

GW - 28

**FARM FIELDS
STAGE 1
ABATEMENT PLAN
FINAL REPORT**

2020



November 19, 2020

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
Final Report
HollyFrontier Navajo Refining LLC
Discharge Permit GW-028**

Dear Mr. Chavez:

Enclosed is one electronic copy of the above-referenced report. A paper copy will be submitted upon request when your offices have reopened. If you have any questions or comments regarding this report, 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



Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Final Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Volume 1 - Text, Tables, Figures 1 through 5



Prepared for:

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November 19, 2020

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List of Acronyms

AP	Stage 1 Abatement Plan
bgs	below ground surface
CGWSL	Critical Groundwater Screening Level
COC	Contaminant of Concern
CSSL	Critical Soil Screening Level
C _w	Target Leachate Concentration
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
NRCS	Natural Resources Conservation Service
OCD	Oil Conservation Division
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
UTL	Upper Tolerance Limit
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, and 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 required 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 of RO reject to the fields 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. The first quarterly groundwater monitoring event was conducted in July 2019 and the second quarterly groundwater monitoring event was conducted in October 2019. Moisture probe readings have been recorded since July 2019 through the current time period. Quarterly monitoring reports were submitted in August 2019 (Wood 2019c), January 2020 (Wood 2020a), and April 2020 (Wood 2020b).

This fourth and final report provides a summary of the AP activities conducted through June 2020 including:

- ▶ Continued monitoring of soil moisture probes
- ▶ Collection of final quarterly groundwater samples from new and existing monitoring wells (delayed due to COVID-19 restrictions)
- ▶ Laboratory analyses of groundwater samples

In addition, this final report provides a review of the data obtained from four quarterly sampling events and recommendations for future activities.

2.0 BACKGROUND

2.1 Soil Moisture Probe Monitoring

As described in the RO AP (Wood 2019a) and the first quarterly progress report (Wood 2019c), soil moisture probes were installed to evaluate the moisture level in the vadose zone to determine when the fields have returned to field capacity. Field capacity is the soil moisture condition after excess water has drained and downward movement of pore water has ceased or greatly reduced. To evaluate changes in soil water content, moisture probes were placed at depths of 2, 5, and 10 feet (ft) below ground surface (bgs) at three locations within each of the two RO reject discharge fields and in two locations outside the two RO reject discharge fields. The depths of the probes were selected based on expected shallow groundwater depths of between 10 to 15 ft bgs. One probe was placed within each field near the former discharge point, the other two probes within the fields were placed to evaluate other areas of the each field (away from the discharge point), and one probe was placed outside the each field to evaluate conditions outside the former discharge areas. The location of each probe is shown on **Figure 3**.

During the installation of the moisture probes, soil samples were collected and analyzed for potential contaminants of concern (COCs). The results of the soil analyses are discussed in Section 4 of this report.

2.2 Soil Characteristics

The soil types within the North and South RO reject discharge fields were described in the Stage 1 AP (Wood 2019a). The boundaries of each field were used to generate a custom soil resource report from the United States Department of Agriculture Natural Resources Conservation Service (NRCS). A copy of the two soil reports are provided in **Appendix A** of this report. The NRCS reports provide information on soil types and provide additional information on soil geochemical and physical properties. Specific characteristics of interest were amount of calcium carbonate and gypsum present in the soil, along with the soil water capacity and hydraulic conductivity. Soils present in the two fields and their characteristics are:

► North RO Reject Discharge Field (approximately 25.3 acres):

- Soils present in this field include:
 - Reeves loam 0-1% slope – 79.5% (20.1 acres)
 - Karro loam 0-1% slope – 16.8% (4.2 acres)
 - Pima silt loam 0-1% slope – 3.7% (0.9 acres)
- Calcium Carbonate Equivalent (% carbonates by weight in soil fraction of less than 2 millimeters) ranges from 10 to 46%, with the Karro loam soil containing an average of 46% and Pima silt loam having 10% and the Reeves loam having 18% carbonates.
- Reeves loam soil has a gypsum (calcium sulfate) composition of 24% by weight. The parent material for the Reeves silt loam soil is weathered gypsum. Gypsum is not significantly present in the Karro loam or Pima silt loams.
- Soil pH values are 8.2 in the Karro loam, and 7.6 in the Pima silt loam and Reeves loam
- Available soil water holding capacity for the three soils are 1.6 inches/ft in the Reeves loam, 2.2 inches/ft in the Karro loam, and 2.4 inches/ft in the Pima silt loam
- 1/3 bar soil moisture, roughly field capacity on a volumetric basis, are 0.297 in the Pima silt loam, 0.308 in the Reeves loam, and 0.314 in the Karro loam

► South RO Reject Discharge Field (approximately 28.9 acres):

- Soils present in this field include:
 - Pima silt loam 0-1% slope – 98% (28.3 acres)
 - Karro loam 0-1% – 2.0% (0.6 acres)
- Calcium Carbonate Equivalent for the two soils were 10% by weight for Pima silt loam and 46%, for the Karro loam
- Gypsum is not significantly present in either the Karro loam or Pima silt loam soil series
- Soil pH values are 8.2 for the Karro loam and 7.6 for the Pima silt loam
- Available soil water holding capacity are 2.2 inches/ft for the Karro loam and 2.4 inches/ft for the Pima silt loam
- 1/3 bar soil moisture, roughly field capacity on a volumetric basis, are from 0.297 for the Pima silt loam and 0.314 for the Karro loam

The 1/3 bar soil moisture was used to compare the soil moisture probe data while the geochemical data was used to interpret the soil and groundwater data presented later in this report.

2.3 Groundwater Sampling

Groundwater samples were collected from the five monitoring wells specifically for the AP 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

Due to travel and other restrictions imposed due to the COVID-19 pandemic, groundwater monitoring samples were not collected in April 2020, as planned for the fourth quarterly monitoring event. Water levels were measured in April 2020 and again in June 2020. Groundwater samples were collected in June 2020 for the fourth quarterly monitoring event.

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

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. **Table 2** provides a summary of the final purge parameter readings for each well. Groundwater sampling forms for all four quarters of monitoring events conducted as part of this AP are included in **Appendix B**.

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. The sample containers were labeled and placed into

appropriate shipping containers (coolers) with ice for submittal to the analytical laboratory under the proper chain of custody.

Quality Assurance/Quality Control (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

The regulations found in New Mexico Administrative Code (NMAC) 20.6.2 do not provide screening values for soil concentrations. Therefore, HFNR has followed guidance provided by the New Mexico Environment Department (NMED) to develop critical soil screening levels (CSSLs) to evaluate which 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 approved personnel approved, which includes employees and contractors who have met the safety and security requirements for Refinery entry. The primary 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 noncancer endpoints (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 1×10^{-5} to be comparable to the NMED SSLs.
- ▶ The lowest value of the Target Leachate Concentration (C_w) with Dilution Attenuation Factor (DAF) 20 SSLs was used to screen soil samples from greater than 10 ft bgs. If no NMED C_w 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 1×10^{-5} to be comparable to the NMED DAF 20 SSLs.

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.

The data screening evaluation does not include residential SSLs and 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 elects 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 OCD and 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 NMAC 20.6.2.3103, updated December 28, 2018.
- ▶ EPA's Federal Maximum Contaminant Levels (MCL), primary or secondary.
- ▶ 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 Data Evaluation

4.1 Soil Analytical Results

Soil samples were collected during the installation of the moisture probes, as described in the first quarterly progress report (Wood, 2019a). The laboratory analytical reports and a data usability report are included in **Appendix C**.

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)
- ▶ Leachable Metals (arsenic, boron, cobalt, iron, lead, manganese, and uranium) using the SPLP leaching method
- ▶ Total Cations and Anions
- ▶ Leachable Cations and Anions (Calcium, Chloride, Fluoride, Magnesium, Nitrate/Nitrite as N, Potassium, Sodium, Sulfate) using the SPLP leaching method

Table 3 provides a summary of the soil analytical data. The COCs with reported concentrations above the applicable standards listed in Section 3.1 include:

- ▶ Total Metals:
 - Arsenic
 - Cobalt
 - Iron
 - Manganese
- ▶ Leachable Cations/Anions:
 - Fluoride
 - Sulfate
- ▶ Leachable Metals:
 - Iron

Figure 4 provides a graphical depiction of the soil analytical data for total concentrations of COCs for the cations/anions and for those metals that had at least one reported value over the applicable screening level.

Figure 5 provides a similar depiction of the soil analytical data for the leachable concentrations of COCs for the cations/anions and for those metals that had at least one reported value over the default groundwater screening level or the upgradient groundwater upper tolerance limits (UTLs), as applicable. A discussion of upgradient groundwater UTLs is provided in Section 4.4.3 of this report.

4.2 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. Intermittent data loss was reported in October through December 2019 and was listed in

the second quarterly report (Wood 2020a). More robust measures were instituted to prevent additional damage to the wires from livestock.

Precipitation data for Artesia was obtained from www.usclimatedata.com for the period of July 16, 2019 through June 30, 2020. 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, 2019 through June 30, 2020 was performed. The data trends are presented in **Appendix D**, 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 indicates that the moisture content is fairly stable. As expected, the shallow soil moisture (2 ft bgs) increases immediately following precipitation events. The soil moisture in deeper zones (5 ft bgs and 10 ft bgs) shows a delayed response to precipitation events and slower draining. The soil moisture readings from the majority of the 5 ft bgs and 10 ft bgs probes are within the range of the expected 1/3 bar soil moisture for the soil types present in each field, while the moisture readings from the majority of the 2 ft bgs probes are lower (drier). The responsiveness of the soil to precipitation events and the measurements recorded from the deeper probes indicate that the fields have reached field capacity.

4.3 Groundwater Potentiometric Surface

Water level measurements were recorded during each of the four quarterly monitoring events and in April 2020, as described in Section 2.2. **Figures 6** through **15** depict the potentiometric surface within and immediately surrounding the two RO fields for each of the five measuring periods, respectively.

4.3.1 North RO Reject Discharge Field

A review of the potentiometric surface maps for the North RO reject discharge field shows that the direction of groundwater flow is generally from the southwest to the northeast. The primary direction of flow appears to be consistent throughout the measurement period and little to no mounding of groundwater is observed near the former discharge point. The groundwater gradient fluctuates somewhat through the measurement period, changing from approximately 0.0054 ft/ft in July 2019 to approximately 0.0070 ft/ft in October 2019, then reducing again to approximately 0.0055 ft/ft in June 2020. The gradient fluctuation appears to be related to seasonal rainfall events.

4.3.2 South RO Reject Discharge Field

A review of the potentiometric surface maps for the South RO reject discharge field shows that the overall direction of groundwater flow is from the west to the east, with mounding observed near MW-114 toward MW-115. The mounding of groundwater between MW-114 and MW-115 was observed and described in the report of the previous investigation of the RO reject discharge fields (Arcadis 2015b) and has been reported in annual groundwater reports. The source of the mounding was previously believed to be due to the infiltration of the RO reject discharge. However, the persistence of the mounding even though the moisture probe data shows the soil has reached field capacity indicates that there may be other reasons for the mounding, including variation in the soil matrix in the shallow groundwater zone or infiltration from the unlined stormwater ditch that is located along the south side of the South RO reject discharge field.

The direction of groundwater flow does not appear to change throughout the measurement period. The groundwater gradient east of the observed mounding between MW-114 and MW-115 also fluctuated throughout the measurement period, changing from approximately 0.0057 ft/ft in July 2019 to approximately 0.0078 ft/ft in October 2019, then reducing to approximately 0.0053 ft/ft in June 2020. The gradient fluctuation appears to be related to vegetation and seasonal rainfall events.

4.4 Groundwater Analytical Results

4.4.1 Analytical Results

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

- ▶ Total Metals (Arsenic, Boron, Cobalt, Iron, Lead, Manganese, and Uranium)
- ▶ Dissolved (field-filtered) Metals (Arsenic, Boron, Cobalt, Iron, Lead, Manganese, and Uranium)
- ▶ Total Cations (Calcium, Magnesium, Potassium, and Sodium)
- ▶ Total Anions (Chloride, Fluoride, Sulfate, Alkalinity [Carbonate, Bicarbonate, and Total], and Nitrate/Nitrite as N)
- ▶ Total Dissolved Solids (TDS)

Groundwater analytical laboratory reports for the fourth quarterly monitoring vent are included in **Appendix C**, along with a data assessment summary. The data was determined to be usable for the purposes of this investigation. Laboratory reports and data assessment summaries were provided for the previous three monitoring events in the quarterly progress reports, but are also included in **Appendix C**.

4.4.2 Comparison to CGWSLs

Table 4 provides a summary of the groundwater analytical data screened against the CGWSLs listed in Section 3.2. The analytes with reported concentrations above the CGWSLs include:

- ▶ Total Metals:
 - Arsenic – in MW-29 (upgradient) only
 - Boron – in MW-29 and MW-55 (upgradient); MW-115 (in-field); and MW-143 (downgradient)
 - Iron – in MW-29 (upgradient); none in-field; and MW-142 (downgradient)
 - Manganese – in MW-29 and MW-56 (upgradient); MW-114 (in-field); and MW-125 (downgradient)
 - Uranium – in MW-55 and MW-140 (upgradient); MW-115, MW-118 and MW-119 (in-field); and MW-125, MW-142, MW-143, and RW-18A (downgradient)
- ▶ Dissolved Metals:
 - Arsenic – in MW-29 (upgradient) only
 - Boron – in MW-29 and MW-55 (upgradient); MW-115 (in-field); and MW-143 (downgradient)
 - Iron – in MW-29 (upgradient) only
 - Manganese – in MW-29 and MW-56 (upgradient); MW-114 (in-field); and MW-125 (downgradient)
 - Uranium – in MW-55 and MW-140 (upgradient); MW-115, MW-118, and MW-119 (in-field); and MW-125, MW-142, MW-143, and RW-18A (downgradient)
- ▶ General Chemistry Parameters:
 - Chloride – in at least one sample from all of the wells except MW-40 (upgradient) and RW-18A (downgradient)
 - Fluoride – in at least one sample from all of the wells except MW-56 (upgradient) and MW-125 (downgradient)
 - Nitrate/Nitrite – in MW-140 only (upgradient)
 - Sulfate – in all samples from all wells
 - TDS – in all samples from all wells

4.4.3 Comparison to Upgradient Concentrations

A background groundwater evaluation was performed following the initial investigation of the RO reject discharge fields, as described in the AP (Wood 2019a). A recommendation from the background groundwater evaluation

(Arcadis 2015a) was to use the calculated UTLs for select COCs in lieu of the CGWSLs; however, OCD and NMED rejected the calculated UTLs. The basis for the rejection was that the UTLs were not calculated using EPA's ProUCL software and that the calculation assumed the groundwater beneath the Refinery and beneath the evaporation ponds, located approximately three miles east of the Refinery, should be treated as a single groundwater unit.

To properly evaluate whether operation of the RO reject discharge fields has impacted the underlying local vicinity groundwater, it is also necessary to evaluate the concentrations of COCs that occur in groundwater immediately upgradient from areas not impacted by Refinery operations. Four monitoring wells installed to the west of US 285, upgradient of the Refinery were included in the background groundwater evaluation (Arcadis 2015a). These wells are included in the facility-wide groundwater monitoring program and have continued to be sampled for inorganic constituents routinely. The data from these four wells was evaluated using ProUCL statistical evaluation software. Results from this evaluation are summarized in **Table 5**. The dataset used for the evaluation and the software output are provided in **Appendix E**.

It should be noted that the additional wells included in the previous background groundwater evaluation (Arcadis 2015a), which were cross-gradient and downgradient from the RO reject discharge fields, were not included in this updated evaluation of upgradient groundwater concentrations.

Table 5 provides a summary of the number of samples collected between 2014 and 2020 (first semiannual sampling event), the number of detected results, and the range of concentrations for the inorganic COCs, along with the calculated UTL and a recommendation for a revised CGWSL based on the regulatory standards or on the calculated UTL. The COCs where the UTL of the four upgradient wells exceeds the regulatory standards include:

- ▶ Boron
- ▶ Uranium
- ▶ Fluoride
- ▶ Nitrate-Nitrite
- ▶ Sulfate
- ▶ TDS

Table 6 provides a summary of the groundwater analytical data screened against the CGWSLs and UTLs. The analytes with reported concentrations above the CGWSLs include:

- ▶ Total Metals:
 - Arsenic – in MW-29 (upgradient) only
 - Iron – in MW-29 (upgradient); none in-field; MW-142 (downgradient)
 - Manganese – in MW-29 and MW-56 (upgradient); MW-114 (in-field); and MW-125 (downgradient)
 - Uranium – in MW-55 (upgradient); MW-115, MW-118, and MW-119 (in-field); and MW-125, MW-142, MW-143, and RW-18A (downgradient)
- ▶ Dissolved Metals:
 - Arsenic – in MW-29 (upgradient) only
 - Iron – in MW-29 (upgradient) only
 - Manganese – in MW-29 and MW-56 (upgradient); MW-114 (in-field); and MW-125 (downgradient)
 - Uranium – in MW-55 (upgradient); MW-115, MW-118, and MW-119 (in-field); and MW-125, MW-142, MW-143, and RW-18A (downgradient)

► General Chemistry Parameters:

- Chloride – in at least one sample from all of the wells except MW-40 (upgradient) and RW-18A (downgradient)
- Fluoride – in at least one sample from all of the wells except MW-56 (upgradient) and MW-125 (downgradient)
- Sulfate – in MW-29 (upgradient); MW-115 and MW-118 (in-field); and MW-143, and RW-18A (downgradient)
- TDS – in MW-29 and MW-55 (upgradient); MW-115 (in-field); and MW-142 and MW-143 (downgradient)

Figure 16 depicts the groundwater analytical data graphically, including those parameters that had one or more values reported above the screening levels, using the upgradient UTLs as described above, at one or more locations throughout the monitoring period.

4.4.4 Groundwater Classification

The ionic data obtained during the fourth quarterly sampling event was used to construct Stiff diagrams (Stiff 1951) and Piper diagrams (Piper 1953) to classify the groundwater upgradient, beneath, and downgradient from the two RO reject discharge fields. The data and diagrams are provided in **Appendix F**, along with the diagrams constructed for the previous three quarterly monitoring events.

The Piper diagrams constructed using the analytical data from wells upgradient, within, and downgradient from the North RO field indicate the following “types” of groundwater for all four monitoring events:

- Groundwater in all of the wells are of a Calcium Chloride type, as depicted by the diamond plot (combined cation/anion balance)
- Two of the upgradient wells (MW-140 and MW-141) and the westernmost in-field well (MW-117) are of a Calcium type for cations, while the remaining wells have no dominant type for cations
- All of the wells show Sulfate to be the dominant anion
- Individual diagrams for each of the wells associated with the North RO field indicate the following:
 - Five of the wells (MW-55, MW-118, MW-119, MW-142, and MW-143) can be classified as Calcium Chloride type, with no dominant cations, and Sulfate as the dominant anion
 - The remaining three wells (MW-117, MW-140, and MW-141) can be classified as Calcium Chloride type, with Calcium as the dominant cation, and Sulfate as the dominant anion

The Stiff diagrams constructed for the wells associated with the North RO field appear to be of a very similar shape between upgradient, in-field, and downgradient wells. There are only minor changes in the overall shape of the Stiff diagrams for each well throughout the four quarterly monitoring periods, with the exception of MW-55. The shape of the Stiff diagram was very different during the first quarterly monitoring event for MW-55 than the remaining three events. The Stiff diagrams for the North RO reject discharge field indicate that, based on cation and anion concentrations, the cessation of RO reject discharge did not result in any significant change in groundwater characteristics, and that there is no significant difference between upgradient, in-field, and downgradient water quality.

The Piper diagrams constructed using the analytical data from wells upgradient, within, and downgradient from the South RO field indicate the following “types” (Piper 1953) of groundwater for all four monitoring events:

- Groundwater in all of the wells are of a Calcium Chloride type, as depicted by the diamond plot (combined cation/anion balance)
- Three of the wells (MW-40, MW-114, and MW-144) are of a Calcium type for cations

- ▶ One of the wells (MW-115) is of a Magnesium type for cations
- ▶ The remaining wells (MW-29, MW-56, MW-116, MW-125, and RW-18A) have no dominant type for cations
- ▶ All of the wells are of a Sulfate type for anions
- ▶ Individual diagrams for each of the wells associated with the South RO field indicate the following:
 - Five of the wells (MW-29, MW-56, MW-116, MW-125, and RW-18A) can be classified as Calcium Chloride type, with no dominant cations, and Sulfate as the dominant anion
 - One well (MW-115) can be classified as Calcium Chloride type, with Magnesium as the dominant cation, and Sulfate as the dominant anion
 - The remaining three wells (MW-40, MW-114, and MW-144) can be classified as Calcium Chloride type, with Calcium as the dominant cation, and Sulfate as the dominant anion

The Stiff diagrams constructed for the wells associated with the South RO field appear to be of a very similar shape between upgradient, in-field, and downgradient wells. There appears to be a decrease in Sulfate concentrations in all of the wells throughout the monitoring period, as shown in the individual well cumulative Stiff diagrams. The Stiff diagrams for the South RO reject discharge field indicate that, based on cation and anion concentrations, the cessation of RO reject discharge has resulted in a decrease in sulfate concentrations, but otherwise did not result in any significant change in groundwater characteristics, and that there is no significant difference between upgradient, in-field, and downgradient water quality.

4.4.5 Evaluation of Groundwater Data Trends

The analytical data for the dissolved metals and general chemistry parameters with at least one reported concentration above the applicable standards were used to construct trend plots for the time period of 2013 through 2020. The monitoring wells located within the two fields were installed in 2013 and samples were collected on a quarterly basis throughout that year. The trend charts are provided in **Appendix G**.

The analytical data for the dissolved metals and general chemistry parameters were also used to construct a profile of concentrations for each of the four quarterly monitoring period across each of the two fields. The profile across the North field was constructed using wells MW-55 (upgradient), MW-117 (near discharge point), MW-118 (near the northern central portion of the field), and MW-142 (downgradient to the northeast). The profile across the South field was constructed along the northern portion of the field using MW-56 (west of the field), MW-115 (northwestern area of the field), MW-116 (northeastern area of the field), and MW-144 (downgradient to the east of MW-116). The profiles are also provided in **Appendix G**.

North RO Field Profiles and Trends

- ▶ Profiles were constructed from upgradient to downgradient, from southwest to northeast, across the North RO field using wells MW-55, MW-117 (near the former discharge point), MW-118, and MW-142. The profiles indicate the following:
 - Chloride concentrations decrease from the upgradient well MW-55, through the field, and increase slightly in downgradient well MW-142. The chloride concentrations are lower in the downgradient well than in the upgradient well. All of the four wells used for the profile contain concentrations of chloride above the screening level.
 - Fluoride concentrations increase across the field, then decrease at the downgradient location. The fluoride concentrations in the downgradient well are only slightly higher than in the upgradient well. All but one of the reported concentrations (MW-55 in October 2019) are above the default screening level and the upgradient UTL.

- Magnesium does not have a screening level, but this analyte was included in the profiles as it is used in the groundwater classification evaluation. The concentration of magnesium decreases from the upgradient well to the well nearest the former discharge point, then increases across the field and decreases again in the downgradient well. The magnesium concentrations are lower in the downgradient well than in the upgradient well.
 - Nitrate/nitrite concentrations in all of the wells are below the screening level for all events. The concentrations fluctuate across the field. The nitrate/nitrite concentrations are typically lower in the downgradient well than in the upgradient well. All of the reported concentrations of Nitrate/Nitrite are below both the default screening level and the upgradient UTL.
 - Sulfate concentrations increase from the upgradient well, across the field, and decrease slightly in the downgradient well. The sulfate concentrations are higher in the downgradient well than in the upgradient well. The sulfate concentrations in all wells are above the default screening level; however, all but one of the reported concentrations (MW-118 in January 2020) are below the upgradient UTL.
 - TDS concentrations decrease from the upgradient well to the well closest to the former discharge point, then increase across the field. The downgradient concentrations of TDS are lower in the downgradient well than the upgradient well during two events and higher than the upgradient well in the other two events. The TDS concentrations in all wells are above the default screening level; however, all but two of the reported concentrations (MW-55 and MW-142 in July 2019) are below the upgradient UTL.
 - Dissolved arsenic concentrations decrease significantly from the upgradient well to the well closest to the former discharge point, then increase slightly across the field to the downgradient well. The dissolved arsenic concentrations all of the wells are below the screening level.
 - Dissolved boron concentrations decrease significantly from the upgradient well to the well closest to the former discharge point, then increase slightly across the field to the downgradient well. The dissolved boron concentrations in the upgradient well are above the default screening level but the concentrations are below the screening level in all of the other three wells. All reported concentrations of dissolved boron are below the upgradient UTL.
 - Dissolved cobalt concentrations were primarily not detected or were detected at very low concentrations, well below the default screening level, in all wells.
 - Dissolved iron concentrations were primarily not detected or were detected at very low concentrations, well below the default screening level, in all wells.
 - Dissolved lead concentrations were not detected in all samples from all wells during this investigation.
 - Dissolved manganese concentrations decrease significantly from the upgradient well to the well closest to the former discharge point, then increase slightly across the field to the downgradient well. The dissolved manganese concentrations in all wells are below the default screening level.
 - Dissolved uranium concentrations decrease significantly from the upgradient well to the well closest to the former discharge point, then increase across the field to the downgradient well. The dissolved uranium concentrations in the downgradient well are below the concentrations in the upgradient well. The dissolved uranium concentrations are below the default screening level in the well closest to the former discharge point, but above the default screening level in all other wells. The upgradient UTL for uranium is slightly higher than the default screening level.
- Trends in the data were reviewed between 2013 and 2020. The trend charts indicate the following:
- Chloride concentrations appear to be increasing in upgradient well MW-55 and have been above the screening level since 2017. The chloride concentrations were relatively stable in the upgradient wells MW-141 and MW-142 installed as part of this AP. Chloride concentrations fluctuated in the in-field wells from 2013 to 2020, with an overall decrease observed in the wells between 2013 to 2014, an increase between 2014 and 2016, a slight decrease between late 2016 and early 2018, an increase between early 2018 and

mid-2018, followed by a decrease in 2020. The concentrations in the downgradient well MW-142 appear stable while the concentrations in downgradient well MW-143. As seen in the profile across the field, all of the chloride concentrations reported during this AP were above the screening level.

- Fluoride concentrations have fluctuated between 2013 and 2020 in both the upgradient and in-field wells. The concentrations in the in-field wells are typically higher than those in either the upgradient or downgradient directions. The concentrations in the upgradient wells MW-140 and MW-141 are similar to those reported for downgradient wells MW-142 and MW-143.
- Magnesium concentrations appear to be relatively stable and appear to be slightly higher in the in-field and downgradient wells than the upgradient wells.
- Nitrate/nitrite concentrations in upgradient well MW-44 have been below the default screening level between 2013 and 2020, with the exception of one value reported in early 2015. The concentrations of nitrate/nitrite in upgradient well MW-140 fluctuated above and below the default screening level between 2019 and 2020, but the concentrations in MW-141 were all below the default screening level. Nitrate/nitrite concentrations in all of the in-field wells are below the screening level for all events between 2013 and 2020 but show fluctuation through that time period. The nitrate/nitrite concentrations are significantly lower in the downgradient wells, well below the default screening level. All of the nitrate/nitrite concentrations in all of the wells included in this investigation are below the calculated upgradient UTL.
- Sulfate concentrations have fluctuated in the upgradient well MW-55 but show an overall decrease between 2013 and 2020. The sulfate concentrations in upgradient wells MW-140 and MW-141 are generally in the same range as those in MW-55 during 2019 and 2020. The sulfate concentrations in in-field wells fluctuate between 2013 and 2020, but in general appear fairly stable. The concentrations in sulfate in the downgradient wells MW-142 and MW-143 appear to be in the same range as the concentrations in the upgradient and in-field wells. The sulfate concentrations in all wells are above the default screening level, with the exception of an anomalously low value reported for sulfate in MW-117 in October 2017. The majority of the sulfate concentrations in these wells are below the upgradient UTL.
- TDS concentrations have fluctuated in the upgradient well MW-55 but show an overall decrease between 2013 and 2020. The TDS concentrations in upgradient wells MW-140 are generally in the same range as those in MW-55 during 2019 and 2020, while the concentrations in MW-141 are lower than the other two upgradient wells. The TDS concentrations in in-field wells fluctuate between 2013 and 2020, but in general appear fairly stable. The concentrations in TDS in the downgradient wells MW-142 and MW-143 appear to be in the same range as the concentrations in the upgradient and in-field wells. The TDS concentrations in all wells are above the default screening level. The TDS concentrations have been below the upgradient UTL since early 2016 in all wells, with a few exceptions (MW-55 in Jul 2019, MW-142 in July 2019, and MW-143 in July and October 2019).
- Dissolved arsenic concentrations in upgradient well MW-55 fluctuate but appear relatively stable between 2013 and 2020, with an outlier in early 2019. The concentrations of dissolved arsenic in upgradient wells MW-140 and MW-141 in 2019 and 2020 are lower than the concentrations in MW-55. Concentrations of dissolved arsenic in the in-field wells have been generally decreasing between 2013 and 2020, with an outlier in MW-117 in early 2018. The dissolved arsenic concentrations in the downgradient wells are lower than those of the upgradient wells. The concentrations of dissolved arsenic in all of the wells were below the default screening level in 2019 and 2020.
- Dissolved boron concentrations in upgradient well MW-55 fluctuate but have an overall stable to declining trend. The concentrations in MW-55 are above the default screening level but the concentrations in MW-140 and MW-141 are below the default screening level. The concentrations of dissolved boron reported for the in-field wells are below the default screening level. The concentrations in wells MW-118 and MW-119 show a slight increase between 2013 and 2014. The concentrations of dissolved boron for MW-142 are

below the default screening level, but concentrations for MW-143 are above the default screening level. All of the concentrations of dissolved boron are below the upgradient UTL.

- Dissolved cobalt concentrations were primarily not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
- Dissolved iron concentrations were either not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
- Dissolved lead concentrations were either not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
- Dissolved manganese concentrations appear to be stable to declining in upgradient well MW-55 between 2013 to early 2017, then appear to increase between early 2017 to 2020. The dissolved manganese concentrations in upgradient wells MW-140 and MW-141 are lower than those in MW-55. Dissolved manganese concentrations appear to have decreased in the in-field wells between 2013 and 2020. The dissolved manganese concentrations in downgradient wells MW-142 and MW-143 appear to be similar to or lower than the upgradient concentrations. All of the reported concentrations of dissolved manganese between 2013 and 2020 are below the default screening level.
- Dissolved uranium concentrations appear to be stable to slightly increasing in upgradient well MW-55, with all values above the default screening level and the upgradient UTL. The dissolved uranium concentrations in upgradient well MW-140 are slightly above the default screening level, while the concentrations in well MW-141 are below the default screening level. The dissolved uranium concentrations reported for in-field well MW-117 are below the default screening level from 2013 to 2020, with a decreasing trend in concentrations. The concentrations of dissolved uranium show decreasing trends for in-field wells MW-118 and MW-119 but increasing trends in these two wells in 2019 to 2020. The concentrations in MW-118 were below the default screening level in 2013, but are above the default screening level in 2020, while the concentrations in MW-119 are above the default screening level throughout. The dissolved uranium concentrations in downgradient wells MW-142 and MW-143 are above the default screening level, at similar concentrations to those reported in MW-55, MW-118, and MW-119. There is little difference between the default screening level and the UTL for uranium.

South RO Field Profiles and Trends

- Profiles were constructed from upgradient to downgradient across the northern and southern portions of the South RO field. The profile across the northern portion of the field included wells MW-56, MW-115, MW-116, and MW-144. The profile across the southern portion of the field included wells MW-40, MW-114, MW-125, and RW-18A. The groundwater potentiometric surface is mounded between MW-114 and MW-115, as described in Section 4.3; however, the primary flow pattern is from MW-114 or MW-115 to the east. The profiles indicate the following:
 - Chloride concentrations appear to increase as slightly moving from the area of MW-114 and MW-115 to the east, then decreases again in the downgradient wells. Chloride concentrations are primarily above the default screening level in the northern portion of the field, decreasing to near or below the default screening level in MW-144. Chloride concentrations are primarily below the default screening level within the southern portion of the field, but increase at MW-125, then decrease at RW-18A.
 - Fluoride concentrations appear to decrease moving east across the northern portion of the field, then increase at MW-144. However, fluoride concentrations decrease moving east across the southern portion of the field to below the screening levels at MW-125, then increase at RW-18A. Fluoride concentrations are above the default screening level and upgradient UTL in the northern portion of the field and at RW-18A.

- Magnesium concentrations decrease moving eastward across the northern portion of the field but increase from the southern portion of the field moving eastward.
 - Nitrate/nitrite concentrations appear slightly elevated at MW-115 in the northern portion of the field but decrease significantly to the east. Nitrate/nitrite concentrations do not fluctuate significantly in the southern portion of the field. All of the nitrate/nitrite concentrations observed during this investigation are below the default screening level and upgradient UTL.
 - Sulfate concentrations are slightly higher at MW-115 and decrease moving to the east across the northern portion of the field; however, sulfate concentrations increase eastward of MW-114 in the southern portion of the field. All of the sulfate concentrations reported during this investigation are above the default screening level but are below the upgradient UTL with two exceptions (MW-115 and RW-18A in July 2019).
 - TDS concentrations are very similar to the sulfate concentrations in that the concentrations are slightly higher at MW-115 and decrease moving to the east across the northern portion of the field but increase eastward of MW-114 in the southern portion of the field. All of the TDS concentrations reported during this investigation are above the default screening level but are below the upgradient UTL with two exceptions (MW-115 in July 2019 and June 2020).
 - Dissolved arsenic concentrations decrease moving eastward across the field from both MW-114 and MW-115. All of the reported concentrations for dissolved arsenic for this investigation were below the default screening level.
 - Dissolved boron concentrations decrease moving eastward across the field from MW-115 in the northern portion of the field but increase slightly moving eastward from MW-114 in the southern portion of the field. All of the reported concentrations for dissolved boron for this investigation were below both the default screening level and the upgradient UTL.
 - Dissolved cobalt concentrations were primarily not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
 - Dissolved iron concentrations were either not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
 - Dissolved lead concentrations were either not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
 - Dissolved manganese concentrations decline significantly moving eastward from both MW-114 and MW-115. The reported concentrations in both MW-114 is above the default screening level but the concentrations in downgradient wells MW-144 and RW-18A are below the default screening level.
 - Dissolved uranium concentrations decrease significantly to the east from MW-115 but are above both the default screening level and the upgradient UTL at MW-115. Uranium increases significantly eastward from MW-114 and the concentrations in RW-18A are above both the default screening level and the upgradient UTL.
- Trends in the data were reviewed between 2013 and 2020. The trend charts indicate the following:
- Chloride concentrations appear to be increasing in wells MW-29, MW-40, and MW-56, located west of the South RO field. The concentrations have been above and below the screening level in all three wells between 2013 and 2020 but appear to be generally stable to declining in these wells. Chloride concentrations also fluctuated in the in-field wells from 2013 to 2020, with an overall decrease observed in the wells between 2013 to 2018, followed by a general increase in 2019 to 2020. The concentrations in the downgradient wells MW-125 and RW-18A appear stable to decreasing. Concentrations in downgradient well MW-144, installed for this AP, are in the same general range as wells MW-125 and RW-18A.

Concentrations of chloride are above the screening level during some or most of 2019 to 2020 in wells MW-29, MW-56, MW-115, MW-116, and MW-125.

- Fluoride concentrations have fluctuated between 2013 and 2020 in all of the wells associated with the South RO field. The concentrations in the in-field wells are typically higher than those in either the west or east directions. Concentrations in downgradient well MW-144 are slightly higher than those reported for downgradient well RW-18A. Concentrations of fluoride are above the both the default screening level and the upgradient UTL during some or most of 2019 to 2020 in wells MW-29, MW-40, MW-114, MW-115, MW-116, MW-144, and RW-18A.
- Magnesium concentrations have decreased in MW-29 between 2013 and 2020 but appear to be relatively stable with little to no trend in concentrations in the remaining wells. Magnesium was not analyzed in wells within or downgradient (east) of the South RO reject discharge field prior to 2019.
- Nitrate/nitrite concentrations in all of the wells associated with the South RO field are below the default screening level. Concentrations have fluctuated between 2013 and 2020 in all of the wells, with a general overall decrease in concentrations. The nitrate/nitrite concentration in MW-115 appears to have increased during the June 2020 sampling event above previous concentrations.
- Sulfate concentrations have fluctuated in all of the wells associated with the South RO field, with a general stable to declining trend observed in all wells between 2013 and 2020. The concentration of sulfate in all wells associated with this field exceed the default screening level. However, the majority of the concentrations reported between 2019 and 2020 are below the upgradient UTL and show a general decreasing trend.
- TDS concentrations have fluctuated in all of the wells associated with the South RO field, with a general stable to declining trend observed in all wells between 2013 and 2020. The concentration of TDS in all wells associated with this field exceed the default screening level. However, the majority of the concentrations reported between 2019 and 2020 are below the upgradient UTL, with a few exceptions (MW-29 in July 2019, MW-115 in July 2019 and June 2020, MW-125 in July 2019).
- Dissolved arsenic concentrations all of the wells associated with the South RO field are below the default screening level, with the exception of two values reported for MW-29 (April 2013 and October 2019). The concentrations reported between 2013 and 2020 show a general decrease for all wells.
- Dissolved boron concentrations in well MW-29 are above the default screening level, with a decrease in concentrations between October 2019 and June 2020. The concentration in wells MW-40 and MW-56 are below the default screening level and appear to be relatively stable. The dissolved boron concentrations reported for in-field wells MW-114 and MW-116 are generally below the default screening level (with the exception of MW-115 in 2013 and MW-114 in late 2013) with stable to decreasing trends between 2013 and 2020. The concentrations of dissolved boron in downgradient wells MW-125, MW-144, and RW-18A are all below the default screening level. All of the reported concentrations of dissolved boron between 2013 and 2020 are below the upgradient UTL.
- Dissolved cobalt concentrations were primarily not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.
- Dissolved iron concentrations were primarily not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. There is one anomalous reported concentration of iron in MW-29 in October 2019; however, the samples collected between 2013 and 2019 and in June 2020 were much lower, if detected. No significant trends are noted in this data.
- Dissolved lead concentrations were either not detected or were detected at very low concentrations, well below the default screening level, in all wells for this investigation. No significant trends are noted in this data.

- Dissolved manganese concentrations appear to be stable to declining between 2013 and 2020 in all of the wells associated with the South RO field. The concentrations of dissolved manganese are above the screening level in wells MW-29, MW-56, MW-114, and MW-125, but are below the screening level in wells MW-40, MW-115, MW-116, and RW-18A.
- Dissolved uranium concentrations are below the default screening level for wells MW-29, MW-40, MW-56, MW-114 (with the exception of late 2013), and MW-144. The concentrations of dissolved uranium are above the default screening level for wells MW-115, MW-116 (in 2013), MW-125, and RW-18A. The concentrations of dissolved uranium appear to be declining in MW-116 between 2013 and 2020 but appear to be increasing slightly in MW-115. Dissolved uranium has not been reported for the wells located east or west of the South RO field prior to this AP.

5.0 SUMMARY AND CONCLUSIONS

The Stage 1 AP approved work plan has been implemented and completed, with a delay in collection of the fourth quarterly sampling event due to pandemic restrictions.

5.1 Summary of Activities

The monitoring events conducted for this AP included the following activities:

► Soil sampling:

- Soil samples were collected from three different depths during installation of the soil moisture probe.
- Analytical data indicate that four metals (arsenic, cobalt, iron, and manganese) are present in total concentrations above the applicable screening levels for soil. Arsenic, cobalt, and iron concentrations exceed the soil-leaching-to-groundwater screening level while manganese exceeds the construction worker screening level.
- Analytical data indicate that two general chemistry parameters (fluoride and sulfate) and one metal (iron) are present at leachable concentrations above the applicable screening levels for groundwater. All of the leachable sulfate concentrations were below the upgradient UTL. Only one of the reported leachable concentrations of iron exceeded the default groundwater screening level.

► Soil moisture:

- Monitoring of soil moisture was conducted at three different depths at eight different locations.
- Graphs of data collected between July 16, 2019 and June 30, 2020 indicate that the fields have stabilized. Moisture contents observed were consistent with values expected for the soil types within the fields. Soil moisture responded to significant precipitation events as observed during October 2019 and March 2020.

► Groundwater sampling:

- Groundwater samples during four different events were collected from the 17 monitoring wells along with 2 duplicate samples collected during each event.
- Groundwater analytical data was compared to default screening levels for all analytes. The default screening levels were exceeded in at least one well for the following analytes: Boron, Manganese, Uranium, Chloride, Fluoride, Nitrate/Nitrite, Sulfate, and TDS.
- Four wells (UG-1, UG2, UG3R, UG4) located to the west of the refinery, hydraulically upgradient and not impacted by Refinery operations, were used to calculate upgradient UTLs for Boron, Uranium, Fluoride, Nitrate/Nitrite, Sulfate, and TDS. The groundwater analytical data was compared to the upgradient UTLs, which were exceeded in at least one well for: Uranium, Fluoride, Sulfate, and TDS. None of the reported concentrations of Boron or Nitrate/Nitrite exceed the upgradient UTLs.
- Water classification diagrams have been constructed for samples collected from each well to evaluate changes to the groundwater following cessation of discharge of the RO reject stream.
- Concentration trends and profiles were constructed and reviewed for each field to evaluate changes to the groundwater through time and across the two RO reject discharge fields.

5.2 Conclusions

The groundwater data collected as part of this Stage 1 AP, as well as data collected during the 2013 investigation of the RO fields and for the semiannual facility-wide groundwater monitoring program has been evaluated. The following conclusions are based on the data evaluations presented in this report:

► Soil Moisture and Potentiometric Surfaces:

- Soil moisture probe data indicates that both the North and South RO reject discharge fields have reached field capacity, or normal conditions, following cessation of discharge.
- Potentiometric surface maps indicate that little to no mounding is present near the former outfall within the North RO reject discharge field and while the groundwater gradient appears to fluctuate seasonally, the direction of flow is consistently from southwest to northeast.
- The potentiometric surface maps indicate that mounding is present between MW-114 and MW-115 in the South RO reject discharge field. The source of the mounding was previously believed to be the RO reject discharge; however, the persistence of the mounding even though the moisture probe data shows the soil has reached field capacity indicates that there may be other reasons for the mounding.

► North RO Reject Discharge Field groundwater impacts:

- COCs that exceed the UTL or default screening standards in at least one well associated with the North RO reject discharge field, for at least one of the groundwater monitoring events between July 2019 and June 2020, include:
 - Chloride
 - Fluoride
 - Nitrate/Nitrite
 - Sulfate
 - TDS
 - Boron
 - Uranium
- The following observations are made regarding the groundwater beneath and downgradient of the North RO reject discharge field:
 - Chloride decreases near the discharge point, indicating that some dilution of chloride occurred as a result of the application of the RO reject stream, then increases in the downgradient direction but does not return to the concentration observed upgradient of the North RO reject discharge field. The leachable concentrations of chloride in shallow soils do not exceed the default screening level for groundwater. Thus, it does not appear that discharge of the RO reject stream has resulted in increased chloride concentrations in groundwater. Further, it does not appear that future migration of chloride from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is needed to address chloride.
 - Fluoride increases in groundwater as it moves to the middle of the field, then decreases in the downgradient well but does not decrease to below the upgradient UTL for groundwater. The leachable fluoride concentrations in shallow soils within the field exceed the upgradient UTL for groundwater. These two observations indicate that, although attenuation appears to be occurring, fluoride in the soil within the field may be migrating into groundwater beneath the North RO reject discharge field. Thus, continued monitoring of fluoride in groundwater is needed, and additional future actions may be needed to address fluoride in the shallow soils.
 - Nitrate/Nitrite concentrations in MW-140, upgradient of the North RO field, exceeded the default screening level but were below the upgradient UTL for groundwater. The leachable concentrations of nitrate/nitrite in shallow soils do not exceed the default screening level for groundwater. Thus, it does not appear that discharge of the RO reject stream has resulted in increased nitrate/nitrite concentrations in

groundwater. Further, it does not appear that future migration of nitrate/nitrite from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is needed to address nitrate or nitrite.

- Sulfate increases slightly in groundwater as it moves across the field, then decreases in the downgradient well to below the upgradient UTL for groundwater. The leachable sulfate concentrations in shallow soils within the field do not exceed the upgradient UTL for groundwater. These two observations indicate that adequate attenuation of sulfate is occurring beneath the North RO reject discharge field and that future migration of sulfate from the shallow soil to groundwater will not occur at concentrations that would negatively impact groundwater quality. It should be noted that gypsum is a natural source of sulfate and the parent material for the Reeves loam soil, which comprises approximately 20 acres of the North RO reject discharge field, likely contributes to the presence of sulfate in both upgradient groundwater and groundwater beneath the North RO reject discharge field. Thus, continued monitoring of sulfate concentrations in groundwater is needed; however, it is not anticipated that remediation of sulfate in shallow soil is warranted and may not even be possible.
- TDS fluctuates across the field, decreasing significantly at the discharge point, then increasing slightly across the field and in the downgradient direction. TDS did not exceed the upgradient UTL during the two sampling events of 2020. This indicates that adequate attenuation of TDS is occurring beneath the North RO reject discharge field. Thus, no further action is warranted to address TDS.
- Boron decreases significantly near the discharge point, then increases in the middle and downgradient of the field. Only two wells contained reported concentrations of boron above the default screening level and none of the concentrations exceeded the upgradient UTL for groundwater. None of the leachable concentrations of boron in shallow soils exceed the default screening level for groundwater. Thus, it does not appear that discharge of the RO reject stream caused an increase in boron concentrations in groundwater. Further, it does not appear that future migration of boron from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is warranted to address boron.
- Uranium decreases near the discharge point, then increases in the middle and downgradient of the field, but the concentrations do not return to the concentration observed upgradient of the North RO reject discharge field. The leachable uranium concentrations in shallow soil do not exceed either the default screening level or the upgradient UTL for groundwater. Thus, it does not appear that discharge of the RO reject stream has caused a significant increase in uranium concentrations above the UTL in groundwater. Further, it does not appear that future migration of uranium from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is warranted to address uranium.

► South RO Reject Discharge Field:

- COCs that exceed the UTL or default screening standards in at least one well for at least one of the monitoring events between July 2019 and June 2020 include:
 - Chloride
 - Fluoride
 - Sulfate
 - TDS
 - Boron

- Manganese
- Uranium
- The following observations are made based on the concentration profiles across the South RO reject discharge field:
 - Chloride increases from the mounded groundwater (between MW-114 and MW-115) as groundwater moves eastward across the field, then decreases downgradient of the field. The leachable concentrations of chloride in shallow soils do not exceed the default screening level for groundwater. Thus, it does not appear that discharge of the RO reject stream caused a significant increase in chloride concentrations in groundwater. Further, it does not appear that future migration of chloride from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is warranted to address chloride.
 - Fluoride decreases in groundwater as it moves eastward from the groundwater mound between MW-114 and MW-115, then increases in the downgradient wells. The leachable fluoride concentrations in shallow soils within the field exceed the upgradient UTL for groundwater. These two observations indicate that, although attenuation appears to be occurring within the field, the potential exists for fluoride in the shallow soil to migrate into groundwater beneath and downgradient of the South RO reject discharge field. Thus, continued monitoring of fluoride in groundwater is needed, and additional future actions may be needed to address fluoride in the shallow soils.
 - Sulfate increases moving eastward across the southern portion of the field but decreases slightly across the northern portion of the field and to the northernmost downgradient well. The sulfate concentrations in the downgradient wells have not exceeded the upgradient UTL for groundwater since July 2019. The leachable sulfate concentrations in shallow soils within the field do not exceed the upgradient UTL for groundwater. These two observations indicate that adequate attenuation of sulfate is occurring beneath the South RO reject discharge field. It does not appear that future migration of sulfate from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, continued monitoring of sulfate in groundwater concentrations is needed; however, it is not anticipated that remediation of sulfate in shallow soil is warranted.
 - TDS fluctuates across the field, decreasing to below the upgradient UTL in the downgradient wells. This indicates that adequate attenuation of TDS is occurring beneath the North RO reject discharge field. Thus, continued monitoring of TDS concentrations is needed.
 - Boron decreases significantly near the discharge point, and the concentrations in the downgradient wells are below the default screening levels. Only two wells contained reported concentrations of boron above the default screening level and none of the concentrations exceeded the upgradient UTL for groundwater. None of the leachable concentrations of boron in shallow soils exceed the default screening level for groundwater. Thus, it does not appear that discharge of the RO reject stream caused an increase in boron concentrations in groundwater. Further, it does not appear likely that future migration of boron from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is warranted for boron.
 - Manganese exceeds the screening levels near the discharge point and the well east of the discharge point, however, is below the default screening level in the two most downgradient wells. None of the leachable concentrations of manganese in shallow soils exceed the default screening level for groundwater. Thus, it does not appear that discharge of the RO reject stream has caused an increase in manganese concentrations in groundwater. Further, it does not appear that future migration of manganese from the

shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Thus, no further action is warranted for manganese.

- Uranium decreases near the discharge point (MW-114), then increases to above the default screening level and the upgradient UTL in RW-18A. Uranium concentrations at MW-115 exceed both the default screening level and the upgradient UTL, but decrease moving eastward to MW-144 to well below the screening levels. Uranium concentrations appear to have a stable to declining trend between 2013 and 2020. None of the leachable concentrations of uranium in shallow soils exceed the default screening level for groundwater. Thus, it does not appear that future migration of uranium from the shallow soil to groundwater will occur at concentrations that would negatively impact groundwater quality. Continued monitoring of uranium concentrations is needed.
- ▶ The characteristics of the soil types present in both the North and South RO reject discharge fields were reviewed to evaluate potential sources of inorganic COCs and/or effects on COCs that were present in the former discharge water.
 - The presence of gypsum in the primary soil within the North RO reject discharge field indicates that the sulfate present in groundwater may be from a natural source. Continued groundwater monitoring is needed to monitor the trends of sulfate in groundwater, but remediation of sulfate in the soil is not warranted.
 - Calcium carbonate present in the soils present in both fields may be contributing to binding fluoride from the former discharge water into the form of calcium fluoride. Further study of the leachability of fluoride from the soil and potential methods for limiting migration of fluoride from the soil to groundwater is needed.

5.3 Recommendations

The conclusions listed above indicate that, in general, the majority of potential contaminants, do not pose a threat to either human health or the environment due to past operation of the RO reject discharge fields. However, there remains a potential for migration of fluoride from shallow soil to the underlying groundwater. Thus, the following recommendations are made for the RO reject discharge fields:

- ▶ Continued groundwater monitoring:
 - Installation of additional downgradient wells:
 - One well approximately 350 feet northeast of MW-119 to provide downgradient monitoring of the North RO reject discharge field
 - One well approximately 1,000 feet east of RW-18A to provide additional downgradient monitoring of the South RO reject discharge field
 - Semiannual gauging and sampling of the wells included in this study, with the addition of the two new wells recommended downgradient of MW-119 and RW-18A along with inclusion of MW-134 for additional downgradient monitoring of the South RO reject discharge field.
 - Analysis of groundwater samples for the following analytes, at a minimum (additional analytes may be required for the facility-wide groundwater monitoring program):
 - Fluoride
 - Sulfate
 - TDS (South RO reject discharge field only)
 - Uranium (South RO reject discharge field only)
 - Inclusion of the analytical data in the annual facility-wide monitoring report.

- ▶ Preparation and submittal of a Stage 2 Abatement Plan Work Plan in accordance with NMAC 20.6.2.4106.D, following approval of this Stage 1 Abatement Plan Report. The Stage 2 work plan would evaluate remedial alternatives focused on removal of fluoride (and potentially other inorganics) from shallow soil and/or groundwater or removal of the potential infiltration pathway.

The following recommendations will be implemented upon receipt of approval of this Stage 1 AP Report, as follows:

- ▶ Continued groundwater monitoring will be scheduled to occur at the same time as semiannual facility-wide groundwater monitoring. Installation of the recommended two additional monitoring wells will be performed prior to the first semiannual monitoring event following approval of this Stage 1 AP Report, if scheduling and weather allows.
- ▶ Stage 2 Abatement Plan Work Plan will be submitted within 60 days of receipt of approval of this Stage 1 AP Report.

6.0 REFERENCES

- Arcadis 2015a. Background Groundwater Investigation Report. September 2015.
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- NMED 2019. Risk Assessment Guidance for Site Investigations and Remediation. March 2019.
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- Piper 1953. A Graphic Procedure in the Geochemical Interpretation of Water Analysis. A.M. Piper, U. S. Geological Survey Ground Water Branch. 1953.
- Stiff 1951. The Interpretation of Chemical Water Analysis by Means of Patterns. H.A. Stiff, Journal of Petroleum Technology. 1951.
- 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.
- Wood 2020a. Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Second Quarterly Progress Report. January 31, 2020.
- Wood 2020b. Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Third Quarterly Progress Report. April 17, 2020.

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
			Quarter 3	1/16/2020	14.50	3364.77	3350.27
			Quarter 4a	4/15/2020	13.78	3364.77	3350.99
			Quarter 4b	6/16/2020	15.02	3364.77	3349.75
		MW-140	Quarter 1	7/15/2019	9.46	3361.23	3351.77
			Quarter 2	10/22/2019	9.31	3361.23	3351.92
			Quarter 3	1/16/2020	11.21	3361.23	3350.02
			Quarter 4a	4/15/2020	10.45	3361.23	3350.78
			Quarter 4b	6/16/2020	11.92	3361.23	3349.31
		MW-141	Quarter 1	7/15/2019	10.62	3359.89	3349.27
			Quarter 2	10/22/2019	9.95	3359.89	3349.94
			Quarter 3	1/16/2020	11.35	3359.89	3348.54
			Quarter 4a	4/15/2020	10.38	3359.89	3349.51
			Quarter 4b	6/16/2020	12.57	3359.89	3347.32
	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
			Quarter 3	1/16/2020	13.95	3363.01	3349.06
			Quarter 4a	4/15/2020	13.37	3363.01	3349.64
			Quarter 4b	6/16/2020	14.65	3363.01	3348.36
		MW-118	Quarter 1	7/17/2019	15.23	3361.95	3346.72
			Quarter 2	10/22/2019	15.19	3361.95	3346.76
			Quarter 3	1/16/2020	16.60	3361.95	3345.35
			Quarter 4a	4/15/2020	16.10	3361.95	3345.85
			Quarter 4b	6/16/2020	17.76	3361.95	3344.19
		MW-119	Quarter 1	7/17/2019	13.75	3356.11	3342.36
			Quarter 2	10/22/2019	13.70	3356.11	3342.41
			Quarter 3	1/16/2020	15.99	3356.11	3340.12
			Quarter 4a	4/15/2020	16.47	3356.11	3339.64
			Quarter 4b	6/16/2020	16.02	3356.11	3340.09
	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
			Quarter 3	1/16/2020	15.35	3355.78	3340.43
			Quarter 4a	4/15/2020	15.80	3355.78	3339.98
			Quarter 4b	6/16/2020	15.51	3355.78	3340.27
		MW-143	Quarter 1	7/12/2019	13.51	3355.85	3342.34
			Quarter 2	10/22/2019	13.58	3355.85	3342.27
			Quarter 3	1/16/2020	15.96	3355.85	3339.89
			Quarter 4a	4/15/2020	16.47	3355.85	3339.38
			Quarter 4b	6/16/2020	15.79	3355.85	3340.06
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
			Quarter 3	1/16/2020	19.49	3360.64	3341.15
			Quarter 4a	4/15/2020	19.03	3360.64	3341.61
			Quarter 4b	6/16/2020	20.76	3360.64	3339.88
		MW-40	Quarter 1	7/17/2019	11.87	3356.93	3345.06
			Quarter 2	10/22/2019	11.44	3356.93	3345.49
			Quarter 3	1/16/2020	12.34	3356.93	3344.59
			Quarter 4a	4/15/2020	11.75	3356.93	3345.18
			Quarter 4b	6/16/2020	13.86	3356.93	3343.07



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)
South RO Field	Upgradient	MW-56	Quarter 1	7/17/2019	14.00	3357.44	3343.44
			Quarter 2	10/22/2019	13.21	3357.44	3344.23
			Quarter 3	1/16/2020	16.14	3357.44	3341.30
			Quarter 4a	4/15/2020	15.58	3357.44	3341.86
			Quarter 4b	6/16/2020	16.67	3357.44	3340.77
	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
			Quarter 3	1/16/2020	14.02	3361.68	3347.66
			Quarter 4a	4/15/2020	13.98	3361.68	3347.70
			Quarter 4b	6/16/2020	15.98	3361.68	3345.70
		MW-115	Quarter 1	7/17/2019	13.75	3359.31	3345.56
			Quarter 2	10/22/2019	12.95	3359.31	3346.36
			Quarter 3	1/16/2020	15.11	3359.31	3344.20
			Quarter 4a	4/15/2020	14.89	3359.31	3344.42
			Quarter 4b	6/16/2020	16.18	3359.31	3343.13
		MW-116	Quarter 1	7/17/2019	14.06	3353.77	3339.71
			Quarter 2	10/22/2019	12.77	3353.77	3341.00
			Quarter 3	1/16/2020	15.22	3353.77	3338.55
			Quarter 4a	4/15/2020	15.53	3353.77	3338.24
			Quarter 4b	6/16/2020	16.18	3353.77	3337.59
	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
			Quarter 3	1/16/2020	17.45	3358.81	3341.36
			Quarter 4a	4/15/2020	17.82	3358.81	3340.99
			Quarter 4b	6/16/2020	19.17	3358.81	3339.64
		MW-144	Quarter 1	7/16/2019	14.51	3351.12	3336.61
			Quarter 2	10/22/2019	13.13	3351.12	3337.99
			Quarter 3	1/16/2020	15.75	3351.12	3335.37
			Quarter 4a	4/15/2020	16.35	3351.12	3334.77
			Quarter 4b	6/16/2020	16.04	3351.12	3335.08
		RW-18A	Quarter 1	7/17/2019	15.99	3350.84	3334.85
			Quarter 2	10/22/2019	14.02	3350.84	3336.82
			Quarter 3	1/16/2020	16.94	3350.84	3333.90
			Quarter 4a	4/15/2020	16.41	3350.84	3334.43
			Quarter 4b	6/16/2020	16.94	3350.84	3333.90

Abbreviations

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

Notes

Quarter 4a includes water level measurements conducted in April 2020; however, no samples were collected in April 2020 due to COVID travel restrictions. Quarter 4b includes water level measurements conducted in June 2020 associated with the final sampling event for this investigation.



Table 2 - Purge Parameters
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	0.0	Clear
			Quarter 2	10/22/2019	1.06	20.20	6.61	4.210	2.1	155.7	7.4	Clear
			Quarter 3	1/16/2020	1.06	16.20	6.63	3.670	2.4	109.4	7.3	Clear
			Quarter 4b	6/16/2020	1.06	18.80	6.58	3.280	1.9	72.3	7.7	Clear
		MW-140	Quarter 1	7/15/2019	1.10	21.49	6.45	4.310	0.45	144	340.0	Clear
			Quarter 2	10/22/2019	1.32	18.80	6.75	3.570	1.7	70.4	30.7	Slightly Cloudy
			Quarter 3	1/16/2020	1.06	16.90	6.76	3.566	1.8	74.1	22.6	Clear
			Quarter 4b	6/16/2020	1.06	18.40	6.73	3.430	1.9	71.6	7.7	Clear
		MW-141	Quarter 1	7/15/2019	1.10	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
			Quarter 3	1/16/2020	1.06	15.30	6.89	2.790	2.7	59.5	8.0	Clear
			Quarter 4b	6/16/2020	1.06	18.00	6.85	3.010	2.4	93.5	7.1	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
			Quarter 3	1/16/2020	1.06	14.50	6.58	3.120	2.3	-36.2	9.5	Clear
			Quarter 4b	6/16/2020	1.06	20.30	6.48	3.220	2.6	76.1	21.5	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
			Quarter 3	1/16/2020	1.06	14.50	6.81	3.830	3	-107.9	24.2	Clear
			Quarter 4b	6/16/2020	1.06	18.20	6.41	3.410	3.4	75.9	27.3	Clear
South RO Field	Downgradient	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
			Quarter 3	1/16/2020	1.06	15.40	6.47	3.918	1.8	76.2	22.7	Clear
			Quarter 4b	6/16/2020	1.06	19.70	7.06	6.470	1.4	105.3	7.1	Clear
		MW-142	Quarter 1	7/12/2019	1.10	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
			Quarter 3	1/16/2020	1.06	15.80	6.65	3.941	0.9	103.7	51.6	Clear
			Quarter 4b	6/16/2020	1.06	21.20	6.96	6.470	1.2	129.9	3.0	Clear
		MW-143	Quarter 1	7/12/2019	1.10	17.84	6.76	4.540	0	81	375.0	Clear
			Quarter 2	10/22/2019	1.06	19.30	6.98	4.490	1.4	81.7	55.4	Slightly Cloudy
			Quarter 3	1/16/2020	1.06	14.70	6.92	4.132	1.5	100.3	35.7	Clear
			Quarter 4b	6/16/2020	1.06	20.70	7.08	6.690	0.9	137	7.7	Clear
	Upgradient	MW-29	Quarter 1	7/17/2019	1.00	23.72	6.89	5.780	0	-173	0.0	Clear
			Quarter 2	10/22/2019	1.06	20.40	6.67	4.200	1.6	-203	8.1	Clear
			Quarter 3	1/16/2020	1.06	15.00	6.97	3.750	1.5	-277	9.6	Clear
			Quarter 4b	6/16/2020	1.06	23.10	6.88	4.270	1.7	-325.8	8.9	Clear
		MW-40	Quarter 1	7/17/2019	0.85	24.95	6.83	3.220	0.35	-347	0.0	Clear
			Quarter 2	10/22/2019	1.06	22.30	6.80	2.470	1.3	-336.8	9.7	Clear
			Quarter 3	1/16/2020	1.06	15.90	7.05	2.440	1.2	-310.2	6.9	Clear
			Quarter 4b	6/16/2020	1.06	21.70	6.70	2.670	1.5	-365.9	9.1	Clear

Table 2 - Purge Parameters
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
South RO Field	Upgradient	MW-56	Quarter 1	7/17/2019	1.00	23.35	6.56	4.260	0	70	0.0	Clear
			Quarter 2	10/22/2019	1.06	21.10	6.70	4.110	1.6	-43.8	0.6	Clear
			Quarter 3	1/16/2020	1.06	16.00	6.67	3.410	1.4	-67.2	1.5	Clear
			Quarter 4b	6/16/2020	1.06	22.30	6.70	3.850	1.3	-156	1.9	Clear
		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
			Quarter 3	1/16/2020	1.06	16.00	6.75	3.196	1.7	64.6	1.5	Clear
			Quarter 4b	6/16/2020	1.06	21.90	6.68	3.307	1.7	57.1	1.6	Clear
	In Field	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
			Quarter 3	1/16/2020	1.06	15.40	6.83	3.781	2.9	13.3	0.8	Clear
			Quarter 4b	6/16/2020	1.06	19.30	6.81	4.027	2.8	27.5	1.4	Clear
		MW-116	Quarter 1	7/17/2019	1.30	21.17	6.85	4.300	0	125	124.0	Clear
			Quarter 2	10/22/2019	1.06	18.40	6.81	3.820	1.1	72.9	10.8	Clear
			Quarter 3	1/16/2020	1.06	15.60	6.73	3.515	1.2	66.4	21.5	Clear
			Quarter 4b	6/16/2020	1.06	20.90	6.81	4.180	2.1	42.8	3.8	Clear
		MW-125	Quarter 1	7/17/2019	0.80	22.47	6.61	5.010	0	149	0.0	Clear
			Quarter 2	10/22/2019	1.06	18.20	6.81	4.131	2.3	65.1	3.9	Clear
			Quarter 3	1/16/2020	1.06	15.00	6.76	4.022	2	79.9	3.6	Clear
			Quarter 4b	6/16/2020	1.06	20.90	6.81	4.180	2.1	42.8	3.8	Clear
	Downgradient	MW-144	Quarter 1	7/16/2019	55	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
			Quarter 3	1/16/2020	1.06	12.50	6.78	3.460	2.2	-13.8	48.1	Clear
			Quarter 4b	6/16/2020	1.06	19.80	6.70	3.720	2	63.2	47.3	Clear
		RW-18A	Quarter 1	7/17/2019	1.05	20.02	6.72	4.460	0	102	0.0	Clear
			Quarter 2	10/22/2019	1.06	21.40	6.79	4.520	2.1	69.4	16.8	Clear
			Quarter 3	1/16/2020	1.06	12.90	6.91	3.720	2	88.3	17.4	Clear
			Quarter 4b	6/16/2020	1.06	22.10	6.95	3.630	2	109.1	9.8	Clear

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

Notes

Quarter 4a includes water level measurements conducted in April 2020; however, no samples were collected in April 2020 due to COVID travel restrictions. Quarter 4b includes water level measurements conducted in June 2020 associated with the final sampling event for this investigation.



Table 3 - Summary of Soil Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte		MP-1				MP-2				MP-3				MP-4			
		2	5	10		2	5	10		2	5	10		2	DUP-1 (MP-4 2')	5	10
Location: Depth Range (ft bgs):		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
Date:																	
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	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	<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	145000	73800	114000	215000		71800	113000	246000		154000	154000	208000	260000
Magnesium	1.55E+06	CW SSL, Noncancer	11700	O1	5650	12800	10600	8980		13200	9730	6240		10900	10700	9450	5180
Potassium	2.08E+07	CW SSL, Noncancer	5770	O1	1690	6260	4670	2520		5600	3850	2250		4470	4660	3110	1690
Sodium	1.02E+07	CW SSL, Noncancer	327	B	217	251	B	199	B	309	260	B	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	<0.0197	0.102	<0.0197	<0.0197		0.076	J	<0.0197		0.068	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	1.52		2.25	1.27	0.518	J	2.81	3.36	0.595	0.558
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	3.06	1.2	J	3.4	2.36	J	3.09	3.61	3.14	3.25	1.44
Boron	2.51E+02	Cw, DAF 20	13.3	5.78	J	12.3	J	7.44	J	9.9	8.47	J	5.79	9.12	J	7.1	J
Cobalt	5.40E+00	Cw, DAF 20	7.50	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	9360	18500	13700	7410		17100	11200	6600		12900	12800	8400	5660
Lead	2.70E+02	Cw, DAF 20	39.2	O1	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	90.6	454	263	73.3		415	261	181		286	291	208	143
Uranium	2.30E+02	EPA Ind RSL	2.52	J O1	1.22	0.757	J	0.321	J	0.602	J	0.539	J	0.631	J	0.76	J
Leachable Metals (mg/L)																	
Arsenic	1.00E-02	WQCC HH	0.00163	J	0.0024	0.00257	0.00141	J	0.00108	J	0.00053	J	0.00102	0.00157	J	0.000915	J
Boron	7.50E-01	WQCC Irr	0.0892	J	0.0775	0.151	J	0.068	J	0.0354	J	0.0342	J	0.193	J	0.191	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	1.00E+00	WQCC Dom	<0.0141	0.0325	J	0.0317	J	0.0303	J	<0.0141	<0.0141	0.0278	J	0.02	J	<0.0141	0.0221
Lead	1.50E-02	WQCC HH	0.000278	J	0.000444	0.000638	J	<0.00024		<0.00024	<0.00024	0.000424	J	0.000394	B J	0.000475	B J
Manganese	2.00E-01	WQCC Dom	0.000518	B J	0.00283	0.000993	B J	0.00121	B J	0.000372	B J	0.00154	B J	0.00149	J	0.00085	J
Uranium	3.00E-02	WQCC HH	<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
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 3 - 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):		Screening Level		2	5	10	2	5	10	2	5	10
Date:		Source		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	434	45.9	41.3	66.3	102	42.5
Fluoride	1.20E+04	Cw, DAF 20		24.4	15.6		12.2	14.1	16.7	20.2	14.9	26.9
Nitrate-Nitrite	4.25E+02	Cw, DAF 20		5.86	3.87	<0.128	<0.125	<0.143	<0.122	0.974	J	<0.127
Sulfate	--	--		560	668	1070	9950	4840	14900	1980	2370	18800
Calcium	8.85E+06	CW SSL, Noncancer		81600	O1 V	156000	81200	103000	200000	78000	91700	208000
Magnesium	1.55E+06	CW SSL, Noncancer		12500	O1 V	6850	14400	11100	7390	12600	10700	8120
Potassium	2.08E+07	CW SSL, Noncancer		6830	O1 V	2920	7080	5550	2920	6520	5790	3520
Sodium	1.02E+07	CW SSL, Noncancer		269	B	204	895	320	B	299	294	259
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	1.94
Fluoride	1.60E+00	WQCC HH		2.83	2.11	1.83	1.14	1.28	1.46	2.61	1.8	1.82
Nitrate-Nitrite	1.00E+01	EPA MCL		0.198	0.037	J	0.045	J	<0.0197	0.231	0.131	<0.0197
Sulfate	6.00E+02	WQCC Dom		45.5	72.3	156	647	459	1390	267	285	1570
Calcium	--	--		23.5	31.3	48.8	155	114	475	101	102	596
Magnesium	--	--		5.8	7.55	9.35	46.6	29.4	35.2	16.5	18	29.8
Potassium	--	--		1.34	B	0.646	5.02	1.86	5.14	2.21	1.43	2.24
Sodium	--	--		19.3	55.2	14.8	50.6	25.6	11.8	20.2	20	16.7
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	6.18
Boron	2.51E+02	Cw, DAF 20		9.13	J	5.2	12.1	9.56	J	7.62	J	7.7
Cobalt	5.40E+00	Cw, DAF 20		7.67	5.46	4.02	8.89	7.28	3.46	8.23	6.96	5.11
Iron	6.96E+03	Cw, DAF 20		18100	O1 V	8520	19600	15500	8290	18700	16000	11400
Lead	2.70E+02	Cw, DAF 20		14.4	O1	3.86	13.1	7.8	3.57	14.3	12.3	5.69
Manganese	4.64E+02	CW SSL, Noncancer		381	O1	316	489	404	476	469	331	329
Uranium	2.30E+02	EPA Ind RSL		0.786	J	0.643	0.767	J	0.641	0.645	J	0.586
Leachable Metals (mg/L)												
Arsenic	1.00E-02	WQCC HH		0.00383	0.00121	J	0.00121	J	0.00156	0.00141	J	0.00192
Boron	7.50E-01	WQCC Irr		0.119	B J	0.0877	0.167	B J	0.0775	0.124	B J	0.095
Cobalt	5.00E-02	WQCC Irr		<0.00026	0.000266	J	0.00035	J	0.000503	<0.00026	<0.00026	<0.00026
Iron	1.00E+00	WQCC Dom		0.174	0.0308	J	0.058	J	0.652	0.0146	J	<0.0141
Lead	1.50E-02	WQCC HH		0.00107	B J	0.00046	0.000523	B J	0.00273	0.000315	B J	0.000283
Manganese	2.00E-01	WQCC Dom		0.00385	J	0.00111	0.00241	J	0.0218	0.000454	J	0.00205
Uranium	3.00E-02	WQCC HH		<0.00033	<0.00033	<0.00033	0.000391	J	0.000561	<0.00033	<0.00033	<0.00033
Total Solids (%)	--	--		84.2	83.8	83.7	86.2	74.8	87.9	84.5	85.4	84.4
Moisture (%)	--	--		15.8	16.2	16.3	13.8	25.2	12.1	15.5	14.6	15.6

Table 3 - Summary of Soil Analytical Results

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Location:				
Depth Range (ft bgs):			MP-8	
Date:			2	5
			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
Fluoride	1.20E+04	Cw, DAF 20	8.58	12.2
Nitrate-Nitrite	4.25E+02	Cw, DAF 20	74.9	<0.119
Sulfate	--	--	1420	2420
Calcium	8.85E+06	CW SSL, Noncancer	69900	79900
Magnesium	1.55E+06	CW SSL, Noncancer	15200	14400
Potassium	2.08E+07	CW SSL, Noncancer	8180	3400
Sodium	1.02E+07	CW SSL, Noncancer	1220	546
Leachable Cations/Anions (mg/L)				
Chloride	2.50E+02	WQCC Dom	211	19.4
Fluoride	1.60E+00	WQCC HH	0.763	1.65
Nitrate-Nitrite	1.00E+01	EPA MCL	2.07	0.089
Sulfate	6.00E+02	WQCC Dom	250	361
Calcium	--	--	117	86.1
Magnesium	--	--	46.9	28.8
Potassium	--	--	10.2	1.42
Sodium	--	--	63.7	29
Total Metals (mg/kg)				
Arsenic	5.83E+00	Cw, DAF 20	4.35	4.57
Boron	2.51E+02	Cw, DAF 20	9.39	10.8
Cobalt	5.40E+00	Cw, DAF 20	9.84	6.96
Iron	6.96E+03	Cw, DAF 20	21400	13100
Lead	2.70E+02	Cw, DAF 20	15.5	6.27
Manganese	4.64E+02	CW SSL, Noncancer	525	260
Uranium	2.30E+02	EPA Ind RSL	0.703	0.873
Leachable Metals (mg/L)				
Arsenic	1.00E-02	WQCC HH	0.00116	0.00207
Boron	7.50E-01	WQCC Irr	0.146	0.143
Cobalt	5.00E-02	WQCC Irr	0.000662	<0.00026
Iron	1.00E+00	WQCC Dom	0.0171	<0.0141
Lead	1.50E-02	WQCC HH	0.000368	<0.00024
Manganese	2.00E-01	WQCC Dom	0.00202	0.00622
Uranium	3.00E-02	WQCC HH	<0.00033	0.00035
Total Solids (%)	--	--	84.3	90
Moisture (%)	--	--	15.7	10

		Notes and Definitions
X		Reported concentration, X, exceeds the screening level
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 screening level
CW		Construction Worker
Cw		Target Leachate Concentration
DAF 20		Dilution Attenuation Factor of 20
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
RSL		Regional Screening Level
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 high to evaluate accurate spike recoveries.



Table 4 - Summary of Groundwater Analytical Results Screened Using CGWSLs

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 Dom	WQCC HH	WQCC Dom	WQCC HH	WQCC HH		
Location	Well	Event	Date	Type																
North RO Field																				
Upgradient	MW-55	Quarter 1	07/17/2019	N																
		Quarter 2	10/22/2019	N	0.00615	1.07	<0.000260	0.0207 J	<0.0020 BIU	0.132	0.0513	0.00595	1.00	<0.000260	<0.0141	<0.0020 BIU	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 BIU	0.128	0.0528		
		Quarter 3	1/16/2020	N																
	MW-140	Quarter 4*	1/16/2020	FD																
		Quarter 4*	6/16/2020	N	0.00608	0.992	<0.000477	<0.0458	<0.00249	0.142	0.0548	0.00663	0.951	<0.000477	<0.0458	<0.00249	0.148	0.0549		
		Quarter 1	07/15/2019	N																
		Quarter 2	10/22/2019	N	0.00241	0.412	<0.000260	0.224	<0.0020 BIU	0.102	0.0318	0.00247	0.395	<0.000260	<0.0141	<0.0020 BIU	0.0975	0.0325		
	MW-141	Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00262	0.468	<0.000477	<0.0458	<0.00249	0.0636	0.0359	0.00265	0.445	<0.000477	<0.0458	<0.00249	0.00615	0.0348		
		Quarter 4*	6/16/2020	FD	0.00252	0.460	<0.000477	<0.0458	<0.00249	0.0678	0.0323	0.00273	0.442	<0.000477	<0.0458	<0.00249	0.0564	0.0336		
		Quarter 1	07/15/2019	N																
In Field	MW-117	Quarter 1	07/15/2019	FD																
		Quarter 2	10/22/2019	N	0.00389	0.215	0.000333 J	0.132	<0.0020 BIU	0.00939	0.0280	0.00360	0.218	0.000308 J	0.0159 J	<0.000240	0.00925	0.0288		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00310 BJ	0.196 J	<0.000477	<0.0458	<0.00249	0.00205 J	0.0244	0.00297	0.200 J	<0.000477	<0.0458	<0.00249	0.00132 J	0.0259		
	MW-118	Quarter 1	07/17/2019	N																
		Quarter 2	10/22/2019	N	0.0025	0.145 J	<0.000260	0.0611 J	<0.000240	<0.0050 BIU	0.0176	0.00243	0.147 J	<0.000260	0.0195 J	<0.000240	<0.0050 BIU	0.0172		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00248	0.143 J	<0.000477	0.261	<0.00249	0.00392 J	0.0152 J	0.00246	0.131 J	<0.000477	<0.0458	<0.00249	0.00158 J	0.0160 J		
	MW-119	Quarter 1	07/17/2019	N																
		Quarter 2	10/22/2019	N	0.00871	0.352	<0.000260	0.127	<0.000240	<0.0050 BIU	0.0371	0.00863	0.366	<0.000260	<0.0141	<0.0020 BIU	<0.0050 BIU	0.0370		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00753	0.381	<0.000477	0.137	<0.00249	0.00167 J	0.0360	0.00787	0.399	<0.000477	<0.0458	<0.00249	<0.00132	0.0390		
MW-142	Quarter 1	07/17/2019	N																	
	Quarter 2	10/22/2019	N	0.00430	0.334	0.000429 J	0.805	<0.0020 BIU	0.0188	0.0322	0.00388	0.338	<0.000260	0.0215 J	<0.0020 BIU	0.00524	0.0325			
	Quarter 3	1/16/2020	N																	
	Quarter 4*	6/16/2020	N	0.00376	0.482	<0.000477	<0.0458	<0.00249	0.00633	0.0451	0.00384	0.457	<0.000477	<0.0458	<0.00249	0.00643	0.0467			
Downgradient	MW-143	Quarter 1	07/12/2019	N																
		Quarter 2	10/22/2019	N	0.00364	0.381	0.000744 J	1.55	<0.0020 BIU	0.0257	0.0371	0.00317	0.380	0.000525 J	0.0160 J	<0.000240	0.0177	0.0369		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00327	0.430	<0.000477	<0.0458	<0.00249	0.0140	0.0410	0.00336	0.402	<0.000477	<0.0458	<0.00249	0.0130	0.0401		
		Quarter 1	07/12/2019	N																
		Quarter 2	10/22/2019	N	0.00338	0.870	0.00239	0.419	<0.0020 BIU	0.109	0.0491	0.00336	0.848	0.00248	0.0249 J	<0.0020 BIU	0.107	0.0484		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00339	0.865	0.000864 J	<0.0458	<0.00249	0.0511	0.0468	0.00318	0.839	0.000816 J	<0.0458	<0.00249	0.0432	0.0473		



Table 4 - Summary of Groundwater Analytical Results Screened Using CGWSLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:										Total Metals							Dissolved Metals									
Analyte:				Units:			CGWSL:			CGWSL Source:			Type							Location						



Table 4 - Summary of Groundwater Analytical Results Screened Using CGWSLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:		Total Metals										Dissolved Metals						
		Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium			
Analyte: Units: CGWSL:		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			
		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			
Downgradient	RW-18A																	
		Quarter 1	07/17/2019	N														
		Quarter 2	10/22/2019	N	0.00281	0.675	<0.000260	0.556	<0.0020 BIU	0.00933	0.0583	0.00271	0.648	<0.000260	0.0519 J	<0.0020 BIU	0.00668	0.0566
		Quarter 3	1/16/2020	N														
		Quarter 4*	6/16/2020	N	0.00258	0.542	<0.000477	<0.00458	<0.00249	0.00320 J	0.0527	0.00280	0.506	<0.000477	<0.00458	<0.00249	0.00265 J	0.0565



Table 4 - Summary of Groundwater Analytical Results Screened Using CGWSLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:																		
General Chemistry																		
Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS							
mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L							
--	250	1.6	--	10	--	--	600	--	--	--	1,000							
--	WQCC Dom	WQCC HH	--	EPA MCL	--	--	WQCC Dom	--	--	--	WQCC Dom							
Location	Well	Event	Date	Type														
North RO Field																		
Upgradient	MW-55	Quarter 1	07/17/2019	N	492	498	1.83	364	1.65	1.11	247	2,100	446	<2.71	446	4,680		
		Quarter 2	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	
		Quarter 3	1/16/2020	N	435	562	1.73	311	0.302	1.32	237	1,570	492	<2.71	492	2,820		
			1/16/2020	FD	428	552	1.72	304	0.289	0.961	J	235	1,540	495	<2.71	495	3,480	
		Quarter 4*	6/16/2020	N	411	600	1.66	302	0.0746	J	0.804	J	243	1,340	553	<8.45	553	3,910
		Quarter 1	07/15/2019	N	659	293	1.82	241	15.5	39.6	168	2,430	295	<2.71	295	3,970		
		Quarter 2	10/22/2019	N	639	310	1.44	240	9.29	45.2	170	2,220	311	<2.71	311	3,390		
	MW-140	Quarter 3	1/16/2020	N	637	310	1.79	235	10.3	58.3	172	2,190	304	<2.71	304	3,180		
		6/16/2020	N	624	305	1.66	231	9.65	50.3	180	2,020	331	<8.45	331	3,900			
			6/16/2020	FD	628	305	1.74	227	10.3	49.5	177	2,150	330	<8.45	330	3,500	J	
		Quarter 1	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			
		Quarter 2	10/22/2019	N	632	284	3.02	163	9.71	8.52	69.4	1,690	223	<2.71	223	2,880		
		Quarter 3	1/16/2020	N	597	275	2.35	157	8.54	5.37	58.5	1,570	224	<2.71	224	2,250		
			6/16/2020	N	617	290	2.87	158	7.60	6.06	60.7	1,520	229	<8.45	229	3,260		
In Field	MW-117	Quarter 1	07/17/2019	N	597	284	3.40	268	0.191	6.54	107	2,230	344	<2.71	344	3,740		
		Quarter 2	10/22/2019	N	583	305	3.02	264	0.395	6.81	108	2,260	344	<2.71	344	3,490		
			1/16/2020	N	584	285	3.28	263	0.593	7.34	114	1,990	344	<2.71	344	2,650	J3 J	
		Quarter 4*	6/16/2020	N	584	290	3.41	265	2.37	6.97	131	2,010	365	<8.45	365	3,350	J	
	MW-118	Quarter 1	07/17/2019	N	600	301	6.16	378	1.02	5.31	146	2,860	360	<2.71	360	4,180		
		Quarter 2	10/22/2019	N	585	274	4.39	389	1.80	4.15	167	2,480	365	<2.71	365	4,240		
			1/16/2020	N	585	313	5.75	382	1.90	4.79	160	2,910	354	<2.71	354	3,630		
		Quarter 4*	6/16/2020	N	585	290	5.63	403	2.27	4.01	168	2,630	364	<8.45	364	4,350	J	
	MW-119	Quarter 1	07/17/2019	N	623	443	2.79	288	0.308	1.71	243	2,570	319	<2.71	319	3,980		
		Quarter 2	10/22/2019	N	625	388	2.36	304	0.174	1.39	217	2,330	331	<2.71	331	3,820		
			1/16/2020	N	619	356	2.09	301	0.115	0.964	J	206	2,440	334	<2.71	334	3,860	
		Quarter 4*	6/16/2020	N	636	341	1.70	350	0.184	0.781	J	206	2,590	356	<8.45	356	3,940	J
	Downgradient	MW-142	Quarter 1	07/12/2019	N	633	380	2.22	311	0.159	1.74	195	2,610	334	<2.71	334	4,580	
			Quarter 2	10/22/2019	N	645	369	1.87	304	0.0910	J	188	2,280	343	<2.71	343	4,000	
				1/16/2020	N	629	363	2.07	301	0.0950	J	183	2,350	338	<2.71	338	4,090	
			Quarter 4*	6/16/2020	N	642	360	2.25	332	0.108	1.16	J	189	2,430	356	<8.45	356	4,020
MW-143		Quarter 1	07/12/2019	N	583	264	1.54	430	0.0980	J	233	3,170	328	<2.71	328	4,870		
		Quarter 2	10/22/2019	N	550	296	1.2	446	0.127	1.22	B	220	2,970	333	<2.71	333	4,500	
			1/16/2020	N	525	263	1.71	422	0.056	J	209	2,830	329	<2.71	329	4,070		
		Quarter 4*	6/16/2020	N	536	278	1.82	443	<0.0500	J	0.936	J	214	2,770	348	<8.45	348	4,100



Table 4 - Summary of Groundwater Analytical Results Screened Using CGWSLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:					General Chemistry											
Location	Well	Event	Date	Type	Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS
Upgradient	MW-29	Quarter 1	07/17/2019	N	578	383	2.00	446	<0.985	2.48	384	3,300	503	<2.71	503	4,820
		Quarter 2	10/22/2019	N	527	354	1.84	345	<0.0197	2.43	376	2,480	577	<2.71	577	3,910
		Quarter 3	1/16/2020	N	416 O1V	344	1.86	298 O1V	0.021 JP1	2.46	358 O1V	2,010	542	<2.71	542	3,330
		Quarter 4*	6/16/2020	N	375	395	1.70	285	<0.0500	2.10	361	1,700	564	<8.45	564	3,980
	MW-40	Quarter 4*	6/16/2020	FD	379	397	1.74	292	<0.0500	1.95 J	369	1,780	563	<8.45	563	3,360 J
		Quarter 1	07/17/2019	N	588	87.7	1.93	205	<1.97	2.54	104	1,730	309	<2.71	309	2,580
		Quarter 2	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
		Quarter 3	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	Quarter 3	1/16/2020	N	380	94.1 J	3.38 J	196	<0.0394 UJ	1.81	95.4	1,770	320	<2.71	320	2,370
		Quarter 4*	1/16/2020	FD	376	83.8	1.85	192	0.658 J	1.60	95.3	1,540	325	<2.71	325	2,620
		Quarter 4*	6/16/2020	N	365	91.2	1.56	190	< 0.0500	1.59 J	93.9	1,410	376	< 8.45	376	2,500
		Quarter 1	07/17/2019	N	525	273	1.20	268	<0.0197	2.21	184	2,180	375	<2.71	375	3,430
	MW-114	Quarter 2	10/22/2019	N	508	286	1.1	261	<0.0197	2.07	155	1,890	363	<2.71	363	3,120
		Quarter 3	1/16/2020	N	493	256	1.2	248	<0.0197	2.40	150	1,840	343	<2.71	343	2,850
		Quarter 4*	6/16/2020	N	504	209	1.11	254	< 0.0500	1.91	153	1,840	351	<8.45	351	3,040
		Quarter 1	07/17/2019	N	604	219	2.10	239	0.375	3.08	137	2,320	377	<2.71	377	3,000
	MW-115	Quarter 2	10/22/2019	N	611	252	1.50	234	0.613	2.83	136	2,170	376	<2.71	376	3,650
Quarter 3		1/16/2020	N	606	239	2.15	225	0.785	3.25	133	1,980	370	<2.71	370	2,710	
Quarter 4*		6/16/2020	N	587	241	2.27	211	0.471	2.64	128	1,780	407	<8.45	407	2,920	
Quarter 1		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	Quarter 2	10/22/2019	N	444	270	2.04	405	0.145	0.608 BJ	195	2,390	417	<2.71	417	3,870	
	Quarter 3	1/16/2020	N	437	286	2.12	411	0.793	0.812 J	191	2,250	406	<2.71	406	3,670	
	Quarter 4*	6/16/2020	N	476	392	2.16	429	3.78	0.681 J	181	2,260	432	<8.45	432	4,740	
	Quarter 1	07/17/2019	N	576	265	2.01	289	0.371	2.10	189	2,550	341	<2.71	341	3,700	
MW-125	Quarter 2	07/17/2019	FD	570	266	2.00	289	0.35	2.01	189	2,570	346	<2.71	346	3,490	
	Quarter 2	10/22/2019	N	567	309	1.99	282	0.403	1.71	187	2,380	336	<2.71	336	3,490	
	Quarter 3	1/16/2020	N	550	278	1.89	273	0.409	1.53	180	2,270	332	<2.71	332	3,570	
	Quarter 4*	6/16/2020	N	572	321	1.75	297	0.528	1.29 J	188	2,140	341	<8.45	341	4,020 J	
MW-144	Quarter 1	07/17/2019	N	557	298	1.26	392	0.587	1.67	231	2,750	407	<2.71	407	4,380	
	Quarter 2	10/22/2019	N	553	327	1.08	390	0.544	1.47	229	2,810	406	<2.71	406	3,920	
	Quarter 3	1/16/2020	N	545	291	1.24	381	0.388	1.89	226	2,560	398	<2.71	398	4,200	
	Quarter 4*	6/16/2020	N	545	278	1.12	392	0.215	1.49 J	231	2,500	421	<8.45	421	4,080 J	
Downgradient	MW-144	Quarter 1	07/11/2019	N	787	222	2.57	220	0.290	2.36	137	2,360	344	<2.71	344	3,740
		Quarter 2	10/22/2019	N	687	274	2.36	235	0.201	1.71	143	2,530	313	<2.71	313	3,330
		Quarter 3	1/16/2020	N	648	245	2.47	225	0.26	1.63	139	2,300	309	<2.71	309	3,930
		Quarter 4*	6/16/2020	N	647	257	2.64	238	0.401 J	1.36 J	142	2,120	324	<8.45	324	3,500 J



Table 4 - Summary of Groundwater Analytical Results Screened Using CGWSLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:		General Chemistry															
Location	Well	Event	Date	Type	Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS	
Downgradient	RW-18A	Quarter 1	07/17/2019	N	521	247	2.10	375	0.256	0.884	J	126	293	<2.71	293	4,150	
		Quarter 2	10/22/2019	N	525	235	2.07	384	0.258	<1.00	BJU	124	298	<2.71	298	3,740	
		Quarter 3	1/16/2020	N	503	214	2.18	379	0.228	0.854	J	119	290	<2.71	290	3,830	
		Quarter 4*	6/16/2020	N	525	228	2.13	369	0.549	0.900	J	136	325	<8.45	325	3,660	J
CGWSL Source:																	

		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 Source	CGWSL	Critical Groundwater Screening Level										
	EPA	Critical Groundwater Screening Level Source										
	EPA MCL	United States Environmental Protection Agency										
	FD	EPA Maximum Contaminant Level										
mg/L	mg/L	Field Duplicate										
	N	milligrams per Liter										
NMAC	NMAC	Normal										
	WQCC	New Mexico Administrative Code										
WQCC Dom	WQCC	New Mexico Water Quality Control Commission										
	WQCC Dom	Groundwater standard for domestic exposure from 20.6.2.3 103.B NMAC										
WQCC HH	WQCC HH	Groundwater standard for human health exposure from 20.6.2.3 103.A NMAC										
	WQCC Irr	Groundwater standard for irrigation use from 20.6.2.3 103.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										
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.										
J3		The associated batch QC was outside the established quality control range for precision.										
		Data Validation Qualifier										
U		Result qualified as not detected at the reporting limit. See data validation report for more detail.										



Table 5 - Summary of Upgradient Groundwater Statistical Evaluation
Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Parameter	Dataset			Regulatory Standards			Upper Tolerance Limits ^c	Recommended Revised CGWSL ^d
	Number of Samples ^a	Number of Detections	Detection Rate (%)	Concentration Range (mg/L)	WQCC	MCL		
Metals								
Arsenic-Dissolved	66	63	95%	0.00055 - 0.0029	0.01	0.01	0.00258	0.01
Boron-Dissolved	66	66	100%	0.0341 - 1.21	0.75	-	1.60	1.60
Cobalt-Dissolved	66	16	24%	0.00026 - 0.0026	0.05	-	--	0.05
Iron-Dissolved	66	15	23%	0.0173 - 0.1	1	0.3	--	1
Lead-Dissolved	66	5	8%	0.000301 - 0.0035	0.015	0.015	--	0.015
Manganese-Dissolved	66	56	85%	0.00028 - 0.23	0.2	0.05	0.17	0.200
Uranium-Dissolved	66	65	98%	0.039 - 0.01	0.03	-	0.037	0.037
Water Quality Parameters								
Calcium	66	66	100%	0.0873 - 810	-	-	661	-
Chloride	66	66	100%	24 - 704	250	250	139	250
Fluoride	66	66	100%	0.5 - 22.6	1.6	4	1.71	1.71
Nitrate-Nitrite	66	64	97%	0.326 - 20.6	10	10	17.0	17
Potassium	66	65	98%	1.07 - 3.4	-	-	3.30	-
Sodium	66	66	100%	0.305 - 264	-	-	251	-
Sulfate	66	65	98%	924 - 3,400	600	250	2,900	2,900
TDS	66	66	100%	1,810 - 6,310	1,000	500	4,400	4,400

Notes

- ^a Data set used includes monitoring data from wells UG-1, UG-2, UG-3R, and UG-4 from 2014 through first half 2020. Outliers, including obvious laboratory errors and outliers identified by ProUCL, were excluded.
- ^b CGWSL selected from WQCC, if available. If no WQCC standard has been defined, then DWS is used.
- ^c Upper Tolerance Limits calculated using ProUCL 5.1, excluding statistical outliers.
- ^d Recommended Revised CGWSL incorporating upgradient groundwater statistical evaluation.
- Green shading indicates recommended screening level based on elevated upgradient groundwater concentrations
- = No standard available
- = No statistical evaluation performed, greater than 50% of the samples were not detected.

