19:09	WG1314527
Magnesium	6270		1.42	100	128	1	07/22/2019 19:09	WG1314527
Manganese	121		0.153	1.00	1.28	1	07/22/2019 19:09	WG1314527
Potassium	2500		13.1	100	128	1	07/22/2019 19:09	WG1314527
Sodium	246	B	12.6	100	128	1	07/22/2019 19:09	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	3.15	J	0.102	1.00	6.39	5	07/22/2019 16:14	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	7.92		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0775	J	0.0126	0.200	0.200	1	07/19/2019 22:21	WG1313959
Calcium	587		0.0463	1.00	1.00	1	07/19/2019 22:21	WG1313959
Iron	0.0325	J	0.0141	0.100	0.100	1	07/19/2019 22:21	WG1313959
Magnesium	17.0		0.0111	1.00	1.00	1	07/19/2019 22:21	WG1313959
Potassium	1.13		0.102	1.00	1.00	1	07/19/2019 22:21	WG1313959
Sodium	16.6		0.0985	1.00	1.00	1	07/19/2019 22:21	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00110	J	0.000250	0.00200	0.00200	1	07/19/2019 16:46	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:46	WG1313966
Lead	0.000444	J	0.000240	0.00200	0.00200	1	07/19/2019 16:46	WG1313966
Manganese	0.00149	B J	0.000250	0.00500	0.00500	1	07/19/2019 16:46	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:46	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.9		1	07/22/2019 18:00	WG1315308

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	77.7		0.936	10.0	11.8	1	07/19/2019 05:40	WG1312638
Fluoride	13.8		0.307	1.00	1.18	1	07/19/2019 05:40	WG1312638
Nitrate-Nitrite	U		0.126	2.00	2.36	1	07/19/2019 05:40	WG1312638
Sulfate	18400		33.6	50.0	2940	50	07/19/2019 06:22	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	7.56		0.542	2.00	2.36	1	07/22/2019 19:12	WG1314527
Boron	4.41	J	1.48	10.0	11.8	1	07/22/2019 19:12	WG1314527
Calcium	145000		27.3	100	589	5	07/22/2019 23:27	WG1314527
Cobalt	4.88		0.271	1.00	1.18	1	07/22/2019 19:12	WG1314527
Iron	9360		1.66	10.0	11.8	1	07/22/2019 19:12	WG1314527
Lead	3.45		0.224	0.500	0.589	1	07/22/2019 19:12	WG1314527
Magnesium	5650		1.31	100	118	1	07/22/2019 19:12	WG1314527
Manganese	90.6		0.141	1.00	1.18	1	07/22/2019 19:12	WG1314527
Potassium	1690		12.1	100	118	1	07/22/2019 19:12	WG1314527
Sodium	217	B	11.6	100	118	1	07/22/2019 19:12	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	1.22	J	0.0942	1.00	5.89	5	07/22/2019 16:18	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.02		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0781	J	0.0126	0.200	0.200	1	07/19/2019 22:24	WG1313959
Calcium	561		0.0463	1.00	1.00	1	07/19/2019 22:24	WG1313959
Iron	U		0.0141	0.100	0.100	1	07/19/2019 22:24	WG1313959
Magnesium	18.9		0.0111	1.00	1.00	1	07/19/2019 22:24	WG1313959
Potassium	1.03		0.102	1.00	1.00	1	07/19/2019 22:24	WG1313959
Sodium	17.0		0.0985	1.00	1.00	1	07/19/2019 22:24	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00240		0.000250	0.00200	0.00200	1	07/19/2019 16:49	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:49	WG1313966
Lead	0.000357	J	0.000240	0.00200	0.00200	1	07/19/2019 16:49	WG1313966
Manganese	0.00283	B J	0.000250	0.00500	0.00500	1	07/19/2019 16:49	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:49	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	74.1		1	07/22/2019 18:00	WG1315308

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	20.7		1.07	10.0	13.5	1	07/19/2019 06:35	WG1312638
Fluoride	49.9		0.352	1.00	1.35	1	07/19/2019 06:35	WG1312638
Nitrate-Nitrite	7.91		0.145	2.00	2.70	1	07/19/2019 06:35	WG1312638
Sulfate	1670		3.85	50.0	337	5	07/19/2019 16:10	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	4.31		0.621	2.00	2.70	1	07/22/2019 18:23	WG1314527
Boron	12.3	J	1.70	10.0	13.5	1	07/22/2019 18:23	WG1314527
Calcium	73800		6.25	100	135	1	07/22/2019 18:23	WG1314527
Cobalt	8.39		0.310	1.00	1.35	1	07/22/2019 18:23	WG1314527
Iron	18500		1.90	10.0	13.5	1	07/22/2019 18:23	WG1314527
Lead	201		0.256	0.500	0.675	1	07/22/2019 18:23	WG1314527
Magnesium	12800		1.50	100	135	1	07/22/2019 18:23	WG1314527
Manganese	454		0.162	1.00	1.35	1	07/22/2019 18:23	WG1314527
Potassium	6260		13.8	100	135	1	07/22/2019 18:23	WG1314527
Sodium	251	B	13.3	100	135	1	07/22/2019 18:23	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.757	J	0.108	1.00	6.75	5	07/22/2019 16:50	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.59		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.151	J	0.0126	0.200	0.200	1	07/19/2019 22:32	WG1313959
Calcium	29.0		0.0463	1.00	1.00	1	07/19/2019 22:32	WG1313959
Iron	0.0317	J	0.0141	0.100	0.100	1	07/19/2019 22:32	WG1313959
Magnesium	6.51		0.0111	1.00	1.00	1	07/19/2019 22:32	WG1313959
Potassium	0.845	J	0.102	1.00	1.00	1	07/19/2019 22:32	WG1313959
Sodium	27.6		0.0985	1.00	1.00	1	07/19/2019 22:32	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00257		0.000250	0.00200	0.00200	1	07/19/2019 16:52	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:52	WG1313966
Lead	0.000638	J	0.000240	0.00200	0.00200	1	07/19/2019 16:52	WG1313966
Manganese	0.000993	B J	0.000250	0.00500	0.00500	1	07/19/2019 16:52	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:52	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.8		1	07/22/2019 14:31	WG1315309

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	55.5		0.906	10.0	11.4	1	07/19/2019 07:01	WG1312638
Fluoride	26.0		0.297	1.00	1.14	1	07/19/2019 07:01	WG1312638
Nitrate-Nitrite	U		0.122	2.00	2.28	1	07/19/2019 07:01	WG1312638
Sulfate	2640		3.25	50.0	285	5	07/19/2019 16:36	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.06		0.524	2.00	2.28	1	07/22/2019 18:26	WG1314527
Boron	9.57	J	1.44	10.0	11.4	1	07/22/2019 18:26	WG1314527
Calcium	114000		26.4	100	570	5	07/22/2019 23:30	WG1314527
Cobalt	6.18		0.262	1.00	1.14	1	07/22/2019 18:26	WG1314527
Iron	13700		1.61	10.0	11.4	1	07/22/2019 18:26	WG1314527
Lead	17.5		0.216	0.500	0.570	1	07/22/2019 18:26	WG1314527
Magnesium	10600		1.26	100	114	1	07/22/2019 18:26	WG1314527
Manganese	263		0.137	1.00	1.14	1	07/22/2019 18:26	WG1314527
Potassium	4670		11.7	100	114	1	07/22/2019 18:26	WG1314527
Sodium	310		11.2	100	114	1	07/22/2019 18:26	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.615	J	0.0912	1.00	5.70	5	07/22/2019 16:53	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.55		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.161	J	0.0126	0.200	0.200	1	07/19/2019 22:34	WG1313959
Calcium	34.7		0.0463	1.00	1.00	1	07/19/2019 22:34	WG1313959
Iron	0.0151	J	0.0141	0.100	0.100	1	07/19/2019 22:34	WG1313959
Magnesium	7.74		0.0111	1.00	1.00	1	07/19/2019 22:34	WG1313959
Potassium	0.491	J	0.102	1.00	1.00	1	07/19/2019 22:34	WG1313959
Sodium	48.1		0.0985	1.00	1.00	1	07/19/2019 22:34	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00141	J	0.000250	0.00200	0.00200	1	07/19/2019 16:56	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:56	WG1313966
Lead	0.000253	J	0.000240	0.00200	0.00200	1	07/19/2019 16:56	WG1313966
Manganese	0.000490	B J	0.000250	0.00500	0.00500	1	07/19/2019 16:56	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:56	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	67.8		1	07/22/2019 14:31	WG1315309

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	47.9		1.17	10.0	14.8	1	07/19/2019 07:13	WG1312638
Fluoride	24.8		0.385	1.00	1.48	1	07/19/2019 07:13	WG1312638
Nitrate-Nitrite	U		0.158	2.00	2.95	1	07/19/2019 07:13	WG1312638
Sulfate	19700		16.8	50.0	1480	20	07/19/2019 16:49	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	1.20	J	0.679	2.00	2.95	1	07/22/2019 18:29	WG1314527
Boron	7.44	J	1.86	10.0	14.8	1	07/22/2019 18:29	WG1314527
Calcium	215000		34.2	100	738	5	07/22/2019 23:33	WG1314527
Cobalt	2.22		0.339	1.00	1.48	1	07/22/2019 18:29	WG1314527
Iron	7410		2.08	10.0	14.8	1	07/22/2019 18:29	WG1314527
Lead	5.56		0.280	0.500	0.738	1	07/22/2019 18:29	WG1314527
Magnesium	8980		1.64	100	148	1	07/22/2019 18:29	WG1314527
Manganese	73.3		0.177	1.00	1.48	1	07/22/2019 18:29	WG1314527
Potassium	2520		15.1	100	148	1	07/22/2019 18:29	WG1314527
Sodium	199	B	14.5	100	148	1	07/22/2019 18:29	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.321	J	0.118	1.00	7.38	5	07/22/2019 16:57	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.32		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0680	J	0.0126	0.200	0.200	1	07/19/2019 22:37	WG1313959
Calcium	350		0.0463	1.00	1.00	1	07/19/2019 22:37	WG1313959
Iron	0.0303	J	0.0141	0.100	0.100	1	07/19/2019 22:37	WG1313959
Magnesium	13.1		0.0111	1.00	1.00	1	07/19/2019 22:37	WG1313959
Potassium	1.52		0.102	1.00	1.00	1	07/19/2019 22:37	WG1313959
Sodium	15.9		0.0985	1.00	1.00	1	07/19/2019 22:37	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00108	J	0.000250	0.00200	0.00200	1	07/19/2019 16:59	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 16:59	WG1313966
Lead	U		0.000240	0.00200	0.00200	1	07/19/2019 16:59	WG1313966
Manganese	0.00121	B J	0.000250	0.00500	0.00500	1	07/19/2019 16:59	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 16:59	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.3		1	07/22/2019 14:31	WG1315309

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	60.4		0.911	10.0	11.5	1	07/19/2019 07:42	WG1312638
Fluoride	30.9		0.299	1.00	1.15	1	07/19/2019 07:42	WG1312638
Nitrate-Nitrite	8.82		0.123	2.00	2.29	1	07/19/2019 07:42	WG1312638
Sulfate	2030		3.26	50.0	286	5	07/19/2019 17:02	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.40		0.527	2.00	2.29	1	07/22/2019 18:32	WG1314527
Boron	9.90	J	1.44	10.0	11.5	1	07/22/2019 18:32	WG1314527
Calcium	71800		5.30	100	115	1	07/22/2019 18:32	WG1314527
Cobalt	7.89		0.263	1.00	1.15	1	07/22/2019 18:32	WG1314527
Iron	17100		1.61	10.0	11.5	1	07/22/2019 18:32	WG1314527
Lead	30.4		0.218	0.500	0.573	1	07/22/2019 18:32	WG1314527
Magnesium	13200		1.27	100	115	1	07/22/2019 18:32	WG1314527
Manganese	415		0.137	1.00	1.15	1	07/22/2019 18:32	WG1314527
Potassium	5600		11.7	100	115	1	07/22/2019 18:32	WG1314527
Sodium	309		11.3	100	115	1	07/22/2019 18:32	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.602	J	0.0916	1.00	5.73	5	07/22/2019 17:00	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.53		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0354	J	0.0126	0.200	0.200	1	07/19/2019 22:39	WG1313959
Calcium	30.7		0.0463	1.00	1.00	1	07/19/2019 22:39	WG1313959
Iron	U		0.0141	0.100	0.100	1	07/19/2019 22:39	WG1313959
Magnesium	8.34		0.0111	1.00	1.00	1	07/19/2019 22:39	WG1313959
Potassium	2.25		0.102	1.00	1.00	1	07/19/2019 22:39	WG1313959
Sodium	15.5		0.0985	1.00	1.00	1	07/19/2019 22:39	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00108	J	0.000250	0.00200	0.00200	1	07/19/2019 17:02	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 17:02	WG1313966
Lead	U		0.000240	0.00200	0.00200	1	07/19/2019 17:02	WG1313966
Manganese	0.000372	B J	0.000250	0.00500	0.00500	1	07/19/2019 17:02	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 17:02	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	77.5		1	07/22/2019 14:31	WG1315309

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	45.9		1.03	10.0	12.9	1	07/19/2019 07:57	WG1312638
Fluoride	20.3	J6	0.337	1.00	1.29	1	07/19/2019 07:57	WG1312638
Nitrate-Nitrite	U		0.139	2.00	2.58	1	07/19/2019 07:57	WG1312638
Sulfate	3380		3.68	50.0	322	5	07/19/2019 17:15	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	2.36	J	0.593	2.00	2.58	1	07/22/2019 18:35	WG1314527
Boron	8.47	J	1.63	10.0	12.9	1	07/22/2019 18:35	WG1314527
Calcium	113000		5.97	100	129	1	07/22/2019 18:35	WG1314527
Cobalt	5.10		0.297	1.00	1.29	1	07/22/2019 18:35	WG1314527
Iron	11200		1.82	10.0	12.9	1	07/22/2019 18:35	WG1314527
Lead	12.2		0.245	0.500	0.645	1	07/22/2019 18:35	WG1314527
Magnesium	9730		1.43	100	129	1	07/22/2019 18:35	WG1314527
Manganese	261		0.155	1.00	1.29	1	07/22/2019 18:35	WG1314527
Potassium	3850		13.2	100	129	1	07/22/2019 18:35	WG1314527
Sodium	260	B	12.7	100	129	1	07/22/2019 18:35	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	0.539	J	0.103	1.00	6.45	5	07/22/2019 17:04	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.38		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0401	J	0.0126	0.200	0.200	1	07/19/2019 22:42	WG1313959
Calcium	139		0.0463	1.00	1.00	1	07/19/2019 22:42	WG1313959
Iron	U		0.0141	0.100	0.100	1	07/19/2019 22:42	WG1313959
Magnesium	14.1		0.0111	1.00	1.00	1	07/19/2019 22:42	WG1313959
Potassium	1.27		0.102	1.00	1.00	1	07/19/2019 22:42	WG1313959
Sodium	17.4		0.0985	1.00	1.00	1	07/19/2019 22:42	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000530	J	0.000250	0.00200	0.00200	1	07/19/2019 17:06	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 17:06	WG1313966
Lead	U		0.000240	0.00200	0.00200	1	07/19/2019 17:06	WG1313966
Manganese	0.000284	B J	0.000250	0.00500	0.00500	1	07/19/2019 17:06	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 17:06	WG1313966

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.3		1	07/22/2019 14:31	WG1315309

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Chloride	60.7		0.922	10.0	11.6	1	07/19/2019 09:07	WG1312638
Fluoride	15.2		0.303	1.00	1.16	1	07/19/2019 09:07	WG1312638
Nitrate-Nitrite	U		0.124	2.00	2.32	1	07/19/2019 09:07	WG1312638
Sulfate	4210		3.30	50.0	290	5	07/19/2019 17:28	WG1312638

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Arsenic	3.09		0.533	2.00	2.32	1	07/22/2019 18:38	WG1314527
Boron	5.79	J	1.46	10.0	11.6	1	07/22/2019 18:38	WG1314527
Calcium	246000		26.8	100	580	5	07/22/2019 23:36	WG1314527
Cobalt	3.50		0.267	1.00	1.16	1	07/22/2019 18:38	WG1314527
Iron	6600		1.63	10.0	11.6	1	07/22/2019 18:38	WG1314527
Lead	4.41		0.220	0.500	0.580	1	07/22/2019 18:38	WG1314527
Magnesium	6240		1.29	100	116	1	07/22/2019 18:38	WG1314527
Manganese	181		0.139	1.00	1.16	1	07/22/2019 18:38	WG1314527
Potassium	2250		11.9	100	116	1	07/22/2019 18:38	WG1314527
Sodium	255	B	11.4	100	116	1	07/22/2019 18:38	WG1314527

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	SDL (dry)	Unadj. MQL	MQL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg	mg/kg		date / time	
Uranium	3.64	J	0.0927	1.00	5.80	5	07/22/2019 17:07	WG1314534

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/17/2019 1:30:48 PM	WG1312868
Fluid	2		7/17/2019 1:30:48 PM	WG1312868
Final pH	8.20		7/17/2019 1:30:48 PM	WG1312868

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Boron	0.0342	J	0.0126	0.200	0.200	1	07/19/2019 22:09	WG1313959
Calcium	184	O1 V	0.0463	1.00	1.00	1	07/19/2019 22:09	WG1313959
Iron	0.0278	J	0.0141	0.100	0.100	1	07/19/2019 22:09	WG1313959
Magnesium	14.5		0.0111	1.00	1.00	1	07/19/2019 22:09	WG1313959
Potassium	0.518	J	0.102	1.00	1.00	1	07/19/2019 22:09	WG1313959
Sodium	16.6		0.0985	1.00	1.00	1	07/19/2019 22:09	WG1313959

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00102	J	0.000250	0.00200	0.00200	1	07/19/2019 17:09	WG1313966
Cobalt	U		0.000260	0.00200	0.00200	1	07/19/2019 17:09	WG1313966
Lead	0.000424	J	0.000240	0.00200	0.00200	1	07/19/2019 17:09	WG1313966
Manganese	0.00154	B J	0.000250	0.00500	0.00500	1	07/19/2019 17:09	WG1313966
Uranium	U		0.000330	0.0100	0.0100	1	07/19/2019 17:09	WG1313966

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	7.97		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	4.16		0.0519	1.00	1.00	1	07/20/2019 22:03	WG1314691
Fluoride	2.05		0.00990	0.100	0.100	1	07/20/2019 22:03	WG1314691
Sulfate	452		0.774	5.00	50.0	10	07/20/2019 22:21	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0410	J	0.0197	0.100	0.100	1	07/23/2019 10:28	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.14		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.35		0.0519	1.00	1.00	1	07/20/2019 22:38	WG1314691
Fluoride	1.30		0.00990	0.100	0.100	1	07/20/2019 22:38	WG1314691
Sulfate	1600		1.55	5.00	100	20	07/20/2019 22:56	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.256		0.0197	0.100	0.100	1	07/23/2019 10:31	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.54		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	3.79		0.0519	1.00	1.00	1	07/20/2019 23:14	WG1314691
Fluoride	1.02		0.00990	0.100	0.100	1	07/20/2019 23:14	WG1314691
Sulfate	1320		1.55	5.00	100	20	07/20/2019 23:31	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:33	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.61		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	1.76		0.0519	1.00	1.00	1	07/20/2019 23:49	WG1314691
Fluoride	3.30		0.00990	0.100	0.100	1	07/20/2019 23:49	WG1314691
Sulfate	88.2		0.0774	5.00	5.00	1	07/20/2019 23:49	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.102		0.0197	0.100	0.100	1	07/23/2019 10:34	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.58		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.70		0.0519	1.00	1.00	1	07/21/2019 00:42	WG1314691
Fluoride	2.06		0.00990	0.100	0.100	1	07/21/2019 00:42	WG1314691
Sulfate	121		0.387	5.00	25.0	5	07/21/2019 19:50	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:42	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.25		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.29		0.0519	1.00	1.00	1	07/21/2019 01:35	WG1314691
Fluoride	1.49		0.00990	0.100	0.100	1	07/21/2019 01:35	WG1314691
Sulfate	1160		1.55	5.00	100	20	07/21/2019 01:52	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:43	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.53		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	3.11		0.0519	1.00	1.00	1	07/21/2019 02:10	WG1314691
Fluoride	2.55		0.00990	0.100	0.100	1	07/21/2019 02:10	WG1314691
Sulfate	99.0		0.0774	5.00	5.00	1	07/21/2019 02:10	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0760	J	0.0197	0.100	0.100	1	07/23/2019 10:45	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.36		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	2.05		0.0519	1.00	1.00	1	07/21/2019 02:45	WG1314691
Fluoride	1.21		0.00990	0.100	0.100	1	07/21/2019 02:45	WG1314691
Sulfate	353		0.387	5.00	25.0	5	07/21/2019 03:03	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0210	J	0.0197	0.100	0.100	1	07/23/2019 10:46	WG1314627