Definitions

CGWSL = Critical Groundwater Screening Level
MCL = USEPA Primary or Secondary Maximum Contaminant Level
mg/L = milligrams per Liter
NMAC = New Mexico Administrative Code
USEPA = United States Environmental Protection Agency
WQCC = New Mexico Water Quality Control Commission standards from NMAC 20.6.2.3103



Table 6 - Summary of Groundwater Analytical Results Screened Using CGWSLs and UTLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:					Total Metals								Dissolved Metals							
Analyte: Units: CGWSL: Source:					Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium		
Location	Well	Event	Date	Type	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		
North RO Field																				
Upgradient	MW-55	Quarter 1	07/17/2019	N																
		Quarter 2	10/22/2019	N	0.00615	1.07	<0.000260	0.0207 J	<0.00200 BJU	0.132	0.0513	0.00595	1.00	<0.000260	<0.0141	<0.00200 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	<0.00200 BJU	0.128	0.0528		
		Quarter 3	1/16/2020	N																
			1/16/2020	FD																
		Quarter 4*	6/16/2020	N	0.00608	0.992	<0.000477	<0.0458	<0.00249	0.142	0.0548	0.00663	0.951	<0.000477	<0.0458	<0.00249	0.148	0.0549		
	MW-140	Quarter 1	07/15/2019	N																
		Quarter 2	10/22/2019	N	0.00241	0.412	<0.000260	0.224	<0.00200 BJU	0.102	0.0318	0.00247	0.395	<0.000260	<0.0141	<0.00200 BJU	0.0975	0.0325		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00262	0.468	<0.000477	<0.0458	<0.00249	0.0636	0.0359	0.00265	0.445	<0.000477	<0.0458	<0.00249	0.00615	0.0348		
			6/16/2020	FD	0.00252	0.460	<0.000477	<0.0458	<0.00249	0.0678	0.0323	0.00273	0.442	<0.000477	<0.0458	<0.00249	0.0564	0.0336		
		MW-141	Quarter 1	07/15/2019	N															
	07/15/2019		FD																	
Quarter 2	10/22/2019		N	0.00389	0.215	0.000333 J	0.132	<0.00200 BJU	0.00939	0.0280	0.00360	0.218	0.000308 J	0.0159 J	<0.000240	0.00925	0.0288			
Quarter 3	1/16/2020		N																	
Quarter 4*	6/16/2020		N	0.00310 BJ	0.196 J	<0.000477	<0.0458	<0.00249	0.00205 J	0.0244	0.00297	0.200 J	<0.000477	<0.0458	<0.00249	0.00132 J	0.0259			
Quarter 1	07/17/2019		N																	
In Field	MW-117	Quarter 2	10/22/2019	N	0.0025	0.145 J	<0.000260	0.0611 J	<0.000240	<0.00500 BJU	0.0176	0.00243	0.147 J	<0.000260	0.0195 J	<0.000240	<0.00500 BJU	0.0172		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00248	0.143 J	<0.000477	0.261	<0.00249	0.00392 J	0.0152 J	0.00246	0.131 J	<0.000477	<0.0458	<0.00249	0.00158 J	0.0160 J		
		Quarter 1	07/17/2019	N																
		Quarter 2	10/22/2019	N	0.00871	0.352	<0.000260	0.127	<0.000240	<0.00500 BJU	0.0371	0.00863	0.366	<0.000260	<0.0141	<0.00200 BJU	<0.00500 BJU	0.0370		
		Quarter 3	1/16/2020	N																
	MW-118	Quarter 4*	6/16/2020	N	0.00753	0.381	<0.000477	0.137	<0.00249	0.00167 J	0.0360	0.00787	0.399	<0.000477	<0.0458	<0.00249	<0.00132	0.0390		
		Quarter 1	07/17/2019	N																
		Quarter 2	10/22/2019	N	0.00430	0.334	0.000429 J	0.805	<0.00200 BJU	0.0188	0.0322	0.00388	0.338	<0.000260	0.0215 J	<0.00200 BJU	0.00524	0.0325		
		Quarter 3	1/16/2020	N																
		Quarter 4*	6/16/2020	N	0.00376	0.482	<0.000477	<0.0458	<0.00249	0.00633	0.0451	0.00384	0.457	<0.000477	<0.0458	<0.00249	0.00643	0.0467		
		Quarter 1	07/12/2019	N																
MW-119	Quarter 2	10/22/2019	N	0.00364	0.381	0.000744 J	1.55	<0.00200 BJU	0.0257	0.0371	0.00317	0.380	0.000525 J	0.0160 J	<0.000240	0.0177	0.0369			
	Quarter 3	1/16/2020	N																	
	Quarter 4*	6/16/2020	N	0.00327	0.430	<0.000477	<0.0458	<0.00249	0.0140	0.0410	0.00336	0.402	<0.000477	<0.0458	<0.00249	0.0130	0.0401			
	Quarter 1	07/12/2019	N																	
	Quarter 2	10/22/2019	N	0.00338	0.870	0.00239	0.419	<0.00200 BJU	0.109	0.0491	0.00336	0.848	0.00248	0.0249 J	<0.00200 BJU	0.107	0.0484			
	Quarter 3	1/16/2020	N																	
Downgradient	MW-143	Quarter 4*	6/16/2020	N	0.00339	0.865	0.000864 J	<0.0458	<0.00249	0.0511	0.0468	0.00318	0.839	0.000816 J	<0.0458	<0.00249	0.0432	0.0473		



Table 6 - Summary of Groundwater Analytical Results Screened Using CGWSLs and UTLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:										Total Metals										Dissolved Metals									
Location	Well	Event	Date	Type	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium		Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium			
South RO Field	Upgradient	Quarter 1	07/17/2019	N																									
		Quarter 2	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	<0.00200 BIU	0.574 V												0.0189
		Quarter 3	1/16/2020	N																									
		Quarter 4*	6/16/2020	N	0.00746	1.10	<0.000477	<0.0458	<0.00249	0.234	0.00789 J	0.00674	1.10	<0.000477	<0.0458	<0.00249	0.229		0.00811 J										
			6/16/2020	FD	0.00772	1.12	<0.000477	0.0704 J	<0.00249	0.223	<0.00754	0.00735	1.06	<0.000477	<0.0458	<0.00249	0.214		0.00779 J										
	MW-40	Quarter 1	07/17/2019	N																									
		Quarter 2	10/22/2019	N	0.00106 J	0.311	<0.000260	0.270 J	<0.00200 BIU	0.0233	0.000622 J	0.000851 J	0.292	<0.000260	0.0179 J	<0.00200 BIU	0.0238		0.000544 J										
			10/22/2019	FD	0.000878 J	0.300	<0.000260	0.135 J	<0.00200 BIU	0.0239	0.000602 J	0.000829 J	0.305	<0.000260	0.0236 J	<0.00200 BIU	0.0243		0.000538 J										
		Quarter 3	1/16/2020	N																									
		Quarter 4*	6/16/2020	N																									
			1/16/2020	FD																									
	MW-56	Quarter 4*	6/16/2020	N	<0.000735	0.315	<0.000477	0.145	<0.00249	0.0255	<0.00754	<0.000735	0.308	<0.000477	<0.0458	<0.00249	0.0266		<0.00754										<0.00754
		Quarter 1	07/17/2019	N																									
		Quarter 2	10/22/2019	N	0.00515	0.284	0.00698	<0.0141	<0.00200 BIU	0.306	0.0178	0.00524	0.269	0.00699	<0.0141	<0.00200 BIU	0.304		0.0173										
		Quarter 3	1/16/2020	N																									
In Field	MW-114	Quarter 4*	6/16/2020	N	0.00552	0.253	0.00786	<0.0458	<0.00249	0.302	0.0172 J	0.00521	0.259	0.00813	<0.0458	<0.00249	0.295		0.0175 J										
		Quarter 1	07/17/2019	N																									
		Quarter 2	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	<0.00200 BIU	0.972		0.0108										
		Quarter 3	1/16/2020	N																									
		Quarter 4*	6/16/2020	N	0.00353	0.121 J	0.00618	<0.0458	<0.00249	0.959	0.00950 J	0.00364	0.109 J	0.00583	<0.0458	<0.00249	0.927		0.00917 J										
		Quarter 1	07/17/2019	N																									
	MW-115	Quarter 2	10/22/2019	N	0.00443	0.780	0.00109 J	0.286	<0.00200 BIU	0.155	0.0793	0.00405	0.767	0.000362 J	<0.0141	<0.00200 BIU	0.120		0.0825										
		Quarter 3	1/16/2020	N																									
		Quarter 4*	6/16/2020	N	0.00400	0.520	<0.000477	<0.0458	<0.00249	0.125	0.0953	0.00430	0.564	<0.000477	<0.0458	<0.00249	0.109		0.0947										
		Quarter 1	07/17/2019	N																									
	MW-116	Quarter 1	07/17/2019	N																									
			07/17/2019	FD																									
		Quarter 2	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										
		Quarter 3	1/16/2020	N																									
	MW-125	Quarter 4*	6/16/2020	N	0.00292	0.227	0.00240	0.0746 J	<0.00249	0.0128	0.0273	0.00290	0.220	0.00254	<0.0458	<0.00249	0.00781		0.0287										
		Quarter 1	07/17/2019	N																									
		Quarter 2	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										
		Quarter 3	1/16/2020	N																									
	MW-144	Quarter 4*	6/16/2020	N	0.00357	0.519	0.00760	<0.0458	<0.00249	0.413	0.0351	0.00342	0.498	0.00557	<0.0458	<0.00249	0.389		0.0365										
		Quarter 1	07/11/2019	N																									
		Quarter 2	10/22/2019	N	0.00338	0.216	0.000788 J	0.468	<0.00200 BIU	0.0365	0.0180	0.00320	0.211	0.000698 J	<0.0141	<0.00200 BIU	0.0272		0.0185										
		Quarter 3	1/16/2020	N																									
		Quarter 4*	6/16/2020	N	0.00361	0.237	0.000816 J	<0.0458	<0.00249	0.0216	0.0168 J	0.00375	0.224	0.000874 J	<0.0458	<0.00249	0.0170		0.0187 J										



Table 6 - Summary of Groundwater Analytical Results Screened Using CGWSLs and UTLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:			Total Metals								Dissolved Metals						
Location	Well	Date	Event	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium	Arsenic	Boron	Cobalt	Iron	Lead	Manganese	Uranium
Downgradient	RW-18A	07/17/2019	Quarter 1	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
		10/22/2019	Quarter 2	0.01	1.6	0.05	1.0	0.015	0.2	0.037	0.01	1.6	0.05	1.0	0.015	0.2	0.037
		1/16/2020	Quarter 3	WQCC HH	UTL	WQCC Irr	WQCC Dom	WQCC HH	WQCC Dom	UTL	WQCC HH	WQCC Dom	WQCC Dom	WQCC HH	WQCC Dom	WQCC Dom	UTL
		6/16/2020	Quarter 4*	0.00258	0.542	<0.000477	<0.00458	<0.00249	0.00320	0.0527	0.0028	0.506	<0.000477	<0.00458	<0.00249	0.00265	0.0565



Table 6 - Summary of Groundwater Analytical Results Screened Using CGWSLs and UTLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:										General Chemistry													
Analyte:	Units:	CGWSL:	CGWSL Source:	Location	Well	Event	Date	Type	Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS			
				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	mg/L	mg/L	mg/L	mg/L	mg/L	
				--	250	1.71	--	17	--	--	2,900	--	--	--	--	--	--	--	--	--	--	--	4,400
				--	WQCC Dom	UTL	--	UTL	--	--	UTL	--	--	--	UTL	--	--	--	UTL	--	--	--	UTL
North RO Field																							
Upgradient	MW-55	Quarter 1	07/17/2019	N	492	498	1.83	364	1.65	1.11	247	2,100	446	<2.71	446					4,680			
		Quarter 2	10/22/2019	N	418	514	1.53	312	0.469	<1.00	BJU	237	1,570	489	<2.71	489					3,390		
		Quarter 3	10/22/2019	FD	413	523	1.67	305	0.453	<1.00	BJU	235	1,590	496	<2.71	496					3,350		
		Quarter 4*	1/16/2020	N	435	562	1.73	311	0.302	1.32	237	1,570	492	<2.71	492					2,820			
		Quarter 1	1/16/2020	FD	428	552	1.72	304	0.289	0.961	J	235	1,540	495	<2.71	495					3,480		
		Quarter 2	6/16/2020	N	411	600	1.66	302	0.0746	J	243	1,340	553	<8.45	553						3,910		
		Quarter 3	07/15/2019	N	659	293	1.82	241	15.5	39.6	168	2,430	295	<2.71	295						3,970		
		Quarter 4*	10/22/2019	N	639	310	1.44	240	9.29	45.2	170	2,220	311	<2.71	311						3,390		
		Quarter 1	1/16/2020	N	637	310	1.79	235	10.3	58.3	172	2,190	304	<2.71	304						3,180		
		Quarter 2	6/16/2020	N	624	305	1.66	231	9.65	50.3	180	2,020	331	<8.45	331						3,900		
		Quarter 3	6/16/2020	FD	628	305	1.74	227	10.3	49.5	177	2,150	330	<8.45	330						3,500 J		
		Quarter 4*	07/15/2019	N	593	288	1.95	168	9.36	4.27	57.5	1,770	229	<2.71	229						2,660		
In Field	MW-141	Quarter 1	07/15/2019	FD	607	285	1.83	171	9.53	4.20	57.7	1,680	227	<2.71	227						2,900		
		Quarter 2	10/22/2019	N	632	284	3.02	163	9.71	8.52	69.4	1,690	223	<2.71	223						2,880		
		Quarter 3	1/16/2020	N	597	275	2.35	157	8.54	5.37	58.5	1,570	224	<2.71	224						2,250		
		Quarter 4*	6/16/2020	N	617	290	2.87	158	7.60	6.06	60.7	1,520	229	<8.45	229						3,260		
		Quarter 1	07/17/2019	N	597	284	3.40	268	0.191	6.54	107	2,230	344	<2.71	344						3,740		
		Quarter 2	10/22/2019	N	583	305	3.02	264	0.395	6.81	108	2,260	344	<2.71	344						3,490		
		Quarter 3	1/16/2020	N	584	285	3.28	263	0.593	7.34	114	1,990	344	<2.71	344						2,650 J3 J		
		Quarter 4*	6/16/2020	N	584	290	3.41	265	2.37	6.97	131	2,010	365	<8.45	365						3,350 J		
		Quarter 1	07/17/2019	N	600	301	6.16	378	1.02	5.31	146	2,860	360	<2.71	360						4,180		
		Quarter 2	10/22/2019	N	585	274	4.39	389	1.80	4.15	167	2,480	365	<2.71	365						4,240		
		Quarter 3	1/16/2020	N	585	313	5.75 J	382	1.90	4.79	160	2,910	354	<2.71	354						3,630		
		Quarter 4*	6/16/2020	N	585	290	5.63	403	2.27	4.01	168	2,630	364	<8.45	364						4,350 J		
Downgradient	MW-119	Quarter 1	07/17/2019	N	623	443	2.79	288	0.308	1.71	243	2,570	319	<2.71	319						3,980		
		Quarter 2	10/22/2019	N	625	388	2.36	304	0.174	1.39	217	2,330	331	<2.71	331						3,820		
		Quarter 3	1/16/2020	N	619	356	2.09	301	0.115	0.964	J	206	2,440	334	<2.71	334					3,860		
		Quarter 4*	6/16/2020	N	636	341	1.70	350	0.184	0.781	J	206	2,590	356	<8.45	356					3,940 J		
		Quarter 1	07/12/2019	N	633	380	2.22	311	0.159	1.74	195	2,610	334	<2.71	334						4,580		
		Quarter 2	10/22/2019	N	645	369	1.87	304	0.0910	1.84	188	2,280	343	<2.71	343						4,000		
		Quarter 3	1/16/2020	N	629	363	2.07	301	0.0950	1.46	183	2,350	338	<2.71	338						4,090		
		Quarter 4*	6/16/2020	N	642	360	2.25	332	0.108	1.16	189	2,430	356	<8.45	356						4,020 J		
		Quarter 1	07/12/2019	N	583	264	1.54	430	0.0980	1.78	233	3,170	328	<2.71	328						4,870		
		Quarter 2	10/22/2019	N	550	296	1.20	446	0.127	1.22	B	2,970	333	<2.71	333						4,500		
		Quarter 3	1/16/2020	N	525	263	1.71	422	0.0560	1.19	209	2,830	329	<2.71	329						4,070		
		Quarter 4*	6/16/2020	N	536	278	1.82	443	<0.0500	0.936	J	214	2,770	348	<8.45	348					4,100 J		



Table 6 - Summary of Groundwater Analytical Results Screened Using CGWSLs and UTLs

Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:					General Chemistry												
Location	Well	Event	Date	Type	Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Total Alkalinity	TDS	
Upgradient	MW-29	Quarter 1	07/17/2019	N	578	383	2.00	446	<0.985	2.48	384	3,300	503	<2.71	503	4,820	
		Quarter 2	10/22/2019	N	527	354	1.84	345	<0.0197	2.43	376	2,480	577	<2.71	577	3,910	
		Quarter 3	1/16/2020	N	416	O1V	1.86	298	O1V	2.46	358	O1V	2,010	542	<2.71	542	3,330
		Quarter 4*	6/16/2020	N	375	395	1.70	285	<0.0500	2.10	361	1,700	564	<8.45	564	3,980	
	MW-40	Quarter 4*	6/16/2020	FD	379	397	1.74	292	<0.0500	1.95	J	369	1,780	563	<8.45	563	3,360 J
		Quarter 1	07/17/2019	N	588	87.7	1.93	205	<1.97	2.54	104	1,730	309	<2.71	309	2,580	
		Quarter 2	10/22/2019	N	435	V	2.18	198	V	2.11	98.7	V	1,570	299	<2.71	299	2,610
		Quarter 2	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	Quarter 3	1/16/2020	N	380	94.1	J	196	<0.0394	1.81	95.4	1,770	320	<2.71	320	2,370	
		Quarter 3	1/16/2020	FD	376	83.8	1.85	192	0.658	J	95.3	1,540	325	<2.71	325	2,620	
		Quarter 4*	6/16/2020	N	365	91.2	1.56	190	<0.0500	1.59	J	93.9	1,410	376	<8.45	376	2,500
		Quarter 1	07/17/2019	N	525	273	1.20	268	<0.0197	2.21	184	2,180	375	<2.71	375	3,430	
		Quarter 2	10/22/2019	N	508	286	1.10	261	<0.0197	2.07	155	1,890	363	<2.71	363	3,120	
		Quarter 3	1/16/2020	N	493	256	1.20	248	<0.0197	2.40	150	1,840	343	<2.71	343	2,850	
		Quarter 4*	6/16/2020	N	504	209	1.11	254	<0.0500	1.91	153	1,840	351	<8.45	351	3,040	
		Quarter 1	07/17/2019	N	604	219	2.10	239	0.375	3.08	137	2,320	377	<2.71	377	3,000	
In Field	MW-114	Quarter 2	10/22/2019	N	611	252	1.50	234	0.613	2.83	136	2,170	376	<2.71	376	3,650	
		Quarter 3	1/16/2020	N	606	239	2.15	225	0.785	3.25	133	1,980	370	<2.71	370	2,710	
		Quarter 4*	6/16/2020	N	587	241	2.27	211	0.471	2.64	128	1,780	407	<8.45	407	2,920	
		Quarter 1	07/17/2019	N	477	254	2.33	451	<0.0197	0.765	J	217	2,940	410	<2.71	410	4,510
	MW-115	Quarter 2	10/22/2019	N	444	270	2.04	405	0.145	0.608	BJ	195	2,390	417	<2.71	417	3,870
		Quarter 3	1/16/2020	N	437	286	2.12	411	0.793	0.812	J	191	2,250	406	<2.71	406	3,670
		Quarter 4*	6/16/2020	N	476	392	2.16	429	3.78	0.681	J	181	2,260	432	<8.45	432	4,740
		Quarter 1	07/17/2019	N	576	265	2.01	289	0.371	2.10	189	2,550	341	<2.71	341	3,700	
	MW-116	Quarter 2	10/22/2019	FD	570	266	2.00	289	0.350	2.01	189	2,570	346	<2.71	346	3,490	
		Quarter 3	1/16/2020	N	567	309	1.99	282	0.403	1.71	187	2,380	336	<2.71	336	3,490	
		Quarter 4*	6/16/2020	N	550	278	1.89	273	0.409	1.53	180	2,270	332	<2.71	332	3,570	
		Quarter 1	07/16/2020	N	572	321	1.75	297	0.528	1.29	J	188	2,140	341	<8.45	341	4,020 J
Downgradient	MW-125	Quarter 1	07/17/2019	N	557	298	1.26	392	0.587	1.67	231	2,750	407	<2.71	407	4,380	
		Quarter 2	10/22/2019	N	553	327	1.08	390	0.544	1.47	229	2,810	406	<2.71	406	3,920	
		Quarter 3	1/16/2020	N	545	291	1.24	381	0.388	1.89	226	2,560	398	<2.71	398	4,200	
		Quarter 4*	6/16/2020	N	545	278	1.12	392	0.215	1.49	J	231	2,500	421	<8.45	421	4,080 J
	MW-144	Quarter 1	07/11/2019	N	787	222	2.57	220	0.290	2.36	137	2,360	344	<2.71	344	3,740	
		Quarter 2	10/22/2019	N	687	274	2.36	235	0.201	1.71	143	2,530	313	<2.71	313	3,330	
		Quarter 3	1/16/2020	N	648	245	2.47	225	0.260	1.63	139	2,300	309	<2.71	309	3,930	
		Quarter 4*	6/16/2020	N	647	257	2.64	238	0.401	J	142	2,120	324	<8.45	324	3,500 J	



Table 6 - Summary of Groundwater Analytical Results Screened Using CGWSLs and UTLs

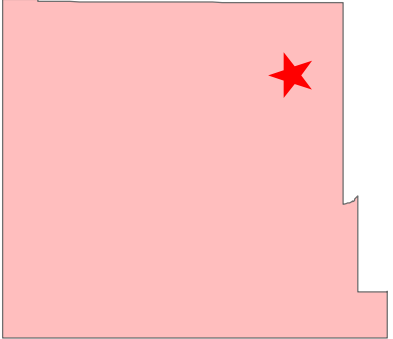
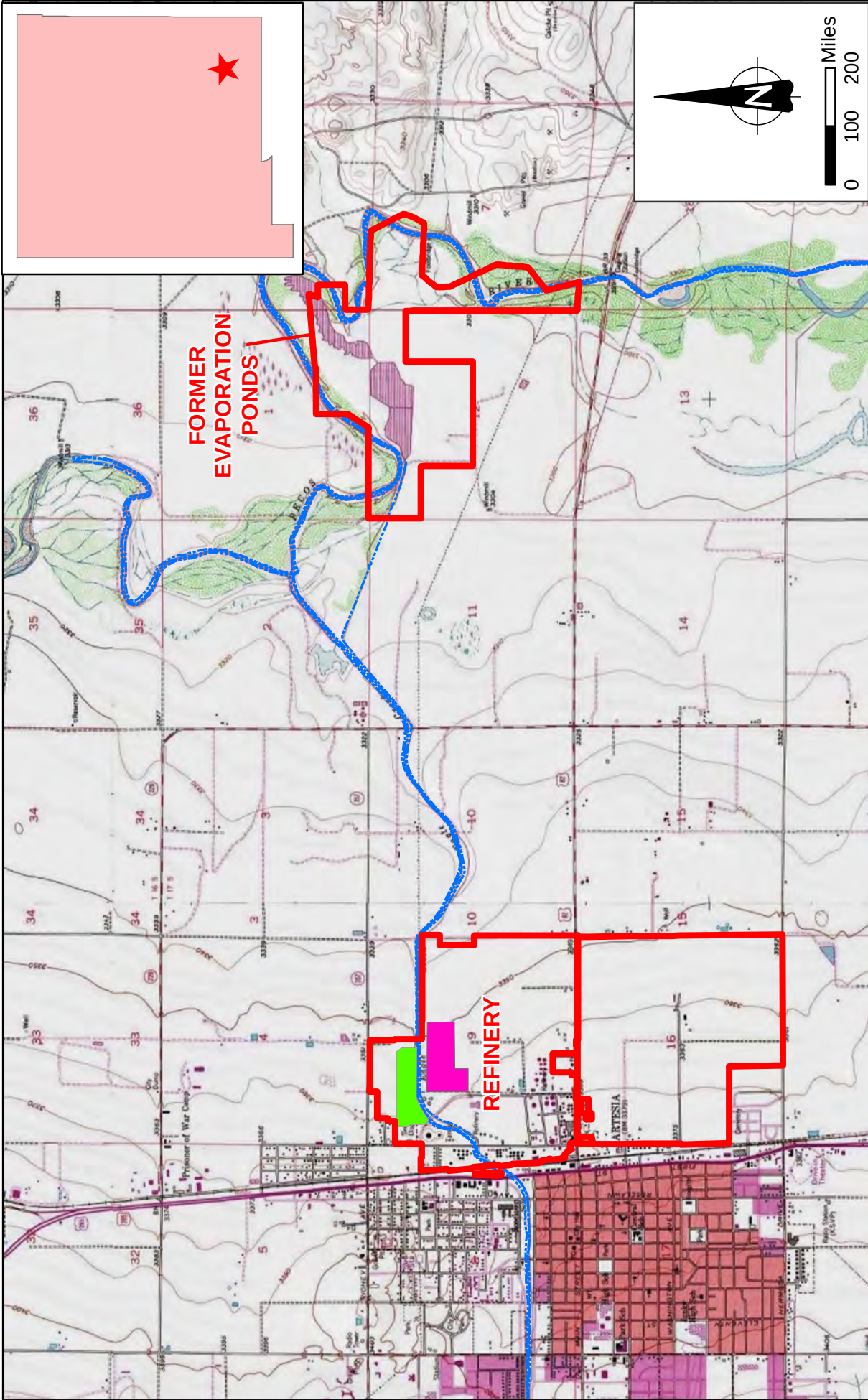
Reverse Osmosis Reject Discharge Fields Stage 1 Abatement

HollyFrontier Navajo Refining LLC, Artesia, NM

Analyte Group:					General Chemistry											
Location	Well	Event	Date	Type	Calcium mg/L	Chloride mg/L	Fluoride mg/L	Magnesium mg/L	Nitrate/Nitrite mg/L	Potassium mg/L	Sodium mg/L	Sulfate mg/L	Alkalinity - Bicarbonate mg/L	Alkalinity - Carbonate mg/L	Total Alkalinity mg/L	TDS mg/L
Downgradient	RW-18A	Quarter 1	07/17/2019	N	521	247	2.10	375	0.256	0.884 J	126	3,090	293	<2.71	293	4,150
		Quarter 2	10/22/2019	N	525	235	2.07	384	0.258	<1.00 BJU	124	2,750	298	<2.71	298	3,740
		Quarter 3	1/16/2020	N	503	214	2.18	379	0.228	0.854 J	119	2,660	290	<2.71	290	3,830
		Quarter 4*	6/16/2020	N	525	228	2.13	369	0.549	0.900 J	136	2,320	325	<8.45	325	3,660 J



FIGURES (1 through 5)

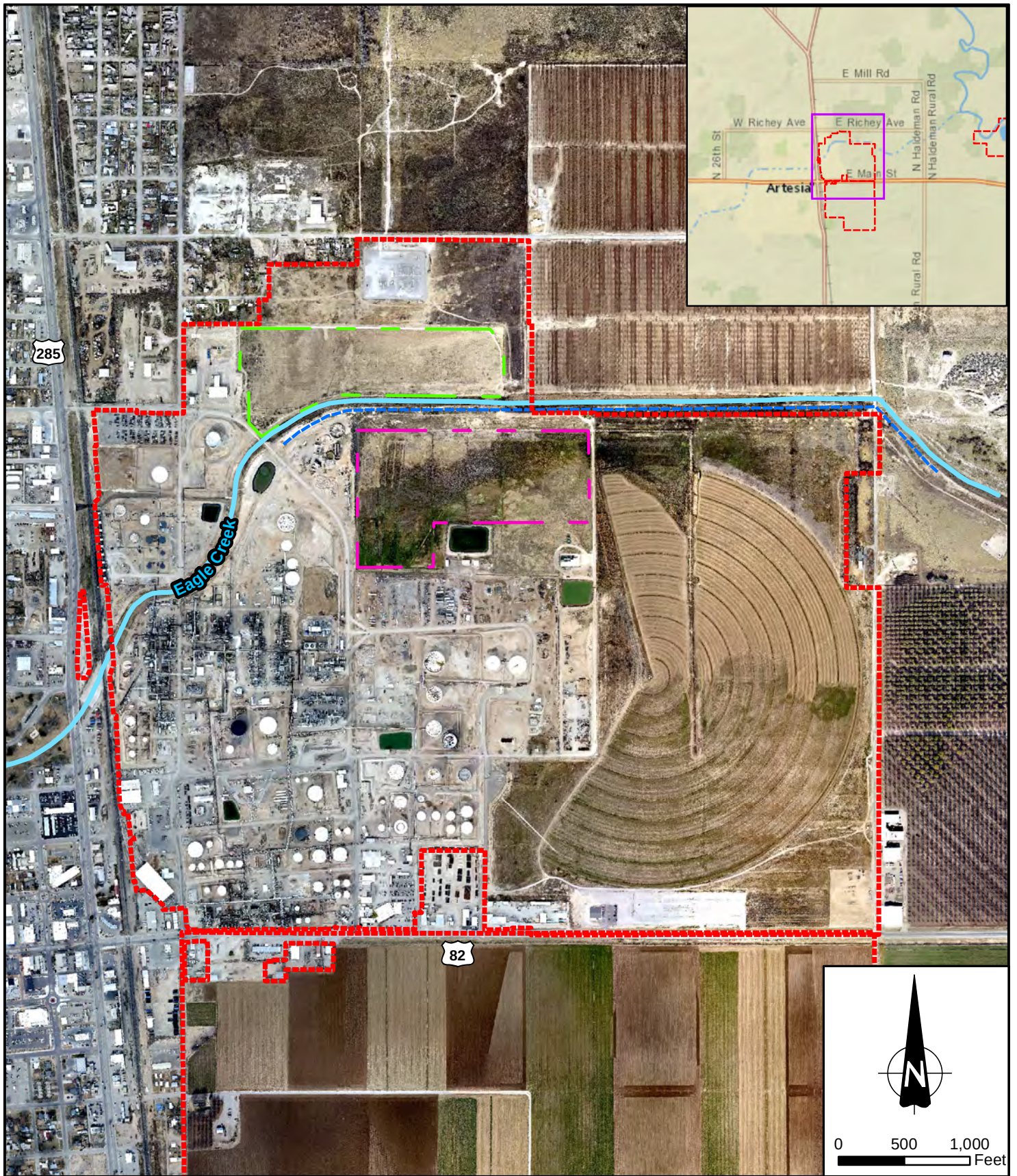


DATE	NOVEMBER 2020
SCALE	1" = 3,500'
PROJECT NO.	6703180022
FIGURE	1

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

Legend Navajo_Property_Boundary_2019 North RO Reject Field South RO Reject Field Water Way Site Location	
---	--

 HOLLYFRONTIER	
---	---



Legend

- Property Boundary
- North RO Reject Field
- South RO Reject Field
- Three-Mile Ditch
- Eagle Creek

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

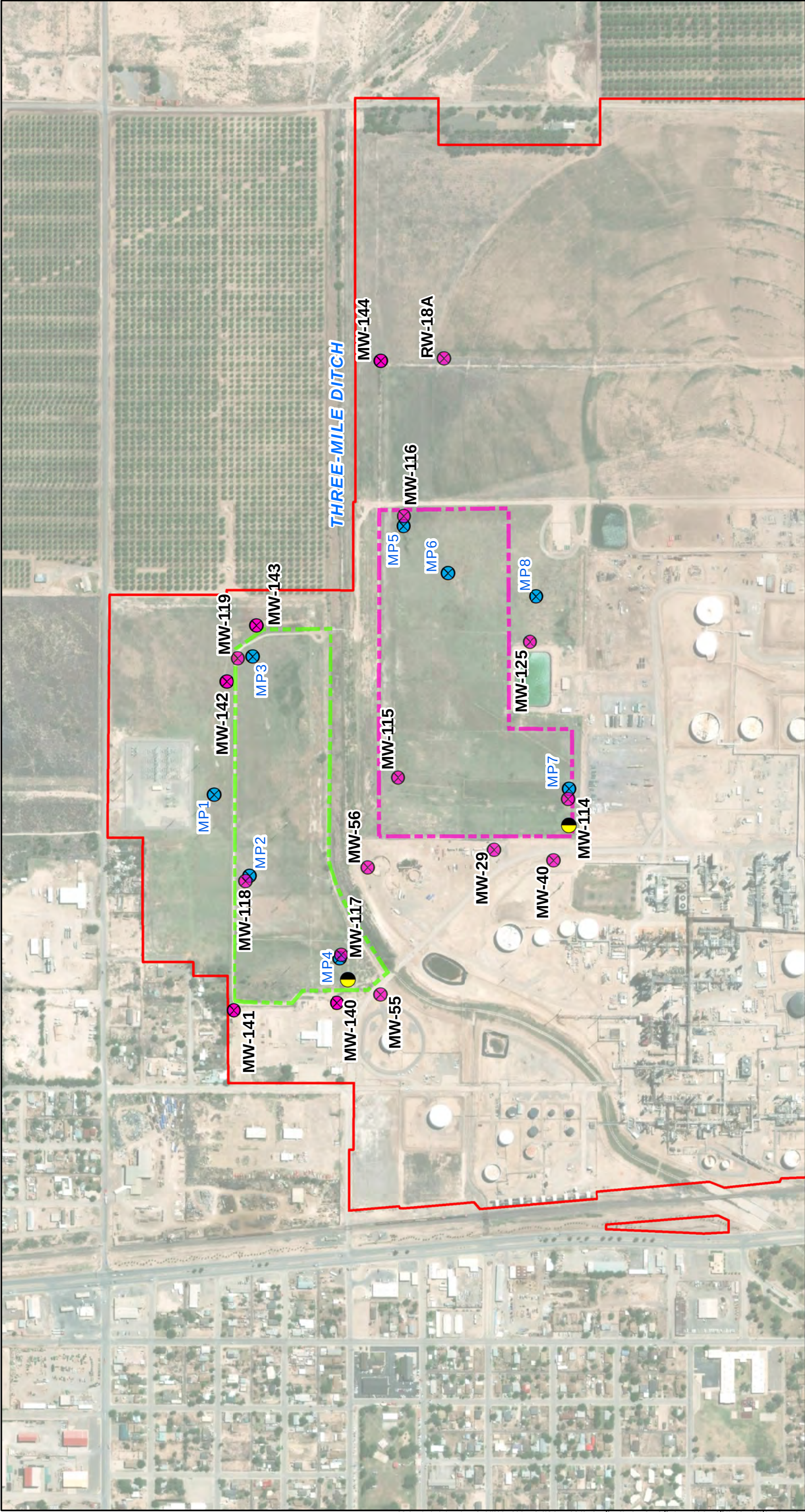
RO Reject Discharge
Fields Locations

DATE
NOVEMBER 2020

SCALE
1" = 1,000 feet

PROJECT NO.
6703180022

FIGURE
2



Legend

- Property Boundary
- South RO Reject Discharge Field
- North RO Reject Discharge Field
- Moisture Probes
- Monitoring Well
- Former Discharge Point

HollyFrontier Navajo Refining LLC Artesia, New Mexico		
RO Reject Discharge Fields Stage 1 Abatement Monitoring Well & Soil Moisture Probe Locations		
Prepared By: ALB	wood.	FIGURE 3
Date Prepared: 11/4/2020		
Project Number: 6703200016		



Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Final Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Volume 2 - Figures 6 through 16



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
November 19, 2020

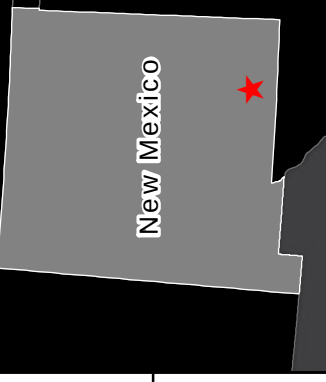
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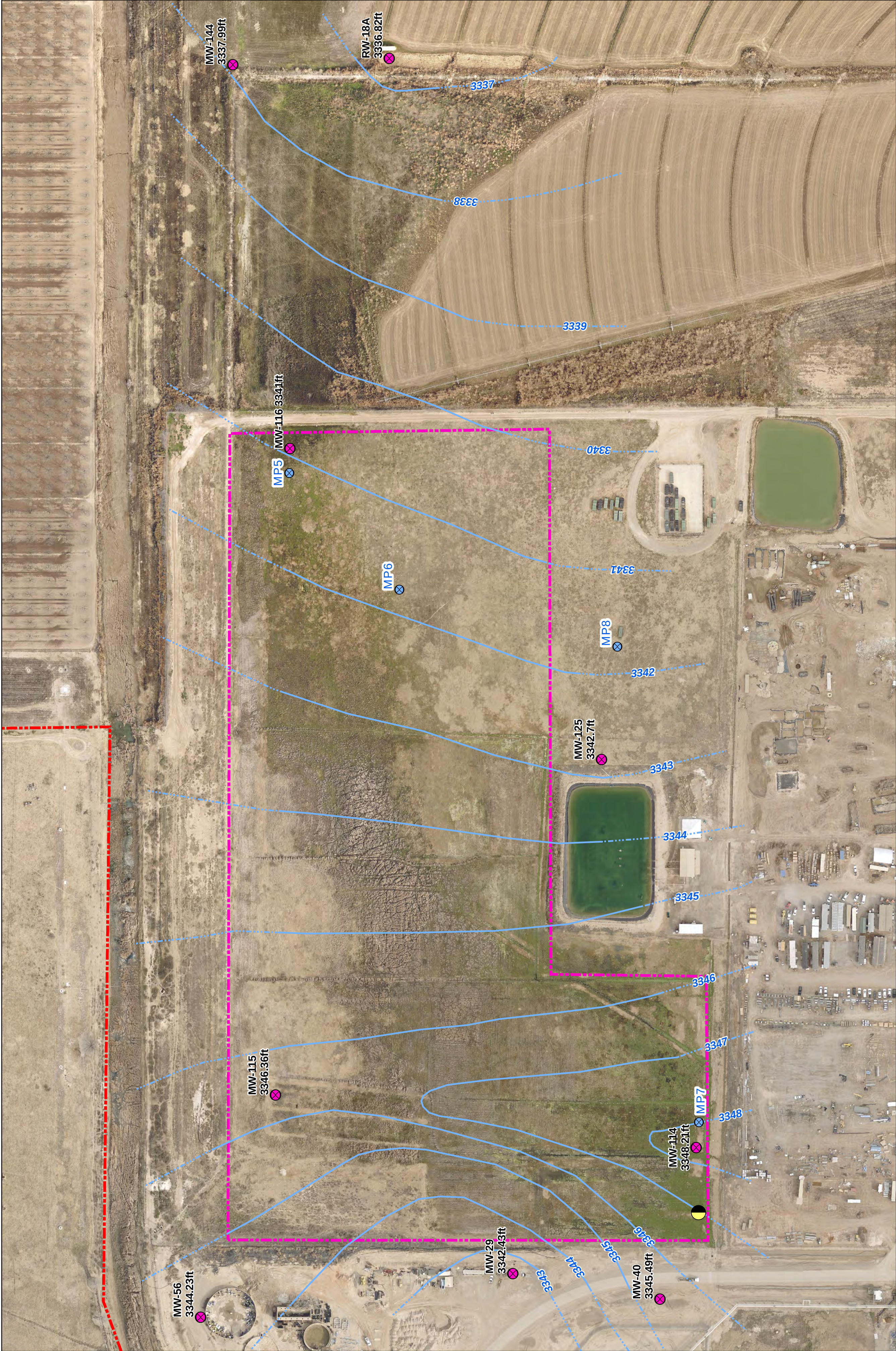


FIGURES (6 through 16)



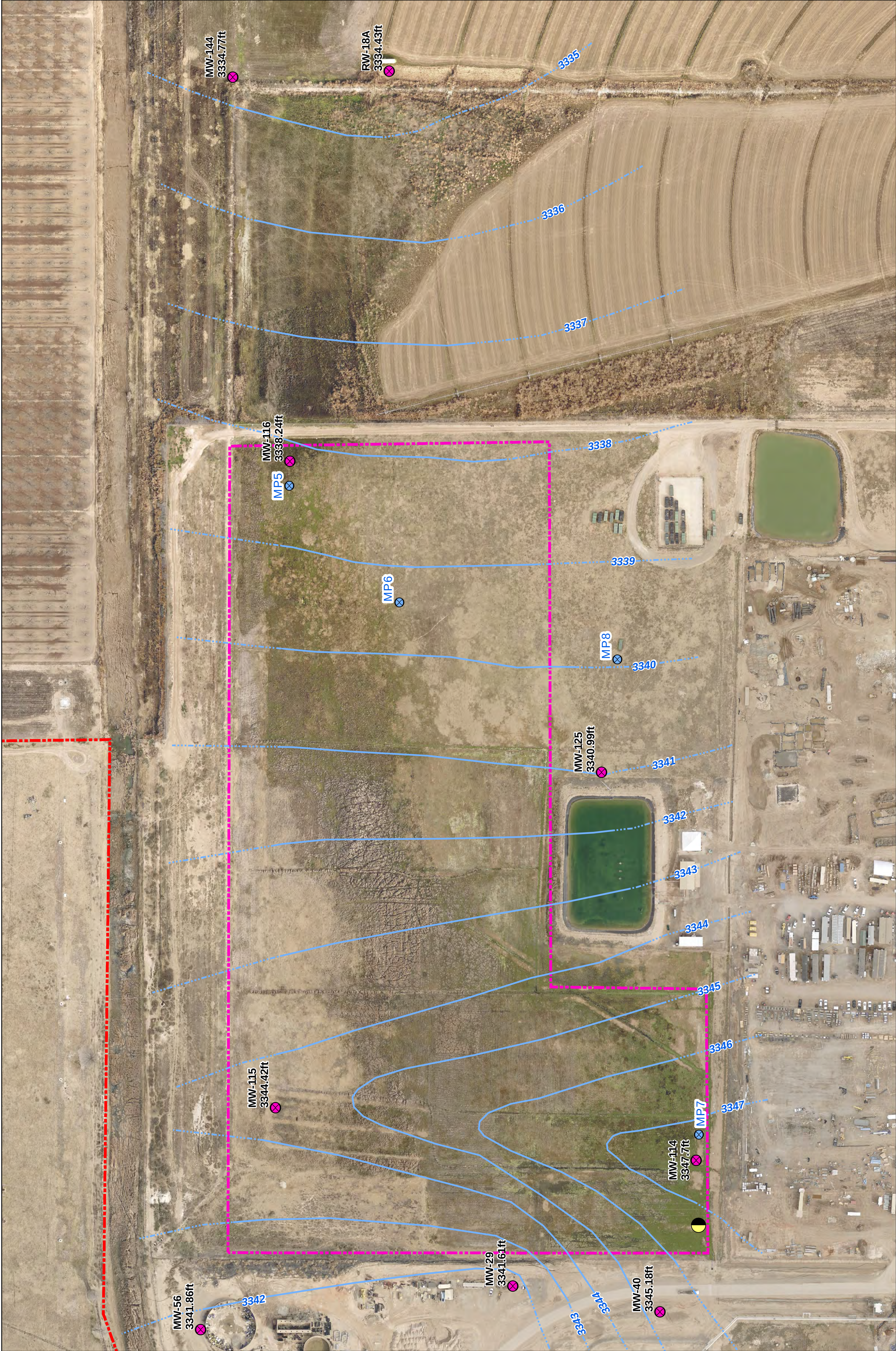
 North RO Reject Field	 Monitoring Well	 Former Discharge Point	 Moisture Probe	 HOLLYFRONTIER.	 New Mexico	DATE	AUGUST 2020
						SCALE	1" = 120'
						PROJECT NO.	6703200016
						FIGURE	8
Groundwater Potentiometric Surface Map North RO Reject Field, October 2019							

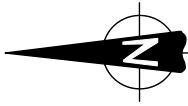
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
DRAWN BY: LK CHECKED BY: LR
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			HollyFrontier Navajo Refining LLC		DATE AUGUST 2020
			Groundwater Potentiometric Surface Map South RO Reject Field, October 2019		SCALE 1" = 140'
					PROJECT NO. 6703200016
					FIGURE 9

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
DRAWN BY: LK CHECKED BY: LR
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 0 70 140 Feet		 HOLLYFRONTIER.		 wood.	
 North RO Reject Field		 Monitoring Well		 Former Discharge Point	
 South RO Reject Field		 Moisture Probe			
 Contour Line		 Contour Line, Inferred			
				Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community	
				C:\GIS\MapDocs\Fig 13 - Groundwater Potentiometric Surface Map (South) - April 2020.mxd - Larry Karpov - 8/16/2020 - 1:55:51 PM	
DATE		AUGUST 2020			
SCALE		1" = 140'			
PROJECT NO.		6703200016			
FIGURE		13			

MW-118									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N			301		6.16	1.02	2.860	4.180
Oct-19	N	0.366	<0.0050	BUJ	0.0370	4.39	1.80	2.480	4.240
Jan-20	N			313		5.75	1.90	2.910	3.630
Jun-20	N	0.399	<0.00132	0.0390	290	5.63	2.27	2.630	4.350
Jun-20	J								

MW-141									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				288	1.95	9.36	1,770	2,660
	FD				285	1.83	9.53	1,680	2,900
Oct-19	N	0.218	0.00925	0.0288	284	3.02	9.71	1,690	2,880
Jan-20	N				275	2.35	8.54	1,570	2,250
Jun-20	J	0.200	0.00132	0.0259	290	2.87	7.60	1,520	3,260

MW-140									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				293	1.82	15.5	2,430	3,970
Oct-19	N	0.395	0.0975	0.0325	310	1.44	9.29	2,220	3,390
Jan-20	N				310	1.79	10.3	2,190	3,180
Jun-20	N	0.445	0.00615	0.0348	305	1.66	9.65	2,020	3,900
Jun-20	FD	0.442	0.0564	0.0336	305	1.74	10.3	2,150	3,500 J

		MW-117							
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				284	3.40	0.191	2.230	3.740
Oct-19	N	0.147	J	<0.0050	BJU	0.0172	3.05	2.260	3.490
Jan-20	N				285	3.28	0.593	1.990	2.650
Jun-20	N	0.131	J	0.00158	J	0.0160	J	2.010	3.350

MM-55									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				498	1.83	1.65	2,100	4,680
Oct-19	N	1.00	0.126	0.0504	514	1.53	0.469	1,570	3,390
	FD	1.01	0.128	0.0528	523	1.67	0.453	1,590	3,350
Jan-20	N				562	1.73	0.302	1,570	2,820
	FD				552	1.72	0.289	1,540	3,480
Jun-20	N	0.951	0.148	0.0549	600	1.66	0.0746	1,340	3,910

	Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
	Jul-19	N				273	1.20	<0.0197	2,180	3,430
	Oct-19	N	0.269	0.304	0.0173	286	1.10	<0.0197	1,890	3,120
	Jan-20	N		Jan-20	256	256	1.20	<0.0197	1,840	2,850
	Jun-20	N	0.259	0.295	0.0175	J	209	< 0.0500	1,840	3,040

Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				254	2.33	<0.0197	2.940	4.510
Oct-19	N	0.767	0.120	0.0825	270	2.04	0.145	2.390	3.870
Jan-20	N				286	2.12	0.793	2.250	3.670
Jun-20	N	0.564	0.109	0.0947	392	2.16	3.78	2.260	4.740

MW-29									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				383	2.00	<0.985	3.300	4.820
Oct-19	N	1.26	0.574 V	0.0189	354	1.84	<0.0197	2.480	3.910
Jan-20	N				344	1.86	0.0210 JP1	2.010	3.330
Jun-20	N	1.10	0.229	0.00811 J	395	1.70	<0.0500	1.700	3.980
	N	1.06	0.214	0.00779 J	397	1.74	<0.0500	1.780	3.360 J

	MW-40							TDS
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate
Jul-19	N				87.7	1.93	<1.97	1.730
		N	0.292	0.0238	68.2	2.18	0.0330 J	1.570
Oct-19	FD	0.305	0.0243	0.000538 J	67.1	2.29	<0.0197	1.910
		N			94.1 J	3.38 J	<0.0394 UJ	2.370
Jan-20	FD				83.8	1.85	0.658 J	1.540
Jun-20	N	0.308	0.0266	<0.00754	91.2	1.56	< 0.0500	1.410
								2.500

MW-142									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				380	2.22	0.159	2,610	4,580
Oct-19	N	0.38	0.0177	0.0369	369	1.87	0.0910	J 2,280	4,000
Jan-20	N				363	2.07	0.0950	J 2,350	4,090
Jun-20	N	0.402	0.0130	0.0401	360	2.25	0.108	2,450	4,020 J

Date	Type	Event
Jul-19	N	
Oct-19	N	0
Jan-20	N	

Date	Type	Boron	Manganese	Uranium
Jul-19	N			
Oct-19	N	0.509	0.399	0.0388
Jan-20	N			

MW-114									
Sample	Date	Latitude	Longitude	Depth (m)	Salinity	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	TDS
1	2011-03-11	11° 07' 30" N	103° 00' 00" E	0-10	35.2	28.5	7.8	4.5	3,000
2	2011-03-11	11° 07' 30" N	103° 00' 00" E	10-20	35.2	28.5	7.8	4.5	3,000
3	2011-03-11	11° 07' 30" N	103° 00' 00" E	20-30	35.2	28.5	7.8	4.5	3,000
4	2011-03-11	11° 07' 30" N	103° 00' 00" E	30-40	35.2	28.5	7.8	4.5	3,000
5	2011-03-11	11° 07' 30" N	103° 00' 00" E	40-50	35.2	28.5	7.8	4.5	3,000
6	2011-03-11	11° 07' 30" N	103° 00' 00" E	50-60	35.2	28.5	7.8	4.5	3,000
7	2011-03-11	11° 07' 30" N	103° 00' 00" E	60-70	35.2	28.5	7.8	4.5	3,000
8	2011-03-11	11° 07' 30" N	103° 00' 00" E	70-80	35.2	28.5	7.8	4.5	3,000
9	2011-03-11	11° 07' 30" N	103° 00' 00" E	80-90	35.2	28.5	7.8	4.5	3,000
10	2011-03-11	11° 07' 30" N	103° 00' 00" E	90-100	35.2	28.5	7.8	4.5	3,000

MW-119									
	Date	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
	Jul-19	N			443	2.79	0.308	2,570	3,980
	Oct-19	N	0.338	0.00524	0.0325	388	2.36	0.174	3,820
	Jan-20	N			356	2.09	0.115	2,440	3,860
	Jun-20	N	0.457	0.00643	0.0467	341	1.70	0.184	2,590
									3,940 J

MW-143									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				264	1.54	0.0980	J	4,870
Oct-19	N	0.848	0.107	0.0484	296	1.20	0.127	2.970	4,500
Jan-20	N				263	1.71	0.0560	J	4,070
Jun-20	N	0.839	0.0432	0.0473	278	1.82	<0.0500	2.770	4,100

Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				222	2.57	0.290	2.360	3,740
Oct-19	N	0.211	0.0272	0.0185	274	2.36	0.201	2.530	3,330
Jan-20	N				245	2.47	0.260	2,300	3,930
Jun-20	N	0.224	0.0170	0.0187	257	2.64	0.401	2,120	3,500

MW-144

MW-116

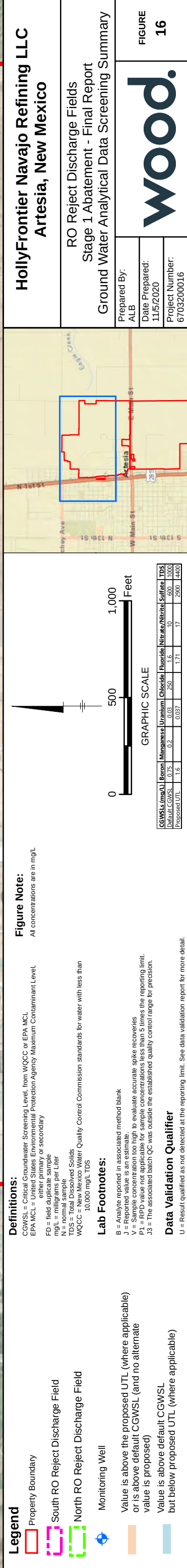
DW 18A

RW-18A									
Date	Type	Boron	Manganese	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Jul-19	N				247	2.10	0.256	3.090	4.150
Oct-19	N	0.648	0.00668	0.0566	235	2.07	0.258	2.750	3.740
Jan-20	N				214	2.18	0.228	2.660	3.830
Mar-20	N	0.608	0.00667	0.0567	220	2.13	0.240	3.320	4.560

An aerial photograph of a residential area. A red rectangle highlights a specific house with a white roof and a dark driveway, situated on a lot with green grass and trees. The surrounding area includes other houses, roads, and fields.

	Uranium	Chloride	Fluoride	Nitrate/Nitrite	Sulfate	TDS
Manganese		265	2.01	0.371	2.550	3.700
		266	2.00	0.350	2.570	3.490
	0.0271	309	1.99	0.403	2.380	3.490
		278	1.99	0.409	2.270	3.570

W-125					
	Amide	Fluoride	Nitrate/Nitrite	Sulfate	TDS
8	1.26	0.587	2.750	4.380	
7	1.08	0.544	2.810	3.920	
			0.388	2.560	4.200





Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Final Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Volume 3 - Appendices A and B



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
November 19, 2020

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APPENDIX A

SOIL RESOURCE REPORTS



United States
Department of
Agriculture

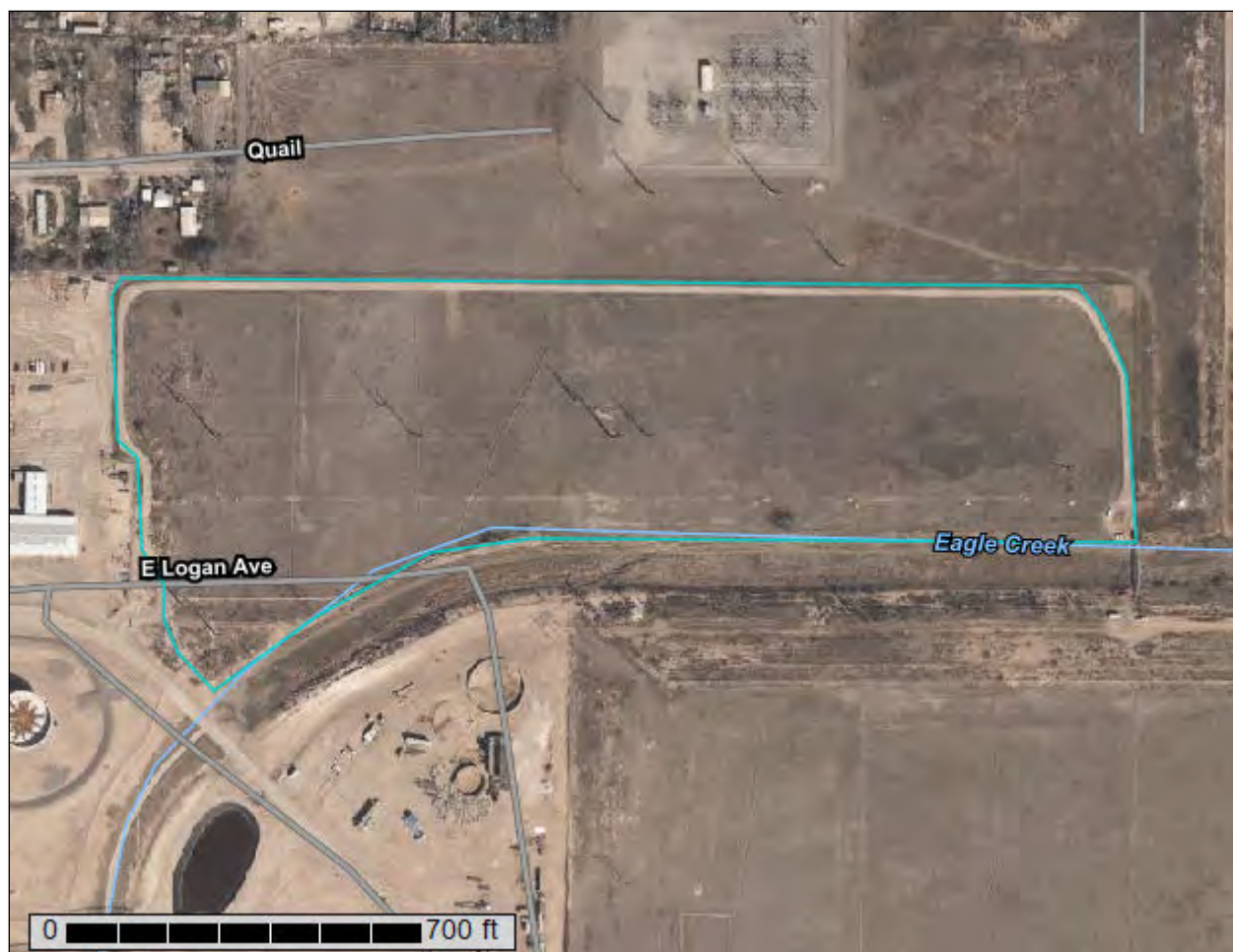
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Eddy Area, New Mexico**

**Navajo Refinery - North RO
Reject Field**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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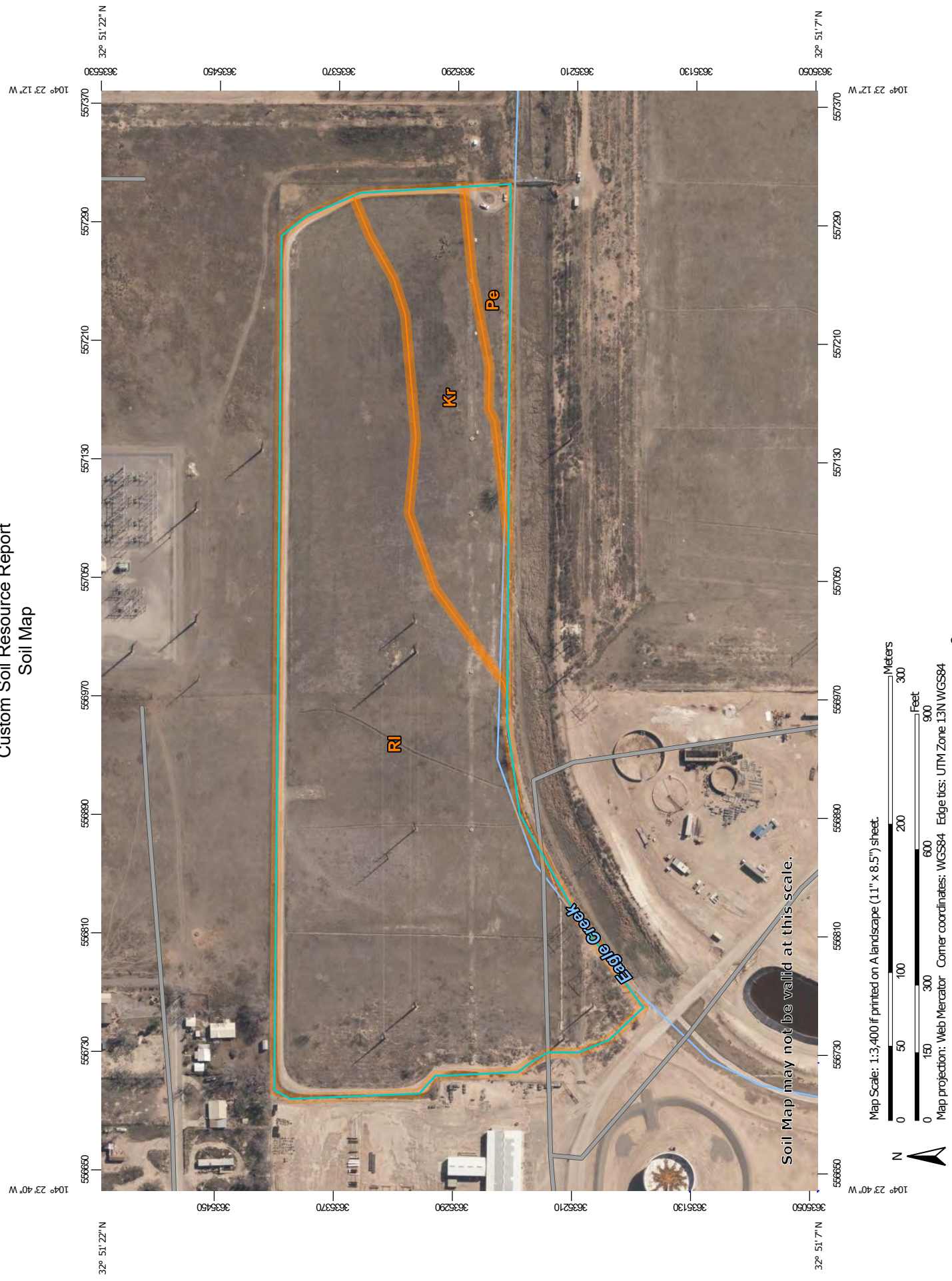
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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	0.9	3.7%
Rl	Reeves loam, 0 to 1 percent slopes	20.1	79.5%
Totals for Area of Interest		25.3	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Eddy Area, New Mexico

Kr—Karro loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w4v

Elevation: 2,500 to 5,300 feet

Mean annual precipitation: 10 to 15 inches

Mean annual air temperature: 57 to 64 degrees F

Frost-free period: 200 to 230 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Karro and similar soils: 99 percent

Minor components: 1 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Karro

Setting

Landform: Alluvial fans, plains

Landform position (three-dimensional): Riser, rise, talf

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 10 inches: loam

H2 - 10 to 90 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 60 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0

Available water capacity: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Ecological site: R042XC030NM - Limy

Hydric soil rating: No

Minor Components

Reeves

Percent of map unit: 1 percent

Custom Soil Resource Report

Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

Pe—Pima silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w58
Elevation: 600 to 4,200 feet
Mean annual precipitation: 8 to 25 inches
Mean annual air temperature: 60 to 70 degrees F
Frost-free period: 195 to 290 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pima and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pima

Setting

Landform: Alluvial fans, alluvial flats, flood plains
Landform position (three-dimensional): Rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Alluvium

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R042XC017NM - Bottomland

Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Dev

Percent of map unit: 1 percent

Ecological site: R042XC017NM - Bottomland

Hydric soil rating: No

Reagan

Percent of map unit: 1 percent

Ecological site: R042XC007NM - Loamy

Hydric soil rating: No

RI—Reeves loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w5p

Elevation: 1,250 to 4,800 feet

Mean annual precipitation: 10 to 25 inches

Mean annual air temperature: 57 to 70 degrees F

Frost-free period: 120 to 225 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Reeves and similar soils: 98 percent

Minor components: 2 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Reeves

Setting

Landform: Hills, plains, ridges

Landform position (two-dimensional): Backslope, footslope, shoulder, toeslope

Landform position (three-dimensional): Crest, nose slope, side slope, head slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Residuum weathered from gypsum

Typical profile

Ap - 0 to 8 inches: loam

H2 - 8 to 32 inches: clay loam

H3 - 32 to 60 inches: gypsiferous material

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Custom Soil Resource Report

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Gypsum, maximum content: 80 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

Minor Components

Cottonwood

Percent of map unit: 1 percent
Ecological site: R042XC006NM - Gyp Upland
Hydric soil rating: No

Karro

Percent of map unit: 1 percent
Ecological site: R042XC030NM - Limy
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Chemical Properties

Soil Chemical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

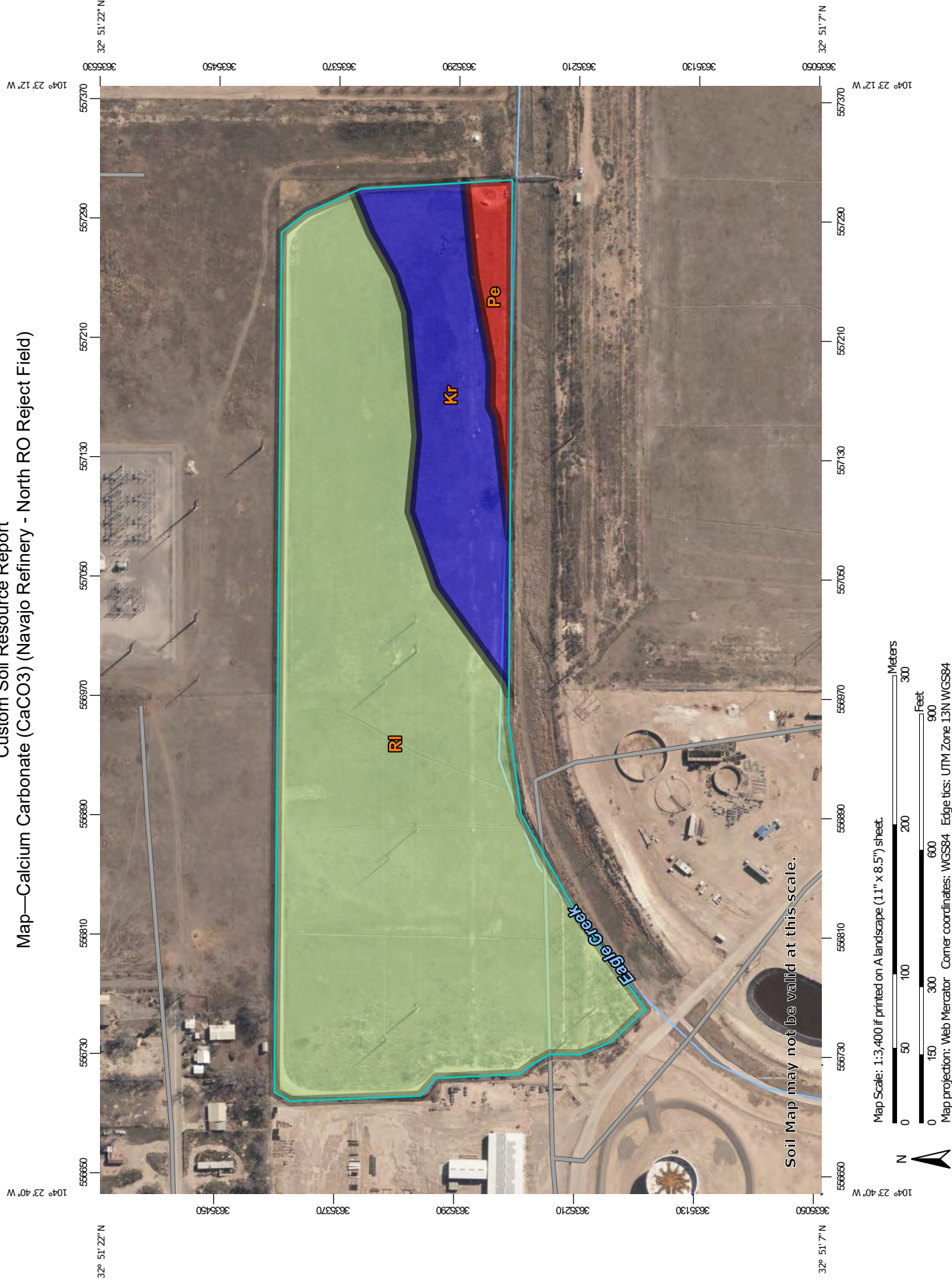
Calcium Carbonate (CaCO₃) (Navajo Refinery - North RO Reject Field)

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Calcium Carbonate (CaCO3) (Navajo Refinery - North RO Reject Field)



Table—Calcium Carbonate (CaCO₃) (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	46	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	10	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	18	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

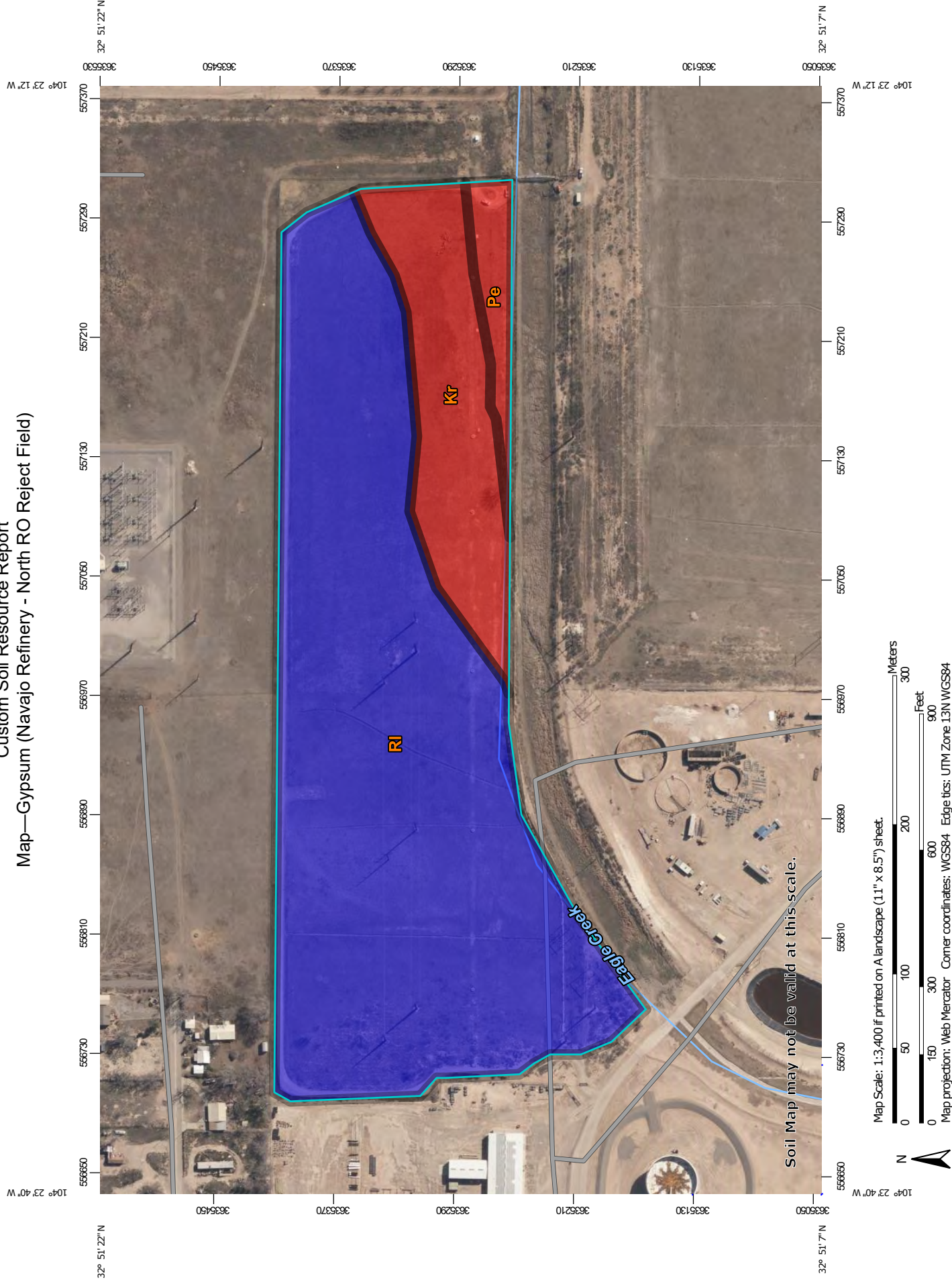
Rating Options—Calcium Carbonate (CaCO₃) (Navajo Refinery - North RO Reject Field)*Units of Measure:* percent*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* Yes*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**Gypsum (Navajo Refinery - North RO Reject Field)**

The content of gypsum is the percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils high in content of gypsum, such as those with more than 10 percent gypsum, may collapse if the gypsum is removed by percolating water. Gypsum is corrosive to concrete.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Gypsum (Navajo Refinery - North RO Reject Field)



MAP LEGEND

Area of Interest (AOI)
Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 0
- > 0 and <= 24
- Not rated or not available

Soil Rating Lines

- <= 0
- > 0 and <= 24
- Not rated or not available

Soil Rating Points

- <= 0
- > 0 and <= 24
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Gypsum (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	0	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	24	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

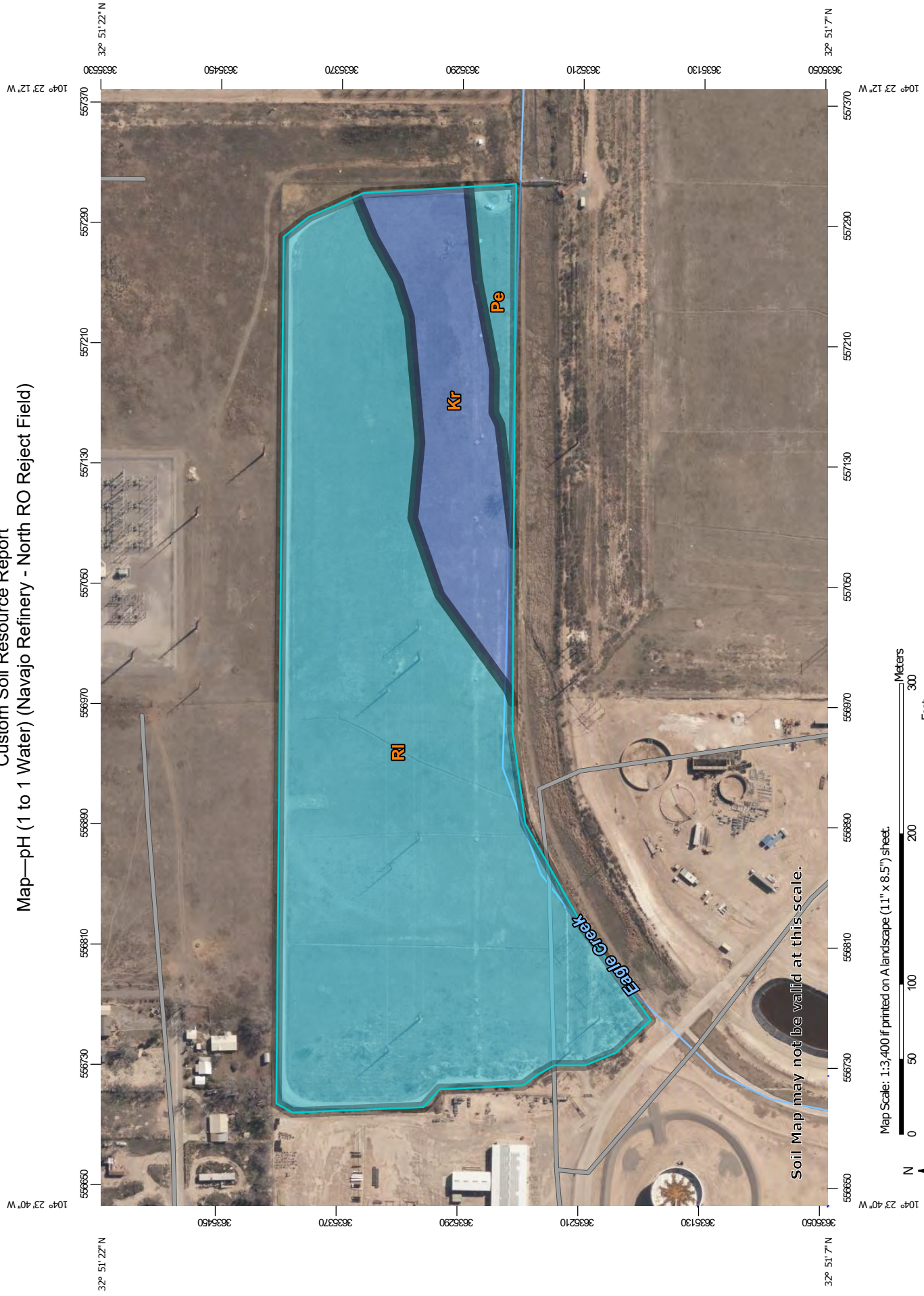
Rating Options—Gypsum (Navajo Refinery - North RO Reject Field)*Units of Measure:* percent*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* Yes*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**pH (1 to 1 Water) (Navajo Refinery - North RO Reject Field)**

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion. In general, soils that are either highly alkaline or highly acid are likely to be very corrosive to steel. The most common soil laboratory measurement of pH is the 1:1 water method. A crushed soil sample is mixed with an equal amount of water, and a measurement is made of the suspension.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—pH (1 to 1 Water) (Navajo Refinery - North RO Reject Field)

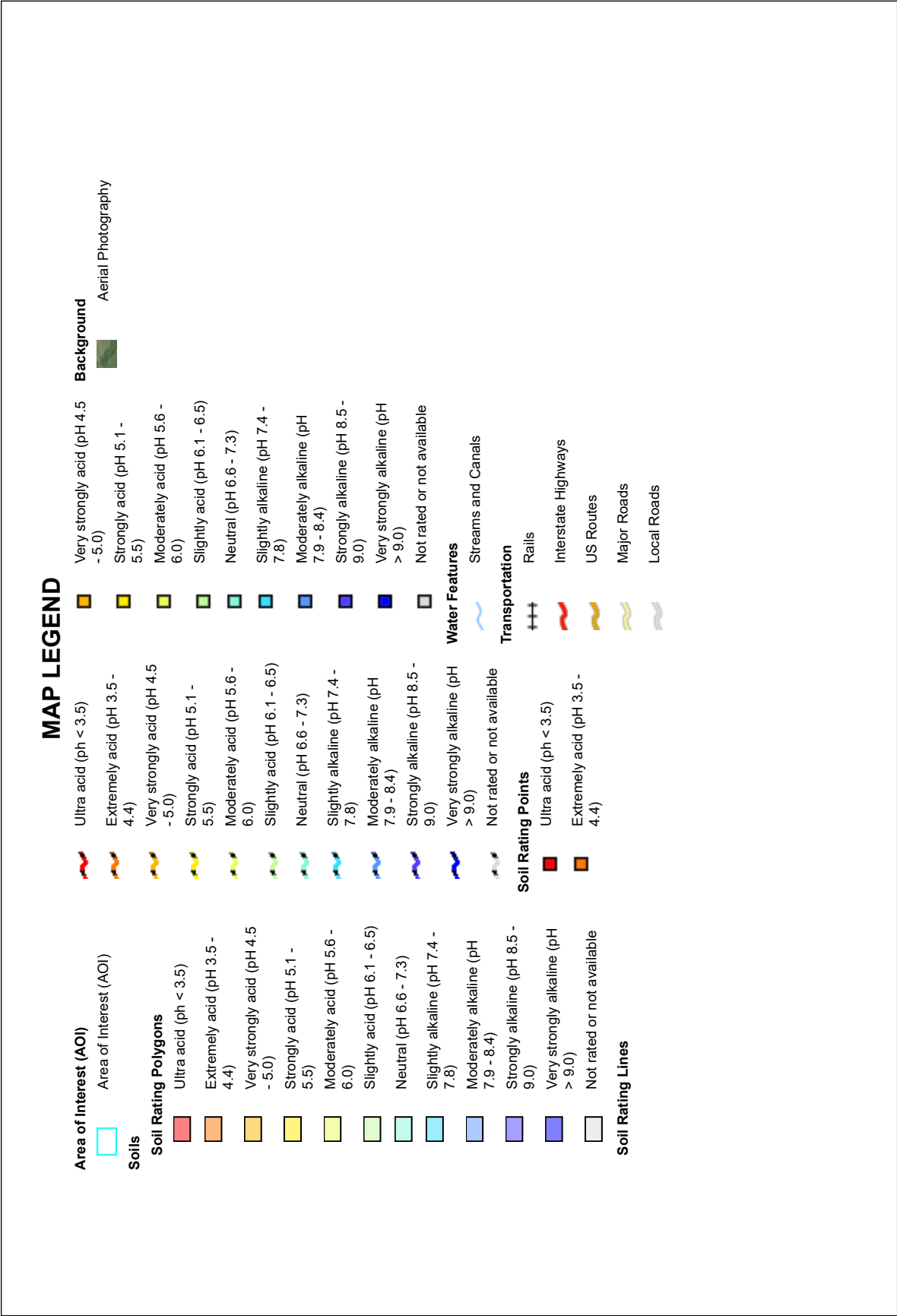


Soil Map may not be valid at this scale.

Map Scale: 1:3,400 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—pH (1 to 1 Water) (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	8.2	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	7.6	0.9	3.7%
Rl	Reeves loam, 0 to 1 percent slopes	7.6	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

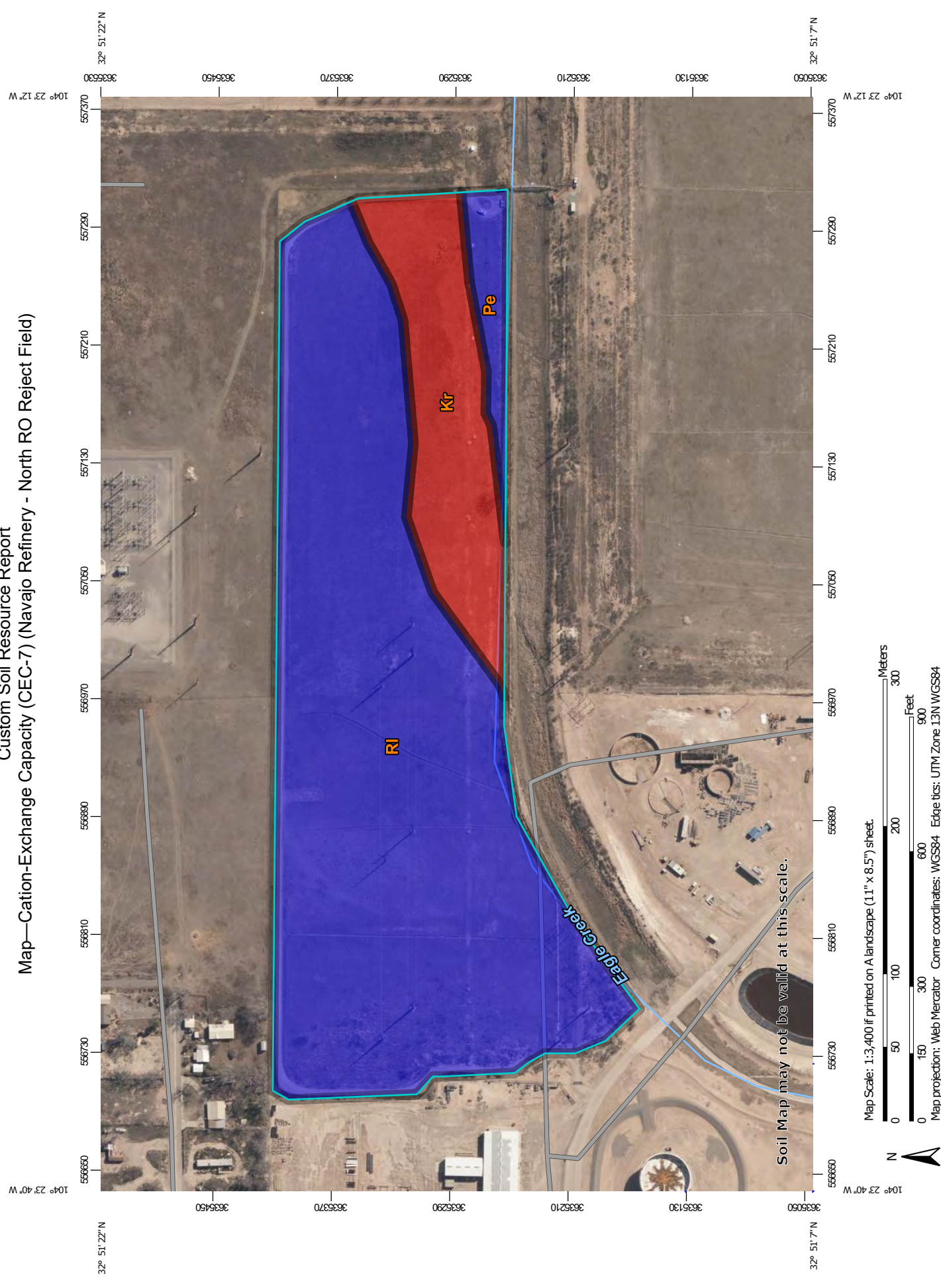
Rating Options—pH (1 to 1 Water) (Navajo Refinery - North RO Reject Field)*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* No*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**Cation-Exchange Capacity (CEC-7) (Navajo Refinery - North RO Reject Field)**

Cation-exchange capacity (CEC-7) is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Cation-Exchange Capacity (CEC-7) (Navajo Refinery - North RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 14.1



> 14.1 and <= 15.0



Not rated or not available



Soil Rating Lines

<= 14.1



> 14.1 and <= 15.0



Not rated or not available



Soil Rating Points

<= 14.1



> 14.1 and <= 15.0



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background

Aerial Photography



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Cation-Exchange Capacity (CEC-7) (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (milliequivalents per 100 grams)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	14.1	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	15.0	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	15.0	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

Rating Options—Cation-Exchange Capacity (CEC-7) (Navajo Refinery - North RO Reject Field)

Units of Measure: milliequivalents per 100 grams

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

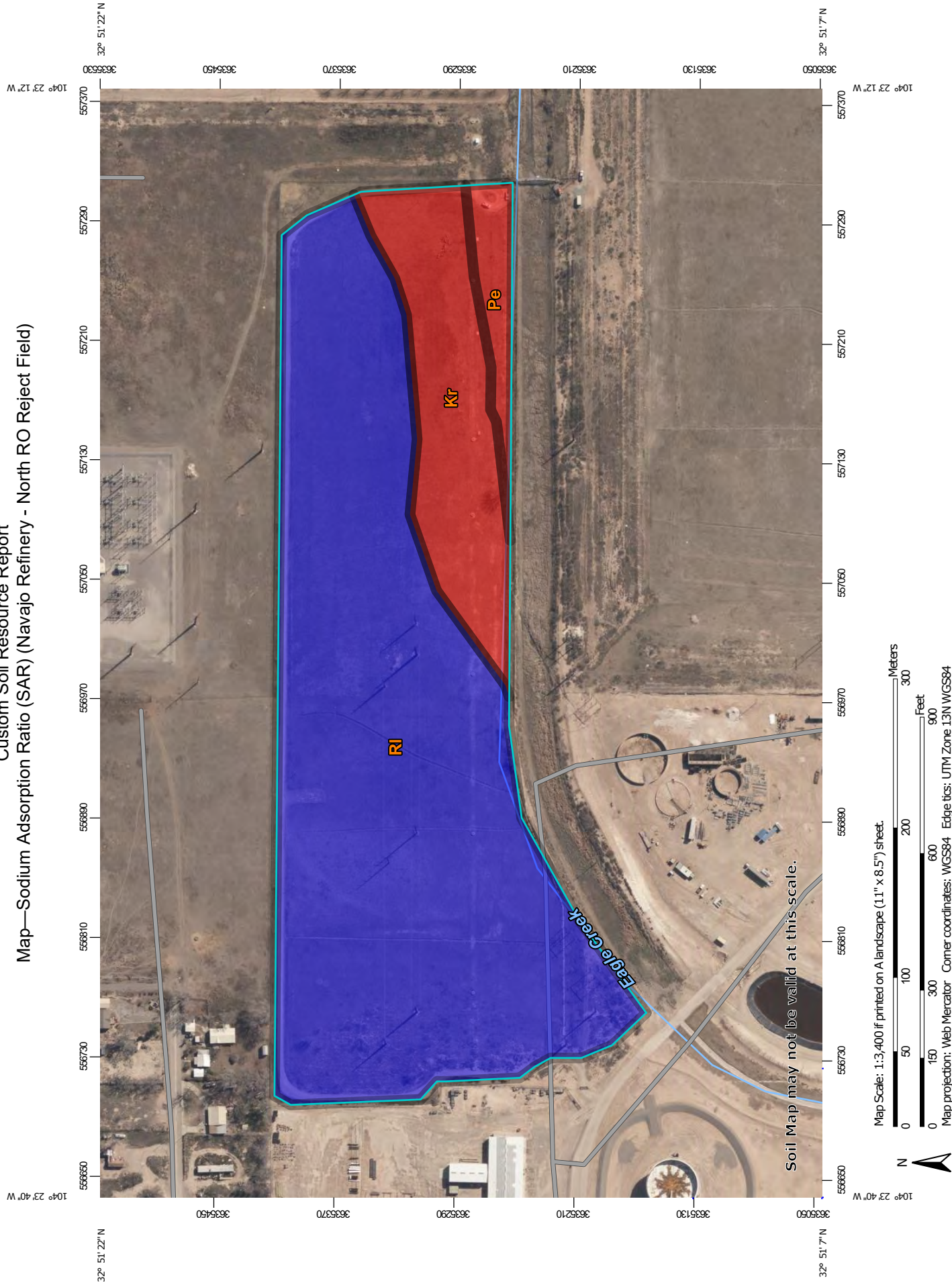
Sodium Adsorption Ratio (SAR) (Navajo Refinery - North RO Reject Field)

Sodium adsorption ratio is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity (Ksat) and aeration, and a general degradation of soil structure.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Sodium Adsorption Ratio (SAR) (Navajo Refinery - North RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

 <= 0.0

 > 0.0 and <= 2.0

 Not rated or not available

Soil Rating Lines

 <= 0.0

 > 0.0 and <= 2.0

 Not rated or not available

Soil Rating Points

 <= 0.0

 > 0.0 and <= 2.0

 Not rated or not available

Water Features

Streams and Canals



Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Sodium Adsorption Ratio (SAR) (Navajo Refinery - North RO Reject Field)

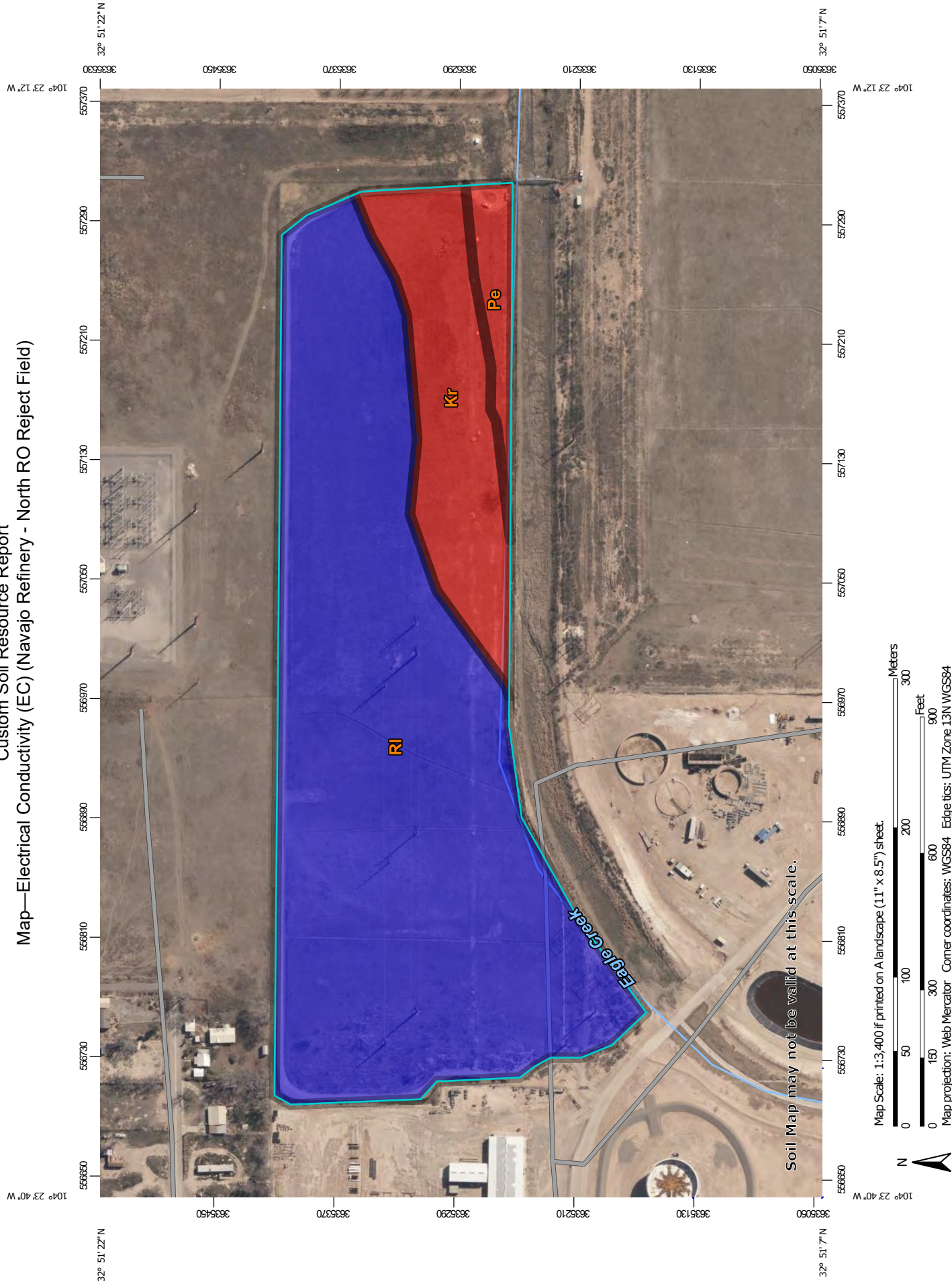
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0.0	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	0.0	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	2.0	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

Rating Options—Sodium Adsorption Ratio (SAR) (Navajo Refinery - North RO Reject Field)*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* Yes*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**Electrical Conductivity (EC) (Navajo Refinery - North RO Reject Field)**

Electrical conductivity (EC) is the electrolytic conductivity of an extract from saturated soil paste, expressed as decisiemens per meter at 25 degrees C. Electrical conductivity is a measure of the concentration of water-soluble salts in soils. It is used to indicate saline soils. High concentrations of neutral salts, such as sodium chloride and sodium sulfate, may interfere with the absorption of water by plants because the osmotic pressure in the soil solution is nearly as high as or higher than that in the plant cells.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report Map—Electrical Conductivity (EC) (Navajo Refinery - North RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 2.0



> 2.0 and <= 5.0



Not rated or not available



Soil Rating Lines

<= 2.0



> 2.0 and <= 5.0



Not rated or not available



Soil Rating Points

<= 2.0



> 2.0 and <= 5.0



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background

Aerial Photography



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Electrical Conductivity (EC) (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (decisiemens per meter)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	2.0	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	2.0	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	5.0	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

Rating Options—Electrical Conductivity (EC) (Navajo Refinery - North RO Reject Field)

Units of Measure: decisiemens per meter

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - North RO Reject Field)

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this

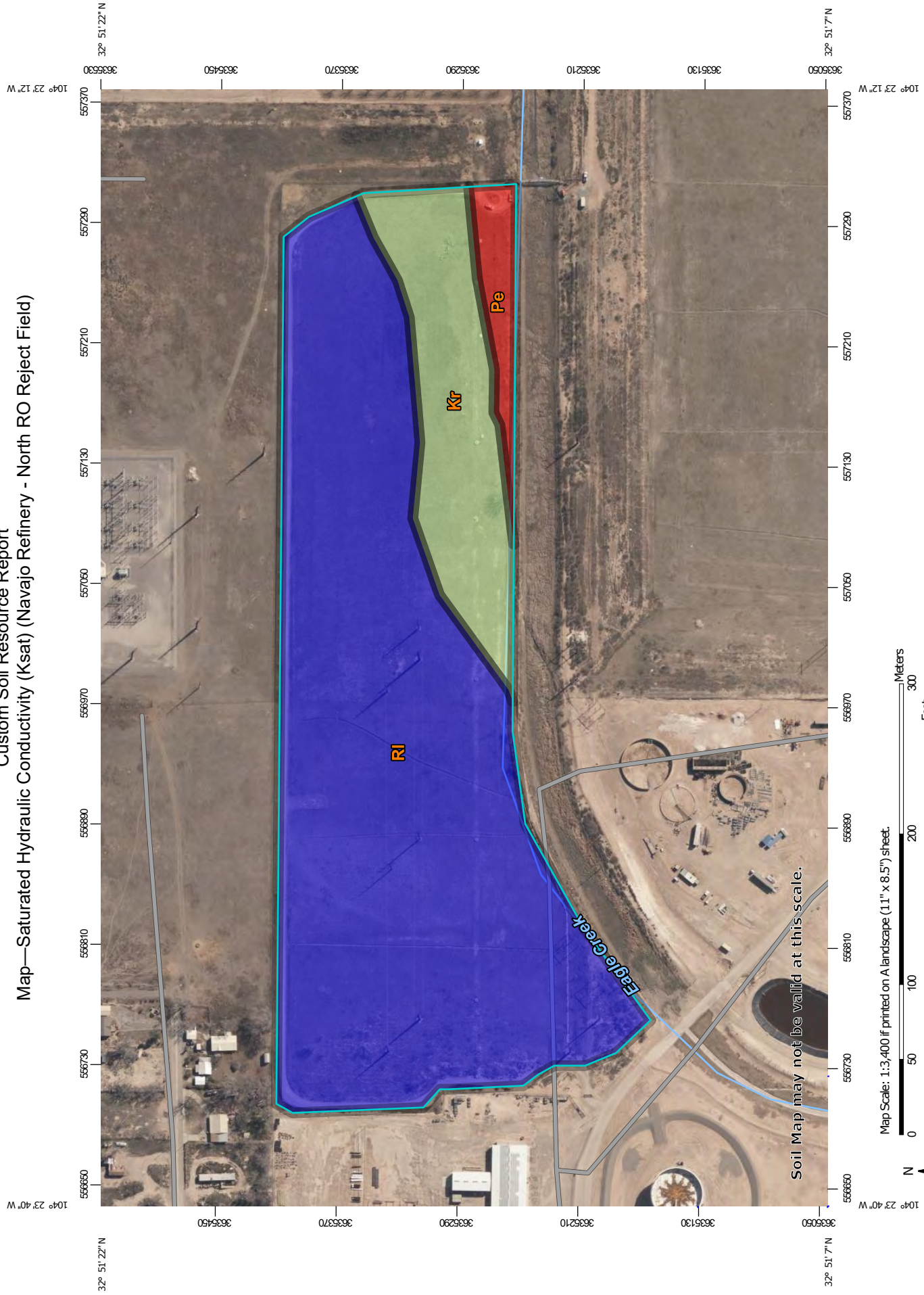
Custom Soil Resource Report

attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Custom Soil Resource Report

Map—Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - North RO Reject Field)



Map Scale: 1:3,400 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Aerial Photography

Background

Aerial Photography

Soils

Soil Rating Polygons

<= 3.1542

> 3.1542 and <= 3.5132

> 3.5132 and <= 4.9847

Not rated or not available

Soil Rating Lines

<= 3.1542

> 3.1542 and <= 3.5132

> 3.5132 and <= 4.9847

Not rated or not available

Soil Rating Points

<= 3.1542

> 3.1542 and <= 3.5132

> 3.5132 and <= 4.9847

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	3.5132	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	3.1542	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	4.9847	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

Rating Options—Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - North RO Reject Field)

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Available Water Capacity (Navajo Refinery - North RO Reject Field)

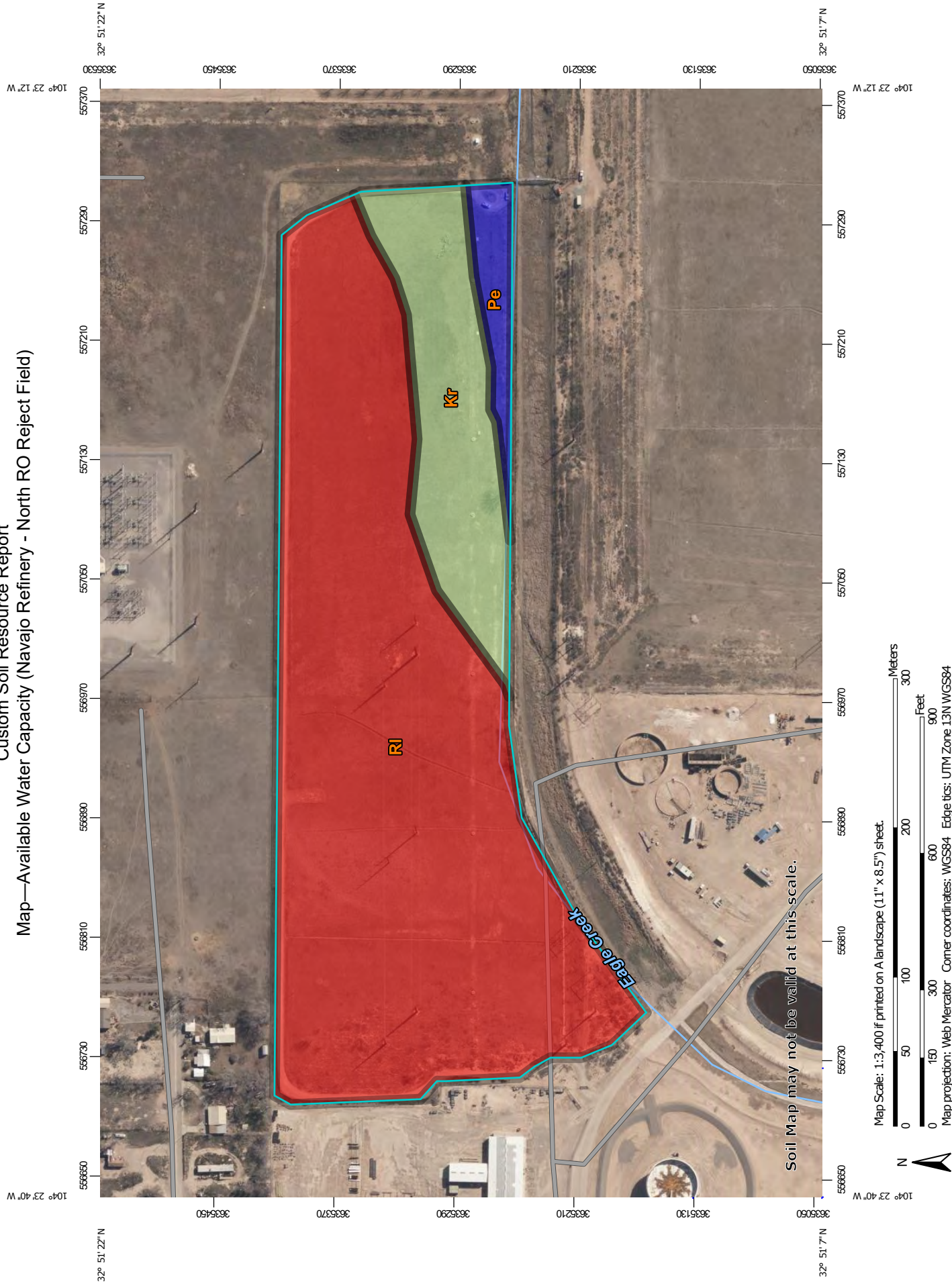
Available water capacity (AWC) refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in centimeters of water per centimeter of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure, with corrections for salinity and rock fragments. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. It is not an estimate of the quantity of water actually available to plants at any given time.

Available water supply (AWS) is computed as AWC times the thickness of the soil. For example, if AWC is 0.15 cm/cm, the available water supply for 25 centimeters of soil would be 0.15 x 25, or 3.75 centimeters of water.

For each soil layer, AWC is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Available Water Capacity (Navajo Refinery - North RO Reject Field)



Map Scale: 1:3,400 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

Table—Available Water Capacity (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (centimeters per centimeter)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0.18	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	0.20	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	0.13	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

Rating Options—Available Water Capacity (Navajo Refinery - North RO Reject Field)

Units of Measure: centimeters per centimeter

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Water Content, One-Third Bar (Navajo Refinery - North RO Reject Field)

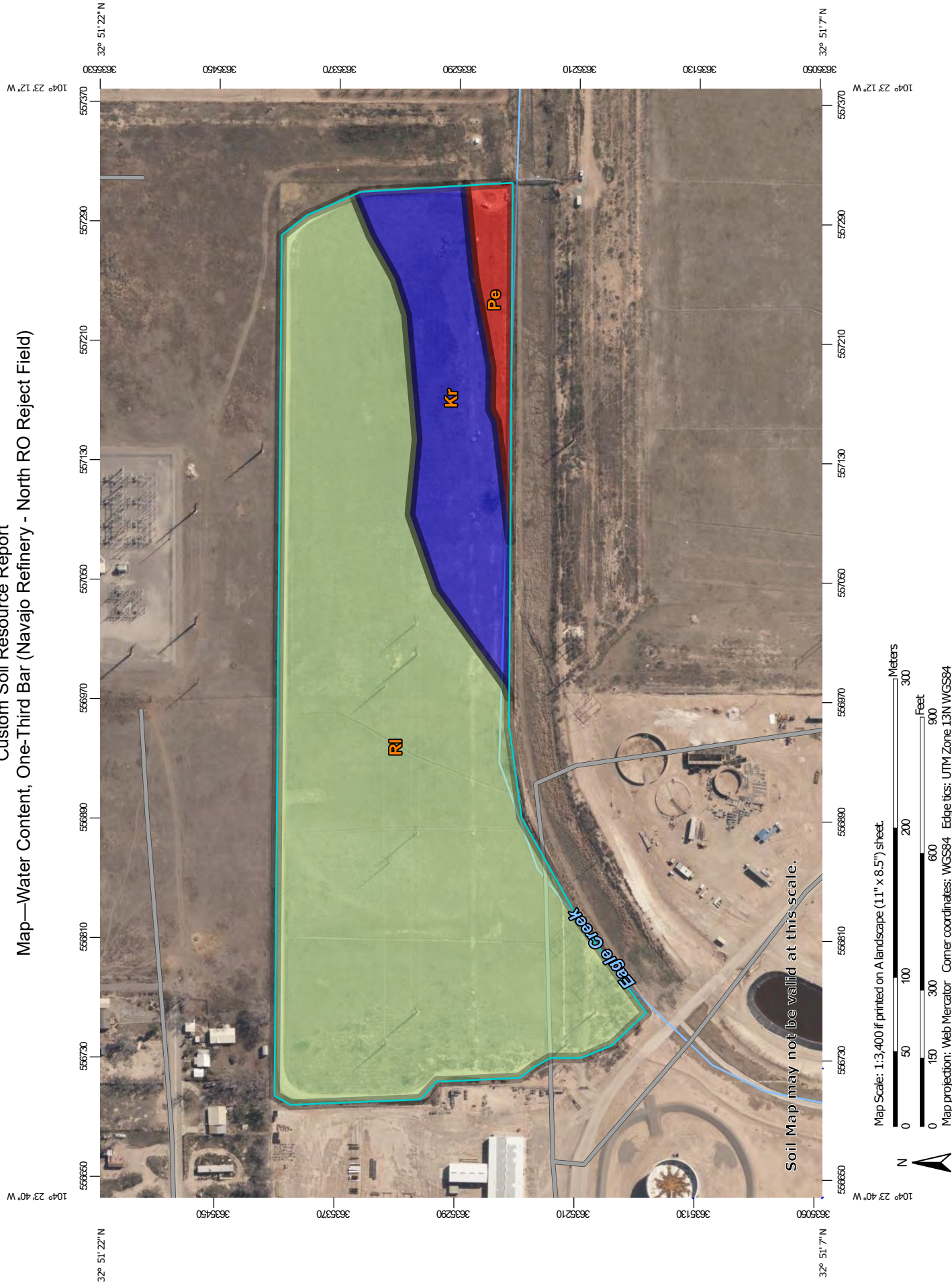
Water content, one-third bar, is the amount of soil water retained at a tension of 1/3 bar, expressed as a volumetric percentage of the whole soil. Water retained at 1/3 bar is significant in the determination of soil water-retention difference, which is used as the initial estimation of available water capacity for some soils. Water retained at 1/3 bar is the value commonly used to estimate the content of water at field capacity for most soils.

Water content varies between soil types, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure.

For each soil layer, water content is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Water Content, One-Third Bar (Navajo Refinery - North RO Reject Field)



MAP LEGEND

MAP INFORMATION

Area of Interest (AOI)



Area of Interest (AOI)

Background



Aerial Photography

Soils

Soil Rating Polygons

-  <= 29.7
 > 29.7 and <= 30.8
 > 30.8 and <= 31.4
 Not rated or not available

Soil Rating Lines

- | Color | Category |
|---|----------------------------|
|  | <= 29.7 |
|  | > 29.7 and <= 30.8 |
|  | > 30.8 and <= 31.4 |
|  | Not rated or not available |

Soil Rating Points

-  <= 29.7
 > 29.7 and <= 30.8
 > 30.8 and <= 31.4
 Not rated or not available

Water Features

- ## Streams and Canals

Transportation

- | Rails | Interstate Highways | US Routes | Major Roads | Local Roads |
|-------|---------------------|-----------|-------------|-------------|
|-------|---------------------|-----------|-------------|-------------|

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 16. Jun 8, 2020

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Table—Water Content, One-Third Bar (Navajo Refinery - North RO Reject Field)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	31.4	4.2	16.8%
Pe	Pima silt loam, 0 to 1 percent slopes	29.7	0.9	3.7%
RI	Reeves loam, 0 to 1 percent slopes	30.8	20.1	79.5%
Totals for Area of Interest			25.3	100.0%

Rating Options—Water Content, One-Third Bar (Navajo Refinery - North RO Reject Field)

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: Yes

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

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United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Eddy Area, New Mexico**

**Navajo Refinery South RO Reject
Field**



November 5, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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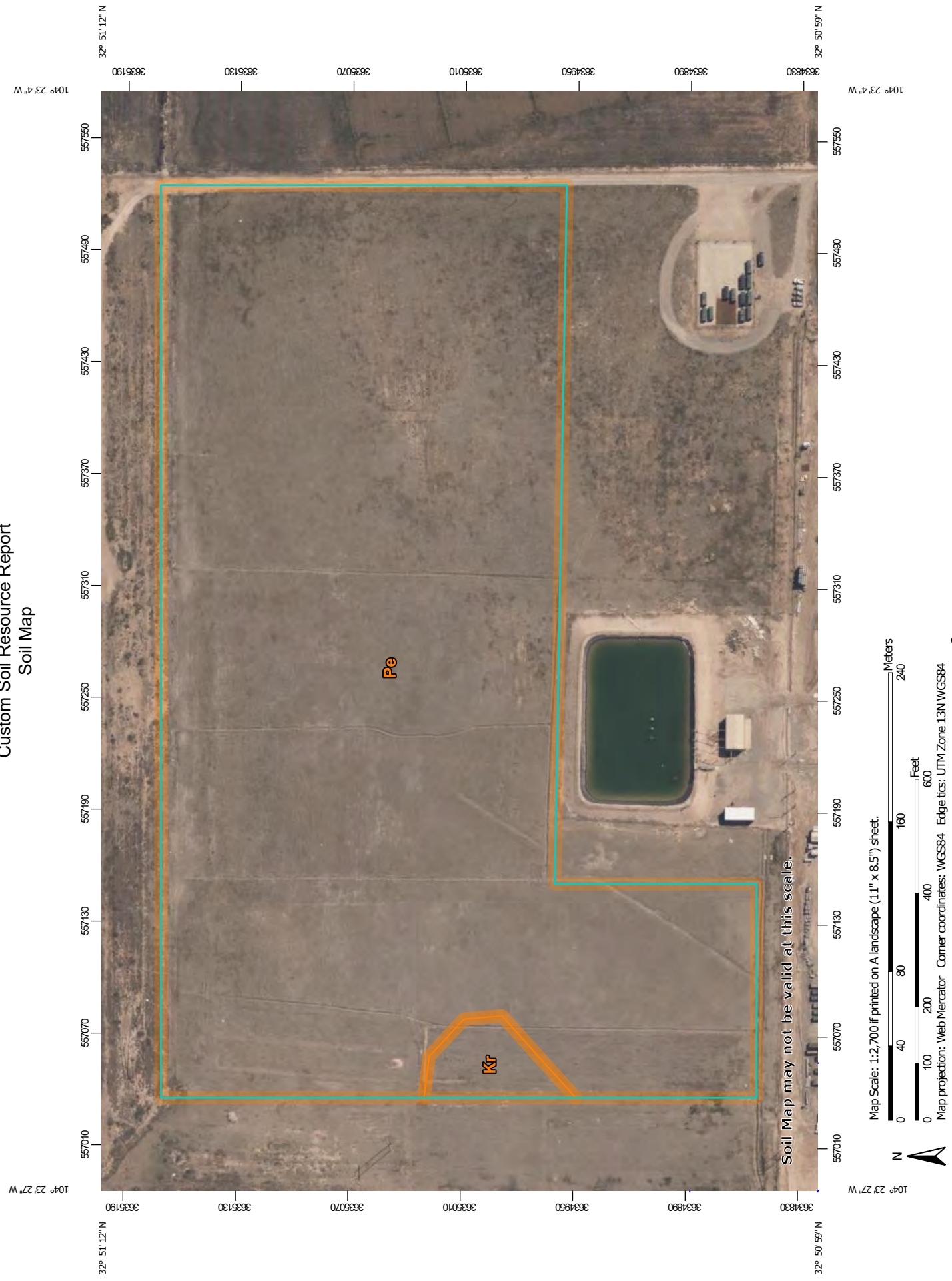
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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	28.3	98.0%
Totals for Area of Interest		28.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

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onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Eddy Area, New Mexico

Kr—Karro loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w4v

Elevation: 2,500 to 5,300 feet

Mean annual precipitation: 10 to 15 inches

Mean annual air temperature: 57 to 64 degrees F

Frost-free period: 200 to 230 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Karro and similar soils: 99 percent

Minor components: 1 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Karro

Setting

Landform: Alluvial fans, plains

Landform position (three-dimensional): Riser, rise, talf

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 10 inches: loam

H2 - 10 to 90 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 60 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0

Available water capacity: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2s

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Ecological site: R042XC030NM - Limy

Hydric soil rating: No

Minor Components

Reeves

Percent of map unit: 1 percent

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Ecological site: R042XC007NM - Loamy

Hydric soil rating: No

Pe—Pima silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w58

Elevation: 600 to 4,200 feet

Mean annual precipitation: 8 to 25 inches

Mean annual air temperature: 60 to 70 degrees F

Frost-free period: 195 to 290 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pima and similar soils: 98 percent

Minor components: 2 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pima

Setting

Landform: Alluvial fans, alluvial flats, flood plains

Landform position (three-dimensional): Rise, tal

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Parent material: Alluvium

Typical profile

H1 - 0 to 3 inches: silt loam

H2 - 3 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: RareNone

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0

Available water capacity: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 1

Land capability classification (nonirrigated): 7c

Hydrologic Soil Group: C

Ecological site: R042XC017NM - Bottomland

Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Dev

Percent of map unit: 1 percent

Ecological site: R042XC017NM - Bottomland

Hydric soil rating: No

Reagan

Percent of map unit: 1 percent

Ecological site: R042XC007NM - Loamy

Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Chemical Properties

Soil Chemical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

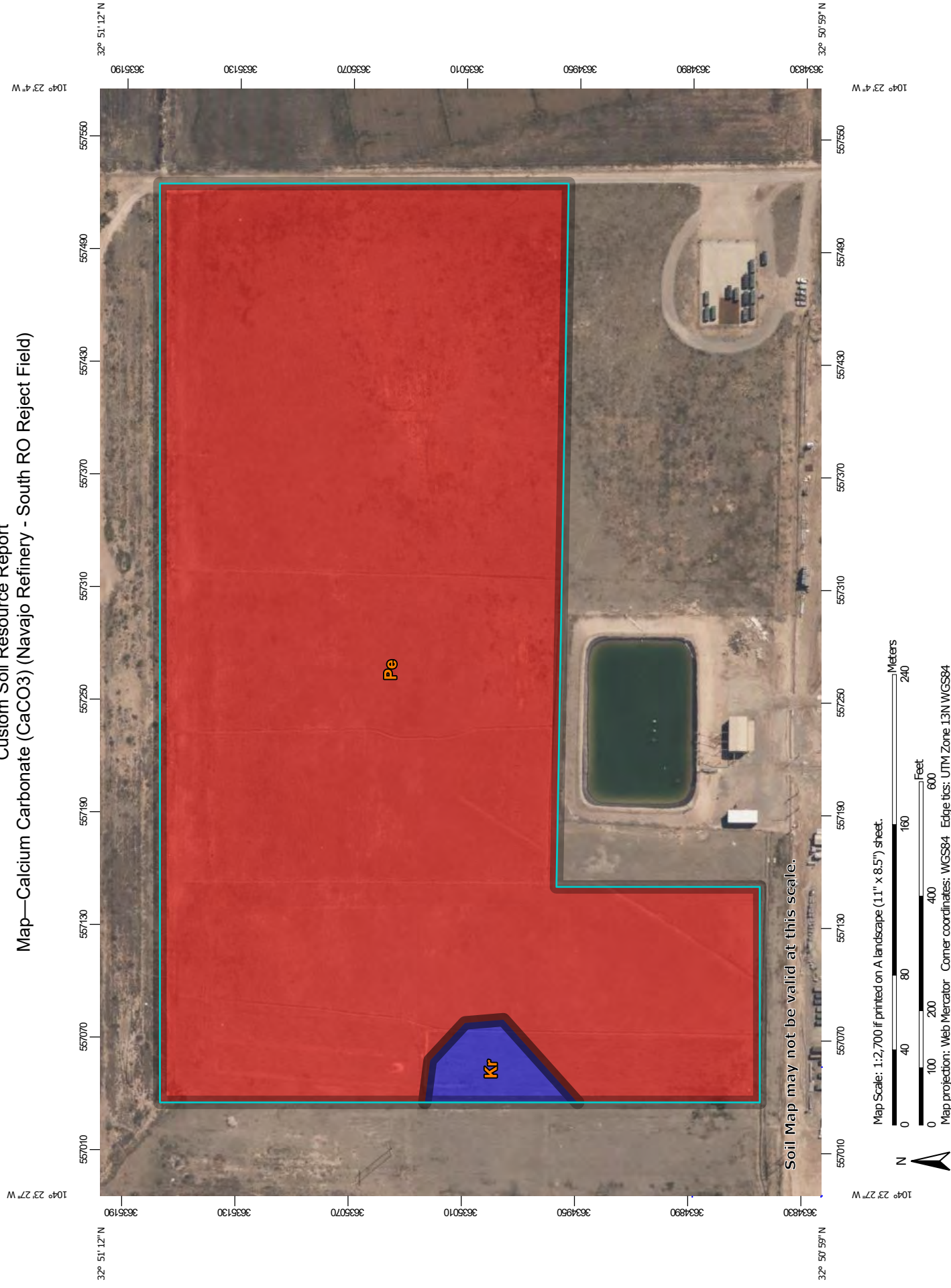
Calcium Carbonate (CaCO₃) (Navajo Refinery - South RO Reject Field)

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Calcium Carbonate (CaCO3) (Navajo Refinery - South RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 10



> 10 and <= 46



Not rated or not available



Soil Rating Lines

<= 10



> 10 and <= 46



Not rated or not available



Soil Rating Points

<= 10



> 10 and <= 46



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background

Aerial Photography



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Calcium Carbonate (CaCO₃) (Navajo Refinery - South RO Reject Field)

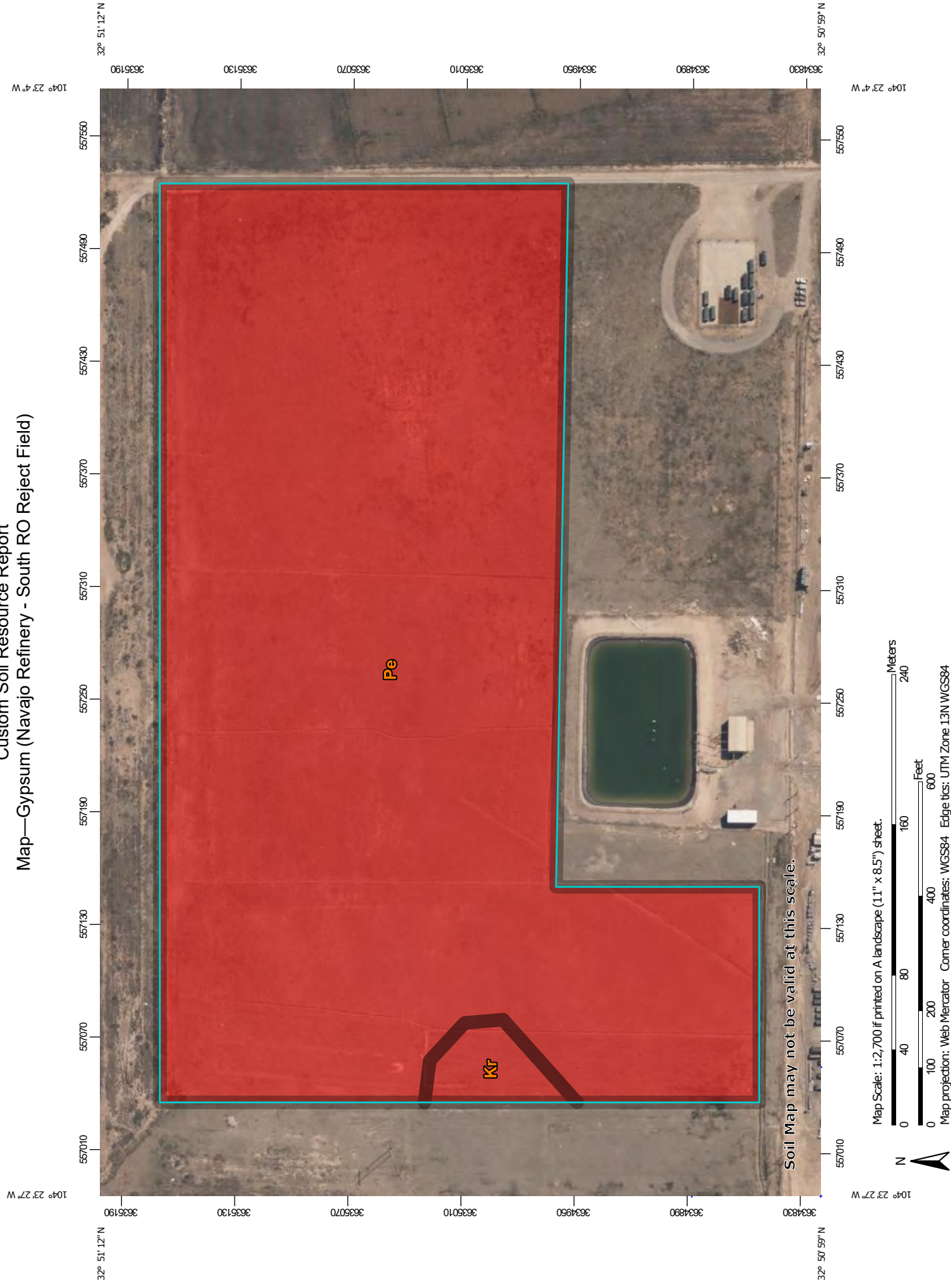
Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	46	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	10	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Calcium Carbonate (CaCO₃) (Navajo Refinery - South RO Reject Field)*Units of Measure:* percent*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* Yes*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**Gypsum (Navajo Refinery - South RO Reject Field)**

The content of gypsum is the percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils high in content of gypsum, such as those with more than 10 percent gypsum, may collapse if the gypsum is removed by percolating water. Gypsum is corrosive to concrete.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Gypsum (Navajo Refinery - South RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 = 0

 Not rated or not available

Soil Rating Lines

 = 0

 Not rated or not available

Soil Rating Points

 = 0

 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL: [Web Soil Survey](#)

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico

Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Gypsum (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	0	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Gypsum (Navajo Refinery - South RO Reject Field)

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: Yes

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

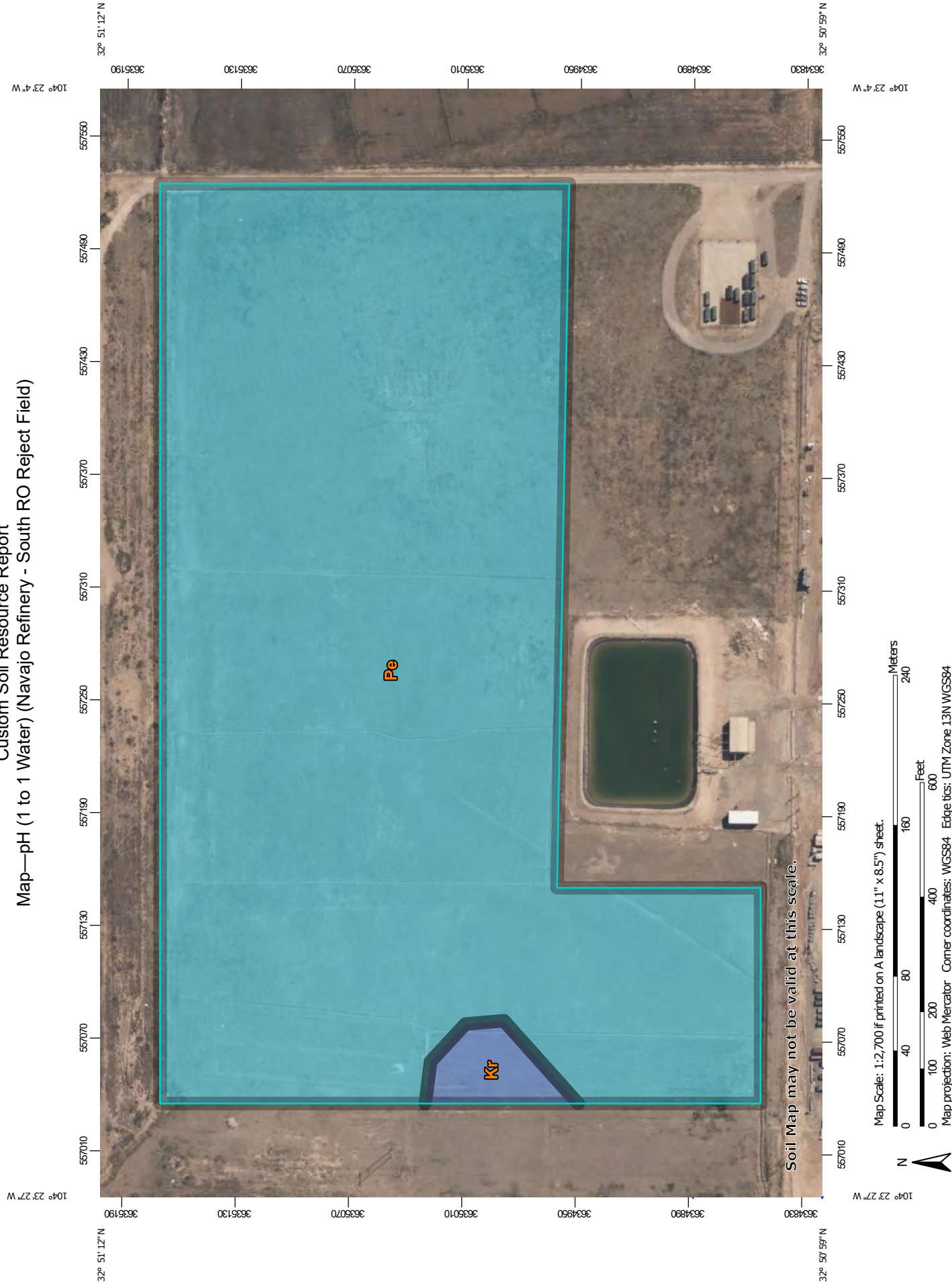
pH (1 to 1 Water) (Navajo Refinery - South RO Reject Field)

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion. In general, soils that are either highly alkaline or highly acid are likely to be very corrosive to steel. The most common soil laboratory measurement of pH is the 1:1 water method. A crushed soil sample is mixed with an equal amount of water, and a measurement is made of the suspension.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—pH (1 to 1 Water) (Navajo Refinery - South RO Reject Field)



Map Scale: 1:2,700 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
 Area of Interest (AOI)

Soils

Soil Rating Polygons

Ultra acid (pH < 3.5)
 Extremely acid (pH 3.5 - 4.4)
 Very strongly acid (pH 4.5 - 5.0)
 Strongly acid (pH 5.1 - 5.5)
 Moderately acid (pH 5.6 - 6.0)
 Slightly acid (pH 6.1 - 6.5)
 Neutral (pH 6.6 - 7.3)
 Slightly alkaline (pH 7.4 - 7.8)
 Moderately alkaline (pH 7.9 - 8.4)
 Strongly alkaline (pH 8.5 - 9.0)
 Very strongly alkaline (pH > 9.0)
 Not rated or not available

Soil Rating Lines

Ultra acid (pH < 3.5)
 Extremely acid (pH 3.5 - 4.4)
 Very strongly acid (pH 4.5 - 5.0)
 Strongly acid (pH 5.1 - 5.5)
 Moderately acid (pH 5.6 - 6.0)
 Slightly acid (pH 6.1 - 6.5)
 Neutral (pH 6.6 - 7.3)
 Slightly alkaline (pH 7.4 - 7.8)
 Moderately alkaline (pH 7.9 - 8.4)
 Strongly alkaline (pH 8.5 - 9.0)
 Very strongly alkaline (pH > 9.0)
 Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

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Table—pH (1 to 1 Water) (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	8.2	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	7.6	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

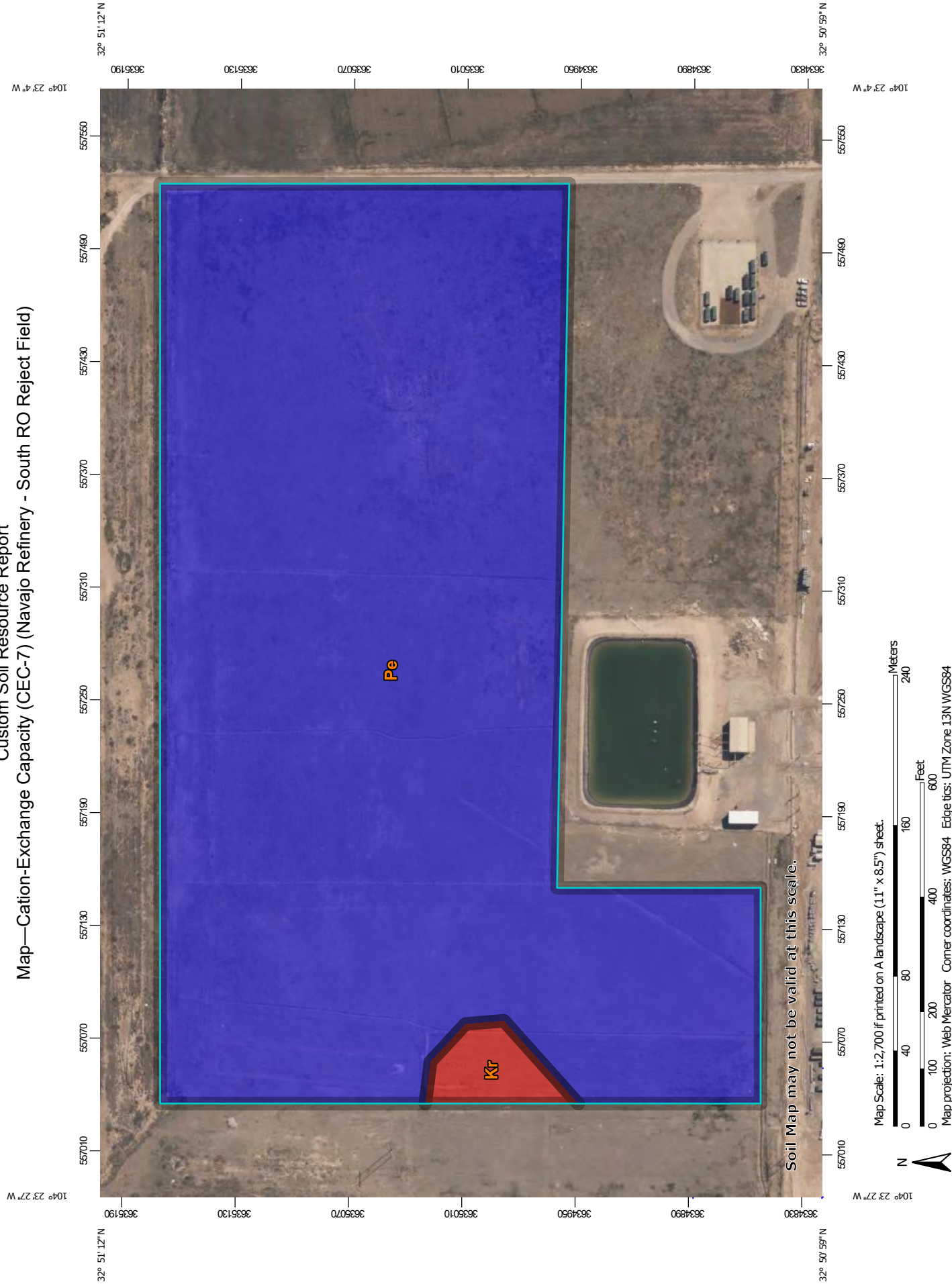
Rating Options—pH (1 to 1 Water) (Navajo Refinery - South RO Reject Field)*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* No*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**Cation-Exchange Capacity (CEC-7) (Navajo Refinery - South RO Reject Field)**

Cation-exchange capacity (CEC-7) is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Cation-Exchange Capacity (CEC-7) (Navajo Refinery - South RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 14.1



> 14.1 and <= 15.0



Not rated or not available



Soil Rating Lines

<= 14.1



> 14.1 and <= 15.0



Not rated or not available



Soil Rating Points

<= 14.1



> 14.1 and <= 15.0



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background

Aerial Photography



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

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Table—Cation-Exchange Capacity (CEC-7) (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating (milliequivalents per 100 grams)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	14.1	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	15.0	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Cation-Exchange Capacity (CEC-7) (Navajo Refinery - South RO Reject Field)

Units of Measure: milliequivalents per 100 grams

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

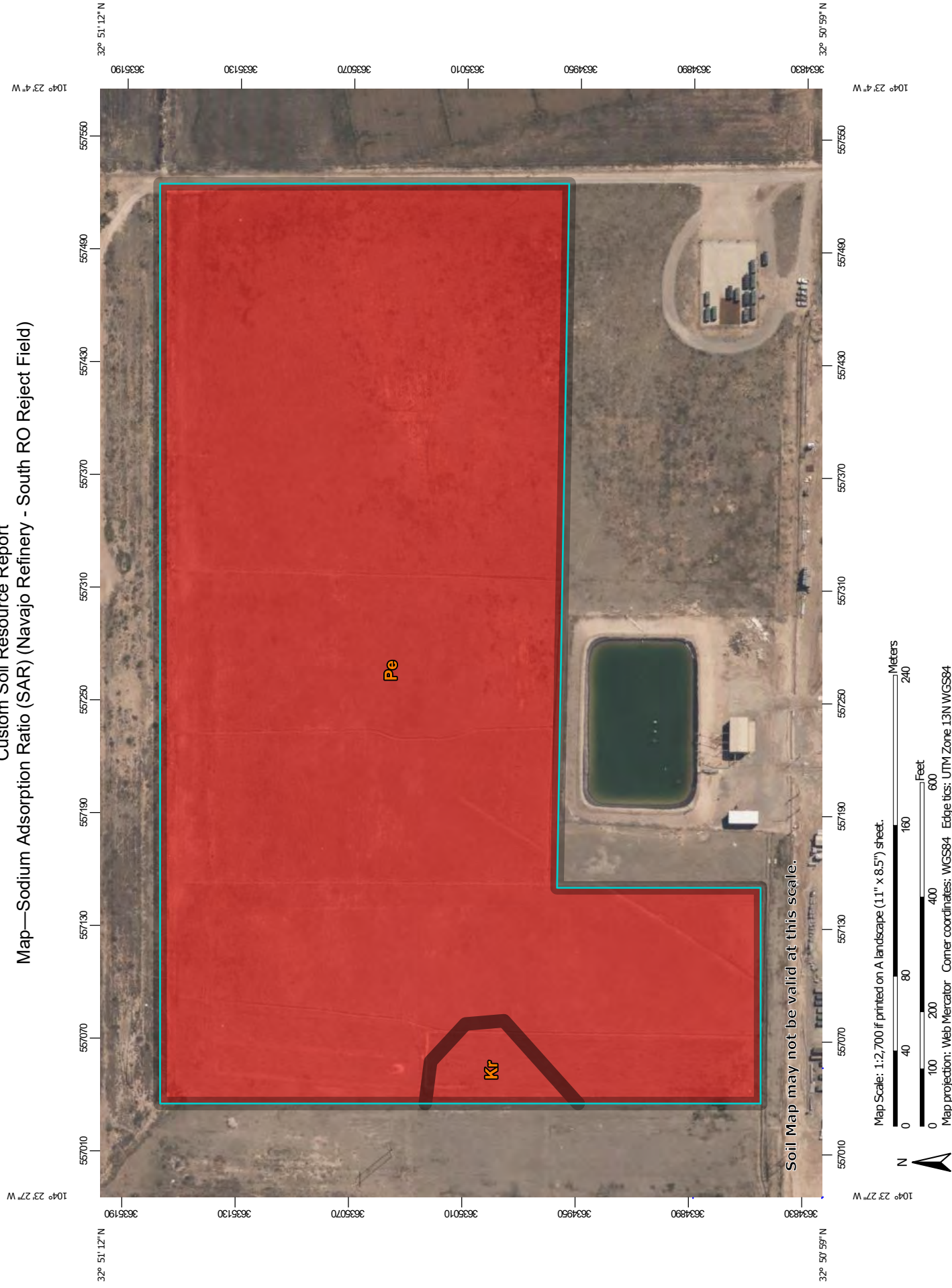
Sodium Adsorption Ratio (SAR) (Navajo Refinery - South RO Reject Field)

Sodium adsorption ratio is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity (Ksat) and aeration, and a general degradation of soil structure.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Sodium Adsorption Ratio (SAR) (Navajo Refinery - South RO Reject Field)



Map Scale: 1:2,700 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 = 0.0

 Not rated or not available

Soil Rating Lines

 = 0.0

 Not rated or not available

Soil Rating Points

 = 0.0

 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 16, Jun 8, 2020

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Table—Sodium Adsorption Ratio (SAR) (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0.0	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	0.0	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Sodium Adsorption Ratio (SAR) (Navajo Refinery - South RO Reject Field)*Aggregation Method:* Dominant Component*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher*Interpret Nulls as Zero:* Yes*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)**Soil Physical Properties**

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Available Water Capacity (Navajo Refinery - South RO Reject Field)

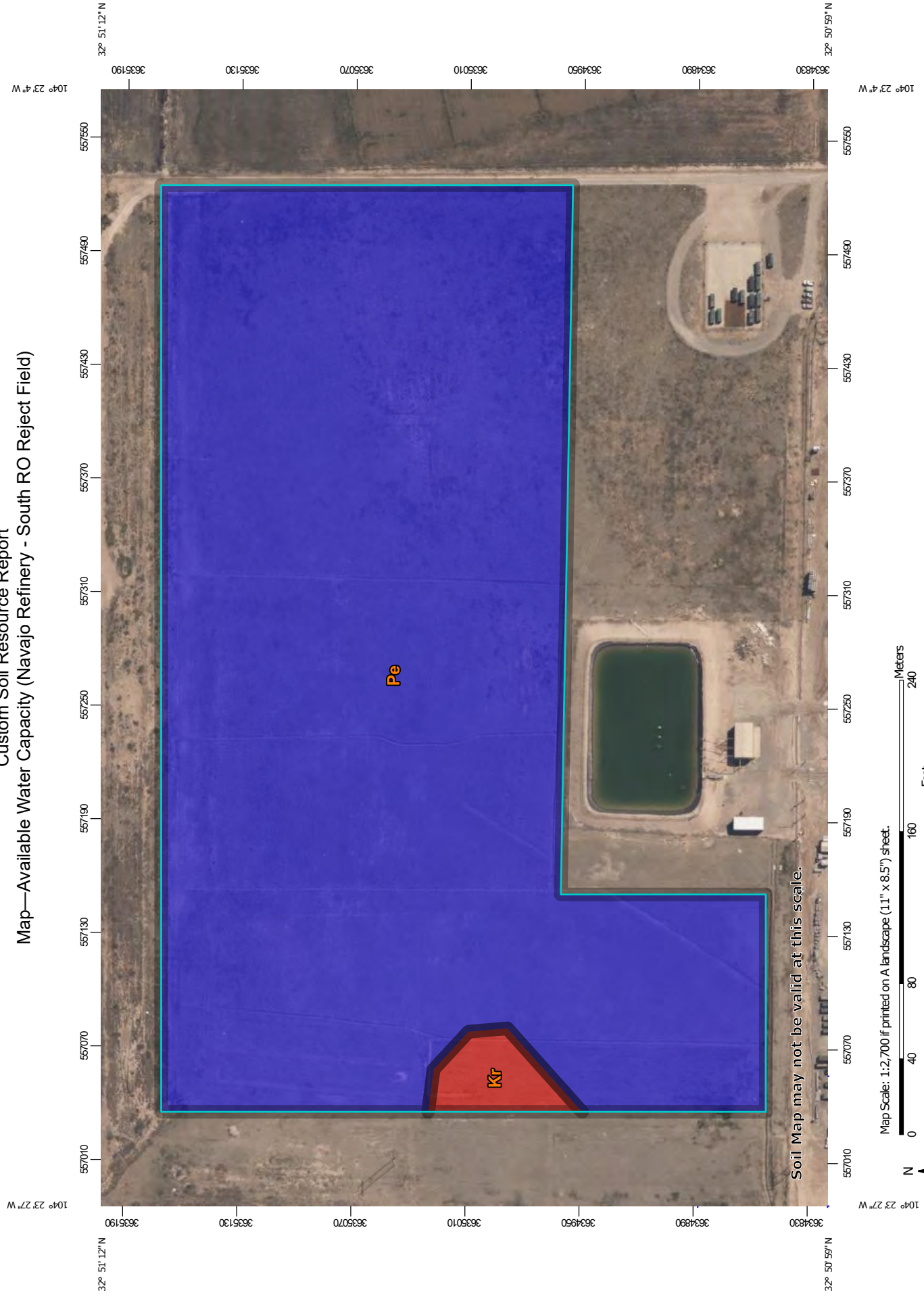
Available water capacity (AWC) refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in centimeters of water per centimeter of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure, with corrections for salinity and rock fragments. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. It is not an estimate of the quantity of water actually available to plants at any given time.

Available water supply (AWS) is computed as AWC times the thickness of the soil. For example, if AWC is 0.15 cm/cm, the available water supply for 25 centimeters of soil would be 0.15 x 25, or 3.75 centimeters of water.

Custom Soil Resource Report

For each soil layer, AWC is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report Map—Available Water Capacity (Navajo Refinery - South RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 0.18



> 0.18 and <= 0.20



Not rated or not available



Soil Rating Lines

<= 0.18



> 0.18 and <= 0.20



Not rated or not available



Soil Rating Points

<= 0.18



> 0.18 and <= 0.20



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background

Aerial Photography



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

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Table—Available Water Capacity (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating (centimeters per centimeter)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	0.18	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	0.20	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Available Water Capacity (Navajo Refinery - South RO Reject Field)

Units of Measure: centimeters per centimeter

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

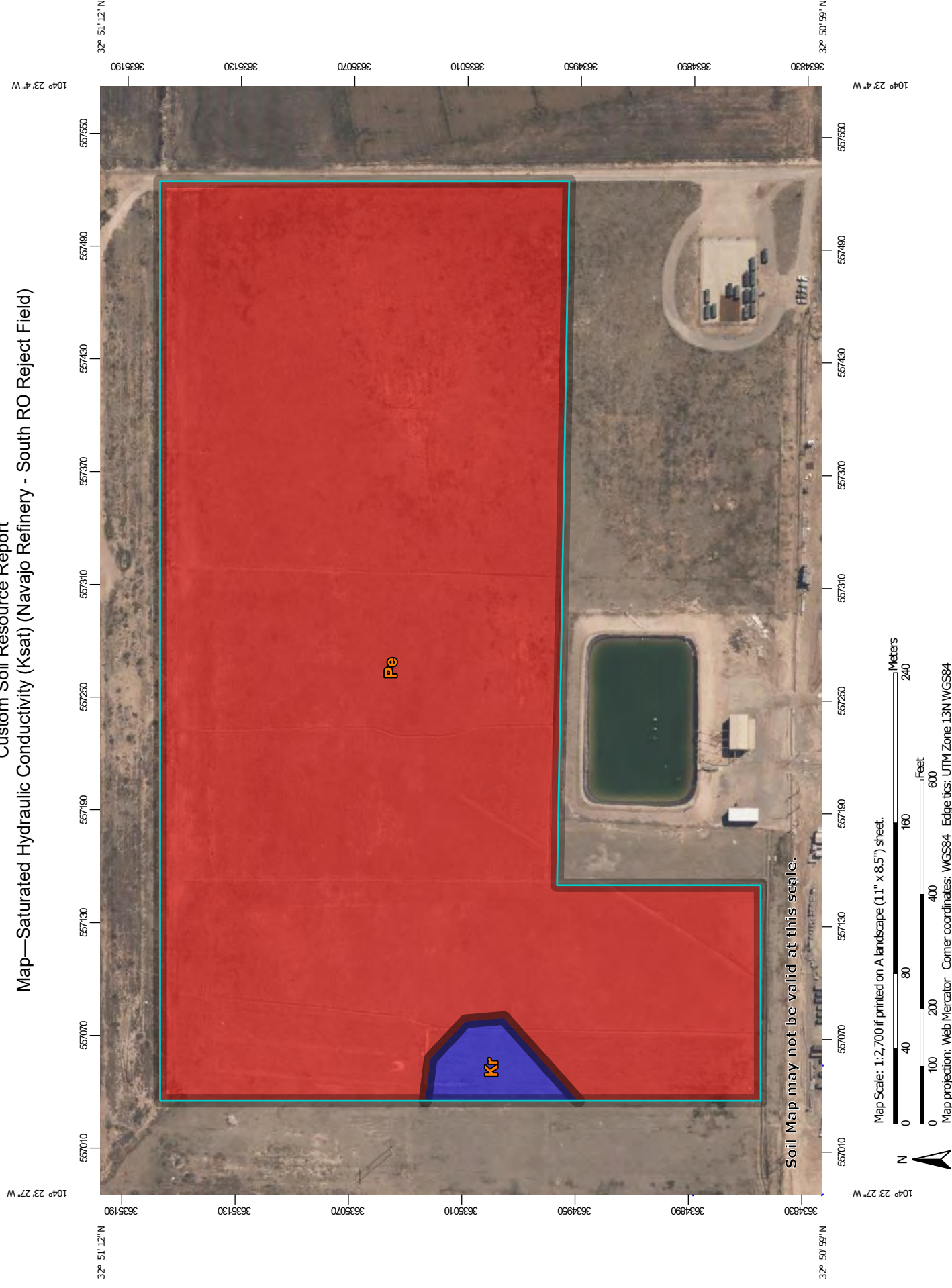
Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - South RO Reject Field)

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Custom Soil Resource Report Map—Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - South RO Reject Field)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 3.1542



> 3.1542 and <= 3.5132



Not rated or not available



Soil Rating Lines

<= 3.1542



> 3.1542 and <= 3.5132



Not rated or not available



Soil Rating Points

<= 3.1542



> 3.1542 and <= 3.5132



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background

Aerial Photography



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

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Table—Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	3.5132	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	3.1542	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Saturated Hydraulic Conductivity (Ksat) (Navajo Refinery - South RO Reject Field)

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

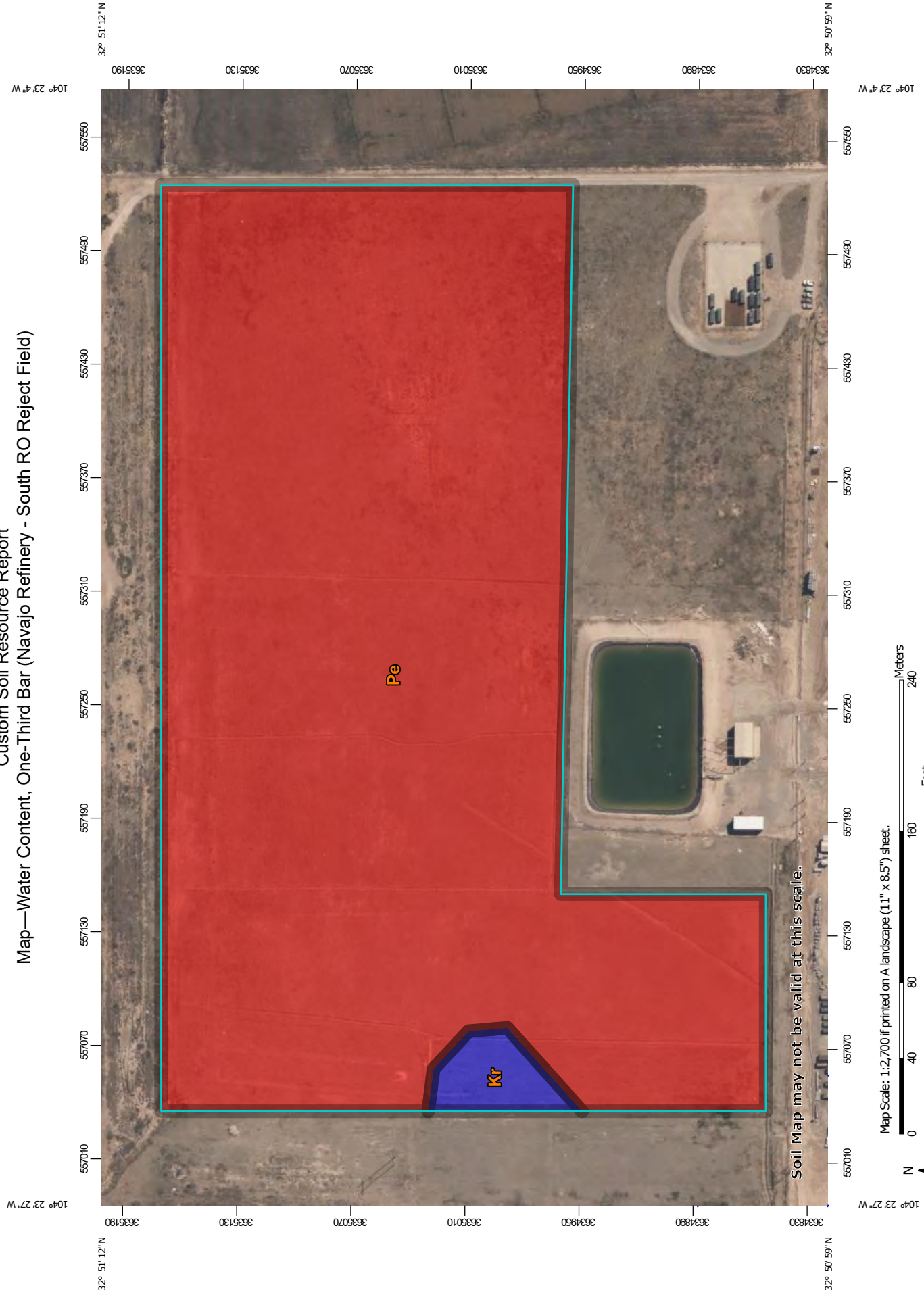
Water Content, One-Third Bar (Navajo Refinery - South RO Reject Field)

Water content, one-third bar, is the amount of soil water retained at a tension of 1/3 bar, expressed as a volumetric percentage of the whole soil. Water retained at 1/3 bar is significant in the determination of soil water-retention difference, which is used as the initial estimation of available water capacity for some soils. Water retained at 1/3 bar is the value commonly used to estimate the content of water at field capacity for most soils.

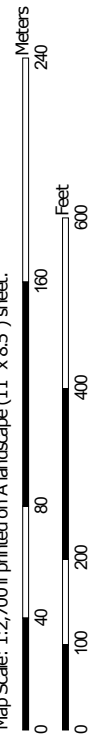
Water content varies between soil types, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure.

For each soil layer, water content is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report Map—Water Content, One-Third Bar (Navajo Refinery - South RO Reject Field)



Map Scale: 1:2,700 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)



Soils

Soil Rating Polygons

<= 29.7



> 29.7 and <= 31.4



Not rated or not available



Soil Rating Lines

<= 29.7



> 29.7 and <= 31.4



Not rated or not available



Soil Rating Points

<= 29.7



> 29.7 and <= 31.4



Not rated or not available



Water Features

Streams and Canals



Transportation

Rails



Interstate Highways



US Routes



Major Roads



Local Roads



Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Water Content, One-Third Bar (Navajo Refinery - South RO Reject Field)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Kr	Karro loam, 0 to 1 percent slopes	31.4	0.6	2.0%
Pe	Pima silt loam, 0 to 1 percent slopes	29.7	28.3	98.0%
Totals for Area of Interest			28.9	100.0%

Rating Options—Water Content, One-Third Bar (Navajo Refinery - South RO Reject Field)

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: Yes

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

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Custom Soil Resource Report

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United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX B

GROUNDWATER SAMPLING FORMS

First Quarterly Event (July 2019)

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: 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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
									NTU	Color
1528	18.78	200	0.10	24.04	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)				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.:			

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-40
 Sample ID: MW-40 Duplicate ID: _____
 Sample Depth: _____
 Project and Task No.: _____
 Project Name: R0 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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)
1556	12.21	200	0.1	25.07	6.72	3.26	0.29	-308	NTU color
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	<u>Sample</u>								

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.:			

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-SS
 Sample ID: MW-SS 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 ($\mu\text{S}/\text{cm}$) ms/cm	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
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	0.65	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 ($\mu\text{S}/\text{cm}=\mu\text{mhos}/\text{cm}$)	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.:			

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: SJM
 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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	NTU	Remarks (color, turbidity, and sediment)
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	6.69	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.:			

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: 2'
 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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
0925	13.98'	200	0.10	21.61	6.75	4.21	0.00	149	NTU	color
0930	13.99'	200	0.25	21.57	6.75	4.21	0.00	149	56.4	clear
0935	14.00'	200	0.40	21.75	6.74	4.21	0.00	149	59.1	clear
0938	14.00	200	0.55	21.70	6.74	4.22	0.00	151	28.8	clear
0941	14.00	200	0.70	21.83	6.74	4.21	0.00	152	13.3	clear
0944	14.00	200	0.85	21.82	6.74	4.20	0.00	153	3.2	clear
0947	14.00	200	1.0	21.81	6.74	4.19	0.00	153	2.0	clear
0950	Sample								1.8	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 %		EB-071719-6W	
Field Temperature °C		Field Temperature °C		collected @	
Instrument Reading (mV)		Instrument Reading (mg/L)		0940 off	
Model or Unit No.:		Model or Unit No.:		water level	
				meter	

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-115

Initial Depth to Water: 13.75'

Sample ID: mw-115 Duplicate ID: -

Depth to Water after Sampling: 13.83

Sample Depth: _____

Total Depth to Well: _____

Project and Task No.: _____

Well Diameter: 2

Project Name: Ro Fields

1 Casing/Borehole Volume: _____

Date: 7-17-19

(Circle one)

Sampled By: SHM

4 Casing/Borehole Volumes: _____
(Circle one)

Method of Purging: Peri Pump

Total Casing/Borehole
Volumes Removed: _____

Method of Sampling: LOW FLOW

[illegible]

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: EB 071719 GW water level meter 0.003
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.:			

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-116
 Sample ID: MW-116 Duplicate ID: Dup-6W-2
 Sample Depth: _____
 Project and Task No.: _____
 Project Name: Navajo Rd Fields
 Date: 7-17-19
 Sampled By: SHM
 Method of Purging: Peri Pump
 Method of Sampling: Low Flow

Initial Depth to Water: 14.05
 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 ($\mu\text{S/cm}$) (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 ($\mu\text{S/cm}=\mu\text{mhos/cm}$)	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.:			

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 ($\mu S/cm$)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
									NTU	color
11:09	12.60	200	0.10	23.97	6.84	4.25	1.21	157	112	clear
11:12	12.60	200	0.25	22.13	6.66	4.26	0.00	162	82.3	clear
11:15	12.60	200	0.40	21.88	6.67	4.27	0.00	162	85.3	clear
11:18	12.60	200	0.55	21.70	6.69	4.28	0.00	162	77.2	clear
11:21	12.60	200	0.70	21.81	6.70	4.27	0.00	162	70.7	clear
11:24	12.60	200	0.85	21.77	6.71	4.27	0.00	161	62.7	clear
11:27	12.60	200	1.0	21.75	6.72	4.26	0.00	161	63.4	clear
11:30	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 ($\mu S/cm = \mu mhos/cm$)	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.:			

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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
						µS/cm			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	4.88	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)					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.:				

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: Perc 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)	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)					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.:				

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 ($\mu\text{S}/\text{cm}$)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
						<u>113/cm</u>			<u>NTU</u>	<u>color</u>
1419	17.12	200	0.1	26.65	6.94	2.74	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	6.61	5.01	0.00	149	0.0	clear
1437	<u>Sample</u>									

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 ($\mu\text{S}/\text{cm} = \mu\text{mhos}/\text{cm}$)	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.:				

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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
1307	15.99	250	0.15	24.73	7.20	4.17	0.63	98	NTU	color
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.:			

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 RO 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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
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/ per 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)					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 %		Going dry intermittently while development	
Field Temperature °C		Field Temperature °C			
Instrument Reading (mV)		Instrument Reading (mg/L)			
Model or Unit No.:		Model or Unit No.:		Sample @	
				1624	

WELL SAMPLING AND/OR DEVELOPMENT RECORD

Well ID: MW-141
 Sample ID: MW-141 Duplicate ID: Dup-6W
 Sample Depth: _____
 Project and Task No.: _____
 Project Name: Navajo BO Fields
 Date: 7-15-19
 Sampled By: SHM
 Method of Purging: sb 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) (mg/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)
1014	pump on								NTU color 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)				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 %		Sample @	
Field Temperature °C		Field Temperature °C		1124	
Instrument Reading (mV)		Instrument Reading (mg/L)			
Model or Unit No.:		Model or Unit No.:			

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 RO 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: 3.19 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)	
1400	Pump on								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
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.:			

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: Nawajo RO fields

Date: 7-12-19

Sampled By: SHM

Method of Purging: 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"

(Circle one) Casing/Borehole Volume: 3.40
(Circle one)

(Circle one) 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)
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/ peripump									
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)				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		
Instrument Reading (mV)		Instrument Reading (mg/L)		
Model or Unit No.:		Model or Unit No.:		

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 pump / peri pump

Method of Sampling: Low flow

Initial Depth to Water: 12.20

Depth to Water after Sampling: 17.35

Total Depth to Well: 22.75 → 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)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Remarks (color, turbidity, and sediment)	
						µS/cm			NTU	Color
1855	pump on for development								1000+	Pinkish brown
1910		2000	10	16.68	7.11	3.45	1.00	95	1000+	light tan
1920		2000	150	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	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)

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

Standard Solution (mV)	
Field Temperature °C	
Instrument Reading (mV)	

DISSOLVED OXYGEN CALIBRATION

Altitude / Salinity %	
Field Temperature °C	
Instrument Reading (mg/L)	

Notes:

Model or Unit No.:

Model or Unit No.:

Not final TOC measurement

Sample @ 2027

Second Quarterly Event (October 2019)



Hydrologic Monitoring

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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 background 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").

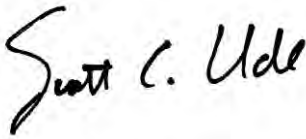
With suggested telephone notification, FedEx pickup from locked shed (35-25-39 combination) no earlier than approximately 14:00 daily, across from Artesia Wool Co (access area from "inside" Refinery).

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.

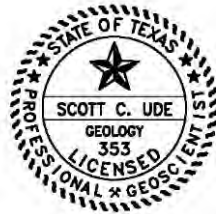
HMI appreciates the opportunity to assist Wood with this project. If you have any questions or
would like additional information please feel free to call us at 713.464.5206.

Sincerely,

HYDROLOGIC MONITORING



Scott C. Ude, 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

Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																						
Well ID	QA/QC	HMI Use	HMI Use (# Samp Wells)	n																		
				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/c m)	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	22.3	2,470	1.3	-336.8	9.7	Clear	Yes	Yes	Yes	
MW-29			2	REST	10/22/19	9:00	NP	18.21	0.00	24.22	10/22/19	9:25	20.4	4,200	1.6	-203.0	8.1	Clear	Yes	Yes	Yes	
MW-56			3	NCL	10/22/19	9:00	NP	13.21	0.00	26.50	10/22/19	9:25	21.1	4,110	1.6	-43.8	0.6	Clear	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	20.2	4,210	2.1	155.7	7.4	Clear	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	18.8	3,570	1.7	70.4	30.7	Sl. Cloudy	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	17.9	2,910	2.6	56.4	7.6	Clear	Yes	Yes	Yes	
MW-115			7	REST	10/22/19	11:30	NP	12.95	0.00	27.50	10/22/19	11:55	18.8	3,798	2.7	53.2	1.1	Clear	Yes	Yes	Yes	
MW-114			8	REST	10/22/19	10:35	NP	13.47	0.00	38.25	10/22/19	11:00	19.9	3,375	1.4	78.4	1.9	Clear	Yes	Yes	Yes	
MW-125			9	REST	10/22/19	9:35	NP	16.11	0.00	28.31	10/22/19	10:00	18.2	4,131	2.3	65.1	3.9	Clear	Yes	Yes	Yes	
MW-117			10	REST	10/22/19	11:40	NP	11.78	0.00	27.22	10/22/19	12:05	20.1	2,700	2.0	43.1	14.3	Clear	Yes	Yes	Yes	
MW-118			11	REST	10/22/19	10:25	NP	15.19	0.00	28.29	10/22/19	10:50	18.9	3,150	3.2	71.3	31.3	Clear	Yes	Yes	Yes	
MW-119			12	REST	10/22/19	9:30	NP	13.70	0.00	28.11	10/22/19	9:55	19.6	3,260	2.7	47.6	28.3	Clear	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	19.0	4,240	0.9	121.8	75.9	Sl. Cloudy	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	19.3	4,490	1.4	81.7	55.4	Sl. Cloudy	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	18.4	3,820	1.1	72.9	10.8	Clear	Yes	Yes	Yes	
RW-#18A			16	REST	10/22/19	9:40	NP	14.02	0.00	17.78	10/22/19	10:00	21.4	4,520	2.1	69.4	16.8	Clear	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	21.1	4,100	2.0	140.3	59.2	Sl. Cloudy	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

+ Dup - RO - 01

This is scheduled for RO Field on 4/21/93. It is a gauge only well for 2419 p.p.m.

Monitoring Well Purging and Sampling Record

Navajo Refining Company Well: MW-40 Completion Casing Diam. Casing Material

Artesia Refinery Event: 4/21/93 RO Field At-Grade 2-in PVC ✓

Artesia, New Mexico Area of Concern: REST Upright 4-in SS ✓

Well Inspection Information Vault Other Other Other

Hydrologic Monitoring
for TRC
Houston, Texas

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
10/22/94	950	NP	11.44	0.00	24.75	21.8	Yes	Yes	Yes	Yes		
											Weather: Clear 50's	

Well Purging Record

Initials: From TAB - to SCD

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	
10/22/93	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
10/22/93	1015	MW-40	11.56	6.80	22.3	2470	1.3	-336.8	9.7	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
												8260
												300
												6010/6020
												per historical, Pace National
												2540C
												6010/6020
												Field filtered 0.45-u
												6010/6020 and/or 7470
												Field filtered 0.45-u
												SM4500
10/22/93	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

Well Inspection Information

Date	Time	Depth to Water (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Cap	Casing	Well Secured	Label	Other	Comments
10/22/19	900	117	18.21	0.00	24.22	19.2	Yes	Yes	Yes	Yes		Weather: Clear-50's

Initials: From TAB - to SCD

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	Comments
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	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
										Anions (Chloride, Fluoride, Sulfate)	Neat	8260
										Cations (Ca, K, Na), taken from total metals bottle	HNO3	300
										Nitrate-Nitrite	H2SO4	6010/6020
										TDS	Neat	per historical, Pace National
										Short List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Neat	2540C
										Short List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	HNO3	6010/6020
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020 and/or 7470
											HNO3	Field filtered 0.45-u
										Cyanide	NaOH	Field filtered 0.45-u
										+ 80 Field		SMA500

If <0.03 feet LNAPL present remove LNAPL and sample immediately.

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

Monitoring Well Purging and Sampling Record

Navajo Refining Company
 Artesia Refinery
 Artesia, New Mexico

Well: MW-56
Event: 4/19/2014
Area of Concern: NCL

Hydrologic Monitoring for TRC
 Houston, Texas

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

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: cloudy 48°

Well Pumping Record

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	4200	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
	910	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

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	9:15	MW-56	13.25	6.70	21.1	4110	1.6	-93.8	0.6	DRO	HCL	Lab: Pace National, Mt. Juliet, TN 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 / NAPI present remove / NAPI and sample again. If not:

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-55
Event: 2/19/94
Area of Concern: NCL

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

Hydrologic Monitoring
for TRC
Houston, Texas

+ Dup-RO-02

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	
10-22-19	920	NP	12.51	0.00	26.85	21.7	Yes	Yes	Yes	Yes	
Weather: Clear, 50's											

Well Purging Record

Initials: FKH CJH - TO BRH

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	Comments
10-22-94	925	12.53	0.5	6.50	20.0	4210	2.0	104.9	12.6	Colorless; Clear	Low-flow groundwater sample:
	927	12.53	1.0	6.52	20.0	4210	2.0	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	6.54	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
10-22-94	945	MW-55	12.54	6.61	20.2	4210	2.1	155.7	7.4	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
										Anions (Chloride, Fluoride, Sulfate)	HCL	8260
										Cations (Ca, K, Na), taken from total metals bottle	Neat	300
										Nitrate-Nitrite	HNO3	6010/6020
										TDS	H2SO4	per historical, Pace National
										Short List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Neat	2540C
										Short List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	HNO3	6010/6020
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020 and/or 7470
										Cyanide	HNO3	Field filtered 0.45-u
											NaOH	SM4500
10-22-94	1000	Dup-RO-02	12.54	6.61	20.2	4210	2.1	155.7	7.4	+ RO Field		

If <0.03 feet / NAPI present remain / NAPI

Bagged dedicated tubing
Navajo Refining Company

Well: MW-140

Event:

Area of Concern: RO Fields

Well Inspection Information

Well Purging and Sanitation

Record Located inside north
 warehouse fence/pin area.
 If gate is closed, Doming
 can facilitate access.

Hydrologic Monitoring for TRC Houston, Texas

Initials: B/2/H

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	
10/22/19	1010	NP	9.31	0.00	29-76	24-76	Yes	Yes	Yes		Weather: Clear, 50s
						(5' off base)					

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	
10/22/14	1015	9.41	0.5	6.84	18.7	3480	3.0	67.9	38.6	51.2 lowly, color less	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	44.7		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		
V	1038	9.41	5.0	6.75	18.8	3570	1.7	70.4	30.7		

Well Sampling Record

[illegible]

ATV S. Field RO-Reject water field

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-115
Event: 2-19
Area of Concern: REST

Completion
At-Grade ☒ 2-in ☒ PVC ☒
Upright ☒ 4-in ☐ SS ☐
Vault ☐ Other ☐

Hydrologic Monitoring
for TRC
Houston, Texas

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		Initials: <i>B3</i>	Weather: <i>Sunny 60's</i>

Well Purging Record

Initials: BB

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
10/22/19	1155	MW-115	12.99	6.78	18.8	3798	2.7	53.2	1.1	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
										Anions (Chloride, Fluoride, Sulfate)	HCL	8260
										Cations (Ca, K, Na), taken from total metals bottle	Neat	300
										Nitrate-Nitrite	HNO3	6010/6020
										TDS	H2SO4	per historical, Pace National
										Short List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Neat	2540C
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020 and/or 7470
										Cyanide	HNO3	Field filtered 0.45-u
											NaOH	SM4500
										+ RO Field		
												If <0.03 feet LNAPL present, remove LNAPL and sample groundwater

ATV S-Field RO-Reject water field

Monitoring Well Purging and Sampling Record

Navajo Refining Company Well: MW-114 Completion Casing Diam. Casing Material
Artesia Refinery Event: 2H19 At-Grade 2-in PVC ✓
Artesia, New Mexico Area of Concern: REST Upright ✓ 4-in SS
Vault Other Other

Hydrologic Monitoring
for TRC
Houston, Texas

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												

Initials: BS

Well Purging Record

Initials: BS

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
	1053	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	DRO	HCL	Lab: Pace National, Mt. Juliet, TN 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
At-Grade ☒ 2-in ☒ PVC ☒
Upright ☒ 4-in ☐ SS ☐
Vault ☐ 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	9:35	NP	16.11	0.00	28.31	23.5	yes	yes	yes	YES		

Initials: BS

Weather: Sunny 50's

Well Purging Record

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	9:40	16.17	0.5	6.89	18.5	4136	3.3	53.4	9.6	Colorless, clear	Low-flow groundwater sample:
	9:43	16.17	1.0	6.86	18.3	4148	2.7	57.5	7.1	"	A) peristaltic pump w/ ded tubing
	9:45	16.17	1.5	6.83	18.1	4139	2.5	63.1	6.2	"	B) ded bladder pump
	9:48	16.17	2.0	6.82	18.1	4135	2.4	63.8	4.5	"	C) non-ded bladder pump; or
	9:50	16.17	2.5	6.81	18.2	4133	2.3	64.3	4.1	"	Standard groundwater sample:
	9:53	16.17	3.0	6.81	18.2	4132	2.3	64.6	4.1	"	D) bailer due to limited column; or
	9:55	16.17	3.5	6.81	18.2	4132	2.3	64.8	4.0	"	E) recovery well cycling sample
	9:58	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	10:00	MW-125	16.17	6.81	18.2	4131	2.3	65.1	3.9	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8260
										Antions (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
										Long 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	SMA500
										+RO Field		
										If <0.03 feet LNAPL present, remove LNAPL and sample groundwater.		

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

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

Well Inspection Information

JAC

Well Purging Record

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	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										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 & 1d		

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:
Event:
Area of Concern:

MW-118
Z-H14
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

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	
10/23/19	1025	ND	15.19	0.00	28.29	21.0	yes	yes	yes	yes		JAC
Weather: Clear, 60's												

Well Purging Record											
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Initials: SAC

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	Comments
10/23/19	1030	15.23	0.5	6.56	20.2	3,240	4.5	54.7	12.6	Colorless / Cloudy	Low-flow groundwater sample:
	1033	15.23	1.0	6.44	19.7	3,210	4.1	60.3	9.3	"	A) peristaltic pump w/ ded tubing
	1035	15.24	1.5	6.41	19.5	3,200	3.8	66.2	7.6	"	B) ded bladder pump
	1038	15.24	2.0	6.35	19.3	3,180	3.5	67.4	5.9	Colorless / Sl. Cloudy	C) non-ded bladder pump; or
	1040	15.24	2.5	6.32	19.2	3,170	3.4	68.6	4.3	"	Standard groundwater sample:
	1043	15.25	3.0	6.30	19.1	3,160	3.3	69.9	3.8	Colorless / Clear	D) bailer due to limited column; or
	1045	15.25	3.5	6.29	19.0	3,150	3.2	70.1	3.6	"	E) recovery well cycling sample
	1048	15.25	4.0	6.28	18.9	3,150	3.2	71.3	3.1	"	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
10/23/19	1050	MW-118	15.25	6.28	18.9	3,150	3.2	71.3	3.1	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
										Anions (Chloride, Fluoride, Sulfate)	HCL	8260
										Cations (Ca, K, Na), taken from total metals bottle	Neat	300
										Nitrate-Nitrite	HNO3	6010/6020
										TDS	H2SO4	per historical, Pace National
										Short List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Neat	254DC
										Short List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	HNO3	6010/6020
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020 and/or 7470
											HNO3	Field filtered 0.45-u
										Cyanide	NaOH	SM4500
										+ 20 F. 310		
										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:
Event:
Area of Concern:

MW-119
2H19
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

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

Initials: JAC

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	Low-flow groundwater sample:
10/22/19	935	13.70	0.5	6.89	18.6	3150	4.1	42.5	114	Colorless/Cloudy	A) peristaltic pump w/ ded tubing
	938	13.70	1.0	6.69	18.9	3180	3.7	44.1	96	"	B) ded bladder pump
	940	13.71	1.5	6.61	19.1	3200	3.4	45.3	80	"	C) non-ded bladder pump; or
	943	13.71	2.0	6.56	19.2	3220	3.1	46.9	67	"	Standard groundwater sample:
	945	13.71	2.5	6.48	19.3	3230	2.9	46.7	41.8	Colorless/si. Cloudy	D) bailer due to limited column; or
	948	13.71	3.0	6.44	19.4	3240	2.8	46.8	35.3	"	E) recovery well cycling sample
	950	13.71	3.5	6.42	19.5	3250	2.7	47.0	31.5	"	F) irrigation well grab sample
	953	13.71	4.0	6.41	19.6	3260	2.7	47.6	28.3	Colorless/clear	

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	3260	2.7	47.6	28.3	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
										Anions (Chloride, Fluoride, Sulfate)	HCL	8260
										Cations (Ca, K, Na), taken from total metals bottle	Neat	300
										Nitrate-Nitrite	HNO3	6010/6020
										TDS	H2SO4	per historical, Pace National
										Short List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Neat	2540C
										Short List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	HNO3	6010/6020
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020 and/or 7470
										Cyanide	HNO3	Field filtered 0.45-u
										+20 Field	NaOH	SM4500

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

Hydrologic Monitoring for TRC Houston, Texas

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		Sunny, 50's
						(5' off base)				* NEEDS lock		Weather:

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

Bagged two extensions

Monitoring Well Purging and Sampling Record

+ EB-RD-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

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	
10-22-19	900	NP	12.77	0.00	27.03	20.0	Yes	Yes	Yes	Weather: Clear

Initials: MJB

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	Low-flow groundwater sample:
10-22-19	405	12.85	0.5	6.80	17.3	3760	2.0	46.9	18.7	Clear / Colorless	peristaltic pump w/ ded tubing
	907	12.85	1.0	6.81	17.7	3810	1.8	56.0	16.3		ded bladder pump
	910	12.85	1.5	6.80	18.0	3830	1.6	62.4	15.1		non-ded bladder pump; or
	912	12.85	2.0	6.81	18.2	3820	1.5	65.6	14.7		Standard groundwater sample:
	915	12.85	2.5	6.81	18.4	3810	1.3	67.8	13.6		baller due to limited column; or
	917	12.85	3.0	6.82	18.5	3810	1.2	64.0	12.5		recovery well cycling sample
	920	12.85	3.5	6.82	18.4	3820	1.1	70.7	11.1		irrigation well grab sample
	922	12.85	4.0	6.81	18.4	3820	1.1	72.9	10.8		

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	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8015M
										Antions (Chloride, Fluoride, Sulfate)	HCL	8260
										Cations (Ca, K, Na), taken from total metals bottle	Neat	300
										Nitrate-Nitrite	HNO3	6010/6020
										TDS	H2SO4	per historical, Pace National
										Short List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Neat	2540C
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	HNO3	6010/6020
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	6010/6020 and/or 7470
										Cyanide	HNO3	Field filtered 0.45-u
											NaOH	SM4500
945		EB-RD-1	NA							+ RD Field		

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

Annual Frequency for site-wide program

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: RW-#18A
Event: 2/1/9
Area of Concern: REST

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

Hydrologic Monitoring
for TRC
Houston, Texas

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	YES	YES	YES			Initials: <u>SLH</u>	Weather: <u>clear, 60s</u>
						16.7 (permanently lowered in 1H19)							

Well Purging Record

Initials: *SLU*

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	21.0	4000	2.3	64.6	36.2		A) peristaltic pump w/ ded tubing
	950	14.04	1.5	6.64	21.0	4080	2.3	64.4	24.5		B) ded bladder pump
	952	14.04	2.0	6.60	21.0	4080	2.2	65.2	20.4		C) non-ded bladder pump; or
	955	14.04	2.5	6.73	21.5	4020	2.2	65.5	18.8		Standard groundwater sample:
	957	14.04	3.0	6.77	21.5	4530	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
	1007	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
10/22/19	1005	RW-#18A	14.04	6.79	21.4	4520	2.1	69.4	16.8	DRO	HCL	Lab: Pace National, Mt. Juliet, TN
										GRO	HCL	8015M
										VOC	HCL	8260
										Antons (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
										Long List Total Metals (As, Ba, Cr, Fe, Pb, Mn, Se, Hg, Ni, V, B, Cd, Co, U)	HNO3	Field filtered 0.45-u
										Long List Dissolved 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 Fluid		
												If <0.03 feet LNAPL present, remove LNAPL and sample groundwater.

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Hydrologic Monitoring for TRC Houston, Texas

[illegible]

Wood E&I Solutions Inc. - Houston, TX 585 N. Dairy Ashford Accounts Payable 585 N. Dairy Ashford Houston, TX 77079 Report to: Pam Krueger City/State Collected: Artesia, NM Client Project # 6703180022.0003 Phone: 713-929-5674 Fax: Collected by (print): Collected by (signature): Immediately Packed on Ice N Y ✓										Billing Information: Accounts Payable 585 N. Dairy Ashford Houston, TX 77079 Email To: pamela.krueger@woodplc.com Please Circle: PT MT CT ET Lab Project # AMECFWHTX-ROFIELDS P.O. # Quote # Rush? (Lab MUST Be Notified) Same Day Five Day Next Day 5 Day (Rad Only) Two Day 10 Day (Rad Only) Three Day Date Results Needed No. of Cntrs										Analysis / Container / Preservative Pres Chk									
Chain of Custody Page 1 of 2 Peace 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: 101519 Shipped Via: FedEx Ground Remarks Sample # (lab only)										Sample Receipt Checklist COC Seal Present/Intact: NP COC signed/Accurate: Bottles arrive intact: Correct bottles used: Sufficient volume sent: If Applicable VOA Zero Headspace: Preservation Correct/Checked: RAD Screen <0.5 m/s/hr: If preservation required by Login: Date/Time																			
Matrix: SS - Soil GW - Groundwater WW - Waste Water DW - Drinking Water OT - Other F - Filter B - Bioassay Remarks: WetChem=ALKB, 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. Samples returned via: UPS ✓ FedEx _____ Courier _____ Date: 10/22/19 Time: 1300 Relinquished by: (Signature) Sina Udd Relinquished by: (Signature) Relinquished by: (Signature)										pH _____ Temp _____ Flow _____ Other _____ Tracking # Received by: (Signature) Received by: (Signature) Received for lab by: (Signature) Temp: _____ °C Bottles Received: HCL / MeOH TBR Date: _____ Time: _____ Condition: NGF / OK																			

Wood E&I Solutions Inc. - Houston, TX

585 N. Dairy Ashford

Report to:
Pam Krueger

Project Description: Navajo RO Fields

Phone: 713-929-5674

Collected by (print): Scott Wade + Hannah Team

Collected by (signature): Scott Wade

Immediately Packed on Ice N Y

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Email To: pamela.krueger@woodplc.com

City/State Collected: Artesia, NM

Client Project #
6703180022.0003

Site/Facility ID #

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

Comp/Grab Matrix * Depth Date Time

Chain of Custody

Page 2 of 2

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-787-5859
Fax: 615-758-5859

SDG #

Table #

Accnum: AMECFWHTX

Template: T156731

Prelogin: P735653

PVI: 526 - Chris McCord

PB: 10/22/19

Shipped Via: FedEx Ground

Remarks

Sample # (lab only)

Pres Chk

Analysis / Container / Preservative

WetChem 250mIHDP-NOPres

Total Metals 250mIHDP- HNO3

NO2NO3 250mIHDP- H2SO4

Diss. Metals-FF 250mIHDP- NOPres

NO2NO3 250mIHDP- H2SO4

Total Metals 250mIHDP- HNO3

WetChem 250mIHDP-NOPres

Sample ID

MW-118

MW-119

MW-142

MW-143

MW-116

MW-144

DUP-RO-01

DUP-RO-02

EB-RO-01

Matrix:
SS - Soil
GW - Groundwater
WW - Waste Water
DW - Drinking Water
OT - Other

10/22/19

955

1005

1055

925

1005

1100

1000

1000

945

GW

GW

GW

GW

GW

GW

GW

GW

GW

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,C,Fe by 6010. Field Filtered.

Relinquished by : (Signature)
Scott Wade

Relinquished by : (Signature)

Relinquished by : (Signature)

Sample Receipt Checklist

COC Seal Present/Intact: Y N

COC Signed/Accurate: Y N

Bottles arrive intact: Y N

Correct bottles used: Y N

Sufficient volume sent: Y N

If Applicable
VQA Zero Headspace: Y N

Preservation Correct/Checked: Y N

RAD Screen <0.5 mR/hr: Y N

If preservation required by Login: Date/Time

Hold:

Condition:
NCF / OK

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:
- Field-Measured Parameters - pH, temp, SC, DO, ORP, and turbidity
 - Total Metals *Select List* (6010)
 - Dissolved Metals *Select List* (6010) (field-filtered, 0.45 micron)
 - Total Metals *Select List* (6020)
 - Dissolved Metals *Select List* (6020) (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)

= 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



Hydrologic Monitoring

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

M E M O R A N D U M

Phone 713.464.5206

Fax 713.464.5207

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.

Third Quarterly Event (January 2020)



Hydrologic Monitoring

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

Phone 713.464.5206
Fax 713.464.5207

January 22, 2020

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

Subject: 1Q20 RO Field Groundwater Sampling, January 16, 2020
Navajo Refining Company, Artesia, New Mexico

Dear Ms. Krueger:

This document summarizes the 1Q20 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 1Q20 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 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 background 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").

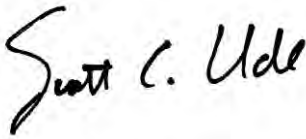
With suggested telephone notification, FedEx pickup from locked shed (35-25-39 combination) no earlier than approximately 14:00 daily, across from Artesia Wool Co (access area from "inside" Refinery).

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.

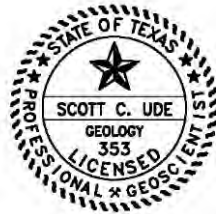
HMI appreciates the opportunity to assist Wood with this project. If you have any questions or
would like additional information please feel free to call us at 713.464.5206.

Sincerely,

HYDROLOGIC MONITORING



Scott C. Ude, P.G.



The seal appearing on this
document was authorized by
Scott C. Ude, P.G. 353 on
January 22, 2020.

Attachments

cc: Greg Scherbenske, P.G., HMI

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1Q20 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)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date		Sample Time	pH (S.U.)	T (C)	Spec. Cond. (umho/c m)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label
MW-40	Dup-RO-01		1	REST	01/16/20	8:30	NP	12.34	0.00	24.75	01/16/20	8:55	7.05	15.9	2,440	1.2	-310.2	9.6	Clear	Yes	Yes	Yes	
MW-29			2	REST	01/16/20	9:20	NP	19.49	0.00	24.22	01/16/20	9:45	6.97	15.0	3,750	1.5	-277.0	6.9	Clear	Yes	Yes	Yes	
MW-56			3	NCL	01/16/20	10:05	NP	16.14	0.00	26.50	01/16/20	10:30	6.67	16.0	3,410	1.4	-67.2	1.5	Clear	Yes	Yes	Yes	
MW-55	Dup-RO-02		4	NCL	01/16/20	10:50	NP	14.50	0.00	26.85	01/16/20	11:15	6.63	16.2	3,670	2.4	109.4	7.3	Clear	Yes	Yes	Yes	
MW-140			5	RO Field	01/16/20	12:50	NP	11.21	0.00	29.76	01/16/20	1:15	6.76	16.9	3,566	1.8	74.1	22.6	Clear	Yes	Yes	Yes	
MW-141			6	RO Field	01/16/20	12:25	NP	11.35	0.00	29.68	01/16/20	12:50	6.89	15.3	2,790	2.7	59.5	8.0	Clear	Yes	Yes	Yes	
MW-115			7	REST	01/16/20	8:15	NP	15.11	0.00	27.50	01/16/20	8:40	6.83	15.4	3,781	2.9	13.3	0.8	Clear	Yes	Yes	Yes	
MW-114			8	REST	01/16/20	10:00	NP	14.02	0.00	38.25	01/16/20	10:25	6.75	16.0	3,196	1.7	64.6	1.5	Clear	Yes	Yes	Yes	
MW-125			9	REST	01/16/20	11:50	NP	17.45	0.00	28.31	01/16/20	12:15	6.76	15.0	4,022	2.0	79.9	3.6	Clear	Yes	Yes	Yes	
MW-117			10	REST	01/16/20	13:10	NP	13.95	0.00	27.22	01/16/20	13:35	6.58	14.5	3,120	2.3	-36.2	9.5	Clear	Yes	Yes	Yes	
MW-118			11	REST	01/16/20	11:40	NP	16.60	0.00	28.29	01/16/20	12:05	6.81	14.5	3,830	3.0	-107.9	24.2	Clear	Yes	Yes	Yes	
MW-119			12	REST	01/16/20	10:55	NP	15.99	0.00	28.11	01/16/20	11:20	6.47	15.4	3,918	1.8	76.2	22.7	Clear	Yes	Yes	Yes	
MW-142			13	RO Field	01/16/20	2:25	NP	15.35	0.00	32.75	01/16/20	2:50	6.65	15.8	3,941	0.9	103.7	51.6	Clear	Yes	Yes	Yes	
MW-143			14	RO Field	01/16/20	13:40	NP	15.96	0.00	32.71	01/16/20	2:05	6.92	14.7	4,132	1.5	100.3	35.7	Clear	Yes	Yes	Yes	
MW-116	EB-RO-01		15	REST	01/16/20	9:00	NP	15.22	0.00	27.63	01/16/20	9:25	6.73	15.6	3,515	1.2	66.4	21.5	Clear	Yes	Yes	Yes	
RW-#18A			16	REST	01/16/20	2:15	NP	16.94	0.00	17.78	01/16/20	2:40	6.91	12.9	3,720	2.0	88.3	17.4	Clear	Yes	Yes	Yes	
MW-144			17	RO Field	01/16/20	3:00	NP	15.75	0.00	32.75	01/16/20	3:25	6.78	12.5	3,460	2.2	-13.8	48.1	Clear	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

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Navajo Refining Company	Well:
Artesia Refinery	Event:
Artesia, New Mexico	Area of Concern:

Well: MW-29
Event: 1Q20 RO Field
ncern: REST

Completion	Casing Diam.	Casing Material
At-Grade	2-in	PVC
Upright	4-in	SS
Vault	Other <i>60-in</i>	Other

Hydrologic Monitoring for TRC Houston, Texas

Well Inspection Information

Initials: SC0

183

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	
11/6/20	920	NF	19.49	0.00	24.22	19.2	Yes	Yes	Yes		Weather: Cloudy 40's

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Monitoring Well Purging and Sampling Record

+ Dup-RO-01

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-40
Event: 1020 RD
Concern:

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

— Other

Other — 1

50

179

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	
1/16/20	830	NF	12-34	0.00	24.75	21.8	Yes	Yes	Yes	Yes		Weather: Cloudy 40's

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Monitoring Well Purging and Sampling Record

+ Dup-RO-02

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-55
Event: 1020 RO Field
Area of Concern: NCL

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

Hydrologic Monitoring
for TRC
Houston, Texas

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)	Cap	Casing	Well Secured	Label	Other	Comments
1/16/20	1050	M	14.50	0.00	26.85	21.7	Yes	Yes	Yes	Yes		Weather: Cloudy 40's

Initials: SCD

(210)

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	Comments
1/16/20	1055	14.52	0.5	6.72	14.6	3540	1.9	89.2	13.1	Clear	Low-flow groundwater sample:
	1057	14.53	1.0	6.70	15.2	3580	2.1	94.9	10.5		A) peristaltic pump w/ ded tubing
	1100	14.53	1.5	6.67	15.8	3630	2.2	102.8	9.8		B) ded bladder pump
	1102	14.53	2.0	6.65	16.0	3650	2.4	105.6	9.1		C) non-ded bladder pump; or
	1105	14.53	2.5	6.64	16.1	3660	2.5	107.2	8.9		Standard groundwater sample:
	1107	14.53	3.0	6.64	16.1	3660	2.5	108.9	8.5		D) bailer due to limited column; or
	1110	14.53	3.5	6.63	16.2	3670	2.4	109.2	8.0		E) recovery well cycling sample
	1112	14.53	4.0	6.63	16.2	3670	2.4	109.4	7.3	↓	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
1/16/20	1115	MW-55	14.53	6.63	16.2	3670	2.4	109.4	7.3	Per COC	Per COC	Lab: Pace National, Mt. Juliet, TN
↓	1000	Dup-RO-02	14.53	6.63	16.2	3670	2.4	109.4	7.3	Same	Same	

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well:
Event:
Concern:

Well: MW-56
Event: 1020 RO Field

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

Hydrologic Monitoring for TRC Houston, Texas

Initials: SC D

186

Well Inspection Information

Initials: 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	
1/16/70	1005	NP	16.14	0.00	26.50	21.4	Yes	Yes	Yes			Weather: Cloudy 40's

[illegible][illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

ATV- S. Ro Field

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-115
Event: 1020 Ro Fields
Area of Concern: REST

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

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

Date	Time	Depth to Water (Ft-TOC)	Depth to LNAPL (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection			Comments
1/16/20	815	15.11	NP	0.00	27.50	19.8	Cap	Casing	Well Secured	Other
							YES	YES	YES	
										Weather: Cloudy 40s

Initials: **B3** (109)

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	
1/16/20	820	15.13	0.5	6.96	12.8	3502	4.3	-28.6	3.0	Colorless, clear	Low-flow groundwater sample:
	823	15.15	1.0	6.91	14.4	3610	4.0	-3.2	2.1	" "	A) peristaltic pump w/ ded tubing
	825	15.16	1.5	6.87	14.7	3696	3.7	+6.7	1.6	" "	B) ded bladder pump
	828	15.16	2.0	6.85	14.9	3742	3.4	10.4	1.3	" "	C) non-ded bladder pump; or
	830	15.16	2.5	6.84	15.0	3768	3.2	11.8	1.1	" "	Standard groundwater sample:
	833	15.16	3.0	6.83	15.2	3774	3.0	12.2	0.9	" "	D) bailer due to limited column; or
	835	15.16	3.5	6.83	15.3	3778	2.9	12.9	0.8	" "	E) recovery well cycling sample
	838	15.16	4.0	6.83	15.4	3781	2.9	13.3	0.8	" "	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
1/16/20	840	MW-115	15.16	6.83	15.4	3781	2.9	13.3	0.8	Per COC	Per COC	Lab: Pace National, Mt. Juliet, TN

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Bagged extension (when Flooded)

Monitoring Well Purging and Sampling Record

+ EB-R0-01

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-116
Event: 1020 R0 Field

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

Hydrologic Monitoring
for TRC
Houston, Texas

Area of Concern: REST

Well Inspection Information

Initials: BZ

156

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	
1/16/20	900	NP	15.22	0.00	27.03	20.0	yes	yes	yes	Weather 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	Low-flow groundwater sample:
1/16/20	905	15.27	0.5	6.74	14.7	3416	2.8	51.4	12.6	Colored, clear	A) peristaltic pump w/ ded tubing
	908	15.28	1.0	6.71	15.0	3503	2.1	58.9	17.4	(Small Brown)	B) ded bladder pump
	910	15.29	1.5	6.71	15.2	3508	1.8	61.3	20.2	(particles)	C) non-ded bladder pump; or
	913	15.29	2.0	6.72	15.3	3510	1.5	63.5	21.3	" "	Standard groundwater sample:
	915	15.29	2.5	6.72	15.4	3511	1.4	64.7	22.6	" "	D) bailer due to limited column; or
	918	15.29	3.0	6.73	15.4	3511	1.3	65.5	21.8	" "	E) recovery well cycling sample
	920	15.29	3.5	6.73	15.5	3513	1.3	66.1	21.7	" "	F) irrigation well grab sample
	923	15.29	4.0	6.73	15.6	3515	1.2	66.4	21.5	" "	

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
1/16/20	925	MW-116	15.29	6.73	15.6	3515	1.2	66.4	21.5	Per COC	Per COC	Lab: Pace National, Mt. Juliet, TN
	930	EB-R0-01	NA							Same	Same	

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-117
Event: 1Q20 RO Field
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: SCD

112

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
1/16/20	1310	NP	13.95	0.00	27.22	19.7	yes	yes	yes	yes		Weather: Cloudy 40's

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL and collect groundwater sample

Hydrologic Monitoring for TRC Houston, Texas

Well Inspection Information

Initials: SCD

113

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	
11/16/20	1140	NP	16.60	0.00	28.29	21.0	yes	yes	yes			Weather: Cloudy 40°s

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-125
Event: 1920 P0 F=1d
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: 

③

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
11/16/20	11:50	NP	17.45	0.00	28.31	23.5	yes	yes	yes		Weather: Cloudy 40's	

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

Monitoring Well Purging and Sampling Record

Well:

051-221

Completion Casing Diam

Casing Material

Located inside North

Hydrologic Monitoring

Artesia Refinery

Event: $\text{QZQ}(\text{RO})$

Event: 1020 (RO Fields)

At-Grade ✓ 2-in ✓

PVC ✓

warehouse fenced-in area:

Artesia, New Mexico

Area of Concern: RO Fields

Concern: RO Fields

Upright 4-in

•

Houston Taxes for 1980

Well Inspection Information

Initials:

BR

[illegible]

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

Bagged dedicated tubing
Navajo Refining Company

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

Artesia - well / gate lock-chain close gate to

**Hydrologic Monitoring
for TRC
Houston, Texas**

[illegible]

11

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	
1/16/20	1340	NP	15.96	0.00	33.71	27.71	Yes	YES	no	YES	needs work	Weather: Cloudy 40's

100

[illegible]

1000

[illegible]

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

[illegible]

No field filtering
in 1Q20

1Q20

Navajo-Artesia, Wood-RO Field, Quarterly Groundwater Program, 1Q20															
		HMI Team List	# wells planned for sampling	Total Metals (6010) (Ca, Mg, K, Na)	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							
MW-29	Monitoring	TAB to SCD	2	X	X	X	X	X							
MW-56	Monitoring	TAB to SCD	3	X	X	X	X	X							
Team B - QA/QC:															
Dup-RO-01	mw40	SCD		X	X	X	X	X							
Team C															
MW-55	Monitoring	CJH to BRH	4	X	X	X	X	X							
MW-140	RO Fields	BRH	5	X	X	X	X	X							
MW-141	RO Fields	BRH	6	X	X	X	X	X							
Team C - QA/QC:															
Dup-RO-02	mw55	BRH		X	X	X	X	X							
Team D															
MW-115	Monitoring	BTB	7	X	X	X	X	X							
MW-114	Monitoring	BTB	8	X	X	X	X	X							
MW-125	Monitoring	BTB	9	X	X	X	X	X							
Team E															
MW-117	Monitoring	GDS	10	X	X	X	X	X							
MW-118	Monitoring	GDS	11	X	X	X	X	X							
MW-119	Monitoring	GDS	12	X	X	X	X	X							
MW-142	RO Fields	GDS	13	X	X	X	X	X							
MW-143	RO Fields	GDS	14	X	X	X	X	X							
Team F															
MW-116	Monitoring	SCU	15	X	X	X	X	X							
RW-#18A	Recovery	GDS to SCU	16	X	X	X	X	X							
MW-144	RO Fields	SCU	17	X	X	X	X	X							
Team F - QA/QC:															
EB-RO-01	mw116	SCU		X	X	X	X	X							
Team G															
MW-40	Monitoring	TAB													
MW-29	Monitoring	TAB													
MW-56	Monitoring	TAB													
Team H															
MW-55	Monitoring	CJH													

...taken away from TAB list

...taken away from TAB list

...taken away from TAB list

...taken away from CJH list

Wood-Installed well, 2019...Domingo for access, per Pam Krueger

Wood-Installed well, 2019...Domingo for access, per Pam Krueger

Wood-Installed well, 2019...Mr. King's horses in field? (special access, possible...)