Preparation by Method 1312

Analyte	Result	Qualifier	Prep date / time	Batch
SPLP Extraction	-		7/18/2019 4:37:33 PM	WG1313869
Fluid	3		7/18/2019 4:37:33 PM	WG1313869
Final pH	8.34		7/18/2019 4:37:33 PM	WG1313869

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	3.08		0.0519	1.00	1.00	1	07/21/2019 03:20	WG1314691
Fluoride	1.34		0.00990	0.100	0.100	1	07/21/2019 03:20	WG1314691
Sulfate	485		0.387	5.00	25.0	5	07/21/2019 04:13	WG1314691

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:48	WG1314627

Method Blank (MB)

(MB) R3433301-1 07/22/19 18:00

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1119028-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-03 07/22/19 18:00 • (DUP) R3433301-3 07/22/19 18:00

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	78.2	78.1	1	0.0672		10

Laboratory Control Sample (LCS)

(LCS) R3433301-2 07/22/19 18:00

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3433298-1 07/22/19 14:31

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1119802-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119802-01 07/22/19 14:31 • (DUP) R3433298-3 07/22/19 14:31

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	84.7	87.2	1	2.89		10

Laboratory Control Sample (LCS)

(LCS) R3433298-2 07/22/19 14:31

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3432485-1 07/19/19 00:49

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	1.33	J	0.795	10.0
Fluoride	U		0.261	1.00
Nitrate-Nitrite	U		0.107	2.00
Sulfate	U		0.570	50.0

L1119017-17 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-17 07/19/19 02:53 • (DUP) R3432485-3 07/19/19 03:06

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	33.5	34.2	1	2.11		20
Fluoride	18.6	19.5	1	4.83		20
Nitrate-Nitrite	U	0.000	1	0.000		20

L1119017-17 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-17 07/19/19 03:44 • (DUP) R3432485-4 07/19/19 03:57

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	14700	15100	20	2.67		20

L1119028-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-07 07/19/19 06:35 • (DUP) R3432485-5 07/19/19 06:48

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	20.7	20.1	1	2.75		20
Fluoride	49.9	52.8	1	5.59		20
Nitrate-Nitrite	7.91	7.01	1	12.1		20

L1119028-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-07 07/19/19 16:10 • (DUP) R3432485-8 07/19/19 16:23

Analyte	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
Sulfate	1670	1660	5	0.606		20

Laboratory Control Sample (LCS)

(LCS) R3432485-2 07/19/19 01:02

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
Chloride	200	205	102	90.0-110	
Fluoride	20.0	20.9	104	90.0-110	
Nitrate-Nitrite	40.0	42.0	105	90.0-110	
Sulfate	200	203	101	90.0-110	

L1119028-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-15 07/19/19 07:57 • (MS) R3432485-6 07/19/19 08:10 • (MSD) R3432485-7 07/19/19 08:22

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chloride	645	45.9	692	689	100	99.7	1	80.0-120			0.462	20
Fluoride	64.5	20.3	62.4	63.4	65.1	66.7	1	80.0-120	J6	J6	1.63	20
Nitrate-Nitrite	129	U	142	141	110	109	1	80.0-120			1.16	20
Sulfate	645	3310	4990	4900	260	247	1	80.0-120	E V	E V	1.71	20

Method Blank (MB)

(MB) R3432717-1 07/20/19 11:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1119017-22 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-22 07/20/19 17:56 • (DUP) R3432717-3 07/20/19 18:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	6.66	6.67	1	0.0615		20
Fluoride	2.61	2.61	1	0.103		20
Sulfate	270	271	1	0.164	E	20

L1119028-23 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-23 07/21/19 00:42 • (DUP) R3432717-6 07/21/19 00:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	2.70	2.67	1	1.09		20
Fluoride	2.06	2.06	1	0.228		20
Sulfate	122	123	1	0.0757	E	20

L1119017-22 Original Sample (OS) • Duplicate (DUP)

(OS) L1119017-22 07/21/19 18:40 • (DUP) R3432717-8 07/21/19 18:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	267	262	5	2.20		20

L1119028-23 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-23 07/21/19 19:50 • (DUP) R3432717-9 07/21/19 20:08

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	121	120	5	0.850		20

Laboratory Control Sample (LCS)

(LCS) R3432717-2 07/20/19 11:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.9	99.8	90.0-110	
Fluoride	8.00	8.07	101	90.0-110	
Sulfate	40.0	40.5	101	90.0-110	

L1119017-22 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119017-22 07/20/19 17:56 • (MS) R3432717-4 07/20/19 18:32 • (MSD) R3432717-5 07/20/19 18:49

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 %
Chloride	50.0	6.66	57.9	57.9	103	102	1	80.0-120			0.0874	20
Fluoride	5.00	2.61	7.59	7.60	99.5	99.9	1	80.0-120			0.219	20
Sulfate	50.0	270	304	306	67.0	70.2	1	80.0-120	E V	E V	0.526	20

L1119028-23 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119028-23 07/21/19 00:42 • (MS) R3432717-7 07/21/19 01:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	2.70	53.8	102	1	80.0-120	
Fluoride	5.00	2.06	7.10	101	1	80.0-120	
Sulfate	50.0	122	164	82.7	1	80.0-120	E

Method Blank (MB)

(MB) R3433243-1 07/23/19 10:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1119028-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-19 07/23/19 10:28 • (DUP) R3433243-4 07/23/19 10:30

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.0410	0.000	1	4.76	J	20

L1119038-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-06 07/23/19 10:49 • (DUP) R3433243-5 07/23/19 10:51

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	U	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3433243-2 07/23/19 10:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.92	98.0	90.0-110	

L1118546-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1118546-01 07/23/19 10:24 • (MS) R3433243-3 07/23/19 10:25

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	ND	2.77	111	1	90.0-110	J5

L1119038-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119038-07 07/23/19 10:52 • (MS) R3433243-6 07/23/19 10:54 • (MSD) R3433243-7 07/23/19 10:55

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 %
Nitrate-Nitrite	2.50	U	2.43	2.65	97.3	106	1	90.0-110			8.69	20

Method Blank (MB)

(MB) R3432674-1 07/19/19 22:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200
Calcium	0.0473	J	0.0463	1.00
Iron	U		0.0141	0.100
Magnesium	0.0127	J	0.0111	1.00
Potassium	U		0.102	1.00
Sodium	U		0.0985	1.00

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

(LCS) R3432674-2 07/19/19 22:04 • (LCSD) R3432674-3 07/19/19 22:06

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 %
Boron	1.00	0.959	0.937	95.9	93.7	80.0-120			2.36	20
Calcium	10.0	9.68	9.53	96.8	95.3	80.0-120			1.61	20
Iron	10.0	9.68	9.57	96.8	95.7	80.0-120			1.15	20
Magnesium	10.0	10.1	10.2	101	102	80.0-120			0.607	20
Potassium	10.0	9.79	9.78	97.9	97.8	80.0-120			0.0863	20
Sodium	10.0	9.79	9.77	97.9	97.7	80.0-120			0.196	20

L1119028-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-18 07/19/19 22:09 • (MS) R3432674-5 07/19/19 22:14 • (MSD) R3432674-6 07/19/19 22:16

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 %
Boron	1.00	0.0342	1.04	0.998	100	96.4	1	75.0-125			3.79	20
Calcium	10.0	184	191	192	70.6	77.7	1	75.0-125	V		0.370	20
Iron	10.0	0.0278	9.68	9.56	96.5	95.3	1	75.0-125			1.22	20
Magnesium	10.0	14.5	24.4	24.3	99.0	97.6	1	75.0-125			0.561	20
Potassium	10.0	0.518	10.4	10.3	98.5	97.7	1	75.0-125			0.834	20
Sodium	10.0	16.6	26.5	26.5	99.3	99.0	1	75.0-125			0.128	20

Method Blank (MB)

(MB) R3433087-1 07/22/19 18:47

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Boron	U		1.26	10.0
Calcium	4.96	J	4.63	100
Cobalt	U		0.230	1.00
Iron	U		1.41	10.0
Lead	U		0.190	0.500
Magnesium	U		1.11	100
Manganese	U		0.120	1.00
Potassium	U		10.2	100
Sodium	23.2	J	9.85	100

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

(LCS) R3433087-2 07/22/19 18:49 • (LCSD) R3433087-3 07/22/19 18:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	94.7	95.2	94.7	95.2	80.0-120			0.581	20
Boron	100	98.7	101	98.7	101	80.0-120			1.94	20
Calcium	1000	977	993	97.7	99.3	80.0-120			1.57	20
Cobalt	100	101	101	101	101	80.0-120			0.653	20
Iron	1000	967	983	96.7	98.3	80.0-120			1.65	20
Lead	100	96.4	97.1	96.4	97.1	80.0-120			0.731	20
Magnesium	1000	1000	1020	100	102	80.0-120			1.54	20
Manganese	100	95.9	98.3	95.9	98.3	80.0-120			2.49	20
Potassium	1000	962	974	96.2	97.4	80.0-120			1.27	20
Sodium	1000	999	1020	99.9	102	80.0-120			1.63	20

L1119028-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-01 07/22/19 18:55 • (MS) R3433087-6 07/22/19 19:03 • (MSD) R3433087-7 07/22/19 19:06

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	126	4.26	127	128	97.7	97.8	1	75.0-125			0.133	20
Boron	126	13.3	133	133	94.8	94.6	1	75.0-125			0.144	20
Calcium	1260	100000	97800	95700	0.000	0.000	1	75.0-125	V	V	2.11	20
Cobalt	126	7.50	141	140	106	105	1	75.0-125			0.643	20
Iron	1260	17100	18300	17800	96.8	58.3	1	75.0-125		V	2.69	20
Lead	126	39.2	168	167	102	102	1	75.0-125			0.549	20

L1119028-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-01 07/22/19 18:55 • (MS) R3433087-6 07/22/19 19:03 • (MSD) R3433087-7 07/22/19 19:06

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Magnesium	1260	11700	13000	12600	101	75.4	1	75.0-125			2.48	20
Manganese	126	346	464	453	93.4	84.8	1	75.0-125			2.38	20
Potassium	1260	5770	7190	7000	113	98.0	1	75.0-125			2.71	20
Sodium	1260	327	1560	1530	98.0	95.4	1	75.0-125			2.12	20

Method Blank (MB)

(MB) R3432483-1 07/19/19 16:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200
Cobalt	U		0.000260	0.00200
Lead	U		0.000240	0.00200
Manganese	0.000350	J	0.000250	0.00500
Uranium	U		0.000330	0.0100

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

(LCS) R3432483-2 07/19/19 16:19 • (LCSD) R3432483-3 07/19/19 16:22

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 %
Arsenic	0.0500	0.0558	0.0544	112	109	80.0-120			2.58	20
Cobalt	0.0500	0.0536	0.0528	107	106	80.0-120			1.57	20
Lead	0.0500	0.0489	0.0516	97.7	103	80.0-120			5.39	20
Manganese	0.0500	0.0512	0.0506	102	101	80.0-120			1.03	20
Uranium	0.0500	0.0504	0.0512	101	102	80.0-120			1.60	20

L1119028-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-02 07/19/19 16:25 • (MS) R3432483-5 07/19/19 16:39 • (MSD) R3432483-6 07/19/19 16:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.00163	0.0563	0.0564	109	110	1	75.0-125			0.158	20
Cobalt	0.0500	U	0.0514	0.0517	103	103	1	75.0-125			0.551	20
Lead	0.0500	0.000278	0.0495	0.0492	98.4	97.9	1	75.0-125			0.539	20
Manganese	0.0500	0.000518	0.0498	0.0499	98.6	98.7	1	75.0-125			0.0821	20
Uranium	0.0500	U	0.0509	0.0495	102	99.0	1	75.0-125			2.83	20

Method Blank (MB)

(MB) R3433019-1 07/22/19 15:46

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Uranium	U		0.0800	5.00

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

(LCS) R3433019-2 07/22/19 15:49 • (LCSD) R3433019-3 07/22/19 15:53

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Uranium	100	105	107	105	107	80.0-120			1.55	20

L1119028-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119028-01 07/22/19 15:56 • (MS) R3433019-6 07/22/19 16:07 • (MSD) R3433019-7 07/22/19 16:11

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	25.2	2.52	137	137	107	106	5	75.0-125			0.191	20

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

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MQL (dry)	Method Quantitation Limit.
MQL	Method Quantitation Limit.
ND	Not detected at the Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
SDL	Sample Detection Limit.
SDL (dry)	Sample Detection Limit.
U	Not detected at the Sample Detection Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.
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.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Qualifier	Description
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

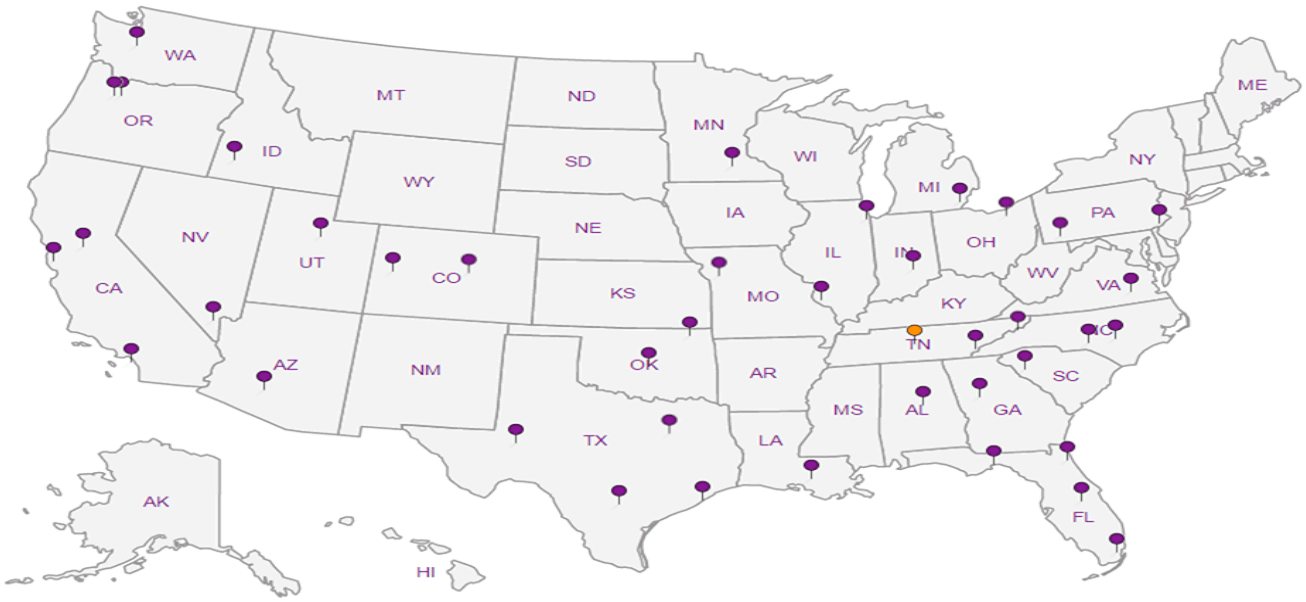
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahan

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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

L# L1119028

M026

Acctnum: AMECFWHTX
Template: T152381
Prelogin: P716917
TSR: 526 - Chris McCord
PB: 06-28-19 ES
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Total/SPLP Anions 4ozClr-NoPres	Total/SPLP Cations 4ozClr-NoPres	Total/SPLP Metals 4ozClr-NoPres	Remarks	Sample # (lab only)
MP-1 (2')	G	SS	—	7-10-19	1530	3	X	X	X		-01/02
MP-1 (5')	G	SS	—	7-10-19	1545	3	X	X	X		03/04
MP-1 (10')	G	SS	—	7-10-19	1555	3	X	X	X		05/06
MP-2 (2')	G	SS	—	7-11-19	1725	3	X	X	X		07/08
MP-2 (5')	G	SS	—	7-11-19	1730	3	X	X	X		09/10
MP-2 (10')	G	SS	—	7-11-19	1735	3	X	X	X		11/12
MP-3 (2')	G	SS	—	7-11-19	1655	3	X	X	X		13/14
MP-3 (5')	G	SS	—	7-11-19	1705	3	X	X	X		15/16
MP-3 (10')	G	SS	—	7-11-19	1715	3	X	X	X		17/18
		SS									

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

Remarks: Cations=Ca,K,Mg,Na by 6010.
Anions=Chloride,Fluoride,Sulfate,NO2NO3 by 300/353.2.
Metals=As,B,Co,Fe,Mn,Pb,U by 6010/6020.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier __ _____

Tracking # 1082 5987 2208

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received:	If preservation required by Login: Date/Time
	7-15-19	1500	Fedex 108259872208	Yes / (No) HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: A3BF °C 1.5+.1=1.6 Bottles Received: 27	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/16/19 Time: 0845	Hold: / Condition: NCF / (OK)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 24, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1119038
Samples Received:	07/16/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Jordan N Zito
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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EB-071019 L1119038-01 GW

Collected by: Sam McMahan | Collected date/time: 07/10/19 16:00 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 22:41	07/20/19 22:41	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314625	1	07/22/19 15:51	07/22/19 15:51	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:37	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1312567	1	07/17/19 09:51	07/18/19 11:35	JPD	Mt. Juliet, TN

EB-071119 L1119038-02 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 17:45 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 22:56	07/20/19 22:56	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314625	1	07/22/19 15:52	07/22/19 15:52	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:39	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1312567	1	07/17/19 09:51	07/18/19 11:38	JPD	Mt. Juliet, TN

EB-071119-GW L1119038-03 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 20:15 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1312519	1	07/18/19 01:23	07/18/19 04:38	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1314030	1	07/19/19 13:52	07/19/19 13:52	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 23:10	07/20/19 23:10	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314625	1	07/22/19 15:55	07/22/19 15:55	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:47	CCE	Mt. Juliet, TN

MW-144 L1119038-04 GW

Collected by: Sam McMahan | Collected date/time: 07/11/19 20:27 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1312519	1	07/18/19 01:23	07/18/19 04:38	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1314030	1	07/19/19 13:59	07/19/19 13:59	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/20/19 23:25	07/20/19 23:25	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	50	07/20/19 23:40	07/20/19 23:40	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 21:00	07/22/19 21:00	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:50	CCE	Mt. Juliet, TN

MW-143 L1119038-05 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 12:51 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1312519	1	07/18/19 01:23	07/18/19 04:38	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1314030	1	07/19/19 14:07	07/19/19 14:07	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/21/19 00:25	07/21/19 00:25	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	50	07/21/19 00:40	07/21/19 00:40	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314626	1	07/22/19 21:03	07/22/19 21:03	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:52	CCE	Mt. Juliet, TN

EB-071219 L1119038-06 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 09:30 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1314701	1	07/21/19 00:55	07/21/19 00:55	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:49	07/23/19 10:49	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:55	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1312567	1	07/17/19 09:51	07/18/19 11:41	JPD	Mt. Juliet, TN

EB-071219-GW L1119038-07 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 12:59 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1312519	1	07/18/19 01:23	07/18/19 04:38	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1314030	1	07/19/19 14:14	07/19/19 14:14	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/21/19 01:10	07/21/19 01:10	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 10:52	07/23/19 10:52	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 18:58	CCE	Mt. Juliet, TN

MW-142 L1119038-08 GW

Collected by: Sam McMahan | Collected date/time: 07/12/19 15:08 | Received date/time: 07/16/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1312519	1	07/18/19 01:23	07/18/19 04:38	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1314030	1	07/19/19 14:21	07/19/19 14:21	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	1	07/21/19 01:55	07/21/19 01:55	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1314701	50	07/21/19 02:09	07/21/19 02:09	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1314627	1	07/23/19 11:26	07/23/19 11:26	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1312475	1	07/17/19 11:02	07/18/19 19:00	CCE	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.

Jordan N Zito
Project Manager

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Jordan N Zito
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:46
Project Name: Navajo RO Fields	Laboratory Job Number: L1119038-01, 02, 03, 04, 05, 06, 07 and 08
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1312567, WG1312519, WG1312475, WG1314030, WG1314701, WG1314625, WG1314626 and WG1314627

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		X			1
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			2
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?		X			3
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:46
Project Name: Navajo RO Fields	Laboratory Job Number: L1119038-01, 02, 03, 04, 05, 06, 07 and 08
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1312567, WG1312519, WG1312475, WG1314030, WG1314701, WG1314625, WG1314626 and WG1314627

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?			X		
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?			X		
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
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3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/24/2019 08:46
Project Name: Navajo RO Fields	Laboratory Job Number: L1119038-01, 02, 03, 04, 05, 06, 07 and 08
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1312567, WG1312519, WG1312475, WG1314030, WG1314701, WG1314625, WG1314626 and WG1314627

ER #[1]	Description
1	WG1314625 R3433058-4: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
2	6010B WG1312475 Calcium, Magnesium, Sodium: Percent Recovery is outside of established control limits. 353.2 WG1314625 Nitrate-Nitrite: Percent Recovery is outside of established control limits. 353.2 WG1314627 Nitrate-Nitrite: Percent Recovery is outside of established control limits.
3	300.0 WG1314701 Chloride, Sulfate: Relative Percent Difference is outside of established control limits.

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	0.164	J	0.0519	1.00	1.00	1	07/20/2019 22:41	WG1314701
Fluoride	U		0.00990	0.100	0.100	1	07/20/2019 22:41	WG1314701
Sulfate	1.90	J	0.0774	5.00	5.00	1	07/20/2019 22:41	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 15:51	WG1314625

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Boron	0.0206	B J	0.0126	0.200	0.200	1	07/18/2019 18:37	WG1312475
Calcium	U		0.0463	1.00	1.00	1	07/18/2019 18:37	WG1312475
Iron	U		0.0141	0.100	0.100	1	07/18/2019 18:37	WG1312475
Magnesium	U		0.0111	1.00	1.00	1	07/18/2019 18:37	WG1312475
Potassium	0.184	J	0.102	1.00	1.00	1	07/18/2019 18:37	WG1312475
Sodium	0.101	B J	0.0985	1.00	1.00	1	07/18/2019 18:37	WG1312475

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Arsenic	U		0.000250	0.00200	0.00200	1	07/18/2019 11:35	WG1312567
Cobalt	U		0.000260	0.00200	0.00200	1	07/18/2019 11:35	WG1312567
Lead	U		0.000240	0.00200	0.00200	1	07/18/2019 11:35	WG1312567
Manganese	U		0.000250	0.00500	0.00500	1	07/18/2019 11:35	WG1312567
Uranium	U		0.000330	0.0100	0.0100	1	07/18/2019 11:35	WG1312567

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	U		0.0519	1.00	1.00	1	07/20/2019 22:56	WG1314701
Fluoride	U		0.00990	0.100	0.100	1	07/20/2019 22:56	WG1314701
Sulfate	0.0775	J	0.0774	5.00	5.00	1	07/20/2019 22:56	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/22/2019 15:52	WG1314625

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Boron	U		0.0126	0.200	0.200	1	07/18/2019 18:39	WG1312475
Calcium	U		0.0463	1.00	1.00	1	07/18/2019 18:39	WG1312475
Iron	U		0.0141	0.100	0.100	1	07/18/2019 18:39	WG1312475
Magnesium	U		0.0111	1.00	1.00	1	07/18/2019 18:39	WG1312475
Potassium	0.146	J	0.102	1.00	1.00	1	07/18/2019 18:39	WG1312475
Sodium	0.121	B J	0.0985	1.00	1.00	1	07/18/2019 18:39	WG1312475

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Arsenic	U		0.000250	0.00200	0.00200	1	07/18/2019 11:38	WG1312567
Cobalt	U		0.000260	0.00200	0.00200	1	07/18/2019 11:38	WG1312567
Lead	U		0.000240	0.00200	0.00200	1	07/18/2019 11:38	WG1312567
Manganese	U		0.000250	0.00500	0.00500	1	07/18/2019 11:38	WG1312567
Uranium	U		0.000330	0.0100	0.0100	1	07/18/2019 11:38	WG1312567

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	U		2.82	10.0	10.0	1	07/18/2019 04:38	WG1312519

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	3.45	B J	2.71	20.0	20.0	1	07/19/2019 13:52	WG1314030
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/19/2019 13:52	WG1314030

Sample Narrative:

L1119038-03 WG1314030: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	U		0.0519	1.00	1.00	1	07/20/2019 23:10	WG1314701
Fluoride	U		0.00990	0.100	0.100	1	07/20/2019 23:10	WG1314701
Sulfate	U		0.0774	5.00	5.00	1	07/20/2019 23:10	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.156		0.0197	0.100	0.100	1	07/22/2019 15:55	WG1314625

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	U		0.0463	1.00	1.00	1	07/18/2019 18:47	WG1312475
Magnesium	U		0.0111	1.00	1.00	1	07/18/2019 18:47	WG1312475
Potassium	U		0.102	1.00	1.00	1	07/18/2019 18:47	WG1312475
Sodium	U		0.0985	1.00	1.00	1	07/18/2019 18:47	WG1312475

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3740		14.1	50.0	50.0	1	07/18/2019 04:38	WG1312519

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	344		2.71	20.0	20.0	1	07/19/2019 13:59	WG1314030
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/19/2019 13:59	WG1314030

Sample Narrative:

L1119038-04 WG1314030: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	222		2.60	1.00	50.0	50	07/20/2019 23:40	WG1314701
Fluoride	2.57		0.00990	0.100	0.100	1	07/20/2019 23:25	WG1314701
Sulfate	2360		3.87	5.00	250	50	07/20/2019 23:40	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.290		0.0197	0.100	0.100	1	07/22/2019 21:00	WG1314626

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	787		0.0463	1.00	1.00	1	07/18/2019 18:50	WG1312475
Magnesium	220		0.0111	1.00	1.00	1	07/18/2019 18:50	WG1312475
Potassium	2.36		0.102	1.00	1.00	1	07/18/2019 18:50	WG1312475
Sodium	137		0.0985	1.00	1.00	1	07/18/2019 18:50	WG1312475

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4870		14.1	50.0	50.0	1	07/18/2019 04:38	WG1312519

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	328		2.71	20.0	20.0	1	07/19/2019 14:07	WG1314030
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/19/2019 14:07	WG1314030

Sample Narrative:

L1119038-05 WG1314030: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	264		2.60	1.00	50.0	50	07/21/2019 00:40	WG1314701
Fluoride	1.54		0.00990	0.100	0.100	1	07/21/2019 00:25	WG1314701
Sulfate	3170		3.87	5.00	250	50	07/21/2019 00:40	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.0980	J	0.0197	0.100	0.100	1	07/22/2019 21:03	WG1314626

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	583		0.0463	1.00	1.00	1	07/18/2019 18:52	WG1312475
Magnesium	430		0.0111	1.00	1.00	1	07/18/2019 18:52	WG1312475
Potassium	1.78		0.102	1.00	1.00	1	07/18/2019 18:52	WG1312475
Sodium	233		0.0985	1.00	1.00	1	07/18/2019 18:52	WG1312475

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	0.152	J	0.0519	1.00	1.00	1	07/21/2019 00:55	WG1314701
Fluoride	U		0.00990	0.100	0.100	1	07/21/2019 00:55	WG1314701
Sulfate	2.27	J	0.0774	5.00	5.00	1	07/21/2019 00:55	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:49	WG1314627

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Boron	0.0160	B J	0.0126	0.200	0.200	1	07/18/2019 18:55	WG1312475
Calcium	0.0487	J	0.0463	1.00	1.00	1	07/18/2019 18:55	WG1312475
Iron	U		0.0141	0.100	0.100	1	07/18/2019 18:55	WG1312475
Magnesium	U		0.0111	1.00	1.00	1	07/18/2019 18:55	WG1312475
Potassium	U		0.102	1.00	1.00	1	07/18/2019 18:55	WG1312475
Sodium	0.148	B J	0.0985	1.00	1.00	1	07/18/2019 18:55	WG1312475

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Arsenic	U		0.000250	0.00200	0.00200	1	07/18/2019 11:41	WG1312567
Cobalt	U		0.000260	0.00200	0.00200	1	07/18/2019 11:41	WG1312567
Lead	U		0.000240	0.00200	0.00200	1	07/18/2019 11:41	WG1312567
Manganese	U		0.000250	0.00500	0.00500	1	07/18/2019 11:41	WG1312567
Uranium	U		0.000330	0.0100	0.0100	1	07/18/2019 11:41	WG1312567

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	U		2.82	10.0	10.0	1	07/18/2019 04:38	WG1312519

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	4.05	B J	2.71	20.0	20.0	1	07/19/2019 14:14	WG1314030
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/19/2019 14:14	WG1314030

Sample Narrative:

L1119038-07 WG1314030: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	0.428	J P1	0.0519	1.00	1.00	1	07/21/2019 01:10	WG1314701
Fluoride	U		0.00990	0.100	0.100	1	07/21/2019 01:10	WG1314701
Sulfate	0.669	J P1	0.0774	5.00	5.00	1	07/21/2019 01:10	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:52	WG1314627

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	0.0736	J	0.0463	1.00	1.00	1	07/18/2019 18:58	WG1312475
Magnesium	0.0477	J	0.0111	1.00	1.00	1	07/18/2019 18:58	WG1312475
Potassium	0.116	J	0.102	1.00	1.00	1	07/18/2019 18:58	WG1312475
Sodium	0.107	B J	0.0985	1.00	1.00	1	07/18/2019 18:58	WG1312475

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4580		14.1	50.0	50.0	1	07/18/2019 04:38	WG1312519

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	334		2.71	20.0	20.0	1	07/19/2019 14:21	WG1314030
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/19/2019 14:21	WG1314030

Sample Narrative:

L1119038-08 WG1314030: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	380		2.60	1.00	50.0	50	07/21/2019 02:09	WG1314701
Fluoride	2.22		0.00990	0.100	0.100	1	07/21/2019 01:55	WG1314701
Sulfate	2610		3.87	5.00	250	50	07/21/2019 02:09	WG1314701

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.159		0.0197	0.100	0.100	1	07/23/2019 11:26	WG1314627

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	633		0.0463	1.00	1.00	1	07/18/2019 19:00	WG1312475
Magnesium	311		0.0111	1.00	1.00	1	07/18/2019 19:00	WG1312475
Potassium	1.74		0.102	1.00	1.00	1	07/18/2019 19:00	WG1312475
Sodium	195		0.0985	1.00	1.00	1	07/18/2019 19:00	WG1312475

Method Blank (MB)

(MB) R3432139-1 07/18/19 04:38

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

L1119138-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119138-01 07/18/19 04:38 • (DUP) R3432139-3 07/18/19 04:38

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	1090	1090	1	0.184		5

Laboratory Control Sample (LCS)

(LCS) R3432139-2 07/18/19 04:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8780	99.8	85.0-115	

Method Blank (MB)

(MB) R3432432-1 07/19/19 12:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	3.44	J	2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1118722-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1118722-04 07/19/19 12:38 • (DUP) R3432432-2 07/19/19 12:44

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	64.0	68.1	1	6.23		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

Method Blank (MB)

(MB) R3432721-1 07/20/19 15:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1118327-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1118327-01 07/20/19 15:58 • (DUP) R3432721-3 07/20/19 16:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	9.03	9.08	1	0.585		20
Fluoride	0.773	0.772	1	0.181		20
Sulfate	9.63	9.60	1	0.367		20

L1119038-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-07 07/21/19 01:10 • (DUP) R3432721-6 07/21/19 01:25

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	0.428	0.332	1	25.5	J P1	20
Fluoride	U	0.000	1	0.000		20
Sulfate	0.669	0.540	1	21.3	J P1	20

Laboratory Control Sample (LCS)

(LCS) R3432721-2 07/20/19 15:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.7	99.2	90.0-110	
Fluoride	8.00	8.19	102	90.0-110	
Sulfate	40.0	41.4	104	90.0-110	

L1118327-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1118327-01 07/20/19 15:58 • (MS) R3432721-4 07/20/19 16:28 • (MSD) R3432721-5 07/20/19 16:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	9.03	59.7	59.7	101	101	1	80.0-120			0.0142	20
Fluoride	5.00	0.773	5.92	5.92	103	103	1	80.0-120			0.0169	20
Sulfate	50.0	9.63	60.3	60.4	101	101	1	80.0-120			0.185	20

L1119038-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119038-07 07/21/19 01:10 • (MS) R3432721-7 07/21/19 01:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	0.428	50.6	100	1	80.0-120	
Fluoride	5.00	U	5.04	101	1	80.0-120	
Sulfate	50.0	0.669	51.9	102	1	80.0-120	

Method Blank (MB)

(MB) R3433058-1 07/22/19 15:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1118817-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1118817-01 07/22/19 15:13 • (DUP) R3433058-3 07/22/19 15:15

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	ND	0.000	1	0.000		20

L1119038-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-02 07/22/19 15:52 • (DUP) R3433058-5 07/22/19 15:54

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	U	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3433058-2 07/22/19 15:09

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	4.14	103	90.0-110	

L1118817-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1118817-02 07/22/19 15:16 • (MS) R3433058-4 07/22/19 15:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	3.92	6.05	85.2	1	90.0-110	E J6

L1119038-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119038-03 07/22/19 15:55 • (MS) R3433058-6 07/22/19 15:57 • (MSD) R3433058-7 07/22/19 15:58

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 %
Nitrate-Nitrite	2.50	0.156	2.49	2.55	93.5	95.9	1	90.0-110			2.42	20

Method Blank (MB)

(MB) R3433067-1 07/22/19 20:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1119009-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1119009-19 07/22/19 20:17 • (DUP) R3433067-3 07/22/19 20:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.198	0.197	1	0.506		20

L1119038-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-04 07/22/19 21:00 • (DUP) R3433067-5 07/22/19 21:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.290	0.297	1	2.39		20

Laboratory Control Sample (LCS)

(LCS) R3433067-2 07/22/19 20:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.95	98.8	90.0-110	

L1119009-20 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119009-20 07/22/19 20:20 • (MS) R3433067-4 07/22/19 20:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	0.0370	2.51	98.8	1	90.0-110	

L1119038-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119038-05 07/22/19 21:03 • (MS) R3433067-6 07/22/19 21:05 • (MSD) R3433067-7 07/22/19 21:06

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 %
Nitrate-Nitrite	2.50	0.0980	2.46	2.71	94.4	104	1	90.0-110			9.65	20

Method Blank (MB)

(MB) R3433243-1 07/23/19 10:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1119028-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1119028-19 07/23/19 10:28 • (DUP) R3433243-4 07/23/19 10:30

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.0410	0.000	1	4.76	J	20

L1119038-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1119038-06 07/23/19 10:49 • (DUP) R3433243-5 07/23/19 10:51

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	U	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3433243-2 07/23/19 10:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.92	98.0	90.0-110	

L1118546-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1118546-01 07/23/19 10:24 • (MS) R3433243-3 07/23/19 10:25

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	ND	2.77	111	1	90.0-110	J5

L1119038-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119038-07 07/23/19 10:52 • (MS) R3433243-6 07/23/19 10:54 • (MSD) R3433243-7 07/23/19 10:55

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 %
Nitrate-Nitrite	2.50	U	2.43	2.65	97.3	106	1	90.0-110			8.69	20

Method Blank (MB)

(MB) R3432161-1 07/18/19 17:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	0.0165	J	0.0126	0.200
Calcium	U		0.0463	1.00
Iron	U		0.0141	0.100
Magnesium	U		0.0111	1.00
Potassium	U		0.102	1.00
Sodium	0.149	J	0.0985	1.00

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

(LCS) R3432161-2 07/18/19 17:49 • (LCSD) R3432161-3 07/18/19 17:51

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 %
Boron	1.00	0.988	0.973	98.8	97.3	80.0-120			1.62	20
Calcium	10.0	9.84	9.77	98.4	97.7	80.0-120			0.710	20
Iron	10.0	10.1	9.93	101	99.3	80.0-120			1.19	20
Magnesium	10.0	10.3	10.0	103	100	80.0-120			2.91	20
Potassium	10.0	9.66	9.57	96.6	95.7	80.0-120			0.976	20
Sodium	10.0	9.80	9.67	98.0	96.7	80.0-120			1.38	20

L1118899-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1118899-01 07/18/19 17:54 • (MS) R3432161-5 07/18/19 17:59 • (MSD) R3432161-6 07/18/19 18:01

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 %
Boron	1.00	ND	1.12	1.18	99.8	106	1	75.0-125			5.04	20
Calcium	10.0	472	474	470	24.2	0.000	1	75.0-125	V	V	0.784	20
Iron	10.0	0.306	10.2	10.5	98.8	102	1	75.0-125			3.06	20
Magnesium	10.0	288	292	290	41.5	19.1	1	75.0-125	V	V	0.771	20
Potassium	10.0	3.61	13.5	13.6	99.0	100	1	75.0-125			0.684	20
Sodium	10.0	482	479	476	0.000	0.000	1	75.0-125	V	V	0.782	20

Method Blank (MB)

(MB) R3431748-1 07/17/19 21:14

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000250	0.00200
Cobalt	U		0.000260	0.00200
Lead	U		0.000240	0.00200
Manganese	U		0.000250	0.00500
Uranium	U		0.000330	0.0100

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

(LCS) R3431748-2 07/17/19 21:18 • (LCSD) R3431748-3 07/17/19 21:21

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 %
Arsenic	0.0500	0.0521	0.0509	104	102	80.0-120			2.46	20
Cobalt	0.0500	0.0526	0.0519	105	104	80.0-120			1.37	20
Lead	0.0500	0.0504	0.0501	101	100	80.0-120			0.465	20
Manganese	0.0500	0.0503	0.0496	101	99.2	80.0-120			1.44	20
Uranium	0.0500	0.0505	0.0504	101	101	80.0-120			0.0350	20

L1118156-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1118156-15 07/17/19 21:24 • (MS) R3431748-5 07/17/19 21:31 • (MSD) R3431748-6 07/17/19 21:34

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 %
Arsenic	0.0500	ND	0.0565	0.0568	103	104	1	75.0-125			0.395	20
Cobalt	0.0500	0.0250	0.0757	0.0772	101	104	1	75.0-125			1.93	20
Lead	0.0500	ND	0.0530	0.0533	104	104	1	75.0-125			0.535	20
Manganese	0.0500	3.49	3.54	3.55	96.6	121	1	75.0-125			0.346	20
Uranium	0.0500	ND	0.0535	0.0542	106	107	1	75.0-125			1.40	20

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.
MQL	Method Quantitation Limit.
ND	Not detected at the Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
SDL	Sample Detection Limit.
U	Not detected at the Sample Detection Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.
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.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
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

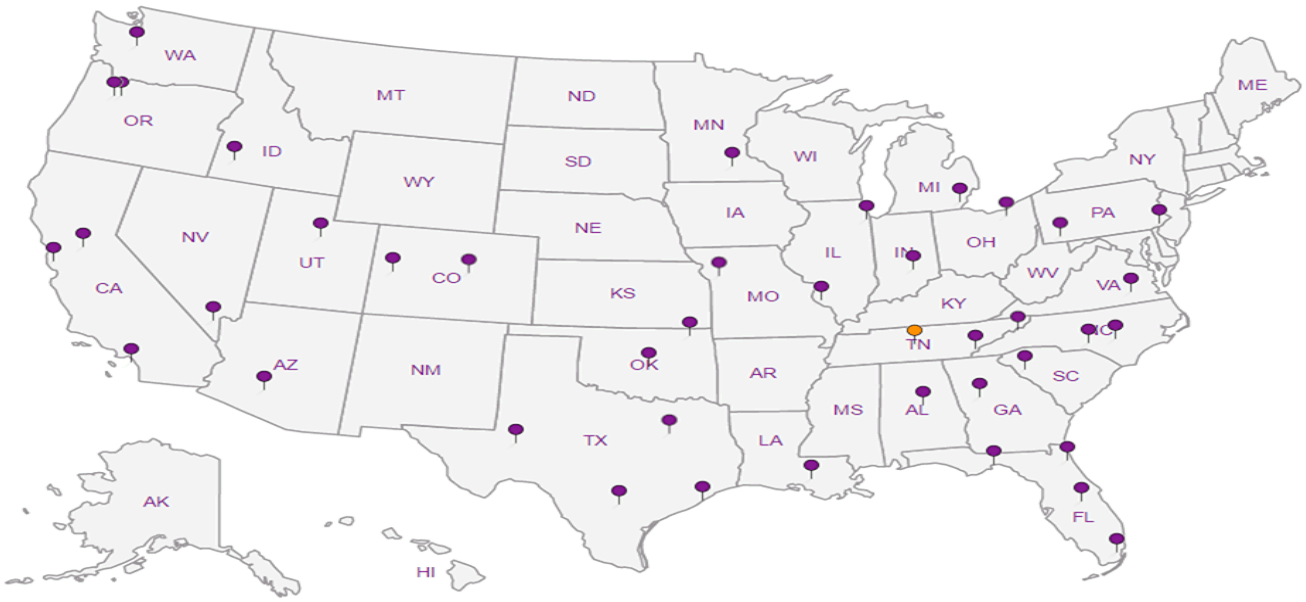
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahan

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

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

Quote #

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALKCA,ALKBI,TDS 250mlHDPE-NoPres	Cl,F,SO4 125mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Cations 250mlHDPE-HNO3	Total Metals/Cations 250mlHDPE-HNO3					Remarks	Sample # (lab only)
									22	22	22						
EB-071019	G	GW	—	7-10-19	1600	~~3~~ 2	~~X~~	X	X	X	X						-01
EB-071119	G	GW	—	7-11-19	1745	3		X	X	X	X						02
EB-071119-GW	G	GW	—	7-11-19	2015	4	X	X	X	X							03
MW-144	G	GW	—	7-11-19	2027	4	X	X	X	X							04
MW-143	G	GW	—	7-12-19	1251	4	X	X	X	X							05
EB-071219	G	GW	—	7-12-19	0930	3		X	X	X	X						06
EB-071219-GW	G	GW	—	7-12-19	1259	4	X	X	X	X							07
MW-142	G	GW	—	7-12-19	1508	4	X	X	X	X							08
		GW															
		GW															