Wood-Installed well, 2019...Mr. King's horses in field? (special access, possible...)

...taken away from GDS list

Wood-Installed well, 2019

...moved to SCD list

...moved to SCD list

...moved to SCD list

...moved to BRH list

Instructions for Pace National:

Please send kits directly to Pace-Houston. Pace-Houston to transfer to HMI on or before _____, 2020.

Sampling scheduled - week of _____, 2020

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:

- Field-Measured Parameters - pH, temp, SC, DO, ORP, and turbidity
- Total Metals *Select List* (6010)
- Anions (Method 300) (Chloride, Fluoride, Sulfate)
- Nitrate-Nitrite as Nitrogen (353.2)
- Alkalinity (2320)
 - Carbonate
 - Bicarbonate
- 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



Hydrologic Monitoring

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

M E M O R A N D U M

Phone 713.464.5206

Fax 713.464.5207

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.

Fourth Quarterly* Event (June 2020)

*delayed due to COVID-19



Hydrologic Monitoring

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

Phone 713.464.5206

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June 22, 2020

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

Subject: 2Q20 RO Field Groundwater Sampling, June 16, 2020
Navajo Refining Company, Artesia, New Mexico

Dear Ms. Krueger:

This document summarizes the 2Q20 RO Field Program groundwater sampling conducted by Hydrologic Monitoring, LLC (HMI) on behalf of Wood at the Navajo-Artesia Refinery, Artesia, New Mexico. COVID 19 concerns delayed 2Q20 implementation from April to June 2020.

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 2Q20 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 is shown below:

1. MW-40
2. MW-29 + Duplicate (Dup-RO-01)
3. MW-56
4. MW-55
5. MW-140 + Duplicate (Dup-RO-02 (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
16. RW-#18A + Equipment Blank (EB-RO-01)
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 background 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").

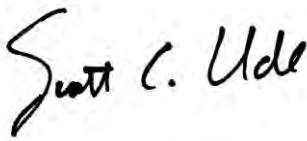
With suggested telephone notification, FedEx pickup from locked shed (35-25-39 combination) no earlier than approximately 14:00 daily, across from Artesia Wool Co (access area from "inside" Refinery).

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.

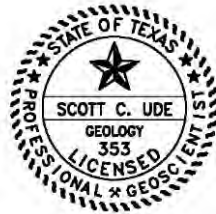
HMI appreciates the opportunity to assist Wood with this project. If you have any questions or
would like additional information please feel free to call us at 713.464.5206.

Sincerely,

HYDROLOGIC MONITORING



Scott C. Ude, P.G.



The seal appearing on this
document was authorized by
Scott C. Ude, P.G. 353 on
June 22, 2020.

Attachments

cc: Greg Scherbenske, P.G., HMI

Monitoring Well Purging and Sampling Record

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

Hydrologic Monitoring for TRC Houston, Texas

Initials: ISTB

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
6/16/20	1030	NP	14'-17	0-00	28'31	235	yes	yes	yes	yes		Weather: pt. cloudy, qds

[illegible][illegible]

Well: MW-117

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well:
Event:
ncern:

MW-
IH20
REST

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

Monitoring Well Purging and Sampling Record

Hydrologic Monitoring for TRC Houston, Texas

Well Inspection Information

Initials: ESD

112

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	
6-6-20	1050	NP	4.65	0.00	27.22	19.7	yes	yes	yes	yes	Weather Clear 80s

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-118
Event: 1420
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

Other

Initials: **OSD**

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	
6-16-20	955	NP	17.76	0.00	28.29	21.0	Yes	Yes	Yes	Yes		Weather: Clear 80's

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Initials: *WAS* (115)

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Monitor
RW-#18A

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: RW-#18A
Event: 1H20
Concern: REST

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

Monitoring Well Purging and Sampling Record

Well: RW-#18A
Event: 1H20
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: SCU

122

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	
6/16/26	925	NP	16.94	0.00	17.78	16.7	Yes	Yes	Yes			Weather: Pt. Cloudy, 80°

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Monitoring Well Purging and Sampling Record

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

Well: MW-116
Event: 1420
Concern: REST

Hydrologic Monitoring for TRC Houston, Texas

Well Inspection Information

Initials: Scu

156

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	
6/16/20	1050	NP	16.18	0.00	27.63	20.0	YES	YES	YES	YES	Weather is Cloudy, 80s

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Event:

Event: 1470

Artesia, New Mexico

Area of Concern:

TEST

Well Inspection Information

Completion	Casing Diam.	Casing Material
100%	6 7/8"	API 5L X 60
95%	6 7/8"	API 5L X 60
90%	6 7/8"	API 5L X 60
85%	6 7/8"	API 5L X 60
80%	6 7/8"	API 5L X 60
75%	6 7/8"	API 5L X 60
70%	6 7/8"	API 5L X 60
65%	6 7/8"	API 5L X 60
60%	6 7/8"	API 5L X 60
55%	6 7/8"	API 5L X 60
50%	6 7/8"	API 5L X 60
45%	6 7/8"	API 5L X 60
40%	6 7/8"	API 5L X 60
35%	6 7/8"	API 5L X 60
30%	6 7/8"	API 5L X 60
25%	6 7/8"	API 5L X 60
20%	6 7/8"	API 5L X 60
15%	6 7/8"	API 5L X 60
10%	6 7/8"	API 5L X 60
5%	6 7/8"	API 5L X 60
0%	6 7/8"	API 5L X 60

At-Grade	2-in	PVC	✓
----------	------	-----	---

Upright ✓ 4-in SS

Category	Other	Vault	Other
Category 1			
Category 2			
Category 3			
Category 4			
Category 5			
Category 6			
Category 7			
Category 8			
Category 9			
Category 10			
Category 11			
Category 12			
Category 13			
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Category 15			
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Category 93			
Category 94			
Category 95			
Category 96			
Category 97			
Category 98			
Category 99			
Category 100			

Hydrologic Monitoring for TRC Houston, Texas

Initials: TAB to SCD

179

Monitoring Well Purging and Sampling Record

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
							Yes	No		Yes	No			
6/16/20	900	NR	13.86	0.00	24.75	21.8	Yes		Yes		Yes		Weather: Pt. Cloudy 70's	

Well Purging Record

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03"; if LNAPL thickness is measured at 0.01" or 0.02", remove LNAPL, and collect groundwater sample

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-29
Event: 1420
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: TAB to SLD

183

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	
6/16/20	955	NP	20.76	0.00	24.22	19.2	yes	yes	yes		Weather: PF. Cloudy 70's

Well Purging Record

↳ lowered tubing intake as needed

[illegible]

Well Sampling Record

[illegible]

No groundwater sample collected if LNAPL thickness is greater than, or equal to 0.03'; if LNAPL thickness is measured at 0.01' or 0.02', remove LNAPL, and collect groundwater sample

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-55
Event: 1420
Concern: NCL

<u>Completion</u>	<u>Casing Diam.</u>	<u>Casing Material</u>
At-Grade	2-in	PVC
Upright	4-in	SS
Vault	Other	Other

Hydrologic Monitoring
for TRC
Houston, Texas

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
6-16-20	1015	NP	15.02	0.00	26.85	21.7	Yes	Yes	Yes	Yes		Weather: Pt. Cloudy, 80s

[illegible][illegible]

Bagged dedicated tubing
Navajo Refining Company
Artesia Refinery
Artesia, New Mexico **Area c**

Monitoring Well Purging and Sampling Record

Well: MW-140
Event: 2Q20 (RO Fields)
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 locked, Domingo can facilitate access.

Initials: **BZ-H**

Well Inspection Information

[illegible]

Well Purging Record

[illegible]

Well Sampling Record RO Fields Program, 2020

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
6-16-20	955	MW-14D	12.01	6.73	18.4	3430	1.9	71.6	8.6	per Wood	Per Pace	Lab: Pace National, Mt. Juliet, TN
↓	1000	DUP-R0-02	12.01	6.73	18.4	3430	1.9	71.6	8.6	"	"	(see LOC)
										If <0.03 feet LNAPL present, remove LNAPL and sample groundwater		

Monitoring Well Purging and Sampling Record

Well: MW-141

Artesia Refinery

Event: 2620 (RO Fields)

Artesia, New Mexico

Area of Concern: RO Fields

<u>Completion</u>	<u>Casing Diam.</u>	<u>Casing Material</u>

At-Grade	✓	2-in	✓	PVC	✓
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Upright	4-in	SS

Category	Other	Vault
Other		

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	
6-16-20	850	NP	12.57	0.00	29.68	24.68	Yes	Yes	Yes	Yes		Weather: Sunny, 70s

Initials: BR14

Located inside North Warehouse fenced-in area. IF gate locked, Domingo can force entry access.

Comments

Weather: Sunny, 70s

Well Purging Record

[illegible]Well Sampling Record
RO Fields Program, 2020[illegible]

~~Baseball~~ *W.S.*

Monitoring Well Purging and Sampling Record

Well: MW-143

Event: 2020 (RO Fields)

Concern: RO Fields

[illegible]At-Grade 2-in ✓Upright ☒ 4-in _____

Vault — Other —

1

Casing Material

PVC ✓

§ 1

Other _____

1

Mr. Kings

552

possible

1

Initials:

Hydrologic Monitoring

for TRC

Houston, Texas

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
6/16/20	1110	NP	15.79	0.00	32.71	27.71	Yes	Yes	# NO	Yes		Weather: Partly Cloudy, 80's
									+ NO lock, but located inside			

Well Purging Record

[illegible]Well Sampling Record
RO Fields Program, 2020[illegible]

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Wood - RO Field Investigation

Hydrologic Monitoring for TRC Houston, Texas

[illegible]

Billing Information:				Analysis / Container / Preservative				Chain of Custody	
Wood E&I Solutions Inc. - Houston, TX				Accounts Payable				Page 1 of 2	
585 N. Dairy Ashford				585 N. Dairy Ashford				Pace Analytical National Center for Testing & Innovation	
Report to:				Email To: pamela.krueger@woodplc.com				12065 Lebanon Rd Moundville, TN 37122 Phone: 615-758-5858 Fax: 615-758-5859	
Project		City/State		Please Circle		PT MT CT ET		SDG #	
Description: Navajo RO Fields		Collected: Arizona, NM		Lab Project #		AMECFWHTX-ROFIELDS		Table #	
Phone: 713-929-5674		Client Project #		P.O. #		Quote #		Acctnum: AMECFWHTX	
Fax:		Site/Facility ID #		Date		Date Results Needed		Template: T161237	
Collected by (print): Scott Wade & Pam Krueger		Rush? (Lab MUST Be Notified)		Depth		Time		Prelogin: P763895	
Collected by (signature): Scott Wade		Same Day Five Day		Matrix *		Date		PM: 526 - Chris McCord	
Immediately		Next Day 5 Day (Rad Only)		Comp/Grab		Time		PB: 60325	
Packed on Ice N Y		Two Day 10 Day (Rad Only)		No. of		Time		Shipped Via: FedEx Ground	
Sample ID		Date		Date		Time		Remarks	
MW-40		GW	6/16/20	925	4				
MW-29		GW		1020	4				
MW-56		GW		1125	4				
MW-55		GW		1040	4				
MW-140		GW		955	4				
MW-141		GW		915	4				
MW-115		GW		920	4				
MW-114		GW		1020	4				
MW-125		GW		1055	4				
MW-117		GW		1115	4				
Remarks: WetChem=ALKB1,ALKCA,CHLORIDE,FLUORIDE,SULFATE,TDS. Total Metals= B,Ca,Fe,Mg,K,Na 6010; As,Co,Pb,Mn,U 6020 Dissolved Metals= Fe 6010; As,Co,Pb,Mn,U 6020 (Field-Filtered)									
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - Waste Water DW - Drinking Water OT - Other									
Samples returned via: UPS FedEx Courier Tracking #									
Relinquished by: (Signature) Date: 6/16/20 Time: 1300 Received by: (Signature)									
Relinquished by: (Signature) Date: Time: Received by: (Signature)									
Relinquished by: (Signature) Date: Time: Received by: (Signature)									
Trip Blank Received: Yes / No HCL / MeqH TBR Temp: °C Bottles Received: Date: Time:									
Preservation required by Login: Date/Time Hold: Condition: NCF / OK									

				Navajo-Artesia, Wood-RO Field, Quarterly Groundwater Program, 2Q20													
		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 _____, 2020.
Sampling scheduled - week of _____, 2020
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:
- Field-Measured Parameters - pH, temp, SC, DO, ORP, and turbidity
 - Total Metals *Select List* (6010)
 - Dissolved Metals *Select List* (6010) (field-filtered, 0.45 micron)
 - Total Metals *Select List* (6020)
 - Dissolved Metals *Select List* (6020) (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)

= 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



Hydrologic Monitoring

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

M E M O R A N D U M

Phone 713.464.5206

Fax 713.464.5207

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.



Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Final Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Volume 4 - Appendix C



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
November 19, 2020

Third-party disclaimer

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Wood at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means. Wood excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not, however, exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.



APPENDIX C

LABORATORY ANALYTICAL REPORTS and DATA ASSESSMENT SUMMARY

(electronic)

JULY 2019

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 (no VOCs)
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

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.





Cp: Cover Page	1	¹ Cp
Tc: Table of Contents	2	
Ss: Sample Summary	4	² Tc
Cn: Case Narrative	9	
Tr: TRRP Summary	10	³ Ss
TRRP form R	11	
TRRP form S	12	⁴ Cn
TRRP Exception Reports	13	⁵ Tr
Sr: Sample Results	14	⁶ Sr
MP-5 (2') L1119009-01	14	
MP-5 (2') L1119009-02	15	⁷ Qc
MP-5 (5') L1119009-03	16	
MP-5 (5') L1119009-04	17	⁸ Gl
MP-5 (10') L1119009-05	18	
MP-5 (10') L1119009-06	19	⁹ Al
MP-6 (2') L1119009-07	20	
MP-6 (2') L1119009-08	21	¹⁰ Sc
MP-6 (5') L1119009-09	22	
MP-6 (5') L1119009-10	23	
MP-6 (10') L1119009-11	24	
MP-6 (10') L1119009-12	25	
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MP-8 (10') L1119009-17	30	
MP-8 (10') L1119009-18	31	
MP-5 (2') L1119009-19	32	
MP-5 (5') L1119009-20	33	
MP-5 (10') L1119009-21	34	
MP-6 (2') L1119009-22	35	
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Wet Chemistry by Method 300.0	43	
Wet Chemistry by Method 353.2	47	



Metals (ICP) by Method 6010B	48
Metals (ICPMS) by Method 6020	51
GI: Glossary of Terms	53
AI: Accreditations & Locations	55
Sc: Sample Chain of Custody	56

¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MP-5 (2') L1119009-01 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:20	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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

MP-5 (2') L1119009-02 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:20	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:25	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:25	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:30	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:30	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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1119009

DATE/TIME:

07/24/19 08:48

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MP-6 (2') L1119009-07 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:50	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc

MP-6 (2') L1119009-08 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:50	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:55	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 08:55	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:00	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:00	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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1119009

DATE/TIME:

07/24/19 08:48

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MP-8 (2') L1119009-13 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:10	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

¹ Cp

² Tc

³ Ss

⁴ Cn

MP-8 (2') L1119009-14 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:10	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

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

MP-8 (5') L1119009-15 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:15	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

⁹ Al

¹⁰ Sc

MP-8 (5') L1119009-16 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:15	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:20	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 09:20	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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

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L1119009

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07/24/19 08:48

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Sr

⁷Qc

⁸Gl

⁹Al

¹⁰Sc

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

ACCOUNT:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

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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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>B</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 14:52	WG1313961
Manganese	0.00385	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>P1</u>	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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.0954	1.00	5.97	5	07/19/2019 18:05	WG1313999

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>B J</u>	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	<u>J</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 14:58	WG1313961
Manganese	0.00111	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>J</u>	0.0928	1.00	5.80	5	07/19/2019 18:18	WG1313999

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.107	1.00	6.68	5	07/19/2019 18:22	WG1313999

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 15:12	WG1313961
Manganese	0.000607	<u>J</u>	0.000250	0.00500	0.00500	1	07/19/2019 15:12	WG1313961
Uranium	0.000417	<u>J</u>	0.000330	0.0100	0.0100	1	07/19/2019 15:12	WG1313961

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.0910	1.00	5.69	5	07/19/2019 18:25	WG1313999

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	0.000250	0.00200	0.00200	1	07/19/2019 15:15	WG1313961
Cobalt	0.000503	<u>J</u>	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	<u>J</u>	0.000330	0.0100	0.0100	1	07/19/2019 15:15	WG1313961

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>J</u>	0.000250	0.00200	0.00200	1	07/19/2019 15:18	WG1313961
Cobalt	0.000662	<u>J</u>	0.000260	0.00200	0.00200	1	07/19/2019 15:18	WG1313961
Lead	0.000368	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 15:18	WG1313961
Manganese	0.00202	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>B</u> <u>J</u>	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	<u>B</u>	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	<u>J</u>	0.000330	0.0100	0.0100	1	07/19/2019 15:22	WG1313961

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Method Blank (MB)

(MB) R3433270-1 07/22/19 08:36

Analyte	MB Result		<u>MB Qualifier</u>		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		<u>DUP Qualifier</u>		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		<u>LCS Qualifier</u>	
	%		%		%		%			
Total Solids	50.0		50.0		100		85.0-115			

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



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			

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



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		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/kg		mg/kg		%		%			
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)		MSD Result (dry)		MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
			MS Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MSD Result (dry) mg/kg								
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	E	3.67	20

9Al

10Sc



Method Blank (MB)

(MB) R3432721-1 07/20/19 15:08

Analyte	MB Result mg/l	<u>MB Qualifier</u> mg/l	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

L118327-01 Original Sample (OS) • Duplicate (DUP)

(OS) L118327-01 07/20/19 15:58 • (DUP) R3432721-3 07/20/19 16:13

Analyte	Original Result		DUP Result		DUP RPD		<u>DUP Qualifier</u>	DUP RPD Limits
	mg/l		mg/l		Dilution	%		%
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

L119038-07 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-07 07/21/19 01:10 • (DUP) R3432721-6 07/21/19 01:25

Analyte	Original Result		DUP Result		DUP RPD		<u>DUP Qualifier</u>	DUP RPD Limits
	mg/l		mg/l		Dilution	%		%
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		LCS Result		LCS Rec.		Rec. Limits		<u>LCS Qualifier</u>
	mg/l		mg/l		%		%		
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	0.0142	20
Fluoride	5.00	0.773	5.92	5.92	103	103	1	80.0-120		0.0169	0.0169	20
Sulfate	50.0	9.63	60.3	60.4	101	101	1	80.0-120		0.185	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	

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	0.0980	2.46	2.71	94.4	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	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	<u>MB Qualifier</u>	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	<u>J</u>	0.120	1.00
Potassium	U		10.2	100
Sodium	25.2	<u>J</u>	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 %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	<u>RPD Limits</u>
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 %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	<u>RPD Limits</u>
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	<u>V</u>	<u>V</u>	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		<u>V</u>	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)		MSD Result (dry)		MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
			MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg								
Magnesium	1190	12500	13800	14300	109	149	1	75.0-125			✓		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			✓		2.71	20
Sodium	1190	269	1460	1480	100	102	1	75.0-125					1.43	20

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.0485	0.0508	97.1	102	80.0-120	80.0-120	4.63	20
Cobalt	0.0500	0.0497	0.0527	99.4	105	80.0-120	80.0-120	5.88	20
Lead	0.0500	0.0487	0.0507	97.5	101	80.0-120	80.0-120	4.01	20
Manganese	0.0500	0.0487	0.0512	97.5	102	80.0-120	80.0-120	4.94	20
Uranium	0.0500	0.0497	0.0505	99.5	101	80.0-120	80.0-120	1.57	20

L119017-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119017-16 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	RPD %	RPD Limits %
Arsenic	0.0500	0.000946	0.0514	0.0537	101	106	1	75.0-125	4.43	4.43	20
Cobalt	0.0500	U	0.0507	0.0520	101	104	1	75.0-125	2.47	2.47	20
Lead	0.0500	0.000272	0.0487	0.0516	96.9	103	1	75.0-125	5.64	5.64	20
Manganese	0.0500	0.000389	0.0497	0.0506	98.6	100	1	75.0-125	1.79	1.79	20
Uranium	0.0500	U	0.0499	0.0523	99.9	105	1	75.0-125	4.56	4.56	20



Method Blank (MB)

(MB) R3432502-1 07/19/19 17:39

Analyte	MB Result mg/kg	<u>MB Qualifier</u> mg/kg	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. %	Rec. Limits %	<u>LCS Qualifier</u> %	<u>LCSD Qualifier</u> %	RPD %	RPD Limits %
Uranium	100	91.9	96.4	91.9	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 mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u> %	<u>MSD Qualifier</u> %	RPD %	RPD Limits %
Uranium	23.8	0.786	123	121	103	101	5	75.0-125		1.90		20

1Cp	2Tc	3Ss	4Cn	5Tr	6Sr	7Qc	8Gl	9Al	10Sc
-----	-----	-----	-----	-----	-----	-----	-----	-----	------



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.

¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc



Qualifier	Description
V	The sample concentration is too high to evaluate accurate spike recoveries.

- ¹Cp
- ²Tc
- ³Ss
- ⁴Cn
- ⁵Tr
- ⁶Sr
- ⁷Qc
- ⁸Gl
- ⁹Al
- ¹⁰Sc



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	LA000356
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

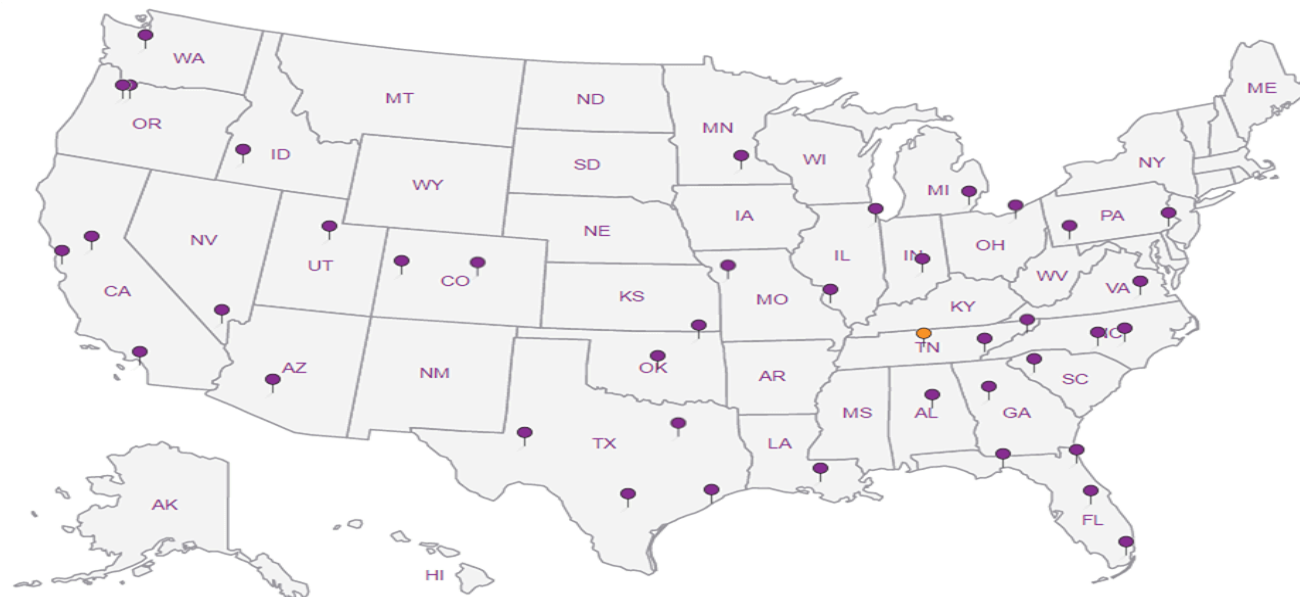
Third Party Federal Accreditations

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.



Billing Information:				Analysis / Container / Preservative				Chain of Custody	
Wood E&I Solutions Inc. - Houston, TX 585 N. Dairy Ashford Houston, TX 77079				Accounts Payable 585 N. Dairy Ashford Houston, TX 77079				Page 1 of 1	
Report to: Pam Krueger				Email To: pamela.krueger@woodpic.com				Pace Analytical National Center for Testing & Innovation	
Project Description: Navajo RO Fields				City/State Collected: Lab Project # AMECFWHTX-ROFIELDS				L# L1119009 M021	
Phone: 713-929-5674 Fax:				Client Project # 6703180022.0003				Acctnum: AMECFWHTX Template: T152381 Prelogin: P716917 TSR: 526 - Chris McCord PB: 06-28-19 CS	
Collected by (print): San Mc Mahan Collected by (signature): <i>[Signature]</i> Immediately Packed on Ice N ☒ Y ☐				Site/Facility ID # Rush? (Lab MUST Be Notified) ☐ Same Day ☐ Five Day ☐ Next Day ☐ 5 Day (Rad Only) ☐ Two Day ☐ 10 Day (Rad Only) ☐ Three Day				Shipped Via: FedEX Ground	
Sample ID				Comp/Grab Matrix * Depth Date Time				Remarks Sample # (lab only)	
MP-S (2')				G SS - 7-12-19 0820				-01/02	
MP-S (5')				SS - 0825				03/04	
MP-S (10')				SS - 0830				05/04	
MP-6 (2')				SS - 0850				07/08	
MP-6 (5')				SS - 0855				09/10	
MP-6 (10')				SS - 0900				11/12	
MP-8 (2')				SS - 0910				13/14	
MP-8 (5')				SS - 0915				15/16	
MP-8 (10')				SS - 0920				17/18	
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - Waste Water DW - Drinking Water OT - Other				Remarks: Cations=Ca,K,Mg,Na by 6010. Anions=Chloride,Fluoride,Sulfate,NO2,NO3 by 300/353.2. Metals=As,B,Co,Fe,Mn,Pb,U by 6010/6020.				Sample Receipt Checklist COC Seal Present/Intact: ☒ NP ☒ COC Signed/Accurate: ☒ Bottles arrive intact: ☒ Correct bottles used: ☒ Sufficient volume sent: ☒ If Applicable VOA Zero Headspace: ☒ Preservation Correct/Checked: ☒ Y ☒ N	
Samples returned via: ☒ UPS ☐ FedEx ☐ Courier				Tracking # 1082 5987 2219				RAD SCREEN: <0.5 mR/hr	
Relinquished by: (Signature) <i>[Signature]</i> Date: 7-15-19 Time: 1500				Trip Blank Received: Yes / No ☒ HCL / MeOH ☒ TBR				If preservation required by Login: Date/Time	
Relinquished by: (Signature) <i>[Signature]</i> Date: Time:				Temp: 73.04.13.1 C Bottles Received: 27				Hold:	
Relinquished by: (Signature) <i>[Signature]</i> Date: Time:				Date: 7/16/19 Time: 0845				Condition: NCF / ☒ OK	

July 24, 2019

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

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

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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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

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

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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1119017

DATE/TIME:

07/24/19 10:11

PAGE:

4 of 56

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MP-4 (10') L1119017-06 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:30	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

¹ Cp

² Tc

³ Ss

MP-7 (2') L1119017-07 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:40	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

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

MP-7 (2') L1119017-08 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:40	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

⁸ Gl

⁹ Al

¹⁰ Sc

MP-7 (5') L1119017-09 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:45	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:45	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:50	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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MP-7 (10') L1119017-12 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:50	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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

DUP-1-SOIL L1119017-13 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 00:00	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 00:00	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 00:00	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 00:00	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	Collected date/time	Received date/time
				Sam McMahan	07/12/19 00:00	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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



DUP-3-SOIL L119017-18 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 00:00	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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

MP-4 (2') L119017-19 WW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:20	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') L119017-20 WW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:25	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') L119017-21 WW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:30	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') L119017-22 WW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:40	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') L119017-23 WW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/12/19 07:45	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

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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

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Sr⁷Qc⁸Gl⁹Al¹⁰Sc

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc



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. 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 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); 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	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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>J</u>	0.536	2.00	2.33	1	07/19/2019 21:33	WG1314000
Boron	3.23	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.0932	1.00	5.82	5	07/19/2019 18:45	WG1313999

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>B J</u>	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	<u>J</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 15:35	WG1313961
Manganese	0.00150	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>J</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 15:38	WG1313961
Manganese	0.000454	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B</u> <u>J</u>	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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	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	<u>B</u> <u>J</u>	0.000240	0.00200	0.00200	1	07/19/2019 15:58	WG1313961
Manganese	0.000384	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.0948	1.00	5.93	5	07/19/2019 19:01	WG1313999

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 16:01	WG1313961
Manganese	0.00205	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

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



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	<u>B J</u>	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	<u>J</u>	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	<u>J</u>	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	<u>B J</u>	0.000240	0.00200	0.00200	1	07/19/2019 14:39	WG1313961
Manganese	0.000389	<u>J</u>	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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.0944	1.00	5.90	5	07/19/2019 19:11	WG1313999

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>B J</u>	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	<u>J</u>	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	<u>J</u>	0.000330	0.0100	0.0100	1	07/19/2019 16:08	WG1313961

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	Qualifier	SDL	Unadj. MQL	MQL	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	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.231		0.0197	0.100	0.100	1	07/22/2019 20:45	WG1314626

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Method Blank (MB)

(MB) R3433304-1 07/22/19 14:55

Analyte	MB Result		<u>MB Qualifier</u>		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		<u>DUP Qualifier</u>		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		<u>LCS Qualifier</u>	
	%		%		%		%			
Total Solids	50.0		50.0		100		85.0-115			

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



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		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/kg		mg/kg		%		%			
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)		MSD Result (dry)		MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
			MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg								
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			<u>J6</u>	<u>J6</u>	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			<u>E</u>	<u>E</u>	3.67	20

9Al

10Sc



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 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	J6	J6	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	EV	EV	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

L119017-22 Original Sample (OS) • Duplicate (DUP)

(OS) L119017-22 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

L119028-23 Original Sample (OS) • Duplicate (DUP)

(OS) L119028-23 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

L119017-22 Original Sample (OS) • Duplicate (DUP)

(OS) L119017-22 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

L119028-23 Original Sample (OS) • Duplicate (DUP)

(OS) L119028-23 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		LCS Result		LCS Rec.		Rec. Limits		<u>LCS Qualifier</u>	
	mg/l		mg/l	%	%		%			
Chloride	40.0	39.9	99.8	99.8	90.0-110					
Fluoride	8.00	8.07	101	101	90.0-110					
Sulfate	40.0	40.5	101	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	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
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	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U	0.0197	0.100	0.100

L119009-19 Original Sample (OS) • Duplicate (DUP)

(OS) L119009-19 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 %	<u>DUP Qualifier</u>	DUP RPD Limits %
Nitrate-Nitrite	0.198	0.197	1	0.506		20

L119038-04 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-04 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 %	<u>DUP Qualifier</u>	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 %	<u>LCS Qualifier</u>
Nitrate-Nitrite	4.00	3.95	98.8	90.0-110	

L119009-20 Original Sample (OS) • Matrix Spike (MS)

(OS) L119009-20 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 %	<u>MS Qualifier</u>
Nitrate-Nitrite	2.50	0.0370	2.51	98.8	1	90.0-110	

L119038-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119038-05 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. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	0.0980	2.46	2.71	94.4	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

L119009-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119009-18 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	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

L119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119009-01 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



L119009-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119009-01 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)		MSD Result		MSD Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
			mg/kg	mg/kg	mg/kg	%							
Magnesium	1190	12500	13800	14300	109	149	1	1	75.0-125		✓	3.37	20
Manganese	119	381	517	516	114	114	1	1	75.0-125			0.129	20
Potassium	1190	6830	8310	8540	125	144	1	1	75.0-125		✓	2.71	20
Sodium	1190	269	1460	1480	100	102	1	1	75.0-125			1.43	20

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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	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	<u>MB Qualifier</u> mg/kg	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		LCSD Result		LCS Rec.		Rec. Limits		<u>LCS Qualifier</u>		<u>LCSD Qualifier</u>		RPD		RPD Limits	
	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%	%	%	%	%
Uranium	100		96.4	91.9	96.4	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		Original Result		MS Result (dry)		MSD Result (dry)		MS Rec.		MSD Rec.		Dilution	Rec. Limits	<u>MS Qualifier</u>		<u>MSD Qualifier</u>		RPD	RPD Limits	
	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%			%	%	%	%		%	%
Uranium	23.8		0.786		123	121	103	101	75.0-125		1.90		5		4.76		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	LA000356
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

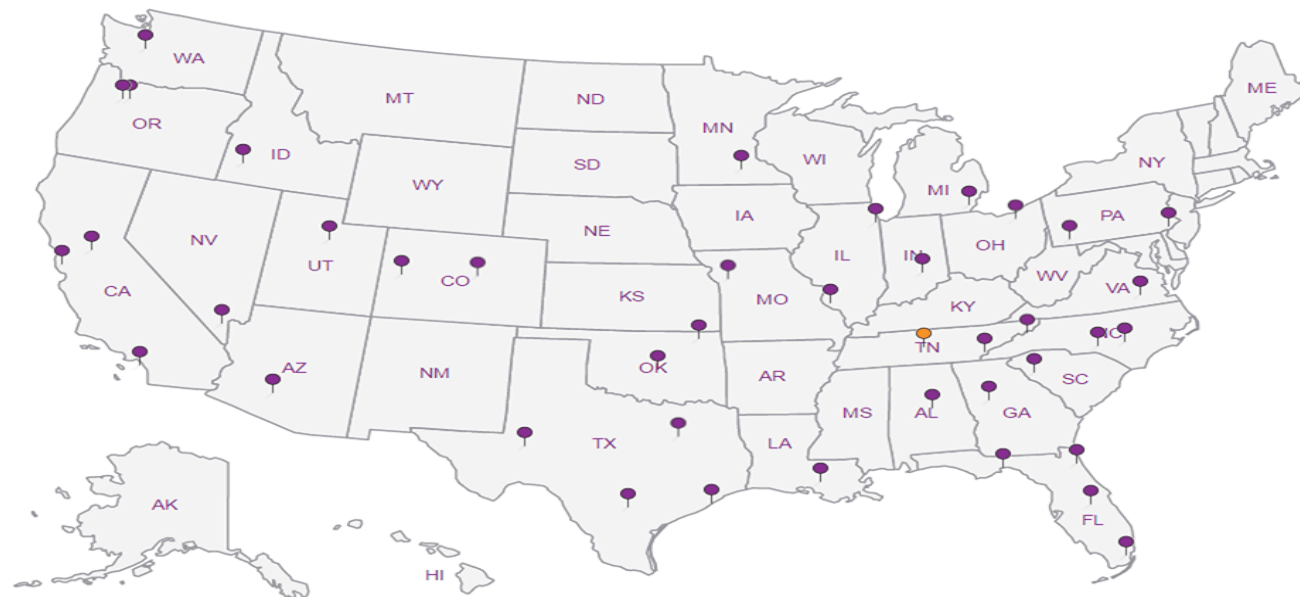
Third Party Federal Accreditations

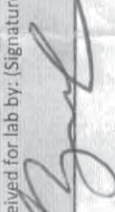
A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

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.



Billing Information:				Analysis / Container / Preservative				Chain of Custody		Page 1 of 1	
Wood E&I Solutions Inc. - Houston, TX Accounts Payable 585 N. Dairy Ashford Houston, TX 77079				Accounts Payable 585 N. Dairy Ashford Houston, TX 77079				Pres Chk		 Pace Analytical National Center for Testing & Innovation	
Report to: Pam Krueger Project Description: Navajo RO Fields				Email To: pamela.krueger@woodplc.com				L# L119017		12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859	
Client Project # 6703180022.0003				City/State Collected:				M022		Account: AMIECFWHTX	
Site/Facility ID #				Lab Project # AMECFWHTX-ROFIELDS				Template: T152381		Prelogin: P716917	
Rush? (Lab MUST Be Notified) ☐ Same Day ☐ Five Day ☐ Next Day ☐ 5 Day (Rad Only) ☐ Two Day ☐ 10 Day (Rad Only) ☐ Three Day				Quote #				TSR: 526 - Chris McCord		PB: 06-28-19 ES	
Immediately Packed on Ice ☒ N ☐ Y				Date Results Needed				Shipped Via: FedEX Ground		Remarks	
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')	6	SS	-	7-12-19	0720	3	X	X	X		-01102
MP-4 (5')		SS	-		0725	3	X	X	X		03104
MP-4 (10')		SS	-		0730	3	X	X	X		05106
MP-7 (2')		SS	-		0740	3	X	X	X		07108
MP-7 (5')		SS	-		0745	3	X	X	X		09110
MP-7 (10')		SS	-		0750	3	X	X	X		11112
Dup-1-soil		SS	-		-	3	X	X	X		13114
Dup-2-soil		SS	-		-	3	X	X	X		15116
Dup-3-soil		SS	-		-	3	X	X	X		17118
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - Waste Water DW - Drinking Water OT - Other							pH _____ Temp _____ Flow _____ 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.							Sample Receipt Checklist COC Seal Present/Intact: ☒ NP ☒ N COC Signed/Accurate: ☒ N ☒ N Bottles arrive intact: ☒ N ☒ N Correct bottles used: ☒ N ☒ N Sufficient volume sent: ☒ N ☒ N If Applicable VOA Zero Headspace: ☒ Y ☒ N Preservation Correct/Checked: ☒ Y ☒ N RAD SCREEN: <0.5 mR/hr				
Samples returned via: ☒ UPS ☐ FedEx ☐ Courier							Tracking #				
Relinquished by: (Signature) 							Received by: (Signature) Fedex 108259872230				
Relinquished by: (Signature) 							Temp: 43.3°C 0.3 ± 0.4 Date: 7/16/19				
Relinquished by: (Signature) 							Trip Blank Received: Yes/No ☒ HCL/MEOH ☐ TBR Bottles Received: 24 Time: 0845				
Relinquished by: (Signature) 							Received for lab by: (Signature) 				
Date:							Hold:				
Date:							Condition: NCF / OK				

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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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc



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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

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

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

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

⁹ Al

¹⁰ Sc

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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

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

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

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

⁹ Al

¹⁰ Sc

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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MP-3 (2') L1119028-13 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/11/19 15:55	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

¹ Cp

² Tc

³ Ss

⁴ Cn

MP-3 (2') L1119028-14 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/11/19 15:55	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

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

MP-3 (5') L1119028-15 Solid

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/11/19 17:05	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

⁹ Al

¹⁰ Sc

MP-3 (5') L1119028-16 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/11/19 17:05	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	Collected date/time	Received date/time
				Sam McMahan	07/11/19 17:15	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	Collected date/time	Received date/time
				Sam McMahan	07/11/19 17:15	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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Sr

⁷Qc

⁸Gl

⁹Al

¹⁰Sc



MP-3 (2') L1119028-25 WW

Collected by
Sam McMahanCollected date/time
07/11/19 16:55Received 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

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Sr⁷Qc⁸Gl⁹Al¹⁰Sc

MP-3 (5') L1119028-26 WW

Collected by
Sam McMahanCollected date/time
07/11/19 17:05Received 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 McMahanCollected date/time
07/11/19 17:15Received 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				
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 08:44	
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.		
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	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.0942	1.00	5.89	5	07/22/2019 16:18	WG1314534

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.108	1.00	6.75	5	07/22/2019 16:50	WG1314534

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>J</u>	0.679	2.00	2.95	1	07/22/2019 18:29	WG1314527
Boron	7.44	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.118	1.00	7.38	5	07/22/2019 16:57	WG1314534

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr

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

⁷ Qc⁸ Gl⁹ Al¹⁰ Sc

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>J6</u>	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	<u>J</u>	0.593	2.00	2.58	1	07/22/2019 18:35	WG1314527
Boron	8.47	<u>J</u>	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	<u>B</u>	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	<u>J</u>	0.103	1.00	6.45	5	07/22/2019 17:04	WG1314534

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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	<u>Q1 V</u>	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	<u>B J</u>	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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	Qualifier	SDL	Unadj. MQL	MQL	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	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	0.100	1	07/23/2019 10:33	WG1314627

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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		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			

1 Cp	2 Tc	3 Ss	4 Cn	5 Tr	6 Sr	7 Qc	8 Gl	9 Al	10 Sc
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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			

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



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

L119017-17 Original Sample (OS) • Duplicate (DUP)

(OS) L119017-17 07/19/19 02:53 • (DUP) R3432485-3 07/19/19 03:06

Analyte	Original Result		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/kg		mg/kg			%		%
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	

L119017-17 Original Sample (OS) • Duplicate (DUP)

(OS) L119017-17 07/19/19 03:44 • (DUP) R3432485-4 07/19/19 03:57

Analyte	Original Result		DUP Result		DUP Qualifier		DUP RPD Limits	
	(dry) mg/kg		(dry) mg/kg			%		%
Sulfate	14700		15100	20	2.67		20	

L119028-07 Original Sample (OS) • Duplicate (DUP)

(OS) L119028-07 07/19/19 06:35 • (DUP) R3432485-5 07/19/19 06:48

Analyte	Original Result		DUP Result		DUP Qualifier		DUP RPD Limits	
	(dry) mg/kg		(dry) mg/kg			%		%
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		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/kg	(dry)	mg/kg	(dry)	Dilution	%	mg/kg	(dry)	%	%
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		Original Result		MS Result		MSD Result		MS Rec.		MSD Rec.		Dilution	Rec. Limits	MS Qualifier		RPD	RPD Limits	
	mg/kg	(dry)	mg/kg	(dry)	mg/kg	(dry)	mg/kg	(dry)	%	%	%	%			%	%		%	%
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	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	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		LCS Result		LCS Rec.		Rec. Limits		<u>LCS Qualifier</u>	
	mg/l		mg/l	%	%		%			
Chloride	40.0	39.9	99.8		99.8		90.0-110			
Fluoride	8.00	8.07	101		101		90.0-110			
Sulfate	40.0	40.5	101		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		Original Result		MS Result		MSD Result		MS Rec.		Dilution		Rec. Limits		<u>MS Qualifier</u>		<u>MSD Qualifier</u>		RPD		RPD Limits	
	mg/l		mg/l	%	mg/l	%	mg/l	%	%			%	%		%		%	%		%		%
Chloride	50.0	50.0	6.66	57.9	57.9	103	57.9	102	102	1	1	80.0-120			0.0874		0.0874		20		20	
Fluoride	5.00	5.00	2.61	7.59	7.59	99.5	7.60	99.9	99.9	1	1	80.0-120			0.219		0.219		20		20	
Sulfate	50.0	50.0	270	304	304	67.0	306	70.2	70.2	1	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	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
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	

L119028-19 Original Sample (OS) • Duplicate (DUP)

(OS) L119028-19 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

L119038-06 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-06 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	

L118546-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L118546-01 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

L119038-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119038-07 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	MS 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	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 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



L119028-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119028-01 07/22/19 18:55 • (MS) R3433087-6 07/22/19 19:03 • (MSD) R3433087-7 07/22/19 19:06

Analyte	Spike Amount		Original Result		MS Result (dry)		MSD Result (dry)		MS Rec.		MSD Rec.		Dilution	Rec. Limits	<u>MS Qualifier</u>		<u>MSD Qualifier</u>		RPD	RPD Limits	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	%	%			%	%	%	%		%	%
Magnesium	1260		11700		13000		12600		101		75.4		1	75.0-125					2.48	20	20
Manganese	126		346		464		453		93.4		84.8		1	75.0-125					2.38	20	20
Potassium	1260		5770		7190		7000		113		98.0		1	75.0-125					2.71	20	20
Sodium	1260		327		1560		1530		98.0		95.4		1	75.0-125					2.12	20	20

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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. %	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	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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Uranium	100	105	107	105	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 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

1Cp	2Tc	3Ss	4Cn	5Tr	6Sr	7Qc	8Gl	9Al	10Sc
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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.

- ¹Cp
- ²Tc
- ³Ss
- ⁴Cn
- ⁵Tr
- ⁶Sr
- ⁷Qc
- ⁸Gl
- ⁹Al
- ¹⁰Sc



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	LA000356
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

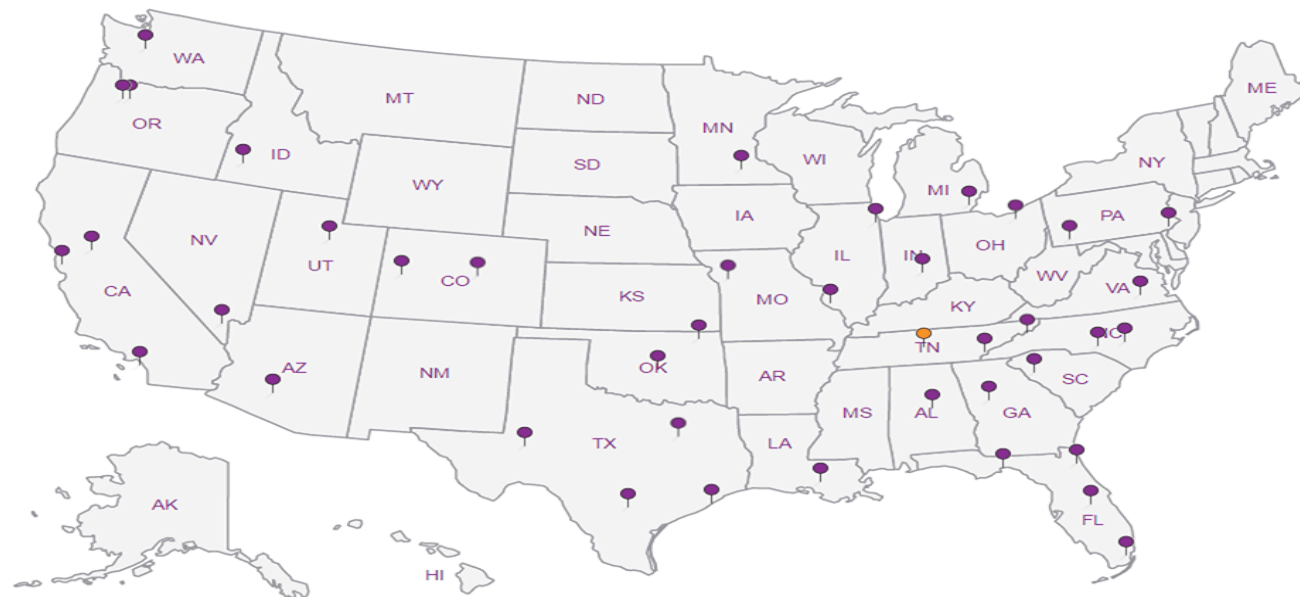
Third Party Federal Accreditations

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

Report to:

Pam Krueger

Project

Description: Navajo RO Fields

Phone: 713-929-5674

Fax:

Client Project #
6703180022.0003

Site/Facility ID #

Collected by (print):

Sam McMahon

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

No. of

Cntrs

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

Analysis / Container / Preservative

Pres Chk

Chain of Custody

Page 1 of 1

Chain of Custody

Analysis / Container / Preservative

Pres Chk

Chain of Custody

Page 1 of 1

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

Email To: pamela.krueger@woodpic.com

City/State
 Collected:

Lab Project #
 AMECFWHTX-ROFIELDS

P.O. #

Quote #

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 95

Shipped Via: FedEx Ground

Remarks

Sample # (lab only)

-01/02

03/04

05/06

07/08

09/10

11/12

13/14

15/16

17/18

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

If preservation required by Login: Date/Time

Hold:

Condition: NCF /OK

pH 7.2 Temp 22.0
 Flow 22.0 Other 22.0

Tracking # 1082 5487 2208
 Received by: (Signature) Felix
 Received by: (Signature) 108259872208

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.

Samples returned via:
 UPS Y FedEx Y Courier Y

Trip Blank Received: Yes/NO
 HCL / MeOH
 TBR

Temp: ASDF C
 1.5-1-1.6
 Date: 7/16/19 Time: 0845

Relinquished by: (Signature)
 Relinquished by: (Signature)
 Relinquished by: (Signature)

Relinquished by: (Signature)
 Relinquished by: (Signature)
 Relinquished by: (Signature)

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

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Cn: Case Narrative	5	
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TRRP form R	7	
TRRP form S	8	⁴ Cn
TRRP Exception Reports	9	⁵ Tr
Sr: Sample Results	10	⁶ Sr
EB-071019 L1119038-01	10	
EB-071119 L1119038-02	11	⁷ Qc
EB-071119-GW L1119038-03	12	
MW-144 L1119038-04	13	⁸ Gl
MW-143 L1119038-05	14	
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Sc: Sample Chain of Custody	29	

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



EB-071019 L119038-01 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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

EB-071119 L119038-02 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 L119038-03 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 L119038-04 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 L119038-05 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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L119038

DATE/TIME:

07/24/19 08:46

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1119038

DATE/TIME:

07/24/19 08:46

PAGE:

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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: L119038-01, 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: L119038-01, 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. 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 08:46	
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc

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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc

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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Method Blank (MB)

(MB) R3432139-1 07/18/19 04:38

Analyte	MB Result mg/l	<u>MB Qualifier</u> mg/l	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		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%			%	%	
Dissolved Solids	1090		1090		1	0.184				5

Laboratory Control Sample (LCS)

(LCS) R3432139-2 07/18/19 04:38

Analyte	Spike Amount		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/l		mg/l		%		%			
Dissolved Solids	8800		8780		99.8		85.0-115			

1 Cp	2 Tc	3 Ss	4 Cn	5 Tr	6 Sr	7 Qc	8 Gl	9 Al	10 Sc
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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

L118722-04 Original Sample (OS) • Duplicate (DUP)

(OS) L118722-04 07/19/19 12:38 • (DUP) R3432432-2 07/19/19 12:44

Analyte	Original Result		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
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

L118327-01 Original Sample (OS) • Duplicate (DUP)

(OS) L118327-01 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

L119038-07 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-07 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	

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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	

L118817-01 Original Sample (OS) • Duplicate (DUP)

(OS) L118817-01 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

L119038-02 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-02 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	

L118817-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L118817-02 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

L119038-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119038-03 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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	0.156	2.49	2.55	93.5	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	

L119009-19 Original Sample (OS) • Duplicate (DUP)

(OS) L119009-19 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

L119038-04 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-04 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	

L119009-20 Original Sample (OS) • Matrix Spike (MS)

(OS) L119009-20 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	

L119038-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119038-05 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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	0.0980	2.46	2.71	94.4	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	

L119028-19 Original Sample (OS) • Duplicate (DUP)

(OS) L119028-19 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

L119038-06 Original Sample (OS) • Duplicate (DUP)

(OS) L119038-06 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	

L118546-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L118546-01 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

L119038-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119038-07 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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	U	2.43	2.65	97.3	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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.0521	0.0509	104	80.0-120			2.46	20
Cobalt	0.0500	0.0526	0.0519	105	80.0-120			1.37	20
Lead	0.0500	0.0504	0.0501	101	80.0-120			0.465	20
Manganese	0.0500	0.0503	0.0496	101	80.0-120			1.44	20
Uranium	0.0500	0.0505	0.0504	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	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.

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



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
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

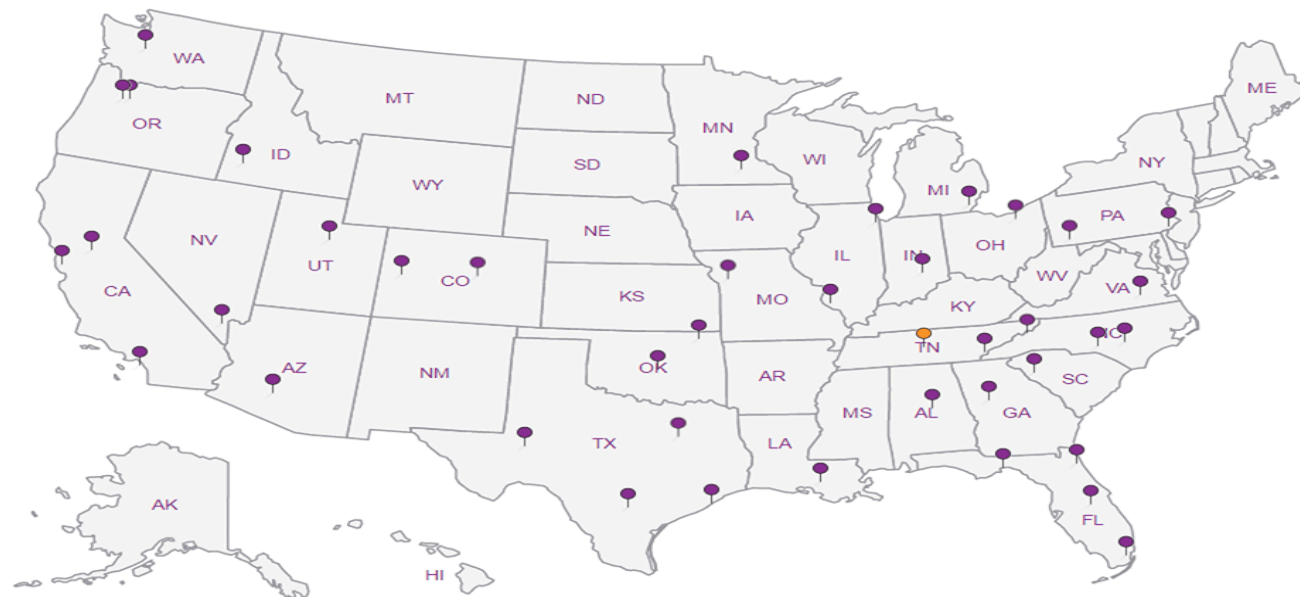
Third Party Federal Accreditations

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.



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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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-141 L1119789-01 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/15/19 11:24	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

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

EB-071519-GW L1119789-02 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/15/19 11:18	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	Collected date/time	Received date/time
				Sam McMahan	07/15/19 16:24	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	Collected date/time	Received date/time
				Sam McMahan	07/15/19 00:00	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	Collected date/time	Received date/time
				Sam McMahan	07/17/19 00:00	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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1119789

DATE/TIME:

07/26/19 09:42

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc



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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	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	Qualifier	SDL	Unadj. MQL	MQL	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	Qualifier	SDL	Unadj. MQL	MQL	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	Qualifier	SDL	Unadj. MQL	MQL	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	Qualifier	SDL	Unadj. MQL	MQL	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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
Dissolved Solids	2900		14.1	50.0	50.0	1	07/19/2019 11:51	WG1314047

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

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



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		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
Dissolved Solids	2660		2790	1	4.77				5	

Laboratory Control Sample (LCS)

(LCS) R3432611-2 07/19/19 11:51

Analyte	Spike Amount		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/l		mg/l		%		%			
Dissolved Solids	8800		8270	94.0	85.0-115					

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



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

L119594-01 Original Sample (OS) • Duplicate (DUP)

(OS) L119594-01 07/23/19 14:35 • (DUP) R3433463-2 07/23/19 14:43

Analyte	Original Result		DUP Result		DUP RPD		DUP RPD Limits	
	mg/l		mg/l	%	Dilution	DUP RPD	DUP Qualifier	%
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

L119789-07 Original Sample (OS) • Duplicate (DUP)

(OS) L119789-07 07/23/19 16:54 • (DUP) R3433463-4 07/23/19 17:09

Analyte	Original Result		DUP Result		DUP RPD		DUP RPD Limits	
	mg/l		mg/l	%	Dilution	DUP RPD	DUP Qualifier	%
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		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l	%		%		%
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		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l	%		%		%
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		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/l		mg/l	%		%		%		
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	

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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	

L118566-03 Original Sample (OS) • Duplicate (DUP)

(OS) L118566-03 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

L120037-02 Original Sample (OS) • Duplicate (DUP)

(OS) L120037-02 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	

L119305-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L119305-01 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	MSD Qualifier	RPD %
Nitrate-Nitrite	2.50	2.26	4.52	90.4	1	90.0-110			

L120102-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L120102-01 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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	ND	2.44	2.42	97.7	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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Calcium	10.0	9.89	9.91	98.9	80.0-120			0.268	20
Magnesium	10.0	10.4	10.3	104	80.0-120			0.450	20
Potassium	10.0	9.60	9.72	96.0	80.0-120			1.29	20
Sodium	10.0	9.75	9.79	97.5	80.0-120			0.374	20

L119356-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119356-01 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	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	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	LA000356
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

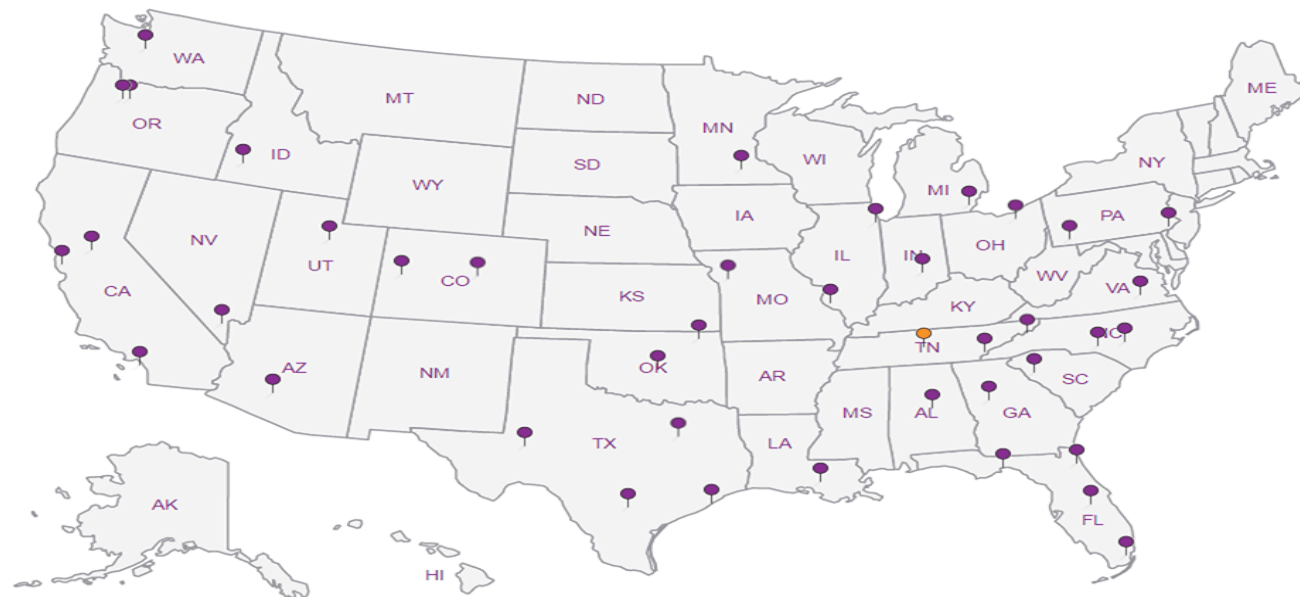
Third Party Federal Accreditations

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.



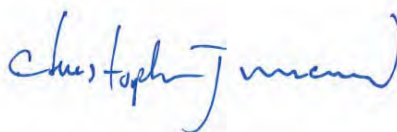
July 30, 2019

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group: L1120149
Samples Received: 07/19/2019
Project Number: 6703180022.0003
Description: Navajo RO Fields

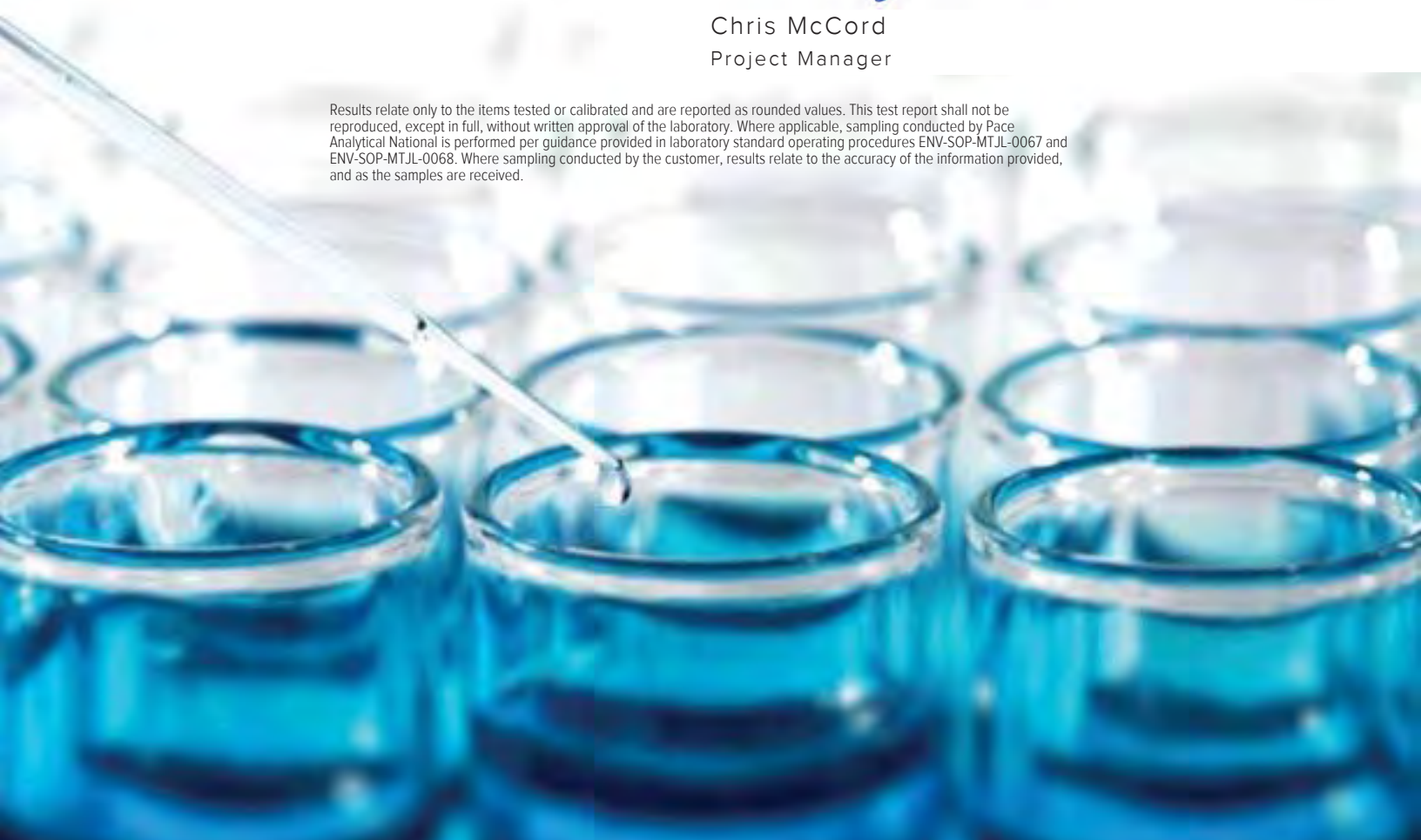
Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Project Manager

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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Tr
⁶ Sr
⁷ Qc
⁸ Gl
⁹ Al
¹⁰ Sc

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1120149

DATE/TIME:

07/30/19 09:18

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-56 L1120149-06 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/17/19 15:20	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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc

MW-29 L1120149-07 GW

				Collected by	Collected date/time	Received date/time
				Sam McMahan	07/17/19 15:49	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	Collected date/time	Received date/time
				Sam McMahan	07/17/19 16:14	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	Collected date/time	Received date/time
				Sam McMahan	07/17/19 16:42	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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1120149

DATE/TIME:

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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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

¹ Cp² Tc³ Ss⁴ Cn⁵ Tr⁶ Sr⁷ Qc⁸ Gl⁹ Al¹⁰ Sc



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	

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Method Blank (MB)

(MB) R3432988-1 07/21/19 11:24

Analyte	MB Result mg/l	<u>MB Qualifier</u> mg/l	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 %	<u>DUP Qualifier</u>	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 %	<u>LCS Qualifier</u>
Dissolved Solids	8800	8490	96.5	85.0-115	

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



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		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l			%	%	
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

L119604-02 Original Sample (OS) • Duplicate (DUP)

(OS) L119604-02 07/23/19 10:27 • (DUP) R3433429-6 07/23/19 10:35

Analyte	Original Result		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l			%	%	
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		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l	%	mg/l	%			%	%
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		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l	%	mg/l	%			%	%
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		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l	%	mg/l	%			%	%
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		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/l		mg/l	%	%		%			
Chloride	40.0	39.8	99.5	99.5	90.0-110					
Fluoride	8.00	8.08	101	101	90.0-110					
Sulfate	40.0	40.4	101	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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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

L119610-01 Original Sample (OS) • Duplicate (DUP)

(OS) L119610-01 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	



L119610-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119610-01 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	20
Fluoride	5.00	0.812	5.91	5.97	102	103	1	80.0-120		0.929	20	20
Sulfate	50.0	9.26	60.4	61.0	102	103	1	80.0-120		0.920	20	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	

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate-Nitrite	2.50	1.62	4.11	4.07	99.6	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	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.

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



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
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

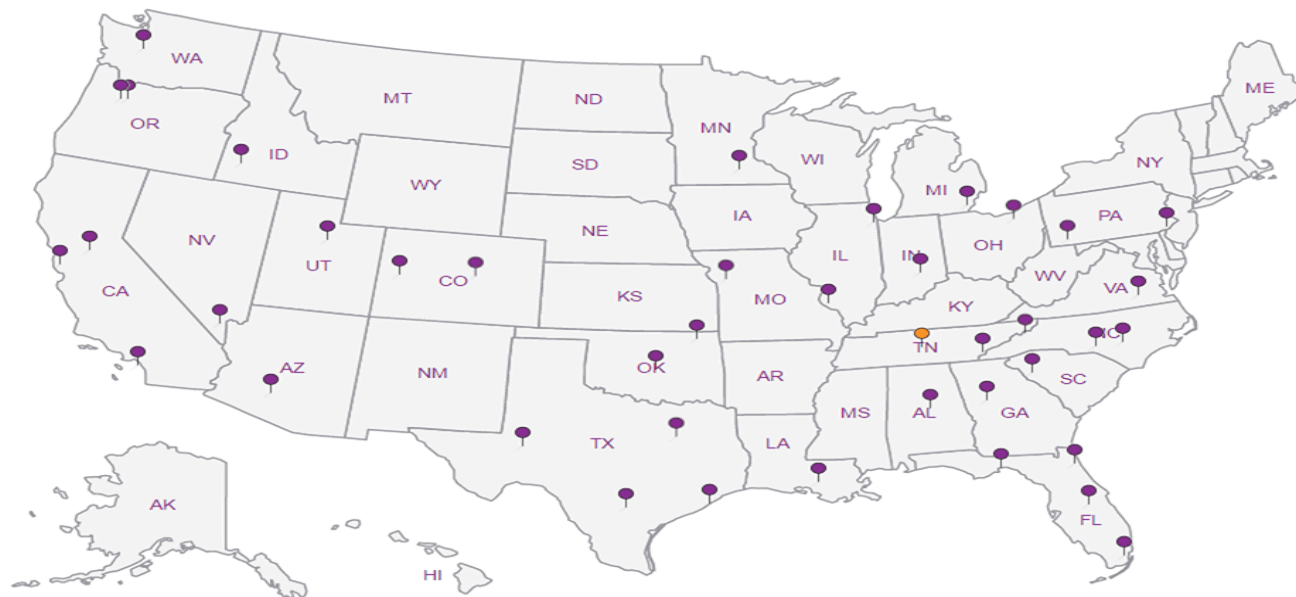
Third Party Federal Accreditations

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.



[illegible]

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.





Cp: Cover Page	1	¹ Cp
Tc: Table of Contents	2	
Ss: Sample Summary	3	² Tc
Cn: Case Narrative	4	
Tr: TRRP Summary	5	³ Ss
TRRP form R	6	
TRRP form S	7	⁴ Cn
TRRP Exception Reports	8	⁵ Tr
Sr: Sample Results	9	
WASTE SOIL L1120150-01	9	⁶ Sr
Qc: Quality Control Summary	10	⁷ Qc
Mercury by Method 7470A	10	
Metals (ICP) by Method 6010B	11	⁸ Gl
Volatile Organic Compounds (GC/MS) by Method 8260B	12	
Gl: Glossary of Terms	14	⁹ Al
Al: Accreditations & Locations	15	
Sc: Sample Chain of Custody	16	¹⁰ Sc

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Sr

⁷Qc

⁸Gl

⁹Al

¹⁰Sc

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1120150

DATE/TIME:

07/25/19 12:02

PAGE:

3 of 16



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Tr

⁶ Sr

⁷ Qc

⁸ Gl

⁹ Al

¹⁰ Sc



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 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).			

WASTE SOIL

Collected date/time: 07/17/19 13:35

SAMPLE RESULTS - 01

L1120150

ONE LAB. NATIONWIDE.



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	Qualifier	MQL	Limit	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	Qualifier	MQL	Limit	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	Qualifier	MQL	Limit	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

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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1120150

DATE/TIME:

07/25/19 12:02

PAGE:

9 of 16



Method Blank (MB)

(MB) R3433050-1 07/22/19 17:56

Analyte	MB Result mg/l	<u>MB Qualifier</u>	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. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Mercury	0.0300	0.0284	0.0284	94.7	80.0-120	94.8		0.0382	20

L119816-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119816-02 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 %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Mercury	0.0300	ND	0.0277	0.0271	92.4	90.5	1	75.0-125		2.08		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) 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

L119816-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L119816-02 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	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



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	3.09	27
Carbon tetrachloride	1.25	ND	1.25	1.17	99.9	93.8	1	23.0-159		6.26	6.26	28
Chlorobenzene	1.25	ND	1.15	1.13	92.1	90.0	1	33.0-152		2.23	2.23	27
Chloroform	1.25	ND	1.22	1.22	97.4	97.6	1	29.0-154		0.252	0.252	28
1,2-Dichloroethane	1.25	ND	1.12	1.13	89.8	90.0	1	29.0-151		0.218	0.218	27
1,1-Dichloroethene	1.25	ND	1.12	1.05	89.4	84.4	1	11.0-160		5.79	5.79	29
2-Butanone (MEK)	6.25	ND	5.90	6.22	93.3	98.4	1	10.0-160		5.27	5.27	32
Tetrachloroethene	1.25	ND	1.27	1.17	101	93.3	1	10.0-160		8.23	8.23	27
Trichloroethene	1.25	0.0550	1.36	1.34	105	103	1	10.0-160		1.72	1.72	25
Vinyl chloride	1.25	ND	1.15	1.13	92.4	90.7	1	10.0-160		1.86	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				

1Cp

2Tc

3Ss

4Cn

5Tr

6Sr

7Qc

8Gl

9Al

10Sc



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.

1 Cp

2 Tc

3 Ss

4 Cn

5 Tr

6 Sr

7 Qc

8 Gl

9 Al

10 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
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

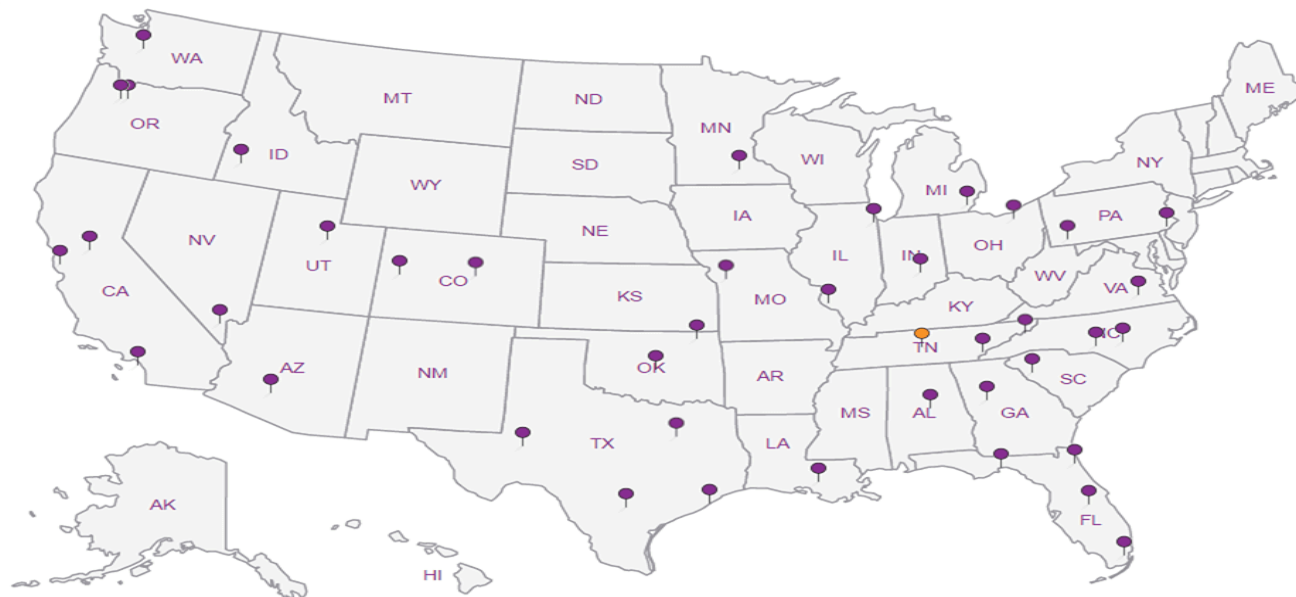
Third Party Federal Accreditations

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.



OCTOBER 2019

October 31, 2019

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

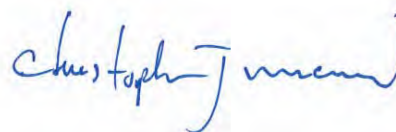
⁹ Sc

Wood E&I Solutions Inc. - Houston, TX

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

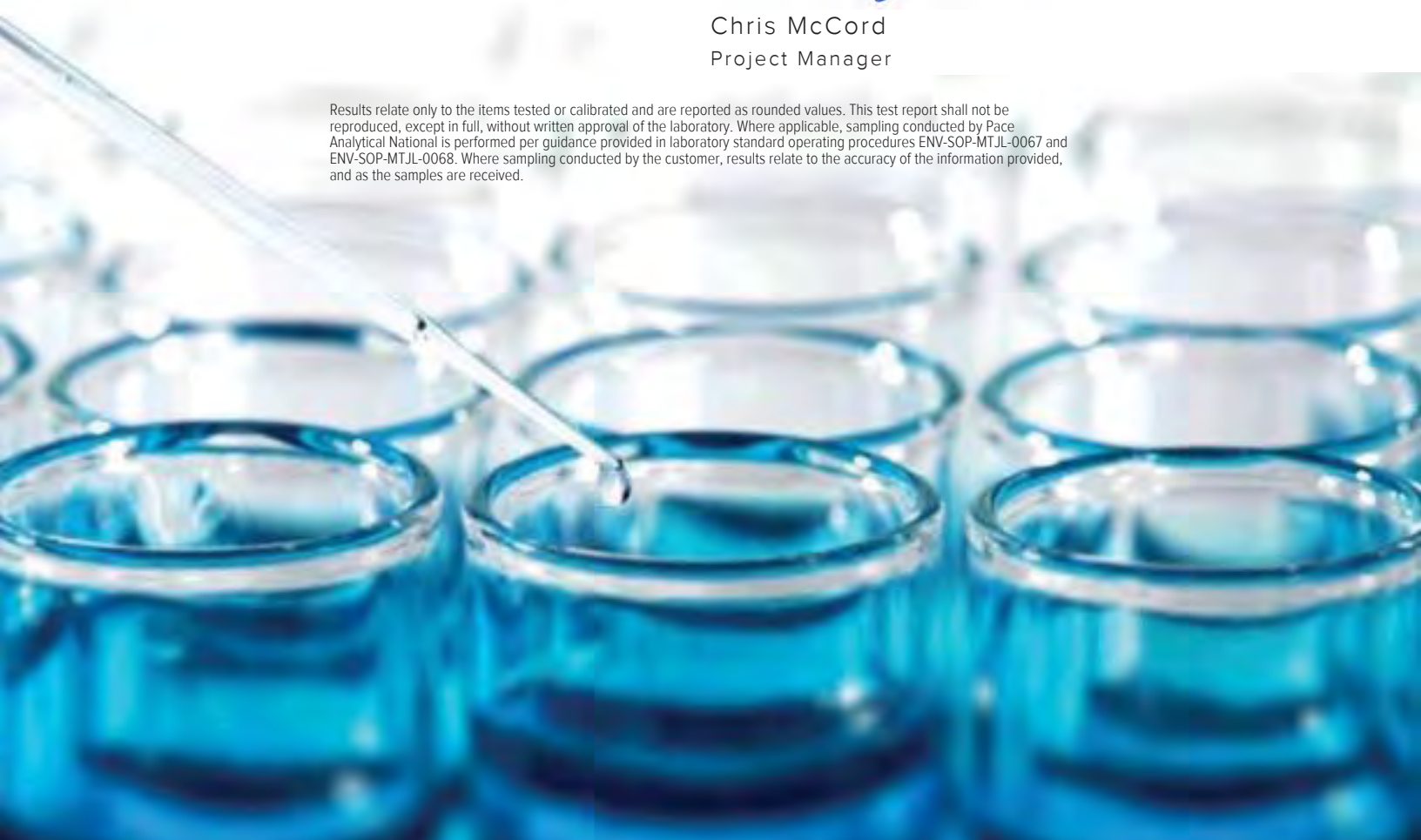
Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

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-140 L1152946-05	13	⁶ Qc
MW-141 L1152946-06	14	
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MW-114 L1152946-08	16	⁸ Al
MW-125 L1152946-09	17	
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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

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

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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1152946

DATE/TIME:

10/31/19 17:08

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



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

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

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

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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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

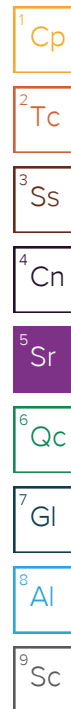
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0330	J	0.0197	0.100	1	10/26/2019 15:16	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

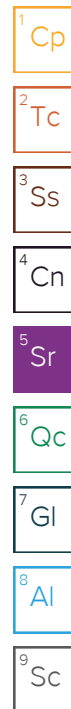
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	10/26/2019 15:19	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

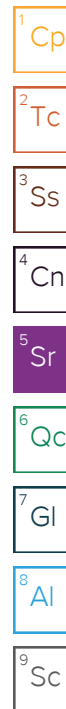
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.469		0.0197	0.100	1	10/26/2019 15:25	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

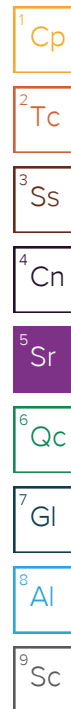
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	9.71		0.0985	0.500	5	10/26/2019 15:34	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

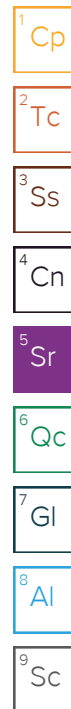
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.145		0.0197	0.100	1	10/26/2019 15:35	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

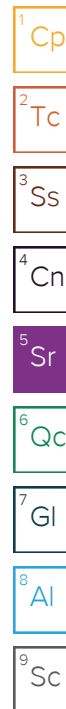
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.613		0.0197	0.100	1	10/26/2019 15:37	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

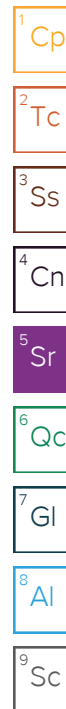
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.544		0.0197	0.100	1	10/26/2019 15:38	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

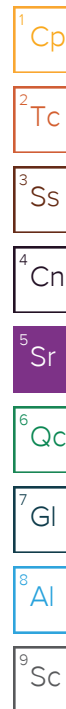
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.395		0.0197	0.100	1	10/26/2019 15:40	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

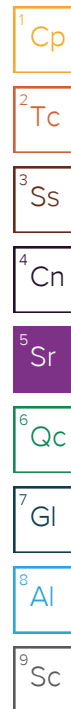
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	1.80		0.0197	0.100	1	10/26/2019 15:41	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

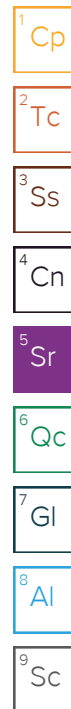
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.174		0.0197	0.100	1	10/26/2019 15:44	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

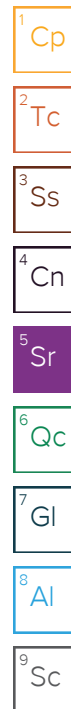
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0910	J	0.0197	0.100	1	10/26/2019 15:47	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	<u>J</u>	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	<u>B</u>	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	Qualifier	MDL	RDL	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	<u>B J</u>	0.000240	0.00200	1	10/28/2019 22:08	WG1368589
Lead,Dissolved	0.000379	<u>B J</u>	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

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

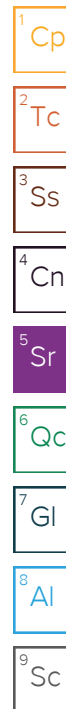
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.258		0.0197	0.100	1	10/26/2019 15:58	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

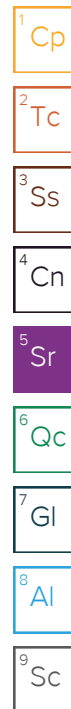
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.201		0.0197	0.100	1	10/26/2019 15:59	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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 date / time	Batch
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

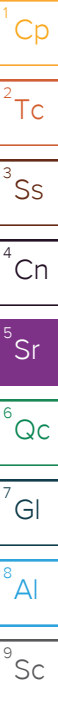
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.453		0.0197	0.100	1	10/26/2019 16:02	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
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 date / time	Batch
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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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

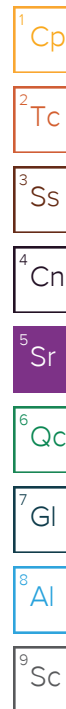
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	10/26/2019 16:04	WG1369963

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	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	Qualifier	MDL	RDL	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	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

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

Analyte	MB Result mg/l	<u>MB Qualifier</u> mg/l	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		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
Dissolved Solids	4240		4360		1	2.79			5	

Laboratory Control Sample (LCS)

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

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

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



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		DUP Result		Dilution	DUP RPD		DUP RPD Limits	
	mg/l		mg/l			%		%	
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		DUP Result		Dilution	DUP RPD		DUP RPD Limits	
	mg/l		mg/l			%		%	
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		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
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		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
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. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD	RPD Limits %
Chloride	50.0	10.2	61.7	62.4	103	1	80.0-120			1.03	20
Fluoride	5.00	0.159	5.20	5.25	101	1	80.0-120			1.06	20
Sulfate	50.0	ND	52.6	53.1	102	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	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



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

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

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

Analyte	MB Result mg/l	<u>MB Qualifier</u>	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 %	<u>DUP Qualifier</u>	DUP RPD Limits %
Nitrate-Nitrite	0.0330	0.0380	1	14.1		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 %	<u>DUP Qualifier</u>	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 %	<u>LCS Qualifier</u>
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 %	<u>MS Qualifier</u>	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 %	<u>MS Qualifier</u>
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	0.0126	0.200
Iron,Dissolved	U	0.0141	0.0100	

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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	0.972	0.941	97.2	80.0-120	94.1	94.1	3.30	20
Iron,Dissolved	10.0	9.64	9.40	96.4	80.0-120	94.0	94.0	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	RPD %	RPD Limits %
Boron,Dissolved	1.00	0.292	1.28	1.28	99.2	98.4	1	75.0-125	96.2	0.648	20
Iron,Dissolved	10.0	0.0179	9.63	9.53	96.2	95.1	1	75.0-125	96.2	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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	0.0500	0.0480	0.0474	96.0	80.0-120	94.8	94.8	1.28	20
Cobalt,Dissolved	0.0500	0.0490	0.0489	97.9	80.0-120	97.7	97.7	0.187	20
Lead,Dissolved	0.0500	0.0463	0.0475	92.6	80.0-120	94.9	94.9	2.45	20
Manganese,Dissolved	0.0500	0.0485	0.0480	96.9	80.0-120	96.0	96.0	0.921	20
Uranium,Dissolved	0.0500	0.0471	0.0478	94.3	80.0-120	95.6	95.6	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	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. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.0502	0.0486	100	80.0-120			3.19	20
Cobalt	0.0500	0.0513	0.0499	103	80.0-120			2.79	20
Lead	0.0500	0.0514	0.0496	103	80.0-120			3.56	20
Manganese	0.0500	0.0509	0.0492	102	80.0-120			3.37	20
Uranium	0.0500	0.0491	0.0475	98.2	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	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

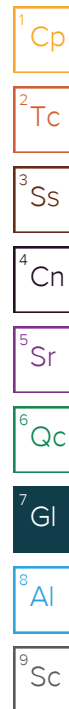
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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	LA000356
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

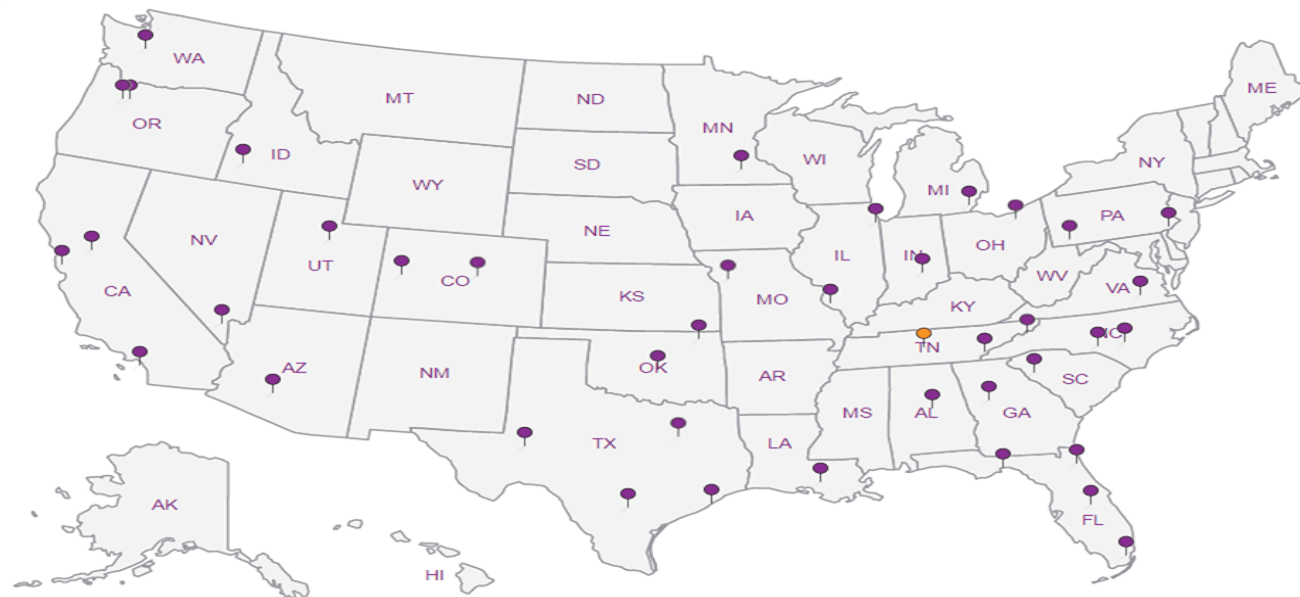
Third Party Federal Accreditations

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
Project Description: Navajo RO Fields
Phone: 713-929-5674
Fax:
City/State: Navajo, NM
Client Project #: 6703180022.0003
Lab Project #: AMECFWHTX-ROFIELDS
P.O. #:
Quote #:
Rush? (Lab MUST Be Notified)
Same Day Five Day
Next Day 5 Day (Rad Only)
Two Day 10 Day (Rad Only)
Three Day
Date Results Needed
No. of Cntrs
Sample ID
Comp/Grab
Matrix
Depth
Date
Time
MW-118
MW-119
MW-142
MW-143
MW-116
MW-18A RW - #18A
MW-144
DUP-RO-01
DUP-RO-02
EB-RO-01
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.
Samples returned via: UPS FedEx Courier
Relinquished by: (Signature) Scott Ude
Date: 10/22/19 1300
Time:
Relinquished by: (Signature)
Date:
Time:
Relinquished by: (Signature)
Date:
Time:
Received for lab by: (Signature)
Date: 10/23/19 8:45
Time:
Trip Blank Received: Yes No
HCL/MeOH TBR
Temp: 21.00 = 2.124 100
Bottles Received:
Date:
Time:
Analysis / Container / Preservative
Pres Chk
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: VC 10-15-19
Shipped Via: FedEx Ground
Remarks
Sample # (lab only)
11
12
13
14
15
16
17
18
19
20
Sample Receipt Checklist
COC Seal Present/Intact: NP
COC Signed/Accurate:
Bottles arrive intact:
Correct bottles used:
Sufficient volume sent:
If Applicable
VOA Zero Headspace:
Preservation Correct/Checked:
RAD Screen <0.5 mR/hr:
If preservation required by Login: Date/Time
Hold:
Condition: NCF / P

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
<u>Assessment Codes:</u> 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".