Chain of Custody Page 1 of 1

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

L# L1119038
1250

Acctnum: AMECFWHTX
Template: T152382
Prelogin: P716916
TSR: 526 - Chris McCord
PB: TG 6-28-19
Shipped Via: FedEX Ground

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

Remarks: Total Metals = As,Co,Mn,Pb,U by 6020; B,Fe by 6010.
Total Cations = Ca,K,Mg,Na by 6010.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier __ _____

Tracking # 1682 5487 7200

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / (No) HCL / MeoH TBR	If preservation required by Login: Date/Time
	7-15-19	1500	Fedex 108259872220		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.4 +1-3.3 °C Bottles Received: 24	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/16/19 Time: 8:45	Hold: / Condition: NCF / (OK)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 26, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1119789
Samples Received:	07/18/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Jordan N Zito
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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MW-141 L1119789-01 GW

Collected by: Sam McMahan | Collected date/time: 07/15/19 11:24 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:11	07/23/19 16:11	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 17:09	07/23/19 17:09	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	50	07/23/19 17:24	07/23/19 17:24	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	5	07/24/19 11:37	07/24/19 11:37	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 03:55	TRB	Mt. Juliet, TN

EB-071519-GW L1119789-02 GW

Collected by: Sam McMahan | Collected date/time: 07/15/19 11:18 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:19	07/23/19 16:19	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 17:39	07/23/19 17:39	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	1	07/24/19 11:38	07/24/19 11:38	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 03:58	TRB	Mt. Juliet, TN

MW-140 L1119789-03 GW

Collected by: Sam McMahan | Collected date/time: 07/15/19 16:24 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:26	07/23/19 16:26	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 18:24	07/23/19 18:24	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	50	07/23/19 18:39	07/23/19 18:39	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	5	07/24/19 11:40	07/24/19 11:40	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:01	TRB	Mt. Juliet, TN

DUP-GW L1119789-04 GW

Collected by: Sam McMahan | Collected date/time: 07/15/19 00:00 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:33	07/23/19 16:33	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 19:23	07/23/19 19:23	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	20	07/23/19 19:38	07/23/19 19:38	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	5	07/24/19 11:47	07/24/19 11:47	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:08	TRB	Mt. Juliet, TN

DUP-GW-2 L1119789-05 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 00:00 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:40	07/23/19 16:40	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 19:53	07/23/19 19:53	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	50	07/23/19 20:08	07/23/19 20:08	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	1	07/24/19 11:49	07/24/19 11:49	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:11	TRB	Mt. Juliet, TN

MW-116 L1119789-06 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 08:09 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:47	07/23/19 16:47	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 20:23	07/23/19 20:23	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	50	07/23/19 20:38	07/23/19 20:38	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	1	07/24/19 11:50	07/24/19 11:50	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:13	TRB	Mt. Juliet, TN

MW-115 L1119789-07 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 09:18 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 16:54	07/23/19 16:54	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 20:53	07/23/19 20:53	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	50	07/23/19 21:08	07/23/19 21:08	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	1	07/24/19 11:52	07/24/19 11:52	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:16	TRB	Mt. Juliet, TN

MW-114 L1119789-08 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 09:50 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 17:17	07/23/19 17:17	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 21:23	07/23/19 21:23	ST	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	50	07/23/19 21:38	07/23/19 21:38	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	1	07/24/19 11:53	07/24/19 11:53	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:18	TRB	Mt. Juliet, TN

EB-071719-GW L1119789-09 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 09:40 | Received date/time: 07/18/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314047	1	07/19/19 11:19	07/19/19 11:51	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315389	1	07/23/19 17:24	07/23/19 17:24	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315667	1	07/23/19 22:22	07/23/19 22:22	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1315536	1	07/24/19 11:55	07/24/19 11:55	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1313407	1	07/22/19 07:03	07/23/19 04:21	TRB	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.

Jordan N Zito
Project Manager

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Jordan N Zito
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/26/2019 09:42
Project Name: Navajo RO Fields	Laboratory Job Number: L1119789-01, 02, 03, 04, 05, 06, 07, 08 and 09
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1314047, WG1313436, WG1313407, WG1315389, WG1315667 and WG1315536

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			1
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?		X			2
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/26/2019 09:42
Project Name: Navajo RO Fields	Laboratory Job Number: L1119789-01, 02, 03, 04, 05, 06, 07, 08 and 09
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1314047, WG1313436, WG1313407, WG1315389, WG1315667 and WG1315536

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?			X		
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?			X		
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/26/2019 09:42
Project Name: Navajo RO Fields	Laboratory Job Number: L1119789-01, 02, 03, 04, 05, 06, 07, 08 and 09
Reviewer Name: Jordan N Zito	Prep Batch Number(s): WG1314047, WG1313436, WG1313407, WG1315389, WG1315667 and WG1315536

ER #[1]	Description
1	6010B WG1313407 Sodium: Percent Recovery is outside of established control limits.
2	300.0 WG1315667 Sulfate: Relative Percent Difference is outside of established control limits.

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	2660		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	229		2.71	20.0	20.0	1	07/23/2019 16:11	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:11	WG1315389

Sample Narrative:

L1119789-01 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	288		2.60	1.00	50.0	50	07/23/2019 17:24	WG1315667
Fluoride	1.95		0.00990	0.100	0.100	1	07/23/2019 17:09	WG1315667
Sulfate	1770		3.87	5.00	250	50	07/23/2019 17:24	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	9.36		0.0985	0.100	0.500	5	07/24/2019 11:37	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	593		0.0463	1.00	1.00	1	07/23/2019 03:55	WG1313407
Magnesium	168		0.0111	1.00	1.00	1	07/23/2019 03:55	WG1313407
Potassium	4.27		0.102	1.00	1.00	1	07/23/2019 03:55	WG1313407
Sodium	57.5		0.0985	1.00	1.00	1	07/23/2019 03:55	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	5.00	J	2.82	10.0	10.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	2.78	J	2.71	20.0	20.0	1	07/23/2019 16:19	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:19	WG1315389

Sample Narrative:

L1119789-02 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Chloride	U		0.0519	1.00	1.00	1	07/23/2019 17:39	WG1315667
Fluoride	U		0.00990	0.100	0.100	1	07/23/2019 17:39	WG1315667
Sulfate	1.62	B J P1	0.0774	5.00	5.00	1	07/23/2019 17:39	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/24/2019 11:38	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	SDL mg/l	Unadj. MQL mg/l	MQL mg/l	Dilution	Analysis date / time	Batch
Calcium	0.0751	J	0.0463	1.00	1.00	1	07/23/2019 03:58	WG1313407
Magnesium	0.0626	B J	0.0111	1.00	1.00	1	07/23/2019 03:58	WG1313407
Potassium	U		0.102	1.00	1.00	1	07/23/2019 03:58	WG1313407
Sodium	U		0.0985	1.00	1.00	1	07/23/2019 03:58	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3970		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	295		2.71	20.0	20.0	1	07/23/2019 16:26	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:26	WG1315389

Sample Narrative:

L1119789-03 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	293		2.60	1.00	50.0	50	07/23/2019 18:39	WG1315667
Fluoride	1.82		0.00990	0.100	0.100	1	07/23/2019 18:24	WG1315667
Sulfate	2430		3.87	5.00	250	50	07/23/2019 18:39	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	15.5		0.0985	0.100	0.500	5	07/24/2019 11:40	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	659		0.0463	1.00	1.00	1	07/23/2019 04:01	WG1313407
Magnesium	241		0.0111	1.00	1.00	1	07/23/2019 04:01	WG1313407
Potassium	39.6		0.102	1.00	1.00	1	07/23/2019 04:01	WG1313407
Sodium	168		0.0985	1.00	1.00	1	07/23/2019 04:01	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	2900		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	227		2.71	20.0	20.0	1	07/23/2019 16:33	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:33	WG1315389

Sample Narrative:

L1119789-04 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	285		1.04	1.00	20.0	20	07/23/2019 19:38	WG1315667
Fluoride	1.83		0.00990	0.100	0.100	1	07/23/2019 19:23	WG1315667
Sulfate	1680		1.55	5.00	100	20	07/23/2019 19:38	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	9.53		0.0985	0.100	0.500	5	07/24/2019 11:47	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	607		0.0463	1.00	1.00	1	07/23/2019 04:08	WG1313407
Magnesium	171		0.0111	1.00	1.00	1	07/23/2019 04:08	WG1313407
Potassium	4.20		0.102	1.00	1.00	1	07/23/2019 04:08	WG1313407
Sodium	57.7		0.0985	1.00	1.00	1	07/23/2019 04:08	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3490		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	346		2.71	20.0	20.0	1	07/23/2019 16:40	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:40	WG1315389

Sample Narrative:

L1119789-05 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	266		2.60	1.00	50.0	50	07/23/2019 20:08	WG1315667
Fluoride	2.00		0.00990	0.100	0.100	1	07/23/2019 19:53	WG1315667
Sulfate	2570		3.87	5.00	250	50	07/23/2019 20:08	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.350		0.0197	0.100	0.100	1	07/24/2019 11:49	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	570		0.0463	1.00	1.00	1	07/23/2019 04:11	WG1313407
Magnesium	289		0.0111	1.00	1.00	1	07/23/2019 04:11	WG1313407
Potassium	2.01		0.102	1.00	1.00	1	07/23/2019 04:11	WG1313407
Sodium	189		0.0985	1.00	1.00	1	07/23/2019 04:11	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3700		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	341		2.71	20.0	20.0	1	07/23/2019 16:47	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:47	WG1315389

Sample Narrative:

L1119789-06 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	265		2.60	1.00	50.0	50	07/23/2019 20:38	WG1315667
Fluoride	2.01		0.00990	0.100	0.100	1	07/23/2019 20:23	WG1315667
Sulfate	2550		3.87	5.00	250	50	07/23/2019 20:38	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.371		0.0197	0.100	0.100	1	07/24/2019 11:50	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	576		0.0463	1.00	1.00	1	07/23/2019 04:13	WG1313407
Magnesium	289		0.0111	1.00	1.00	1	07/23/2019 04:13	WG1313407
Potassium	2.10		0.102	1.00	1.00	1	07/23/2019 04:13	WG1313407
Sodium	189		0.0985	1.00	1.00	1	07/23/2019 04:13	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4510		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	410		2.71	20.0	20.0	1	07/23/2019 16:54	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 16:54	WG1315389

Sample Narrative:

L1119789-07 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	254		2.60	1.00	50.0	50	07/23/2019 21:08	WG1315667
Fluoride	2.33		0.00990	0.100	0.100	1	07/23/2019 20:53	WG1315667
Sulfate	2940		3.87	5.00	250	50	07/23/2019 21:08	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/24/2019 11:52	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	477		0.0463	1.00	1.00	1	07/23/2019 04:16	WG1313407
Magnesium	451		0.0111	1.00	1.00	1	07/23/2019 04:16	WG1313407
Potassium	0.765	J	0.102	1.00	1.00	1	07/23/2019 04:16	WG1313407
Sodium	217		0.0985	1.00	1.00	1	07/23/2019 04:16	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3000		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	377		2.71	20.0	20.0	1	07/23/2019 17:17	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 17:17	WG1315389

Sample Narrative:

L1119789-08 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	219		2.60	1.00	50.0	50	07/23/2019 21:38	WG1315667
Fluoride	2.10		0.00990	0.100	0.100	1	07/23/2019 21:23	WG1315667
Sulfate	2320		3.87	5.00	250	50	07/23/2019 21:38	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.375		0.0197	0.100	0.100	1	07/24/2019 11:53	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	604		0.0463	1.00	1.00	1	07/23/2019 04:18	WG1313407
Magnesium	239		0.0111	1.00	1.00	1	07/23/2019 04:18	WG1313407
Potassium	3.08		0.102	1.00	1.00	1	07/23/2019 04:18	WG1313407
Sodium	137		0.0985	1.00	1.00	1	07/23/2019 04:18	WG1313407

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	8.00	J	2.82	10.0	10.0	1	07/19/2019 11:51	WG1314047

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	3.04	J	2.71	20.0	20.0	1	07/23/2019 17:24	WG1315389
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 17:24	WG1315389

Sample Narrative:

L1119789-09 WG1315389: Endpoint pH 4.5 headspace

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	0.218	J	0.0519	1.00	1.00	1	07/23/2019 22:22	WG1315667
Fluoride	U		0.00990	0.100	0.100	1	07/23/2019 22:22	WG1315667
Sulfate	0.778	B J	0.0774	5.00	5.00	1	07/23/2019 22:22	WG1315667

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/24/2019 11:55	WG1315536

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	0.167	J	0.0463	1.00	1.00	1	07/23/2019 04:21	WG1313407
Magnesium	0.162	B J	0.0111	1.00	1.00	1	07/23/2019 04:21	WG1313407
Potassium	0.108	J	0.102	1.00	1.00	1	07/23/2019 04:21	WG1313407
Sodium	0.159	J	0.0985	1.00	1.00	1	07/23/2019 04:21	WG1313407

Method Blank (MB)

(MB) R3432611-1 07/19/19 11:51

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

L1119789-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119789-01 07/19/19 11:51 • (DUP) R3432611-3 07/19/19 11:51

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	2660	2790	1	4.77		5

Laboratory Control Sample (LCS)

(LCS) R3432611-2 07/19/19 11:51

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8270	94.0	85.0-115	

Method Blank (MB)

(MB) R3433463-1 07/23/19 14:05

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	U		2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1119594-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119594-01 07/23/19 14:35 • (DUP) R3433463-2 07/23/19 14:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	69.0	67.9	1	1.56		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

L1119789-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1119789-07 07/23/19 16:54 • (DUP) R3433463-4 07/23/19 17:09

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	410	408	1	0.371		20
Alkalinity,Carbonate	U	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

Method Blank (MB)

(MB) R3433534-1 07/23/19 08:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	0.243	J	0.0774	5.00

L1119159-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119159-01 07/23/19 14:10 • (DUP) R3433534-3 07/23/19 14:25

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	16.4	16.3	1	1.09		20
Fluoride	0.372	0.373	1	0.295		20
Sulfate	22.1	22.0	1	0.738		20

L1119789-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1119789-02 07/23/19 17:39 • (DUP) R3433534-6 07/23/19 17:54

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	U	0.000	1	0.000		20
Fluoride	U	0.000	1	0.000		20
Sulfate	1.62	0.000	1	200	P1	20

Laboratory Control Sample (LCS)

(LCS) R3433534-2 07/23/19 09:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.6	98.9	90.0-110	
Fluoride	8.00	8.07	101	90.0-110	
Sulfate	40.0	41.1	103	90.0-110	

L1119159-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119159-01 07/23/19 14:10 • (MS) R3433534-4 07/23/19 14:40 • (MSD) R3433534-5 07/23/19 14:55

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 %
Chloride	50.0	16.4	66.9	67.0	101	101	1	80.0-120			0.0692	20
Fluoride	5.00	0.372	5.40	5.41	100	101	1	80.0-120			0.198	20
Sulfate	50.0	22.1	71.1	71.2	98.0	98.2	1	80.0-120			0.114	20

L1119789-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119789-02 07/23/19 17:39 • (MS) R3433534-7 07/23/19 18:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	U	51.0	102	1	80.0-120	
Fluoride	5.00	U	5.07	101	1	80.0-120	
Sulfate	50.0	1.62	51.6	100	1	80.0-120	

Method Blank (MB)

(MB) R3433976-1 07/24/19 11:26

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1118566-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1118566-03 07/24/19 11:29 • (DUP) R3433976-3 07/24/19 11:31

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	ND	0.000	1	0.000		20

L1120037-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1120037-02 07/24/19 12:01 • (DUP) R3433976-5 07/24/19 12:08

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	2.16	2.10	1	2.86		20

Laboratory Control Sample (LCS)

(LCS) R3433976-2 07/24/19 11:28

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	4.03	101	90.0-110	

L1119305-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1119305-01 07/24/19 11:32 • (MS) R3433976-4 07/24/19 11:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	2.26	4.52	90.4	1	90.0-110	

L1120102-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1120102-01 07/24/19 12:10 • (MS) R3433976-6 07/24/19 12:11 • (MSD) R3433976-7 07/24/19 12:13

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 %
Nitrate-Nitrite	2.50	ND	2.44	2.42	97.7	96.6	1	90.0-110			1.15	20

Method Blank (MB)

(MB) R3433100-1 07/23/19 03:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Calcium	U		0.0463	1.00
Magnesium	0.0687	J	0.0111	1.00
Potassium	U		0.102	1.00
Sodium	U		0.0985	1.00

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

(LCS) R3433100-2 07/23/19 03:10 • (LCSD) R3433100-3 07/23/19 03:12

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 %
Calcium	10.0	9.89	9.91	98.9	99.1	80.0-120			0.268	20
Magnesium	10.0	10.4	10.3	104	103	80.0-120			0.450	20
Potassium	10.0	9.60	9.72	96.0	97.2	80.0-120			1.29	20
Sodium	10.0	9.75	9.79	97.5	97.9	80.0-120			0.374	20

L1119356-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119356-01 07/23/19 03:15 • (MS) R3433100-5 07/23/19 03:20 • (MSD) R3433100-6 07/23/19 03:22

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 %
Calcium	10.0	51.0	60.5	60.1	94.6	91.2	1	75.0-125			0.565	20
Magnesium	10.0	6.56	16.5	16.6	99.9	100	1	75.0-125			0.233	20
Potassium	10.0	2.04	11.7	11.7	96.7	97.1	1	75.0-125			0.361	20
Sodium	10.0	114	120	120	60.9	57.6	1	75.0-125	V	V	0.276	20

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.
MQL	Method Quantitation Limit.
ND	Not detected at the Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
SDL	Sample Detection Limit.
U	Not detected at the Sample Detection Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.
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.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
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

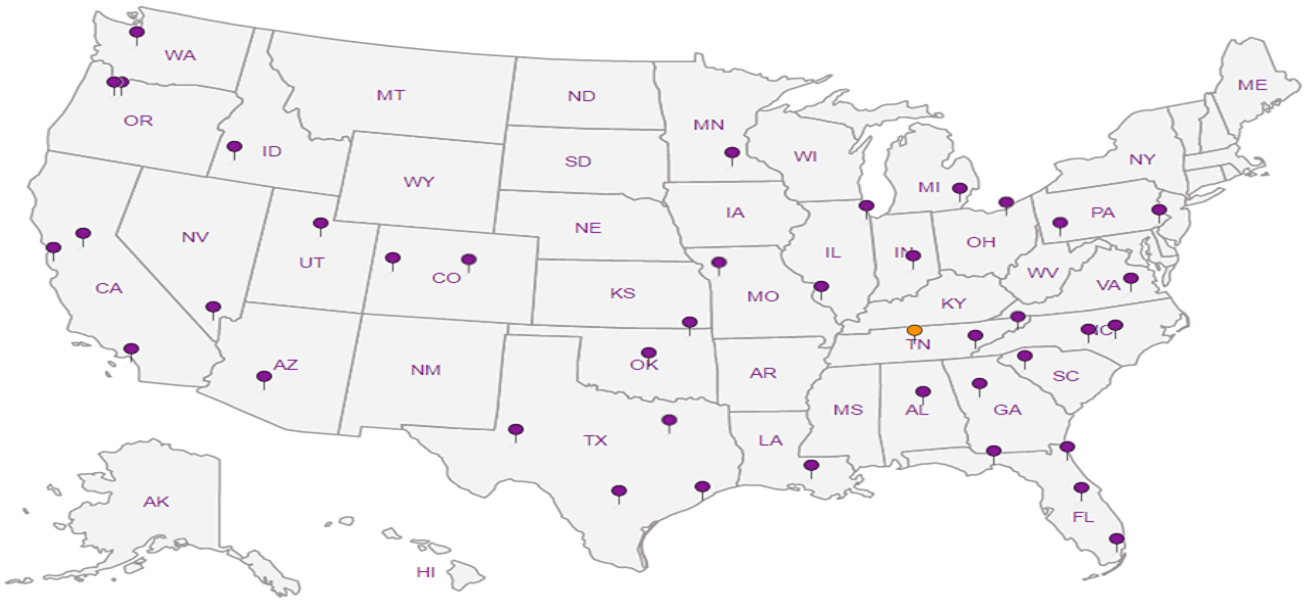
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahon

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y✓

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALKCA,ALKBI,TDS 250mlHDPE-NoPres	Cl,F, SO4 125mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Cations 250mlHDPE-HNO3	Total Metals/Cations 250mlHDPE-HNO3					Remarks	Sample # (lab only)
							2	2	2								
MW-141	G	GW	—	7-15-19	1124	4	X	X	X	X							-01
EB-071519-GW	G	GW	—	7-15-19	1118	4	X	X	X	X							02
MW-140	G	GW	—	7-15-19	1624	4	X	X	X	X							03
Dup-GW	G	GW	—	7-15-19	—	4	X	X	X	X							04
Dup-GW-2	G	GW	—	7-17-19	—	4	X	X	X	X							05
MW-116	G	GW	—	7-17-19	0809	4	X	X	X	X							06
MW-115	G	GW	—	7-17-19	0918	4	X	X	X	X							07
MW-114	G	GW	—	7-17-19	0950	4	X	X	X	X							08
EB-071719-GW	G	GW	—	7-17-19	0940	4	X	X	X	X							09
		GW															

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

Remarks: Total Metals = As,Co,Mn,Pb,U by 6020; B,Fe by 6010.
Total Cations = Ca,K,Mg,Na by 6010.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking # 1082 5087 2013

Chain of Custody Page 1 of 1

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

L# L1119789
J238

Acctnum: AMECFWHTX
Template: T152382
Prelogin: P716916
TSR: 526 - Chris McCord
PB: TG 6-28-19
Shipped Via: FedEX Ground

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes (No) HCL/MeoH TBR	If preservation required by Login: Date/Time
	7-17-19	1500	Fedex 108259872013		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.6 °C Bottles Received: 1.1=1535 36	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/18/19 Time: 8:45	Hold: / Condition: NCF / (OK)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 30, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1120149
Samples Received:	07/19/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Chris McCord
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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MW-119 L1120149-01 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 10:31 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 10:50	07/23/19 10:50	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 04:51	07/24/19 04:51	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 05:06	07/24/19 05:06	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:14	07/24/19 20:14	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:32	RDS	Mt. Juliet, TN

MW-118 L1120149-02 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 10:59 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 10:57	07/23/19 10:57	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 05:21	07/24/19 05:21	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 05:36	07/24/19 05:36	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:17	07/24/19 20:17	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:34	RDS	Mt. Juliet, TN

MW-117 L1120149-03 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 11:30 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:04	07/23/19 11:04	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 05:51	07/24/19 05:51	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 06:06	07/24/19 06:06	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:20	07/24/19 20:20	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:43	RDS	Mt. Juliet, TN

RW-18A L1120149-04 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 13:28 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:11	07/23/19 11:11	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 06:21	07/24/19 06:21	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 06:36	07/24/19 06:36	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:21	07/24/19 20:21	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:46	RDS	Mt. Juliet, TN

MW-125 L1120149-05 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 14:37 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:18	07/23/19 11:18	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 06:50	07/24/19 06:50	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 07:35	07/24/19 07:35	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:23	07/24/19 20:23	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:49	RDS	Mt. Juliet, TN

MW-56 L1120149-06 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 15:20 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:26	07/23/19 11:26	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 07:50	07/24/19 07:50	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 08:05	07/24/19 08:05	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:30	07/24/19 20:30	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:52	RDS	Mt. Juliet, TN

MW-29 L1120149-07 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 15:49 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314210	1	07/21/19 09:43	07/21/19 10:05	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:42	07/23/19 11:42	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 08:20	07/24/19 08:20	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 08:35	07/24/19 08:35	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	50	07/24/19 20:32	07/24/19 20:32	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:55	RDS	Mt. Juliet, TN

MW-40 L1120149-08 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 16:14 | Received date/time: 07/19/19 08:45

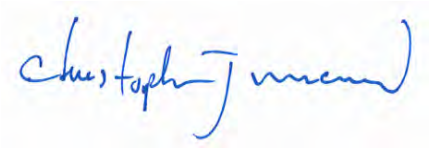
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314631	1	07/21/19 11:01	07/21/19 11:24	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:49	07/23/19 11:49	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	1	07/24/19 08:50	07/24/19 08:50	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315848	50	07/24/19 09:05	07/24/19 09:05	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	100	07/24/19 20:33	07/24/19 20:33	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 17:58	RDS	Mt. Juliet, TN

MW-55 L1120149-09 GW

Collected by: Sam McMahan | Collected date/time: 07/17/19 16:42 | Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1314631	1	07/21/19 11:01	07/21/19 11:24	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1315391	1	07/23/19 11:56	07/23/19 11:56	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315673	1	07/25/19 00:10	07/25/19 00:10	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1315673	50	07/25/19 00:25	07/25/19 00:25	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1316187	1	07/24/19 20:35	07/24/19 20:35	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1314362	1	07/20/19 14:42	07/21/19 18:01	RDS	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.



Chris McCord
Project Manager

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

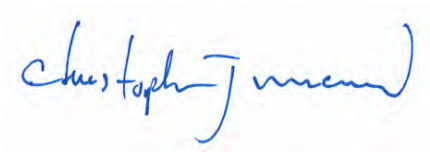
b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.



Chris McCord
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/30/2019 09:18
Project Name: Navajo RO Fields	Laboratory Job Number: L1120149-01, 02, 03, 04, 05, 06, 07, 08 and 09
Reviewer Name: Chris McCord	Prep Batch Number(s): WG1314374, WG1314362, WG1314631, WG1314210, WG1315391, WG1315848, WG1316187 and WG1315673

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		X			1
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			2
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?		X			3
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/30/2019 09:18
Project Name: Navajo RO Fields	Laboratory Job Number: L1120149-01, 02, 03, 04, 05, 06, 07, 08 and 09
Reviewer Name: Chris McCord	Prep Batch Number(s): WG1314374, WG1314362, WG1314631, WG1314210, WG1315391, WG1315848, WG1316187 and WG1315673

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?			X		
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?			X		
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/30/2019 09:18
Project Name: Navajo RO Fields	Laboratory Job Number: L1120149-01, 02, 03, 04, 05, 06, 07, 08 and 09
Reviewer Name: Chris McCord	Prep Batch Number(s): WG1314374, WG1314362, WG1314631, WG1314210, WG1315391, WG1315848, WG1316187 and WG1315673

ER #[1]	Description
1	WG1315673 R3434271-4, 5, 7 and 8: The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
2	300.0 WG1315673 Fluoride, Sulfate: Percent Recovery is outside of established control limits.
3	300.0 WG1315673 Fluoride: Relative Percent Difference is outside of established control limits. 2540 C-2011 WG1314210 Dissolved Solids: Relative Percent Difference is outside of established control limits.

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3980		14.1	50.0	50.0	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	319		2.71	20.0	20.0	1	07/23/2019 10:50	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 10:50	WG1315391

Sample Narrative:

L1120149-01 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	443		2.60	1.00	50.0	50	07/24/2019 05:06	WG1315848
Fluoride	2.79		0.00990	0.100	0.100	1	07/24/2019 04:51	WG1315848
Sulfate	2570		3.87	5.00	250	50	07/24/2019 05:06	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.308		0.0197	0.100	0.100	1	07/24/2019 20:14	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	623		0.0463	1.00	1.00	1	07/21/2019 17:32	WG1314362
Magnesium	288		0.0111	1.00	1.00	1	07/21/2019 17:32	WG1314362
Potassium	1.71		0.102	1.00	1.00	1	07/21/2019 17:32	WG1314362
Sodium	243		0.0985	1.00	1.00	1	07/21/2019 17:32	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4180		14.1	50.0	50.0	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	360		2.71	20.0	20.0	1	07/23/2019 10:57	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 10:57	WG1315391

Sample Narrative:

L1120149-02 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	301		2.60	1.00	50.0	50	07/24/2019 05:36	WG1315848
Fluoride	6.16		0.00990	0.100	0.100	1	07/24/2019 05:21	WG1315848
Sulfate	2860		3.87	5.00	250	50	07/24/2019 05:36	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	1.02		0.0197	0.100	0.100	1	07/24/2019 20:17	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	600		0.0463	1.00	1.00	1	07/21/2019 17:34	WG1314362
Magnesium	378		0.0111	1.00	1.00	1	07/21/2019 17:34	WG1314362
Potassium	5.31		0.102	1.00	1.00	1	07/21/2019 17:34	WG1314362
Sodium	146		0.0985	1.00	1.00	1	07/21/2019 17:34	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3740		14.1	50.0	50.0	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	344		2.71	20.0	20.0	1	07/23/2019 11:04	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:04	WG1315391

Sample Narrative:

L1120149-03 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	284		2.60	1.00	50.0	50	07/24/2019 06:06	WG1315848
Fluoride	3.40		0.00990	0.100	0.100	1	07/24/2019 05:51	WG1315848
Sulfate	2230		3.87	5.00	250	50	07/24/2019 06:06	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.191		0.0197	0.100	0.100	1	07/24/2019 20:20	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	597		0.0463	1.00	1.00	1	07/21/2019 17:43	WG1314362
Magnesium	268		0.0111	1.00	1.00	1	07/21/2019 17:43	WG1314362
Potassium	6.54		0.102	1.00	1.00	1	07/21/2019 17:43	WG1314362
Sodium	107		0.0985	1.00	1.00	1	07/21/2019 17:43	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4150		14.1	50.0	50.0	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	293		2.71	20.0	20.0	1	07/23/2019 11:11	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:11	WG1315391

Sample Narrative:

L1120149-04 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	247		2.60	1.00	50.0	50	07/24/2019 06:36	WG1315848
Fluoride	2.10		0.00990	0.100	0.100	1	07/24/2019 06:21	WG1315848
Sulfate	3090		3.87	5.00	250	50	07/24/2019 06:36	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.256		0.0197	0.100	0.100	1	07/24/2019 20:21	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	521		0.0463	1.00	1.00	1	07/21/2019 17:46	WG1314362
Magnesium	375		0.0111	1.00	1.00	1	07/21/2019 17:46	WG1314362
Potassium	0.884	J	0.102	1.00	1.00	1	07/21/2019 17:46	WG1314362
Sodium	126		0.0985	1.00	1.00	1	07/21/2019 17:46	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4380		14.1	50.0	50.0	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	407		2.71	20.0	20.0	1	07/23/2019 11:18	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:18	WG1315391

Sample Narrative:

L1120149-05 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	298		2.60	1.00	50.0	50	07/24/2019 07:35	WG1315848
Fluoride	1.26		0.00990	0.100	0.100	1	07/24/2019 06:50	WG1315848
Sulfate	2750		3.87	5.00	250	50	07/24/2019 07:35	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	0.587		0.0197	0.100	0.100	1	07/24/2019 20:23	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	557		0.0463	1.00	1.00	1	07/21/2019 17:49	WG1314362
Magnesium	392		0.0111	1.00	1.00	1	07/21/2019 17:49	WG1314362
Potassium	1.67		0.102	1.00	1.00	1	07/21/2019 17:49	WG1314362
Sodium	231		0.0985	1.00	1.00	1	07/21/2019 17:49	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	3430		14.1	50.0	50.0	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	375		2.71	20.0	20.0	1	07/23/2019 11:26	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:26	WG1315391

Sample Narrative:

L1120149-06 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	273		2.60	1.00	50.0	50	07/24/2019 08:05	WG1315848
Fluoride	1.20		0.00990	0.100	0.100	1	07/24/2019 07:50	WG1315848
Sulfate	2180		3.87	5.00	250	50	07/24/2019 08:05	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/24/2019 20:30	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	525		0.0463	1.00	1.00	1	07/21/2019 17:52	WG1314362
Magnesium	268		0.0111	1.00	1.00	1	07/21/2019 17:52	WG1314362
Potassium	2.21		0.102	1.00	1.00	1	07/21/2019 17:52	WG1314362
Sodium	184		0.0985	1.00	1.00	1	07/21/2019 17:52	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4820		28.2	100	100	1	07/21/2019 10:05	WG1314210

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	503		2.71	20.0	20.0	1	07/23/2019 11:42	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:42	WG1315391

Sample Narrative:

L1120149-07 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	383		2.60	1.00	50.0	50	07/24/2019 08:35	WG1315848
Fluoride	2.00		0.00990	0.100	0.100	1	07/24/2019 08:20	WG1315848
Sulfate	3300		3.87	5.00	250	50	07/24/2019 08:35	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		0.985	0.100	5.00	50	07/24/2019 20:32	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	578		0.0463	1.00	1.00	1	07/21/2019 17:55	WG1314362
Magnesium	446		0.0111	1.00	1.00	1	07/21/2019 17:55	WG1314362
Potassium	2.48		0.102	1.00	1.00	1	07/21/2019 17:55	WG1314362
Sodium	384		0.0985	1.00	1.00	1	07/21/2019 17:55	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	2580		14.1	50.0	50.0	1	07/21/2019 11:24	WG1314631

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	309		2.71	20.0	20.0	1	07/23/2019 11:49	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:49	WG1315391

Sample Narrative:

L1120149-08 WG1315391: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	87.7		0.0519	1.00	1.00	1	07/24/2019 08:50	WG1315848
Fluoride	1.93		0.00990	0.100	0.100	1	07/24/2019 08:50	WG1315848
Sulfate	1730		3.87	5.00	250	50	07/24/2019 09:05	WG1315848

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	U		1.97	0.100	10.0	100	07/24/2019 20:33	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	588		0.0463	1.00	1.00	1	07/21/2019 17:58	WG1314362
Magnesium	205		0.0111	1.00	1.00	1	07/21/2019 17:58	WG1314362
Potassium	2.54		0.102	1.00	1.00	1	07/21/2019 17:58	WG1314362
Sodium	104		0.0985	1.00	1.00	1	07/21/2019 17:58	WG1314362

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Dissolved Solids	4680		14.1	50.0	50.0	1	07/21/2019 11:24	WG1314631

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	446		2.71	20.0	20.0	1	07/23/2019 11:56	WG1315391
Alkalinity,Carbonate	U		2.71	20.0	20.0	1	07/23/2019 11:56	WG1315391

Sample Narrative:

L1120149-09 WG1315391: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	498		2.60	1.00	50.0	50	07/25/2019 00:25	WG1315673
Fluoride	1.83		0.00990	0.100	0.100	1	07/25/2019 00:10	WG1315673
Sulfate	2100		3.87	5.00	250	50	07/25/2019 00:25	WG1315673

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Nitrate-Nitrite	1.65		0.0197	0.100	0.100	1	07/24/2019 20:35	WG1316187

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Calcium	492		0.0463	1.00	1.00	1	07/21/2019 18:01	WG1314362
Magnesium	364		0.0111	1.00	1.00	1	07/21/2019 18:01	WG1314362
Potassium	1.11		0.102	1.00	1.00	1	07/21/2019 18:01	WG1314362
Sodium	247		0.0985	1.00	1.00	1	07/21/2019 18:01	WG1314362

Method Blank (MB)

(MB) R3432990-1 07/21/19 10:05

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

L1120122-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1120122-01 07/21/19 10:05 • (DUP) R3432990-3 07/21/19 10:05

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	2220	2090	1	6.31	J3	5

Laboratory Control Sample (LCS)

(LCS) R3432990-2 07/21/19 10:05

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8280	94.1	85.0-115	

Method Blank (MB)

(MB) R3432988-1 07/21/19 11:24

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

L1120149-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1120149-08 07/21/19 11:24 • (DUP) R3432988-3 07/21/19 11:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	2580	2610	1	1.16		5

Laboratory Control Sample (LCS)

(LCS) R3432988-2 07/21/19 11:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8490	96.5	85.0-115	

Method Blank (MB)

(MB) R3433429-1 07/23/19 10:20

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	U		2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5 HEADSPACE

L1120205-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1120205-05 07/23/19 12:44 • (DUP) R3433429-4 07/23/19 12:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	490	488	1	0.379		20
Alkalinity,Carbonate	U	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 HEADSPACE

DUP: Endpoint pH 4.5 HEADSPACE

L1119604-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1119604-02 07/23/19 10:27 • (DUP) R3433429-6 07/23/19 10:35

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	59.2	59.0	1	0.326		20
Alkalinity,Carbonate	ND	0.000	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 HEADSPACE

DUP: Endpoint pH 4.5 HEADSPACE

Method Blank (MB)

(MB) R3434271-1 07/24/19 22:09

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1120145-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1120145-01 07/24/19 23:42 • (DUP) R3434271-3 07/24/19 23:56

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	2.53	2.49	1	1.71		20
Fluoride	ND	0.0307	1	21.5	J P1	20
Sulfate	8.91	8.81	1	1.03		20

L1120270-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1120270-04 07/25/19 09:18 • (DUP) R3434271-6 07/25/19 09:32

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	38.1	37.8	1	0.717		20
Fluoride	0.808	0.805	1	0.298		20

L1120270-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1120270-04 07/25/19 14:37 • (DUP) R3434271-9 07/25/19 14:51

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	263	263	5	0.181		20

Sample Narrative:

OS: REPORT Br @ dilution DUE TO HIGH SO4

Laboratory Control Sample (LCS)

(LCS) R3434271-2 07/24/19 22:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.8	99.5	90.0-110	
Fluoride	8.00	8.08	101	90.0-110	
Sulfate	40.0	40.4	101	90.0-110	

L1120245-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1120245-01 07/25/19 00:39 • (MS) R3434271-4 07/25/19 00:53 • (MSD) R3434271-5 07/25/19 01:08

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 %
Chloride	50.0	36.3	80.1	80.0	87.8	87.5	1	80.0-120			0.190	20
Fluoride	5.00	9.06	13.0	12.9	78.0	77.4	1	80.0-120	E J6	E J6	0.242	20
Sulfate	50.0	135	169	169	66.6	67.3	1	80.0-120	E J6	E J6	0.223	20

L1120270-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1120270-05 07/25/19 09:47 • (MS) R3434271-7 07/25/19 10:01 • (MSD) R3434271-8 07/25/19 10:44

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 %
Chloride	50.0	43.0	92.3	92.0	98.6	98.1	1	80.0-120			0.248	20
Fluoride	5.00	12.6	16.7	16.7	82.4	82.0	1	80.0-120	E	E	0.124	20
Sulfate	50.0	U	50.2	50.2	100	100	1	80.0-120			0.107	20

Method Blank (MB)

(MB) R3433799-1 07/24/19 01:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

L1119610-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1119610-01 07/24/19 02:08 • (DUP) R3433799-3 07/24/19 02:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	9.91	9.71	1	2.01		20
Fluoride	0.812	0.811	1	0.234		20
Sulfate	9.26	9.28	1	0.276		20

L1120600-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1120600-06 07/24/19 10:49 • (DUP) R3433799-6 07/24/19 11:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	20.4	20.3	1	0.456		20
Fluoride	0.983	0.982	1	0.0814		20
Sulfate	52.7	52.4	1	0.635		20

Laboratory Control Sample (LCS)

(LCS) R3433799-2 07/24/19 01:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.8	99.6	90.0-110	
Fluoride	8.00	8.13	102	90.0-110	
Sulfate	40.0	41.0	102	90.0-110	

L1119610-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119610-01 07/24/19 02:08 • (MS) R3433799-4 07/24/19 02:37 • (MSD) R3433799-5 07/24/19 02:52

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 %
Chloride	50.0	9.91	61.3	62.1	103	104	1	80.0-120			1.23	20
Fluoride	5.00	0.812	5.91	5.97	102	103	1	80.0-120			0.929	20
Sulfate	50.0	9.26	60.4	61.0	102	103	1	80.0-120			0.920	20

L1120600-06 Original Sample (OS) • Matrix Spike (MS)

(OS) L1120600-06 07/24/19 10:49 • (MS) R3433799-7 07/24/19 11:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	20.4	70.3	99.8	1	80.0-120	
Fluoride	5.00	0.983	5.90	98.4	1	80.0-120	
Sulfate	50.0	52.7	99.7	94.0	1	80.0-120	

Method Blank (MB)

(MB) R3433978-1 07/24/19 20:09

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0197	0.100

L1120149-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1120149-01 07/24/19 20:14 • (DUP) R3433978-3 07/24/19 20:15

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.308	0.307	1	0.325		20

L1120465-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1120465-04 07/24/19 20:56 • (DUP) R3433978-5 07/24/19 20:57

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3433978-2 07/24/19 20:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	3.88	96.9	90.0-110	

L1120149-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1120149-02 07/24/19 20:17 • (MS) R3433978-4 07/24/19 20:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate-Nitrite	2.50	1.02	3.62	104	1	90.0-110	

L1120473-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1120473-01 07/24/19 20:59 • (MS) R3433978-6 07/24/19 21:00 • (MSD) R3433978-7 07/24/19 21:02

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 %
Nitrate-Nitrite	2.50	1.62	4.11	4.07	99.6	97.9	1	90.0-110			1.05	20

Method Blank (MB)

(MB) R3432756-1 07/21/19 17:09

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Calcium	U		0.0463	1.00
Magnesium	0.0176	J	0.0111	1.00
Potassium	U		0.102	1.00
Sodium	U		0.0985	1.00

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

(LCS) R3432756-2 07/21/19 17:12 • (LCSD) R3432756-3 07/21/19 17:14

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 %
Calcium	10.0	9.58	9.73	95.8	97.3	80.0-120			1.56	20
Magnesium	10.0	9.78	9.98	97.8	99.8	80.0-120			2.00	20
Potassium	10.0	9.34	9.48	93.4	94.8	80.0-120			1.53	20
Sodium	10.0	9.65	9.80	96.5	98.0	80.0-120			1.50	20

L1120145-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1120145-01 07/21/19 17:17 • (MS) R3432756-5 07/21/19 17:23 • (MSD) R3432756-6 07/21/19 17:25