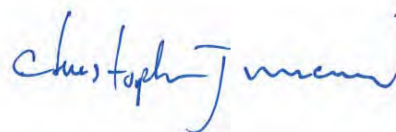
JANUARY 2020

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group: L1180948
Samples Received: 01/18/2020
Project Number: 6703180022.0003
Description: Navajo RO Fields

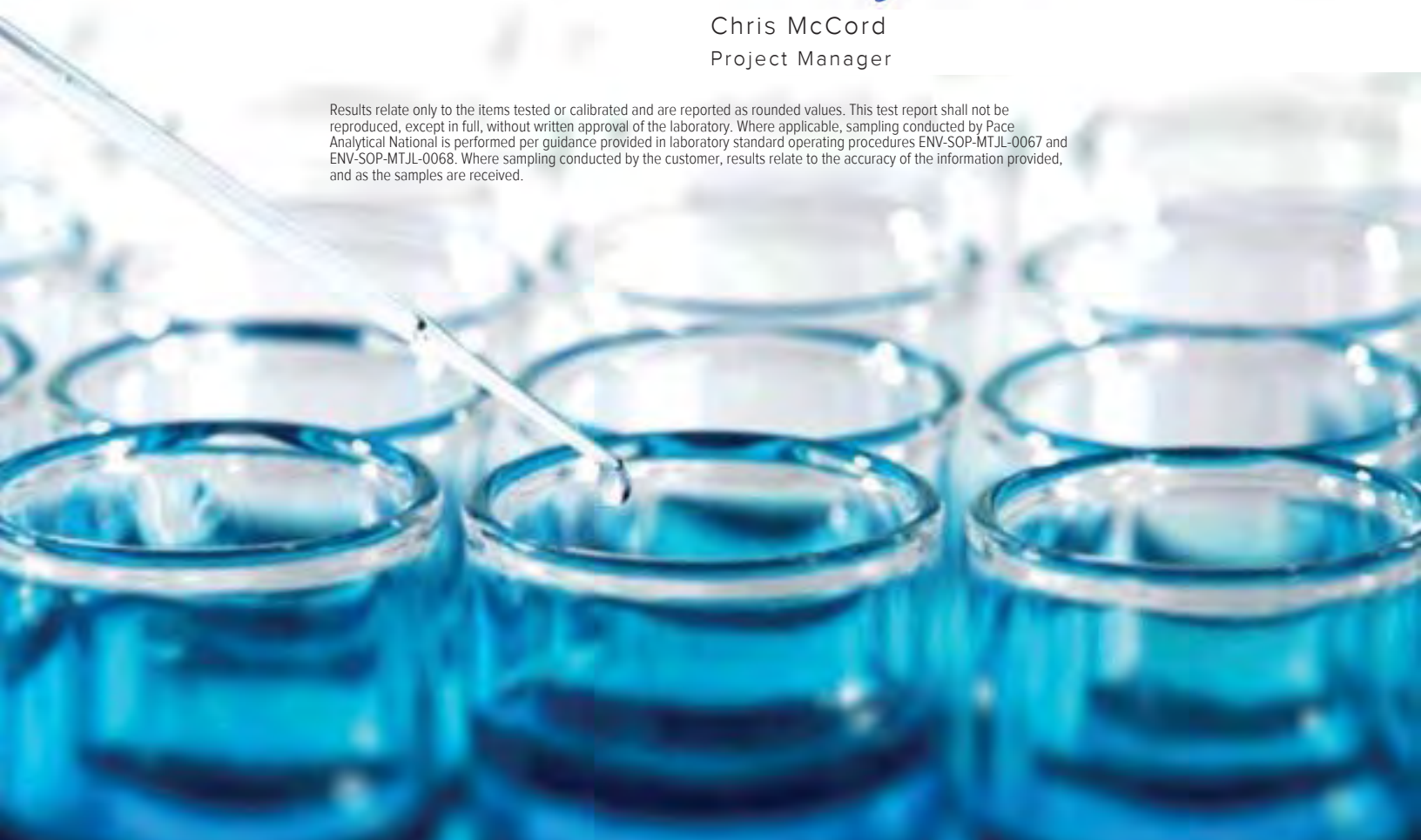
Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

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-141 L1180948-06	13
MW-115 L1180948-07	14
MW-114 L1180948-08	15
MW-125 L1180948-09	16
MW-117 L1180948-10	17
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MW-119 L1180948-12	19
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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-40 L1180948-01 GW

				Collected by Brady Hubbard	Collected date/time 01/16/20 08:55	Received date/time 01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 17:29	01/21/20 17:29	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1416446	100	01/24/20 16:20	01/24/20 16:20	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	2	01/24/20 12:17	01/24/20 12:17	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/22/20 23:36	TRB	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

MW-29 L1180948-02 GW

				Collected by Brady Hubbard	Collected date/time 01/16/20 09:45	Received date/time 01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 17:48	01/21/20 17:48	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 17:34	01/23/20 17:34	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/23/20 17:50	01/23/20 17:50	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:18	01/24/20 12:18	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/22/20 22:55	TRB	Mt. Juliet, TN

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-56 L1180948-03 GW

				Collected by Brady Hubbard	Collected date/time 01/16/20 10:30	Received date/time 01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 17:56	01/21/20 17:56	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 18:39	01/23/20 18:39	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	50	01/23/20 19:44	01/23/20 19:44	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:21	01/24/20 12:21	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/22/20 23:39	TRB	Mt. Juliet, TN

MW-55 L1180948-04 GW

				Collected by Brady Hubbard	Collected date/time 01/16/20 11:15	Received date/time 01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 18:04	01/21/20 18:04	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 20:50	01/23/20 20:50	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	50	01/23/20 21:06	01/23/20 21:06	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:26	01/24/20 12:26	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/22/20 23:42	TRB	Mt. Juliet, TN

MW-140 L1180948-05 GW

				Collected by Brady Hubbard	Collected date/time 01/16/20 13:15	Received date/time 01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 18:12	01/21/20 18:12	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 21:23	01/23/20 21:23	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/23/20 21:39	01/23/20 21:39	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	5	01/24/20 12:27	01/24/20 12:27	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/22/20 23:45	TRB	Mt. Juliet, TN

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-141 L1180948-06 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 12:50

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 18:20	01/21/20 18:20	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 21:55	01/23/20 21:55	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/23/20 22:12	01/23/20 22:12	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	5	01/24/20 12:35	01/24/20 12:35	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/23/20 00:01	TRB	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-115 L1180948-07 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 08:40

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 18:28	01/21/20 18:28	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 22:28	01/23/20 22:28	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/23/20 22:45	01/23/20 22:45	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:36	01/24/20 12:36	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/23/20 00:04	TRB	Mt. Juliet, TN

MW-114 L1180948-08 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 10:25

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 18:37	01/21/20 18:37	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/23/20 23:01	01/23/20 23:01	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/23/20 23:18	01/23/20 23:18	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:38	01/24/20 12:38	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/23/20 00:07	TRB	Mt. Juliet, TN

MW-125 L1180948-09 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 12:15

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 18:54	01/21/20 18:54	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 00:07	01/24/20 00:07	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 00:23	01/24/20 00:23	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:39	01/24/20 12:39	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/23/20 00:10	TRB	Mt. Juliet, TN

MW-117 L1180948-10 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 13:35

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413657	1	01/20/20 21:54	01/21/20 03:58	TH	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:03	01/21/20 19:03	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 00:40	01/24/20 00:40	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 00:56	01/24/20 00:56	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:41	01/24/20 12:41	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/23/20 00:13	TRB	Mt. Juliet, TN

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-118 L1180948-11 GW

				Collected by	Collected date/time	Received date/time
				Brady Hubbard	01/16/20 12:05	01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:11	01/21/20 19:11	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1416446	100	01/24/20 16:36	01/24/20 16:36	ST	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:42	01/24/20 12:42	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414396	1	01/21/20 23:14	01/23/20 00:16	TRB	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

MW-119 L1180948-12 GW

				Collected by	Collected date/time	Received date/time
				Brady Hubbard	01/16/20 11:20	01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:27	01/21/20 19:27	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 01:12	01/24/20 01:12	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 01:29	01/24/20 01:29	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:44	01/24/20 12:44	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 14:57	EL	Mt. Juliet, TN

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-142 L1180948-13 GW

				Collected by	Collected date/time	Received date/time
				Brady Hubbard	01/16/20 14:50	01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:35	01/21/20 19:35	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 01:45	01/24/20 01:45	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 02:02	01/24/20 02:02	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:45	01/24/20 12:45	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:00	EL	Mt. Juliet, TN

MW-143 L1180948-14 GW

				Collected by	Collected date/time	Received date/time
				Brady Hubbard	01/16/20 14:05	01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:43	01/21/20 19:43	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 02:18	01/24/20 02:18	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 02:34	01/24/20 02:34	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:47	01/24/20 12:47	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:03	EL	Mt. Juliet, TN

MW-116 L1180948-15 GW

				Collected by	Collected date/time	Received date/time
				Brady Hubbard	01/16/20 09:25	01/18/20 08:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:52	01/21/20 19:52	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 03:24	01/24/20 03:24	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 03:40	01/24/20 03:40	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:48	01/24/20 12:48	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:11	EL	Mt. Juliet, TN

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



RW-#18A L1180948-16 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 14:40

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 19:59	01/21/20 19:59	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 03:57	01/24/20 03:57	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 04:13	01/24/20 04:13	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 12:57	01/24/20 12:57	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:14	EL	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-144 L1180948-17 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 15:25

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 20:07	01/21/20 20:07	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 04:29	01/24/20 04:29	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	100	01/24/20 04:46	01/24/20 04:46	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 13:00	01/24/20 13:00	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:17	EL	Mt. Juliet, TN

DUP-RO-01 L1180948-18 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 09:00

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 20:25	01/21/20 20:25	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 05:02	01/24/20 05:02	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	50	01/24/20 05:19	01/24/20 05:19	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	2	01/24/20 13:02	01/24/20 13:02	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:20	EL	Mt. Juliet, TN

DUP-RO-02 L1180948-19 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 10:00

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 20:33	01/21/20 20:33	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 05:35	01/24/20 05:35	LBR	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	50	01/24/20 06:57	01/24/20 06:57	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 13:03	01/24/20 13:03	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:23	EL	Mt. Juliet, TN

EB-RO-01 L1180948-20 GW

Collected by
Brady Hubbard

Collected date/time
01/16/20 09:30

Received date/time
01/18/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1413658	1	01/21/20 11:50	01/21/20 12:20	AEC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1413869	1	01/21/20 20:41	01/21/20 20:41	GB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1414481	1	01/24/20 07:30	01/24/20 07:30	LBR	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1414045	1	01/24/20 13:05	01/24/20 13:05	AJC	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1414408	1	01/22/20 09:57	01/23/20 15:25	EL	Mt. Juliet, TN

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

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6703180022.0003

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L1180948

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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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2370		7.05	25.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	320		2.71	20.0	1	01/21/2020 17:29	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 17:29	WG1413869

Sample Narrative:

L1180948-01 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	94.1	J	5.19	100	100	01/24/2020 16:20	WG1416446
Fluoride	3.38	J	0.990	10.0	100	01/24/2020 16:20	WG1416446
Sulfate	1770		7.74	500	100	01/24/2020 16:20	WG1416446

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0394	0.200	2	01/24/2020 12:17	WG1414045

Sample Narrative:

L1180948-01 WG1414045: Dilution due to sulfide interference

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	380		0.0463	1.00	1	01/22/2020 23:36	WG1414396
Magnesium	196		0.0111	1.00	1	01/22/2020 23:36	WG1414396
Potassium	1.81		0.102	1.00	1	01/22/2020 23:36	WG1414396
Sodium	95.4		0.0985	1.00	1	01/22/2020 23:36	WG1414396

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3330		14.1	50.0	1	01/21/2020 03:58	WG1413657

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	542		2.71	20.0	1	01/21/2020 17:48	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 17:48	WG1413869

Sample Narrative:

L1180948-02 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	344		5.19	100	100	01/23/2020 17:50	WG1414481
Fluoride	1.86		0.00990	0.100	1	01/23/2020 17:34	WG1414481
Sulfate	2010		7.74	500	100	01/23/2020 17:50	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0210	J P1	0.0197	0.100	1	01/24/2020 12:18	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	416	O1 V	0.0463	1.00	1	01/22/2020 22:55	WG1414396
Magnesium	298	O1 V	0.0111	1.00	1	01/22/2020 22:55	WG1414396
Potassium	2.46		0.102	1.00	1	01/22/2020 22:55	WG1414396
Sodium	358	O1 V	0.0985	1.00	1	01/22/2020 22:55	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2850		14.1	50.0	1	01/21/2020 03:58	WG1413657

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	343		2.71	20.0	1	01/21/2020 17:56	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 17:56	WG1413869

Sample Narrative:

L1180948-03 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	256		2.60	50.0	50	01/23/2020 19:44	WG1414481
Fluoride	1.20		0.00990	0.100	1	01/23/2020 18:39	WG1414481
Sulfate	1840		3.87	250	50	01/23/2020 19:44	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	01/24/2020 12:21	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	493		0.0463	1.00	1	01/22/2020 23:39	WG1414396
Magnesium	248		0.0111	1.00	1	01/22/2020 23:39	WG1414396
Potassium	2.40		0.102	1.00	1	01/22/2020 23:39	WG1414396
Sodium	150		0.0985	1.00	1	01/22/2020 23:39	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2820		14.1	50.0	1	01/21/2020 03:58	WG1413657

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	492		2.71	20.0	1	01/21/2020 18:04	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:04	WG1413869

Sample Narrative:

L1180948-04 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	562		2.60	50.0	50	01/23/2020 21:06	WG1414481
Fluoride	1.73		0.00990	0.100	1	01/23/2020 20:50	WG1414481
Sulfate	1570		3.87	250	50	01/23/2020 21:06	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.302		0.0197	0.100	1	01/24/2020 12:26	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	435		0.0463	1.00	1	01/22/2020 23:42	WG1414396
Magnesium	311		0.0111	1.00	1	01/22/2020 23:42	WG1414396
Potassium	1.32		0.102	1.00	1	01/22/2020 23:42	WG1414396
Sodium	237		0.0985	1.00	1	01/22/2020 23:42	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3180		14.1	50.0	1	01/21/2020 03:58	WG1413657

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	304		2.71	20.0	1	01/21/2020 18:12	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:12	WG1413869

Sample Narrative:

L1180948-05 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	310		5.19	100	100	01/23/2020 21:39	WG1414481
Fluoride	1.79		0.00990	0.100	1	01/23/2020 21:23	WG1414481
Sulfate	2190		7.74	500	100	01/23/2020 21:39	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	10.3		0.0985	0.500	5	01/24/2020 12:27	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	637		0.0463	1.00	1	01/22/2020 23:45	WG1414396
Magnesium	235		0.0111	1.00	1	01/22/2020 23:45	WG1414396
Potassium	58.3		0.102	1.00	1	01/22/2020 23:45	WG1414396
Sodium	172		0.0985	1.00	1	01/22/2020 23:45	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2250		14.1	50.0	1	01/21/2020 03:58	WG1413657

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	224		2.71	20.0	1	01/21/2020 18:20	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:20	WG1413869

Sample Narrative:

L1180948-06 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	275		5.19	100	100	01/23/2020 22:12	WG1414481
Fluoride	2.35		0.00990	0.100	1	01/23/2020 21:55	WG1414481
Sulfate	1570		7.74	500	100	01/23/2020 22:12	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	8.54		0.0985	0.500	5	01/24/2020 12:35	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	597		0.0463	1.00	1	01/23/2020 00:01	WG1414396
Magnesium	157		0.0111	1.00	1	01/23/2020 00:01	WG1414396
Potassium	5.37		0.102	1.00	1	01/23/2020 00:01	WG1414396
Sodium	58.5		0.0985	1.00	1	01/23/2020 00:01	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3670		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	406		2.71	20.0	1	01/21/2020 18:28	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:28	WG1413869

Sample Narrative:

L1180948-07 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

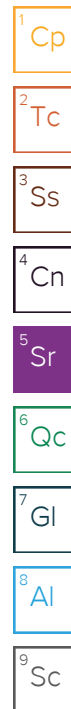
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	286		5.19	100	100	01/23/2020 22:45	WG1414481
Fluoride	2.12		0.00990	0.100	1	01/23/2020 22:28	WG1414481
Sulfate	2250		7.74	500	100	01/23/2020 22:45	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.793		0.0197	0.100	1	01/24/2020 12:36	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	437		0.0463	1.00	1	01/23/2020 00:04	WG1414396
Magnesium	411		0.0111	1.00	1	01/23/2020 00:04	WG1414396
Potassium	0.812	J	0.102	1.00	1	01/23/2020 00:04	WG1414396
Sodium	191		0.0985	1.00	1	01/23/2020 00:04	WG1414396





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2710		14.1	50.0	1	01/21/2020 03:58	WG1413657

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	370		2.71	20.0	1	01/21/2020 18:37	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:37	WG1413869

Sample Narrative:

L1180948-08 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	239		5.19	100	100	01/23/2020 23:18	WG1414481
Fluoride	2.15		0.00990	0.100	1	01/23/2020 23:01	WG1414481
Sulfate	1980		7.74	500	100	01/23/2020 23:18	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.785		0.0197	0.100	1	01/24/2020 12:38	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	606		0.0463	1.00	1	01/23/2020 00:07	WG1414396
Magnesium	225		0.0111	1.00	1	01/23/2020 00:07	WG1414396
Potassium	3.25		0.102	1.00	1	01/23/2020 00:07	WG1414396
Sodium	133		0.0985	1.00	1	01/23/2020 00:07	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4200		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	398		2.71	20.0	1	01/21/2020 18:54	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:54	WG1413869

Sample Narrative:

L1180948-09 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	291		5.19	100	100	01/24/2020 00:23	WG1414481
Fluoride	1.24		0.00990	0.100	1	01/24/2020 00:07	WG1414481
Sulfate	2560		7.74	500	100	01/24/2020 00:23	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.388		0.0197	0.100	1	01/24/2020 12:39	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	545		0.0463	1.00	1	01/23/2020 00:10	WG1414396
Magnesium	381		0.0111	1.00	1	01/23/2020 00:10	WG1414396
Potassium	1.89		0.102	1.00	1	01/23/2020 00:10	WG1414396
Sodium	226		0.0985	1.00	1	01/23/2020 00:10	WG1414396

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2650	J3	14.1	50.0	1	01/21/2020 03:58	WG1413657

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	344		2.71	20.0	1	01/21/2020 19:03	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:03	WG1413869

Sample Narrative:

L1180948-10 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	285		5.19	100	100	01/24/2020 00:56	WG1414481
Fluoride	3.28		0.00990	0.100	1	01/24/2020 00:40	WG1414481
Sulfate	1990		7.74	500	100	01/24/2020 00:56	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.593		0.0197	0.100	1	01/24/2020 12:41	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	584		0.0463	1.00	1	01/23/2020 00:13	WG1414396
Magnesium	263		0.0111	1.00	1	01/23/2020 00:13	WG1414396
Potassium	7.34		0.102	1.00	1	01/23/2020 00:13	WG1414396
Sodium	114		0.0985	1.00	1	01/23/2020 00:13	WG1414396



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3630		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	354		2.71	20.0	1	01/21/2020 19:11	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:11	WG1413869

Sample Narrative:

L1180948-11 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

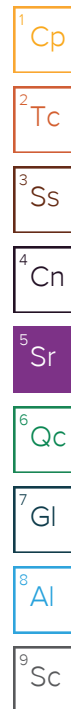
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	313		5.19	100	100	01/24/2020 16:36	WG1416446
Fluoride	5.75	J	0.990	10.0	100	01/24/2020 16:36	WG1416446
Sulfate	2910		7.74	500	100	01/24/2020 16:36	WG1416446

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	1.90		0.0197	0.100	1	01/24/2020 12:42	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	585		0.0463	1.00	1	01/23/2020 00:16	WG1414396
Magnesium	382		0.0111	1.00	1	01/23/2020 00:16	WG1414396
Potassium	4.79		0.102	1.00	1	01/23/2020 00:16	WG1414396
Sodium	160		0.0985	1.00	1	01/23/2020 00:16	WG1414396





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3860		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	334		2.71	20.0	1	01/21/2020 19:27	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:27	WG1413869

Sample Narrative:

L1180948-12 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	356		5.19	100	100	01/24/2020 01:29	WG1414481
Fluoride	2.09		0.00990	0.100	1	01/24/2020 01:12	WG1414481
Sulfate	2440		7.74	500	100	01/24/2020 01:29	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.115		0.0197	0.100	1	01/24/2020 12:44	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	619		0.0463	1.00	1	01/23/2020 14:57	WG1414408
Magnesium	301		0.0111	1.00	1	01/23/2020 14:57	WG1414408
Potassium	0.964	J	0.102	1.00	1	01/23/2020 14:57	WG1414408
Sodium	206		0.0985	1.00	1	01/23/2020 14:57	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4090		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	338		2.71	20.0	1	01/21/2020 19:35	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:35	WG1413869

Sample Narrative:

L1180948-13 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	363		5.19	100	100	01/24/2020 02:02	WG1414481
Fluoride	2.07		0.00990	0.100	1	01/24/2020 01:45	WG1414481
Sulfate	2350		7.74	500	100	01/24/2020 02:02	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0950	J	0.0197	0.100	1	01/24/2020 12:45	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	629		0.0463	1.00	1	01/23/2020 15:00	WG1414408
Magnesium	301		0.0111	1.00	1	01/23/2020 15:00	WG1414408
Potassium	1.46		0.102	1.00	1	01/23/2020 15:00	WG1414408
Sodium	183		0.0985	1.00	1	01/23/2020 15:00	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4070		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	329		2.71	20.0	1	01/21/2020 19:43	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:43	WG1413869

Sample Narrative:

L1180948-14 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	263		5.19	100	100	01/24/2020 02:34	WG1414481
Fluoride	1.71		0.00990	0.100	1	01/24/2020 02:18	WG1414481
Sulfate	2830		7.74	500	100	01/24/2020 02:34	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0560	J	0.0197	0.100	1	01/24/2020 12:47	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	525		0.0463	1.00	1	01/23/2020 15:03	WG1414408
Magnesium	422		0.0111	1.00	1	01/23/2020 15:03	WG1414408
Potassium	1.19		0.102	1.00	1	01/23/2020 15:03	WG1414408
Sodium	209		0.0985	1.00	1	01/23/2020 15:03	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3570		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	332		2.71	20.0	1	01/21/2020 19:52	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:52	WG1413869

Sample Narrative:

L1180948-15 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	278		5.19	100	100	01/24/2020 03:40	WG1414481
Fluoride	1.89		0.00990	0.100	1	01/24/2020 03:24	WG1414481
Sulfate	2270		7.74	500	100	01/24/2020 03:40	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.409		0.0197	0.100	1	01/24/2020 12:48	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	550		0.0463	1.00	1	01/23/2020 15:11	WG1414408
Magnesium	273		0.0111	1.00	1	01/23/2020 15:11	WG1414408
Potassium	1.53		0.102	1.00	1	01/23/2020 15:11	WG1414408
Sodium	180		0.0985	1.00	1	01/23/2020 15:11	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3830		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	290		2.71	20.0	1	01/21/2020 19:59	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 19:59	WG1413869

Sample Narrative:

L1180948-16 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	214		5.19	100	100	01/24/2020 04:13	WG1414481
Fluoride	2.18		0.00990	0.100	1	01/24/2020 03:57	WG1414481
Sulfate	2660		7.74	500	100	01/24/2020 04:13	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.228		0.0197	0.100	1	01/24/2020 12:57	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	503		0.0463	1.00	1	01/23/2020 15:14	WG1414408
Magnesium	379		0.0111	1.00	1	01/23/2020 15:14	WG1414408
Potassium	0.854	J	0.102	1.00	1	01/23/2020 15:14	WG1414408
Sodium	119		0.0985	1.00	1	01/23/2020 15:14	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3930		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	309		2.71	20.0	1	01/21/2020 20:07	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 20:07	WG1413869

Sample Narrative:

L1180948-17 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	245		5.19	100	100	01/24/2020 04:46	WG1414481
Fluoride	2.47		0.00990	0.100	1	01/24/2020 04:29	WG1414481
Sulfate	2300		7.74	500	100	01/24/2020 04:46	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.260		0.0197	0.100	1	01/24/2020 13:00	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	648		0.0463	1.00	1	01/23/2020 15:17	WG1414408
Magnesium	225		0.0111	1.00	1	01/23/2020 15:17	WG1414408
Potassium	1.63		0.102	1.00	1	01/23/2020 15:17	WG1414408
Sodium	139		0.0985	1.00	1	01/23/2020 15:17	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2620		5.64	20.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	325		2.71	20.0	1	01/21/2020 20:25	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 20:25	WG1413869

Sample Narrative:

L1180948-18 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	83.8		0.0519	1.00	1	01/24/2020 05:02	WG1414481
Fluoride	1.85		0.00990	0.100	1	01/24/2020 05:02	WG1414481
Sulfate	1540		3.87	250	50	01/24/2020 05:19	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.658		0.0394	0.200	2	01/24/2020 13:02	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	376		0.0463	1.00	1	01/23/2020 15:20	WG1414408
Magnesium	192		0.0111	1.00	1	01/23/2020 15:20	WG1414408
Potassium	1.60		0.102	1.00	1	01/23/2020 15:20	WG1414408
Sodium	95.3		0.0985	1.00	1	01/23/2020 15:20	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3480		14.1	50.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	495		2.71	20.0	1	01/21/2020 20:33	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 20:33	WG1413869

Sample Narrative:

L1180948-19 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	552		2.60	50.0	50	01/24/2020 06:57	WG1414481
Fluoride	1.72		0.00990	0.100	1	01/24/2020 05:35	WG1414481
Sulfate	1540		3.87	250	50	01/24/2020 06:57	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.289		0.0197	0.100	1	01/24/2020 13:03	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	428		0.0463	1.00	1	01/23/2020 15:23	WG1414408
Magnesium	304		0.0111	1.00	1	01/23/2020 15:23	WG1414408
Potassium	0.961	J	0.102	1.00	1	01/23/2020 15:23	WG1414408
Sodium	235		0.0985	1.00	1	01/23/2020 15:23	WG1414408



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	U		2.82	10.0	1	01/21/2020 12:20	WG1413658

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	4.96	<u>B J</u>	2.71	20.0	1	01/21/2020 20:41	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 20:41	WG1413869

Sample Narrative:

L1180948-20 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	U		0.0519	1.00	1	01/24/2020 07:30	WG1414481
Fluoride	0.0125	<u>J</u>	0.00990	0.100	1	01/24/2020 07:30	WG1414481
Sulfate	U		0.0774	5.00	1	01/24/2020 07:30	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	01/24/2020 13:05	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	0.0486	<u>J</u>	0.0463	1.00	1	01/23/2020 15:25	WG1414408
Magnesium	0.0491	<u>B J</u>	0.0111	1.00	1	01/23/2020 15:25	WG1414408
Potassium	0.128	<u>J</u>	0.102	1.00	1	01/23/2020 15:25	WG1414408
Sodium	0.142	<u>J</u>	0.0985	1.00	1	01/23/2020 15:25	WG1414408



Method Blank (MB)

(MB) R3492938-1 01/21/20 03:58

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

L1180948-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-10 01/21/20 03:58 • (DUP) R3492938-3 01/21/20 03:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	2650	3300	1	21.7	J3	5

Laboratory Control Sample (LCS)

(LCS) R3492938-2 01/21/20 03:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8330	94.7	85.0-115	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3494053-1 01/21/20 12:20

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

L1180948-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-11 01/21/20 12:20 • (DUP) R3494053-3 01/21/20 12:20

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Dissolved Solids	3630	3740	1	2.85		5

Laboratory Control Sample (LCS)

(LCS) R3494053-2 01/21/20 12:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Dissolved Solids	8800	8780	99.8	85.0-115	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3492779-1 01/21/20 17:17

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	4.46	J	2.71	20.0
Alkalinity,Carbonate	U		2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1180948-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-01 01/21/20 17:29 • (DUP) R3492779-2 01/21/20 17:39

Analyte	Original Result		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
Alkalinity,Bicarbonate	320		319		1	0.377			20	
Alkalinity,Carbonate	U		0.000		1	0.000			20	

Sample Narrative:

OS: Endpoint pH 4.5 HEADSPACE

DUP: Endpoint pH 4.5

L1180948-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-11 01/21/20 19:11 • (DUP) R3492779-4 01/21/20 19:19

Analyte	Original Result		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
Alkalinity,Bicarbonate	354		351		1	0.879			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) R3493713-1 01/23/20 10:17

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

L1180948-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-03 01/23/20 18:39 • (DUP) R3493713-3 01/23/20 18:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Fluoride	1.20	1.19	1	0.871		20

L1180948-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-03 01/23/20 19:44 • (DUP) R3493713-6 01/23/20 20:00

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	256	252	50	1.33		20
Sulfate	1840	1820	50	0.648		20

L1180948-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-19 01/24/20 05:35 • (DUP) R3493713-7 01/24/20 05:51

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Fluoride	1.72	1.72	1	0.378		20

L1180948-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-19 01/24/20 06:57 • (DUP) R3493713-9 01/24/20 07:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	552	548	50	0.801		20
Sulfate	1540	1540	50	0.106		20



Laboratory Control Sample (LCS)

(LCS) R3493713-2 01/23/20 10:33

Analyte	Spike Amount		LCS Result		Rec. Limits		<u>LCS Qualifier</u>	
	mg/l		mg/l	%		%		
Chloride	40.0		39.3	98.2	90.0-110			
Fluoride	8.00		8.00	100	90.0-110			
Sulfate	40.0		39.6	99.0	90.0-110			

L1180948-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1180948-03 01/23/20 18:39 • (MS) R3493713-4 01/23/20 19:11 • (MSD) R3493713-5 01/23/20 19:28

Analyte	Spike Amount		Original Result		MS Result		MSD Result		MS Rec.		MSD Rec.		Dilution	Rec. Limits		<u>MS Qualifier</u>		<u>MSD Qualifier</u>		RPD		RPD Limits	
	mg/l		mg/l		mg/l	%	mg/l	%	%	%	%	%		%	%		%		%	%	%	%	%
Fluoride	5.00		1.20		5.31		5.59	82.1		87.8		87.8	1	80.0-120		5.18				20			

L1180948-19 Original Sample (OS) • Matrix Spike (MS)

(OS) L1180948-19 01/24/20 05:35 • (MS) R3493713-8 01/24/20 06:41

Analyte	Spike Amount		Original Result		MS Result		MS Rec.		Dilution	Rec. Limits		<u>MS Qualifier</u>	
	mg/l		mg/l		mg/l	%	%	%		%	%		
Fluoride	5.00		1.72		6.02		86.2		1	80.0-120			

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3494095-1 01/24/20 11:37

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

L1182472-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1182472-01 01/24/20 18:15 • (DUP) R3494095-3 01/24/20 18:31

Analyte	Original Result		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l	%			%	
Chloride	819		819	1	0.0199		20	
Fluoride	4.55		4.54	1	0.370	E	20	
Sulfate	1870		1870	1	0.0740	E	20	

L1182472-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1182472-01 01/24/20 19:20 • (DUP) R3494095-6 01/24/20 19:37

Analyte	Original Result		DUP Result		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l	%			%	
Chloride	828		822	50	0.706		20	
Sulfate	1900		1880	50	0.718		20	

Sample Narrative:

OS: Bromide reported at dilution due to high sulfate result

Laboratory Control Sample (LCS)

(LCS) R3494095-2 01/24/20 11:53

Analyte	Spike Amount		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/l		mg/l	%		%		%		
Chloride	40.0		39.6	98.9		90.0-110		90.0-110		
Fluoride	8.00		7.94	99.3		90.0-110		90.0-110		
Sulfate	40.0		39.9	99.6		90.0-110		90.0-110		



L1182472-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1182472-01 01/24/20 18:15 • (MS) R3494095-4 01/24/20 18:47 • (MSD) R3494095-5 01/24/20 19:04

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	819	828	828	16.5	17.8	1	80.0-120	EV	EV	0.0771	20
Fluoride	5.00	4.55	8.10	9.15	71.0	91.9	1	80.0-120	JG		12.1	20
Sulfate	50.0	1870	1860	1860	0.000	0.000	1	80.0-120	EV	EV	0.0758	20

L1182473-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1182473-01 01/24/20 22:37 • (MS) R3494095-8 01/24/20 23:10

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	73.0	120	94.0	1	80.0-120	E
Fluoride	5.00	0.386	5.41	100	1	80.0-120	
Sulfate	50.0	83.9	129	91.0	1	80.0-120	E

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3493918-1 01/24/20 12:14

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

L1180948-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-02 01/24/20 12:18 • (DUP) R3493918-3 01/24/20 12:20

Analyte	Original Result		DUP Result		Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	mg/l	%	mg/l	%				%
Nitrate-Nitrite	0.0210		0.000		1	200	P1	20

L1180948-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1180948-15 01/24/20 12:48 • (DUP) R3493918-6 01/24/20 12:56

Analyte	Original Result		DUP Result		Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	mg/l	%	mg/l	%				%
Nitrate-Nitrite	0.409		0.406		1	0.736		20

Laboratory Control Sample (LCS)

(LCS) R3493918-2 01/24/20 12:15

Analyte	Spike Amount		LCS Result		Rec. Limits		<u>LCS Qualifier</u>
	mg/l	%	mg/l	%			
Nitrate-Nitrite	4.00		4.01		100	90.0-110	

L1180948-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1180948-03 01/24/20 12:21 • (MS) R3493918-4 01/24/20 12:23 • (MSD) R3493918-5 01/24/20 12:24

Analyte	Spike Amount		Original Result		MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>	RPD	RPD Limits
	mg/l	%	mg/l	%	mg/l	mg/l	%	%		%		%	%
Nitrate-Nitrite	2.50		U		2.62	2.61	105	104	1	90.0-110	0.268		20

L1180948-16 Original Sample (OS) • Matrix Spike (MS)

(OS) L1180948-16 01/24/20 12:57 • (MS) R3493918-7 01/24/20 12:59

Analyte	Spike Amount		Original Result		MS Result	MS Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>
	mg/l	%	mg/l	%	mg/l	%		%	
Nitrate-Nitrite	2.50		0.228		2.75	101	1	90.0-110	



Method Blank (MB)

(MB) R3493231-4 01/22/20 22:47

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Calcium	0.0525	J	0.0463	1.00
Magnesium	0.0205	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) R3493231-5 01/22/20 22:50 • (LCSD) R3493231-6 01/22/20 22:52

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 %
Calcium	10.0	9.99	9.85	99.9	98.5	80.0-120			1.45	20
Magnesium	10.0	9.92	9.87	99.2	98.7	80.0-120			0.580	20
Potassium	10.0	9.48	9.38	94.8	93.8	80.0-120			1.12	20
Sodium	10.0	10.0	9.87	100	98.7	80.0-120			1.23	20

L1180948-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1180948-02 01/22/20 22:55 • (MS) R3493231-8 01/22/20 23:01 • (MSD) R3493231-9 01/22/20 23:03

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 %
Calcium	10.0	416	422	421	58.1	44.2	1	75.0-125	V	V	0.329	20
Magnesium	10.0	298	307	305	82.7	65.2	1	75.0-125		V	0.573	20
Potassium	10.0	2.46	12.0	12.0	95.4	95.2	1	75.0-125			0.243	20
Sodium	10.0	358	365	363	64.5	45.6	1	75.0-125	V	V	0.519	20



Method Blank (MB)

(MB) R3493571-1 01/23/20 14:39

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Calcium	U		0.0463	1.00
Magnesium	0.0458	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) R3493571-2 01/23/20 14:41 • (LCSD) R3493571-3 01/23/20 14:44

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	9.55	9.86	95.5	98.6	80.0-120			3.16	20
Magnesium	10.0	9.39	9.69	93.9	96.9	80.0-120			3.12	20
Potassium	10.0	9.10	9.34	91.0	93.4	80.0-120			2.67	20
Sodium	10.0	9.61	9.93	96.1	99.3	80.0-120			3.24	20

L1180954-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1180954-07 01/23/20 14:47 • (MS) R3493571-5 01/23/20 14:52 • (MSD) R3493571-6 01/23/20 14:54

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	RPD %	RPD Limits %
Calcium	10.0	55.4	64.0	64.0	85.4	86.3	1	75.0-125		0.145	20
Magnesium	10.0	11.5	20.8	20.8	92.4	92.7	1	75.0-125		0.141	20
Potassium	10.0	3.68	13.1	13.0	94.0	93.0	1	75.0-125		0.821	20
Sodium	10.0	78.0	85.8	85.8	77.9	78.3	1	75.0-125		0.0424	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.
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.
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.

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



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
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

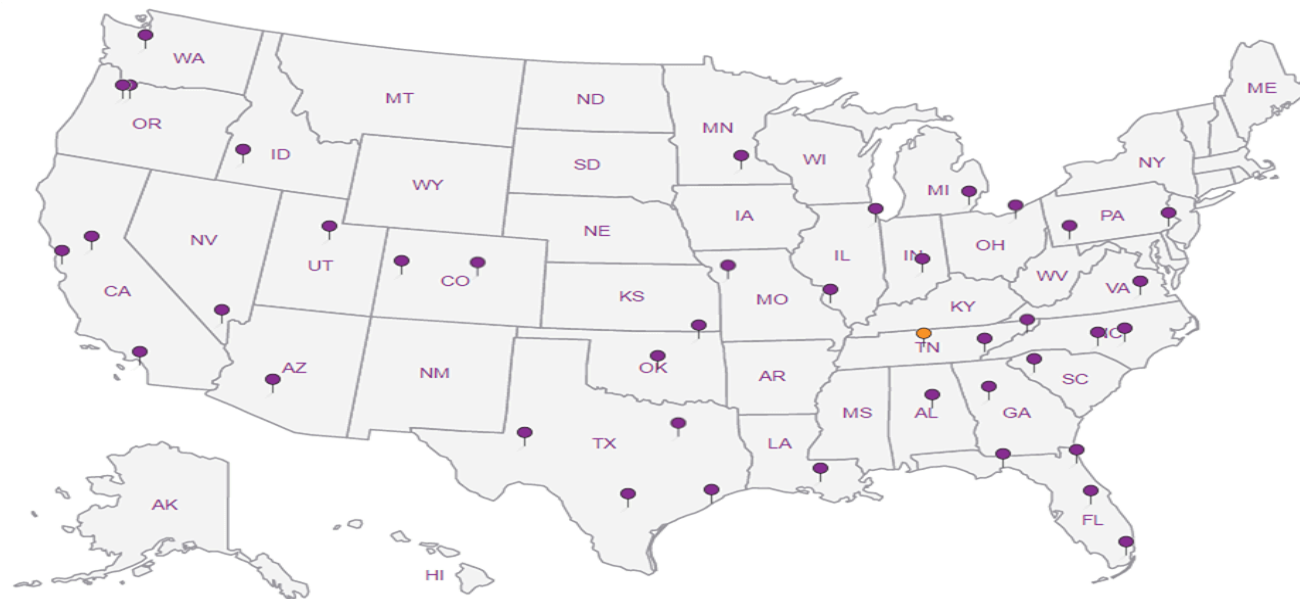
Third Party Federal Accreditations

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.



DATA ASSESSMENT SUMMARY

Project Information						
Project Name:	Navajo RO Fields	Lab Name:	Pace Analytical			
Project Number:	6703190022	Lab Report Number:	L1180948			
Reviewer's Signature:	Julie Ricardi	Number of Samples:	17 primary, 2 field duplicates			
Review Date:	February 7, 2020	Matrix:	GW			
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:	Total Metals (Ca, Mg, K, Na)	Total Dissolved Solids	Alkalinity, Bicarbonate/Carbonate	Anions (Cl, F, SO ₄)	Nitrate + Nitrite	
Method Number:	EPA 6010B	EPA 2540C	EPA 2320B	EPA 300.0	EPA 353.2	
1. Preservation/hold times	O	O	O	O	O	
2. Blanks	X(1)	O	X(2)	O	O	
3. Surrogates	NA	NA	NA	NA	NA	
4. Matrix spike/dup	O	NA	NA	O	O	
5. Lab QC samples	O	M(1)	O	O	O	
6. Field QC samples	X(3)	O	X(3)	X(3)	M(2)	
7. Overall assessment	O	O	O	O	O	
<u>Assessment Codes:</u> 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						

Notes: RCRA = Resource Conservation and Recovery Act
TPH = Total Petroleum Hydrocarbons

Assessment Code	Description	Action Required
X(1)	Calcium was detected in a method blank at a concentration between the MDL and RL (0.525 mg/L). Magnesium was detected in two method blanks at concentrations between the MDL and RL (0.0205 mg/L, 0.0458 mg/L).	Calcium and magnesium results in the associated samples were all greater than the RL or were greater than ten times the blank concentration. Therefore, results are not affected and are not qualified.
X(2)	Bicarbonate alkalinity was detected in a method blank at a concentration between the MDL and RL (4.46 mg/L).	Bicarbonate alkalinity results in the associated samples were all greater than the RL or were greater than ten times the blank concentration. Therefore, results are not affected and are not qualified.
M(1)	The relative percent difference (RPD) between laboratory duplicate results for TDS (22) in sample MW-117 was greater than the laboratory control limit of 5.	The TDS result for sample MW-117 was qualified estimated (J).
M(2)	Inconsistent results for nitrate + nitrite were reported in sample MW-40 and associated field duplicate DUP-RO-01. Nitrate + nitrite was reported at a concentration greater than the RL in DUP-RO-01 (0.658 mg/L) but was not detected in sample MW-40.	Nitrate + nitrite results in sample MW-40 and DUP-RO-01 are qualified estimated (J/UJ).
X(3)	Calcium, magnesium, potassium, sodium, fluoride, and bicarbonate alkalinity were detected in equipment blank EB-RO-01 at concentrations between the MDL and RL.	Results for these target analytes in the associated sample MW-116 were all greater than the RL or were greater than ten times the blank concentrations. Therefore, results are not affected and are not qualified.

MW-40

Collected date/time: 01/16/20 08:55

SAMPLE RESULTS - 01

L1180948

ONE LAB. NATIONWIDE

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2370		7.05	25.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	320		2.71	20.0	1	01/21/2020 17:29	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 17:29	WG1413869

Sample Narrative:

L1180948-01 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	94.1	J	5.19	100	100	01/24/2020 16:20	WG1416446
Fluoride	3.38	J	0.990	10.0	100	01/24/2020 16:20	WG1416446
Sulfate	1770		7.74	500	100	01/24/2020 16:20	WG1416446

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0394	0.200	2	01/24/2020 12:17	WG1414045

Sample Narrative:

L1180948-01 WG1414045: Dilution due to sulfide interference

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	380		0.0463	1.00	1	01/22/2020 23:36	WG1414396
Magnesium	196		0.0111	1.00	1	01/22/2020 23:36	WG1414396
Potassium	1.81		0.102	1.00	1	01/22/2020 23:36	WG1414396
Sodium	95.4		0.0985	1.00	1	01/22/2020 23:36	WG1414396

Jn
2/6/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

01/27/20 09:24

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MW-29

Collected date/time: 01/16/20 09:45

SAMPLE RESULTS - 02

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3330		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	542		2.71	20.0	1	01/21/2020 17:48	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 17:48	WG1413869

Sample Narrative:

L1180948-02 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	344		5.19	100	100	01/23/2020 17:50	WG1414481
Fluoride	1.86		0.00990	0.100	1	01/23/2020 17:34	WG1414481
Sulfate	2010		7.74	500	100	01/23/2020 17:50	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0210	J P1	0.0197	0.100	1	01/24/2020 12:18	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	416	Q1 V	0.0463	1.00	1	01/22/2020 22:55	WG1414396
Magnesium	298	Q1 V	0.0111	1.00	1	01/22/2020 22:55	WG1414396
Potassium	2.46		0.102	1.00	1	01/22/2020 22:55	WG1414396
Sodium	358	Q1 V	0.0985	1.00	1	01/22/2020 22:55	WG1414396

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 GI

8 Al

9 Sc

Jr 2/12/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

01/27/20 09:24

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MW-56

Collected date/time: 01/16/20 10:30

SAMPLE RESULTS - 03

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2850		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	343		2.71	20.0	1	01/21/2020 17:56	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 17:56	WG1413869

Sample Narrative:

L1180948-03 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	256		2.60	50.0	50	01/23/2020 19:44	WG1414481
Fluoride	1.20		0.00990	0.100	1	01/23/2020 18:39	WG1414481
Sulfate	1840		3.87	250	50	01/23/2020 19:44	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	01/24/2020 12:21	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	493		0.0463	1.00	1	01/22/2020 23:39	WG1414396
Magnesium	248		0.0111	1.00	1	01/22/2020 23:39	WG1414396
Potassium	2.40		0.102	1.00	1	01/22/2020 23:39	WG1414396
Sodium	150		0.0985	1.00	1	01/22/2020 23:39	WG1414396

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 GI

8 Al

9 Sc

Jr 2/12/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

01/27/20 09:24

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MW-55

SAMPLE RESULTS - 04

ONE LAB. NATIONWIDE.

Collected date/time: 01/16/20 11:15

L1180948

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2820		14.1	50.0	1	01/21/2020 03:58	WG1413867

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	492		2.71	20.0	1	01/21/2020 18:04	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:04	WG1413869

Sample Narrative:

L1180948-04 WG1413869; Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	562		2.60	50.0	50	01/23/2020 21:06	WG1414481
Fluoride	173		0.00990	0.100	1	01/23/2020 20:50	WG1414481
Sulfate	1570		3.87	250	50	01/23/2020 21:06	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.302		0.0197	0.100	1	01/24/2020 12:26	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	435		0.0463	1.00	1	01/22/2020 23:42	WG1414396
Magnesium	311		0.0111	1.00	1	01/22/2020 23:42	WG1414396
Potassium	1.32		0.102	1.00	1	01/22/2020 23:42	WG1414396
Sodium	237		0.0985	1.00	1	01/22/2020 23:42	WG1414396

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6703180022.0003

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L1180948

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SAMPLE RESULTS - 05

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3180		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	304		2.71	20.0	1	01/21/2020 18:12	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 18:12	WG1413869

Sample Narrative:

L1180948-05 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	310		5.19	100	100	01/23/2020 21:39	WG1414481
Fluoride	1.79		0.00990	0.100	1	01/23/2020 21:23	WG1414481
Sulfate	2190		7.74	500	100	01/23/2020 21:39	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	10.3		0.0985	0.500	5	01/24/2020 12:27	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	637		0.0463	1.00	1	01/22/2020 23:45	WG1414396
Magnesium	235		0.0111	1.00	1	01/22/2020 23:45	WG1414396
Potassium	58.3		0.102	1.00	1	01/22/2020 23:45	WG1414396
Sodium	172		0.0985	1.00	1	01/22/2020 23:45	WG1414396

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Jr 2/12/20

ACCOUNT:

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SAMPLE RESULTS - 06

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2250		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	224		2.71	20.0	1	01/21/2020 18:20	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 18:20	WG1413869

Sample Narrative:

L1180948-06 WG1413869; Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

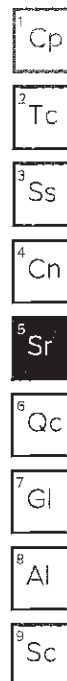
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	275		5.19	100	100	01/23/2020 22:12	WG1414481
Fluoride	2.35		0.00990	0.100	1	01/23/2020 21:55	WG1414481
Sulfate	1570		7.74	500	100	01/23/2020 22:12	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	8.54		0.0985	0.500	5	01/24/2020 12:35	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	597		0.0463	1.00	1	01/23/2020 00:01	WG1414396
Magnesium	157		0.0111	1.00	1	01/23/2020 00:01	WG1414396
Potassium	5.37		0.102	1.00	1	01/23/2020 00:01	WG1414396
Sodium	58.5		0.0985	1.00	1	01/23/2020 00:01	WG1414396



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Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3670		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	406		2.71	20.0	1	01/21/2020 18:28	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 18:28	WG1413869

Sample Narrative:

L1180948-07 WG1413869; Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	286		5.19	100	100	01/23/2020 22:45	WG1414481
Fluoride	2.12		0.00990	0.100	1	01/23/2020 22:28	WG1414481
Sulfate	2250		7.74	500	100	01/23/2020 22:45	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.793		0.0197	0.100	1	01/24/2020 12:36	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	437		0.0463	1.00	1	01/23/2020 00:04	WG1414396
Magnesium	411		0.0111	1.00	1	01/23/2020 00:04	WG1414396
Potassium	0.812	J	0.102	1.00	1	01/23/2020 00:04	WG1414396
Sodium	191		0.0985	1.00	1	01/23/2020 00:04	WG1414396



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Collected date/time: 01/16/20 10:25

SAMPLE RESULTS - 08

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2710		14.1	50.0	1	01/21/2020 03:58	WG1413657

Cp

Tc

Ss

Cn

Sr

Qc

GI

AI

Sc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	370		2.71	20.0	1	01/21/2020 18:37	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 18:37	WG1413869

Sample Narrative:

L1180948-08 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	239		5.19	100	100	01/23/2020 23:18	WG1414481
Fluoride	2.15		0.00990	0.100	1	01/23/2020 23:01	WG1414481
Sulfate	1980		7.74	500	100	01/23/2020 23:18	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.785		0.0197	0.100	1	01/24/2020 12:38	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	606		0.0463	1.00	1	01/23/2020 00:07	WG1414396
Magnesium	225		0.0111	1.00	1	01/23/2020 00:07	WG1414396
Potassium	3.25		0.102	1.00	1	01/23/2020 00:07	WG1414396
Sodium	133		0.0985	1.00	1	01/23/2020 00:07	WG1414396

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ACCOUNT:

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SAMPLE RESULTS - 09

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4200		14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	398		2.71	20.0	1	01/21/2020 18:54	WG1413869
Alkalinity,Carbonate	U		2.71	20.0	1	01/21/2020 18:54	WG1413869

Sample Narrative:

L1180948-09 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

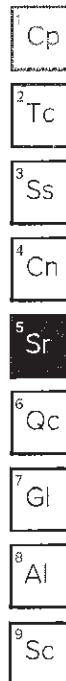
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	291		5.19	100	100	01/24/2020 00:23	WG1414481
Fluoride	1.24		0.00990	0.100	1	01/24/2020 00:07	WG1414481
Sulfate	2560		7.74	500	100	01/24/2020 00:23	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.388		0.0197	0.100	1	01/24/2020 12:39	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	545		0.0463	1.00	1	01/23/2020 00:10	WG1414396
Magnesium	381		0.0111	1.00	1	01/23/2020 00:10	WG1414396
Potassium	1.89		0.102	1.00	1	01/23/2020 00:10	WG1414396
Sodium	226		0.0985	1.00	1	01/23/2020 00:10	WG1414396



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SAMPLE RESULTS - 10

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ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2650	J	14.1	50.0	1	01/21/2020 03:58	WG1413657

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	344		2.71	20.0	1	01/21/2020 19:03	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:03	WG1413869

Sample Narrative:

L1180948-10 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	285		5.19	100	100	01/24/2020 00:56	WG1414481
Fluoride	3.28		0.00990	0.100	1	01/24/2020 00:40	WG1414481
Sulfate	1990		7.74	500	100	01/24/2020 00:56	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.593		0.0197	0.100	1	01/24/2020 12:41	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	584		0.0463	1.00	1	01/23/2020 00:13	WG1414396
Magnesium	263		0.0111	1.00	1	01/23/2020 00:13	WG1414396
Potassium	7.34		0.102	1.00	1	01/23/2020 00:13	WG1414396
Sodium	114		0.0985	1.00	1	01/23/2020 00:13	WG1414396



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Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3630		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	354		2.71	20.0	1	01/21/2020 19:11	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:11	WG1413869

Sample Narrative:

L1180948-11 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	313		5.19	100	100	01/24/2020 16:36	WG1416446
Fluoride	5.75	J	0.990	10.0	100	01/24/2020 16:36	WG1416446
Sulfate	2910		7.74	500	100	01/24/2020 16:36	WG1416446

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	1.90		0.0197	0.100	1	01/24/2020 12:42	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	585		0.0463	1.00	1	01/23/2020 00:16	WG1414396
Magnesium	382		0.0111	1.00	1	01/23/2020 00:16	WG1414396
Potassium	4.79		0.102	1.00	1	01/23/2020 00:16	WG1414396
Sodium	160		0.0985	1.00	1	01/23/2020 00:16	WG1414396

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

g
2/12/20

MW-119

Collected date/time: 01/16/20 11:20

SAMPLE RESULTS - 12

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3860		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	334		2.71	20.0	1	01/21/2020 19:27	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:27	WG1413869

Sample Narrative:

L1180948-12 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	356		5.19	100	100	01/24/2020 01:29	WG1414481
Fluoride	2.09		0.00990	0.100	1	01/24/2020 01:12	WG1414481
Sulfate	2440		7.74	500	100	01/24/2020 01:29	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.115		0.0197	0.100	1	01/24/2020 12:44	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	619		0.0463	1.00	1	01/23/2020 14:57	WG1414408
Magnesium	301		0.0111	1.00	1	01/23/2020 14:57	WG1414408
Potassium	0.964	J	0.102	1.00	1	01/23/2020 14:57	WG1414408
Sodium	206		0.0985	1.00	1	01/23/2020 14:57	WG1414408



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MW-142

Collected date/time: 01/16/20 14:50

SAMPLE RESULTS - 13

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ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4090		14.1	50.0	1	01/21/2020 12:20	WG1413868

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	338		2.71	20.0	1	01/21/2020 19:35	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:35	WG1413869

Sample Narrative:

L1180948-13 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	363		5.19	100	100	01/24/2020 02:02	WG1414481
Fluoride	2.07		0.00990	0.100	1	01/24/2020 01:45	WG1414481
Sulfate	2350		7.74	500	100	01/24/2020 02:02	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0950	J	0.0197	0.100	1	01/24/2020 12:45	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	629		0.0463	1.00	1	01/23/2020 15:00	WG1414408
Magnesium	301		0.0111	1.00	1	01/23/2020 15:00	WG1414408
Potassium	1.46		0.102	1.00	1	01/23/2020 15:00	WG1414408
Sodium	183		0.0985	1.00	1	01/23/2020 15:00	WG1414408

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

2/12/20

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SAMPLE RESULTS - 14

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ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4070		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	329		2.71	20.0	1	01/21/2020 19:43	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:43	WG1413869

Sample Narrative:

L1180948-14 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	263		5.19	100	100	01/24/2020 02:34	WG1414481
Fluoride	1.71		0.00990	0.100	1	01/24/2020 02:18	WG1414481
Sulfate	2830		7.74	500	100	01/24/2020 02:34	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0560	J	0.0197	0.100	1	01/24/2020 12:47	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	525		0.0463	1.00	1	01/23/2020 15:03	WG1414408
Magnesium	422		0.0111	1.00	1	01/23/2020 15:03	WG1414408
Potassium	1.19		0.102	1.00	1	01/23/2020 15:03	WG1414408
Sodium	209		0.0985	1.00	1	01/23/2020 15:03	WG1414408

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

J 2/12/20



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3570		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	332		2.71	20.0	1	01/21/2020 19:52	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:52	WG1413869

Sample Narrative:

L1180948-15 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	278		5.19	100	100	01/24/2020 03:40	WG1414481
Fluoride	1.89		0.00990	0.100	1	01/24/2020 03:24	WG1414481
Sulfate	2270		7.74	500	100	01/24/2020 03:40	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.409		0.0197	0.100	1	01/24/2020 12:48	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	550		0.0463	1.00	1	01/23/2020 15:11	WG1414408
Magnesium	273		0.0111	1.00	1	01/23/2020 15:11	WG1414408
Potassium	153		0.102	1.00	1	01/23/2020 15:11	WG1414408
Sodium	180		0.0985	1.00	1	01/23/2020 15:11	WG1414408

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 GI

8 Al

9 Sc

Jr 2/12/20

RW-#18A

Collected date/time: 01/16/20 14:40

SAMPLE RESULTS - 16

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3830		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	290		2.71	20.0	1	01/21/2020 19:59	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 19:59	WG1413869

Sample Narrative:

L1180948-16 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	214		5.19	100	100	01/24/2020 04:13	WG1414481
Fluoride	2.18		0.00990	0.100	1	01/24/2020 03:57	WG1414481
Sulfate	2660		7.74	500	100	01/24/2020 04:13	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.228		0.0197	0.100	1	01/24/2020 12:57	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	503		0.0463	1.00	1	01/23/2020 15:14	WG1414408
Magnesium	379		0.0111	1.00	1	01/23/2020 15:14	WG1414408
Potassium	0.854	J	0.102	1.00	1	01/23/2020 15:14	WG1414408
Sodium	119		0.0985	1.00	1	01/23/2020 15:14	WG1414408

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Jr
2/12/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

01/27/20 09:24

PAGE:

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MW-144

Collected date/time: 01/16/20 15:25

SAMPLE RESULTS - 17

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3930		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	309		2.71	20.0	1	01/21/2020 20:07	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 20:07	WG1413869

Sample Narrative:

L1180948-17 WG1413869; Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	245		5.19	100	100	01/24/2020 04:46	WG1414481
Fluoride	2.47		0.00990	0.100	1	01/24/2020 04:29	WG1414481
Sulfate	2300		7.74	500	100	01/24/2020 04:46	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.260		0.0197	0.100	1	01/24/2020 13:00	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	648		0.0463	1.00	1	01/23/2020 15:17	WG1414408
Magnesium	225		0.0111	1.00	1	01/23/2020 15:17	WG1414408
Potassium	1.63		0.102	1.00	1	01/23/2020 15:17	WG1414408
Sodium	139		0.0985	1.00	1	01/23/2020 15:17	WG1414408

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

82
2/12/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

01/27/20 09:24

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DUP-R0-01

Collected date/time: 01/16/20 09:00

SAMPLE RESULTS - 18

L1180948

ONE LAB. NATIONWIDE.

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2620		5.64	20.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	325		2.71	20.0	1	01/21/2020 20:25	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 20:25	WG1413869

Sample Narrative:

L1180948-18 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	83.8		0.0519	1.00	1	01/24/2020 05:02	WG1414481
Fluoride	1.85		0.00990	0.100	1	01/24/2020 05:02	WG1414481
Sulfate	1540		3.87	250	50	01/24/2020 05:19	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.658	J	0.0394	0.200	2	01/24/2020 13:02	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	376		0.0463	1.00	1	01/23/2020 15:20	WG1414408
Magnesium	192		0.0111	1.00	1	01/23/2020 15:20	WG1414408
Potassium	1.60		0.102	1.00	1	01/23/2020 15:20	WG1414408
Sodium	95.3		0.0985	1.00	1	01/23/2020 15:20	WG1414408

Jr
2/6/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

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DUP-RO-02

Collected date/time: 01/16/20 10:00

SAMPLE RESULTS - 19

L1180948

ONE LAB. NATIONWIDE



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3480		14.1	50.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	495		2.71	20.0	1	01/21/2020 20:33	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 20:33	WG1413869

Sample Narrative:

L1180948-19 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	552		2.60	50.0	50	01/24/2020 06:57	WG1414481
Fluoride	1.72		0.00990	0.100	1	01/24/2020 05:35	WG1414481
Sulfate	1540		3.87	250	50	01/24/2020 06:57	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.289		0.0197	0.100	1	01/24/2020 13:03	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	428		0.0463	1.00	1	01/23/2020 15:23	WG1414408
Magnesium	304		0.0111	1.00	1	01/23/2020 15:23	WG1414408
Potassium	0.961	J	0.102	1.00	1	01/23/2020 15:23	WG1414408
Sodium	235		0.0985	1.00	1	01/23/2020 15:23	WG1414408

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

9-2/12/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1180948

DATE/TIME:

01/27/20 09:24

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EB-RO-01

Collected date/time: 01/16/20 09:30

SAMPLE RESULTS - 20

L1180948

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	U		2.82	10.0	1	01/21/2020 12:20	WG1413658

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity, Bicarbonate	4.96	B J	2.71	20.0	1	01/21/2020 20:41	WG1413869
Alkalinity, Carbonate	U		2.71	20.0	1	01/21/2020 20:41	WG1413869

Sample Narrative:

L1180948-20 WG1413869: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	U		0.0519	1.00	1	01/24/2020 07:30	WG1414481
Fluoride	0.0125	J	0.00990	0.100	1	01/24/2020 07:30	WG1414481
Sulfate	U		0.0774	5.00	1	01/24/2020 07:30	WG1414481

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0197	0.100	1	01/24/2020 13:05	WG1414045

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Calcium	0.0486	J	0.0463	1.00	1	01/23/2020 15:25	WG1414408
Magnesium	0.0491	B J	0.0111	1.00	1	01/23/2020 15:25	WG1414408
Potassium	0.128	J	0.102	1.00	1	01/23/2020 15:25	WG1414408
Sodium	0.142	J	0.0985	1.00	1	01/23/2020 15:25	WG1414408

Equipment Blank; no goals applied or removed

 Jn
 2/12/20

JUNE 2020

ANALYTICAL REPORT

July 07, 2020

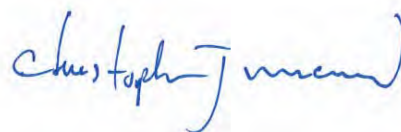
Revised Report

Wood E&I Solutions Inc. - Houston, TX

Sample Delivery Group: L1230105
Samples Received: 06/17/2020
Project Number: 6703180022.0003
Description: Navajo RO Fields

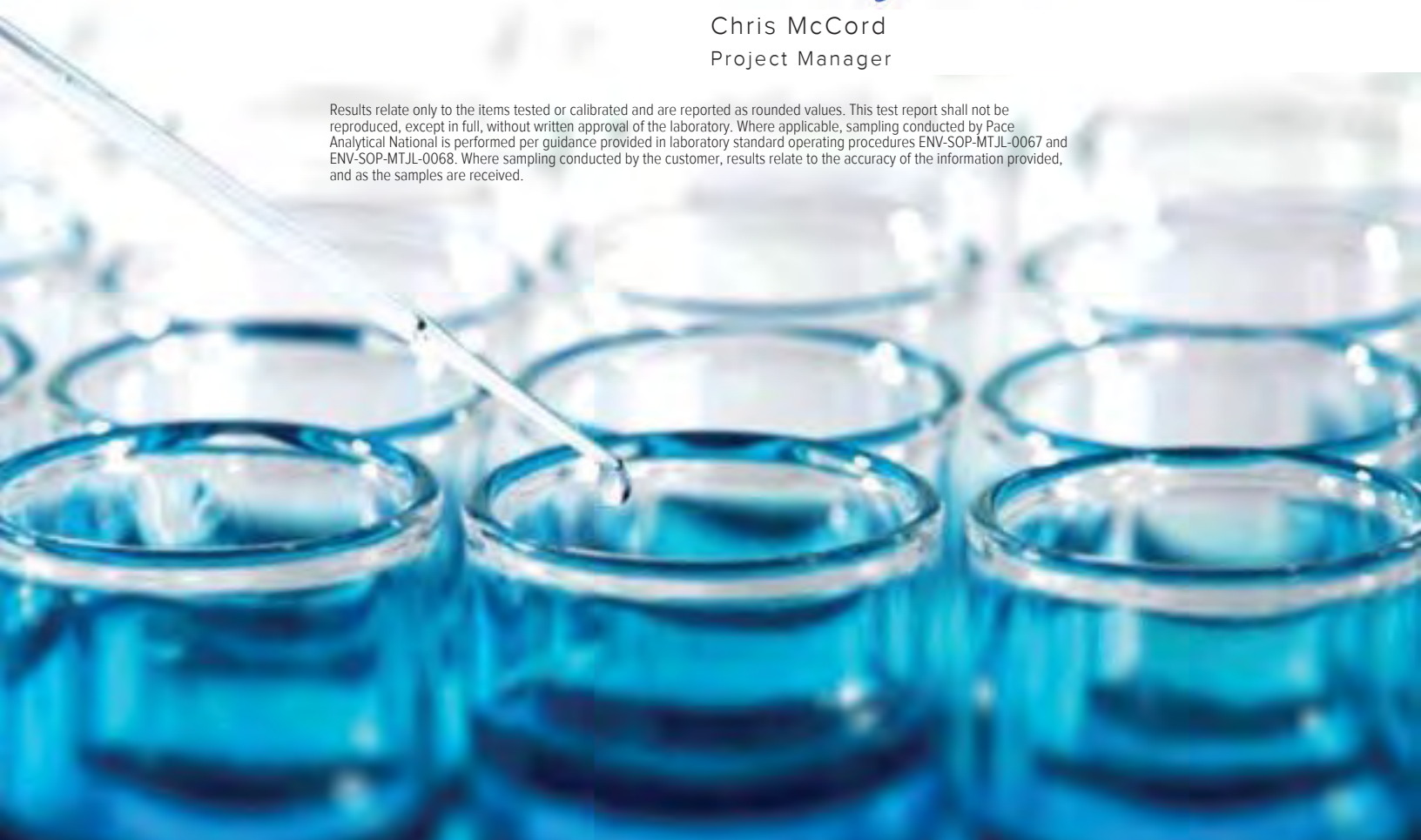
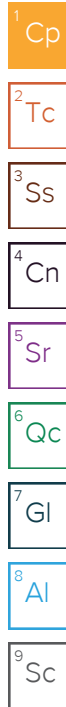
Report To: Pam Krueger
585 N. Dairy Ashford
Houston, TX 77079

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-117 L1230105-10	18	⁹ Sc
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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-40 L1230105-01 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 09:25

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 09:19	06/24/20 09:19	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	1	06/22/20 23:37	06/22/20 23:37	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	50	06/23/20 00:22	06/23/20 00:22	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 12:58	06/24/20 12:58	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495342	1	06/24/20 10:12	06/24/20 12:27	TRB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:07	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 13:37	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495373	1	06/23/20 07:16	06/23/20 12:40	LAT	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-29 L1230105-02 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:20

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 09:34	06/24/20 09:34	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 08:03	06/23/20 08:03	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 00:52	06/23/20 00:52	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 12:59	06/24/20 12:59	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495342	1	06/24/20 10:12	06/24/20 13:37	TRB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:10	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 13:41	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495373	1	06/23/20 07:16	06/23/20 13:15	LAT	Mt. Juliet, TN

MW-56 L1230105-03 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 11:25

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 09:41	06/24/20 09:41	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	1	06/23/20 13:01	06/23/20 13:01	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	50	06/23/20 01:07	06/23/20 01:07	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:00	06/24/20 13:00	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495342	1	06/24/20 10:12	06/24/20 13:40	TRB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:18	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 13:44	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495373	1	06/23/20 07:16	06/23/20 13:19	LAT	Mt. Juliet, TN

MW-55 L1230105-04 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:40

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 09:48	06/24/20 09:48	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 08:32	06/23/20 08:32	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 01:22	06/23/20 01:22	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:04	06/24/20 13:04	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:08	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:22	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 13:55	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495373	1	06/23/20 07:16	06/23/20 13:23	LAT	Mt. Juliet, TN

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1230105

DATE/TIME:

07/07/20 09:46

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-140 L1230105-05 GW

				Collected by	Collected date/time	Received date/time
				Scott Ude/HMI Team	06/16/20 09:55	06/17/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 09:56	06/24/20 09:56	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 08:47	06/23/20 08:47	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 02:06	06/23/20 02:06	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	5	06/24/20 14:27	06/24/20 14:27	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:11	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:25	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 13:58	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495373	1	06/23/20 07:16	06/23/20 13:26	LAT	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-141 L1230105-06 GW

				Collected by	Collected date/time	Received date/time
				Scott Ude/HMI Team	06/16/20 09:15	06/17/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 10:03	06/24/20 10:03	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 09:02	06/23/20 09:02	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 02:21	06/23/20 02:21	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	5	06/24/20 14:28	06/24/20 14:28	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:15	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495367	1	06/24/20 22:10	06/25/20 05:26	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 14:02	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495382	1	06/24/20 17:35	06/24/20 22:58	JPD	Mt. Juliet, TN

MW-115 L1230105-07 GW

				Collected by	Collected date/time	Received date/time
				Scott Ude/HMI Team	06/16/20 09:20	06/17/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 10:10	06/24/20 10:10	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 09:17	06/23/20 09:17	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 02:49	06/23/20 02:49	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 14:31	06/24/20 14:31	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1503190	1	07/02/20 14:21	07/02/20 20:27	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1503193	1	07/02/20 15:12	07/03/20 01:45	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1503290	1	07/02/20 15:06	07/02/20 18:21	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1503294	1	07/02/20 15:06	07/02/20 18:54	LD	Mt. Juliet, TN

MW-114 L1230105-08 GW

				Collected by	Collected date/time	Received date/time
				Scott Ude/HMI Team	06/16/20 10:20	06/17/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1495940	1	06/20/20 18:35	06/20/20 19:01	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 12:29	06/24/20 12:29	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 09:32	06/23/20 09:32	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 03:04	06/23/20 03:04	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:14	06/24/20 13:14	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:26	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:28	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495345	1	06/24/20 08:50	06/24/20 14:05	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495373	1	06/23/20 07:16	06/23/20 13:30	LAT	Mt. Juliet, TN

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1230105

DATE/TIME:

07/07/20 09:46

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-125 L1230105-09 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:55

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 10:33	06/24/20 10:33	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	1	06/23/20 13:16	06/23/20 13:16	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 03:19	06/23/20 03:19	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:15	06/24/20 13:15	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:29	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:31	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 15:43	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:12	LD	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

MW-117 L1230105-10 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 11:15

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 10:40	06/24/20 10:40	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 10:02	06/23/20 10:02	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 03:34	06/23/20 03:34	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:16	06/24/20 13:16	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:32	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:35	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 15:46	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:25	LD	Mt. Juliet, TN

MW-118 L1230105-11 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:20

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 10:47	06/24/20 10:47	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 10:17	06/23/20 10:17	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 03:49	06/23/20 03:49	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:18	06/24/20 13:18	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:35	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:38	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 15:50	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:28	LD	Mt. Juliet, TN

MW-119 L1230105-12 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 09:45

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 10:54	06/24/20 10:54	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 11:02	06/23/20 11:02	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 04:04	06/23/20 04:04	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:19	06/24/20 13:19	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:38	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:41	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 15:53	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:31	LD	Mt. Juliet, TN

ACCOUNT:

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6703180022.0003

SDG:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-142 L1230105-13 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:45

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:00	06/24/20 11:00	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 11:17	06/23/20 11:17	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 04:18	06/23/20 04:18	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:20	06/24/20 13:20	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:41	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:44	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:09	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:34	LD	Mt. Juliet, TN

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

MW-143 L1230105-14 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 11:35

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:07	06/24/20 11:07	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 11:32	06/23/20 11:32	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 04:33	06/23/20 04:33	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494722	1	06/24/20 13:21	06/24/20 13:21	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:44	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:48	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:13	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:45	LD	Mt. Juliet, TN

MW-116 L1230105-15 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 11:15

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:14	06/24/20 11:14	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 11:47	06/23/20 11:47	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 05:18	06/23/20 05:18	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494848	1	06/22/20 10:02	06/22/20 10:02	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:48	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:56	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:16	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:48	LD	Mt. Juliet, TN

RW-#18A L1230105-16 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 09:50

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:21	06/24/20 11:21	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 12:01	06/23/20 12:01	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 05:33	06/23/20 05:33	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494848	1	06/22/20 10:03	06/22/20 10:03	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:51	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 09:59	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:20	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:52	LD	Mt. Juliet, TN

ACCOUNT:

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L1230105

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



MW-144 L1230105-17 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 09:15

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:27	06/24/20 11:27	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 12:16	06/23/20 12:16	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	100	06/23/20 05:48	06/23/20 05:48	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494848	1	06/22/20 10:06	06/22/20 10:06	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 15:54	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 10:03	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:23	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:55	LD	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

DUP-RO-01 L1230105-18 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:00

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:34	06/24/20 11:34	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 12:31	06/23/20 12:31	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	50	06/23/20 06:03	06/23/20 06:03	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494848	1	06/22/20 10:10	06/22/20 10:10	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 16:02	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495359	1	06/23/20 22:56	06/24/20 10:06	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:26	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 21:58	LD	Mt. Juliet, TN

DUP-RO-02 L1230105-19 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:00

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 11:49	06/24/20 11:49	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	10	06/23/20 12:46	06/23/20 12:46	ELN	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	50	06/23/20 06:18	06/23/20 06:18	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494848	10	06/22/20 10:15	06/22/20 10:15	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 16:05	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495360	1	06/23/20 18:24	06/24/20 07:22	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:30	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 22:01	LD	Mt. Juliet, TN

EB-RO-01 L1230105-20 GW

Collected by
Scott Ude/HMI
Team

Collected date/time
06/16/20 10:05

Received date/time
06/17/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG1496359	1	06/23/20 20:32	06/23/20 23:15	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1497244	1	06/24/20 12:02	06/24/20 12:02	LEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG1497133	1	06/23/20 06:33	06/23/20 06:33	ELN	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG1494848	1	06/22/20 10:16	06/22/20 10:16	BAM	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495343	1	06/23/20 13:23	06/23/20 16:08	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1495360	1	06/23/20 18:24	06/24/20 07:24	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495346	1	06/23/20 11:55	06/23/20 16:33	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1495374	1	06/23/20 17:38	06/23/20 22:05	LD	Mt. Juliet, TN

ACCOUNT:

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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

Report Revision History

Level II Report - Version 1: 06/30/20 19:33

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2500		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	376		8.45	20.0	1	06/24/2020 09:19	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:19	WG1497244

Sample Narrative:

L1230105-01 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	91.2		0.379	1.00	1	06/22/2020 23:37	WG1497133
Fluoride	1.56		0.0640	0.150	1	06/22/2020 23:37	WG1497133
Sulfate	1410		29.7	250	50	06/23/2020 00:22	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0500	0.100	1	06/24/2020 12:58	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.315		0.0254	0.200	1	06/24/2020 09:07	WG1495359
Boron,Dissolved	0.308		0.0254	0.200	1	06/24/2020 12:27	WG1495342
Calcium	365		0.389	1.00	1	06/24/2020 09:07	WG1495359
Iron	0.145		0.0458	0.100	1	06/24/2020 09:07	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/24/2020 12:27	WG1495342
Magnesium	190		0.111	1.00	1	06/24/2020 09:07	WG1495359
Potassium	1.59	J	0.510	2.00	1	06/24/2020 09:07	WG1495359
Sodium	93.9		1.40	3.00	1	06/24/2020 09:07	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	U		0.000735	0.00200	1	06/23/2020 12:40	WG1495373
Arsenic,Dissolved	U		0.000735	0.00200	1	06/24/2020 13:37	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 12:40	WG1495373
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 13:37	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 12:40	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:37	WG1495345
Manganese	0.0255		0.00132	0.00500	1	06/23/2020 12:40	WG1495373
Manganese,Dissolved	0.0266		0.00132	0.00500	1	06/24/2020 13:37	WG1495345
Uranium	U		0.00754	0.0200	1	06/23/2020 12:40	WG1495373
Uranium,Dissolved	U		0.00754	0.0200	1	06/24/2020 13:37	WG1495345

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3980		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	564		8.45	20.0	1	06/24/2020 09:34	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:34	WG1497244

Sample Narrative:

L1230105-02 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	395		3.79	10.0	10	06/23/2020 08:03	WG1497133
Fluoride	1.70		0.640	1.50	10	06/23/2020 08:03	WG1497133
Sulfate	1700		59.4	500	100	06/23/2020 00:52	WG1497133

Wet Chemistry by Method 353.2

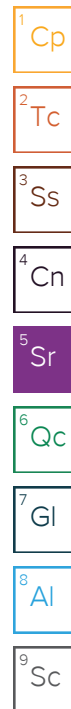
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0500	0.100	1	06/24/2020 12:59	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	1.10		0.0254	0.200	1	06/24/2020 09:10	WG1495359
Boron,Dissolved	1.10		0.0254	0.200	1	06/24/2020 13:37	WG1495342
Calcium	375		0.389	1.00	1	06/24/2020 09:10	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:10	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/24/2020 13:37	WG1495342
Magnesium	285		0.111	1.00	1	06/24/2020 09:10	WG1495359
Potassium	2.10		0.510	2.00	1	06/24/2020 09:10	WG1495359
Sodium	361		1.40	3.00	1	06/24/2020 09:10	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00746		0.000735	0.00200	1	06/23/2020 13:15	WG1495373
Arsenic,Dissolved	0.00674		0.000735	0.00200	1	06/24/2020 13:41	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 13:15	WG1495373
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 13:41	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:15	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:41	WG1495345
Manganese	0.234		0.00132	0.00500	1	06/23/2020 13:15	WG1495373
Manganese,Dissolved	0.229		0.00132	0.00500	1	06/24/2020 13:41	WG1495345
Uranium	0.00789	J	0.00754	0.0200	1	06/23/2020 13:15	WG1495373
Uranium,Dissolved	0.00811	J	0.00754	0.0200	1	06/24/2020 13:41	WG1495345





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3040		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	351		8.45	20.0	1	06/24/2020 09:41	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:41	WG1497244

Sample Narrative:

L1230105-03 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	209		19.0	50.0	50	06/23/2020 01:07	WG1497133
Fluoride	1.11		0.0640	0.150	1	06/23/2020 13:01	WG1497133
Sulfate	1840		29.7	250	50	06/23/2020 01:07	WG1497133

Wet Chemistry by Method 353.2

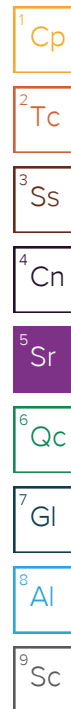
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U	J5	0.0500	0.100	1	06/24/2020 13:00	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.253		0.0254	0.200	1	06/24/2020 09:18	WG1495359
Boron,Dissolved	0.259		0.0254	0.200	1	06/24/2020 13:40	WG1495342
Calcium	504		0.389	1.00	1	06/24/2020 09:18	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:18	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/24/2020 13:40	WG1495342
Magnesium	254		0.111	1.00	1	06/24/2020 09:18	WG1495359
Potassium	1.91	J	0.510	2.00	1	06/24/2020 09:18	WG1495359
Sodium	153		1.40	3.00	1	06/24/2020 09:18	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00552		0.000735	0.00200	1	06/23/2020 13:19	WG1495373
Arsenic,Dissolved	0.00521		0.000735	0.00200	1	06/24/2020 13:44	WG1495345
Cobalt	0.00786		0.000477	0.00200	1	06/23/2020 13:19	WG1495373
Cobalt,Dissolved	0.00813		0.000477	0.00200	1	06/24/2020 13:44	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:19	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:44	WG1495345
Manganese	0.302		0.00132	0.00500	1	06/23/2020 13:19	WG1495373
Manganese,Dissolved	0.295		0.00132	0.00500	1	06/24/2020 13:44	WG1495345
Uranium	0.0172	J	0.00754	0.0200	1	06/23/2020 13:19	WG1495373
Uranium,Dissolved	0.0175	J	0.00754	0.0200	1	06/24/2020 13:44	WG1495345





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3910		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	553		8.45	20.0	1	06/24/2020 09:48	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:48	WG1497244

Sample Narrative:

L1230105-04 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	600		3.79	10.0	10	06/23/2020 08:32	WG1497133
Fluoride	1.66		0.640	1.50	10	06/23/2020 08:32	WG1497133
Sulfate	1340		59.4	500	100	06/23/2020 01:22	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0746	J	0.0500	0.100	1	06/24/2020 13:04	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.992		0.0254	0.200	1	06/24/2020 09:22	WG1495359
Boron,Dissolved	0.951		0.0254	0.200	1	06/23/2020 15:08	WG1495343
Calcium	411		0.389	1.00	1	06/24/2020 09:22	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:22	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:08	WG1495343
Magnesium	302		0.111	1.00	1	06/24/2020 09:22	WG1495359
Potassium	0.804	J	0.510	2.00	1	06/24/2020 09:22	WG1495359
Sodium	243		1.40	3.00	1	06/24/2020 09:22	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00608		0.000735	0.00200	1	06/23/2020 13:23	WG1495373
Arsenic,Dissolved	0.00663		0.000735	0.00200	1	06/24/2020 13:55	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 13:23	WG1495373
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 13:55	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:23	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:55	WG1495345
Manganese	0.142		0.00132	0.00500	1	06/23/2020 13:23	WG1495373
Manganese,Dissolved	0.148		0.00132	0.00500	1	06/24/2020 13:55	WG1495345
Uranium	0.0548		0.00754	0.0200	1	06/23/2020 13:23	WG1495373
Uranium,Dissolved	0.0549		0.00754	0.0200	1	06/24/2020 13:55	WG1495345

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3900		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	331		8.45	20.0	1	06/24/2020 09:56	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:56	WG1497244

Sample Narrative:

L1230105-05 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	305		3.79	10.0	10	06/23/2020 08:47	WG1497133
Fluoride	1.66		0.640	1.50	10	06/23/2020 08:47	WG1497133
Sulfate	2020		59.4	500	100	06/23/2020 02:06	WG1497133

Wet Chemistry by Method 353.2

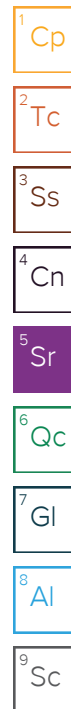
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	9.65		0.250	0.500	5	06/24/2020 14:27	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.468		0.0254	0.200	1	06/24/2020 09:25	WG1495359
Boron,Dissolved	0.445		0.0254	0.200	1	06/23/2020 15:11	WG1495343
Calcium	624		0.389	1.00	1	06/24/2020 09:25	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:25	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:11	WG1495343
Magnesium	231		0.111	1.00	1	06/24/2020 09:25	WG1495359
Potassium	50.3		0.510	2.00	1	06/24/2020 09:25	WG1495359
Sodium	180		1.40	3.00	1	06/24/2020 09:25	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00262		0.000735	0.00200	1	06/23/2020 13:26	WG1495373
Arsenic,Dissolved	0.00265		0.000735	0.00200	1	06/24/2020 13:58	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 13:26	WG1495373
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 13:58	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:26	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:58	WG1495345
Manganese	0.0636		0.00132	0.00500	1	06/23/2020 13:26	WG1495373
Manganese,Dissolved	0.0615		0.00132	0.00500	1	06/24/2020 13:58	WG1495345
Uranium	0.0359		0.00754	0.0200	1	06/23/2020 13:26	WG1495373
Uranium,Dissolved	0.0348		0.00754	0.0200	1	06/24/2020 13:58	WG1495345





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3260		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	229		8.45	20.0	1	06/24/2020 10:03	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:03	WG1497244

Sample Narrative:

L1230105-06 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	290		3.79	10.0	10	06/23/2020 09:02	WG1497133
Fluoride	2.87		0.640	1.50	10	06/23/2020 09:02	WG1497133
Sulfate	1520		59.4	500	100	06/23/2020 02:21	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	7.60		0.250	0.500	5	06/24/2020 14:28	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.196	J	0.0254	0.200	1	06/25/2020 05:26	WG1495367
Boron,Dissolved	0.200	J	0.0254	0.200	1	06/23/2020 15:15	WG1495343
Calcium	617		0.389	1.00	1	06/25/2020 05:26	WG1495367
Iron	U		0.0458	0.100	1	06/25/2020 05:26	WG1495367
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:15	WG1495343
Magnesium	158		0.111	1.00	1	06/25/2020 05:26	WG1495367
Potassium	6.06		0.510	2.00	1	06/25/2020 05:26	WG1495367
Sodium	60.7		1.40	3.00	1	06/25/2020 05:26	WG1495367

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00310	B	0.000735	0.00200	1	06/24/2020 22:58	WG1495382
Arsenic,Dissolved	0.00297		0.000735	0.00200	1	06/24/2020 14:02	WG1495345
Cobalt	U		0.000477	0.00200	1	06/24/2020 22:58	WG1495382
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 14:02	WG1495345
Lead	U		0.00249	0.00500	1	06/24/2020 22:58	WG1495382
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 14:02	WG1495345
Manganese	0.00205	J	0.00132	0.00500	1	06/24/2020 22:58	WG1495382
Manganese,Dissolved	0.00132	J	0.00132	0.00500	1	06/24/2020 14:02	WG1495345
Uranium	0.0244		0.00754	0.0200	1	06/24/2020 22:58	WG1495382
Uranium,Dissolved	0.0259		0.00754	0.0200	1	06/24/2020 14:02	WG1495345

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4740		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	432		8.45	20.0	1	06/24/2020 10:10	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:10	WG1497244

Sample Narrative:

L1230105-07 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	392		3.79	10.0	10	06/23/2020 09:17	WG1497133
Fluoride	2.16		0.640	1.50	10	06/23/2020 09:17	WG1497133
Sulfate	2260		59.4	500	100	06/23/2020 02:49	WG1497133

Wet Chemistry by Method 353.2

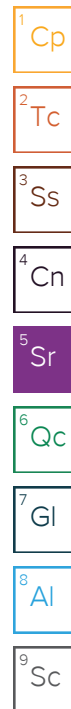
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	3.78		0.0500	0.100	1	06/24/2020 14:31	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.520		0.0254	0.200	1	07/03/2020 01:45	WG1503193
Boron,Dissolved	0.564		0.0254	0.200	1	07/02/2020 20:27	WG1503190
Calcium	476		0.389	1.00	1	07/03/2020 01:45	WG1503193
Iron	U		0.0458	0.100	1	07/03/2020 01:45	WG1503193
Iron,Dissolved	U		0.0458	0.100	1	07/02/2020 20:27	WG1503190
Magnesium	429		0.111	1.00	1	07/03/2020 01:45	WG1503193
Potassium	0.681	J	0.510	2.00	1	07/03/2020 01:45	WG1503193
Sodium	181		1.40	3.00	1	07/03/2020 01:45	WG1503193

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00400		0.000735	0.00200	1	07/02/2020 18:54	WG1503294
Arsenic,Dissolved	0.00430		0.000735	0.00200	1	07/02/2020 18:21	WG1503290
Cobalt	U		0.000477	0.00200	1	07/02/2020 18:54	WG1503294
Cobalt,Dissolved	U		0.000477	0.00200	1	07/02/2020 18:21	WG1503290
Lead	U		0.00249	0.00500	1	07/02/2020 18:54	WG1503294
Lead,Dissolved	U		0.00249	0.00500	1	07/02/2020 18:21	WG1503290
Manganese	0.125		0.00132	0.00500	1	07/02/2020 18:54	WG1503294
Manganese,Dissolved	0.109		0.00132	0.00500	1	07/02/2020 18:21	WG1503290
Uranium	0.0953		0.00754	0.0200	1	07/02/2020 18:54	WG1503294
Uranium,Dissolved	0.0947		0.00754	0.0200	1	07/02/2020 18:21	WG1503290





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	2920		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	407		8.45	20.0	1	06/24/2020 12:29	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 12:29	WG1497244

Sample Narrative:

L1230105-08 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	241		3.79	10.0	10	06/23/2020 09:32	WG1497133
Fluoride	2.27		0.640	1.50	10	06/23/2020 09:32	WG1497133
Sulfate	1780		59.4	500	100	06/23/2020 03:04	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.471		0.0500	0.100	1	06/24/2020 13:14	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.121	J	0.0254	0.200	1	06/24/2020 09:28	WG1495359
Boron,Dissolved	0.109	J	0.0254	0.200	1	06/23/2020 15:26	WG1495343
Calcium	587		0.389	1.00	1	06/24/2020 09:28	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:28	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:26	WG1495343
Magnesium	211		0.111	1.00	1	06/24/2020 09:28	WG1495359
Potassium	2.64		0.510	2.00	1	06/24/2020 09:28	WG1495359
Sodium	128		1.40	3.00	1	06/24/2020 09:28	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00353		0.000735	0.00200	1	06/23/2020 13:30	WG1495373
Arsenic,Dissolved	0.00364		0.000735	0.00200	1	06/24/2020 14:05	WG1495345
Cobalt	0.00618		0.000477	0.00200	1	06/23/2020 13:30	WG1495373
Cobalt,Dissolved	0.00583		0.000477	0.00200	1	06/24/2020 14:05	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:30	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 14:05	WG1495345
Manganese	0.959		0.00132	0.00500	1	06/23/2020 13:30	WG1495373
Manganese,Dissolved	0.927		0.00132	0.00500	1	06/24/2020 14:05	WG1495345
Uranium	0.00950	J	0.00754	0.0200	1	06/23/2020 13:30	WG1495373
Uranium,Dissolved	0.00917	J	0.00754	0.0200	1	06/24/2020 14:05	WG1495345

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4080	J3 J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-09 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	421		8.45	20.0	1	06/24/2020 10:33	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:33	WG1497244

Sample Narrative:

L1230105-09 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	278		37.9	100	100	06/23/2020 03:19	WG1497133
Fluoride	1.12		0.0640	0.150	1	06/23/2020 13:16	WG1497133
Sulfate	2500		59.4	500	100	06/23/2020 03:19	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.215		0.0500	0.100	1	06/24/2020 13:15	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.519		0.0254	0.200	1	06/24/2020 09:31	WG1495359
Boron,Dissolved	0.498		0.0254	0.200	1	06/23/2020 15:29	WG1495343
Calcium	545		0.389	1.00	1	06/24/2020 09:31	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:31	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:29	WG1495343
Magnesium	392		0.111	1.00	1	06/24/2020 09:31	WG1495359
Potassium	1.49	J	0.510	2.00	1	06/24/2020 09:31	WG1495359
Sodium	231		1.40	3.00	1	06/24/2020 09:31	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00357		0.000735	0.00200	1	06/23/2020 21:12	WG1495374
Arsenic,Dissolved	0.00342		0.000735	0.00200	1	06/23/2020 15:43	WG1495346
Cobalt	0.00760		0.000477	0.00200	1	06/23/2020 21:12	WG1495374
Cobalt,Dissolved	0.00557		0.000477	0.00200	1	06/23/2020 15:43	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:12	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 15:43	WG1495346
Manganese	0.413		0.00132	0.00500	1	06/23/2020 21:12	WG1495374
Manganese,Dissolved	0.389		0.00132	0.00500	1	06/23/2020 15:43	WG1495346
Uranium	0.0351		0.00754	0.0200	1	06/23/2020 21:12	WG1495374
Uranium,Dissolved	0.0365		0.00754	0.0200	1	06/23/2020 15:43	WG1495346

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3350	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-10 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	365		8.45	20.0	1	06/24/2020 10:40	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:40	WG1497244

Sample Narrative:

L1230105-10 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	290		3.79	10.0	10	06/23/2020 10:02	WG1497133
Fluoride	3.41		0.640	1.50	10	06/23/2020 10:02	WG1497133
Sulfate	2010		59.4	500	100	06/23/2020 03:34	WG1497133

Wet Chemistry by Method 353.2

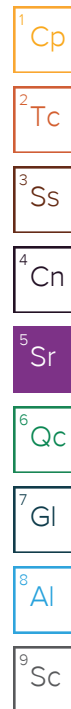
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	2.37		0.0500	0.100	1	06/24/2020 13:16	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.143	J	0.0254	0.200	1	06/24/2020 09:35	WG1495359
Boron,Dissolved	0.131	J	0.0254	0.200	1	06/23/2020 15:32	WG1495343
Calcium	584		0.389	1.00	1	06/24/2020 09:35	WG1495359
Iron	0.261		0.0458	0.100	1	06/24/2020 09:35	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:32	WG1495343
Magnesium	265		0.111	1.00	1	06/24/2020 09:35	WG1495359
Potassium	6.97		0.510	2.00	1	06/24/2020 09:35	WG1495359
Sodium	131		1.40	3.00	1	06/24/2020 09:35	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00248		0.000735	0.00200	1	06/23/2020 21:25	WG1495374
Arsenic,Dissolved	0.00246		0.000735	0.00200	1	06/23/2020 15:46	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:25	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 15:46	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:25	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 15:46	WG1495346
Manganese	0.00392	J	0.00132	0.00500	1	06/23/2020 21:25	WG1495374
Manganese,Dissolved	0.00158	J	0.00132	0.00500	1	06/23/2020 15:46	WG1495346
Uranium	0.0152	J	0.00754	0.0200	1	06/23/2020 21:25	WG1495374
Uranium,Dissolved	0.0160	J	0.00754	0.0200	1	06/23/2020 15:46	WG1495346





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4350	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-11 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	364		8.45	20.0	1	06/24/2020 10:47	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:47	WG1497244

Sample Narrative:

L1230105-11 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	290		3.79	10.0	10	06/23/2020 10:17	WG1497133
Fluoride	5.63		0.640	1.50	10	06/23/2020 10:17	WG1497133
Sulfate	2630		59.4	500	100	06/23/2020 03:49	WG1497133

Wet Chemistry by Method 353.2

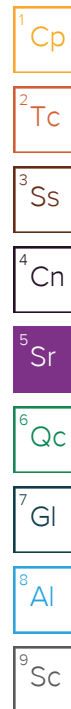
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	2.27		0.0500	0.100	1	06/24/2020 13:18	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.381		0.0254	0.200	1	06/24/2020 09:38	WG1495359
Boron,Dissolved	0.399		0.0254	0.200	1	06/23/2020 15:35	WG1495343
Calcium	585		0.389	1.00	1	06/24/2020 09:38	WG1495359
Iron	0.137		0.0458	0.100	1	06/24/2020 09:38	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:35	WG1495343
Magnesium	403		0.111	1.00	1	06/24/2020 09:38	WG1495359
Potassium	4.01		0.510	2.00	1	06/24/2020 09:38	WG1495359
Sodium	168		1.40	3.00	1	06/24/2020 09:38	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00753		0.000735	0.00200	1	06/23/2020 21:28	WG1495374
Arsenic,Dissolved	0.00787		0.000735	0.00200	1	06/23/2020 15:50	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:28	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 15:50	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:28	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 15:50	WG1495346
Manganese	0.00167	J	0.00132	0.00500	1	06/23/2020 21:28	WG1495374
Manganese,Dissolved	U		0.00132	0.00500	1	06/23/2020 15:50	WG1495346
Uranium	0.0360		0.00754	0.0200	1	06/23/2020 21:28	WG1495374
Uranium,Dissolved	0.0390		0.00754	0.0200	1	06/23/2020 15:50	WG1495346





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3940	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-12 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	356		8.45	20.0	1	06/24/2020 10:54	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:54	WG1497244

Sample Narrative:

L1230105-12 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	341		3.79	10.0	10	06/23/2020 11:02	WG1497133
Fluoride	1.70		0.640	1.50	10	06/23/2020 11:02	WG1497133
Sulfate	2590		59.4	500	100	06/23/2020 04:04	WG1497133

Wet Chemistry by Method 353.2

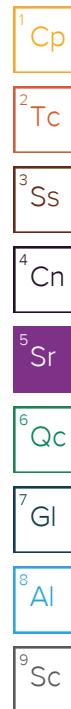
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.184		0.0500	0.100	1	06/24/2020 13:19	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.482		0.0254	0.200	1	06/24/2020 09:41	WG1495359
Boron,Dissolved	0.457		0.0254	0.200	1	06/23/2020 15:38	WG1495343
Calcium	636		0.389	1.00	1	06/24/2020 09:41	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:41	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:38	WG1495343
Magnesium	350		0.111	1.00	1	06/24/2020 09:41	WG1495359
Potassium	0.781	J	0.510	2.00	1	06/24/2020 09:41	WG1495359
Sodium	206		1.40	3.00	1	06/24/2020 09:41	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00376		0.000735	0.00200	1	06/23/2020 21:31	WG1495374
Arsenic,Dissolved	0.00384		0.000735	0.00200	1	06/23/2020 15:53	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:31	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 15:53	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:31	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 15:53	WG1495346
Manganese	0.00633		0.00132	0.00500	1	06/23/2020 21:31	WG1495374
Manganese,Dissolved	0.00643		0.00132	0.00500	1	06/23/2020 15:53	WG1495346
Uranium	0.0451		0.00754	0.0200	1	06/23/2020 21:31	WG1495374
Uranium,Dissolved	0.0467		0.00754	0.0200	1	06/23/2020 15:53	WG1495346





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4020	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-13 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	356		8.45	20.0	1	06/24/2020 11:00	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:00	WG1497244

Sample Narrative:

L1230105-13 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	360		3.79	10.0	10	06/23/2020 11:17	WG1497133
Fluoride	2.25		0.640	1.50	10	06/23/2020 11:17	WG1497133
Sulfate	2430		59.4	500	100	06/23/2020 04:18	WG1497133

Wet Chemistry by Method 353.2

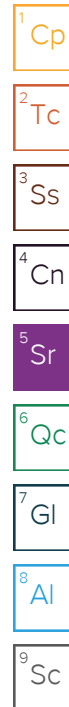
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.108		0.0500	0.100	1	06/24/2020 13:20	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.430		0.0254	0.200	1	06/24/2020 09:44	WG1495359
Boron,Dissolved	0.402		0.0254	0.200	1	06/23/2020 15:41	WG1495343
Calcium	642		0.389	1.00	1	06/24/2020 09:44	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:44	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:41	WG1495343
Magnesium	332		0.111	1.00	1	06/24/2020 09:44	WG1495359
Potassium	1.16	J	0.510	2.00	1	06/24/2020 09:44	WG1495359
Sodium	189		1.40	3.00	1	06/24/2020 09:44	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00327		0.000735	0.00200	1	06/23/2020 21:34	WG1495374
Arsenic,Dissolved	0.00336		0.000735	0.00200	1	06/23/2020 16:09	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:34	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 16:09	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:34	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:09	WG1495346
Manganese	0.0140		0.00132	0.00500	1	06/23/2020 21:34	WG1495374
Manganese,Dissolved	0.0130		0.00132	0.00500	1	06/23/2020 16:09	WG1495346
Uranium	0.0410		0.00754	0.0200	1	06/23/2020 21:34	WG1495374
Uranium,Dissolved	0.0401		0.00754	0.0200	1	06/23/2020 16:09	WG1495346





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	4100	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-14 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	348		8.45	20.0	1	06/24/2020 11:07	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:07	WG1497244

Sample Narrative:

L1230105-14 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	278		3.79	10.0	10	06/23/2020 11:32	WG1497133
Fluoride	1.82		0.640	1.50	10	06/23/2020 11:32	WG1497133
Sulfate	2770		59.4	500	100	06/23/2020 04:33	WG1497133

Wet Chemistry by Method 353.2

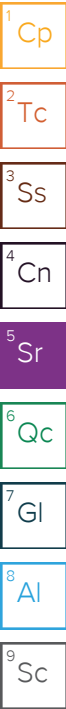
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0500	0.100	1	06/24/2020 13:21	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.865		0.0254	0.200	1	06/24/2020 09:48	WG1495359
Boron,Dissolved	0.839		0.0254	0.200	1	06/23/2020 15:44	WG1495343
Calcium	536		0.389	1.00	1	06/24/2020 09:48	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:48	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:44	WG1495343
Magnesium	443		0.111	1.00	1	06/24/2020 09:48	WG1495359
Potassium	0.936	J	0.510	2.00	1	06/24/2020 09:48	WG1495359
Sodium	214		1.40	3.00	1	06/24/2020 09:48	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00339		0.000735	0.00200	1	06/23/2020 21:45	WG1495374
Arsenic,Dissolved	0.00318		0.000735	0.00200	1	06/23/2020 16:13	WG1495346
Cobalt	0.000864	J	0.000477	0.00200	1	06/23/2020 21:45	WG1495374
Cobalt,Dissolved	0.000816	J	0.000477	0.00200	1	06/23/2020 16:13	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:45	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:13	WG1495346
Manganese	0.0511		0.00132	0.00500	1	06/23/2020 21:45	WG1495374
Manganese,Dissolved	0.0432		0.00132	0.00500	1	06/23/2020 16:13	WG1495346
Uranium	0.0468		0.00754	0.0200	1	06/23/2020 21:45	WG1495374
Uranium,Dissolved	0.0473		0.00754	0.0200	1	06/23/2020 16:13	WG1495346





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	341		8.45	20.0	1	06/24/2020 11:14	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:14	WG1497244

Sample Narrative:

L1230105-15 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	321		3.79	10.0	10	06/23/2020 11:47	WG1497133
Fluoride	1.75		0.640	1.50	10	06/23/2020 11:47	WG1497133
Sulfate	2140		59.4	500	100	06/23/2020 05:18	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Nitrate-Nitrite	0.528		0.0500	0.100	1	06/22/2020 10:02	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron	0.227		0.0254	0.200	1	06/24/2020 09:56	WG1495359
Boron,Dissolved	0.220		0.0254	0.200	1	06/23/2020 15:48	WG1495343
Calcium	572		0.389	1.00	1	06/24/2020 09:56	WG1495359
Iron	0.0746	J	0.0458	0.100	1	06/24/2020 09:56	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:48	WG1495343
Magnesium	297		0.111	1.00	1	06/24/2020 09:56	WG1495359
Potassium	1.29	J	0.510	2.00	1	06/24/2020 09:56	WG1495359
Sodium	188		1.40	3.00	1	06/24/2020 09:56	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	0.00292		0.000735	0.00200	1	06/23/2020 21:48	WG1495374
Arsenic,Dissolved	0.00290		0.000735	0.00200	1	06/23/2020 16:16	WG1495346
Cobalt	0.00240		0.000477	0.00200	1	06/23/2020 21:48	WG1495374
Cobalt,Dissolved	0.00254		0.000477	0.00200	1	06/23/2020 16:16	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:48	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:16	WG1495346
Manganese	0.0128		0.00132	0.00500	1	06/23/2020 21:48	WG1495374
Manganese,Dissolved	0.00781		0.00132	0.00500	1	06/23/2020 16:16	WG1495346
Uranium	0.0273		0.00754	0.0200	1	06/23/2020 21:48	WG1495374
Uranium,Dissolved	0.0287		0.00754	0.0200	1	06/23/2020 16:16	WG1495346

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3660	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-16 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	325		8.45	20.0	1	06/24/2020 11:21	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:21	WG1497244

Sample Narrative:

L1230105-16 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	228		3.79	10.0	10	06/23/2020 12:01	WG1497133
Fluoride	2.13		0.640	1.50	10	06/23/2020 12:01	WG1497133
Sulfate	2320		59.4	500	100	06/23/2020 05:33	WG1497133

Wet Chemistry by Method 353.2

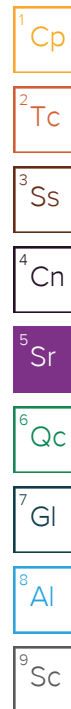
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.549		0.0500	0.100	1	06/22/2020 10:03	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.542		0.0254	0.200	1	06/24/2020 09:59	WG1495359
Boron,Dissolved	0.506		0.0254	0.200	1	06/23/2020 15:51	WG1495343
Calcium	525		0.389	1.00	1	06/24/2020 09:59	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:59	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:51	WG1495343
Magnesium	369		0.111	1.00	1	06/24/2020 09:59	WG1495359
Potassium	0.900	J	0.510	2.00	1	06/24/2020 09:59	WG1495359
Sodium	136		1.40	3.00	1	06/24/2020 09:59	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00258		0.000735	0.00200	1	06/23/2020 21:52	WG1495374
Arsenic,Dissolved	0.00280		0.000735	0.00200	1	06/23/2020 16:20	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:52	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 16:20	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:52	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:20	WG1495346
Manganese	0.00320	J	0.00132	0.00500	1	06/23/2020 21:52	WG1495374
Manganese,Dissolved	0.00265	J	0.00132	0.00500	1	06/23/2020 16:20	WG1495346
Uranium	0.0527		0.00754	0.0200	1	06/23/2020 21:52	WG1495374
Uranium,Dissolved	0.0565		0.00754	0.0200	1	06/23/2020 16:20	WG1495346





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3500	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-17 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	324		8.45	20.0	1	06/24/2020 11:27	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:27	WG1497244

Sample Narrative:

L1230105-17 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	257		3.79	10.0	10	06/23/2020 12:16	WG1497133
Fluoride	2.64		0.640	1.50	10	06/23/2020 12:16	WG1497133
Sulfate	2120		59.4	500	100	06/23/2020 05:48	WG1497133

Wet Chemistry by Method 353.2

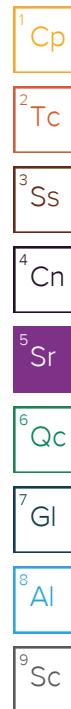
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.401	J5	0.0500	0.100	1	06/22/2020 10:06	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.237		0.0254	0.200	1	06/24/2020 10:03	WG1495359
Boron,Dissolved	0.224		0.0254	0.200	1	06/23/2020 15:54	WG1495343
Calcium	647		0.389	1.00	1	06/24/2020 10:03	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 10:03	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:54	WG1495343
Magnesium	238		0.111	1.00	1	06/24/2020 10:03	WG1495359
Potassium	1.36	J	0.510	2.00	1	06/24/2020 10:03	WG1495359
Sodium	142		1.40	3.00	1	06/24/2020 10:03	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00361		0.000735	0.00200	1	06/23/2020 21:55	WG1495374
Arsenic,Dissolved	0.00375		0.000735	0.00200	1	06/23/2020 16:23	WG1495346
Cobalt	0.000816	J	0.000477	0.00200	1	06/23/2020 21:55	WG1495374
Cobalt,Dissolved	0.000874	J	0.000477	0.00200	1	06/23/2020 16:23	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:55	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:23	WG1495346
Manganese	0.0216		0.00132	0.00500	1	06/23/2020 21:55	WG1495374
Manganese,Dissolved	0.0170		0.00132	0.00500	1	06/23/2020 16:23	WG1495346
Uranium	0.0168	J	0.00754	0.0200	1	06/23/2020 21:55	WG1495374
Uranium,Dissolved	0.0187	J	0.00754	0.0200	1	06/23/2020 16:23	WG1495346





Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3360	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-18 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	563		8.45	20.0	1	06/24/2020 11:34	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:34	WG1497244

Sample Narrative:

L1230105-18 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	397		3.79	10.0	10	06/23/2020 12:31	WG1497133
Fluoride	1.74		0.640	1.50	10	06/23/2020 12:31	WG1497133
Sulfate	1780		29.7	250	50	06/23/2020 06:03	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0500	0.100	1	06/22/2020 10:10	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	1.12		0.0254	0.200	1	06/24/2020 10:06	WG1495359
Boron,Dissolved	1.06		0.0254	0.200	1	06/23/2020 16:02	WG1495343
Calcium	379		0.389	1.00	1	06/24/2020 10:06	WG1495359
Iron	0.0704	J	0.0458	0.100	1	06/24/2020 10:06	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 16:02	WG1495343
Magnesium	292		0.111	1.00	1	06/24/2020 10:06	WG1495359
Potassium	1.95	J	0.510	2.00	1	06/24/2020 10:06	WG1495359
Sodium	369		1.40	3.00	1	06/24/2020 10:06	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00772		0.000735	0.00200	1	06/23/2020 21:58	WG1495374
Arsenic,Dissolved	0.00735		0.000735	0.00200	1	06/23/2020 16:26	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:58	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 16:26	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:58	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:26	WG1495346
Manganese	0.223		0.00132	0.00500	1	06/23/2020 21:58	WG1495374
Manganese,Dissolved	0.214		0.00132	0.00500	1	06/23/2020 16:26	WG1495346
Uranium	U		0.00754	0.0200	1	06/23/2020 21:58	WG1495374
Uranium,Dissolved	0.00779	J	0.00754	0.0200	1	06/23/2020 16:26	WG1495346

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3500	J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-19 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	330		8.45	20.0	1	06/24/2020 11:49	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:49	WG1497244

Sample Narrative:

L1230105-19 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	305		3.79	10.0	10	06/23/2020 12:46	WG1497133
Fluoride	1.74		0.640	1.50	10	06/23/2020 12:46	WG1497133
Sulfate	2150		29.7	250	50	06/23/2020 06:18	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	10.3		0.500	1.00	10	06/22/2020 10:15	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.460		0.0254	0.200	1	06/24/2020 07:22	WG1495360
Boron,Dissolved	0.442		0.0254	0.200	1	06/23/2020 16:05	WG1495343
Calcium	628		0.389	1.00	1	06/24/2020 07:22	WG1495360
Iron	U		0.0458	0.100	1	06/24/2020 07:22	WG1495360
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 16:05	WG1495343
Magnesium	227		0.111	1.00	1	06/24/2020 07:22	WG1495360
Potassium	49.5		0.510	2.00	1	06/24/2020 07:22	WG1495360
Sodium	177		1.40	3.00	1	06/24/2020 07:22	WG1495360

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00252		0.000735	0.00200	1	06/23/2020 22:01	WG1495374
Arsenic,Dissolved	0.00273		0.000735	0.00200	1	06/23/2020 16:30	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 22:01	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 16:30	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 22:01	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:30	WG1495346
Manganese	0.0678		0.00132	0.00500	1	06/23/2020 22:01	WG1495374
Manganese,Dissolved	0.0564		0.00132	0.00500	1	06/23/2020 16:30	WG1495346
Uranium	0.0323		0.00754	0.0200	1	06/23/2020 22:01	WG1495374
Uranium,Dissolved	0.0336		0.00754	0.0200	1	06/23/2020 16:30	WG1495346

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



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	U	J4	2.82	10.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-20 WG1496359: Results confirmed.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	U		8.45	20.0	1	06/24/2020 12:02	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 12:02	WG1497244

Sample Narrative:

L1230105-20 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	U		0.379	1.00	1	06/23/2020 06:33	WG1497133
Fluoride	U		0.0640	0.150	1	06/23/2020 06:33	WG1497133
Sulfate	U		0.594	5.00	1	06/23/2020 06:33	WG1497133

Wet Chemistry by Method 353.2

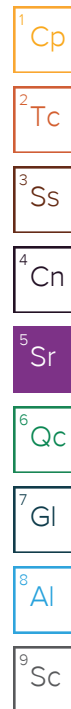
Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	U		0.0500	0.100	1	06/22/2020 10:16	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	U		0.0254	0.200	1	06/24/2020 07:24	WG1495360
Boron,Dissolved	U		0.0254	0.200	1	06/23/2020 16:08	WG1495343
Calcium	U		0.389	1.00	1	06/24/2020 07:24	WG1495360
Iron	U		0.0458	0.100	1	06/24/2020 07:24	WG1495360
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 16:08	WG1495343
Magnesium	U		0.111	1.00	1	06/24/2020 07:24	WG1495360
Potassium	U		0.510	2.00	1	06/24/2020 07:24	WG1495360
Sodium	U		1.40	3.00	1	06/24/2020 07:24	WG1495360

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	U		0.000735	0.00200	1	06/23/2020 22:05	WG1495374
Arsenic,Dissolved	U		0.000735	0.00200	1	06/23/2020 16:33	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 22:05	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 16:33	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 22:05	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:33	WG1495346
Manganese	U		0.00132	0.00500	1	06/23/2020 22:05	WG1495374
Manganese,Dissolved	U		0.00132	0.00500	1	06/23/2020 16:33	WG1495346
Uranium	U		0.00754	0.0200	1	06/23/2020 22:05	WG1495374
Uranium,Dissolved	U		0.00754	0.0200	1	06/23/2020 16:33	WG1495346





Method Blank (MB)

(MB) R3541564-1 06/20/20 19:01

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

L1230105-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-08 06/20/20 19:01 • (DUP) R3541564-3 06/20/20 19:01

Analyte	Original Result		DUP Result		DUP RPD		DUP Qualifier		DUP RPD Limits	
	mg/l		mg/l		%				%	
Dissolved Solids	2920		2800	1	4.20				5	

Laboratory Control Sample (LCS)

(LCS) R3541564-2 06/20/20 19:01

Analyte	Spike Amount		LCS Result		LCS Rec.		Rec. Limits		LCS Qualifier	
	mg/l		mg/l		%		%			
Dissolved Solids	8800		8790	99.9		85.0-115				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3542576-1 06/23/20 23:15

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

L1230105-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-09 06/23/20 23:15 • (DUP) R3542576-3 06/23/20 23:15

Analyte	Original Result		DUP Result		DUP RPD		<u>DUP Qualifier</u>		DUP RPD Limits	
	mg/l		mg/l		%			%		
Dissolved Solids	4080		3850		1	5.80		<u>J3</u>		5

Sample Narrative:

OS: Results confirmed.