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 %
Calcium	10.0	9.05	18.5	18.4	94.2	93.9	1	75.0-125			0.178	20
Magnesium	10.0	2.51	12.3	12.2	97.8	97.2	1	75.0-125			0.488	20
Potassium	10.0	1.04	10.3	10.3	92.1	93.0	1	75.0-125			0.870	20
Sodium	10.0	8.02	17.4	17.4	93.5	93.6	1	75.0-125			0.0620	20

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

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

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

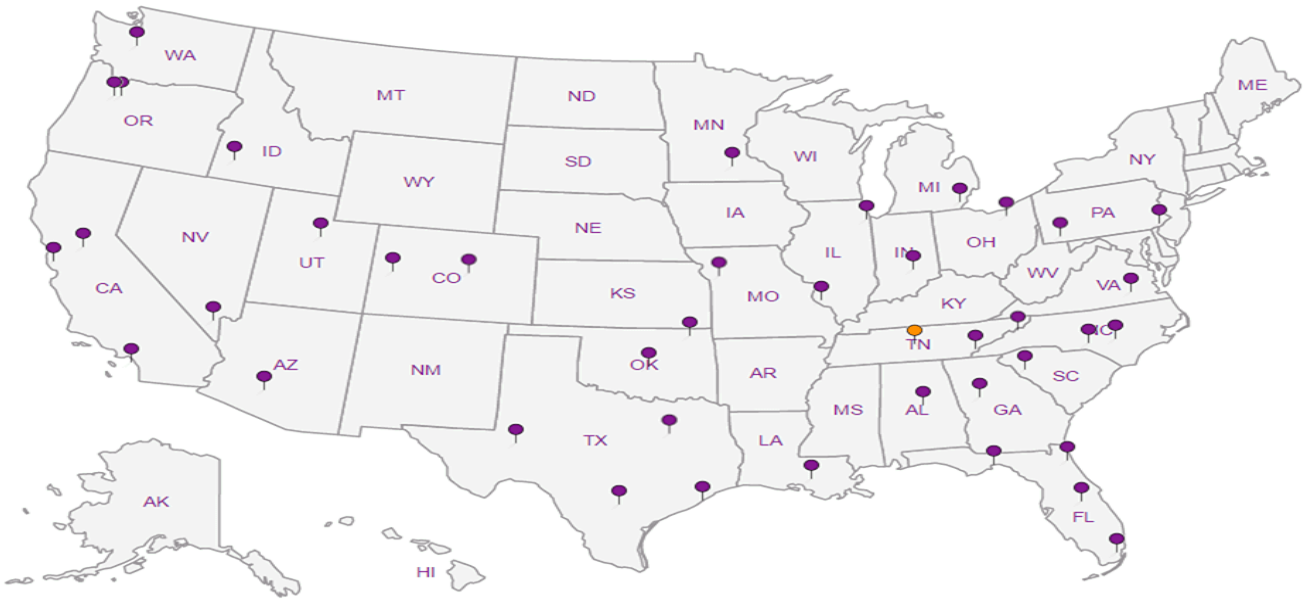
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahan

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y✓

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

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALKCA,ALKBI,TDS 250mlHDPE-NoPres	Cl ,F, SO4 125mlHDPE-NoPres	NO2NO3 250mlHDPE-H2SO4	Total Cations 250mlHDPE-HNO3	Total Metals/Cations 250mlHDPE-HNO3					Remarks	Sample # (lab only)
MW-119	G	GW	—	7-17-19	1031	4	X	X	X	X							01
MW-118	G	GW	—	7-17-19	1059	4	X	X	X	X							02
MW-117	G	GW	—	7-17-19	1130	4	X	X	X	X							03
~~R~~ BW-18A	G	GW	—	7-17-19	1328	4	X	X	X	X							04
MW-125	G	GW	—	7-17-19	1437	4	X	X	X	X							05
MW-56	G	GW	—	7-17-19	1520	4	X	X	X	X							06
MW-29	G	GW	—	7-17-19	1549	4	X	X	X	X							07
MW-40	G	GW	—	7-17-19	1614	4	X	X	X	X							08
MW-55	G	GW	—	7-17-19	1642	4	X	X	X	X							09

Chain of Custody Page 1 of 1

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

L# 112045
H049

Acctnum: AMECFWHTX
Template: T152382
Prelogin: P716916
TSR: 526 - Chris McCord
PB: TB 6-28-19
Shipped Via: FedEX Ground

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

Remarks: Total Metals = As,Co,Mn,Pb,U by 6020; B,Fe by 6010.
Total Cations = Ca,K,Mg,Na by 6010.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier __ _____

Tracking # 1082 5987 2274

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / (No) HCL / MeoH TBR	If preservation required by Login: Date/Time
	7-18-19	1500	Fedex 1082 5987 2274	Ø	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 3.6,1:3.2 36	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7-19-19 Time: 8:45	Hold: / Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 25, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group:	L1120150
Samples Received:	07/19/2019
Project Number:	6703180022.0003
Description:	Navajo RO Fields

Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:

Jason Romer
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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Cn: Case Narrative 4

Tr: TRRP Summary 5

TRRP form R 6

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TRRP Exception Reports 8

Sr: Sample Results 9

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Qc: Quality Control Summary 10

Mercury by Method 7470A 10

Metals (ICP) by Method 6010B 11

Volatile Organic Compounds (GC/MS) by Method 8260B 12

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Al: Accreditations & Locations 15

Sc: Sample Chain of Custody 16

WASTE SOIL L1120150-01 Waste

Collected by: Sam McMahan
Collected date/time: 07/17/19 13:35
Received date/time: 07/19/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1311	WG1315019	1	07/21/19 11:49	07/21/19 11:49	CGD	Mt. Juliet, TN
Preparation by Method 1311	WG1315021	1	07/21/19 12:27	07/21/19 12:27	CGD	Mt. Juliet, TN
Mercury by Method 7470A	WG1315420	1	07/22/19 13:30	07/22/19 19:09	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1315438	1	07/22/19 14:25	07/23/19 04:46	TRB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1315322	1	07/24/19 17:24	07/24/19 17:24	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

This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

a. Items consistent with NELAC Chapter 5,

b. dilution factors,

c. preparation methods,

d. cleanup methods, and

e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

a. Calculated recovery (%R), and

b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

a. LCS spiking amounts,

b. Calculated %R for each analyte, and

c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a. Samples associated with the MS/MSD clearly identified,

b. MS/MSD spiking amounts,

c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d. Calculated %Rs and relative percent differences (RPDs), and

e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

a. The amount of analyte measured in the duplicate,

b. The calculated RPD, and

c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Jason Romer
Project Manager

Laboratory Review Checklist: Reportable Data

Laboratory Name: Pace Analytical National	LRC Date: 07/25/2019 12:02
Project Name: Navajo RO Fields	Laboratory Job Number: L1120150-01
Reviewer Name: Jason Romer	Prep Batch Number(s): WG1315420, WG1315438, WG1315322, WG1315019 and WG1315021

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	Chain-of-custody (C-O-C)					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	Sample and quality control (QC) identification					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	Test reports					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?			X		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, are TICs reported?			X		
R4	O	Surrogate recovery data					
		Were surrogates added prior to extraction?	X				
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
R5	OI	Test reports/summary forms for blank samples					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency?	X				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		Were blank concentrations < MQL?	X				
R6	OI	Laboratory control samples (LCS):					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within QC limits?	X				
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
		Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	Analytical duplicate data					
		Were appropriate analytical duplicates analyzed for each matrix?			X		
		Were analytical duplicates analyzed at the appropriate frequency?			X		
		Were RPDs or relative standard deviations within the laboratory QC limits?			X		
R9	OI	Method quantitation limits (MQLs):					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	Other problems/anomalies					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Supporting Data

Laboratory Name: Pace Analytical National	LRC Date: 07/25/2019 12:02
Project Name: Navajo RO Fields	Laboratory Job Number: L1120150-01
Reviewer Name: Jason Romer	Prep Batch Number(s): WG1315420, WG1315438, WG1315322, WG1315019 and WG1315021

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	Initial calibration (ICAL)					
		Were response factors and/or relative response factors for each analyte within QC limits?	X				
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
S3	O	Mass spectral tuning					
		Was the appropriate compound for the method used for tuning?	X				
		Were ion abundance data within the method-required QC limits?	X				
S4	O	Internal standards (IS)					
		Were IS area counts and retention times within the method-required QC limits?	X				
S5	OI	Raw data (NELAC Section 5.5.10)					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?	X				
S6	O	Dual column confirmation					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	Tentatively identified compounds (TICs)					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	Interference Check Sample (ICS) results					
		Were percent recoveries within method QC limits?	X				
S9	I	Serial dilutions, post digestion spikes, and method of standard additions					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
S10	OI	Method detection limit (MDL) studies					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	Proficiency test reports					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	Standards documentation					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	Compound/analyte identification procedures					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	Demonstration of analyst competency (DOC)					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	Laboratory standard operating procedures (SOPs)					
		Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Review Checklist: Exception Reports

Laboratory Name: Pace Analytical National	LRC Date: 07/25/2019 12:02
Project Name: Navajo RO Fields	Laboratory Job Number: L1120150-01
Reviewer Name: Jason Romer	Prep Batch Number(s): WG1315420, WG1315438, WG1315322, WG1315019 and WG1315021

ER #[1]	Description
	The Exception Report intentionally left blank, there are no exceptions applied to this SDG.

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		7/21/2019 11:49:50 AM	WG1315019
TCLP ZHE Extraction	-		7/21/2019 12:27:19 PM	WG1315021
Fluid	2		7/21/2019 11:49:50 AM	WG1315019
Initial pH	8.79		7/21/2019 11:49:50 AM	WG1315019
Final pH	5.52		7/21/2019 11:49:50 AM	WG1315019

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MQL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0100	0.20	1	07/22/2019 19:09	WG1315420

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MQL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.100	5	1	07/23/2019 04:46	WG1315438
Barium	0.454		0.100	100	1	07/23/2019 04:46	WG1315438
Cadmium	ND		0.100	1	1	07/23/2019 04:46	WG1315438
Chromium	ND		0.100	5	1	07/23/2019 04:46	WG1315438
Lead	ND		0.100	5	1	07/23/2019 04:46	WG1315438
Selenium	ND		0.100	1	1	07/23/2019 04:46	WG1315438
Silver	ND		0.100	5	1	07/23/2019 04:46	WG1315438

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

Analyte	Result mg/l	Qualifier	MQL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.0500	0.50	1	07/24/2019 17:24	WG1315322
Carbon tetrachloride	ND		0.0500	0.50	1	07/24/2019 17:24	WG1315322
Chlorobenzene	ND		0.0500	100	1	07/24/2019 17:24	WG1315322
Chloroform	ND		0.250	6	1	07/24/2019 17:24	WG1315322
1,2-Dichloroethane	ND		0.0500	0.50	1	07/24/2019 17:24	WG1315322
1,1-Dichloroethene	ND		0.0500	0.70	1	07/24/2019 17:24	WG1315322
2-Butanone (MEK)	ND		0.500	200	1	07/24/2019 17:24	WG1315322
Tetrachloroethene	ND		0.0500	0.70	1	07/24/2019 17:24	WG1315322
Trichloroethene	ND		0.0500	0.50	1	07/24/2019 17:24	WG1315322
Vinyl chloride	ND		0.0500	0.20	1	07/24/2019 17:24	WG1315322
(S) Toluene-d8	*100*		*80.0-120*			*07/24/2019 17:24*	WG1315322
(S) 4-Bromofluorobenzene	*99.8*		*77.0-126*			*07/24/2019 17:24*	WG1315322
(S) 1,2-Dichloroethane-d4	*101*		*70.0-130*			*07/24/2019 17:24*	WG1315322

Method Blank (MB)

(MB) R3433050-1 07/22/19 17:56

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.00330	0.0100

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

(LCS) R3433050-2 07/22/19 17:59 • (LCSD) R3433050-3 07/22/19 19:00

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 %
Mercury	0.0300	0.0284	0.0284	94.7	94.8	80.0-120			0.0382	20

L1119816-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119816-02 07/22/19 19:02 • (MS) R3433050-4 07/22/19 19:05 • (MSD) R3433050-5 07/22/19 19:07

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 %
Mercury	0.0300	ND	0.0277	0.0271	92.4	90.5	1	75.0-125			2.08	20

Method Blank (MB)

(MB) R3433101-1 07/23/19 04:29

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.0330	0.100
Barium	U		0.0330	0.100
Cadmium	U		0.0330	0.100
Chromium	U		0.0330	0.100
Lead	U		0.0330	0.100
Selenium	U		0.0330	0.100
Silver	U		0.0330	0.100

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

(LCS) R3433101-2 07/23/19 04:31 • (LCSD) R3433101-3 07/23/19 04:34

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 %
Arsenic	10.0	10.0	10.0	100	100	80.0-120			0.216	20
Barium	10.0	10.1	10.1	101	101	80.0-120			0.222	20
Cadmium	10.0	9.86	9.86	98.6	98.6	80.0-120			0.00659	20
Chromium	10.0	9.79	9.79	97.9	97.9	80.0-120			0.00719	20
Lead	10.0	9.87	9.89	98.7	98.9	80.0-120			0.216	20
Selenium	10.0	10.4	10.5	104	105	80.0-120			0.356	20
Silver	2.00	1.95	1.95	97.6	97.3	80.0-120			0.244	20

L1119816-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1119816-02 07/23/19 04:36 • (MS) R3433101-5 07/23/19 04:41 • (MSD) R3433101-6 07/23/19 04:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	10.0	ND	10.1	10.0	101	100	1	75.0-125			0.648	20
Barium	10.0	0.831	10.8	10.8	99.4	99.7	1	75.0-125			0.201	20
Cadmium	10.0	ND	10.0	10.0	100	100	1	75.0-125			0.338	20
Chromium	10.0	ND	9.75	9.77	97.5	97.7	1	75.0-125			0.196	20
Lead	10.0	ND	9.74	9.68	97.4	96.8	1	75.0-125			0.617	20
Selenium	10.0	ND	10.5	10.5	105	105	1	75.0-125			0.664	20
Silver	2.00	ND	2.00	2.02	100	101	1	75.0-125			1.02	20

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

Method Blank (MB)

(MB) R3433833-3 07/24/19 11:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0165	0.0500
Carbon tetrachloride	U		0.0165	0.0500
Chlorobenzene	U		0.0165	0.0500
Chloroform	U		0.0825	0.250
1,2-Dichloroethane	U		0.0165	0.0500
1,1-Dichloroethene	U		0.0165	0.0500
2-Butanone (MEK)	U		0.165	0.500
Tetrachloroethene	U		0.0165	0.0500
Trichloroethene	U		0.0165	0.0500
Vinyl chloride	U		0.0165	0.0500
(S) Toluene-d8	*103*			*80.0-120*
(S) 4-Bromofluorobenzene	*102*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*102*			*70.0-130*

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

(LCS) R3433833-1 07/24/19 09:21 • (LCSD) R3433833-2 07/24/19 09:42

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	0.0250	0.0269	0.0267	108	107	70.0-123			0.896	20
Carbon tetrachloride	0.0250	0.0264	0.0258	106	103	68.0-126			2.16	20
Chlorobenzene	0.0250	0.0234	0.0237	93.6	94.8	80.0-121			1.26	20
Chloroform	0.0250	0.0258	0.0255	103	102	73.0-120			1.27	20
1,2-Dichloroethane	0.0250	0.0241	0.0233	96.4	93.3	70.0-128			3.34	20
1,1-Dichloroethene	0.0250	0.0251	0.0234	101	93.8	71.0-124			7.00	20
2-Butanone (MEK)	0.125	0.120	0.122	95.8	97.7	44.0-160			1.91	20
Tetrachloroethene	0.0250	0.0266	0.0272	106	109	72.0-132			2.15	20
Trichloroethene	0.0250	0.0248	0.0249	99.1	99.7	78.0-124			0.564	20
Vinyl chloride	0.0250	0.0266	0.0252	106	101	67.0-131			5.31	20
(S) Toluene-d8				*96.5*	*98.8*	*80.0-120*				
(S) 4-Bromofluorobenzene				*95.2*	*95.4*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*108*	*108*	*70.0-130*				

L1120741-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1120741-01 07/24/19 18:27 • (MS) R3433833-4 07/24/19 18:48 • (MSD) R3433833-5 07/24/19 19:09

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	1.25	ND	1.27	1.23	101	98.1	1	17.0-158			3.09	27
Carbon tetrachloride	1.25	ND	1.25	1.17	99.9	93.8	1	23.0-159			6.26	28
Chlorobenzene	1.25	ND	1.15	1.13	92.1	90.0	1	33.0-152			2.23	27
Chloroform	1.25	ND	1.22	1.22	97.4	97.6	1	29.0-154			0.252	28
1,2-Dichloroethane	1.25	ND	1.12	1.13	89.8	90.0	1	29.0-151			0.218	27
1,1-Dichloroethene	1.25	ND	1.12	1.05	89.4	84.4	1	11.0-160			5.79	29
2-Butanone (MEK)	6.25	ND	5.90	6.22	93.3	98.4	1	10.0-160			5.27	32
Tetrachloroethene	1.25	ND	1.27	1.17	101	93.3	1	10.0-160			8.23	27
Trichloroethene	1.25	0.0550	1.36	1.34	105	103	1	10.0-160			1.72	25
Vinyl chloride	1.25	ND	1.15	1.13	92.4	90.7	1	10.0-160			1.86	27
(S) Toluene-d8					*99.5*	*96.3*		*80.0-120*				
(S) 4-Bromofluorobenzene					*98.3*	*91.6*		*77.0-126*				
(S) 1,2-Dichloroethane-d4					*107*	*106*		*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.
MQL	Method Quantitation Limit.
ND	Not detected at the Method Quantitation Limit.
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 Sample Detection Limit.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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

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

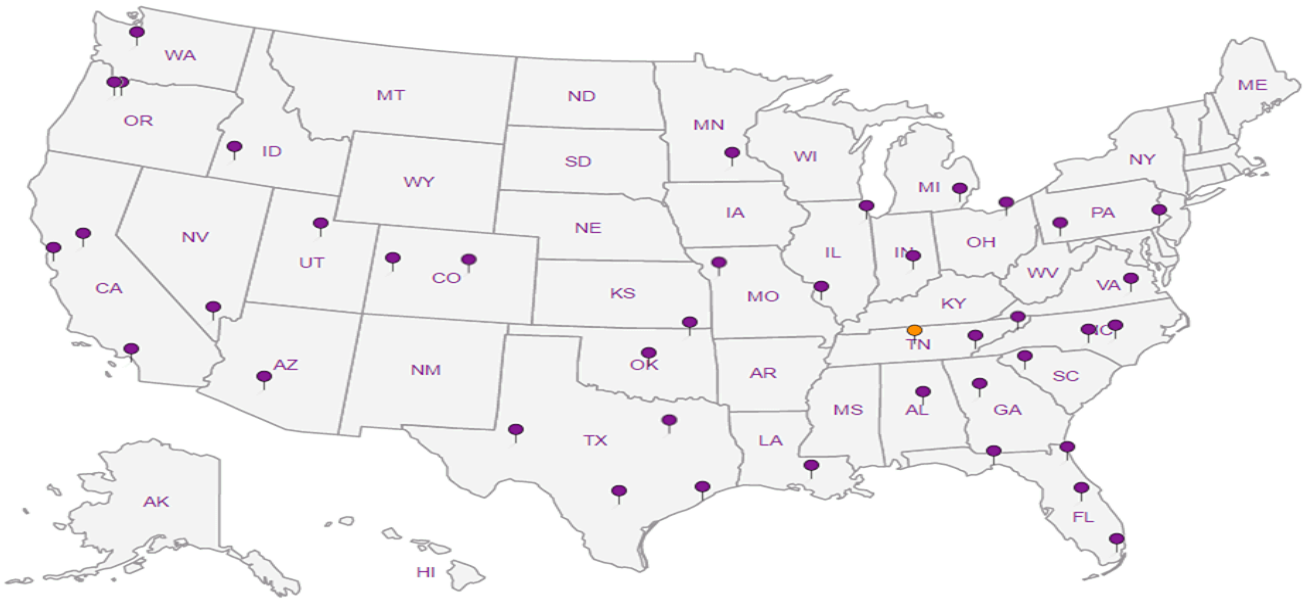
Third Party Federal Accreditations

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.



Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Billing Information:
Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Pres Chk

Report to: Pam Krueger

Email To: pamela.krueger@woodplc.com

Project Description: Navajo RO Fields

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703180022.0003

Lab Project # AMECFWHTX-ROFIELDS

Collected by (print): Sam McMahan

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Total/SPLP Anions 4ozClr-NoPres	Total/SPLP Cations 4ozClr-NoPres	Total/SPLP Metals 4ozClr-NoPres	TCLP - RCRA 8 metals	TCLP - VOCs	Remarks	Sample # (lab only)
Waste Soil	Comp	SS	—	7-17-19	1335	4				X	X		01
		SS											
		SS											
		SS											
		SS											
		SS											
		SS											
		SS											
		SS											
		SS											

Chain of Custody Page 1 of 1

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

L# 1126150

H048

Acctnum: AMECFWHTX
Template: T152381
Prelogin: P716917
TSR: 526 - Chris McCord
PB: 06-28-19 ES
Shipped Via: FedEX Ground

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

Remarks:Cations=Ca,K,Mg,Na by 6010.
Anions=Chloride,Fluoride,Sulfate,NO2NO3 by 300/353.2.
Metals=As,B,Co,Fe,Mn,Pb,U by 6010/6020.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier __ _____

Tracking # 108259872274

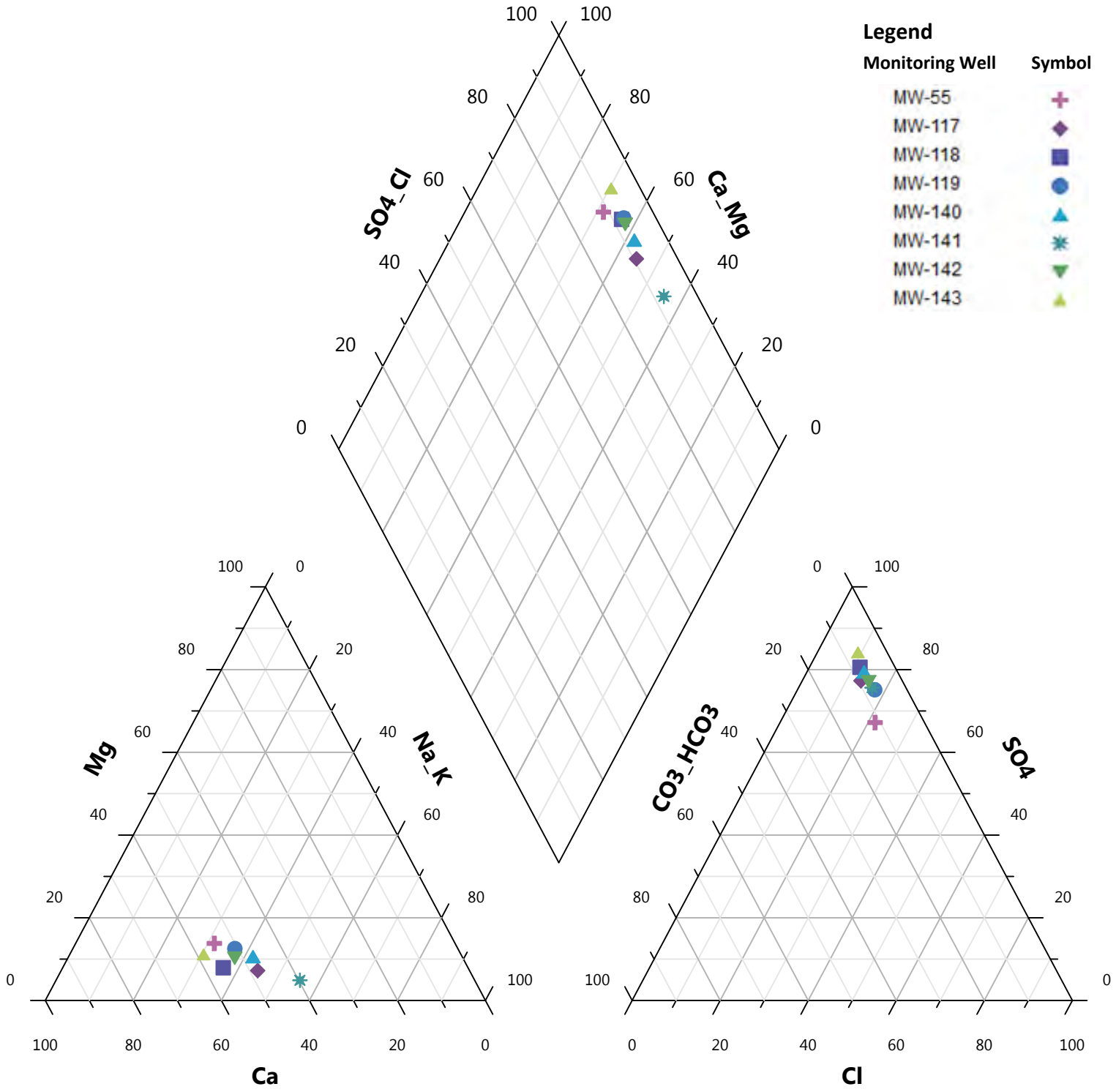
Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

RAD SCREEN: <0.5 mR/hr

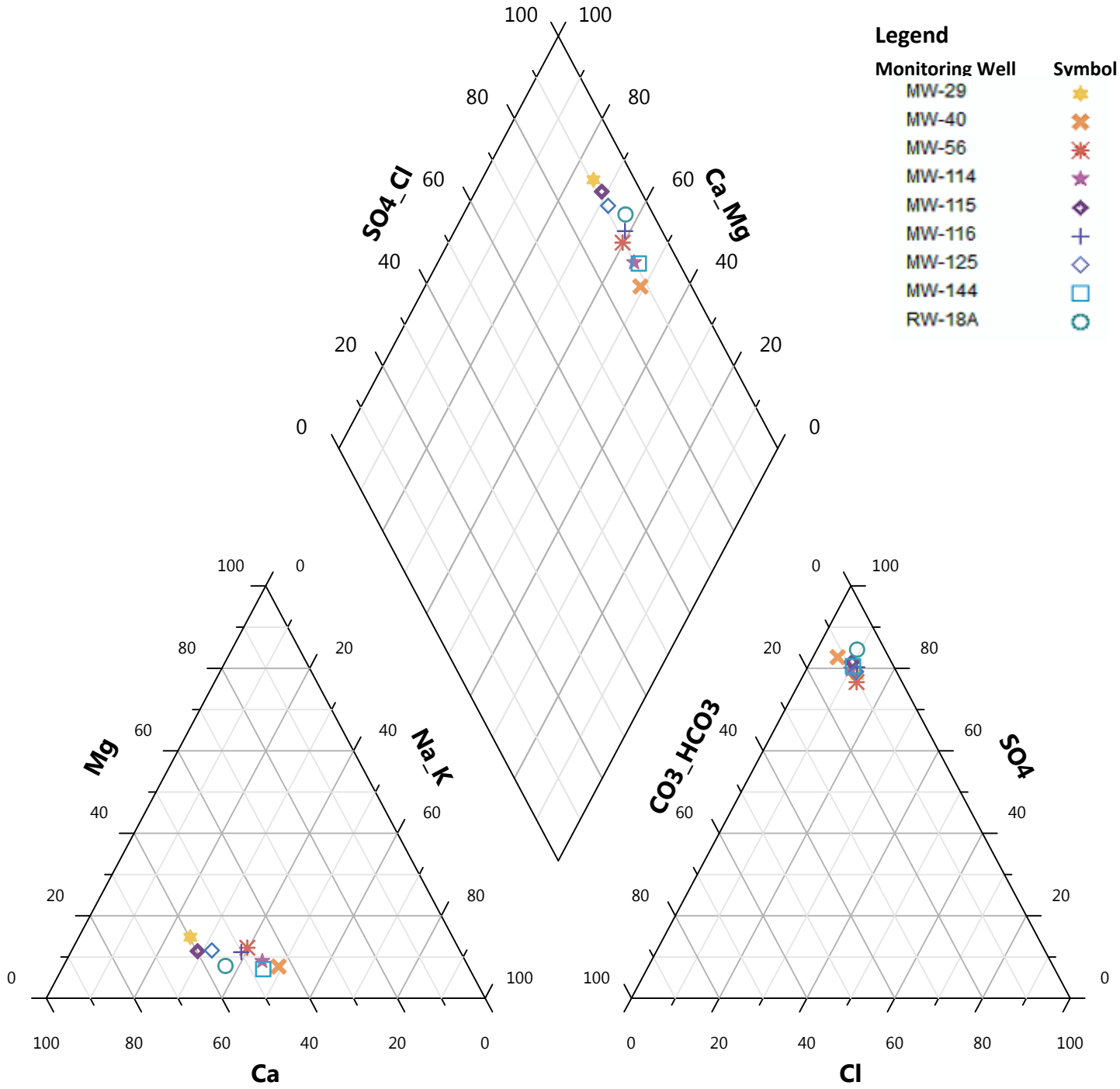
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / (No) HCL / MeoH TBR	If preservation required by Login: Date/Time
	7-18-19	1500	Fedex 108259872274	Ø	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.6 1.1-3.2 °C Bottles Received: 4	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7-19-19 Time: 8:45	Hold: / Condition: NCF / OK

APPENDIX E
WATER CLASSIFICATION DIAGRAMS

Piper Diagram
RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report
North RO Field Monitoring Wells



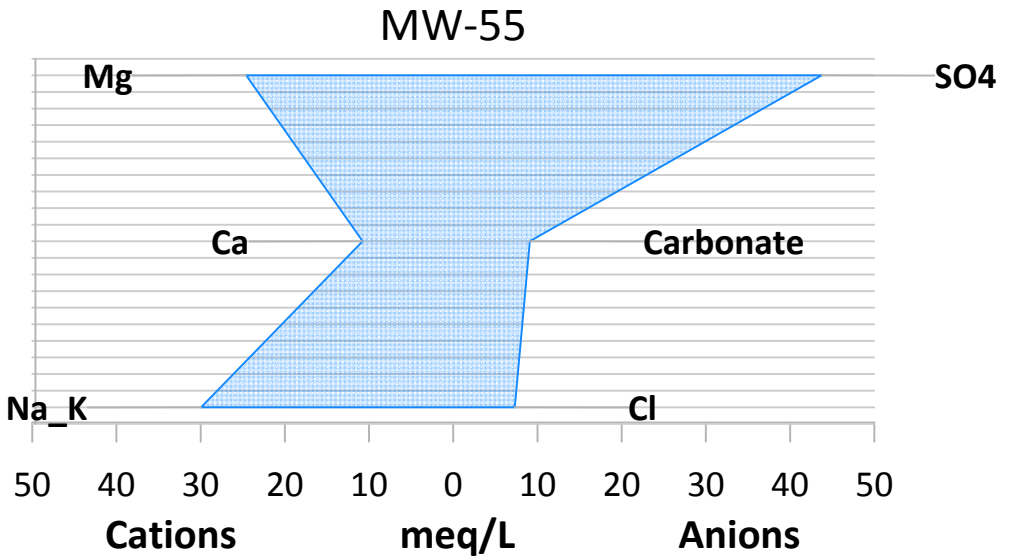
Piper Diagram
RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report
South RO Field Monitoring Wells

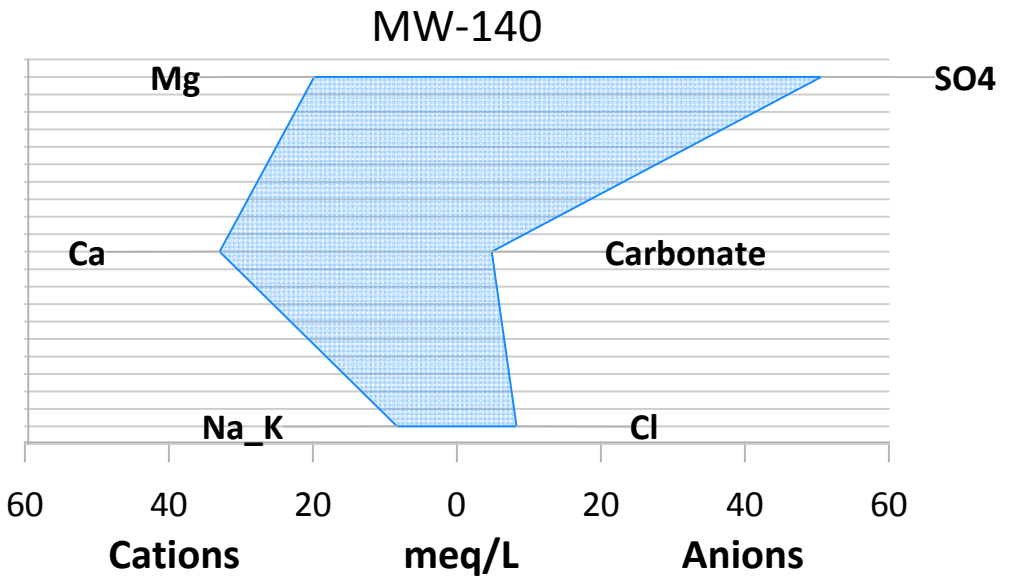


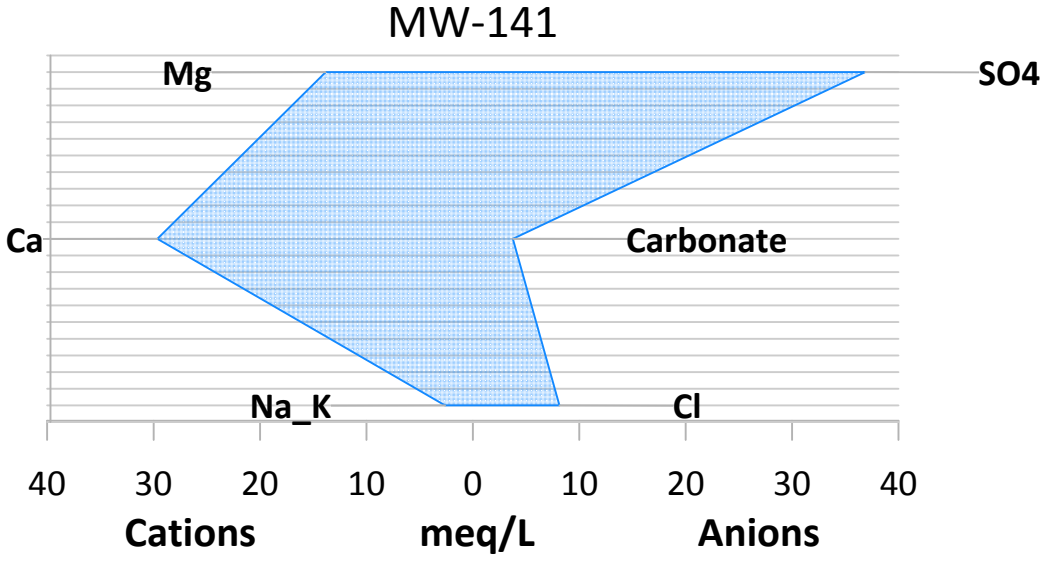
Stiff Diagrams

RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report

North RO Field - Upgradient Monitoring Wells





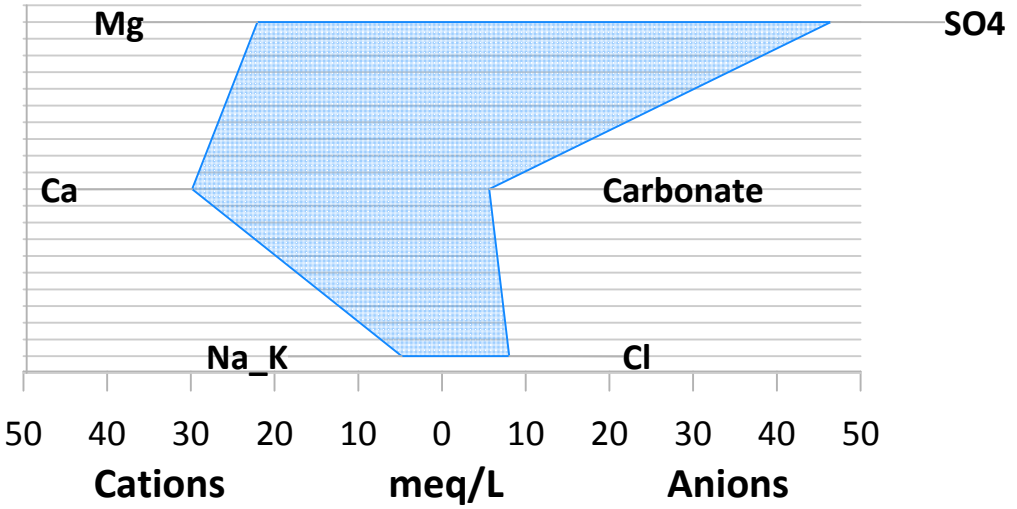


Stiff Diagrams

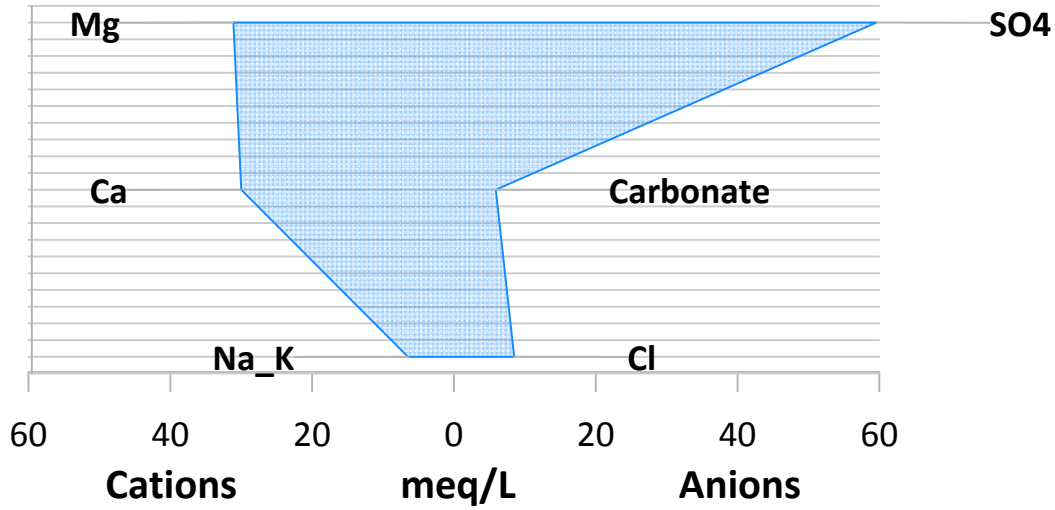
RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report