L1230240-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1230240-01 06/23/20 23:15 • (DUP) R3542576-4 06/23/20 23:15

Analyte	Original Result		DUP Result		DUP RPD		<u>DUP Qualifier</u>		DUP RPD Limits	
	mg/l		mg/l		%			%		
Dissolved Solids	900		1020		1	12.5		<u>J3</u>		5

Laboratory Control Sample (LCS)

(LCS) R3542576-2 06/23/20 23:15

Analyte	Spike Amount		LCS Result		LCS Rec.		Rec. Limits		<u>LCS Qualifier</u>	
	mg/l		mg/l		%		%			
Dissolved Solids	8800		6290		71.5		85.0-115		<u>J4</u>	



Method Blank (MB)

(MB) R3542358-1 06/24/20 08:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	U		8.45	20.0
Alkalinity,Carbonate	U		8.45	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1230105-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-01 06/24/20 09:19 • (DUP) R3542358-2 06/24/20 09:27

Analyte	Original Result		DUP Result		DUP RPD		DUP RPD Limits	
	mg/l		mg/l		Dilution	%	DUP Qualifier	%
Alkalinity,Bicarbonate	376		376		1	0.108		20
Alkalinity,Carbonate	U		U		1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5

L1230105-19 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-19 06/24/20 11:49 • (DUP) R3542358-4 06/24/20 11:56

Analyte	Original Result		DUP Result		DUP RPD		DUP RPD Limits	
	mg/l		mg/l		Dilution	%	DUP Qualifier	%
Alkalinity,Bicarbonate	330		331		1	0.323		20
Alkalinity,Carbonate	U		U		1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5

DUP: Endpoint pH 4.5



Method Blank (MB)

(MB) R3541967-1 06/22/20 22:52

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Chloride	U	0.379	1.00	
Fluoride	U	0.0640	0.150	
Sulfate	U	0.594	5.00	

L1230105-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-01 06/22/20 23:37 • (DUP) R3541967-3 06/22/20 23:52

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Chloride	91.2	91.4	1	0.263		20
Fluoride	1.56	1.61	1	3.65		20

L1230105-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-01 06/23/20 00:22 • (DUP) R3541967-5 06/23/20 00:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Sulfate	1410	1390	50	1.90		20

L1230105-20 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-20 06/23/20 06:33 • (DUP) R3541967-6 06/23/20 06:48

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

Laboratory Control Sample (LCS)

(LCS) R3541967-2 06/22/20 23:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Chloride	40.0	40.3	101	90.0-110	
Fluoride	8.00	8.38	105	90.0-110	
Sulfate	40.0	39.9	99.6	90.0-110	



L1230105-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1230105-01 06/22/20 23:37 • (MS) R3541967-4 06/23/20 00:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	91.2	140	98.0	1	80.0-120	E
Fluoride	5.00	1.56	5.90	86.9	1	80.0-120	
Sulfate	50.0	1410	1420	11.7	1	80.0-120	EV

L1230105-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-20 06/23/20 06:33 • (MS) R3541967-7 06/23/20 07:03 • (MSD) R3541967-8 06/23/20 07:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	U	49.9	50.4	99.9	101	1	80.0-120		0.839	0.839	20
Fluoride	5.00	U	4.65	4.76	93.1	95.2	1	80.0-120		2.27	2.27	20
Sulfate	50.0	U	48.6	48.7	97.2	97.4	1	80.0-120		0.125	0.125	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3542455-1 06/24/20 12:43

Analyte	MB Result mg/l	<u>MB Qualifier</u> mg/l	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U	0.0500	0.100	

L1230099-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1230099-02 06/24/20 12:51 • (DUP) R3542455-3 06/24/20 12:53

Analyte	Original Result		DUP Result		DUP RPD		<u>DUP Qualifier</u>		DUP RPD Limits	
	mg/l		mg/l		%			%	%	
Nitrate-Nitrite	U		U		0.000		1		0.000	20

L1230105-14 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-14 06/24/20 13:21 • (DUP) R3542455-6 06/24/20 13:23

Analyte	Original Result		DUP Result		DUP RPD		<u>DUP Qualifier</u>		DUP RPD Limits	
	mg/l		mg/l		%			%	%	
Nitrate-Nitrite	U		U		0.000		1		0.000	20

Laboratory Control Sample (LCS)

(LCS) R3542455-2 06/24/20 12:44

Analyte	Spike Amount		LCS Result		LCS Rec.		Rec. Limits		<u>LCS Qualifier</u>	
	mg/l		mg/l		%		%		%	
Nitrate-Nitrite	4.00		4.13		103		90.0-110			

L1230105-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-03 06/24/20 13:00 • (MS) R3542455-4 06/24/20 13:01 • (MSD) R3542455-5 06/24/20 13:03

Analyte	Spike Amount		Original Result		MS Result		MSD Result		MS Rec.		MSD Rec.		Dilution		Rec. Limits		<u>MS Qualifier</u>		<u>MSD Qualifier</u>		RPD		RPD Limits	
	mg/l		mg/l		mg/l		mg/l		%		%		%		%		%	%	%	%	%	%	%	%
Nitrate-Nitrite	2.50		U		2.82		2.79		113		112		1		90.0-110		<u>J5</u>		<u>J5</u>		1.07		20	

L1230105-06 Original Sample (OS) • Matrix Spike (MS)

(OS) L1230105-06 06/24/20 14:28 • (MS) R3542455-7 06/24/20 14:29

Analyte	Spike Amount		Original Result		MS Result		MS Rec.		Dilution		Rec. Limits		<u>MS Qualifier</u>	
	mg/l		mg/l		mg/l		%				%		%	
Nitrate-Nitrite	2.50		7.60		20.4		102		5		90.0-110			



Method Blank (MB)

(MB) R3541277-1 06/22/20 10:00

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate-Nitrite	U		0.0500	0.100

L1230105-16 Original Sample (OS) • Duplicate (DUP)

(OS) L1230105-16 06/22/20 10:03 • (DUP) R3541277-3 06/22/20 10:05

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate-Nitrite	0.549	0.553	1	0.726		20

Laboratory Control Sample (LCS)

(LCS) R3541277-2 06/22/20 10:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate-Nitrite	4.00	4.08	102	90.0-110	

L1230105-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-17 06/22/20 10:06 • (MS) R3541277-4 06/22/20 10:07 • (MSD) R3541277-5 06/22/20 10:08

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 %
Nitrate-Nitrite	2.50	0.401	3.21	3.31	112	116	1	90.0-110	J5	J5	3.07	20



Method Blank (MB)

(MB) R3542436-1 06/24/20 12:22

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0254	0.200
Iron,Dissolved	U		0.0458	0.100

Laboratory Control Sample (LCS)

(LCS) R3542436-2 06/24/20 12:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron,Dissolved	1.00	0.983	98.3	80.0-120	
Iron,Dissolved	10.0	9.75	97.5	80.0-120	

L1230105-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-01 06/24/20 12:27 • (MS) R3542436-4 06/24/20 12:33 • (MSD) R3542436-5 06/24/20 12:36

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	0.308	1.30	1.30	99.0	98.9	1	75.0-125			0.0479	20
Iron,Dissolved	10.0	U	9.75	9.67	97.5	96.7	1	75.0-125			0.729	20



Method Blank (MB)

(MB) R3542129-1 06/23/20 14:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0254	0.200
Iron,Dissolved	U		0.0458	0.100

Laboratory Control Sample (LCS)

(LCS) R3542129-2 06/23/20 14:55

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron,Dissolved	1.00	0.983	98.3	80.0-120	
Iron,Dissolved	10.0	9.73	97.3	80.0-120	

L1230106-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230106-08 06/23/20 14:58 • (MS) R3542129-4 06/23/20 15:03 • (MSD) R3542129-5 06/23/20 15:05

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 %
Boron,Dissolved	1.00	0.402	1.35	1.35	95.1	94.9	1	75.0-125		0.138	0.138	20
Iron,Dissolved	10.0	U	9.66	9.53	96.6	95.3	1	75.0-125		1.30	1.30	20



Method Blank (MB)

(MB) R3542327-1 06/24/20 08:44

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0254	0.200
Calcium	U		0.389	1.00
Iron	U		0.0458	0.100
Magnesium	U		0.111	1.00
Potassium	U		0.510	2.00
Sodium	U		1.40	3.00

Laboratory Control Sample (LCS)

(LCS) R3542327-2 06/24/20 08:46

Analyte	Spike Amount mg/l	LCS Result mg/l	<u>LCS Qualifier</u>	
			Rec. Limits %	
Boron	1.00	1.00	100	80.0-120
Calcium	10.0	9.83	98.3	80.0-120
Iron	10.0	9.90	99.0	80.0-120
Magnesium	10.0	10.1	101	80.0-120
Potassium	10.0	9.53	95.3	80.0-120
Sodium	10.0	9.77	97.7	80.0-120

L1230105-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-07 06/24/20 08:49 • (MS) R3542327-4 06/24/20 08:55 • (MSD) R3542327-5 06/24/20 08:58

Analyte	Spike Amount mg/l	Original Result mg/l	<u>MS Result</u>		MSD Result mg/l	<u>MS Rec.</u>		Dilution	<u>Rec. Limits</u>		MSD Qualifier	<u>RPD</u>		RPD Limits %
			mg/l	%		%	%		%	%		%	%	
Boron	1.00	0.558	1.53		1.57	97.4	101	1	75.0-125			2.46		20
Calcium	10.0	473	471		476	0.000	28.0	1	75.0-125	✓	✓	0.943		20
Iron	10.0	U	9.48		9.78	94.8	97.8	1	75.0-125			3.06		20
Magnesium	10.0	445	440		450	0.000	46.9	1	75.0-125	✓	✓	2.30		20
Potassium	10.0	0.528	10.3		10.6	97.4	100	1	75.0-125			2.94		20
Sodium	10.0	184	188		194	41.1	102	1	75.0-125	✓	✓	3.16		20



Method Blank (MB)

(MB) R3542325-6 06/24/20 11:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0254	0.200
Calcium	U		0.389	1.00
Iron	U		0.0458	0.100
Magnesium	U		0.111	1.00
Potassium	U		0.510	2.00
Sodium	1.50	J	1.40	3.00

Laboratory Control Sample (LCS)

(LCS) R3542325-2 06/24/20 07:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Qualifier	
			Rec. Limits %	
Boron	1.00	1.01	101	80.0-120
Calcium	10.0	10.1	101	80.0-120
Iron	10.0	10.0	100	80.0-120
Magnesium	10.0	10.2	102	80.0-120
Potassium	10.0	9.60	96.0	80.0-120
Sodium	10.0	10.1	101	80.0-120

L1230129-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230129-03 06/24/20 07:10 • (MS) R3542325-4 06/24/20 07:16 • (MSD) R3542325-5 06/24/20 07:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result	MSD Result	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
			mg/l	mg/l		%			%	
Boron	1.00	0.0873	1.10	1.08	1	75.0-125			1.60	20
Calcium	10.0	124	132	131	1	75.0-125		✓	0.773	20
Iron	10.0	0.191	10.1	10.1	1	75.0-125			0.0756	20
Magnesium	10.0	22.7	32.0	31.7	1	75.0-125			1.02	20
Potassium	10.0	1.54	11.1	11.1	1	75.0-125			0.873	20
Sodium	10.0	207	213	211	1	75.0-125	✓	✓	1.02	20



Method Blank (MB)

(MB) R3542719-1 06/25/20 04:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0254	0.200
Calcium	U		0.389	1.00
Iron	U		0.0458	0.100
Magnesium	U		0.111	1.00
Potassium	U		0.510	2.00
Sodium	U		1.40	3.00

Laboratory Control Sample (LCS)

(LCS) R3542719-2 06/25/20 04:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron	10.0	10.2	102	80.0-120	
Calcium	10.0	10.2	102	80.0-120	
Iron	10.0	10.1	101	80.0-120	
Magnesium	10.0	10.3	103	80.0-120	
Potassium	10.0	9.69	96.9	80.0-120	
Sodium	10.0	10.1	101	80.0-120	

L1228696-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1228696-01 06/25/20 04:48 • (MS) R3542719-4 06/25/20 04:54 • (MSD) R3542719-5 06/25/20 04:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10.0	14.9	26.5	26.7	116	117	1	75.0-125			0.669	20
Sodium	10.0	108	116	116	86.3	82.4	1	75.0-125			0.335	20



Method Blank (MB)

(MB) R3545836-1 07/02/20 20:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0254	0.200
Iron,Dissolved	U		0.0458	0.100

Laboratory Control Sample (LCS)

(LCS) R3545836-2 07/02/20 20:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron,Dissolved	1.00	1.02	102	80.0-120	
Iron,Dissolved	10.0	10.4	104	80.0-120	

L1235298-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1235298-05 07/02/20 20:16 • (MS) R3545836-4 07/02/20 20:21 • (MSD) R3545836-5 07/02/20 20:24

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	0.936	1.94	1.96	101	103	1	75.0-125			0.962	20
Iron,Dissolved	10.0	0.0604	10.3	10.3	102	102	1	75.0-125			0.128	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3545856-1 07/03/20 01:29

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0254	0.200
Calcium	U		0.389	1.00
Iron	U		0.0458	0.100
Magnesium	U		0.111	1.00
Potassium	U		0.510	2.00
Sodium	U		1.40	3.00

Laboratory Control Sample (LCS)

(LCS) R3545856-2 07/03/20 01:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron	10.0	0.970	97.0	80.0-120	
Calcium	10.0	9.89	98.9	80.0-120	
Iron	10.0	9.75	97.5	80.0-120	
Magnesium	10.0	9.95	99.5	80.0-120	
Potassium	10.0	9.78	97.8	80.0-120	
Sodium	10.0	10.1	101	80.0-120	

L1235589-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1235589-04 07/03/20 01:34 • (MS) R3545856-4 07/03/20 01:40 • (MSD) R3545856-5 07/03/20 01:42

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	10.0	0.285	1.27	1.26	98.1	97.1	1	75.0-125		0.865	0.865	20
Calcium	10.0	161	168	168	78.4	75.2	1	75.0-125		0.192	0.192	20
Iron	10.0	6.50	16.1	16.0	95.7	94.6	1	75.0-125		0.675	0.675	20
Magnesium	10.0	58.2	67.4	67.1	91.7	88.6	1	75.0-125		0.468	0.468	20
Potassium	10.0	5.02	14.7	14.6	96.7	95.5	1	75.0-125		0.780	0.780	20
Sodium	10.0	71.9	79.9	80.0	80.0	80.6	1	75.0-125		0.0707	0.0707	20



Method Blank (MB)

(MB) R3542417-1 06/24/20 11:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U	0.000735	0.00200	
Cobalt,Dissolved	U	0.000477	0.00200	
Lead,Dissolved	U	0.00249	0.00500	
Manganese,Dissolved	U	0.00132	0.00500	
Uranium,Dissolved	U	0.00754	0.0200	

Laboratory Control Sample (LCS)

(LCS) R3542417-2 06/24/20 12:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	0.0500	0.0476	95.2	80.0-120	
Cobalt,Dissolved	0.0500	0.0484	96.7	80.0-120	
Lead,Dissolved	0.0500	0.0474	94.8	80.0-120	
Manganese,Dissolved	0.0500	0.0480	96.0	80.0-120	
Uranium,Dissolved	0.0500	0.0480	96.0	80.0-120	

L1230105-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-07 06/24/20 12:04 • (MS) R3542417-4 06/24/20 12:11 • (MSD) R3542417-5 06/24/20 12:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	0.0500	0.00397	0.0525	0.0530	97.1	98.0	1	75.0-125		0.800	0.800	20
Cobalt,Dissolved	0.0500	U	0.0486	0.0489	97.2	97.7	1	75.0-125		0.535	0.535	20
Lead,Dissolved	0.0500	U	0.0457	0.0487	91.4	97.4	1	75.0-125		6.39	6.39	20
Manganese,Dissolved	0.0500	0.108	0.149	0.154	81.9	90.7	1	75.0-125		2.90	2.90	20
Uranium,Dissolved	0.0500	0.0895	0.140	0.145	100	112	1	75.0-125		4.08	4.08	20



Method Blank (MB)

(MB) R3542046-1 06/23/20 15:22

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.000735	0.00200
Cobalt,Dissolved	U		0.000477	0.00200
Lead,Dissolved	U		0.00249	0.00500
Manganese,Dissolved	U		0.00132	0.00500
Uranium,Dissolved	U		0.00754	0.0200

Laboratory Control Sample (LCS)

(LCS) R3542046-2 06/23/20 15:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	0.0500	0.0493	98.7	80.0-120	
Cobalt,Dissolved	0.0500	0.0507	101	80.0-120	
Lead,Dissolved	0.0500	0.0471	94.3	80.0-120	
Manganese,Dissolved	0.0500	0.0495	99.1	80.0-120	
Uranium,Dissolved	0.0500	0.0470	93.9	80.0-120	

L1230223-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230223-01 06/23/20 15:29 • (MS) R3542046-4 06/23/20 15:36 • (MSD) R3542046-5 06/23/20 15:39

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	0.000979	0.0526	0.0501	103	98.1	1	75.0-125		4.99	4.99	20
Cobalt,Dissolved	0.0500	U	0.0491	0.0490	98.2	98.0	1	75.0-125		0.156	0.156	20
Lead,Dissolved	0.0500	U	0.0463	0.0490	92.6	98.0	1	75.0-125		5.71	5.71	20
Manganese,Dissolved	0.0500	0.0126	0.0610	0.0611	96.9	97.1	1	75.0-125		0.210	0.210	20
Uranium,Dissolved	0.0500	U	0.0494	0.0512	98.8	102	1	75.0-125		3.53	3.53	20



Method Blank (MB)

(MB) R3541838-1 06/23/20 10:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000735	0.00200
Cobalt	U		0.000477	0.00200
Lead	U		0.00249	0.00500
Manganese	U		0.00132	0.00500
Uranium	U		0.00754	0.0200

Laboratory Control Sample (LCS)

(LCS) R3541838-2 06/23/20 10:40

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	0.0500	0.0491	98.2	80.0-120	
Cobalt	0.0500	0.0507	101	80.0-120	
Lead	0.0500	0.0478	95.6	80.0-120	
Manganese	0.0500	0.0495	99.1	80.0-120	
Uranium	0.0500	0.0497	99.3	80.0-120	

L1230091-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230091-07 06/23/20 10:44 • (MS) R3541838-4 06/23/20 10:51 • (MSD) R3541838-5 06/23/20 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 %
Arsenic	0.0500	U	0.0490	0.0475	98.0	95.1	1	75.0-125		3.01	3.01	20
Cobalt	0.0500	U	0.0493	0.0488	98.6	97.6	1	75.0-125		1.03	1.03	20
Lead	0.0500	U	0.0489	0.0498	97.8	99.6	1	75.0-125		1.88	1.88	20
Manganese	0.0500	0.0763	0.126	0.124	99.6	95.7	1	75.0-125		1.55	1.55	20
Uranium	0.0500	U	0.0508	0.0517	102	103	1	75.0-125		1.69	1.69	20



Method Blank (MB)

(MB) R3542092-1 06/23/20 21:05

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000735	0.00200
Cobalt	U		0.000477	0.00200
Lead	U		0.00249	0.00500
Manganese	U		0.00132	0.00500
Uranium	U		0.00754	0.0200

Laboratory Control Sample (LCS)

(LCS) R3542092-2 06/23/20 21:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	0.0500	0.0460	92.0	80.0-120	
Cobalt	0.0500	0.0479	95.8	80.0-120	
Lead	0.0500	0.0435	87.1	80.0-120	
Manganese	0.0500	0.0470	94.0	80.0-120	
Uranium	0.0500	0.0438	87.6	80.0-120	

L1230105-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230105-09 06/23/20 21:12 • (MS) R3542092-4 06/23/20 21:18 • (MSD) R3542092-5 06/23/20 21:21

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	0.00357	0.0503	0.0502	93.5	93.3	1	75.0-125		0.146	0.146	20
Cobalt	0.0500	0.00760	0.0538	0.0537	92.5	92.2	1	75.0-125		0.297	0.297	20
Lead	0.0500	U	0.0449	0.0441	89.7	88.3	1	75.0-125		1.65	1.65	20
Manganese	0.0500	0.413	0.455	0.454	84.4	82.4	1	75.0-125		0.218	0.218	20
Uranium	0.0500	0.0351	0.0828	0.0802	95.4	90.1	1	75.0-125		3.22	3.22	20



Method Blank (MB)

(MB) R3542674-1 06/24/20 22:39

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	0.000747	J	0.000735	0.00200
Cobalt	U		0.000477	0.00200
Lead	U		0.00249	0.00500
Manganese	U		0.00132	0.00500
Uranium	U		0.00754	0.0200

Laboratory Control Sample (LCS)

(LCS) R3542674-2 06/24/20 22:42

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	0.0500	0.0485	96.9	80.0-120	
Cobalt	0.0500	0.0490	98.1	80.0-120	
Lead	0.0500	0.0488	97.6	80.0-120	
Manganese	0.0500	0.0484	96.8	80.0-120	
Uranium	0.0500	0.0484	96.7	80.0-120	

L1230481-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1230481-05 06/24/20 22:45 • (MS) R3542674-4 06/24/20 22:52 • (MSD) R3542674-5 06/24/20 22:55

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 %
Arsenic	0.0500	U	0.0495	0.0493	99.1	98.6	1	75.0-125		0.513	0.513	20
Cobalt	0.0500	U	0.0481	0.0489	96.3	97.8	1	75.0-125		1.59	1.59	20
Lead	0.0500	U	0.0495	0.0486	99.0	97.2	1	75.0-125		1.87	1.87	20
Manganese	0.0500	0.218	0.261	0.264	85.9	90.5	1	75.0-125		0.885	0.885	20
Uranium	0.0500	U	0.0589	0.0583	118	117	1	75.0-125		0.921	0.921	20



Method Blank (MB)

(MB) R3545774-1 07/02/20 18:11

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.000735	0.00200
Cobalt,Dissolved	U		0.000477	0.00200
Lead,Dissolved	U		0.00249	0.00500
Manganese,Dissolved	U		0.00132	0.00500
Uranium,Dissolved	U		0.00754	0.0200

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

(LCS) R3545774-2 07/02/20 18:14 • (LCSD) R3545774-3 07/02/20 18:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Arsenic,Dissolved	0.0500	0.0498	0.0498	99.5	99.7	80.0-120			0.126	20
Cobalt,Dissolved	0.0500	0.0528	0.0529	106	106	80.0-120			0.231	20
Lead,Dissolved	0.0500	0.0497	0.0492	99.4	98.4	80.0-120			1.08	20
Manganese,Dissolved	0.0500	0.0501	0.0514	100	103	80.0-120			2.60	20
Uranium,Dissolved	0.0500	0.0521	0.0513	104	103	80.0-120			1.46	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3545789-1 07/02/20 18:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000735	0.00200
Cobalt	U		0.000477	0.00200
Lead	U		0.00249	0.00500
Manganese	U		0.00132	0.00500
Uranium	U		0.00754	0.0200

Laboratory Control Sample (LCS)

(LCS) R3545789-2 07/02/20 18:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	0.0500	0.0494	98.8	80.0-120	
Cobalt	0.0500	0.0520	104	80.0-120	
Lead	0.0500	0.0503	101	80.0-120	
Manganese	0.0500	0.0505	101	80.0-120	
Uranium	0.0500	0.0519	104	80.0-120	

L1233568-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1233568-01 07/02/20 18:40 • (MS) R3545789-4 07/02/20 18:47 • (MSD) R3545789-5 07/02/20 18:50

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	U	0.0492	0.0494	98.5	98.7	1	75.0-125		0.222	0.222	20
Cobalt	0.0500	U	0.0533	0.0523	107	105	1	75.0-125		1.81	1.81	20
Lead	0.0500	U	0.0514	0.0528	103	106	1	75.0-125		2.66	2.66	20
Manganese	0.0500	U	0.0523	0.0502	105	100	1	75.0-125		3.94	3.94	20
Uranium	0.0500	U	0.0516	0.0521	103	104	1	75.0-125		0.848	0.848	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.
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.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
V	The sample concentration is too high to evaluate accurate spike recoveries.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
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

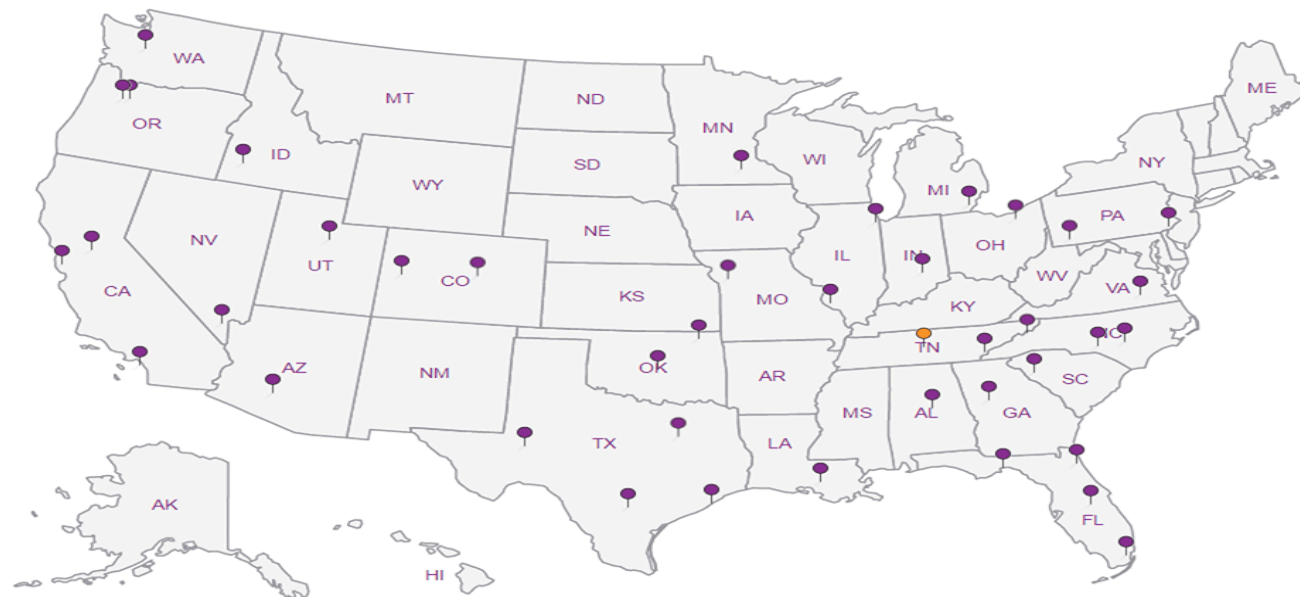
Third Party Federal Accreditations

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

Report to:

Pam Krueger

Project Description: Navajo RO Fields

Phone: 713-929-5674

Fax:

Collected by (print): Scott Wade & Team

Collected by (signature): Scott Wade

Immediately Packed on Ice N Y

Sample ID

Comp/Grab

Matrix

Depth

Date

Time

No. of Cntrs

Quote #

Date Results Needed

Site/Facility ID #

P.O. #

Lab Project #

AMECFWHTX-ROFIELDS

Client Project #

6703180022.0003

City/State

Albuquerque, NM

Collected:

PT MT CT ET

Please Circle:

Rush? (Lab MUST Be Notified)

Same Day Five Day

Next Day 5 Day (Rad Only)

Two Day 10 Day (Rad Only)

Three Day

Matrix

Depth

Date

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No. of Cntrs

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PT MT CT ET

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Two Day 10 Day (Rad Only)

Three Day

Matrix

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Date

Time

No. of Cntrs

Quote #

Date Results Needed

Site/Facility ID #

P.O. #

Lab Project #

AMECFWHTX-ROFIELDS

Client Project #

6703180022.0003

City/State

Albuquerque, NM

Collected:

PT MT CT ET

Please Circle:

Rush? (Lab MUST Be Notified)

Same Day Five Day

Next Day 5 Day (Rad Only)

Two Day 10 Day (Rad Only)

Three Day

Matrix

Depth

Date

Time

No. of Cntrs

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Site/Facility ID #

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AMECFWHTX-ROFIELDS

Client Project #

6703180022.0003

City/State

Albuquerque, NM

Collected:

PT MT CT ET

Please Circle:

Rush? (Lab MUST Be Notified)

Same Day Five Day

Next Day 5 Day (Rad Only)

Two Day 10 Day (Rad Only)

Three Day

Matrix

Depth

Date

Time

No. of Cntrs

Quote #

Date Results Needed

Site/Facility ID #

P.O. #

Lab Project #

AMECFWHTX-ROFIELDS

Client Project #

6703180022.0003

City/State

Albuquerque, NM

Collected:

PT MT CT ET

Please Circle:

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Same Day Five Day

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PT MT CT ET

Please Circle:

Rush? (Lab MUST Be Notified)

Same Day Five Day

Next Day 5 Day (Rad Only)

Two Day 10 Day (Rad Only)

Three Day

DATA ASSESSMENT SUMMARY

Project Information						
Project Name:	Navajo RO Fields	Lab Name:	Pace Analytical			
Project Number:	6703200016	Lab Report Number:	L1230105			
Reviewer's Signature:	Julie Ricardi	Number of Samples:	17 primary, 2 field duplicates			
Review Date:	July 13, 2020	Matrix:	GW			
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:	Total Metals (Ca, Mg, K, Na)	Total Dissolved Solids	Alkalinity, Bicarbonate/Carbonate	Anions (Cl, F, SO ₄)	Nitrate + Nitrite	Total and Dissolved Metals (B, Fe; As, Co, Pb, Mn, U)
Method Number:	EPA 6010B	EPA 2540C	EPA 2320B	EPA 300.0	EPA 353.2	EPA 6010B; 6020
1. Preservation/hold times	O	O	O	O	O	O
2. Blanks	X(1)	O	O	O	O	M(1)
3. Surrogates	NA	NA	NA	NA	NA	NA
4. Matrix spike/dup	O	M(2)	O	O	M(4), X(2)	O
5. Lab QC samples	O	M(3)	O	O	O	O
6. Field QC samples	O	O	O	O	O	O
7. 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						

Notes: RCRA = Resource Conservation and Recovery Act
TPH = Total Petroleum Hydrocarbons

Assessment Code	Description	Action Required
X(1)	Sodium was detected in a method blank at a concentration between the MDL and RL (1.50 J mg/L).	Sodium results in the associated samples were all greater than the RL or were greater than ten times the blank concentration. Therefore, results are not affected and are not qualified.
M(1)	Arsenic was detected in a method blank at a concentration between the MDL and RL (0.000747 J mg/L).	The total arsenic result in the associated sample was greater than the RL but less than ten times the blank concentration. The total arsenic result for sample MW-141 was qualified estimated with potential high bias (J+).
M(2)	The relative percent difference (RPD) between laboratory duplicate results for TDS (5.8) in sample MW-125 was greater than the laboratory control limit of 5.	The TDS result for sample MW-125 was qualified estimated (J).
M(3)	The percent recovery of TDS (71.5) in the LCS associated with a subset of samples was less than the control limits of 85.0-115, indicating potential low bias.	TDS results for the following samples were qualified estimated with potential low bias (J-): MW-117, MW-118, MW-119, MW-142, MW-143, MW-116, RW-#18A, MW-144, DUP-RO-01, DUP-RO-02; the TDS result for sample MW-125 was previously qualified estimated (J) based in the lab duplicate RPD.
M(4)	The percent recoveries of nitrate-nitrite (112/116) in the MS/MSD associated with sample MW-144 were greater than the control limits of 90.0-110, indicating potential high bias.	The nitrate-nitrite result for sample MW-144 was qualified estimated with potential high bias (J+).
X(2)	The percent recoveries of nitrate-nitrite (113/112) in the MS/MSD associated with sample MW-56 were greater than the control limits of 90.0-110, indicating potential high bias.	The nitrate-nitrite result for sample MW-56 was non-detect and was reported unqualified.

MW-40

Collected date/time: 06/16/20 09:25

SAMPLE RESULTS - 01

L1230105

ONE LAB. NATIONWIDE



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	2500		14.1	50.0	1	06/20/2020 19:01	WG1495940

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		8.45	20.0	1	06/24/2020 09:19	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:19	WG1497244

Sample Narrative:

L1230105-01 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	91.2		0.379	1.00	1	06/22/2020 23:37	WG1497133
Fluoride	1.56		0.0640	0.150	1	06/22/2020 23:37	WG1497133
Sulfate	1410		29.7	250	50	06/23/2020 00:22	WG1497133

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		0.0500	0.100	1	06/24/2020 12:58	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.315		0.0254	0.200	1	06/24/2020 09:07	WG1495359
Boron,Dissolved	0.308		0.0254	0.200	1	06/24/2020 12:27	WG1495342
Calcium	365		0.389	1.00	1	06/24/2020 09:07	WG1495359
Iron	0.145		0.0458	0.100	1	06/24/2020 09:07	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/24/2020 12:27	WG1495342
Magnesium	190		0.111	1.00	1	06/24/2020 09:07	WG1495359
Potassium	1.59		0.510	2.00	1	06/24/2020 09:07	WG1495359
Sodium	93.9		1.40	3.00	1	06/24/2020 09:07	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	U		0.000735	0.00200	1	06/23/2020 12:40	WG1495373
Arsenic,Dissolved	U		0.000735	0.00200	1	06/24/2020 13:37	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 12:40	WG1495373
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 13:37	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 12:40	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:37	WG1495345
Manganese	0.0255		0.00132	0.00500	1	06/23/2020 12:40	WG1495373
Manganese,Dissolved	0.0266		0.00132	0.00500	1	06/24/2020 13:37	WG1495345
Uranium	U		0.00754	0.0200	1	06/23/2020 12:40	WG1495373
Uranium,Dissolved	U		0.00754	0.0200	1	06/24/2020 13:37	WG1495345

7/13/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1230105

DATE/TIME:

07/09/20 08:56

PAGE:

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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	3980		14.1	50.0	1	06/20/2020 19:01	WG1495940

Cp

Tc

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	564		8.45	20.0	1	06/24/2020 09:34	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 09:34	WG1497244

Ss

Cn

Sr

Sample Narrative:

L1230105-02 WG1497244: Endpoint pH 4.5

Qc

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	395		3.79	10.0	10	06/23/2020 08:03	WG1497133
Fluoride	1.70		0.640	1.50	10	06/23/2020 08:03	WG1497133
Sulfate	1700		59.4	500	100	06/23/2020 00:52	WG1497133

Gl

Al

Sc

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		0.0500	0.100	1	06/24/2020 12:59	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	1.10		0.0254	0.200	1	06/24/2020 09:10	WG1495359
Boron, Dissolved	1.10		0.0254	0.200	1	06/24/2020 13:37	WG1495342
Calcium	375		0.389	1.00	1	06/24/2020 09:10	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:10	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/24/2020 13:37	WG1495342
Magnesium	285		0.111	1.00	1	06/24/2020 09:10	WG1495359
Potassium	2.10		0.510	2.00	1	06/24/2020 09:10	WG1495359
Sodium	361		1.40	3.00	1	06/24/2020 09:10	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00746		0.000735	0.00200	1	06/23/2020 13:15	WG1495373
Arsenic, Dissolved	0.00674		0.000735	0.00200	1	06/24/2020 13:41	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 13:15	WG1495373
Cobalt, Dissolved	U		0.000477	0.00200	1	06/24/2020 13:41	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:15	WG1495373
Lead, Dissolved	U		0.00249	0.00500	1	06/24/2020 13:41	WG1495345
Manganese	0.234		0.00132	0.00500	1	06/23/2020 13:15	WG1495373
Manganese, Dissolved	0.229		0.00132	0.00500	1	06/24/2020 13:41	WG1495345
Uranium	0.00789	J	0.00754	0.0200	1	06/23/2020 13:15	WG1495373
Uranium, Dissolved	0.00811	J	0.00754	0.0200	1	06/24/2020 13:41	WG1495345

8~ 7/13/20

MW-56

Collected date/time: 06/16/20 11:25

SAMPLE RESULTS - 03

L1230105

ONE LAB. NATIONWIDE.



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	3040		14.1	50.0	1	06/20/2020 19:01	WG1495940

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	351		8.45	20.0	1	06/24/2020 09:41	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 09:41	WG1497244

Sample Narrative:

L1230105-03 WG1497244; Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	209		19.0	50.0	50	06/23/2020 01:07	WG1497133
Fluoride	1.11		0.0540	0.150	1	06/23/2020 13:01	WG1497133
Sulfate	1840		29.7	250	50	06/23/2020 01:07	WG1497133

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		0.0500	0.100	1	06/24/2020 13:00	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.253		0.0254	0.200	1	06/24/2020 09:18	WG1495359
Boron, Dissolved	0.259		0.0254	0.200	1	06/24/2020 13:40	WG1495342
Calcium	504		0.389	1.00	1	06/24/2020 09:18	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:18	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/24/2020 13:40	WG1495342
Magnesium	254		0.111	1.00	1	06/24/2020 09:18	WG1495359
Potassium	1.91		0.510	2.00	1	06/24/2020 09:18	WG1495359
Sodium	153		1.40	3.00	1	06/24/2020 09:18	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00552		0.000735	0.00200	1	06/23/2020 13:19	WG1495373
Arsenic, Dissolved	0.00521		0.000735	0.00200	1	06/24/2020 13:44	WG1495345
Cobalt	0.00786		0.000477	0.00200	1	06/23/2020 13:19	WG1495373
Cobalt, Dissolved	0.00813		0.000477	0.00200	1	06/24/2020 13:44	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:19	WG1495373
Lead, Dissolved	U		0.00249	0.00500	1	06/24/2020 13:44	WG1495345
Manganese	0.302		0.00132	0.00500	1	06/23/2020 13:19	WG1495373
Manganese, Dissolved	0.295		0.00132	0.00500	1	06/24/2020 13:44	WG1495345
Uranium	0.0172		0.00754	0.0200	1	06/23/2020 13:19	WG1495373
Uranium, Dissolved	0.0175		0.00754	0.0200	1	06/24/2020 13:44	WG1495345

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Jr 7/13/20

Jr 7/13/20

MW-55

Collected date/time: 06/16/20 10:40

SAMPLE RESULTS - 04

L1230105

ONE LAB. NATIONWIDE.



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	06/20/2020 19:01	WG1495940

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	553		8.45	20.0	1	06/24/2020 09:48	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 09:48	WG1497244

Sample Narrative:

L1230105-04 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	600		3.79	10.0	10	06/23/2020 08:32	WG1497133
Fluoride	1.66		0.640	1.50	10	06/23/2020 08:32	WG1497133
Sulfate	1340		59.4	500	100	06/23/2020 01:22	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.0746	J	0.0500	0.100	1	06/24/2020 13:04	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.992		0.0254	0.200	1	06/24/2020 09:22	WG1495359
Boron,Dissolved	0.951		0.0254	0.200	1	06/23/2020 15:08	WG1495343
Calcium	411		0.389	1.00	1	06/24/2020 09:22	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:22	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:08	WG1495343
Magnesium	302		0.111	1.00	1	06/24/2020 09:22	WG1495359
Potassium	0.804	J	0.510	2.00	1	06/24/2020 09:22	WG1495359
Sodium	243		1.40	3.00	1	06/24/2020 09:22	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00608		0.000735	0.00200	1	06/23/2020 13:23	WG1495373
Arsenic,Dissolved	0.00663		0.000735	0.00200	1	06/24/2020 13:55	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 13:23	WG1495373
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 13:55	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:23	WG1495373
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 13:55	WG1495345
Manganese	0.142		0.00132	0.00500	1	06/23/2020 13:23	WG1495373
Manganese,Dissolved	0.148		0.00132	0.00500	1	06/24/2020 13:55	WG1495345
Uranium	0.0548		0.00754	0.0200	1	06/23/2020 13:23	WG1495373
Uranium,Dissolved	0.0549		0.00754	0.0200	1	06/24/2020 13:55	WG1495345

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

gr
7/13/20

ACCOUNT:

Wood E&I Solutions Inc. - Houston, TX

PROJECT:

6703180022.0003

SDG:

L1230105

DATE/TIME:

07/09/20 08:56

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MW-140

Collected date/time: 06/16/20 09:55

SAMPLE RESULTS - 05

L1230105

ONE LAB. NATIONWIDE



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	3900		14.1	50.0	1	06/20/2020 19:01	WG1495940

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		8.45	20.0	1	06/24/2020 09:56	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 09:56	WG1497244

Sample Narrative:

L1230105-05 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	305		3.79	10.0	10	06/23/2020 08:47	WG1497133
Fluoride	1.66		0.640	1.50	10	06/23/2020 08:47	WG1497133
Sulfate	2020		59.4	500	100	06/23/2020 02:06	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	9.65		0.250	0.500	5	06/24/2020 14:27	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.468		0.0254	0.200	1	06/24/2020 09:25	WG1495359
Boron, Dissolved	0.445		0.0254	0.200	1	06/23/2020 15:11	WG1495343
Calcium	624		0.389	1.00	1	06/24/2020 09:25	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:25	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:11	WG1495343
Magnesium	231		0.111	1.00	1	06/24/2020 09:25	WG1495359
Potassium	50.3		0.510	2.00	1	06/24/2020 09:25	WG1495359
Sodium	180		1.40	3.00	1	06/24/2020 09:25	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00262		0.000735	0.00200	1	06/23/2020 13:26	WG1495373
Arsenic, Dissolved	0.00265		0.000735	0.00200	1	06/24/2020 13:58	WG1495345
Cobalt	U		0.000477	0.00200	1	06/23/2020 13:26	WG1495373
Cobalt, Dissolved	U		0.000477	0.00200	1	06/24/2020 13:58	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:26	WG1495373
Lead, Dissolved	U		0.00249	0.00500	1	06/24/2020 13:58	WG1495345
Manganese	0.0636		0.00132	0.00500	1	06/23/2020 13:26	WG1495373
Manganese, Dissolved	0.0615		0.00132	0.00500	1	06/24/2020 13:58	WG1495345
Uranium	0.0359		0.00754	0.0200	1	06/23/2020 13:26	WG1495373
Uranium, Dissolved	0.0348		0.00754	0.0200	1	06/24/2020 13:58	WG1495345



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SAMPLE RESULTS - 06

L1230105

ONE LAB. NATIONWIDE.



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	3260		14.1	50.0	1	06/20/2020 19:01	WG1495940

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	229		8.45	20.0	1	06/24/2020 10:03	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:03	WG1497244

Sample Narrative:

L1230105-06 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Chloride	290		3.79	10.0	10	06/23/2020 09:02	WG1497133
Fluoride	2.87		0.640	1.50	10	06/23/2020 09:02	WG1497133
Sulfate	1520		59.4	500	100	06/23/2020 02:21	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	7.60		0.250	0.500	5	06/24/2020 14:28	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Boron	0.196	J	0.0254	0.200	1	06/25/2020 05:26	WG1495367
Boron,Dissolved	0.200	J	0.0254	0.200	1	06/23/2020 15:15	WG1495343
Calcium	617		0.389	1.00	1	06/25/2020 05:26	WG1495367
Iron	U		0.0458	0.100	1	06/25/2020 05:26	WG1495367
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:15	WG1495343
Magnesium	158		0.111	1.00	1	06/25/2020 05:26	WG1495367
Potassium	6.06		0.510	2.00	1	06/25/2020 05:26	WG1495367
Sodium	60.7		1.40	3.00	1	06/25/2020 05:26	WG1495367

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis date / time	Batch
Arsenic	0.00310	J	0.000735	0.00200	1	06/24/2020 22:58	WG1495382
Arsenic,Dissolved	0.00297	J	0.000735	0.00200	1	06/24/2020 14:02	WG1495345
Cobalt	U		0.000477	0.00200	1	06/24/2020 22:58	WG1495382
Cobalt,Dissolved	U		0.000477	0.00200	1	06/24/2020 14:02	WG1495345
Lead	U		0.00249	0.00500	1	06/24/2020 22:58	WG1495382
Lead,Dissolved	U		0.00249	0.00500	1	06/24/2020 14:02	WG1495345
Manganese	0.00205	J	0.00132	0.00500	1	06/24/2020 22:58	WG1495382
Manganese,Dissolved	0.00132	J	0.00132	0.00500	1	06/24/2020 14:02	WG1495345
Uranium	0.0244		0.00754	0.0200	1	06/24/2020 22:58	WG1495382
Uranium,Dissolved	0.0259		0.00754	0.0200	1	06/24/2020 14:02	WG1495345

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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	4740		14.1	50.0	1	06/20/2020 19:01	WG1495940

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	432		8.45	20.0	1	06/24/2020 10:10	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 10:10	WG1497244

Sample Narrative:

L1230105-07 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	392		3.79	10.0	10	06/23/2020 09:17	WG1497133
Fluoride	2.16		0.640	1.50	10	06/23/2020 09:17	WG1497133
Sulfate	2260		59.4	500	100	06/23/2020 02:49	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	3.78		0.0500	0.100	1	06/24/2020 14:31	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.520		0.0254	0.200	1	07/03/2020 01:45	WG1503193
Boron, Dissolved	0.564		0.0254	0.200	1	07/02/2020 20:27	WG1503190
Calcium	476		0.389	1.00	1	07/03/2020 01:45	WG1503193
Iron	U		0.0458	0.100	1	07/03/2020 01:45	WG1503193
Iron, Dissolved	U		0.0458	0.100	1	07/02/2020 20:27	WG1503190
Magnesium	429		0.111	1.00	1	07/03/2020 01:45	WG1503193
Potassium	0.681	J	0.510	2.00	1	07/03/2020 01:45	WG1503193
Sodium	181		1.40	3.00	1	07/03/2020 01:45	WG1503193

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00400		0.000735	0.00200	1	07/02/2020 18:54	WG1503294
Arsenic, Dissolved	0.00430		0.000735	0.00200	1	07/02/2020 18:21	WG1503290
Cobalt	U		0.000477	0.00200	1	07/02/2020 18:54	WG1503294
Cobalt, Dissolved	U		0.000477	0.00200	1	07/02/2020 18:21	WG1503290
Lead	U		0.00249	0.00500	1	07/02/2020 18:54	WG1503294
Lead, Dissolved	U		0.00249	0.00500	1	07/02/2020 18:21	WG1503290
Manganese	0.125		0.00132	0.00500	1	07/02/2020 18:54	WG1503294
Manganese, Dissolved	0.109		0.00132	0.00500	1	07/02/2020 18:21	WG1503290
Uranium	0.0953		0.00754	0.0200	1	07/02/2020 18:54	WG1503294
Uranium, Dissolved	0.0947		0.00754	0.0200	1	07/02/2020 18:21	WG1503290

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

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SAMPLE RESULTS - 08

L1230105

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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	2920		14.1	50.0	1	06/20/2020 19:01	WG1495940

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	407		8.45	20.0	1	06/24/2020 12:29	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 12:29	WG1497244

Sample Narrative:

L1230105-08 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	241		3.79	10.0	10	06/23/2020 09:32	WG1497133
Fluoride	2.27		0.640	1.50	10	06/23/2020 09:32	WG1497133
Sulfate	1780		59.4	500	100	06/23/2020 03:04	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.471		0.0500	0.100	1	06/24/2020 13:14	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.121	J	0.0254	0.200	1	06/24/2020 09:28	WG1495359
Boron, Dissolved	0.109	J	0.0254	0.200	1	06/23/2020 15:26	WG1495343
Calcium	587		0.389	1.00	1	06/24/2020 09:28	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:28	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:26	WG1495343
Magnesium	211		0.111	1.00	1	06/24/2020 09:28	WG1495359
Potassium	2.64		0.510	2.00	1	06/24/2020 09:28	WG1495359
Sodium	128		1.40	3.00	1	06/24/2020 09:28	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00353		0.000735	0.00200	1	06/23/2020 13:30	WG1495373
Arsenic, Dissolved	0.00364		0.000735	0.00200	1	06/24/2020 14:05	WG1495345
Cobalt	0.00618		0.000477	0.00200	1	06/23/2020 13:30	WG1495373
Cobalt, Dissolved	0.00583		0.000477	0.00200	1	06/24/2020 14:05	WG1495345
Lead	U		0.00249	0.00500	1	06/23/2020 13:30	WG1495373
Lead, Dissolved	U		0.00249	0.00500	1	06/24/2020 14:05	WG1495345
Manganese	0.959		0.00132	0.00500	1	06/23/2020 13:30	WG1495373
Manganese, Dissolved	0.927		0.00132	0.00500	1	06/24/2020 14:05	WG1495345
Uranium	0.00950	J	0.00754	0.0200	1	06/23/2020 13:30	WG1495373
Uranium, Dissolved	0.00917	J	0.00754	0.0200	1	06/24/2020 14:05	WG1495345

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

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L1230105

ONE LAB. NATIONWIDE.



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	4080	J J2 J4	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-09 WG1496359: Results confirmed.

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7/13/20

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	421		8.45	20.0	1	06/24/2020 10:33	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 10:33	WG1497244

Sample Narrative:

L1230105-09 WG1497244: Endpoint: pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	278		37.9	100	100	06/23/2020 03:19	WG1497133
Fluoride	1.12		0.0640	0.150	1	06/23/2020 13:16	WG1497133
Sulfate	2500		59.4	500	100	06/23/2020 03:19	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.215		0.0500	0.100	1	06/24/2020 13:15	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.519		0.0254	0.200	1	06/24/2020 09:31	WG1495359
Boron,Dissolved	0.498		0.0254	0.200	1	06/23/2020 15:29	WG1495343
Calcium	545		0.389	1.00	1	06/24/2020 09:31	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:31	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:29	WG1495343
Magnesium	392		0.111	1.00	1	06/24/2020 09:31	WG1495359
Potassium	1.49	J	0.510	2.00	1	06/24/2020 09:31	WG1495359
Sodium	231		1.40	3.00	1	06/24/2020 09:31	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00357		0.000735	0.00200	1	06/23/2020 21:12	WG1495374
Arsenic,Dissolved	0.00342		0.000735	0.00200	1	06/23/2020 15:43	WG1495346
Cobalt	0.00760		0.000477	0.00200	1	06/23/2020 21:12	WG1495374
Cobalt,Dissolved	0.00557		0.000477	0.00200	1	06/23/2020 15:43	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:12	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 15:43	WG1495346
Manganese	0.413		0.00132	0.00500	1	06/23/2020 21:12	WG1495374
Manganese,Dissolved	0.389		0.00132	0.00500	1	06/23/2020 15:43	WG1495346
Uranium	0.0351		0.00754	0.0200	1	06/23/2020 21:12	WG1495374
Uranium,Dissolved	0.0365		0.00754	0.0200	1	06/23/2020 15:43	WG1495346

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7/13/20

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

ACCOUNT:

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ONE LAB. NATIONWIDE.



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	3350	J- <i>H</i>	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-10 WG1496359: Results confirmed.

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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	365		8.45	20.0	1	06/24/2020 10:40	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 10:40	WG1497244

Sample Narrative:

L1230105-10 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	290		3.79	10.0	10	06/23/2020 10:02	WG1497133
Fluoride	3.41		0.640	1.50	10	06/23/2020 10:02	WG1497133
Sulfate	2010		59.4	500	100	06/23/2020 03:34	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	2.37		0.0500	0.100	1	06/24/2020 13:16	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.143	J	0.0254	0.200	1	06/24/2020 09:35	WG1495359
Boron, Dissolved	0.131	J	0.0254	0.200	1	06/23/2020 15:32	WG1495343
Calcium	584		0.389	1.00	1	06/24/2020 09:35	WG1495359
Iron	0.261		0.0458	0.100	1	06/24/2020 09:35	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:32	WG1495343
Magnesium	265		0.111	1.00	1	06/24/2020 09:35	WG1495359
Potassium	6.97		0.510	2.00	1	06/24/2020 09:35	WG1495359
Sodium	131		1.40	3.00	1	06/24/2020 09:35	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00248		0.000735	0.00200	1	06/23/2020 21:25	WG1495374
Arsenic, Dissolved	0.00246		0.000735	0.00200	1	06/23/2020 15:46	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:25	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 15:46	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:25	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 15:46	WG1495346
Manganese	0.00392	J	0.00132	0.00500	1	06/23/2020 21:25	WG1495374
Manganese, Dissolved	0.00158	J	0.00132	0.00500	1	06/23/2020 15:46	WG1495346
Uranium	0.0152	J	0.00754	0.0200	1	06/23/2020 21:25	WG1495374
Uranium, Dissolved	0.0160	J	0.00754	0.0200	1	06/23/2020 15:46	WG1495346

7/13/20

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

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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	4350	J- <i>Handwritten: J- 7/13/20</i>	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-11 WG1496359: Results confirmed.

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	364		8.45	20.0	1	06/24/2020 10:47	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 10:47	WG1497244

Sample Narrative:

L1230105-11 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	290		3.79	10.0	10	06/23/2020 10:17	WG1497133
Fluoride	5.63		0.640	1.50	10	06/23/2020 10:17	WG1497133
Sulfate	2630		59.4	500	100	06/23/2020 03:49	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	2.27		0.0500	0.100	1	06/24/2020 13:18	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.381		0.0254	0.200	1	06/24/2020 09:38	WG1495359
Boron, Dissolved	0.399		0.0254	0.200	1	06/23/2020 15:35	WG1495343
Calcium	585		0.389	1.00	1	06/24/2020 09:38	WG1495359
Iron	0.137		0.0458	0.100	1	06/24/2020 09:38	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:35	WG1495343
Magnesium	403		0.111	1.00	1	06/24/2020 09:38	WG1495359
Potassium	4.01		0.510	2.00	1	06/24/2020 09:38	WG1495359
Sodium	168		1.40	3.00	1	06/24/2020 09:38	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00753		0.000735	0.00200	1	06/23/2020 21:28	WG1495374
Arsenic, Dissolved	0.00787		0.000735	0.00200	1	06/23/2020 15:50	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:28	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 15:50	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:28	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 15:50	WG1495346
Manganese	0.00167	J	0.00132	0.00500	1	06/23/2020 21:28	WG1495374
Manganese, Dissolved	U		0.00132	0.00500	1	06/23/2020 15:50	WG1495346
Uranium	0.0360		0.00754	0.0200	1	06/23/2020 21:28	WG1495374
Uranium, Dissolved	0.0390		0.00754	0.0200	1	06/23/2020 15:50	WG1495346

Handwritten: J- 7/13/20

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L1230105

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SAMPLE RESULTS - 12

L1230105

ONE LAB. NATIONWIDE.



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	3940	J- K	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-12 WG1496359: Results confirmed.

7/13/20

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	356		8.45	20.0	1	06/24/2020 10:54	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 10:54	WG1497244

Sample Narrative:

L1230105-12 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	341		3.79	10.0	10	06/23/2020 11:02	WG1497133
Fluoride	1.70		0.640	1.50	10	06/23/2020 11:02	WG1497133
Sulfate	2590		59.4	500	100	06/23/2020 04:04	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.184		0.0500	0.100	1	06/24/2020 13:19	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.482		0.0254	0.200	1	06/24/2020 09:41	WG1495359
Boron, Dissolved	0.457		0.0254	0.200	1	06/23/2020 15:38	WG1495343
Calcium	636		0.389	1.00	1	06/24/2020 09:41	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:41	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:38	WG1495343
Magnesium	350		0.111	1.00	1	06/24/2020 09:41	WG1495359
Potassium	0.781	J	0.510	2.00	1	06/24/2020 09:41	WG1495359
Sodium	206		1.40	3.00	1	06/24/2020 09:41	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00376		0.000735	0.00200	1	06/23/2020 21:31	WG1495374
Arsenic, Dissolved	0.00384		0.000735	0.00200	1	06/23/2020 15:53	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:31	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 15:53	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:31	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 15:53	WG1495346
Manganese	0.00633		0.00132	0.00500	1	06/23/2020 21:31	WG1495374
Manganese, Dissolved	0.00643		0.00132	0.00500	1	06/23/2020 15:53	WG1495346
Uranium	0.0451		0.00754	0.0200	1	06/23/2020 21:31	WG1495374
Uranium, Dissolved	0.0467		0.00754	0.0200	1	06/23/2020 15:53	WG1495346

7/13/20

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

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SAMPLE RESULTS - 13

L1230105

ONE LAB. NATIONWIDE.



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	4020	J- A	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-13 WG1496359: Results confirmed.

7/13/20

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	356		8.45	20.0	1	06/24/2020 11:00	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 11:00	WG1497244

Sample Narrative:

L1230105-13 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	360		3.79	10.0	10	06/23/2020 11:17	WG1497133
Fluoride	2.25		0.640	1.50	10	06/23/2020 11:17	WG1497133
Sulfate	2430		59.4	500	100	06/23/2020 04:18	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.108		0.0500	0.100	1	06/24/2020 13:20	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.430		0.0254	0.200	1	06/24/2020 09:44	WG1495359
Boron, Dissolved	0.402		0.0254	0.200	1	06/23/2020 15:41	WG1495343
Calcium	642		0.389	1.00	1	06/24/2020 09:44	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:44	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:41	WG1495343
Magnesium	332		0.111	1.00	1	06/24/2020 09:44	WG1495359
Potassium	1.16	J	0.510	2.00	1	06/24/2020 09:44	WG1495359
Sodium	189		1.40	3.00	1	06/24/2020 09:44	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00327		0.000735	0.00200	1	06/23/2020 21:34	WG1495374
Arsenic, Dissolved	0.00336		0.000735	0.00200	1	06/23/2020 16:09	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:34	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 16:09	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:34	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 16:09	WG1495346
Manganese	0.0140		0.00132	0.00500	1	06/23/2020 21:34	WG1495374
Manganese, Dissolved	0.0130		0.00132	0.00500	1	06/23/2020 16:09	WG1495346
Uranium	0.0410		0.00754	0.0200	1	06/23/2020 21:34	WG1495374
Uranium, Dissolved	0.0401		0.00754	0.0200	1	06/23/2020 16:09	WG1495346

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L1230105

ONE LAB. NATIONWIDE.



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	4100	J- A	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-14 WG1496359: Results confirmed.

8- 7/13/20

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	348		8.45	20.0	1	06/24/2020 11:07	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 11:07	WG1497244

Sample Narrative:

L1230105-14 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	278		3.79	10.0	10	06/23/2020 11:32	WG1497133
Fluoride	1.82		0.640	1.50	10	06/23/2020 11:32	WG1497133
Sulfate	2770		59.4	500	100	06/23/2020 04:33	WG1497133

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		0.0500	0.100	1	06/24/2020 13:21	WG1494722

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.865		0.0254	0.200	1	06/24/2020 09:48	WG1495359
Boron,Dissolved	0.839		0.0254	0.200	1	06/23/2020 15:44	WG1495343
Calcium	536		0.389	1.00	1	06/24/2020 09:48	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:48	WG1495359
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 15:44	WG1495343
Magnesium	443		0.111	1.00	1	06/24/2020 09:48	WG1495359
Potassium	0.936	J	0.510	2.00	1	06/24/2020 09:48	WG1495359
Sodium	214		1.40	3.00	1	06/24/2020 09:48	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00339		0.000735	0.00200	1	06/23/2020 21:45	WG1495374
Arsenic,Dissolved	0.00318		0.000735	0.00200	1	06/23/2020 16:13	WG1495346
Cobalt	0.000864	J	0.000477	0.00200	1	06/23/2020 21:45	WG1495374
Cobalt,Dissolved	0.000816	J	0.000477	0.00200	1	06/23/2020 16:13	WG1495346
Lead	U		0.00249	0.00500	1	05/23/2020 21:45	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:13	WG1495346
Manganese	0.0511		0.00132	0.00500	1	06/23/2020 21:45	WG1495374
Manganese,Dissolved	0.0432		0.00132	0.00500	1	06/23/2020 16:13	WG1495346
Uranium	0.0468		0.00754	0.0200	1	06/23/2020 21:45	WG1495374
Uranium,Dissolved	0.0473		0.00754	0.0200	1	06/23/2020 16:13	WG1495346

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L1230105

ONE LAB. NATIONWIDE.



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	4020	J- <i>7/13/20</i>	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-15 WG1496359: Results confirmed.

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	341		8.45	20.0	1	06/24/2020 11:14	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 11:14	WG1497244

Sample Narrative:

L1230105-15 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	321		3.79	10.0	10	06/23/2020 11:47	WG1497133
Fluoride	1.75		0.640	1.50	10	06/23/2020 11:47	WG1497133
Sulfate	2140		59.4	500	100	06/23/2020 05:18	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.528		0.0500	0.100	1	06/22/2020 10:02	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.227		0.0254	0.200	1	06/24/2020 09:56	WG1495359
Boron, Dissolved	0.220		0.0254	0.200	1	06/23/2020 15:48	WG1495343
Calcium	572		0.389	1.00	1	06/24/2020 09:56	WG1495359
Iron	0.0746	J	0.0458	0.100	1	06/24/2020 09:56	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:48	WG1495343
Magnesium	297		0.111	1.00	1	06/24/2020 09:56	WG1495359
Potassium	1.29	J	0.510	2.00	1	06/24/2020 09:56	WG1495359
Sodium	188		1.40	3.00	1	06/24/2020 09:56	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00292		0.000735	0.00200	1	06/23/2020 21:48	WG1495374
Arsenic, Dissolved	0.00290		0.000735	0.00200	1	06/23/2020 16:16	WG1495346
Cobalt	0.00240		0.000477	0.00200	1	06/23/2020 21:48	WG1495374
Cobalt, Dissolved	0.00254		0.000477	0.00200	1	06/23/2020 16:16	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:48	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 16:16	WG1495346
Manganese	0.0128		0.00132	0.00500	1	06/23/2020 21:48	WG1495374
Manganese, Dissolved	0.00781		0.00132	0.00500	1	06/23/2020 16:16	WG1495346
Uranium	0.0273		0.00754	0.0200	1	06/23/2020 21:48	WG1495374
Uranium, Dissolved	0.0287		0.00754	0.0200	1	06/23/2020 16:16	WG1495346

5 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

7/13/20

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L1230105

ONE LAB. NATIONWIDE.



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	3660	J-A	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-16 WG1496359: Results confirmed.

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7/13/20

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	325		8.45	20.0	1	06/24/2020 11:21	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 11:21	WG1497244

Sample Narrative:

L1230105-16 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	228		3.79	10.0	10	06/23/2020 12:01	WG1497133
Fluoride	2.13		0.640	1.50	10	06/23/2020 12:01	WG1497133
Sulfate	2320		59.4	500	100	06/23/2020 05:33	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.549		0.0500	0.100	1	06/22/2020 10:03	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.542		0.0254	0.200	1	06/24/2020 09:59	WG1495359
Boron, Dissolved	0.506		0.0254	0.200	1	06/23/2020 15:51	WG1495343
Calcium	525		0.389	1.00	1	06/24/2020 09:59	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 09:59	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:51	WG1495343
Magnesium	369		0.111	1.00	1	06/24/2020 09:59	WG1495359
Potassium	0.900	J	0.510	2.00	1	06/24/2020 09:59	WG1495359
Sodium	136		1.40	3.00	1	06/24/2020 09:59	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00258		0.000735	0.00200	1	06/23/2020 21:52	WG1495374
Arsenic, Dissolved	0.00280		0.000735	0.00200	1	06/23/2020 16:20	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:52	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 16:20	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:52	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 16:20	WG1495346
Manganese	0.00320	J	0.00132	0.00500	1	06/23/2020 21:52	WG1495374
Manganese, Dissolved	0.00265	J	0.00132	0.00500	1	06/23/2020 16:20	WG1495346
Uranium	0.0527		0.00754	0.0200	1	06/23/2020 21:52	WG1495374
Uranium, Dissolved	0.0565		0.00754	0.0200	1	06/23/2020 16:20	WG1495346

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L1230105

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	3500	J- A	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-17 WG1496359: Results confirmed.

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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	324		8.45	20.0	1	06/24/2020 11:27	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 11:27	WG1497244

Sample Narrative:

L1230105-17 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	257		3.79	10.0	10	06/23/2020 12:16	WG1497133
Fluoride	2.64		0.640	1.50	10	06/23/2020 12:16	WG1497133
Sulfate	2120		59.4	500	100	06/23/2020 05:48	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.401	J+ A	0.0500	0.100	1	06/22/2020 10:06	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.237		0.0254	0.200	1	06/24/2020 10:03	WG1495359
Boron, Dissolved	0.224		0.0254	0.200	1	06/23/2020 15:54	WG1495343
Calcium	647		0.389	1.00	1	06/24/2020 10:03	WG1495359
Iron	U		0.0458	0.100	1	06/24/2020 10:03	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 15:54	WG1495343
Magnesium	238		0.111	1.00	1	06/24/2020 10:03	WG1495359
Potassium	1.36	J	0.510	2.00	1	06/24/2020 10:03	WG1495359
Sodium	142		1.40	3.00	1	06/24/2020 10:03	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00361		0.000735	0.00200	1	06/23/2020 21:55	WG1495374
Arsenic, Dissolved	0.00375		0.000735	0.00200	1	06/23/2020 16:23	WG1495346
Cobalt	0.000816	J	0.000477	0.00200	1	06/23/2020 21:55	WG1495374
Cobalt, Dissolved	0.000874	J	0.000477	0.00200	1	06/23/2020 16:23	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:55	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 16:23	WG1495346
Manganese	0.0216		0.00132	0.00500	1	06/23/2020 21:55	WG1495374
Manganese, Dissolved	0.0170		0.00132	0.00500	1	06/23/2020 16:23	WG1495346
Uranium	0.0168	J	0.00754	0.0200	1	06/23/2020 21:55	WG1495374
Uranium, Dissolved	0.0187	J	0.00754	0.0200	1	06/23/2020 16:23	WG1495346

7/13/20

DUP-RO-01

Collected date/time: 06/16/20 10:00

SAMPLE RESULTS - 18

L1230105

ONE LAB. NATIONWIDE.



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	3360	J- <i>8-7/13/20</i>	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-18 WG1496359: Results confirmed.

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	563		8.45	20.0	1	06/24/2020 11:34	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 11:34	WG1497244

Sample Narrative:

L1230105-18 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	397		3.79	10.0	10	06/23/2020 12:31	WG1497133
Fluoride	1.74		0.640	1.50	10	06/23/2020 12:31	WG1497133
Sulfate	1780		29.7	250	50	06/23/2020 06:03	WG1497133

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		0.0500	0.100	1	06/22/2020 10:10	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	1.12		0.0254	0.200	1	06/24/2020 10:06	WG1495359
Boron, Dissolved	1.06		0.0254	0.200	1	06/23/2020 16:02	WG1495343
Calcium	379		0.389	1.00	1	06/24/2020 10:06	WG1495359
Iron	0.0704	J	0.0458	0.100	1	06/24/2020 10:06	WG1495359
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 16:02	WG1495343
Magnesium	292		0.111	1.00	1	06/24/2020 10:06	WG1495359
Potassium	1.95	J	0.510	2.00	1	06/24/2020 10:06	WG1495359
Sodium	369		1.40	3.00	1	06/24/2020 10:06	WG1495359

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00772		0.000735	0.00200	1	06/23/2020 21:58	WG1495374
Arsenic, Dissolved	0.00735		0.000735	0.00200	1	06/23/2020 16:26	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 21:58	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 16:26	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 21:58	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 16:26	WG1495346
Manganese	0.223		0.00132	0.00500	1	06/23/2020 21:58	WG1495374
Manganese, Dissolved	0.214		0.00132	0.00500	1	06/23/2020 16:26	WG1495346
Uranium	U		0.00754	0.0200	1	06/23/2020 21:58	WG1495374
Uranium, Dissolved	0.00779	J	0.00754	0.0200	1	06/23/2020 16:26	WG1495346

8-7/13/20

ACCOUNT:

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DUP-RO-02

Collected date/time: 06/16/20 10:00

SAMPLE RESULTS - 19

L1230105

ONE LAB. NATIONWIDE.



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	3500	J-A	14.1	50.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-19 WG1496359: Results confirmed.

7/13/20

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	330		8.45	20.0	1	06/24/2020 11:49	WG1497244
Alkalinity, Carbonate	U		8.45	20.0	1	06/24/2020 11:49	WG1497244

Sample Narrative:

L1230105-19 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	305		3.79	10.0	10	06/23/2020 12:46	WG1497133
Fluoride	1.74		0.640	1.50	10	06/23/2020 12:46	WG1497133
Sulfate	2150		29.7	250	50	06/23/2020 06:18	WG1497133

Wet Chemistry by Method 353.2

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	10.3		0.500	1.00	10	06/22/2020 10:15	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	0.460		0.0254	0.200	1	06/24/2020 07:22	WG1495360
Boron, Dissolved	0.442		0.0254	0.200	1	06/23/2020 16:05	WG1495343
Calcium	628		0.389	1.00	1	06/24/2020 07:22	WG1495360
Iron	U		0.0458	0.100	1	06/24/2020 07:22	WG1495360
Iron, Dissolved	U		0.0458	0.100	1	06/23/2020 16:05	WG1495343
Magnesium	227		0.111	1.00	1	06/24/2020 07:22	WG1495360
Potassium	49.5		0.510	2.00	1	06/24/2020 07:22	WG1495360
Sodium	177		1.40	3.00	1	06/24/2020 07:22	WG1495360

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00252		0.000735	0.00200	1	06/23/2020 22:01	WG1495374
Arsenic, Dissolved	0.00273		0.000735	0.00200	1	06/23/2020 16:30	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 22:01	WG1495374
Cobalt, Dissolved	U		0.000477	0.00200	1	06/23/2020 16:30	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 22:01	WG1495374
Lead, Dissolved	U		0.00249	0.00500	1	06/23/2020 16:30	WG1495346
Manganese	0.0678		0.00132	0.00500	1	06/23/2020 22:01	WG1495374
Manganese, Dissolved	0.0564		0.00132	0.00500	1	06/23/2020 16:30	WG1495346
Uranium	0.0323		0.00754	0.0200	1	06/23/2020 22:01	WG1495374
Uranium, Dissolved	0.0336		0.00754	0.0200	1	06/23/2020 16:30	WG1495346

7/13/20

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

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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	U	J4	2.82	10.0	1	06/23/2020 23:15	WG1496359

Sample Narrative:

L1230105-20 WG1496359: Results confirmed.

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	U		8.45	20.0	1	06/24/2020 12:02	WG1497244
Alkalinity,Carbonate	U		8.45	20.0	1	06/24/2020 12:02	WG1497244

Sample Narrative:

L1230105-20 WG1497244: Endpoint pH 4.5

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	U		0.379	1.00	1	06/23/2020 06:33	WG1497133
Fluoride	U		0.0640	0.150	1	06/23/2020 06:33	WG1497133
Sulfate	U		0.594	5.00	1	06/23/2020 06:33	WG1497133

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		0.0500	0.100	1	06/22/2020 10:16	WG1494848

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	U		0.0254	0.200	1	06/24/2020 07:24	WG1495360
Boron,Dissolved	U		0.0254	0.200	1	06/23/2020 16:08	WG1495343
Calcium	U		0.389	1.00	1	06/24/2020 07:24	WG1495360
Iron	U		0.0458	0.100	1	06/24/2020 07:24	WG1495360
Iron,Dissolved	U		0.0458	0.100	1	06/23/2020 16:08	WG1495343
Magnesium	U		0.111	1.00	1	06/24/2020 07:24	WG1495360
Potassium	U		0.510	2.00	1	06/24/2020 07:24	WG1495360
Sodium	U		1.40	3.00	1	06/24/2020 07:24	WG1495360

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	U		0.000735	0.00200	1	06/23/2020 22:05	WG1495374
Arsenic,Dissolved	U		0.000735	0.00200	1	06/23/2020 16:33	WG1495346
Cobalt	U		0.000477	0.00200	1	06/23/2020 22:05	WG1495374
Cobalt,Dissolved	U		0.000477	0.00200	1	06/23/2020 16:33	WG1495346
Lead	U		0.00249	0.00500	1	06/23/2020 22:05	WG1495374
Lead,Dissolved	U		0.00249	0.00500	1	06/23/2020 16:33	WG1495346
Manganese	U		0.00132	0.00500	1	06/23/2020 22:05	WG1495374
Manganese,Dissolved	U		0.00132	0.00500	1	06/23/2020 16:33	WG1495346
Uranium	U		0.00754	0.0200	1	06/23/2020 22:05	WG1495374
Uranium,Dissolved	U		0.00754	0.0200	1	06/23/2020 16:33	WG1495346

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Reverse Osmosis Reject Discharge Fields Stage 1 Abatement – Final Report

HollyFrontier Navajo Refining LLC
Discharge Permit GW-028

Volume 5 - Appendices D through G



Prepared for:

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

Prepared by:

Wood Environment and Infrastructure Solutions, Inc.
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Project 6703180022
November 19, 2020

Third-party disclaimer

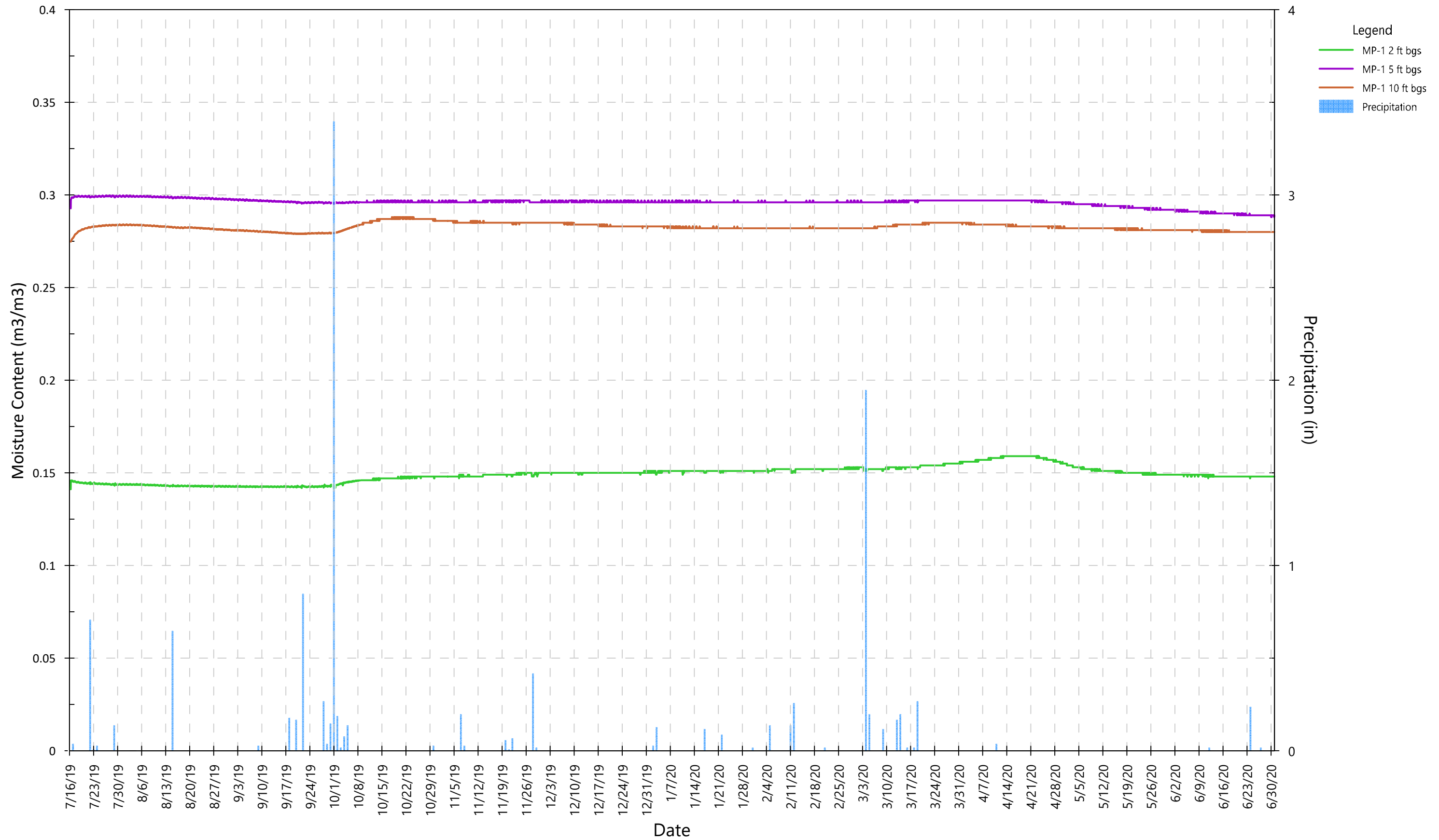
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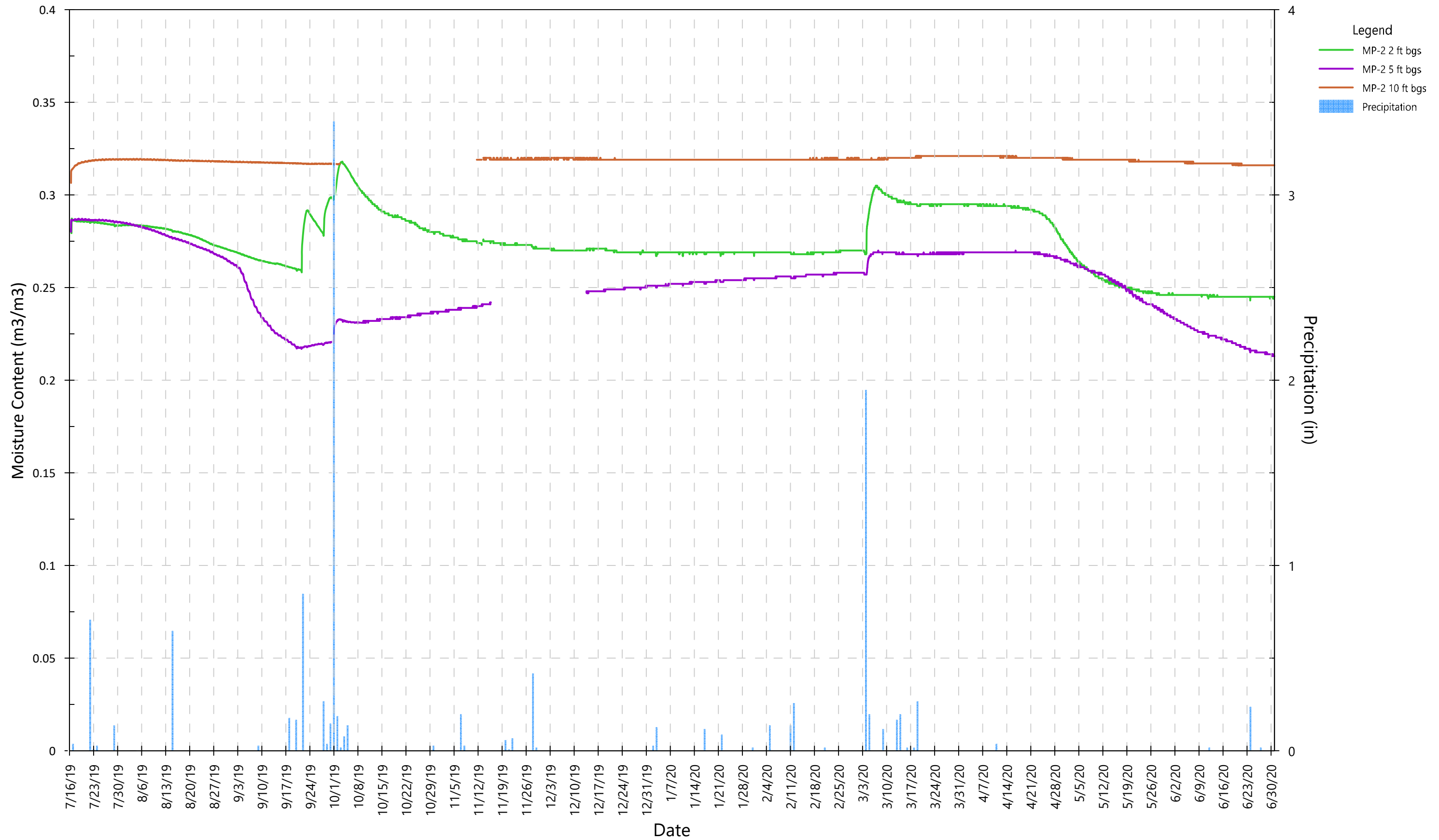
APPENDIX D

SOIL MOISTURE DATA GRAPHS

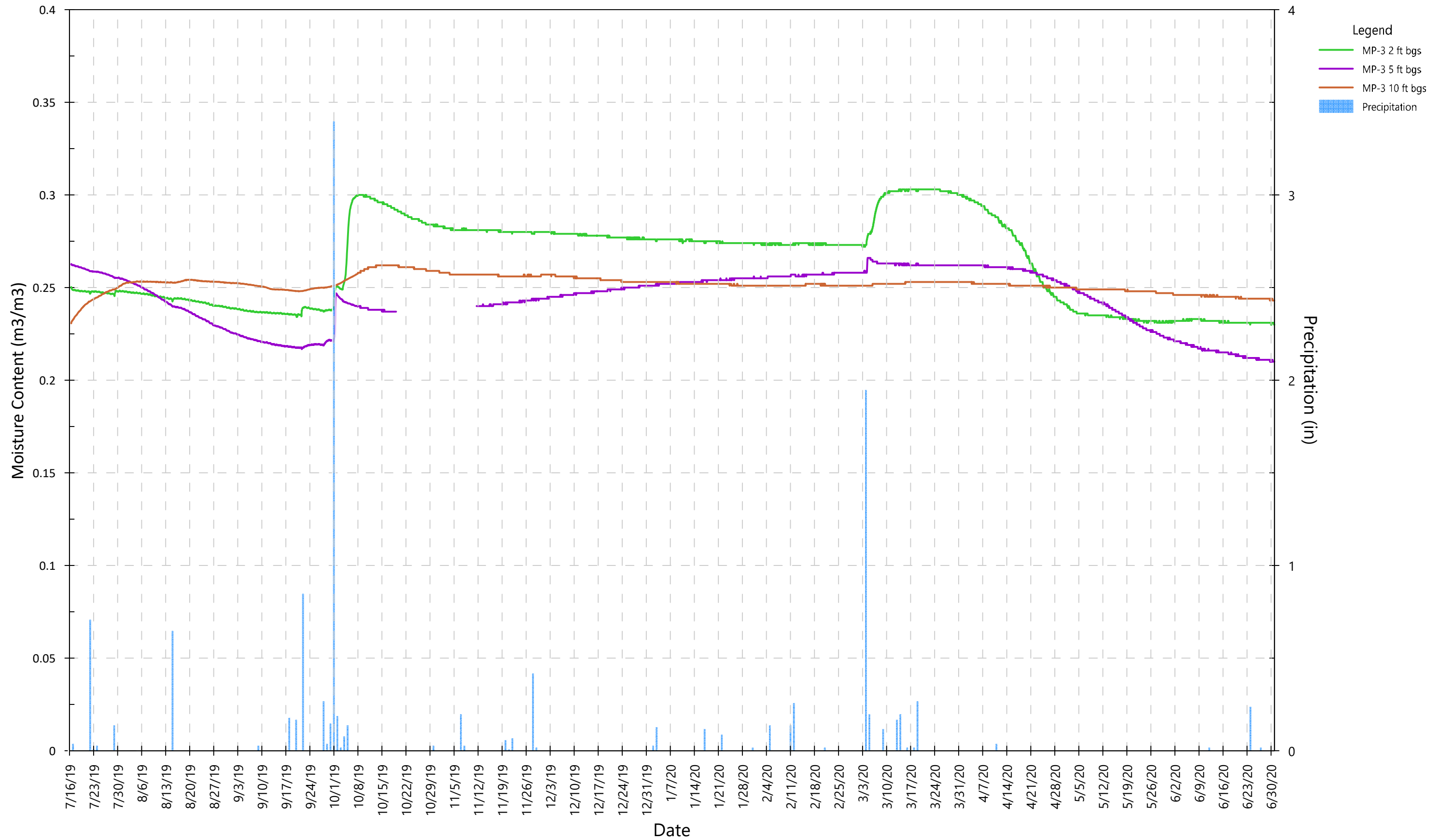
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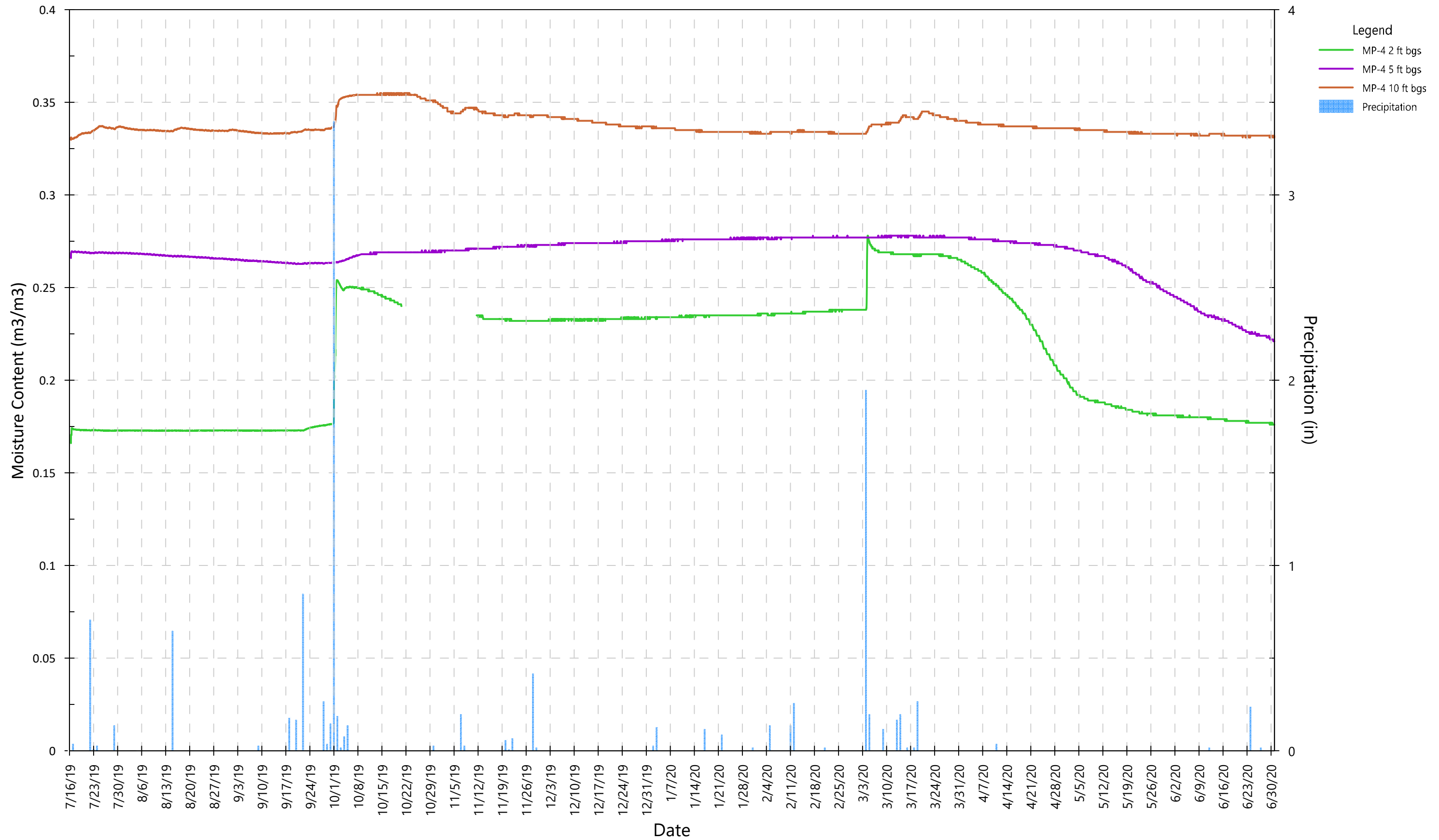
MP-2