North RO Field - In Field Monitoring Wells

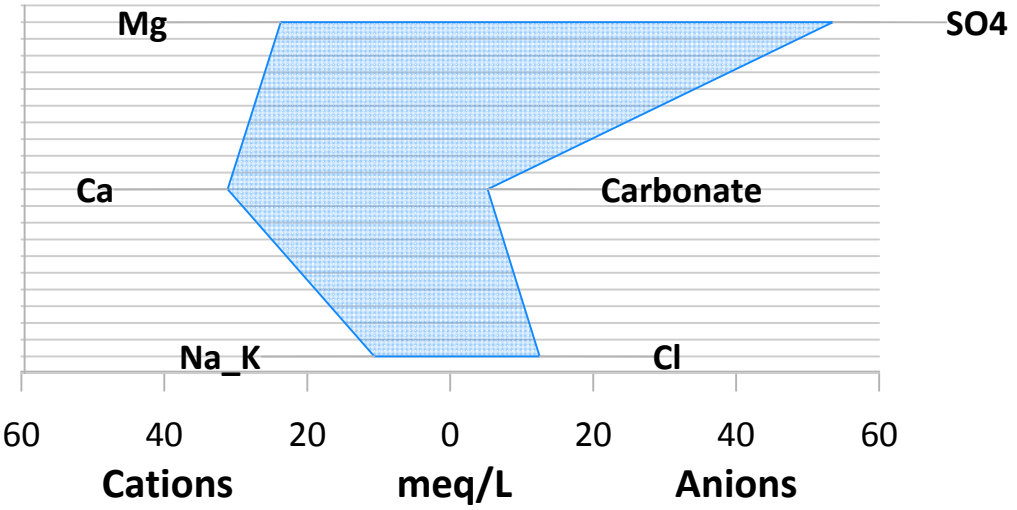
MW-117



MW-118



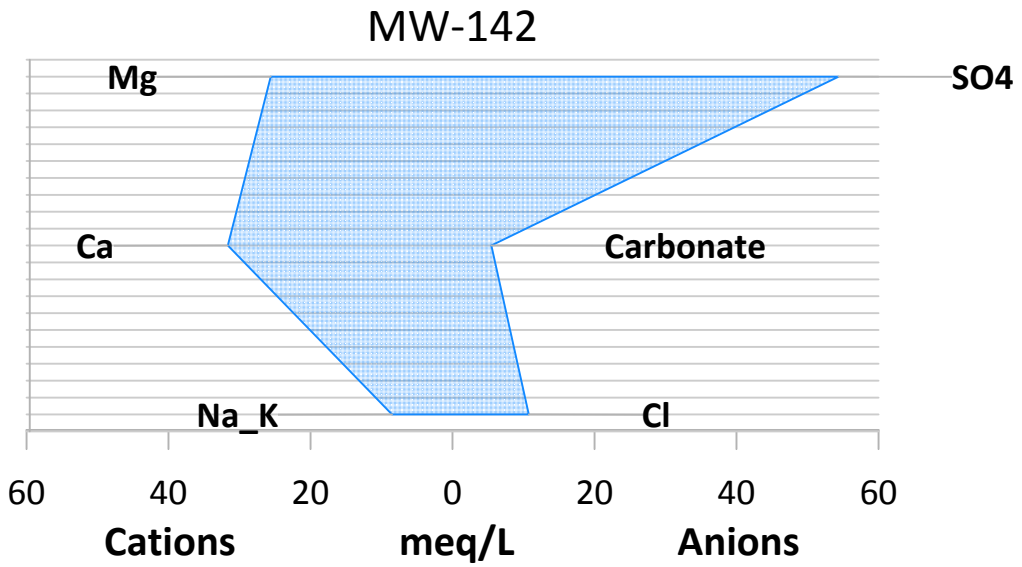
MW-119

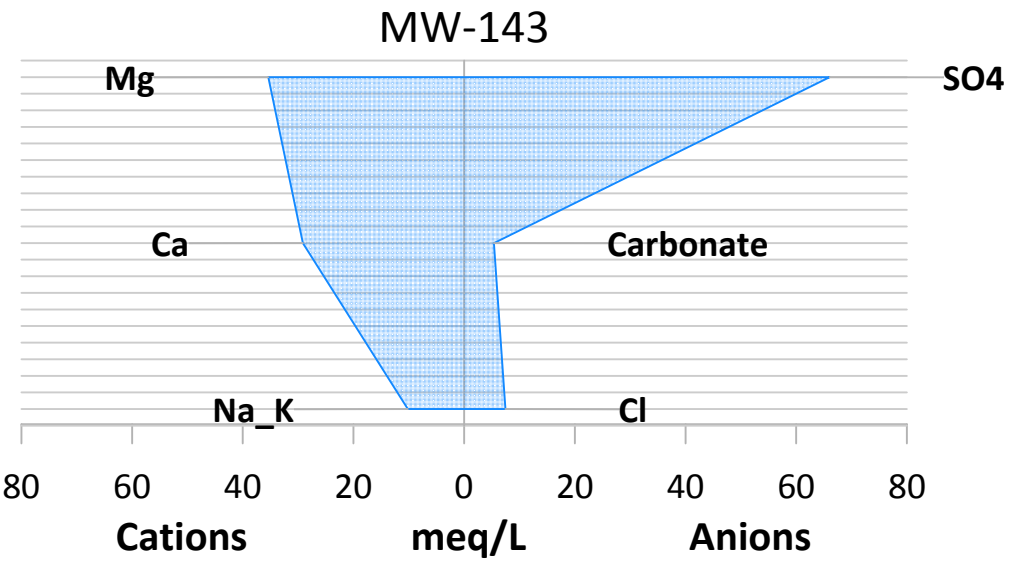


Stiff Diagrams

RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report

North RO Field - Downgradient Monitoring Wells



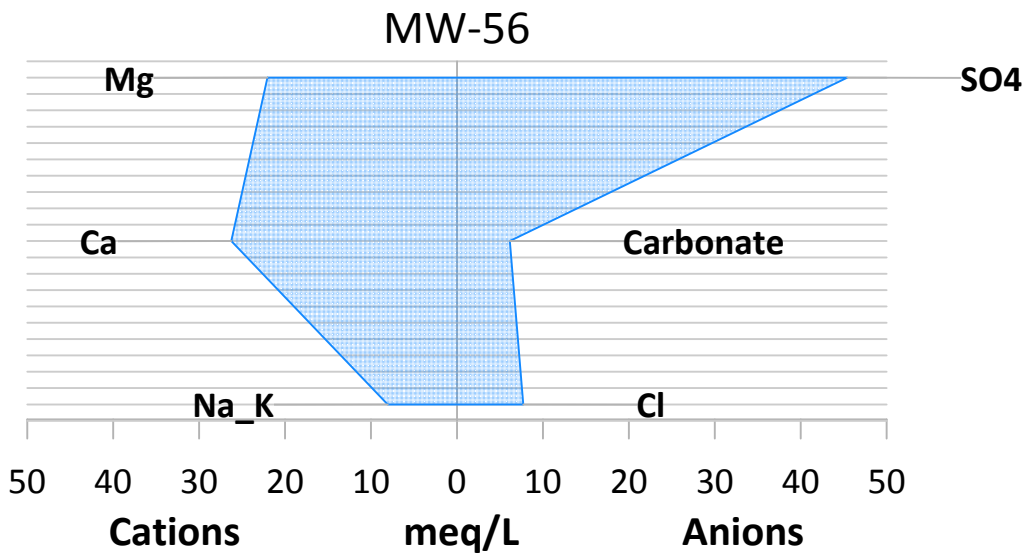


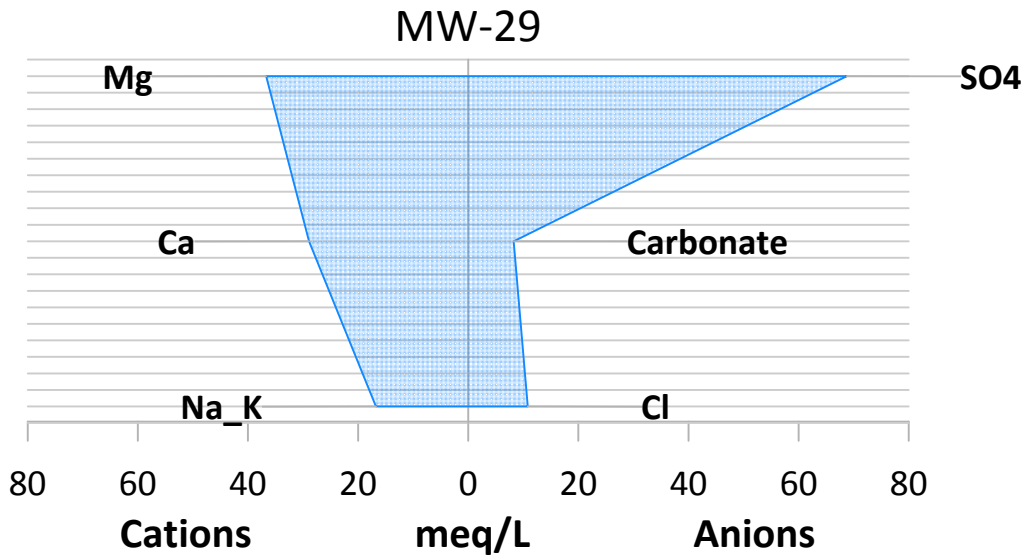
Stiff **Diagrams**

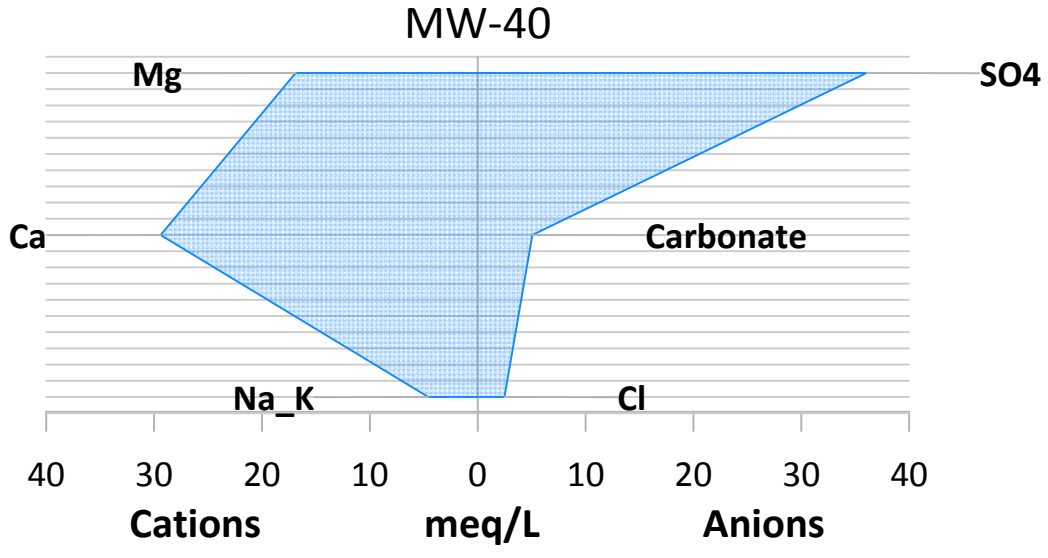
RO Reject Discharge Fields

Stage 1 Abatement - First Quarterly Progress Report

South RO Field - Upgradient Monitoring Wells



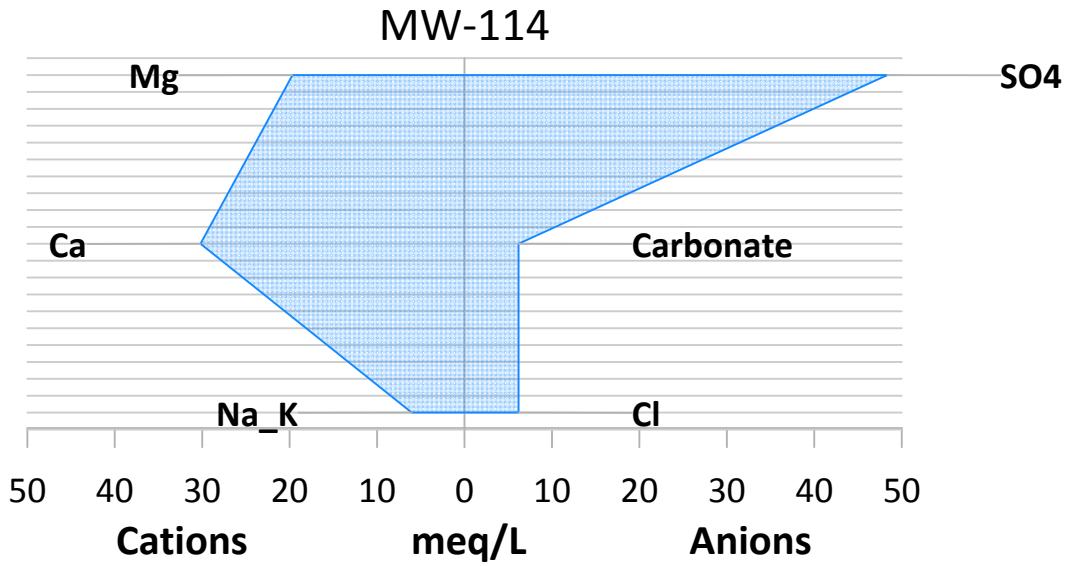


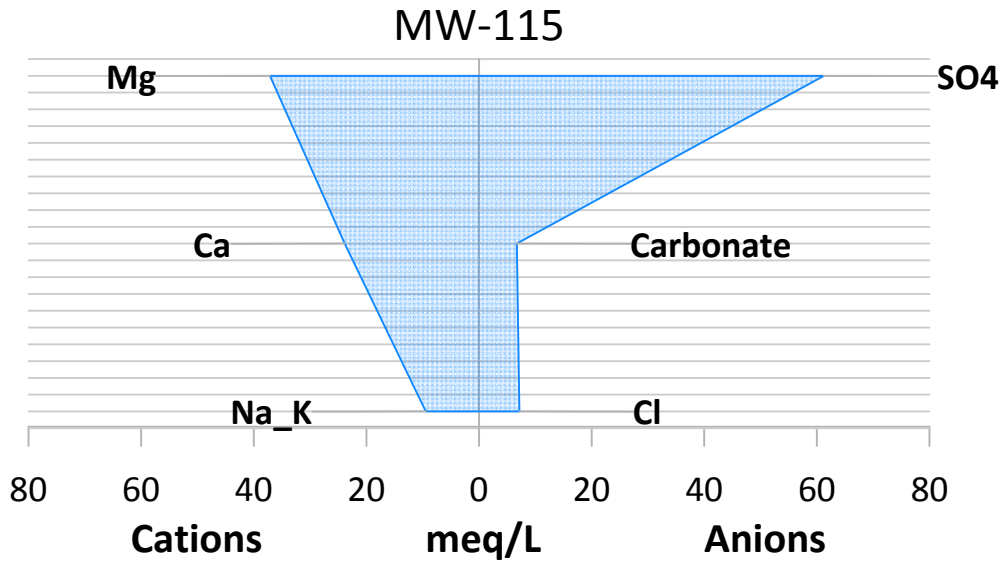


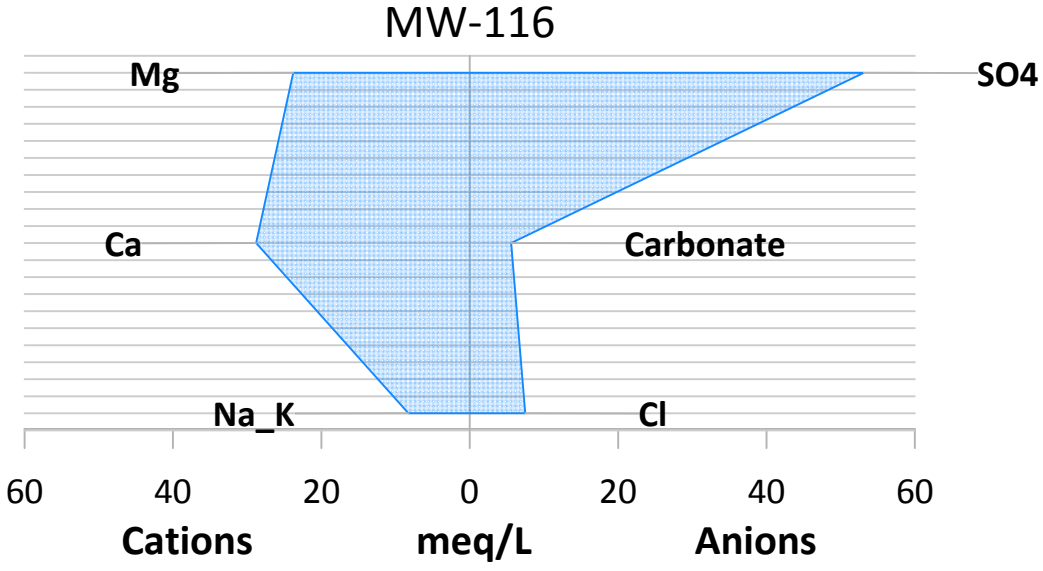
Stiff Diagrams

RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report

South RO Field - In Field Monitoring Wells



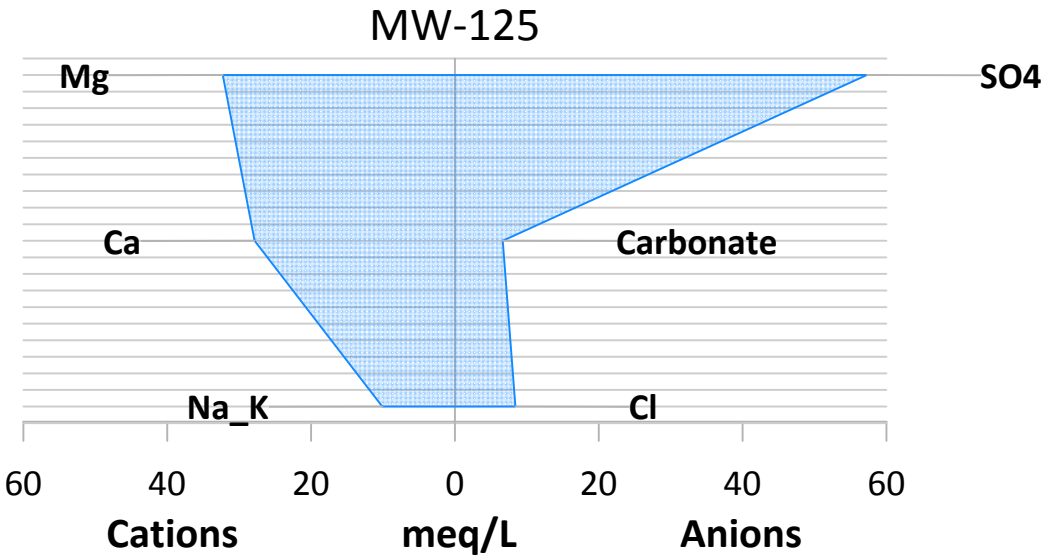


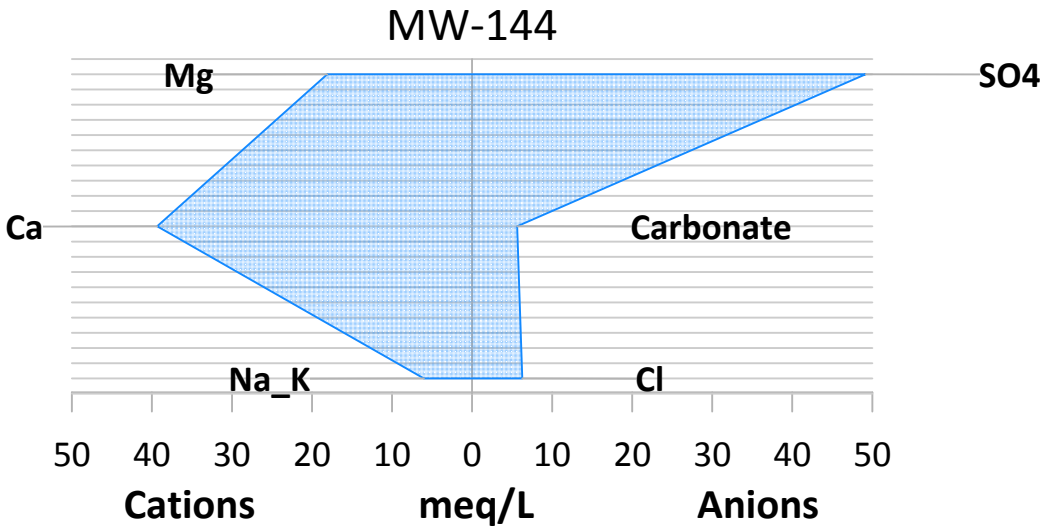


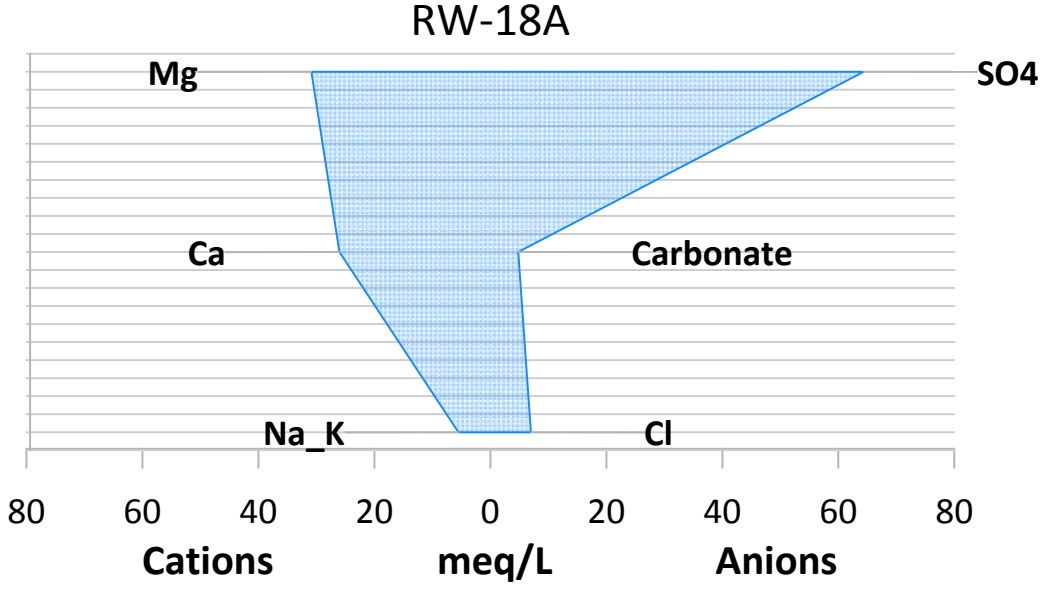
Stiff Diagrams

RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report

South RO Field - Downgradient Monitoring Wells







Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Wednesday, August 28, 2019 3:06 PM
To: Chavez, Carl J, EMNRD
Cc: Griswold, Jim, EMNRD; Denton, Scott; Leik, Jason; Sahba, Arsin M.
Subject: [EXT] RO Reject Stage 1 AP 1st Qtly Report
Attachments: 2019-08-28 RO Stage 1 Q1 Progress Report Transmittal.pdf

Carl,

We will be submitting the 1st quarterly report for the RO Reject Stage 1 Abatement Plan your review. The entire submittal is too large to email, but a hardcopy and CD with the electronic files will be delivered to you tomorrow.

If you have any questions, please let us know.

Thanks,
Robert

Robert Combs
Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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HOLLYFRONTIER.

August 28, 2019

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

RE: Reverse Osmosis Reject Discharge Fields Stage 1 Abatement
First Quarterly Progress Report
HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Dear Mr. Chavez:

Enclosed is one paper copy and one electronic copy of the above-referenced report. If you have any questions or comments regarding this request, please feel free to contact me at 575-746-5487 or Robert Combs at 575-746-5382.

Sincerely,

Scott M. Denton
Environmental Manager
HollyFrontier Navajo Refining LLC

c: HollyFrontier: R. Combs, J. Leik, A. Sahba