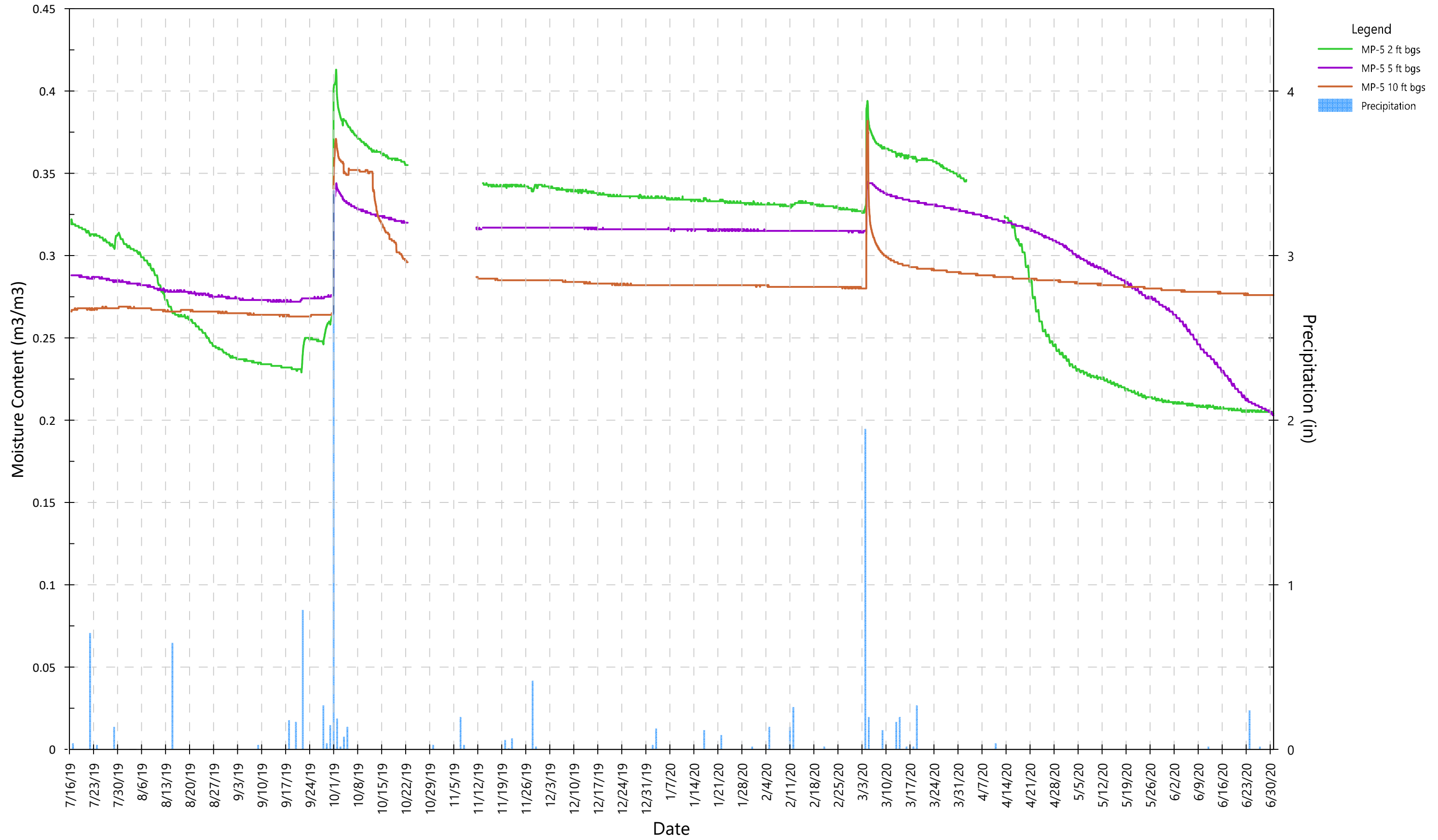
MP-3



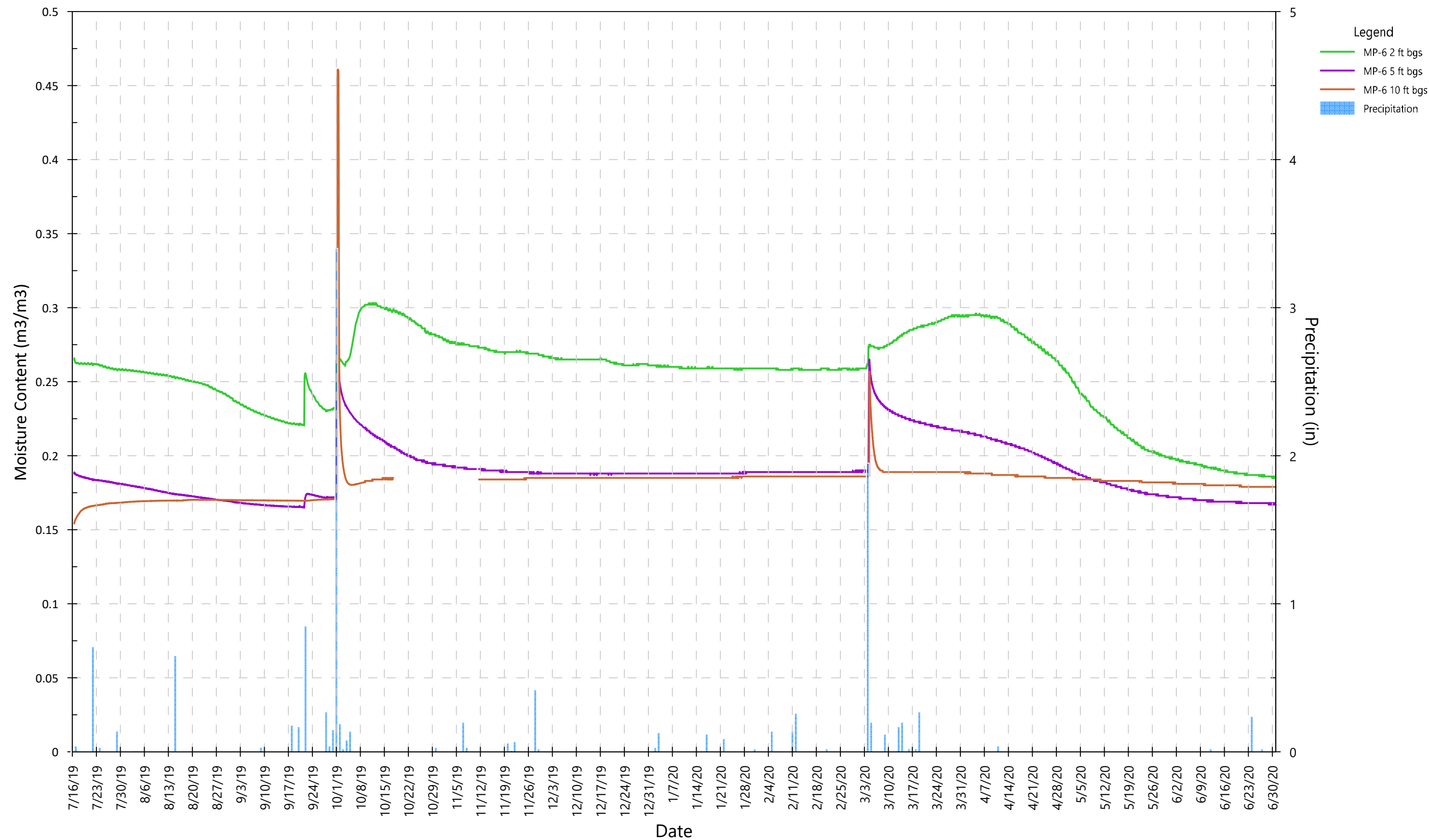
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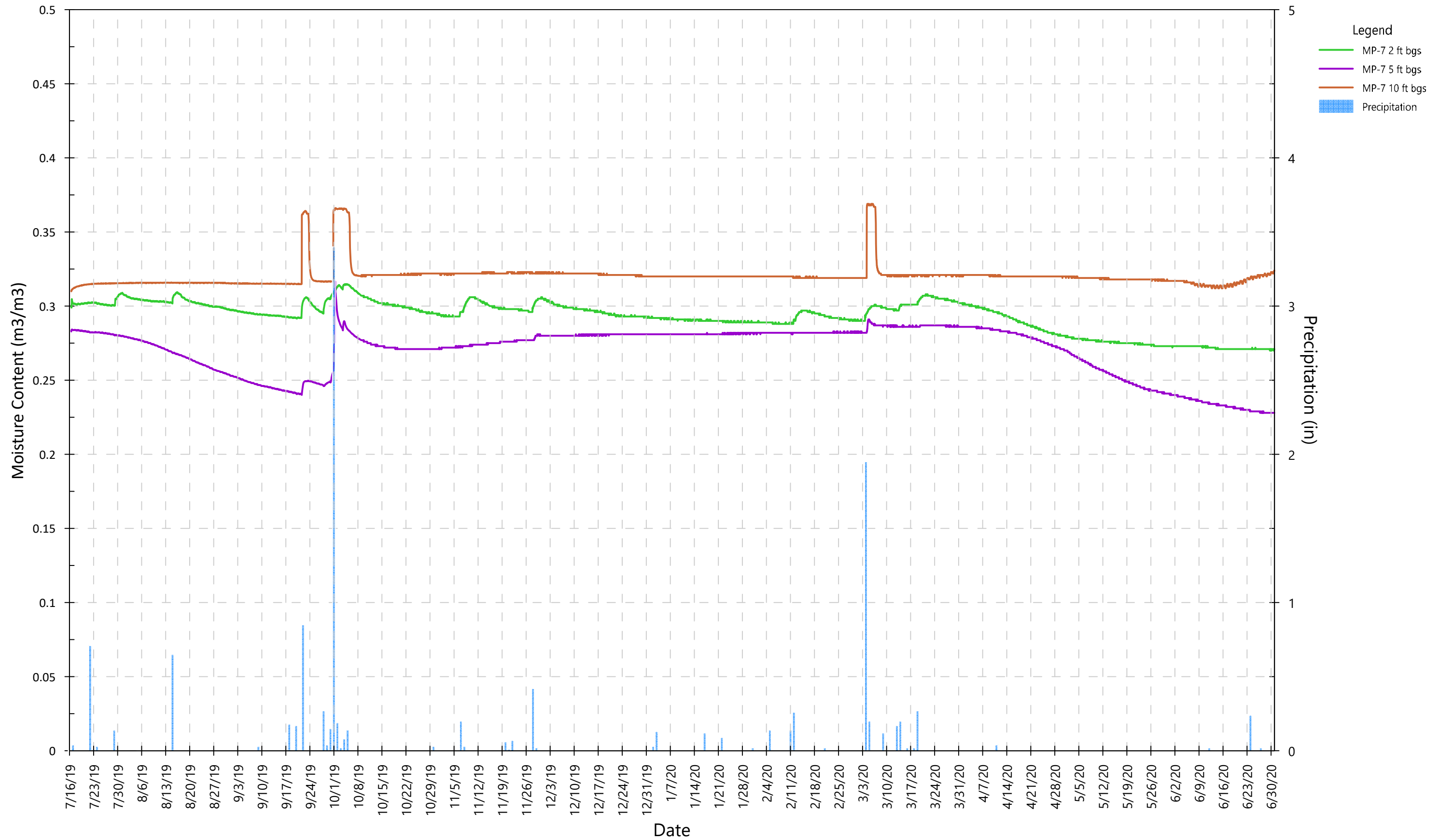
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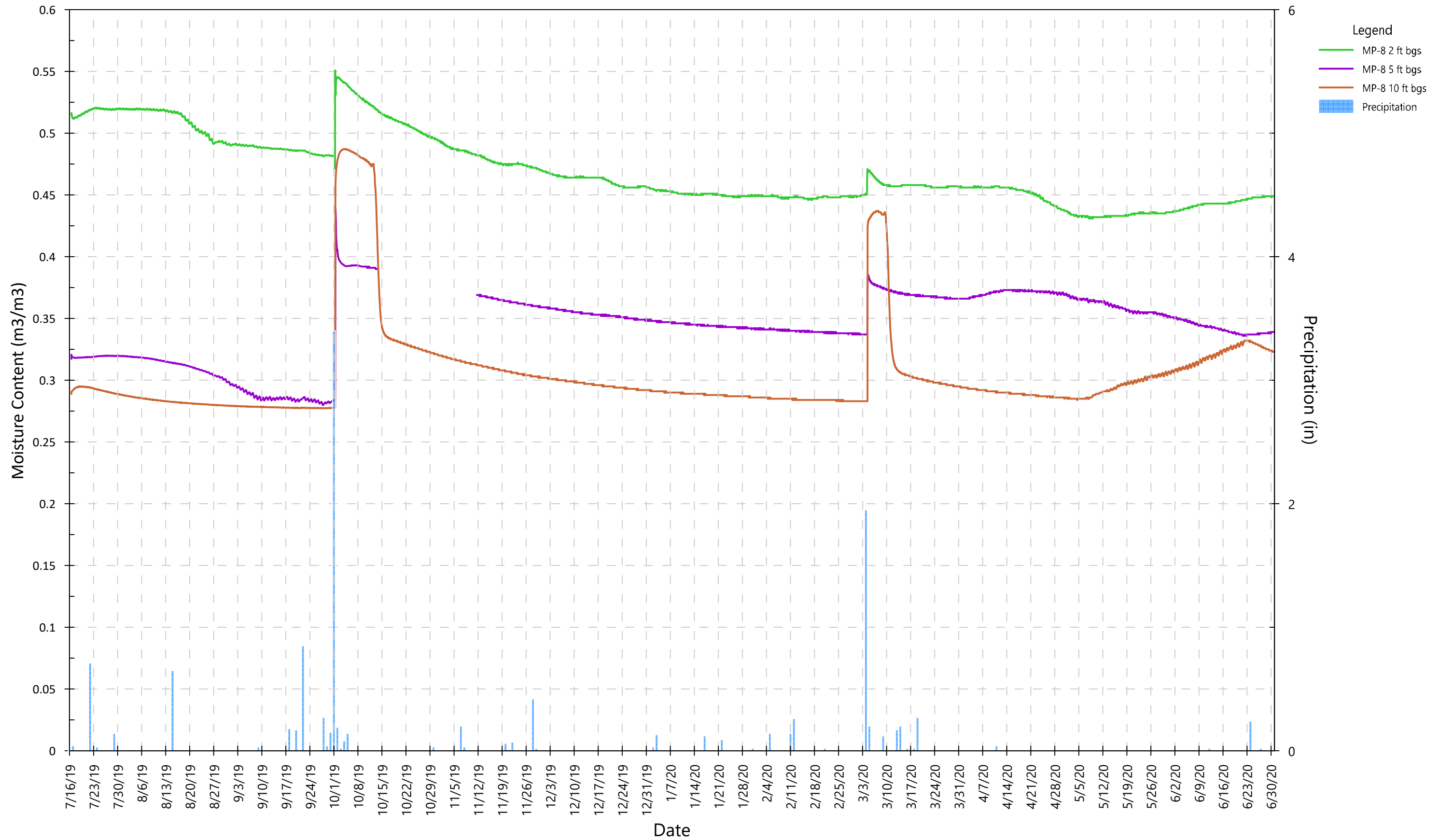
MP-6



MP-7



MP-8



APPENDIX E

UPGRADIENT GROUNDWATER STATISTICAL EVALUATION

Table E-1 Summary of Upgradient Groundwater Data
UG-1, UG-2, UG-3R, UG-4 from 2014 through 2020

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	0.015	0.2	0.03	0.01	0.75	0.05	0.3	0.015	0.05	0.03
Screening Level Source:			EPAMCL	WQCClrr	WQCClrr	WQCCDom	EPAMCL	WQCCDom	WQCCHH	EPAMCL	WQCClrr	WQCClrr	EPAMCL2	EPAMCL	EPAMCL2	WQCCHH
Location	Sample Type	Date														
UG-1	N	7/30/2014	0.0015	0.46 J	<0.00026	0.2	0.00043 J	0.017	0.017	0.0014	0.51	<0.00026	<0.05	<0.00024	0.011	0.018
UG-1	N	8/20/2014	0.0013	0.44	<0.00026	0.074	0.00048 J	0.0066	0.018	0.0012	0.42	<0.00026	<0.05	<0.00024	0.0032	0.018
UG-1	N	9/9/2014	0.0013	--	--	0.079	<0.00024	0.0012 J	--	0.0012	0.44	<0.00026	<0.05	<0.00024	0.00036 J	0.017 J
UG-1	N	10/27/2014	0.0012 J	0.5	<0.00026	<0.05	<0.00024	0.00057 J	0.021	0.0012 J	0.49	<0.00026	<0.05	<0.00024	0.00028 J	0.022
UG-1	N	11/13/2014	0.0013 J	--	--	0.06 J	0.0016 J	0.0016 J	--	0.0012 J	0.47	<0.00026	<0.05	<0.00024	<0.00025	0.022
UG-1	N	12/17/2014	0.0015 J	0.64	<0.00026	0.059 J	0.00083 J	0.0005 J	0.025	0.0015 J	0.56	<0.00026	0.03 J	<0.00024	0.00028 J	0.022
UG-1	N	1/6/2015	0.0012 J	0.65	<0.00026	0.023 J	0.00027 J	0.0014 J	0.023	0.0012 J	0.55	<0.00026	0.045 J	<0.00024	0.00028 J	0.022
UG-1	N	2/3/2015	0.0013 UB	--	--	0.049 UB	<0.000240	0.00087 UB	--	0.002 UB	0.48 UB	<0.000260	<0.0150	<0.000240	0.000327 J	0.0233
UG-1	N	3/3/2015	0.00195 J	--	--	0.0788 J	0.000269 J	0.001 J	--	0.00193 J	0.519	<0.000260	<0.0150	<0.000240	<0.000250	0.0231
UG-1	N	4/8/2015	0.00126 J	--	--	0.0404 J	<0.000240	0.0005 UB	--	0.00135 J	0.58 UB	<0.000260	0.052 UB	<0.000240	0.0011 UB	0.0227
UG-1	N	5/5/2015	0.00139 J	--	--	0.0355 J	<0.000240	0.000637 J	--	0.00125 J	0.456	<0.000260	<0.0150	<0.000240	0.000491 J	0.024
UG-1	N	6/3/2015	0.00128 J	--	--	0.0429 J	<0.000240	0.000664 J	--	0.00112 J	0.485	<0.000260	<0.0150	<0.000240	<0.000250	0.0232
UG-1	N	4/27/2016	<0.00125	0.574	<0.00130	<0.0750	<0.00120	<0.00125	0.0252 J	<0.00125	0.525 O1V	<0.00130	<0.0750	<0.00120	<0.00125	0.0264 J
UG-1	N	4/25/2017	0.00106 J	0.548	<0.000260	0.0561 J	<0.000240	0.00689	0.0262	0.00113 J	0.502	<0.000260	<0.0150	<0.000240	0.00476 J	0.0273
UG-1	N	4/2/2018	0.00177 JB	0.668	0.0013 J	<0.0150	<0.000240	0.000486 J	0.0263	0.00131 J	0.756	0.00125 J	<0.0150	<0.000240	0.000405 J	0.0273
UG-1	N	4/1/2019	0.00158 J	0.727	0.000332 J	<0.0150	<0.000240	0.00109 J	0.0353	0.00123 J	0.794	0.000404 J	<0.0150	0.000301 JB	0.00124 J	0.0324
UG-1	N	6/15/2020	0.00139 J	0.691	<0.000477	<0.0489	<0.00249	<0.00132	0.0385	0.00113 J	0.718	<0.000477	<0.0489	<0.00249	0.00154 J	0.039
UG-2	N	7/30/2014	0.002	0.38 J	0.0034	0.093	<0.00024	0.18	0.025	0.0018	0.34	0.0026	<0.05	<0.00024	0.17	0.023
UG-2	N	8/20/2014	0.0021	0.32	0.0031	0.31	0.00057 J	0.17	0.016	0.0015	0.3	0.0012	0.082	<0.00024	0.16	0.014
UG-2	N	9/9/2014	0.0021	--	--	0.76	0.0008 J	0.12	--	0.0017	0.3	0.00077 J	<0.05	<0.0024	0.081	0.013 J
UG-2	N	10/27/2014	0.0021	0.29	0.0012 J	0.051 J	<0.00024	0.14	0.014	0.0019 J	0.28	0.001 J	<0.05	<0.00024	0.13	0.015
UG-2	N	11/12/2014	0.0021	--	--	<0.05	0.00081 J	0.15	--	0.0022	0.29	0.001 J	0.1	<0.00024	0.15	0.014
UG-2	N	12/17/2014	0.0026	0.36	0.001 J	0.048 J	0.00024 J	0.18	0.017	0.0026	0.33	0.00094 J	0.082 J	0.00043 J	0.17	0.015
UG-2	N	1/6/2015	0.0021	0.36	0.00071 J	0.024 J	0.00025 J	0.11	0.014	0.0021	0.36	0.00054 J	0.047 J	<0.00024	0.097	0.014
UG-2	N	2/3/2015	0.0022 UB	--	--	0.017 UB	<0.000240	0.0665	--	0.0029 UB	0.29 UB	0.00046 J	<0.0150	<0.000240	0.0653	0.0139
UG-2	N	3/3/2015	0.00244	--	--	0.0266 J	0.000312 J	0.0496	--	0.00275	0.338	0.000357 J	<0.0150	<0.000240	0.0446	0.0136
UG-2	N	4/8/2015	0.00237	--	--	<0.0150	<0.000240	0.0403	--	0.00256	0.58 UB	0.000343 J	<0.0150 UB	<0.000240 UB	0.0421	0.0134
UG-2	N	5/5/2015	0.0021	--	--	<0.015	<0.00024	0.017	--	0.00211	0.275	<0.000260	0.0239 J	<0.000240	0.0111	0.0139
UG-2	N	6/3/2015	0.00203	--	--	0.0182 J	<0.000240	0.0146	--	<0.000250	0.0341	<0.000260	<0.0150	<0.000240	<0.000250	<0.000330
UG-2	N	4/27/2016	0.00202 J	0.343	<0.00130	<0.0750	<0.00120	0.0147 J	0.0156 J	0.00226 J	0.315	<0.00130	<0.075	<0.00120	0.0142 J	0.0156 J
UG-2	N	4/25/2017	0.00197 J	0.303	<0.000260	0.0172 J	<0.000240	0.0154	0.0153	0.00206	0.265	<0.000260	<0.0150	<0.000240	0.0039 J	0.0155
UG-2	N	4/3/2018	0.00236 B	0.303	<0.000260	0.0153 J	<0.000240	0.00678	0.0131	0.00194 J	0.421	<0.000260	<0.0150	<0.000240	<0.000250	0.0131
UG-2	N	4/1/2019	0.00227	0.299	0.000357 J	0.0286 J	0.00107 JB	0.0129	0.016	0.002	0.28	<0.000260	<0.0150	<0.000240	0.000681 J	0.0147
UG-2	N	6/15/2020	0.00253	0.274	<0.000477	<0.0489	<0.00249	0.00395 J	0.0161 J	0.00241	0.296	<0.000477	<0.0489	<0.00249	0.00441 J	0.0166 J
UG-3R	N	7/30/2014	0.0014	0.33 J	<0.00026	0.1	<0.00024	0.004	0.015	0.0013	0.3	<0.00026	<0.05	<0.00024	0.00034 J	0.015
UG-3R	N	8/20/2014	0.0014	0.25	<0.00026	0.15	<0.00024	0.0052	0.014	0.0012	0.27	<0.00026	<0.05	<0.00024	0.00055 J	0.014
UG-3R	N	9/9/2014	0.0014	--	--	<0.05	<0.00024	0.0011 UB	--	0.0013	0.18 UB	<0.00026	<0.05	<0.0024	0.00076 UB	0.01 J
UG-3R	N	10/27/2014	0.0014 J	0.23	<0.00026	0.096 J	<0.00024	0.0042 J	0.011	0.0014 J	0.21	<0.00026	0.055 J	<0.00024	0.0004 J	0.012
UG-3R	N	11/13/2014	0.0016 J	--	--	0.32	0.0012 J	0.018	--	0.0015 J	0.24	<0.00026	<0.05	<0.00024	0.0095	0.012
UG-3R	N	12/17/2014	0.0017 J	0.26	<0.00026	0.11	0.00028 J	0.0036 J	0.013	0.0017 J	0.26	<0.00026	<0.015	0.0035	0.00077 J	0.011
UG-3R	N	1/6/2015	0.0014 J	0.38	<0.00026	0.044 J	0.00025 J	0.0024 J	0.011	0.0016 J	0.25	<0.00026	0.033 J	<0.00024	0.0015 J	0.011
UG-3R	N	2/3/2015	0.0024 UB	--	--	0.045 UB	0.000319 UB	0.00149 J	--	0.0023 UB	0.24 UB	<0.000260	<0.0150	<0.000240	0.00044 UB	0.0109
UG-3R	N	3/4/2015	0.00155 J	--	--	0.0236 J	<0.000240	0.000896 J	--	0.00211	0.262	<0.000260	0.0214 J	<0.000240	0.000573 J	0.0111
UG-3R	N	4/8/2015	0.00176 J	--	--	<0.0150	<0.000240	0.0012 UB	--	0.00186 J	0.23 UB	<0.000260	0.022 UB	<0.000240 UB	0.00097 UB	0.011
UG-3R	N	5/5/2015	0.0016 J	--	--	0.023 J	<0.00024	0.0012 J	--	0.00163 J	0.243	<0.000260	<0.0150	<0.000240	0.000627 J	0.0112
UG-3R	N	6/3/2015	0.00169 J	--	--	0.0278 J	<0.000240	0.000821 J	--	0.00146 J	0.221	<0.000260	<0.0150	<0.000240	<0.000250	0.0109
UG-3R	N	4/27/2016	0.00182 J	0.295	<0.00130	<0.0750	<0.00120	0.00141 J	0.0122 J	0.00171 J	0.278	<0.00130	<0.075	<0.00120	0.00182 J	0.0126 J
UG-3R	N	4/25/2017	0.00161 J	0.256	0.000465 J	0.0316 J	<0.000240	0.00182 J	0.0129	0.00165 J	0.219	0.000421 J	<0.0150	<0.000240	0.00217	0.0132
UG-3R	N	4/2/2018	0.00202 B	0.47	<0.000260	0.0377 J	<0.000240	0.000713 J	0.0124	0.00161 J	0.597	<0.000260	0.0186 JB	<0.000240	0.000475 J	0.0126
UG-3R	N	4/1/2019	0.00164 J	0.223	<0.000260	<0.0150	<0.000240	0.00132 J	0.016	0.00143 J	0.332	<0.000260	<0.0150	<0.000240	0.00043 J	0.0149
UG-3R	N	6/16/2020	0.00126 J	0.173 J	<0.000477	<0.0489	<0.00249	<0.00132	0.0167 J	0.00132 J	0.184 J	<0.000477	<0.0489	<0.00249	0.00488 J	0.0166 J

Table E-1 Summary of Upgradient Groundwater Data
UG-1, UG-2, UG-3R, UG-4 from 2014 through 2020

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	0.015	0.2	0.03	0.01	0.75	0.05	0.3	0.015	0.05	0.03
Screening Level Source:			EPAMCL	WQCClrr	WQCClrr	WQCCDom	EPAMCL	WQCCDom	WQCCHH	EPAMCL	WQCClrr	WQCClrr	EPAMCL2	EPAMCL	EPAMCL2	WQCCHH
Location	Sample Type	Date														
UG-4	N	9/11/2014	0.0017	--	--	2.9	0.0031 J	0.28	--	0.00055 J	0.73	0.0013	<0.05	<0.0048	0.23	0.026 J
UG-4	N	10/27/2014	0.0025	0.86	0.0033	4.2	0.0056	0.27	0.032	0.00068 J	0.84	0.00026 J	<0.05	<0.00024	0.098	0.032
UG-4	N	11/13/2014	0.001 J	--	--	0.63	0.0017 J	0.12	--	0.00083 J	0.95	0.0003 J	<0.05	<0.00024	0.1	0.035
UG-4	N	12/17/2014	0.00093 J	1.2	<0.00026	0.017 J	<0.00024	0.1	0.039	0.00094 J	1.1	<0.00026	<0.015	0.0012 J	0.091	0.035
UG-4	N	1/6/2015	0.00088 J	1.1	0.00044 J	0.17	0.00065 J	0.081	0.035	0.00083 J	1.2	<0.00026	<0.015	<0.00024	0.07	0.036
UG-4	N	2/3/2015	0.0016 UB	--	--	0.25 UB	0.00042 UB	0.058	--	0.00088 UB	0.966	<0.000260	<0.0150	<0.000240	0.0489	0.0349
UG-4	N	3/3/2015	0.00105 J	--	--	0.447	0.000525 J	0.052	--	0.000893 J	1.13	<0.000260	0.0173 J	0.000341 J	0.043	0.036
UG-4	N	4/7/2015	0.00117 J	--	--	0.283	0.000316 J	0.0283	--	0.00114 J	1.1 V	<0.000260	0.042 UB	<0.000240 UB	0.0223	0.0366
UG-4	N	5/5/2015	0.00104 J	--	--	0.149	0.000272 J	0.019	--	0.001 J	1.04	<0.000260	<0.0150	<0.000240	0.0119	0.0364
UG-4	N	6/2/2015	0.00108 J	--	--	0.259	0.000346 J	0.0139	--	<0.00120	1.15	<0.00130	<0.0750	<0.00120	<0.00120	0.0348 J
UG-4	N	4/27/2016	<0.00125	1.19	<0.00130	<0.0750	<0.00120	0.00752 J	0.0364 J	0.00144 J	1.21	<0.00130	<0.0750	<0.00120	<0.00125	0.0365 J
UG-4	N	4/25/2017	0.00111 J	1.06	<0.000260	0.0249 J	<0.000240	0.00935	0.0361	0.00103 J	0.958 O1V	<0.000260	<0.0150	<0.000240	0.0062	0.0373
UG-4	N	4/2/2018	0.00177 JB	1.07	<0.000260	0.033 J	<0.000240	0.00117 J	0.0324	0.00109 J	1.17	<0.000260	<0.0150	<0.000240	<0.000250	0.0335
UG-4	N	4/1/2019	0.00128 J	1.07	<0.000260	0.0596 J	<0.000240	0.00792	0.0379	0.000962 J	1.14	<0.000260	<0.0150	<0.000240	0.000298 J	0.0361
UG-4	N	6/15/2020	0.00105 J	1.02	<0.000477	<0.0489	<0.00249	0.00403 J	0.0357	0.00112 J	1.07	<0.000477	<0.0489	<0.00249	0.00149 J	0.0359

Table E-1 Summary of Upgradient Groundwater Data
UG-1, UG-2, UG-3R, UG-4 from 2014 through 2020

Analyte Group:			General Chemistry								
Analyte:			Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	TDS
Units:			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CGWSL			---	250	1.6	---	10	---	---	250	500
Screening Level Source:			---	WQCCDom	WQCCHH	---	WQCCHH	---	---	EPAMCL2	EPAMCL2
Location	Sample Type	Date									
UG-1	N	7/30/2014	520	77	0.61		6.629	1.9	88	1100	2800
UG-1	N	8/20/2014	480	100	0.81		8.3	1.5	86	1600	2500
UG-1	N	9/9/2014	440	99	0.77		7	1.3	78	1700	2900
UG-1	N	10/27/2014	520	88	0.65		8.9 T8	1.2	90	1900	3000
UG-1	N	11/13/2014	540	91	0.82		13	1.3	96	1800	3400
UG-1	N	12/17/2014	490	95	0.71		13	1.4	93	2100	3100
UG-1	N	1/6/2015	500	96	0.68		14	1.2	88	1900	3000
UG-1	N	2/3/2015	492 J	98.1	0.851		13.6	1.29	89.7	1640	2830
UG-1	N	3/3/2015	474	104	0.94		14	1.2	92.7	1800	3110
UG-1	N	4/8/2015	459	93 UB	0.648		13	1.09	93.2	1500	3260
UG-1	N	5/5/2015	510	104	0.805		20.6	1.19	91.5	1900	3210
UG-1	N	6/3/2015	532	634	22.6		15.7	1.2	101	1500	3520
UG-1	N	4/27/2016	512	102	0.926		17	1.07 J	99.7	1920	4050
UG-1	N	4/25/2017	471	178	0.928		15	1.14	99.1	1830	3390
UG-1	N	4/2/2018	434	107	0.751		6.73	2.12	98.3	1670	2600
UG-1	N	4/1/2019	525	98.3	0.623		10.1	1.29	105	1800	3150
UG-1	N	6/15/2020	503	97.3	0.784		10.6	1.16 J	84	2060	3550 B
UG-2	N	7/30/2014	380	73	1.6		3.257	1.8	90	1200	2200
UG-2	N	8/20/2014	460	61	1.6		4.7	1.6	76	1000	2100
UG-2	N	9/9/2014	310	55	1.5		4.3	1.8	69	1100	2000
UG-2	N	10/27/2014	400	81	1.4		3.45 T8	2.2	96	1200	2200
UG-2	N	11/12/2014	420	89	1.6		3.3	1.9	95	1100	2100
UG-2	N	12/17/2014	390	100	1.5		4.2	2.1	100	1400	2200
UG-2	N	1/6/2015	390	87	1.4		6.8	1.7	93	1300	2100
UG-2	N	2/3/2015	360 J	88.6	1.7		5.07	1.79	92.4	924	1930
UG-2	N	3/3/2015	343	77.7	1.71		4.77	1.7	93	1100	2390
UG-2	N	4/8/2015	331	72.7	1.33		4.67	1.61	88.5	970 UB	2070
UG-2	N	5/5/2015	341	69.9	1.6		4.6	1.75	83.9	1130	1980
UG-2	N	6/3/2015	0.873 J	689	15.7		4.75	<0.0370	0.305 J	1050	2220
UG-2	N	4/27/2016	402	86.5	1.75		5.46	2.04 J	103	1210	2240
UG-2	N	4/25/2017	342	78.9	1.67		16.3	1.6	94	1060	2270
UG-2	N	4/3/2018	321	72.5	1.62		14.1	1.33	85.4	1050	1810
UG-2	N	4/1/2019	357	61.3	1.32		7.7 J6	1.58	90.6	1020	2040 Q
UG-2	N	6/15/2020	342	75.9	1.52		9.75	1.41 J	85.7	1190	2150 B
UG-3R	N	7/30/2014	460	44	0.66		1	1.8	47	1400	2200
UG-3R	N	8/20/2014	430	36	0.66		0.96	1.9	41	1200	2100
UG-3R	N	9/9/2014	390	24	0.64		0.55	1.8	46	1500	2400
UG-3R	N	10/27/2014	380	24	0.59		0.55 T8	1.7	48	1300	2100
UG-3R	N	11/13/2014	440	25	0.66		0.76	1.9	64	1300	2400
UG-3R	N	12/17/2014	400	24	0.59		0.87	1.9	58	1500	2100
UG-3R	N	1/6/2015	810	24	0.56		1	1.6	60	1800	2200
UG-3R	N	2/3/2015	400 J	27.2	0.661		1.03	1.67	62.1	1280	2030
UG-3R	N	3/4/2015	358	25.1	0.725		0.969	1.63	56.1	1250	2060
UG-3R	N	4/8/2015	373	24.9	0.54		1.16	1.63	58.1	1170	2120
UG-3R	N	5/5/2015	403	28.1	0.688		1.11	1.68	59.9	1500	2130
UG-3R	N	6/3/2015	421	662	17.4		1.12	1.71	70.3	1310	2540
UG-3R	N	4/27/2016	440	47.7	0.69		1.73	1.86 J	75.8	1350	2340
UG-3R	N	4/25/2017	393	61.1	0.707		2.6	1.74	70.7	1310	2140
UG-3R	N	4/2/2018	418	40.8	0.599		1.68	1.67	73.6	1470	2190
UG-3R	N	4/1/2019	479	36.3	0.502		0.905	1.99	37.1	1390	2440
UG-3R	N	6/16/2020	440	39.6	0.582		1.93	1.93 J	30.1	1560	2430

Table E-1 Summary of Upgradient Groundwater Data
UG-1, UG-2, UG-3R, UG-4 from 2014 through 2020

Analyte Group:			General Chemistry								
Analyte:			Calcium	Chloride	Fluoride	Magnesium	Nitrate/Nitrite	Potassium	Sodium	Sulfate	TDS
Units:			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CGWSL			---	250	1.6	---	10	---	---	250	500
Screening Level Source:			---	WQCCDom	WQCCHH	---	WQCCHH	---	---	EPAMCL2	EPAMCL2
Location	Sample Type	Date									
UG-4	N	9/11/2014	610	39	0.59		<0.023	3.4	190	2900	4000
UG-4	N	10/27/2014	610	48	0.54		<0.023 T8	3.3	250	2800	3900
UG-4	N	11/13/2014	620	49	0.66		0.58	3.3	250	2500	4400
UG-4	N	12/17/2014	590	51	0.56		0.51	3	240	<0.077	4200
UG-4	N	1/6/2015	650	50	0.5		0.46	2.6	250	3400	4000
UG-4	N	2/3/2015	582 J	50	0.641		0.43 UB	2.59	230	2490	3710
UG-4	N	3/3/2015	561	52.3	0.742		0.46	2.65	251	2660	6310
UG-4	N	4/7/2015	562 V	49.3	0.524		0.39 UBJ	2.43	249 O1V	2880	4390
UG-4	N	5/5/2015	600	47.4	0.674		0.795 J	2.46	240	2860	4050
UG-4	N	6/2/2015	599	704	20.2		0.377	1.96 J	264	2170	4700
UG-4	N	4/27/2016	590	49.2	0.668		0.407	1.99 J	224	2480	4140
UG-4	N	4/25/2017	594 V	154	0.666		0.547 J	1.87	202 V	2750	4350
UG-4	N	4/2/2018	620	125	0.574		0.515	1.77	201	2680	4030
UG-4	N	4/1/2019	694	133	0.544		0.418	1.96	190	2420	4210
UG-4	N	6/15/2020	622	108	0.605		0.326	1.78 J	168	2810	4210 B

Obvious outlier (lab error) - Arcadis report

ProUCL determined value to be a statistical outlier - 2020

UB flagged during data validation, lab reported value used in statistical evaluatoin - Arcadis report

	A	B	C	D	E	F	G	H	I	J	K	L
1				Background Statistics for Data Sets with Non-Detects								
2	User Selected Options											
3	Date/Time of Computation			ProUCL 5.19/16/2020 9:57:38 AM								
4	From File			Inorganic data 2013-2020-UG only - 09162020_e.xls								
5	Full Precision			OFF								
6	Confidence Coefficient			95%								
7	Coverage			95%								
8	Different or Future K Observations			1								
9	Number of Bootstrap Operations			2000								
10												
11	Arsenic-Dis											
12												
13	General Statistics											
14	Total Number of Observations				66	Number of Missing Observations				0		
15	Number of Distinct Observations				49							
16	Number of Detects				63	Number of Non-Detects				3		
17	Number of Distinct Detects				48	Number of Distinct Non-Detects				3		
18	Minimum Detect				5.5000E-4	Minimum Non-Detect				2.5000E-4		
19	Maximum Detect				0.0029	Maximum Non-Detect				0.00125		
20	Variance Detected				2.7773E-7	Percent Non-Detects				4.545%		
21	Mean Detected				0.00153	SD Detected				5.2700E-4		
22	Mean of Detected Logged Data				-6.539	SD of Detected Logged Data				0.349		
23												
24	Critical Values for Background Threshold Values (BTVs)											
25	Tolerance Factor K (For UTL)				1.997	d2max (for USL)				3.062		
26												
27	Normal GOF Test on Detects Only											
28	Shapiro Wilk Test Statistic				0.955	Normal GOF Test on Detected Observations Only						
29	5% Shapiro Wilk P Value				0.0508	Detected Data appear Normal at 5% Significance Level						
30	Lilliefors Test Statistic				0.113	Lilliefors GOF Test						
31	5% Lilliefors Critical Value				0.111	Data Not Normal at 5% Significance Level						
32	Detected Data appear Approximate Normal at 5% Significance Level											
33												
34	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
35	KM Mean				0.0015	KM SD				5.4434E-4		
36	95% UTL95% Coverage				0.00258	95% KM UPL (t)				0.00241		
37	90% KM Percentile (z)				0.00219	95% KM Percentile (z)				0.00239		
38	99% KM Percentile (z)				0.00276	95% KM USL				0.00316		
39												
40	DL/2 Substitution Background Statistics Assuming Normal Distribution											
41	Mean				0.00148	SD				5.6486E-4		
42	95% UTL95% Coverage				0.00261	95% UPL (t)				0.00243		
43	90% Percentile (z)				0.00221	95% Percentile (z)				0.00241		
44	99% Percentile (z)				0.0028	95% USL				0.00321		
45	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
46												
47	Gamma GOF Tests on Detected Observations Only											
48	A-D Test Statistic				0.302	Anderson-Darling GOF Test						
49	5% A-D Critical Value				0.752	Detected data appear Gamma Distributed at 5% Significance Level						
50	K-S Test Statistic				0.0687	Kolmogorov-Smirnov GOF						
51	5% K-S Critical Value				0.112	Detected data appear Gamma Distributed at 5% Significance Level						
52	Detected data appear Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
53												
54	Gamma Statistics on Detected Data Only											
55	k hat (MLE)				8.702	k star (bias corrected MLE)				8.298		
56	Theta hat (MLE)				1.7622E-4	Theta star (bias corrected MLE)				1.8479E-4		
57	nu hat (MLE)				1096	nu star (bias corrected)				1046		
58	MLE Mean (bias corrected)				0.00153							
59	MLE Sd (bias corrected)				5.3232E-4	95% Percentile of Chisquare (2kstar)				27.07		
60												
61	Gamma ROS Statistics using Imputed Non-Detects											
62	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
63	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
64	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
65	This is especially true when the sample size is small.											
66	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
67	Minimum				5.5000E-4	Mean				0.00192		
68	Maximum				0.01	Median				0.00145		
69	SD				0.00185	CV				0.964		
70	k hat (MLE)				2.725	k star (bias corrected MLE)				2.611		
71	Theta hat (MLE)				7.0402E-4	Theta star (bias corrected MLE)				7.3469E-4		
72	nu hat (MLE)				359.7	nu star (bias corrected)				344.6		
73	MLE Mean (bias corrected)				0.00192	MLE Sd (bias corrected)				0.00119		
74	95% Percentile of Chisquare (2kstar)				11.41	90% Percentile				0.00351		
75	95% Percentile				0.00419	99% Percentile				0.00568		
76	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
77	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
78					WH	HW					WH	HW
79	95% Approx. Gamma UTL with 95% Coverage				0.00475	0.00468	95% Approx. Gamma UPL				0.00412	0.00404
80	95% Gamma USL				0.00738	0.00745						
81												
82	Estimates of Gamma Parameters using KM Estimates											
83	Mean (KM)				0.0015	SD (KM)				5.4434E-4		
84	Variance (KM)				2.9630E-7	SE of Mean (KM)				6.7750E-5		
85	k hat (KM)				7.558	k star (KM)				7.225		
86	nu hat (KM)				997.7	nu star (KM)				953.6		
87	theta hat (KM)				1.9800E-4	theta star (KM)				2.0714E-4		
88	80% gamma percentile (KM)				0.00193	90% gamma percentile (KM)				0.00224		
89	95% gamma percentile (KM)				0.00251	99% gamma percentile (KM)				0.00309		
90												
91	The following statistics are computed using gamma distribution and KM estimates											
92	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
93					WH	HW					WH	HW
94	95% Approx. Gamma UTL with 95% Coverage				0.00284	0.0029	95% Approx. Gamma UPL				0.00257	0.00261
95	95% KM Gamma Percentile				0.00254	0.00258	95% Gamma USL				0.00387	0.00405
96												
97	Lognormal GOF Test on Detected Observations Only											
98	Shapiro Wilk Approximate Test Statistic				0.982	Shapiro Wilk GOF Test						
99	5% Shapiro Wilk P Value				0.754	Detected Data appear Lognormal at 5% Significance Level						
100	Lilliefors Test Statistic				0.0576	Lilliefors GOF Test						
101	5% Lilliefors Critical Value				0.111	Detected Data appear Lognormal at 5% Significance Level						
102	Detected Data appear Lognormal at 5% Significance Level											
103												
104	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											

	A	B	C	D	E	F	G	H	I	J	K	L
105	Mean in Original Scale					0.0015	Mean in Log Scale					-6.565
106	SD in Original Scale					5.3623E-4	SD in Log Scale					0.366
107	95% UTL95% Coverage					0.00292	95% BCA UTL95% Coverage					0.00271
108	95% Bootstrap (%) UTL95% Coverage					0.00275	95% UPL (t)					0.00261
109	90% Percentile (z)					0.00225	95% Percentile (z)					0.00257
110	99% Percentile (z)					0.0033	95% USL					0.00432
111												
112	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
113	KM Mean of Logged Data					-6.579	95% KM UTL (Lognormal)95% Coverage					0.00316
114	KM SD of Logged Data					0.412	95% KM UPL (Lognormal)					0.00278
115	95% KM Percentile Lognormal (z)					0.00274	95% KM USL (Lognormal)					0.00491
116												
117	Background DL/2 Statistics Assuming Lognormal Distribution											
118	Mean in Original Scale					0.00148	Mean in Log Scale					-6.602
119	SD in Original Scale					5.6486E-4	SD in Log Scale					0.477
120	95% UTL95% Coverage					0.00352	95% UPL (t)					0.00303
121	90% Percentile (z)					0.0025	95% Percentile (z)					0.00297
122	99% Percentile (z)					0.00412	95% USL					0.00585
123	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
124												
125	Nonparametric Distribution Free Background Statistics											
126	Data appear to follow a Discernible Distribution at 5% Significance Level											
127												
128	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
129	Order of Statistic, r					65	95% UTL with95% Coverage					0.00275
130	Approx, f used to compute achieved CC					1.711	Approximate Actual Confidence Coefficient achieved by UTL					0.848
131	Approximate Sample Size needed to achieve specified CC					93	95% UPL					0.00259
132	95% USL					0.0029	95% KM Chebyshev UPL					0.00389
133												
134	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
135	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
136	and consists of observations collected from clean unimpacted locations.											
137	The use of USL tends to provide a balance between false positives and false negatives provided the data											
138	represents a background data set and when many onsite observations need to be compared with the BTV.											
139												
140	Boron-Dis											
141												
142	General Statistics											
143	Total Number of Observations					66	Number of Distinct Observations					59
144	Minimum					0.0341	First Quartile					0.279
145	Second Largest					1.2	Median					0.431
146	Maximum					1.21	Third Quartile					0.727
147	Mean					0.528	SD					0.324
148	Coefficient of Variation					0.615	Skewness					0.882
149	Mean of logged Data					-0.83	SD of logged Data					0.65
150												
151	Critical Values for Background Threshold Values (BTVs)											
152	Tolerance Factor K (For UTL)					1.997	d2max (for USL)					3.062
153												
154	Normal GOF Test											
155	Shapiro Wilk Test Statistic					0.849	Normal GOF Test					
156	5% Shapiro Wilk P Value					5.9090E-9	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
157	Lilliefors Test Statistic					0.173	Lilliefors GOF Test						
158	5% Lilliefors Critical Value					0.109	Data Not Normal at 5% Significance Level						
159	Data Not Normal at 5% Significance Level												
160													
161	Background Statistics Assuming Normal Distribution												
162	95% UTL with 95% Coverage					1.175	90% Percentile (z)					0.943	
163	95% UPL (t)					1.073	95% Percentile (z)					1.061	
164	95% USL					1.52	99% Percentile (z)					1.282	
165													
166	Gamma GOF Test												
167	A-D Test Statistic					1.665	Anderson-Darling Gamma GOF Test						
168	5% A-D Critical Value					0.759	Data Not Gamma Distributed at 5% Significance Level						
169	K-S Test Statistic					0.138	Kolmogorov-Smirnov Gamma GOF Test						
170	5% K-S Critical Value					0.111	Data Not Gamma Distributed at 5% Significance Level						
171	Data Not Gamma Distributed at 5% Significance Level												
172													
173	Gamma Statistics												
174	k hat (MLE)					2.787	k star (bias corrected MLE)					2.67	
175	Theta hat (MLE)					0.189	Theta star (bias corrected MLE)					0.198	
176	nu hat (MLE)					367.9	nu star (bias corrected)					352.5	
177	MLE Mean (bias corrected)					0.528	MLE Sd (bias corrected)					0.323	
178													
179	Background Statistics Assuming Gamma Distribution												
180	95% Wilson Hilferty (WH) Approx. Gamma UPL					1.151	90% Percentile					0.96	
181	95% Hawkins Wixley (HW) Approx. Gamma UPL					1.175	95% Percentile					1.145	
182	95% WH Approx. Gamma UTL with 95% Coverage					1.328	99% Percentile					1.549	
183	95% HW Approx. Gamma UTL with 95% Coverage					1.371							
184	95% WH USL					2.057	95% HW USL					2.217	
185													
186	Lognormal GOF Test												
187	Shapiro Wilk Test Statistic					0.921	Shapiro Wilk Lognormal GOF Test						
188	5% Shapiro Wilk P Value					2.9148E-4	Data Not Lognormal at 5% Significance Level						
189	Lilliefors Test Statistic					0.104	Lilliefors Lognormal GOF Test						
190	5% Lilliefors Critical Value					0.109	Data appear Lognormal at 5% Significance Level						
191	Data appear Approximate Lognormal at 5% Significance Level												
192													
193	Background Statistics assuming Lognormal Distribution												
194	95% UTL with 95% Coverage					1.598	90% Percentile (z)					1.004	
195	95% UPL (t)					1.302	95% Percentile (z)					1.271	
196	95% USL					3.196	99% Percentile (z)					1.98	
197													
198	Nonparametric Distribution Free Background Statistics												
199	Data appear Approximate Lognormal at 5% Significance Level												
200													
201	Nonparametric Upper Limits for Background Threshold Values												
202	Order of Statistic, r					65	95% UTL with 95% Coverage					1.2	
203	Approx, f used to compute achieved CC					1.711	Approximate Actual Confidence Coefficient achieved by UTL					0.848	
204							Approximate Sample Size needed to achieve specified CC					93	
205	95% Percentile Bootstrap UTL with 95% Coverage					1.2	95% BCA Bootstrap UTL with 95% Coverage					1.195	
206	95% UPL					1.163	90% Percentile					1.1	
207	90% Chebyshev UPL					1.508	95% Percentile					1.148	
208	95% Chebyshev UPL					1.952	99% Percentile					1.204	

	A	B	C	D	E	F	G	H	I	J	K	L	
209	95% USL					1.21							
210													
211	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.												
212	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers												
213	and consists of observations collected from clean unimpacted locations.												
214	The use of USL tends to provide a balance between false positives and false negatives provided the data												
215	represents a background data set and when many onsite observations need to be compared with the BTV.												
216													
217	Manganese-Dis												
218													
219	General Statistics												
220	Total Number of Observations					65	Number of Missing Observations					1	
221	Number of Distinct Observations					55							
222	Number of Detects					55	Number of Non-Detects					10	
223	Number of Distinct Detects					52	Number of Distinct Non-Detects					3	
224	Minimum Detect					2.8000E-4	Minimum Non-Detect					2.5000E-4	
225	Maximum Detect					0.17	Maximum Non-Detect					0.00125	
226	Variance Detected					0.00247	Percent Non-Detects					15.38%	
227	Mean Detected					0.0307	SD Detected					0.0497	
228	Mean of Detected Logged Data					-5.4	SD of Detected Logged Data					2.228	
229													
230	Critical Values for Background Threshold Values (BTVs)												
231	Tolerance Factor K (For UTL)					2	d2max (for USL)					3.057	
232													
233	Normal GOF Test on Detects Only												
234	Shapiro Wilk Test Statistic					0.659	Normal GOF Test on Detected Observations Only						
235	5% Shapiro Wilk P Value					8.882E-16	Data Not Normal at 5% Significance Level						
236	Lilliefors Test Statistic					0.321	Lilliefors GOF Test						
237	5% Lilliefors Critical Value					0.119	Data Not Normal at 5% Significance Level						
238	Data Not Normal at 5% Significance Level												
239													
240	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution												
241	KM Mean					0.026	KM SD					0.0466	
242	95% UTL95% Coverage					0.119	95% KM UPL (t)					0.104	
243	90% KM Percentile (z)					0.0857	95% KM Percentile (z)					0.103	
244	99% KM Percentile (z)					0.134	95% KM USL					0.168	
245													
246	DL/2 Substitution Background Statistics Assuming Normal Distribution												
247	Mean					0.026	SD					0.047	
248	95% UTL95% Coverage					0.12	95% UPL (t)					0.105	
249	90% Percentile (z)					0.0862	95% Percentile (z)					0.103	
250	99% Percentile (z)					0.135	95% USL					0.17	
251	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons												
252													
253	Gamma GOF Tests on Detected Observations Only												
254	A-D Test Statistic					3.03	Anderson-Darling GOF Test						
255	5% A-D Critical Value					0.851	Data Not Gamma Distributed at 5% Significance Level						
256	K-S Test Statistic					0.186	Kolmogorov-Smimov GOF						
257	5% K-S Critical Value					0.129	Data Not Gamma Distributed at 5% Significance Level						
258	Data Not Gamma Distributed at 5% Significance Level												
259													
260	Gamma Statistics on Detected Data Only												

	A	B	C	D	E	F	G	H	I	J	K	L
261	k hat (MLE)					0.351	k star (bias corrected MLE)					0.344
262	Theta hat (MLE)					0.0875	Theta star (bias corrected MLE)					0.0893
263	nu hat (MLE)					38.58	nu star (bias corrected)					37.81
264	MLE Mean (bias corrected)					0.0307						
265	MLE Sd (bias corrected)					0.0524	95% Percentile of Chisquare (2kstar)					3.008
266												
267	Gamma ROS Statistics using Imputed Non-Detects											
268	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
269	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
270	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
271	This is especially true when the sample size is small.											
272	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
273	Minimum					2.8000E-4	Mean					0.0275
274	Maximum					0.17	Median					0.0062
275	SD					0.0463	CV					1.681
276	k hat (MLE)					0.392	k star (bias corrected MLE)					0.384
277	Theta hat (MLE)					0.0702	Theta star (bias corrected MLE)					0.0717
278	nu hat (MLE)					50.95	nu star (bias corrected)					49.93
279	MLE Mean (bias corrected)					0.0275	MLE Sd (bias corrected)					0.0444
280	95% Percentile of Chisquare (2kstar)					3.236	90% Percentile					0.0783
281	95% Percentile					0.116	99% Percentile					0.211
282	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
283	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
284				WH	HW						WH	HW
285	95% Approx. Gamma UTL with 95% Coverage			0.137	0.151	95% Approx. Gamma UPL					0.103	0.107
286	95% Gamma USL			0.306	0.392							
287												
288	Estimates of Gamma Parameters using KM Estimates											
289	Mean (KM)					0.026	SD (KM)					0.0466
290	Variance (KM)					0.00217	SE of Mean (KM)					0.00583
291	k hat (KM)					0.312	k star (KM)					0.308
292	nu hat (KM)					40.58	nu star (KM)					40.04
293	theta hat (KM)					0.0834	theta star (KM)					0.0845
294	80% gamma percentile (KM)					0.0402	90% gamma percentile (KM)					0.0765
295	95% gamma percentile (KM)					0.118	99% gamma percentile (KM)					0.226
296												
297	The following statistics are computed using gamma distribution and KM estimates											
298	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
299				WH	HW						WH	HW
300	95% Approx. Gamma UTL with 95% Coverage			0.133	0.144	95% Approx. Gamma UPL					0.0972	0.0995
301	95% KM Gamma Percentile			0.0935	0.0951	95% Gamma USL					0.31	0.399
302												
303	Lognormal GOF Test on Detected Observations Only											
304	Shapiro Wilk Approximate Test Statistic					0.873	Shapiro Wilk GOF Test					
305	5% Shapiro Wilk P Value					4.2668E-6	Data Not Lognormal at 5% Significance Level					
306	Lilliefors Test Statistic					0.14	Lilliefors GOF Test					
307	5% Lilliefors Critical Value					0.119	Data Not Lognormal at 5% Significance Level					
308	Data Not Lognormal at 5% Significance Level											
309												
310	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
311	Mean in Original Scale					0.026	Mean in Log Scale					-6.065
312	SD in Original Scale					0.047	SD in Log Scale					2.636

	A	B	C	D	E	F	G	H	I	J	K	L
313	95% UTL95% Coverage					0.452	95% BCA UTL95% Coverage					0.168
314	95% Bootstrap (%) UTL95% Coverage					0.17	95% UPL (t)					0.195
315	90% Percentile (z)					0.0681	95% Percentile (z)					0.177
316	99% Percentile (z)					1.069	95% USL					7.326
317												
318	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
319	KM Mean of Logged Data					-5.822	95% KM UTL (Lognormal)95% Coverage					0.274
320	KM SD of Logged Data					2.263	95% KM UPL (Lognormal)					0.133
321	95% KM Percentile Lognormal (z)					0.122	95% KM USL (Lognormal)					2.989
322												
323	Background DL/2 Statistics Assuming Lognormal Distribution											
324	Mean in Original Scale					0.026	Mean in Log Scale					-5.878
325	SD in Original Scale					0.047	SD in Log Scale					2.355
326	95% UTL95% Coverage					0.311	95% UPL (t)					0.147
327	90% Percentile (z)					0.0573	95% Percentile (z)					0.135
328	99% Percentile (z)					0.671	95% USL					3.75
329	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
330												
331	Nonparametric Distribution Free Background Statistics											
332	Data do not follow a Discernible Distribution (0.05)											
333												
334	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
335	Order of Statistic, r					64	95% UTL with95% Coverage					0.17
336	Approx, f used to compute achieved CC					1.684	Approximate Actual Confidence Coefficient achieved by UTL					0.842
337	Approximate Sample Size needed to achieve specified CC					93	95% UPL					0.157
338	95% USL					0.17	95% KM Chebyshev UPL					0.231
339												
340	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
341	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
342	and consists of observations collected from clean unimpacted locations.											
343	The use of USL tends to provide a balance between false positives and false negatives provided the data											
344	represents a background data set and when many onsite observations need to be compared with the BTV.											
345												
346	Uranium-dis											
347												
348	General Statistics											
349	Total Number of Observations					66	Number of Missing Observations					0
350	Number of Distinct Observations					47						
351	Number of Detects					65	Number of Non-Detects					1
352	Number of Distinct Detects					46	Number of Distinct Non-Detects					1
353	Minimum Detect					0.01	Minimum Non-Detect					3.3000E-4
354	Maximum Detect					0.039	Maximum Non-Detect					3.3000E-4
355	Variance Detected					8.7401E-5	Percent Non-Detects					1.515%
356	Mean Detected					0.0212	SD Detected					0.00935
357	Mean of Detected Logged Data					-3.945	SD of Detected Logged Data					0.432
358												
359	Critical Values for Background Threshold Values (BTVs)											
360	Tolerance Factor K (For UTL)					1.997	d2max (for USL)					3.062
361												
362	Normal GOF Test on Detects Only											
363	Shapiro Wilk Test Statistic					0.844	Normal GOF Test on Detected Observations Only					
364	5% Shapiro Wilk P Value					4.0961E-9	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
365	Lilliefors Test Statistic					0.188	Lilliefors GOF Test						
366	5% Lilliefors Critical Value					0.11	Data Not Normal at 5% Significance Level						
367	Data Not Normal at 5% Significance Level												
368													
369	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution												
370	KM Mean					0.0209	KM SD					0.00955	
371	95% UTL95% Coverage					0.04	95% KM UPL (t)					0.037	
372	90% KM Percentile (z)					0.0332	95% KM Percentile (z)					0.0366	
373	99% KM Percentile (z)					0.0431	95% KM USL					0.0502	
374													
375	DL/2 Substitution Background Statistics Assuming Normal Distribution												
376	Mean					0.0209	SD					0.00963	
377	95% UTL95% Coverage					0.0401	95% UPL (t)					0.0371	
378	90% Percentile (z)					0.0333	95% Percentile (z)					0.0368	
379	99% Percentile (z)					0.0433	95% USL					0.0504	
380	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons												
381													
382	Gamma GOF Tests on Detected Observations Only												
383	A-D Test Statistic					2.524	Anderson-Darling GOF Test						
384	5% A-D Critical Value					0.753	Data Not Gamma Distributed at 5% Significance Level						
385	K-S Test Statistic					0.169	Kolmogorov-Smirnov GOF						
386	5% K-S Critical Value					0.111	Data Not Gamma Distributed at 5% Significance Level						
387	Data Not Gamma Distributed at 5% Significance Level												
388													
389	Gamma Statistics on Detected Data Only												
390	k hat (MLE)					5.543	k star (bias corrected MLE)					5.298	
391	Theta hat (MLE)					0.00383	Theta star (bias corrected MLE)					0.00401	
392	nu hat (MLE)					720.6	nu star (bias corrected)					688.7	
393	MLE Mean (bias corrected)					0.0212							
394	MLE Sd (bias corrected)					0.00922	95% Percentile of Chisquare (2kstar)					19.12	
395													
396	Gamma ROS Statistics using Imputed Non-Detects												
397	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
398	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
399	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
400	This is especially true when the sample size is small.												
401	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
402	Minimum					0.01	Mean					0.0211	
403	Maximum					0.039	Median					0.0168	
404	SD					0.00938	CV					0.445	
405	k hat (MLE)					5.432	k star (bias corrected MLE)					5.196	
406	Theta hat (MLE)					0.00388	Theta star (bias corrected MLE)					0.00405	
407	nu hat (MLE)					717.1	nu star (bias corrected)					685.8	
408	MLE Mean (bias corrected)					0.0211	MLE Sd (bias corrected)					0.00924	
409	95% Percentile of Chisquare (2kstar)					18.84	90% Percentile					0.0334	
410	95% Percentile					0.0382	99% Percentile					0.0482	
411	The following statistics are computed using Gamma ROS Statistics on Imputed Data												
412	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
413				WH	HW						WH	HW	
414	95% Approx. Gamma UTL with 95% Coverage			0.0429	0.0435	95% Approx. Gamma UPL					0.0384	0.0387	
415	95% Gamma USL			0.0605	0.0628								
416													

	A	B	C	D	E	F	G	H	I	J	K	L
417	Estimates of Gamma Parameters using KM Estimates											
418	Mean (KM)				0.0209	SD (KM)				0.00955		
419	Variance (KM)				9.1271E-5	SE of Mean (KM)				0.00119		
420	k hat (KM)				4.792	k star (KM)				4.585		
421	nu hat (KM)				632.6	nu star (KM)				605.2		
422	theta hat (KM)				0.00436	theta star (KM)				0.00456		
423	80% gamma percentile (KM)				0.0284	90% gamma percentile (KM)				0.034		
424	95% gamma percentile (KM)				0.0391	99% gamma percentile (KM)				0.05		
425												
426	The following statistics are computed using gamma distribution and KM estimates											
427	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
428					WH	HW					WH	HW
429	95% Approx. Gamma UTL with 95% Coverage				0.0468	0.0492	95% Approx. Gamma UPL				0.0413	0.043
430	95% KM Gamma Percentile				0.0407	0.0423	95% Gamma USL				0.0686	0.0755
431												
432	Lognormal GOF Test on Detected Observations Only											
433	Shapiro Wilk Approximate Test Statistic				0.885	Shapiro Wilk GOF Test						
434	5% Shapiro Wilk P Value				1.6599E-6	Data Not Lognormal at 5% Significance Level						
435	Lilliefors Test Statistic				0.153	Lilliefors GOF Test						
436	5% Lilliefors Critical Value				0.11	Data Not Lognormal at 5% Significance Level						
437	Data Not Lognormal at 5% Significance Level											
438												
439	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
440	Mean in Original Scale				0.021	Mean in Log Scale				-3.962		
441	SD in Original Scale				0.00946	SD in Log Scale				0.45		
442	95% UTL95% Coverage				0.0467	95% BCA UTL95% Coverage				0.0371		
443	95% Bootstrap (%) UTL95% Coverage				0.0373	95% UPL (t)				0.0405		
444	90% Percentile (z)				0.0338	95% Percentile (z)				0.0399		
445	99% Percentile (z)				0.0541	95% USL				0.0754		
446												
447	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
448	KM Mean of Logged Data				-4.007	95% KM UTL (Lognormal)95% Coverage				0.0672		
449	KM SD of Logged Data				0.654	95% KM UPL (Lognormal)				0.0546		
450	95% KM Percentile Lognormal (z)				0.0533	95% KM USL (Lognormal)				0.135		
451												
452	Background DL/2 Statistics Assuming Lognormal Distribution											
453	Mean in Original Scale				0.0209	Mean in Log Scale				-4.017		
454	SD in Original Scale				0.00963	SD in Log Scale				0.726		
455	95% UTL95% Coverage				0.0767	95% UPL (t)				0.061		
456	90% Percentile (z)				0.0456	95% Percentile (z)				0.0594		
457	99% Percentile (z)				0.0975	95% USL				0.166		
458	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
459												
460	Nonparametric Distribution Free Background Statistics											
461	Data do not follow a Discernible Distribution (0.05)											
462												
463	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
464	Order of Statistic, r				65	95% UTL with95% Coverage				0.0373		
465	Approx, f used to compute achieved CC				1.711	Approximate Actual Confidence Coefficient achieved by UTL				0.848		
466	Approximate Sample Size needed to achieve specified CC				93	95% UPL				0.0366		
467	95% USL				0.039	95% KM Chebyshev UPL				0.0629		
468												

	A	B	C	D	E	F	G	H	I	J	K	L
469	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
470	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
471	and consists of observations collected from clean unimpacted locations.											
472	The use of USL tends to provide a balance between false positives and false negatives provided the data											
473	represents a background data set and when many onsite observations need to be compared with the BTV.											
474												

	A	B	C	D	E	F	G	H	I	J	K	L
1				Background Statistics for Data Sets with Non-Detects								
2	User Selected Options											
3	Date/Time of Computation			ProUCL 5.19/16/2020 9:52:16 AM								
4	From File			Inorganic data 2013-2020-UG only - 09162020_c.xls								
5	Full Precision			OFF								
6	Confidence Coefficient			95%								
7	Coverage			95%								
8	Different or Future K Observations			1								
9	Number of Bootstrap Operations			2000								
10												
11	Calcium											
12												
13	General Statistics											
14	Total Number of Observations				64		Number of Distinct Observations				50	
15							Number of Missing Observations				2	
16	Minimum				310		First Quartile				392.3	
17	Second Largest				650		Median				459.5	
18	Maximum				694		Third Quartile				534	
19	Mean				469.1		SD				95.87	
20	Coefficient of Variation				0.204		Skewness				0.354	
21	Mean of logged Data				6.13		SD of logged Data				0.204	
22												
23	Critical Values for Background Threshold Values (BTVs)											
24	Tolerance Factor K (For UTL)				2.003		d2max (for USL)				3.051	
25												
26	Normal GOF Test											
27	Shapiro Wilk Test Statistic				0.949		Normal GOF Test					
28	5% Shapiro Wilk P Value				0.0207		Data Not Normal at 5% Significance Level					
29	Lilliefors Test Statistic				0.103		Lilliefors GOF Test					
30	5% Lilliefors Critical Value				0.111		Data appear Normal at 5% Significance Level					
31	Data appear Approximate Normal at 5% Significance Level											
32												
33	Background Statistics Assuming Normal Distribution											
34	95% UTL with		95% Coverage		661.1		90% Percentile (z)				591.9	
35			95% UPL (t)		630.4		95% Percentile (z)				626.8	
36			95% USL		761.6		99% Percentile (z)				692.1	
37												
38	Gamma GOF Test											
39	A-D Test Statistic				0.587		Anderson-Darling Gamma GOF Test					
40	5% A-D Critical Value				0.749		Detected data appear Gamma Distributed at 5% Significance Level					
41	K-S Test Statistic				0.0913		Kolmogorov-Smirnov Gamma GOF Test					
42	5% K-S Critical Value				0.111		Detected data appear Gamma Distributed at 5% Significance Level					
43	Detected data appear Gamma Distributed at 5% Significance Level											
44												
45	Gamma Statistics											
46	k hat (MLE)				24.63		k star (bias corrected MLE)				23.48	
47	Theta hat (MLE)				19.05		Theta star (bias corrected MLE)				19.98	
48	nu hat (MLE)				3152		nu star (bias corrected)				3006	
49	MLE Mean (bias corrected)				469.1		MLE Sd (bias corrected)				96.8	
50												
51	Background Statistics Assuming Gamma Distribution											
52	95% Wilson Hilferty (WH) Approx. Gamma UPL				640.5		90% Percentile				596.6	

	A	B	C	D	E	F	G	H	I	J	K	L
53	95% Hawkins Wixley (HW) Approx. Gamma UPL					642.1	95% Percentile					638.8
54	95% WH Approx. Gamma UTL with 95% Coverage				678.9	99% Percentile					723.1	
55	95% HW Approx. Gamma UTL with 95% Coverage				681.7							
56	95% WH USL				814.8	95% HW USL					823.9	
57												
58	Lognormal GOF Test											
59	Shapiro Wilk Test Statistic				0.959	Shapiro Wilk Lognormal GOF Test						
60	5% Shapiro Wilk P Value				0.0803	Data appear Lognormal at 5% Significance Level						
61	Lilliefors Test Statistic				0.0841	Lilliefors Lognormal GOF Test						
62	5% Lilliefors Critical Value				0.111	Data appear Lognormal at 5% Significance Level						
63	Data appear Lognormal at 5% Significance Level											
64												
65	Background Statistics assuming Lognormal Distribution											
66	95% UTL with 95% Coverage				691.3	90% Percentile (z)					596.8	
67	95% UPL (t)				647.6	95% Percentile (z)					642.6	
68	95% USL				855.9	99% Percentile (z)					738.4	
69												
70	Nonparametric Distribution Free Background Statistics											
71	Data appear Approximate Normal at 5% Significance Level											
72												
73	Nonparametric Upper Limits for Background Threshold Values											
74	Order of Statistic, r				63	95% UTL with 95% Coverage					650	
75	Approx, f used to compute achieved CC				1.658	Approximate Actual Confidence Coefficient achieved by UTL					0.836	
76						Approximate Sample Size needed to achieve specified CC					93	
77	95% Percentile Bootstrap UTL with 95% Coverage				650	95% BCA Bootstrap UTL with 95% Coverage					645.5	
78	95% UPL				621.5	90% Percentile					607	
79	90% Chebyshev UPL				758.9	95% Percentile					620	
80	95% Chebyshev UPL				890.2	99% Percentile					666.3	
81	95% USL				694							
82												
83	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
84	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
85	and consists of observations collected from clean unimpacted locations.											
86	The use of USL tends to provide a balance between false positives and false negatives provided the data											
87	represents a background data set and when many onsite observations need to be compared with the BTV.											
88												
89	Chloride											
90												
91	General Statistics											
92	Total Number of Observations				62	Number of Distinct Observations					56	
93						Number of Missing Observations					4	
94	Minimum				24	First Quartile					47.48	
95	Second Largest				154	Median					72.6	
96	Maximum				178	Third Quartile					95.75	
97	Mean				70.88	SD					33.77	
98	Coefficient of Variation				0.476	Skewness					0.635	
99	Mean of logged Data				4.138	SD of logged Data					0.521	
100												
101	Critical Values for Background Threshold Values (BTVs)											
102	Tolerance Factor K (For UTL)				2.01	d2max (for USL)					3.039	
103												
104	Normal GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L	
105	Shapiro Wilk Test Statistic					0.937	Normal GOF Test						
106	5% Shapiro Wilk P Value					0.00479	Data Not Normal at 5% Significance Level						
107	Lilliefors Test Statistic					0.112	Lilliefors GOF Test						
108	5% Lilliefors Critical Value					0.112	Data appear Normal at 5% Significance Level						
109	Data appear Approximate Normal at 5% Significance Level												
110													
111	Background Statistics Assuming Normal Distribution												
112	95% UTL with		95% Coverage		138.8	90% Percentile (z)				114.2			
113			95% UPL (t)		127.7	95% Percentile (z)				126.4			
114			95% USL		173.5	99% Percentile (z)				149.5			
115													
116	Gamma GOF Test												
117	A-D Test Statistic					0.908	Anderson-Darling Gamma GOF Test						
118	5% A-D Critical Value					0.754	Data Not Gamma Distributed at 5% Significance Level						
119	K-S Test Statistic					0.107	Kolmogorov-Smirnov Gamma GOF Test						
120	5% K-S Critical Value					0.113	Detected data appear Gamma Distributed at 5% Significance Level						
121	Detected data follow Appr. Gamma Distribution at 5% Significance Level												
122													
123	Gamma Statistics												
124	k hat (MLE)				4.224	k star (bias corrected MLE)				4.03			
125	Theta hat (MLE)				16.78	Theta star (bias corrected MLE)				17.59			
126	nu hat (MLE)				523.7	nu star (bias corrected)				499.7			
127	MLE Mean (bias corrected)				70.88	MLE Sd (bias corrected)				35.31			
128													
129	Background Statistics Assuming Gamma Distribution												
130	95% Wilson Hilferty (WH) Approx. Gamma UPL					138.2	90% Percentile				118.2		
131	95% Hawkins Wixley (HW) Approx. Gamma UPL					140.6	95% Percentile				137.1		
132	95% WH Approx. Gamma UTL with		95% Coverage		156.7	99% Percentile				177.5			
133	95% HW Approx. Gamma UTL with		95% Coverage		160.8								
134			95% WH USL		225.6	95% HW USL				239			
135													
136	Lognormal GOF Test												
137	Shapiro Wilk Test Statistic					0.929	Shapiro Wilk Lognormal GOF Test						
138	5% Shapiro Wilk P Value					0.0017	Data Not Lognormal at 5% Significance Level						
139	Lilliefors Test Statistic					0.126	Lilliefors Lognormal GOF Test						
140	5% Lilliefors Critical Value					0.112	Data Not Lognormal at 5% Significance Level						
141	Data Not Lognormal at 5% Significance Level												
142													
143	Background Statistics assuming Lognormal Distribution												
144	95% UTL with		95% Coverage		178.6	90% Percentile (z)				122.2			
145			95% UPL (t)		150.7	95% Percentile (z)				147.7			
146			95% USL		305.4	99% Percentile (z)				210.7			
147													
148	Nonparametric Distribution Free Background Statistics												
149	Data appear Approximate Normal at 5% Significance Level												
150													
151	Nonparametric Upper Limits for Background Threshold Values												
152	Order of Statistic, r				61	95% UTL with 95% Coverage				154			
153	Approx, f used to compute achieved CC					1.605	Approximate Actual Confidence Coefficient achieved by UTL				0.823		
154							Approximate Sample Size needed to achieve specified CC				93		
155	95% Percentile Bootstrap UTL with		95% Coverage		154	95% BCA Bootstrap UTL with 95% Coverage				153			
156			95% UPL		131.8	90% Percentile				104			

	A	B	C	D	E	F	G	H	I	J	K	L
157	90% Chebyshev UPL					173	95% Percentile					124.2
158	95% Chebyshev UPL					219.3	99% Percentile					163.4
159	95% USL					178						
160												
161	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
162	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
163	and consists of observations collected from clean unimpacted locations.											
164	The use of USL tends to provide a balance between false positives and false negatives provided the data											
165	represents a background data set and when many onsite observations need to be compared with the BTV.											
166												
167	Fluoride											
168												
169	General Statistics											
170	Total Number of Observations					62	Number of Distinct Observations					50
171							Number of Missing Observations					4
172	Minimum					0.5	First Quartile					0.613
173	Second Largest					1.71	Median					0.689
174	Maximum					1.75	Third Quartile					1.225
175	Mean					0.898	SD					0.405
176	Coefficient of Variation					0.451	Skewness					1.046
177	Mean of logged Data					-0.193	SD of logged Data					0.4
178												
179	Critical Values for Background Threshold Values (BTVs)											
180	Tolerance Factor K (For UTL)					2.01	d2max (for USL)					3.039
181												
182	Normal GOF Test											
183	Shapiro Wilk Test Statistic					0.757	Normal GOF Test					
184	5% Shapiro Wilk P Value					1.786E-13	Data Not Normal at 5% Significance Level					
185	Lilliefors Test Statistic					0.254	Lilliefors GOF Test					
186	5% Lilliefors Critical Value					0.112	Data Not Normal at 5% Significance Level					
187	Data Not Normal at 5% Significance Level											
188												
189	Background Statistics Assuming Normal Distribution											
190	95% UTL with 95% Coverage					1.713	90% Percentile (z)					1.417
191	95% UPL (t)					1.58	95% Percentile (z)					1.565
192	95% USL					2.13	99% Percentile (z)					1.841
193												
194	Gamma GOF Test											
195	A-D Test Statistic					4.904	Anderson-Darling Gamma GOF Test					
196	5% A-D Critical Value					0.753	Data Not Gamma Distributed at 5% Significance Level					
197	K-S Test Statistic					0.21	Kolmogorov-Smirnov Gamma GOF Test					
198	5% K-S Critical Value					0.113	Data Not Gamma Distributed at 5% Significance Level					
199	Data Not Gamma Distributed at 5% Significance Level											
200												
201	Gamma Statistics											
202	k hat (MLE)					5.997	k star (bias corrected MLE)					5.717
203	Theta hat (MLE)					0.15	Theta star (bias corrected MLE)					0.157
204	nu hat (MLE)					743.6	nu star (bias corrected)					709
205	MLE Mean (bias corrected)					0.898	MLE Sd (bias corrected)					0.376
206												
207	Background Statistics Assuming Gamma Distribution											
208	95% Wilson Hilferty (WH) Approx. Gamma UPL					1.599	90% Percentile					1.4

	A	B	C	D	E	F	G	H	I	J	K	L
209	95% Hawkins Wixley (HW) Approx. Gamma UPL					1.602	95% Percentile					1.591
210	95% WH Approx. Gamma UTL with 95% Coverage				1.783	99% Percentile					1.993	
211	95% HW Approx. Gamma UTL with 95% Coverage				1.795							
212	95% WH USL				2.455	95% HW USL					2.52	
213												
214	Lognormal GOF Test											
215	Shapiro Wilk Test Statistic				0.822	Shapiro Wilk Lognormal GOF Test						
216	5% Shapiro Wilk P Value				6.926E-10	Data Not Lognormal at 5% Significance Level						
217	Lilliefors Test Statistic				0.194	Lilliefors Lognormal GOF Test						
218	5% Lilliefors Critical Value				0.112	Data Not Lognormal at 5% Significance Level						
219	Data Not Lognormal at 5% Significance Level											
220												
221	Background Statistics assuming Lognormal Distribution											
222	95% UTL with 95% Coverage				1.843	90% Percentile (z)					1.377	
223	95% UPL (t)				1.617	95% Percentile (z)					1.592	
224	95% USL				2.783	99% Percentile (z)					2.092	
225												
226	Nonparametric Distribution Free Background Statistics											
227	Data do not follow a Discernible Distribution (0.05)											
228												
229	Nonparametric Upper Limits for Background Threshold Values											
230	Order of Statistic, r				61	95% UTL with 95% Coverage					1.71	
231	Approx, f used to compute achieved CC				1.605	Approximate Actual Confidence Coefficient achieved by UTL					0.823	
232						Approximate Sample Size needed to achieve specified CC					93	
233	95% Percentile Bootstrap UTL with 95% Coverage				1.71	95% BCA Bootstrap UTL with 95% Coverage					1.71	
234	95% UPL				1.696	90% Percentile					1.6	
235	90% Chebyshev UPL				2.124	95% Percentile					1.668	
236	95% Chebyshev UPL				2.679	99% Percentile					1.726	
237	95% USL				1.75							
238												
239	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
240	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
241	and consists of observations collected from clean unimpacted locations.											
242	The use of USL tends to provide a balance between false positives and false negatives provided the data											
243	represents a background data set and when many onsite observations need to be compared with the BTV.											
244												
245	Nitrate/Nitrite											
246												
247	General Statistics											
248	Total Number of Observations				66	Number of Missing Observations					0	
249	Number of Distinct Observations				59							
250	Number of Detects				64	Number of Non-Detects					2	
251	Number of Distinct Detects				58	Number of Distinct Non-Detects					1	
252	Minimum Detect				0.326	Minimum Non-Detect					0.023	
253	Maximum Detect				20.6	Maximum Non-Detect					0.023	
254	Variance Detected				29.99	Percent Non-Detects					3.03%	
255	Mean Detected				5.32	SD Detected					5.477	
256	Mean of Detected Logged Data				0.972	SD of Detected Logged Data					1.31	
257												
258	Critical Values for Background Threshold Values (BTVs)											
259	Tolerance Factor K (For UTL)				1.997	d2max (for USL)					3.062	
260												

	A	B	C	D	E	F	G	H	I	J	K	L
261	Normal GOF Test on Detects Only											
262	Shapiro Wilk Test Statistic					0.823	Normal GOF Test on Detected Observations Only					
263	5% Shapiro Wilk P Value					3.195E-10	Data Not Normal at 5% Significance Level					
264	Lilliefors Test Statistic					0.185	Lilliefors GOF Test					
265	5% Lilliefors Critical Value					0.111	Data Not Normal at 5% Significance Level					
266	Data Not Normal at 5% Significance Level											
267												
268	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
269	KM Mean					5.159	KM SD					5.427
270	95% UTL95% Coverage					16	95% KM UPL (t)					14.28
271	90% KM Percentile (z)					12.11	95% KM Percentile (z)					14.09
272	99% KM Percentile (z)					17.79	95% KM USL					21.78
273												
274	DL/2 Substitution Background Statistics Assuming Normal Distribution											
275	Mean					5.159	SD					5.469
276	95% UTL95% Coverage					16.08	95% UPL (t)					14.35
277	90% Percentile (z)					12.17	95% Percentile (z)					14.16
278	99% Percentile (z)					17.88	95% USL					21.91
279	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
280												
281	Gamma GOF Tests on Detected Observations Only											
282	A-D Test Statistic					1.801	Anderson-Darling GOF Test					
283	5% A-D Critical Value					0.788	Data Not Gamma Distributed at 5% Significance Level					
284	K-S Test Statistic					0.172	Kolmogorov-Smirnov GOF					
285	5% K-S Critical Value					0.115	Data Not Gamma Distributed at 5% Significance Level					
286	Data Not Gamma Distributed at 5% Significance Level											
287												
288	Gamma Statistics on Detected Data Only											
289	k hat (MLE)					0.843	k star (bias corrected MLE)					0.814
290	Theta hat (MLE)					6.309	Theta star (bias corrected MLE)					6.535
291	nu hat (MLE)					107.9	nu star (bias corrected)					104.2
292	MLE Mean (bias corrected)					5.32						
293	MLE Sd (bias corrected)					5.896	95% Percentile of Chisquare (2kstar)					5.249
294												
295	Gamma ROS Statistics using Imputed Non-Detects											
296	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
297	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
298	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
299	This is especially true when the sample size is small.											
300	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
301	Minimum					0.01	Mean					5.159
302	Maximum					20.6	Median					3.279
303	SD					5.469	CV					1.06
304	k hat (MLE)					0.719	k star (bias corrected MLE)					0.696
305	Theta hat (MLE)					7.175	Theta star (bias corrected MLE)					7.408
306	nu hat (MLE)					94.91	nu star (bias corrected)					91.93
307	MLE Mean (bias corrected)					5.159	MLE Sd (bias corrected)					6.182
308	95% Percentile of Chisquare (2kstar)					4.75	90% Percentile					12.97
309	95% Percentile					17.59	99% Percentile					28.64
310	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
311	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
312					WH	HW					WH	HW

	A	B	C	D	E	F	G	H	I	J	K	L
313	95% Approx. Gamma UTL with 95% Coverage				21.8	24.39	95% Approx. Gamma UPL				17.27	18.66
314	95% Gamma USL				42.76	53.78						
315												
316	Estimates of Gamma Parameters using KM Estimates											
317	Mean (KM)				5.159	SD (KM)				5.427		
318	Variance (KM)				29.46	SE of Mean (KM)				0.673		
319	k hat (KM)				0.904	k star (KM)				0.873		
320	nu hat (KM)				119.3	nu star (KM)				115.2		
321	theta hat (KM)				5.709	theta star (KM)				5.912		
322	80% gamma percentile (KM)				8.388	90% gamma percentile (KM)				12.28		
323	95% gamma percentile (KM)				16.22	99% gamma percentile (KM)				25.46		
324												
325	The following statistics are computed using gamma distribution and KM estimates											
326	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
327				WH	HW					WH	HW	
328	95% Approx. Gamma UTL with 95% Coverage				21.43	23.77	95% Approx. Gamma UPL				17.01	18.24
329	95% KM Gamma Percentile				16.55	17.68	95% Gamma USL				41.84	51.98
330												
331	Lognormal GOF Test on Detected Observations Only											
332	Shapiro Wilk Approximate Test Statistic				0.895	Shapiro Wilk GOF Test						
333	5% Shapiro Wilk P Value				9.4088E-6	Data Not Lognormal at 5% Significance Level						
334	Lilliefors Test Statistic				0.142	Lilliefors GOF Test						
335	5% Lilliefors Critical Value				0.111	Data Not Lognormal at 5% Significance Level						
336	Data Not Lognormal at 5% Significance Level											
337												
338	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
339	Mean in Original Scale				5.162	Mean in Log Scale				0.876		
340	SD in Original Scale				5.466	SD in Log Scale				1.403		
341	95% UTL95% Coverage				39.52	95% BCA UTL95% Coverage				16.83		
342	95% Bootstrap (%) UTL95% Coverage				17	95% UPL (t)				25.38		
343	90% Percentile (z)				14.49	95% Percentile (z)				24.12		
344	99% Percentile (z)				62.73	95% USL				176.1		
345												
346	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
347	KM Mean of Logged Data				0.829	95% KM UTL (Lognormal)95% Coverage				47.29		
348	KM SD of Logged Data				1.516	95% KM UPL (Lognormal)				29.3		
349	95% KM Percentile Lognormal (z)				27.73	95% KM USL (Lognormal)				237.8		
350												
351	Background DL/2 Statistics Assuming Lognormal Distribution											
352	Mean in Original Scale				5.159	Mean in Log Scale				0.808		
353	SD in Original Scale				5.469	SD in Log Scale				1.595		
354	95% UTL95% Coverage				54.23	95% UPL (t)				32.77		
355	90% Percentile (z)				17.32	95% Percentile (z)				30.92		
356	99% Percentile (z)				91.71	95% USL				296.7		
357	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
358												
359	Nonparametric Distribution Free Background Statistics											
360	Data do not follow a Discernible Distribution (0.05)											
361												
362	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
363	Order of Statistic, r				65	95% UTL with95% Coverage				17		
364	Approx, f used to compute achieved CC				1.711	Approximate Actual Confidence Coefficient achieved by UTL				0.848		

	A	B	C	D	E	F	G	H	I	J	K	L
365	Approximate Sample Size needed to achieve specified CC					93	95% UPL					16.09
366	95% USL					20.6	95% KM Chebyshev UPL					29
367												
368	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
369	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
370	and consists of observations collected from clean unimpacted locations.											
371	The use of USL tends to provide a balance between false positives and false negatives provided the data											
372	represents a background data set and when many onsite observations need to be compared with the BTV.											
373												
374	Potassium											
375												
376	General Statistics											
377	Total Number of Observations					66	Number of Missing Observations					0
378	Number of Distinct Observations					45						
379	Number of Detects					65	Number of Non-Detects					1
380	Number of Distinct Detects					44	Number of Distinct Non-Detects					1
381	Minimum Detect					1.07	Minimum Non-Detect					0.037
382	Maximum Detect					3.4	Maximum Non-Detect					0.037
383	Variance Detected					0.275	Percent Non-Detects					1.515%
384	Mean Detected					1.81	SD Detected					0.525
385	Mean of Detected Logged Data					0.556	SD of Detected Logged Data					0.27
386												
387	Critical Values for Background Threshold Values (BTVs)											
388	Tolerance Factor K (For UTL)					1.997	d2max (for USL)					3.062
389												
390	Normal GOF Test on Detects Only											
391	Shapiro Wilk Test Statistic					0.883	Normal GOF Test on Detected Observations Only					
392	5% Shapiro Wilk P Value					1.1404E-6	Data Not Normal at 5% Significance Level					
393	Lilliefors Test Statistic					0.166	Lilliefors GOF Test					
394	5% Lilliefors Critical Value					0.11	Data Not Normal at 5% Significance Level					
395	Data Not Normal at 5% Significance Level											
396												
397	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
398	KM Mean					1.783	KM SD					0.56
399	95% UTL95% Coverage					2.901	95% KM UPL (t)					2.725
400	90% KM Percentile (z)					2.501	95% KM Percentile (z)					2.704
401	99% KM Percentile (z)					3.086	95% KM USL					3.498
402												
403	DL/2 Substitution Background Statistics Assuming Normal Distribution											
404	Mean					1.783	SD					0.565
405	95% UTL95% Coverage					2.912	95% UPL (t)					2.733
406	90% Percentile (z)					2.507	95% Percentile (z)					2.712
407	99% Percentile (z)					3.098	95% USL					3.514
408	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
409												
410	Gamma GOF Tests on Detected Observations Only											
411	A-D Test Statistic					1.157	Anderson-Darling GOF Test					
412	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
413	K-S Test Statistic					0.128	Kolmogorov-Smirnov GOF					
414	5% K-S Critical Value					0.11	Data Not Gamma Distributed at 5% Significance Level					
415	Data Not Gamma Distributed at 5% Significance Level											
416												

	A	B	C	D	E	F	G	H	I	J	K	L
417	Gamma Statistics on Detected Data Only											
418	k hat (MLE)				13.62	k star (bias corrected MLE)					13	
419	Theta hat (MLE)				0.133	Theta star (bias corrected MLE)					0.139	
420	nu hat (MLE)				1770	nu star (bias corrected)					1690	
421	MLE Mean (bias corrected)				1.81							
422	MLE Sd (bias corrected)				0.502	95% Percentile of Chisquare (2kstar)					38.89	
423												
424	Gamma ROS Statistics using Imputed Non-Detects											
425	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
426	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
427	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
428	This is especially true when the sample size is small.											
429	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
430	Minimum				0.714	Mean					1.793	
431	Maximum				3.4	Median					1.745	
432	SD				0.538	CV					0.3	
433	k hat (MLE)				12.22	k star (bias corrected MLE)					11.68	
434	Theta hat (MLE)				0.147	Theta star (bias corrected MLE)					0.154	
435	nu hat (MLE)				1613	nu star (bias corrected)					1541	
436	MLE Mean (bias corrected)				1.793	MLE Sd (bias corrected)					0.525	
437	95% Percentile of Chisquare (2kstar)				35.61	90% Percentile					2.49	
438	95% Percentile				2.734	99% Percentile					3.234	
439	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
440	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
441				WH	HW					WH	HW	
442	95% Approx. Gamma UTL with 95% Coverage			2.965	2.986	95% Approx. Gamma UPL				2.743	2.754	
443	95% Gamma USL			3.804	3.878							
444												
445	Estimates of Gamma Parameters using KM Estimates											
446	Mean (KM)				1.783	SD (KM)					0.56	
447	Variance (KM)				0.314	SE of Mean (KM)					0.0695	
448	k hat (KM)				10.13	k star (KM)					9.679	
449	nu hat (KM)				1337	nu star (KM)					1278	
450	theta hat (KM)				0.176	theta star (KM)					0.184	
451	80% gamma percentile (KM)				2.239	90% gamma percentile (KM)					2.545	
452	95% gamma percentile (KM)				2.818	99% gamma percentile (KM)					3.379	
453												
454	The following statistics are computed using gamma distribution and KM estimates											
455	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
456				WH	HW					WH	HW	
457	95% Approx. Gamma UTL with 95% Coverage			3.378	3.564	95% Approx. Gamma UPL				3.062	3.196	
458	95% KM Gamma Percentile			3.027	3.156	95% Gamma USL				4.601	5.039	
459												
460	Lognormal GOF Test on Detected Observations Only											
461	Shapiro Wilk Approximate Test Statistic				0.947	Shapiro Wilk GOF Test						
462	5% Shapiro Wilk P Value				0.0146	Data Not Lognormal at 5% Significance Level						
463	Lilliefors Test Statistic				0.112	Lilliefors GOF Test						
464	5% Lilliefors Critical Value				0.11	Data Not Lognormal at 5% Significance Level						
465	Data Not Lognormal at 5% Significance Level											
466												
467	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
468	Mean in Original Scale				1.795	Mean in Log Scale					0.545	

	A	B	C	D	E	F	G	H	I	J	K	L
469	SD in Original Scale					0.534	SD in Log Scale					0.282
470	95% UTL95% Coverage					3.027	95% BCA UTL95% Coverage					3.3
471	95% Bootstrap (%) UTL95% Coverage					3.3	95% UPL (t)					2.769
472	90% Percentile (z)					2.475	95% Percentile (z)					2.741
473	99% Percentile (z)					3.321	95% USL					4.086
474												
475	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
476	KM Mean of Logged Data					0.498	95% KM UTL (Lognormal)95% Coverage					4.84
477	KM SD of Logged Data					0.54	95% KM UPL (Lognormal)					4.081
478	95% KM Percentile Lognormal (z)					4.001	95% KM USL (Lognormal)					8.608
479												
480	Background DL/2 Statistics Assuming Lognormal Distribution											
481	Mean in Original Scale					1.783	Mean in Log Scale					0.487
482	SD in Original Scale					0.565	SD in Log Scale					0.62
483	95% UTL95% Coverage					5.617	95% UPL (t)					4.618
484	90% Percentile (z)					3.604	95% Percentile (z)					4.515
485	99% Percentile (z)					6.891	95% USL					10.88
486	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
487												
488	Nonparametric Distribution Free Background Statistics											
489	Data do not follow a Discernible Distribution (0.05)											
490												
491	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
492	Order of Statistic, r					65	95% UTL with95% Coverage					3.3
493	Approx, f used to compute achieved CC					1.711	Approximate Actual Confidence Coefficient achieved by UTL					0.848
494	Approximate Sample Size needed to achieve specified CC					93	95% UPL					3.195
495	95% USL					3.4	95% KM Chebyshev UPL					4.243
496												
497	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
498	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
499	and consists of observations collected from clean unimpacted locations.											
500	The use of USL tends to provide a balance between false positives and false negatives provided the data											
501	represents a background data set and when many onsite observations need to be compared with the BTV.											
502												
503	Sodium											
504												
505	General Statistics											
506	Total Number of Observations					66	Number of Distinct Observations					57
507	Minimum					0.305	First Quartile					71.43
508	Second Largest					251	Median					91.05
509	Maximum					264	Third Quartile					102.5
510	Mean					111.6	SD					67.14
511	Coefficient of Variation					0.602	Skewness					1.131
512	Mean of logged Data					4.498	SD of logged Data					0.883
513												
514	Critical Values for Background Threshold Values (BTVs)											
515	Tolerance Factor K (For UTL)					1.997	d2max (for USL)					3.062
516												
517	Normal GOF Test											
518	Shapiro Wilk Test Statistic					0.797	Normal GOF Test					
519	5% Shapiro Wilk P Value					3.464E-12	Data Not Normal at 5% Significance Level					
520	Lilliefors Test Statistic					0.312	Lilliefors GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
521	5% Lilliefors Critical Value					0.109	Data Not Normal at 5% Significance Level						
522	Data Not Normal at 5% Significance Level												
523													
524	Background Statistics Assuming Normal Distribution												
525	95% UTL with		95% Coverage	245.7		90% Percentile (z)					197.6		
526			95% UPL (t)	224.5		95% Percentile (z)					222		
527			95% USL	317.2		99% Percentile (z)					267.8		
528													
529	Gamma GOF Test												
530	A-D Test Statistic		3.303		Anderson-Darling Gamma GOF Test								
531	5% A-D Critical Value		0.761		Data Not Gamma Distributed at 5% Significance Level								
532	K-S Test Statistic		0.225		Kolmogorov-Smirnov Gamma GOF Test								
533	5% K-S Critical Value		0.111		Data Not Gamma Distributed at 5% Significance Level								
534	Data Not Gamma Distributed at 5% Significance Level												
535													
536	Gamma Statistics												
537	k hat (MLE)		2.461		k star (bias corrected MLE)					2.359			
538	Theta hat (MLE)		45.36		Theta star (bias corrected MLE)					47.31			
539	nu hat (MLE)		324.8		nu star (bias corrected)					311.4			
540	MLE Mean (bias corrected)		111.6		MLE Sd (bias corrected)					72.67			
541													
542	Background Statistics Assuming Gamma Distribution												
543	95% Wilson Hilferty (WH) Approx. Gamma UPL			246.9		90% Percentile					208.9		
544	95% Hawkins Wixley (HW) Approx. Gamma UPL			259.7		95% Percentile					251.5		
545	95% WH Approx. Gamma UTL with		95% Coverage	285.3		99% Percentile					345		
546	95% HW Approx. Gamma UTL with		95% Coverage	305									
547			95% WH USL	443.9		95% HW USL					502.6		
548													
549	Lognormal GOF Test												
550	Shapiro Wilk Test Statistic		0.659		Shapiro Wilk Lognormal GOF Test								
551	5% Shapiro Wilk P Value		0		Data Not Lognormal at 5% Significance Level								
552	Lilliefors Test Statistic		0.203		Lilliefors Lognormal GOF Test								
553	5% Lilliefors Critical Value		0.109		Data Not Lognormal at 5% Significance Level								
554	Data Not Lognormal at 5% Significance Level												
555													
556	Background Statistics assuming Lognormal Distribution												
557	95% UTL with		95% Coverage	523.9		90% Percentile (z)					278.6		
558			95% UPL (t)	396.4		95% Percentile (z)					383.9		
559			95% USL	1342		99% Percentile (z)					700.7		
560													
561	Nonparametric Distribution Free Background Statistics												
562	Data do not follow a Discernible Distribution (0.05)												
563													
564	Nonparametric Upper Limits for Background Threshold Values												
565	Order of Statistic, r			65		95% UTL with 95% Coverage					251		
566	Approx, f used to compute achieved CC			1.711		Approximate Actual Confidence Coefficient achieved by UTL					0.848		
567						Approximate Sample Size needed to achieve specified CC					93		
568	95% Percentile Bootstrap UTL with		95% Coverage	251		95% BCA Bootstrap UTL with 95% Coverage					250.8		
569			95% UPL	250		90% Percentile					240		
570			90% Chebyshev UPL	314.5		95% Percentile					250		
571			95% Chebyshev UPL	406.5		99% Percentile					255.6		
572			95% USL	264									

	A	B	C	D	E	F	G	H	I	J	K	L
573												
574	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
575	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
576	and consists of observations collected from clean unimpacted locations.											
577	The use of USL tends to provide a balance between false positives and false negatives provided the data											
578	represents a background data set and when many onsite observations need to be compared with the BTV.											
579												
580	Sulfate											
581												
582	General Statistics											
583	Total Number of Observations					65	Number of Distinct Observations					46
584							Number of Missing Observations					1
585	Minimum					924	First Quartile					1200
586	Second Largest					2900	Median					1500
587	Maximum					3400	Third Quartile					1920
588	Mean					1694	SD					613.7
589	Coefficient of Variation					0.362	Skewness					0.925
590	Mean of logged Data					7.376	SD of logged Data					0.339
591												
592	Critical Values for Background Threshold Values (BTVs)											
593	Tolerance Factor K (For UTL)					2	d2max (for USL)					3.057
594												
595	Normal GOF Test											
596	Shapiro Wilk Test Statistic					0.882	Normal GOF Test					
597	5% Shapiro Wilk P Value					1.1071E-6	Data Not Normal at 5% Significance Level					
598	Lilliefors Test Statistic					0.163	Lilliefors GOF Test					
599	5% Lilliefors Critical Value					0.11	Data Not Normal at 5% Significance Level					
600	Data Not Normal at 5% Significance Level											
601												
602	Background Statistics Assuming Normal Distribution											
603	95% UTL with	95% Coverage	2922	90% Percentile (z)								2481
604		95% UPL (t)	2726	95% Percentile (z)								2704
605		95% USL	3570	99% Percentile (z)								3122
606												
607	Gamma GOF Test											
608	A-D Test Statistic					1.505	Anderson-Darling Gamma GOF Test					
609	5% A-D Critical Value					0.752	Data Not Gamma Distributed at 5% Significance Level					
610	K-S Test Statistic					0.132	Kolmogorov-Smirnov Gamma GOF Test					
611	5% K-S Critical Value					0.111	Data Not Gamma Distributed at 5% Significance Level					
612	Data Not Gamma Distributed at 5% Significance Level											
613												
614	Gamma Statistics											
615	k hat (MLE)					8.646	k star (bias corrected MLE)					8.257
616	Theta hat (MLE)					195.9	Theta star (bias corrected MLE)					205.2
617	nu hat (MLE)					1124	nu star (bias corrected)					1073
618	MLE Mean (bias corrected)					1694	MLE Sd (bias corrected)					589.5
619												
620	Background Statistics Assuming Gamma Distribution											
621	95% Wilson Hilferty (WH) Approx. Gamma UPL					2777	90% Percentile					2480
622	95% Hawkins Wixley (HW) Approx. Gamma UPL					2788	95% Percentile					2766
623	95% WH Approx. Gamma UTL with 95% Coverage					3042	99% Percentile					3357
624	95% HW Approx. Gamma UTL with 95% Coverage					3065						

	A	B	C	D	E	F	G	H	I	J	K	L	
625	95% WH USL					4043	95% HW USL					4137	
626													
627	Lognormal GOF Test												
628	Shapiro Wilk Test Statistic					0.933	Shapiro Wilk Lognormal GOF Test						
629	5% Shapiro Wilk P Value					0.00209	Data Not Lognormal at 5% Significance Level						
630	Lilliefors Test Statistic					0.112	Lilliefors Lognormal GOF Test						
631	5% Lilliefors Critical Value					0.11	Data Not Lognormal at 5% Significance Level						
632	Data Not Lognormal at 5% Significance Level												
633													
634	Background Statistics assuming Lognormal Distribution												
635	95% UTL with 95% Coverage		3148						90% Percentile (z)		2467		
636	95% UPL (t)		2826						95% Percentile (z)		2791		
637	95% USL		4506						99% Percentile (z)		3517		
638													
639	Nonparametric Distribution Free Background Statistics												
640	Data do not follow a Discernible Distribution (0.05)												
641													
642	Nonparametric Upper Limits for Background Threshold Values												
643	Order of Statistic, r		64		95% UTL with 95% Coverage				2900				
644	Approx, f used to compute achieved CC		1.684		Approximate Actual Confidence Coefficient achieved by UTL				0.842				
645					Approximate Sample Size needed to achieve specified CC				93				
646	95% Percentile Bootstrap UTL with 95% Coverage		2900		95% BCA Bootstrap UTL with 95% Coverage				2896				
647	95% UPL		2874		90% Percentile				2722				
648	90% Chebyshev UPL		3549		95% Percentile				2850				
649	95% Chebyshev UPL		4390		99% Percentile				3080				
650	95% USL		3400										
651													
652	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.												
653	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers												
654	and consists of observations collected from clean unimpacted locations.												
655	The use of USL tends to provide a balance between false positives and false negatives provided the data												
656	represents a background data set and when many onsite observations need to be compared with the BTV.												
657													
658	TDS												
659													
660	General Statistics												
661	Total Number of Observations					65		Number of Distinct Observations				51	
662								Number of Missing Observations				1	
663	Minimum					1810		First Quartile				2140	
664	Second Largest					4400		Median				2440	
665	Maximum					4700		Third Quartile				3520	
666	Mean					2855		SD				838.9	
667	Coefficient of Variation					0.294		Skewness				0.681	
668	Mean of logged Data					7.917		SD of logged Data				0.28	
669													
670	Critical Values for Background Threshold Values (BTVs)												
671	Tolerance Factor K (For UTL)					2		d2max (for USL)				3.057	
672													
673	Normal GOF Test												
674	Shapiro Wilk Test Statistic					0.85		Normal GOF Test					
675	5% Shapiro Wilk P Value					9.8699E-9		Data Not Normal at 5% Significance Level					
676	Lilliefors Test Statistic					0.197		Lilliefors GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
677	5% Lilliefors Critical Value					0.11	Data Not Normal at 5% Significance Level						
678	Data Not Normal at 5% Significance Level												
679													
680	Background Statistics Assuming Normal Distribution												
681	95% UTL with		95% Coverage		4533	90% Percentile (z)				3930			
682			95% UPL (t)		4266	95% Percentile (z)				4235			
683			95% USL		5419	99% Percentile (z)				4807			
684													
685	Gamma GOF Test												
686	A-D Test Statistic				3.044	Anderson-Darling Gamma GOF Test							
687	5% A-D Critical Value				0.75	Data Not Gamma Distributed at 5% Significance Level							
688	K-S Test Statistic				0.182	Kolmogorov-Smirnov Gamma GOF Test							
689	5% K-S Critical Value				0.11	Data Not Gamma Distributed at 5% Significance Level							
690	Data Not Gamma Distributed at 5% Significance Level												
691													
692	Gamma Statistics												
693	k hat (MLE)				12.7	k star (bias corrected MLE)				12.12			
694	Theta hat (MLE)				224.8	Theta star (bias corrected MLE)				235.5			
695	nu hat (MLE)				1651	nu star (bias corrected)				1576			
696	MLE Mean (bias corrected)				2855	MLE Sd (bias corrected)				820			
697													
698	Background Statistics Assuming Gamma Distribution												
699	95% Wilson Hilferty (WH) Approx. Gamma UPL				4340	90% Percentile				3943			
700	95% Hawkins Wixley (HW) Approx. Gamma UPL				4352	95% Percentile				4324			
701	95% WH Approx. Gamma UTL with		95% Coverage		4689	99% Percentile				5100			
702	95% HW Approx. Gamma UTL with		95% Coverage		4715								
703			95% WH USL		5980	95% HW USL				6082			
704													
705	Lognormal GOF Test												
706	Shapiro Wilk Test Statistic				0.874	Shapiro Wilk Lognormal GOF Test							
707	5% Shapiro Wilk P Value				3.3106E-7	Data Not Lognormal at 5% Significance Level							
708	Lilliefors Test Statistic				0.17	Lilliefors Lognormal GOF Test							
709	5% Lilliefors Critical Value				0.11	Data Not Lognormal at 5% Significance Level							
710	Data Not Lognormal at 5% Significance Level												
711													
712	Background Statistics assuming Lognormal Distribution												
713	95% UTL with		95% Coverage		4805	90% Percentile (z)				3929			
714			95% UPL (t)		4395	95% Percentile (z)				4349			
715			95% USL		6460	99% Percentile (z)				5264			
716													
717	Nonparametric Distribution Free Background Statistics												
718	Data do not follow a Discernible Distribution (0.05)												
719													
720	Nonparametric Upper Limits for Background Threshold Values												
721	Order of Statistic, r				64	95% UTL with 95% Coverage				4400			
722	Approx, f used to compute achieved CC				1.684	Approximate Actual Confidence Coefficient achieved by UTL				0.842			
723						Approximate Sample Size needed to achieve specified CC				93			
724	95% Percentile Bootstrap UTL with		95% Coverage		4400	95% BCA Bootstrap UTL with		95% Coverage		4398			
725			95% UPL		4378			90% Percentile		4176			
726			90% Chebyshev UPL		5391			95% Percentile		4322			
727			95% Chebyshev UPL		6540			99% Percentile		4508			
728			95% USL		4700								

	A	B	C	D	E	F	G	H	I	J	K	L
729												
730	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
731	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
732	and consists of observations collected from clean unimpacted locations.											
733	The use of USL tends to provide a balance between false positives and false negatives provided the data											
734	represents a background data set and when many onsite observations need to be compared with the BTV.											
735												

APPENDIX F

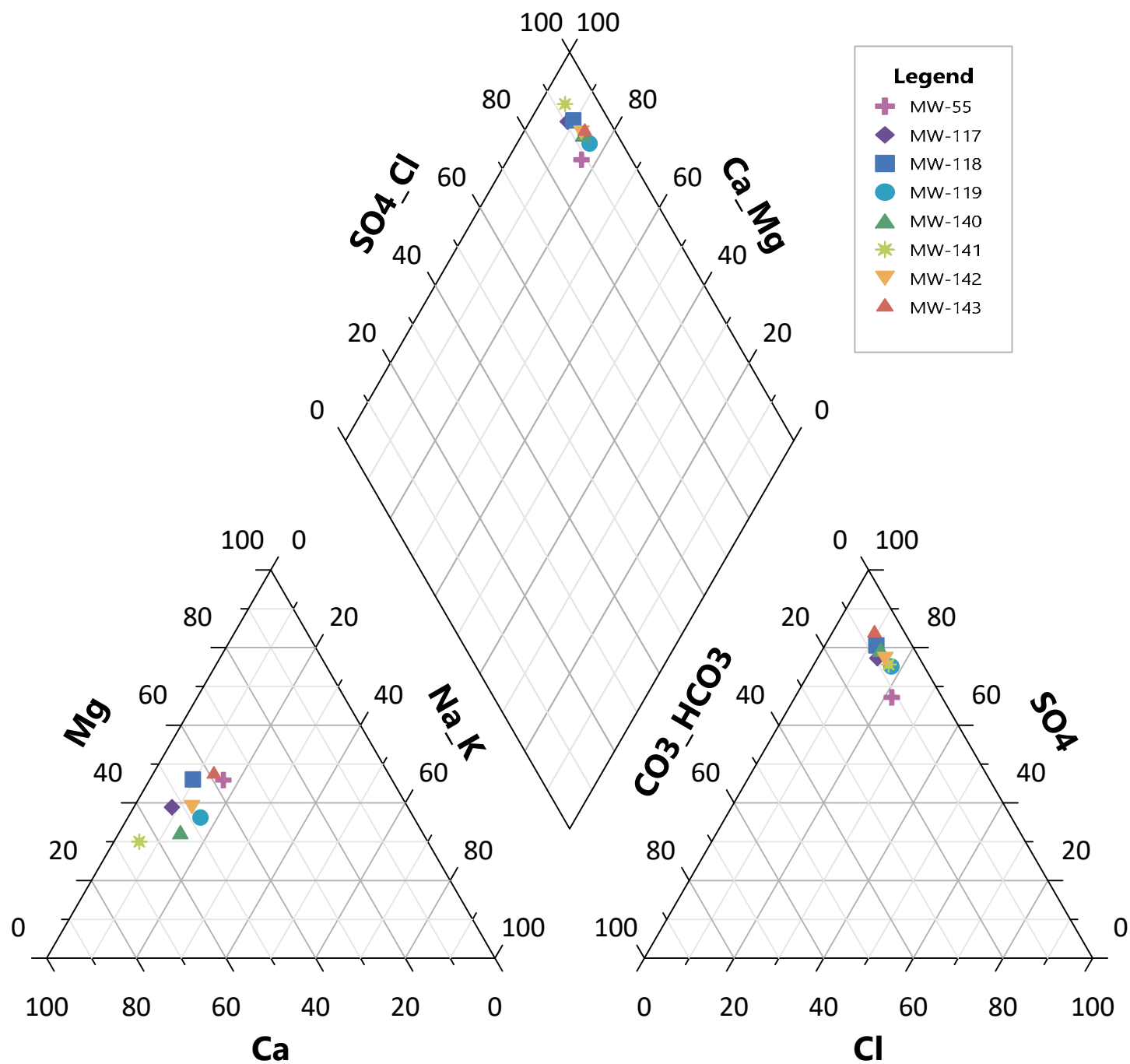
WATER CLASSIFICATION DIAGRAMS

North RO Reject Discharge Field

Piper Diagram

RO Reject Field Stage 1 Abatement - First Quarterly Progress Report

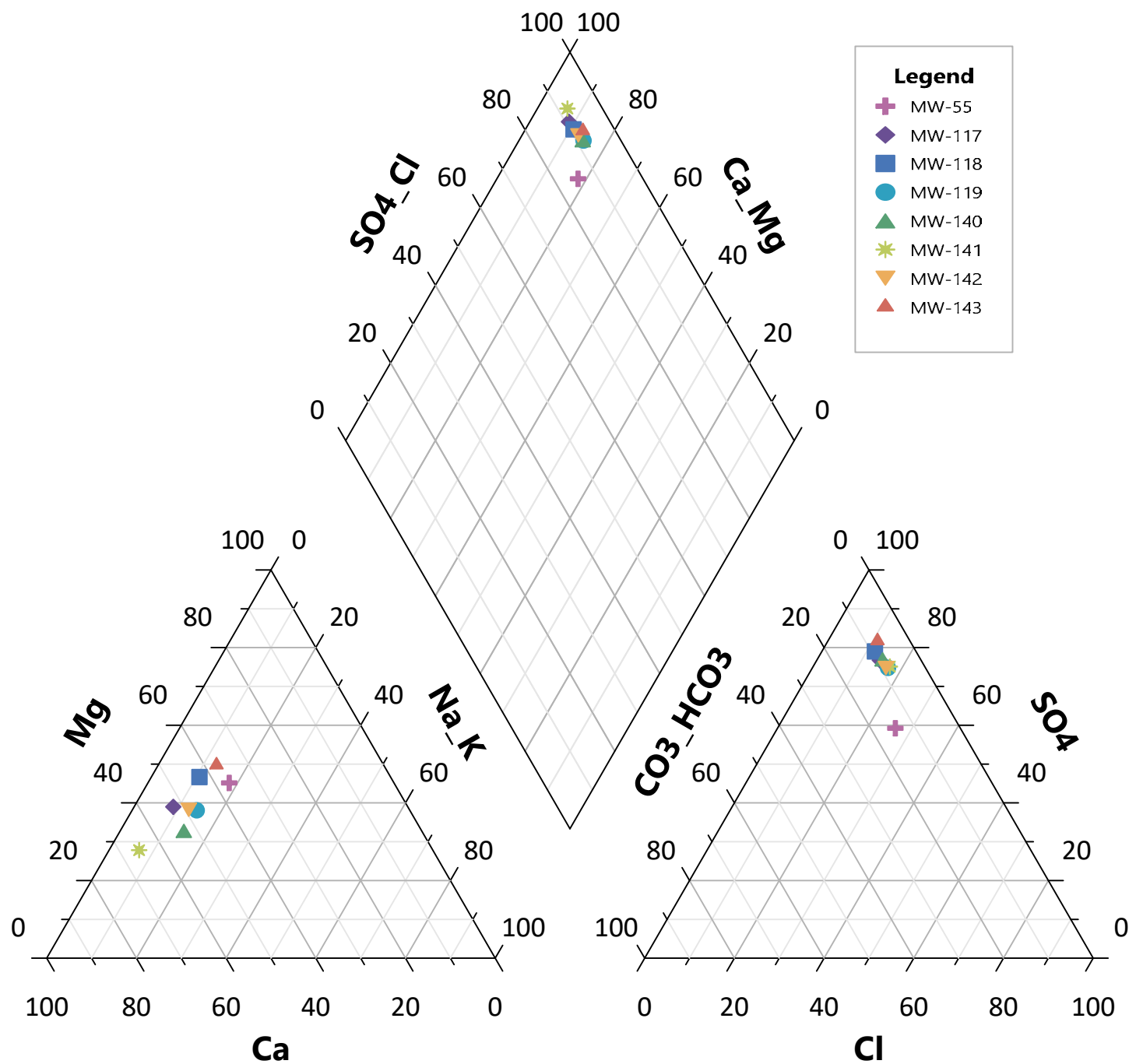
North RO Field Monitoring Wells - July 2019



Piper Diagram

RO Reject Field Stage 1 Abatement - Second Quarterly Progress Report

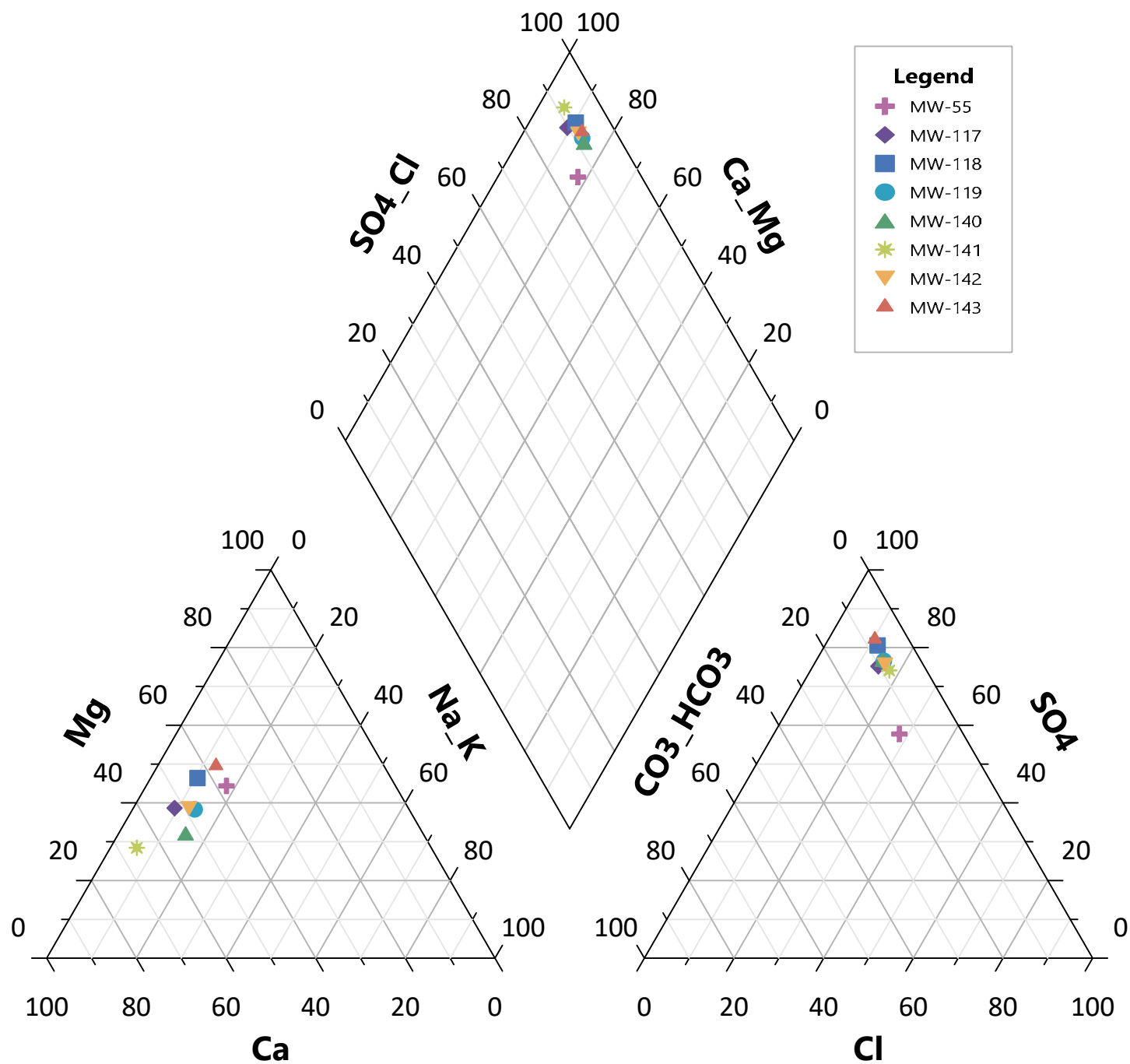
North RO Field Monitoring Wells - October 2019



Piper Diagram

RO Reject Field Stage 1 Abatement - Third Quarterly Progress Report

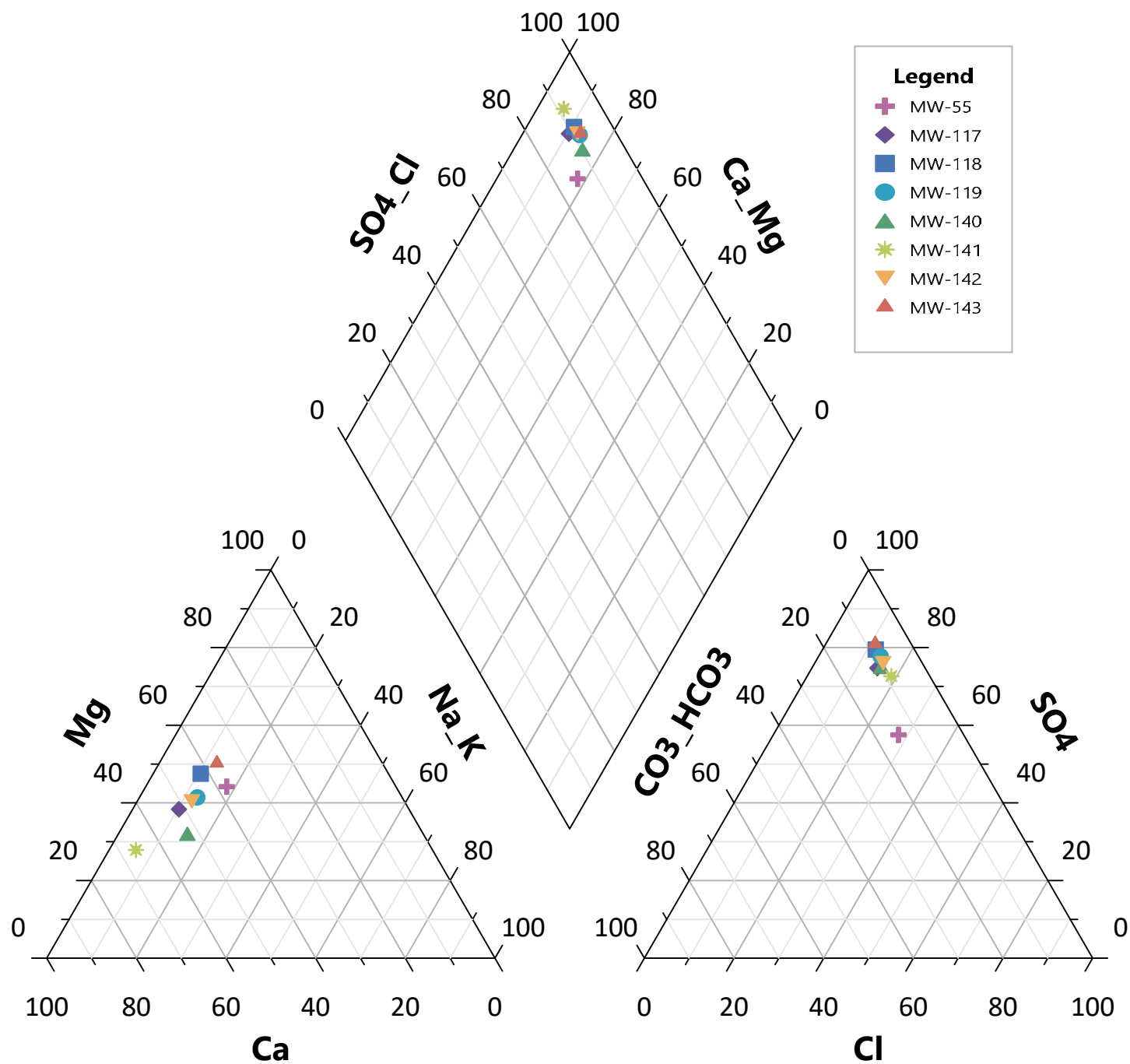
North RO Field Monitoring Wells - January 2020



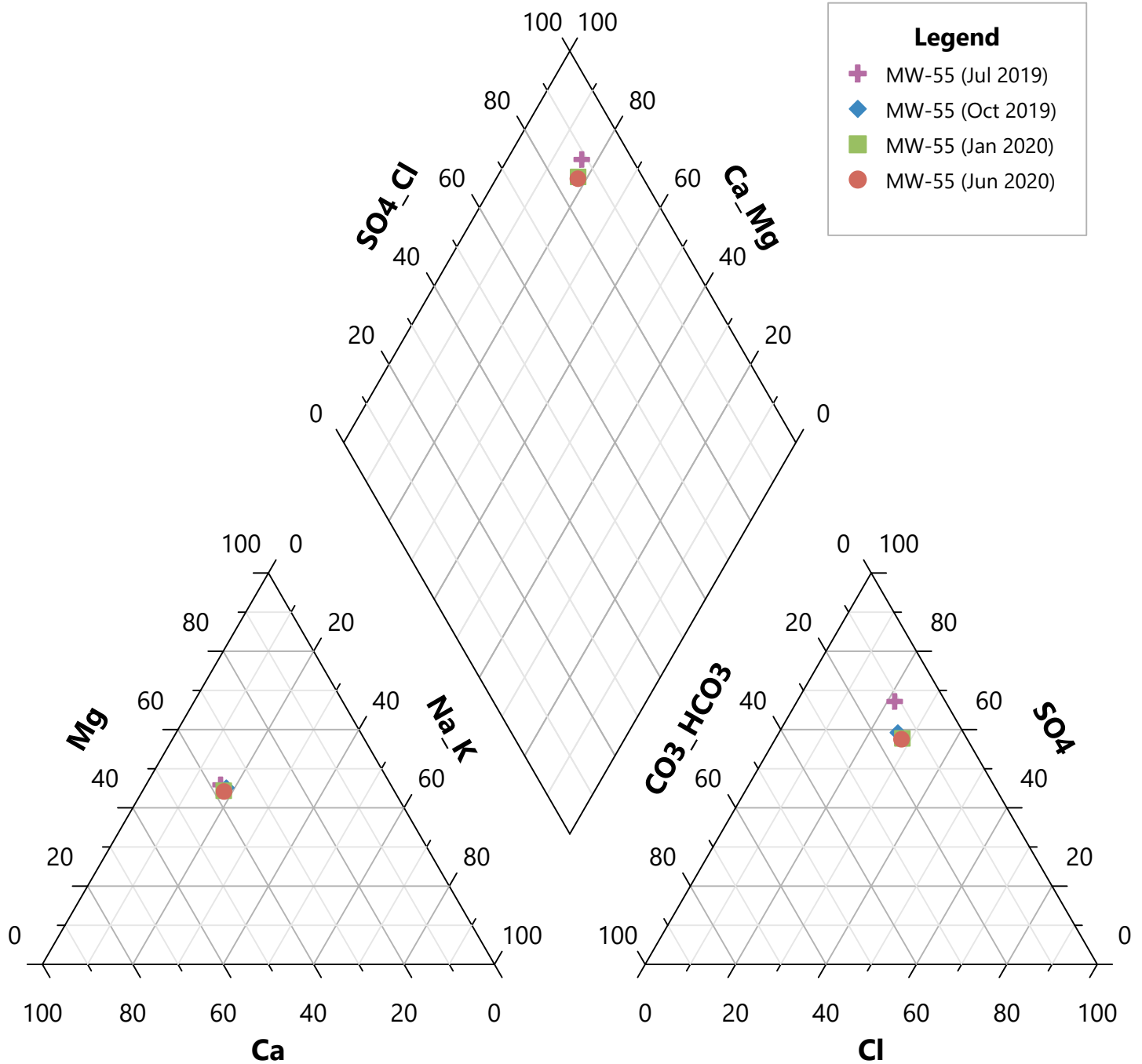
Piper Diagram

RO Reject Field Stage 1 Abatement - Fourth Quarterly Progress Report

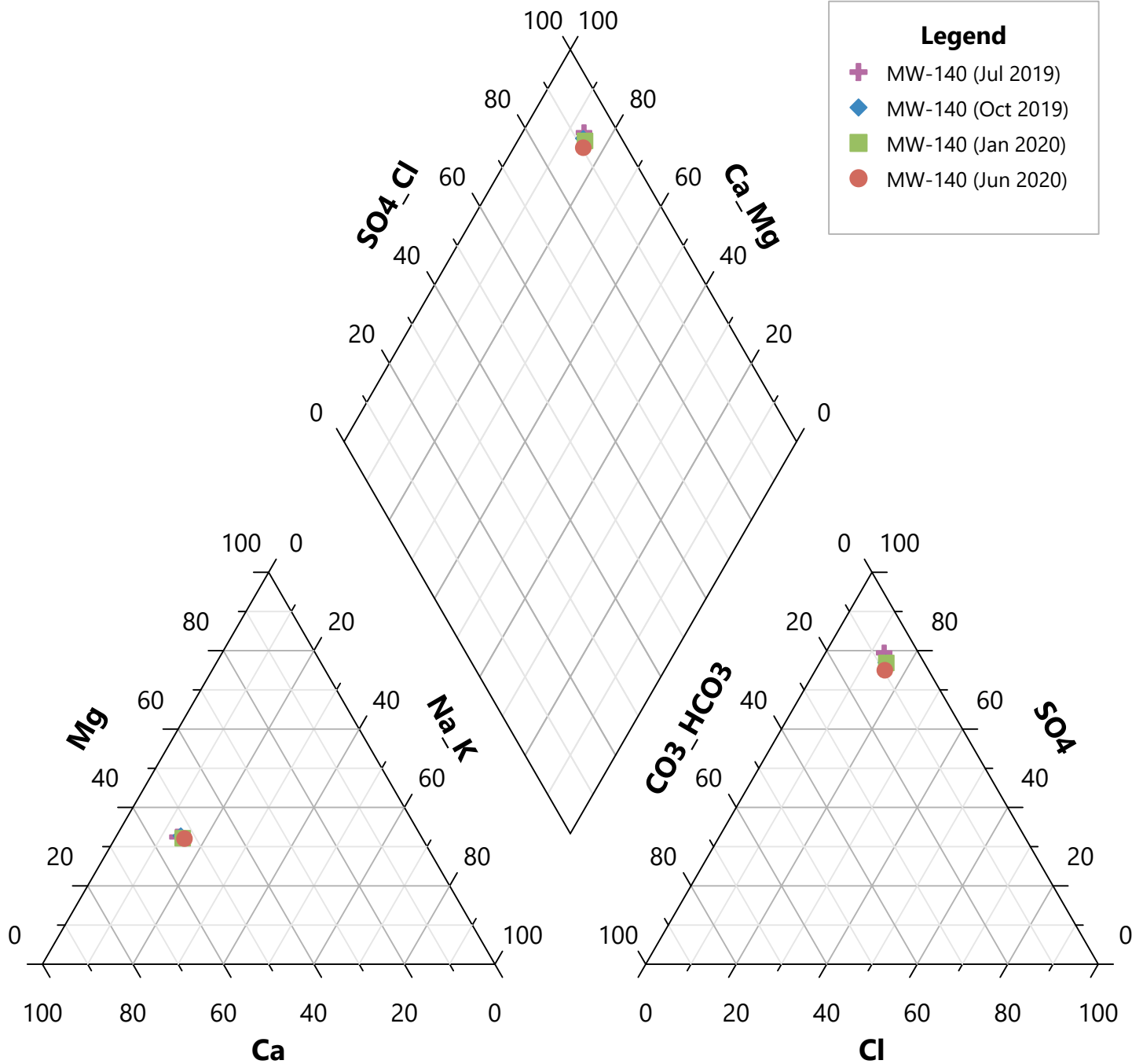
North RO Field Monitoring Wells - June 2020



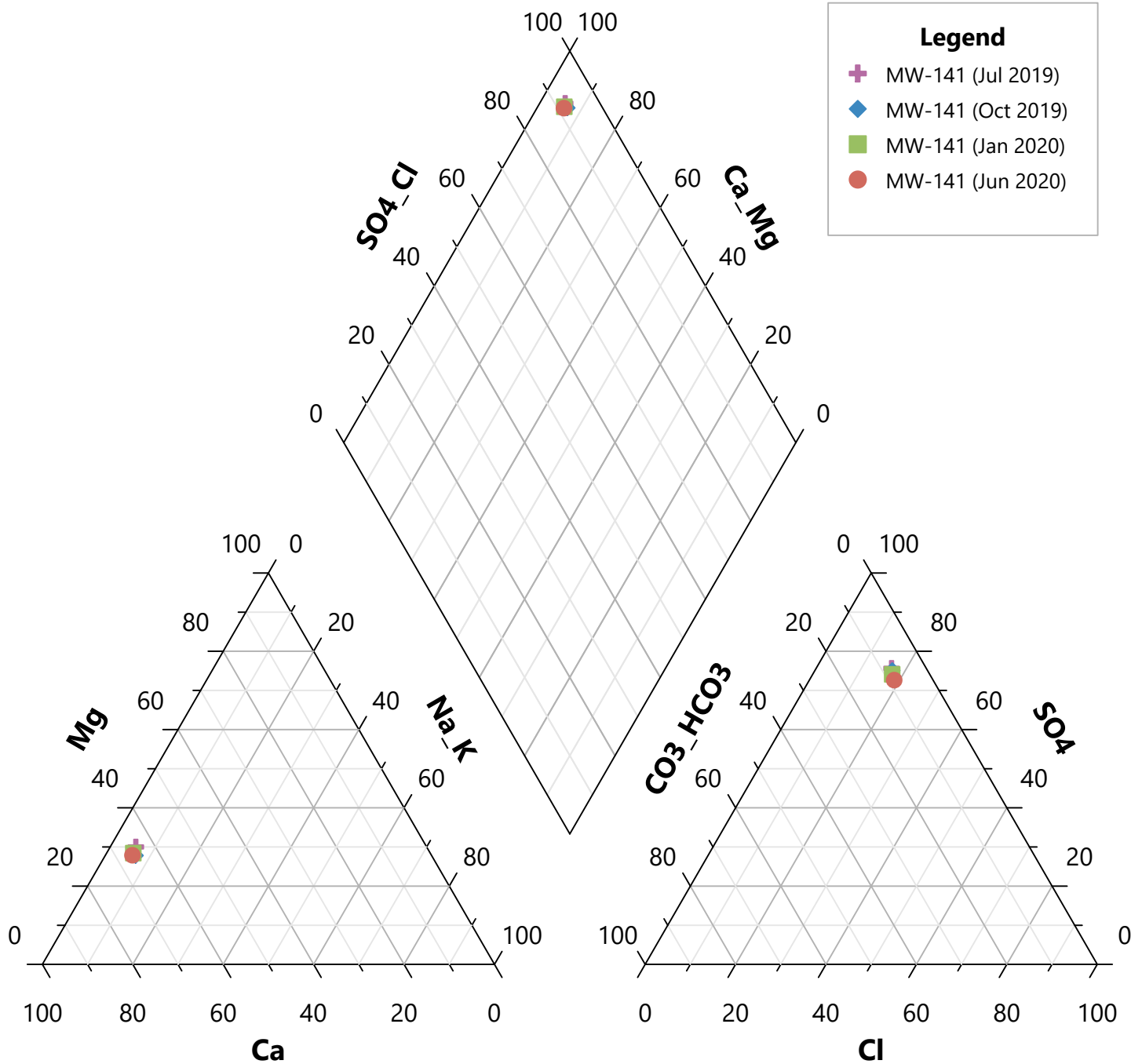
Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-55



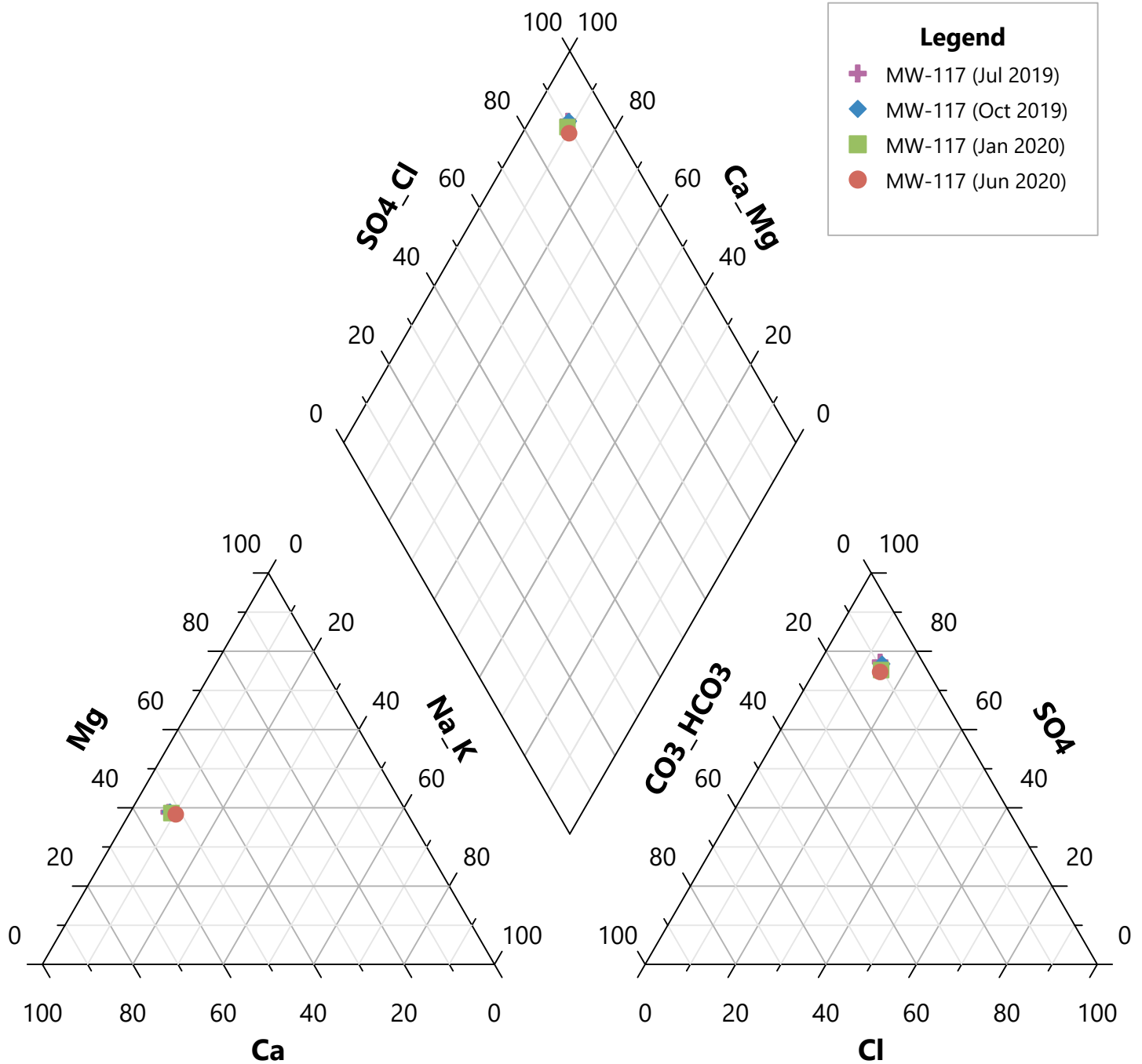
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RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-140



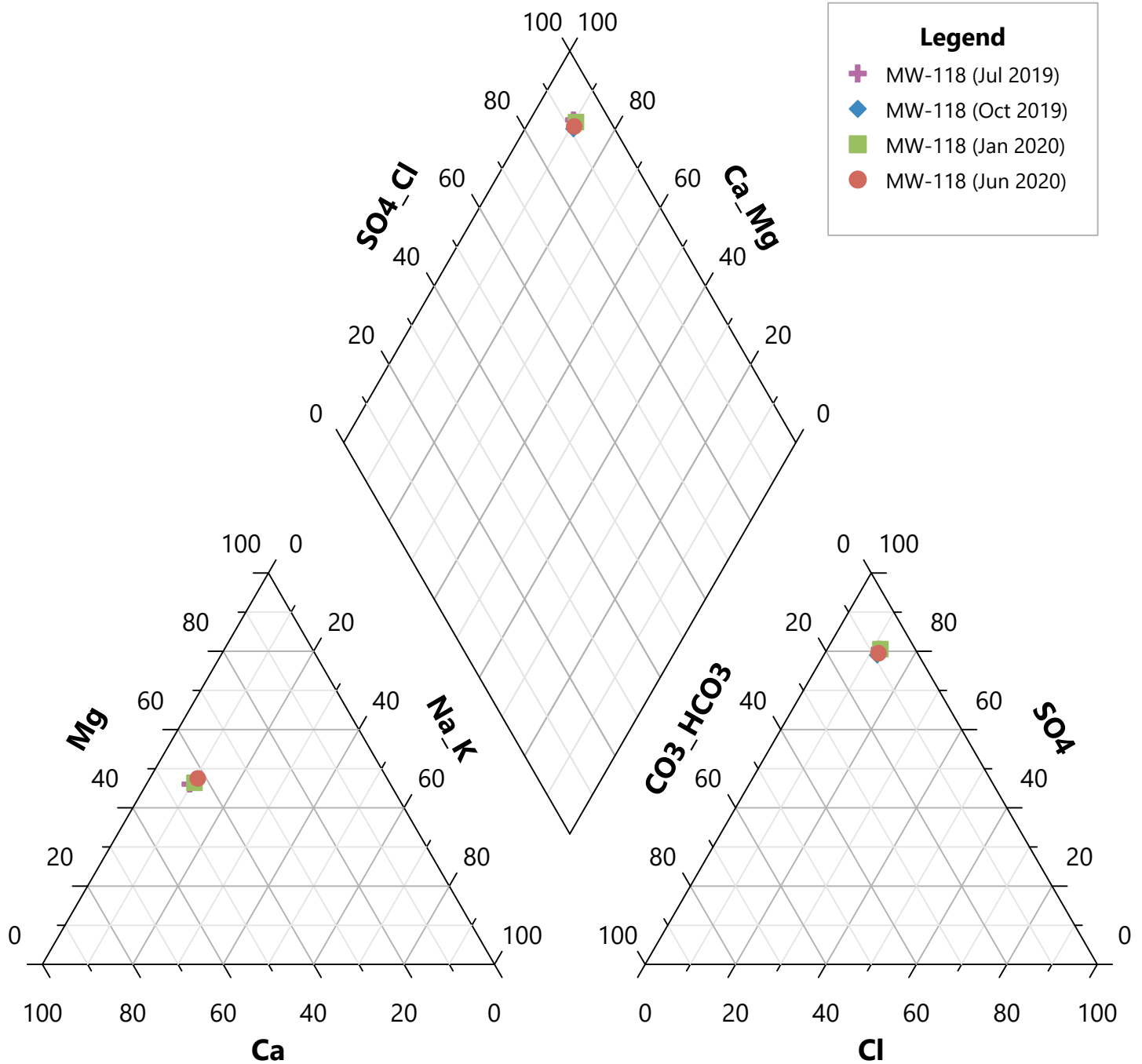
Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-141



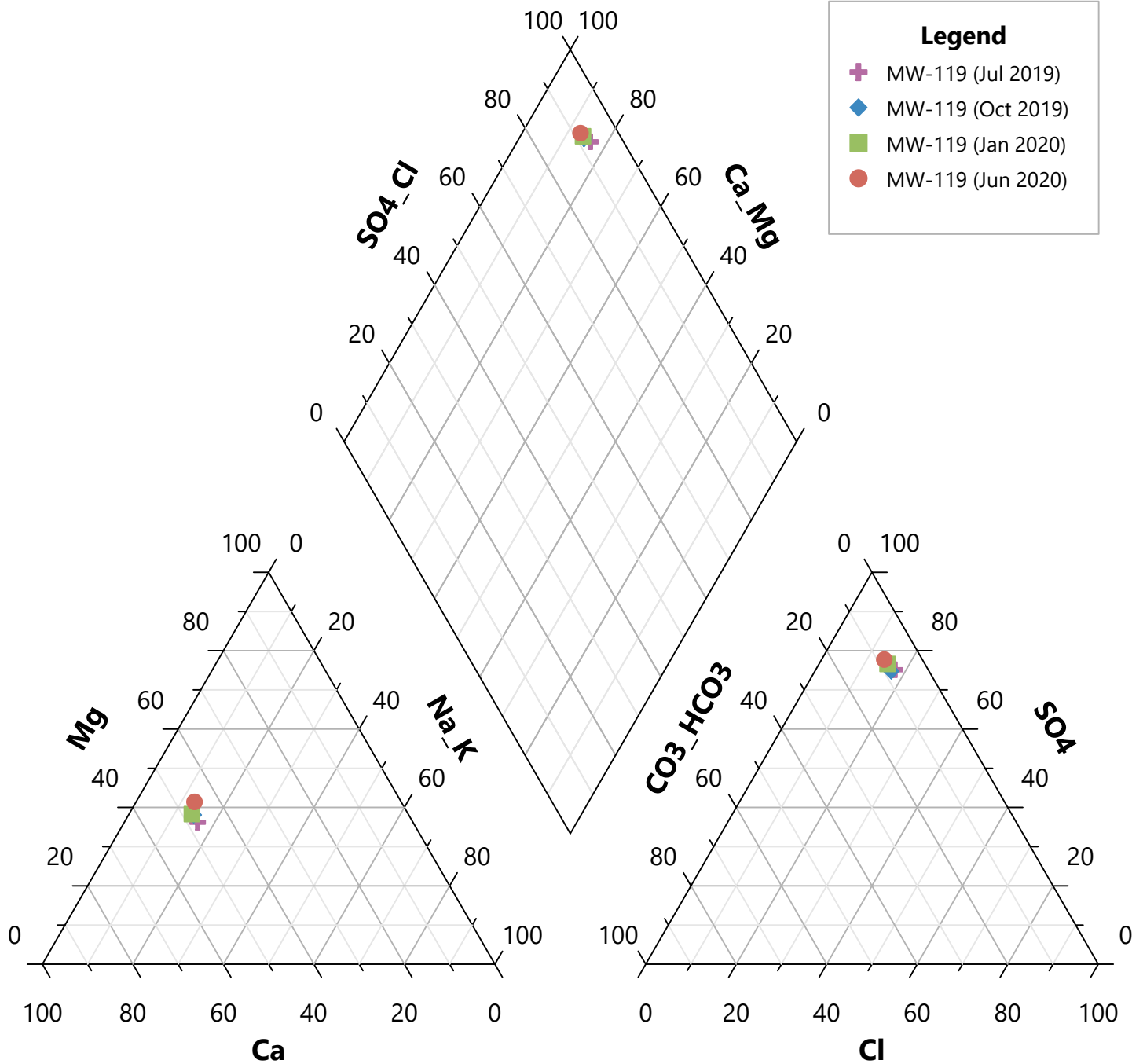
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RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-117



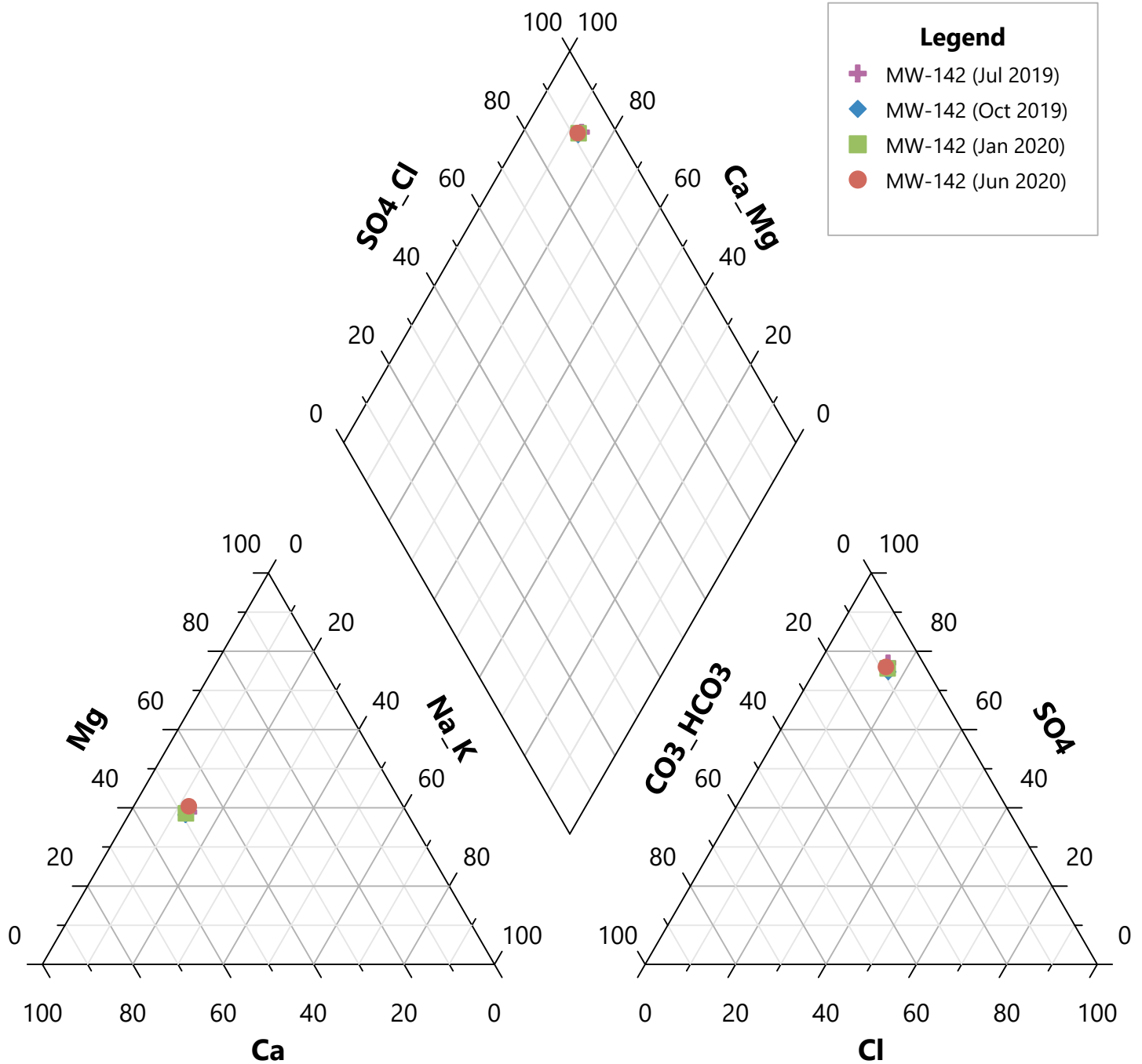
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RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-118



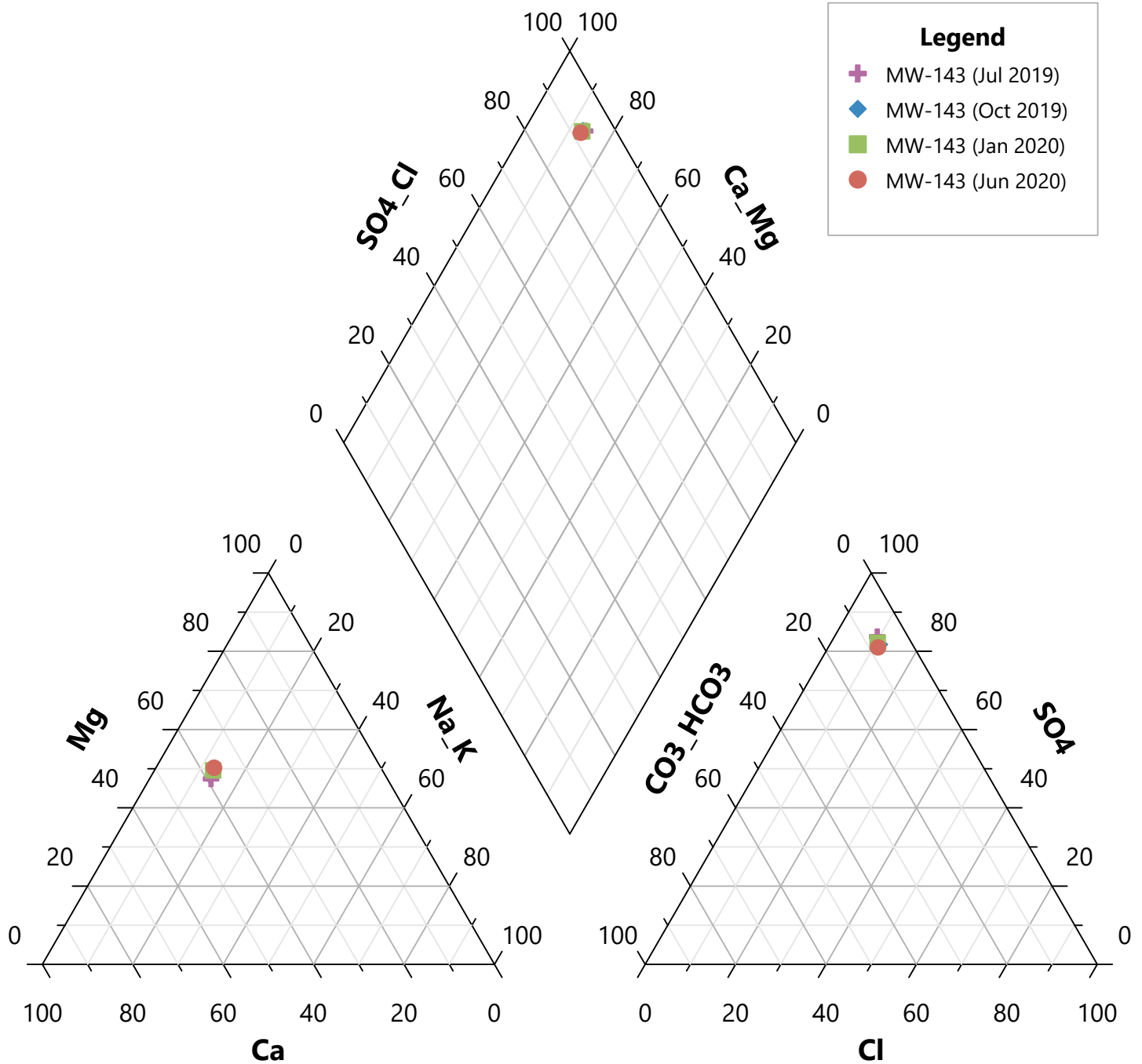
Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-119



Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-142



Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
North RO Field - MW-143



STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Final Report
North RO Field - Upgradient Monitoring Wells - Cumulative Quarterly Data

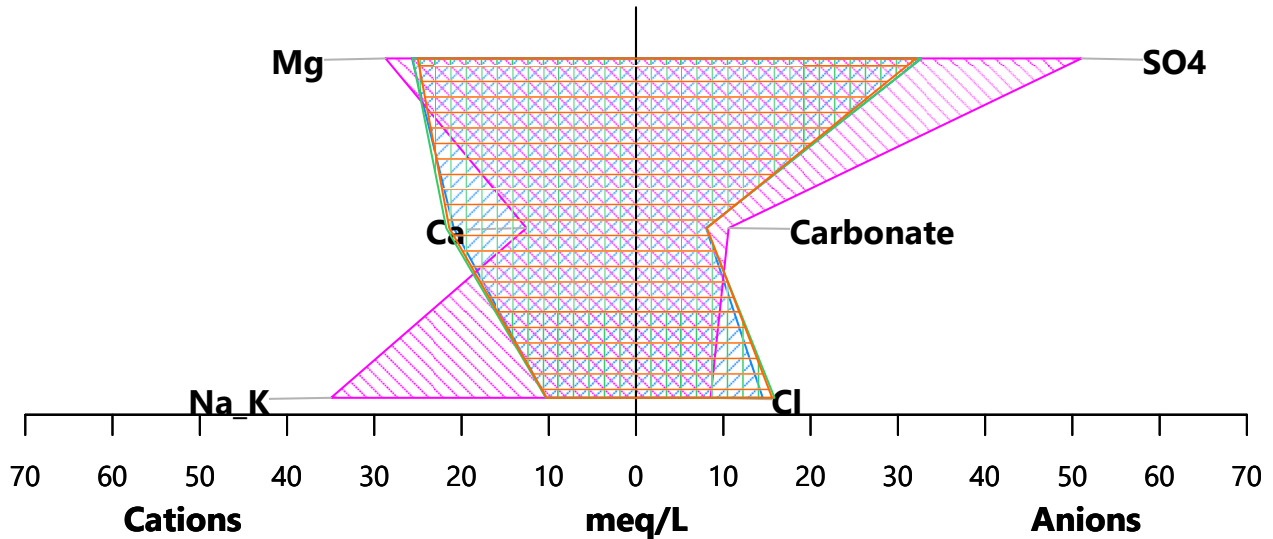
7/2019

10/2019

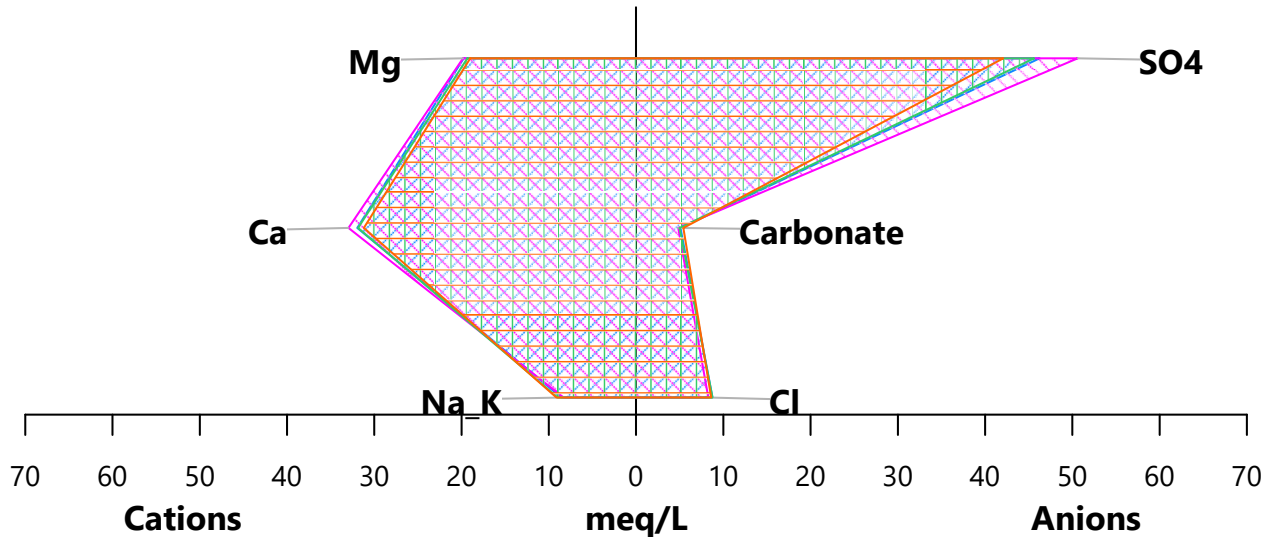
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06/2020

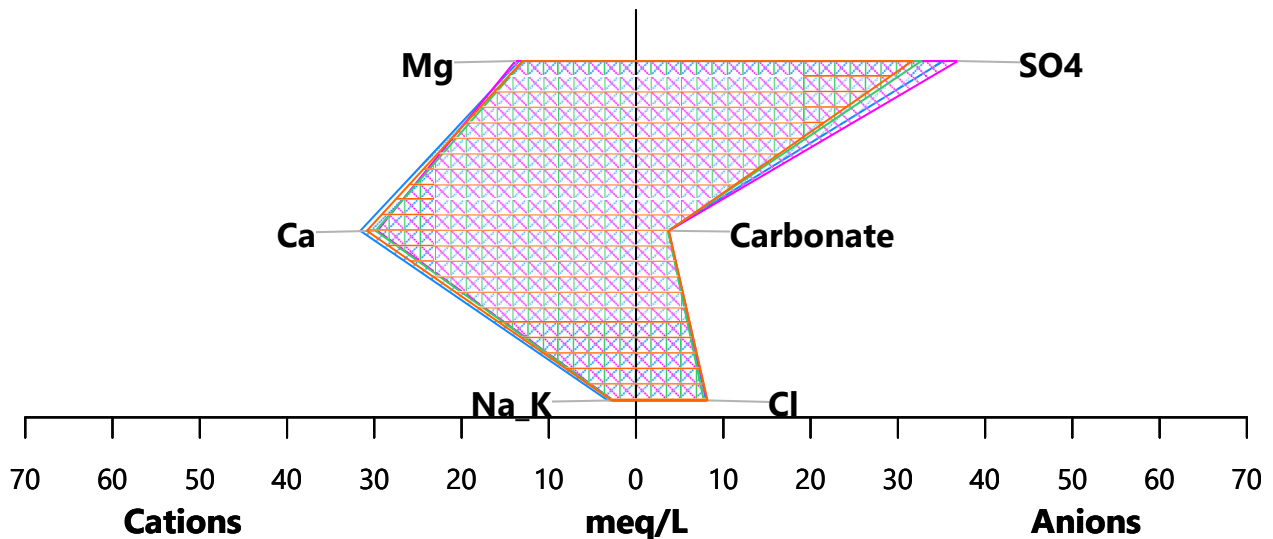
MW-55



MW-29

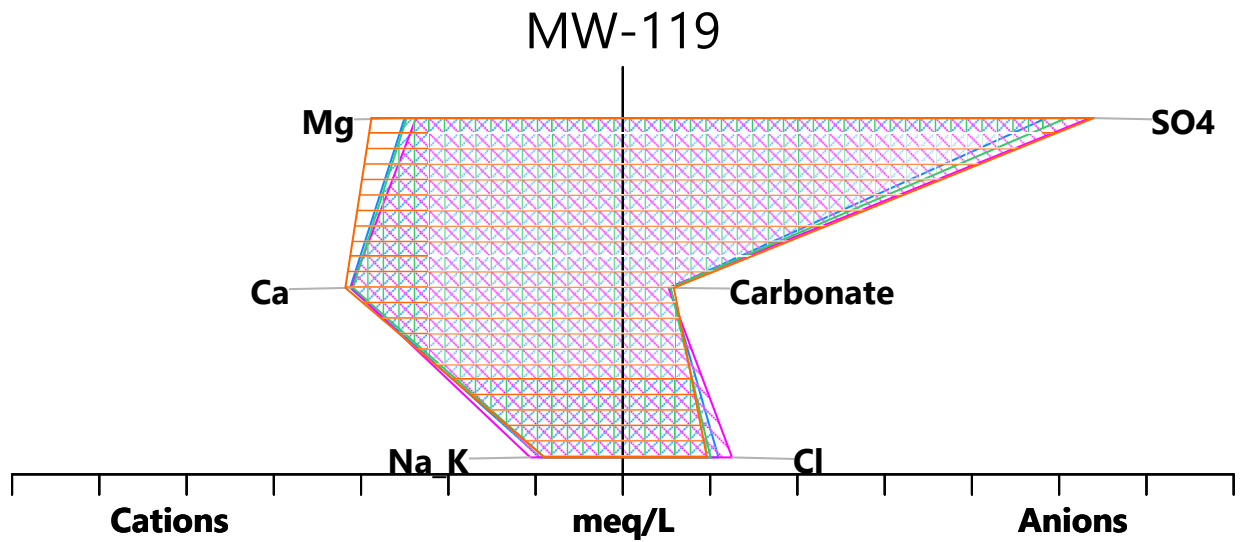
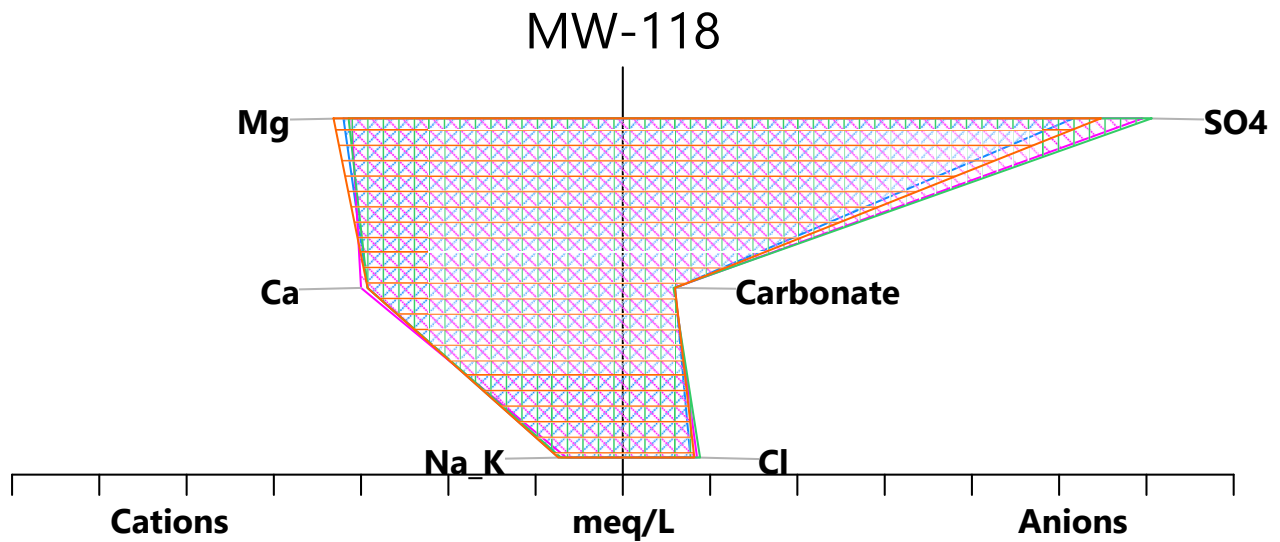
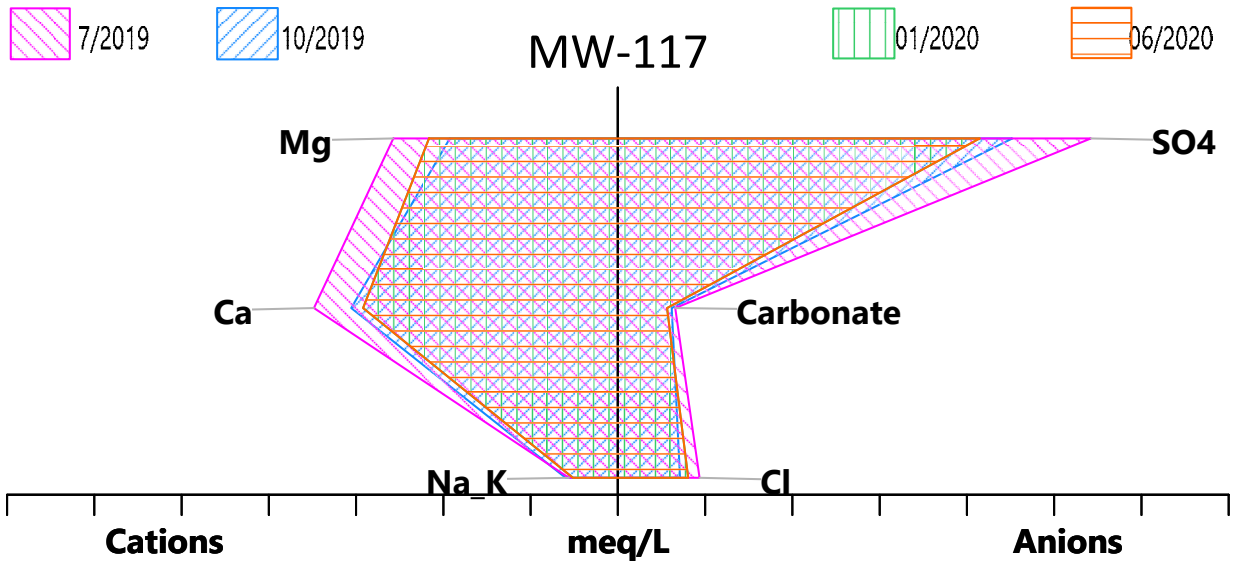


MW-141



STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Final Report
North RO Field - In Field Monitoring Wells - Cumulative Quarterly Data



STIFF DIAGRAMS

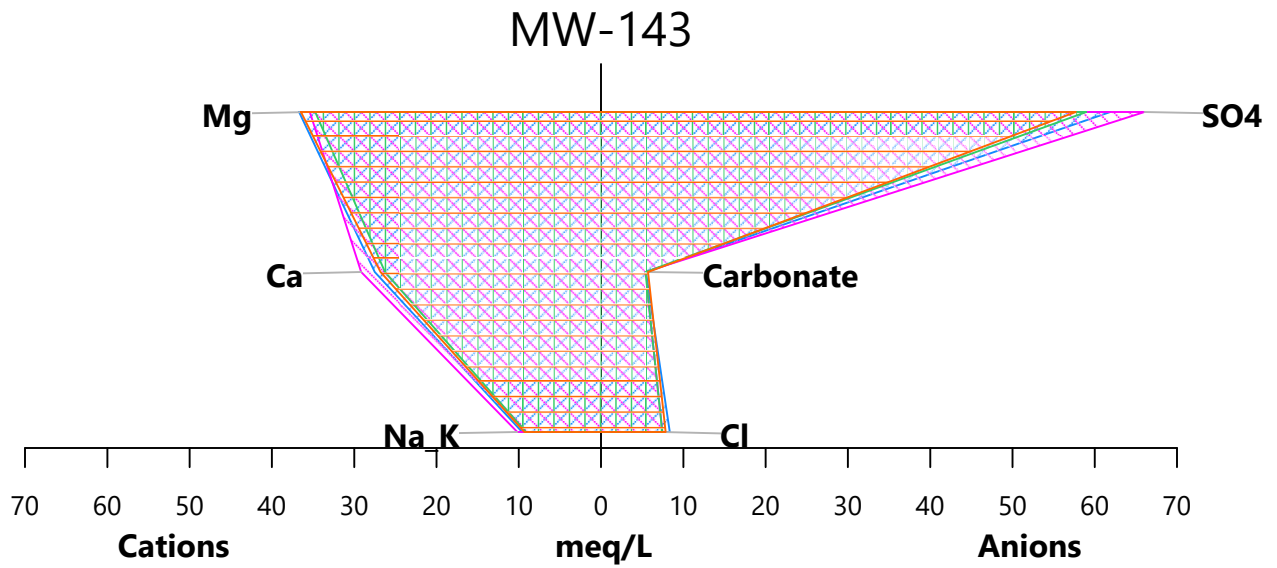
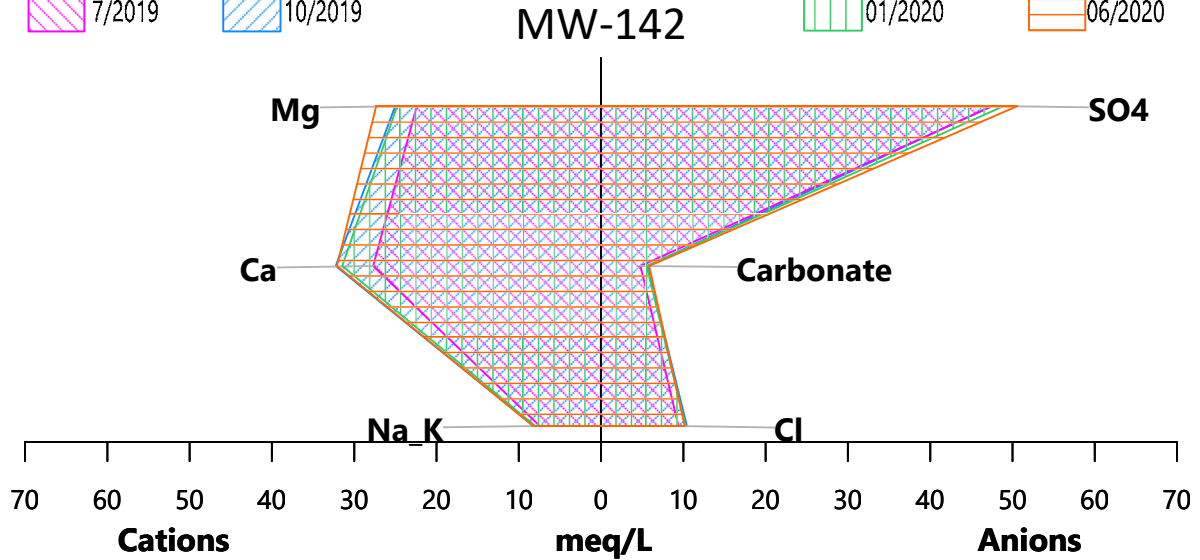
RO Reject Discharge Fields Stage 1 Abatement - Final Report
North RO Field - Downgradient Monitoring Wells - Cumulative Quarterly Data

7/2019

10/2019

01/2020

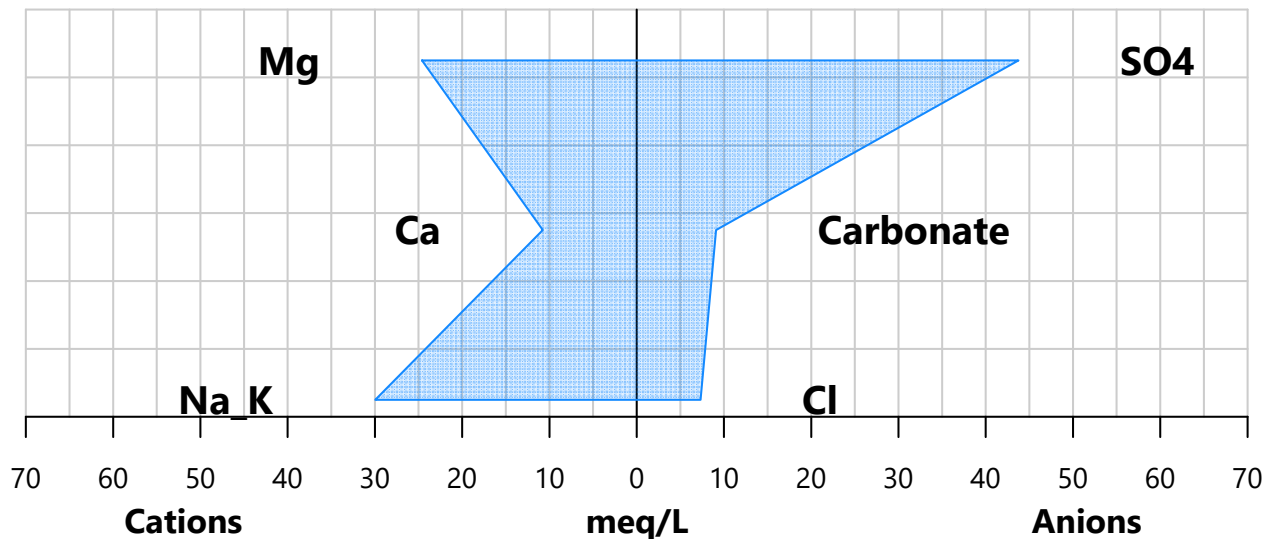
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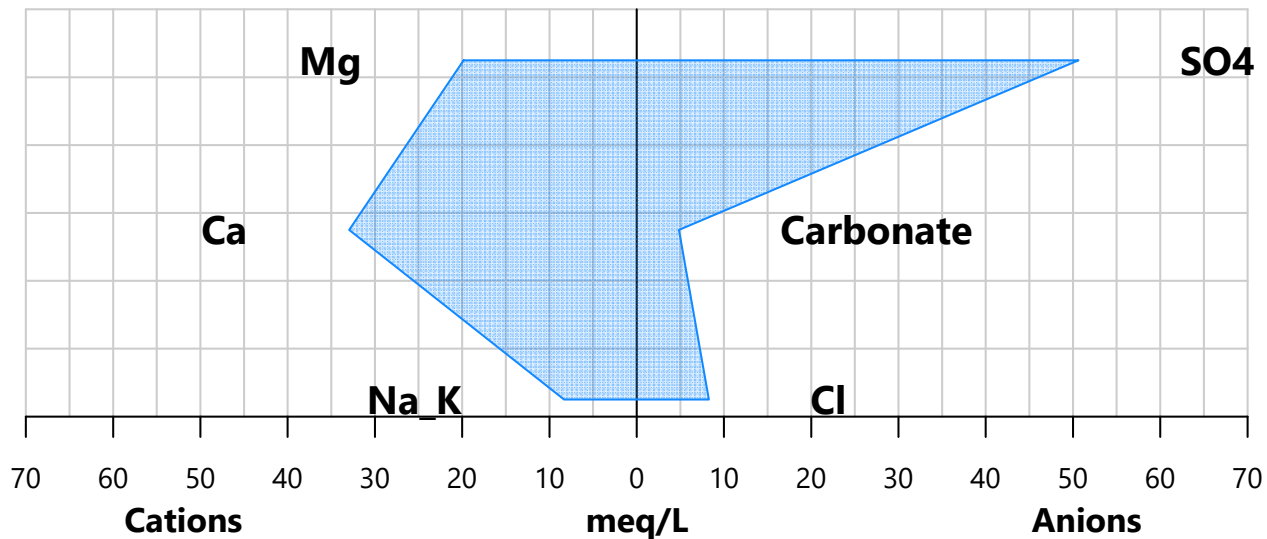
STIFF DIAGRAMS

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

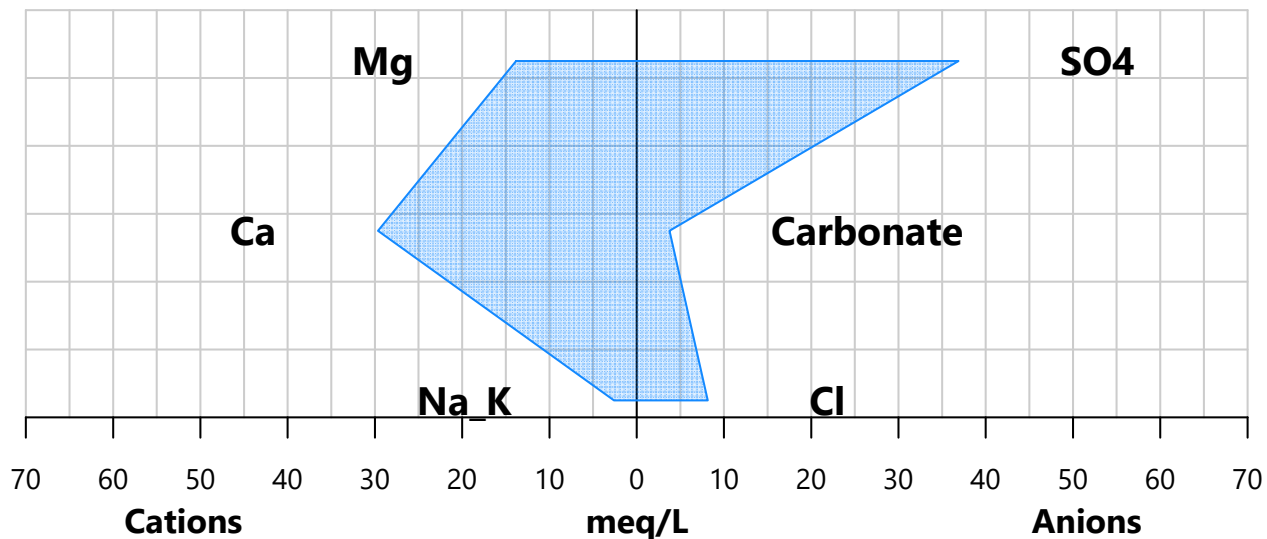
MW-55



MW-140



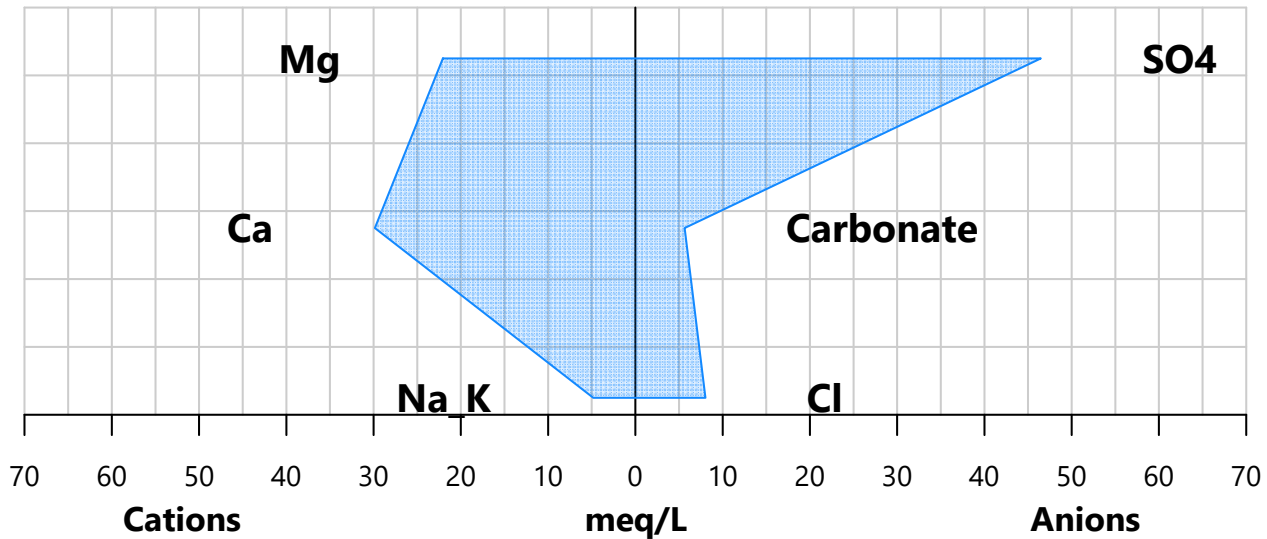
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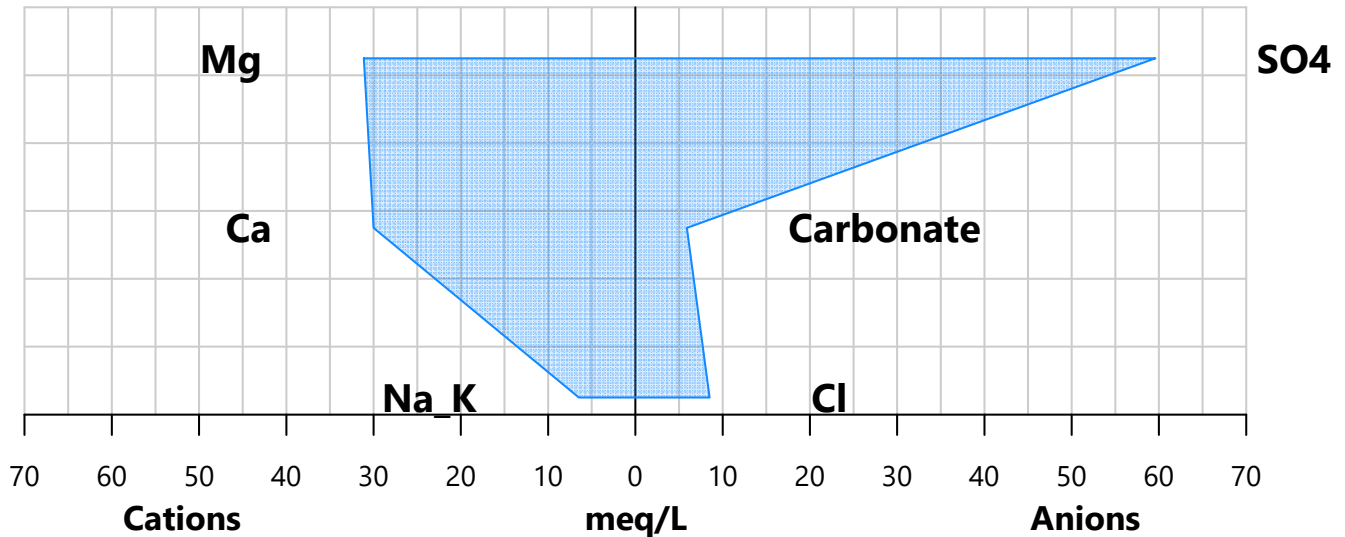
STIFF DIAGRAMS

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

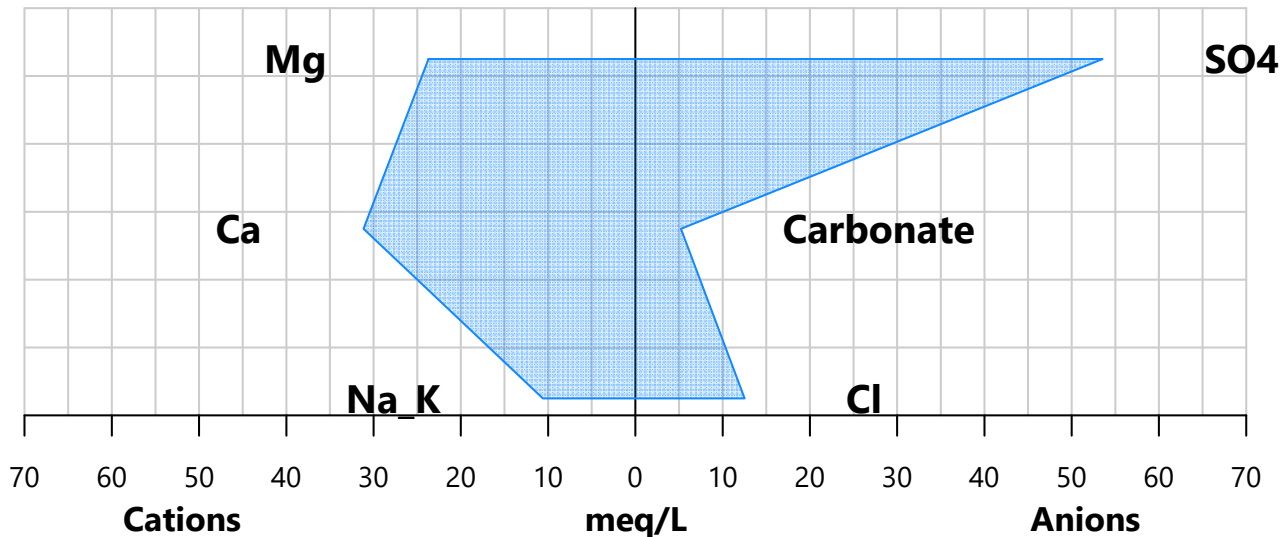
MW-117



MW-118



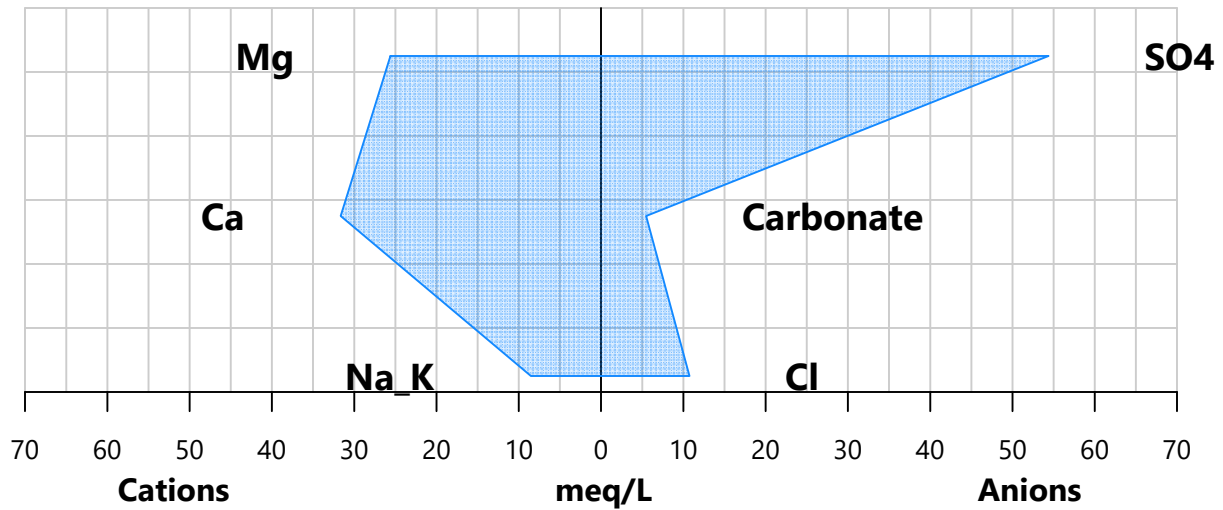
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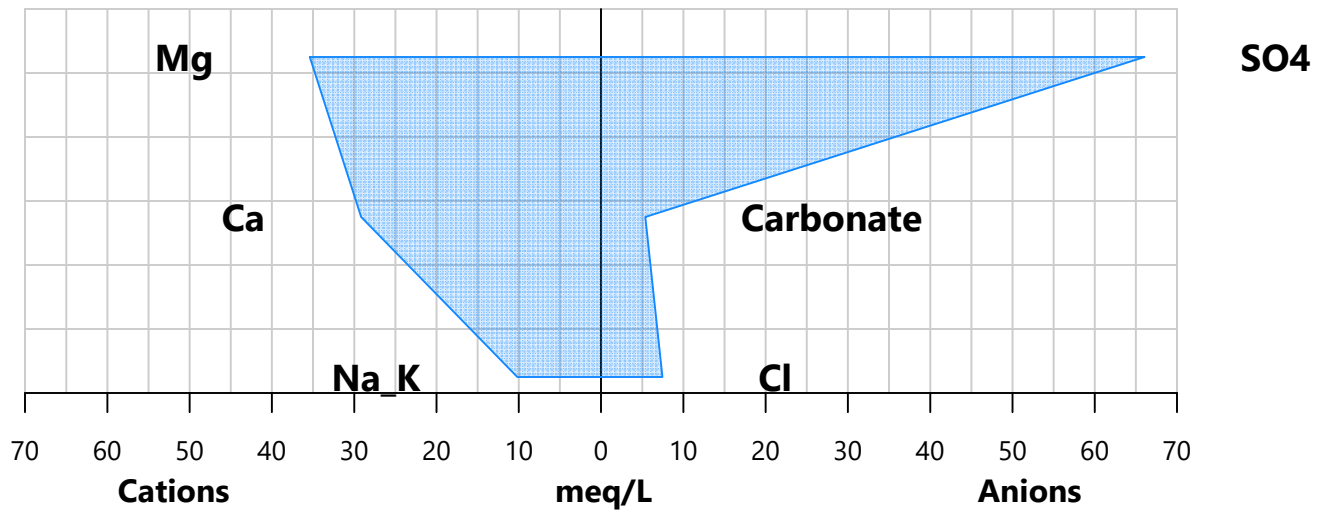
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - First Quarterly Progress Report
North RO Field - Downgradient Monitoring Wells - July 2019

MW-142



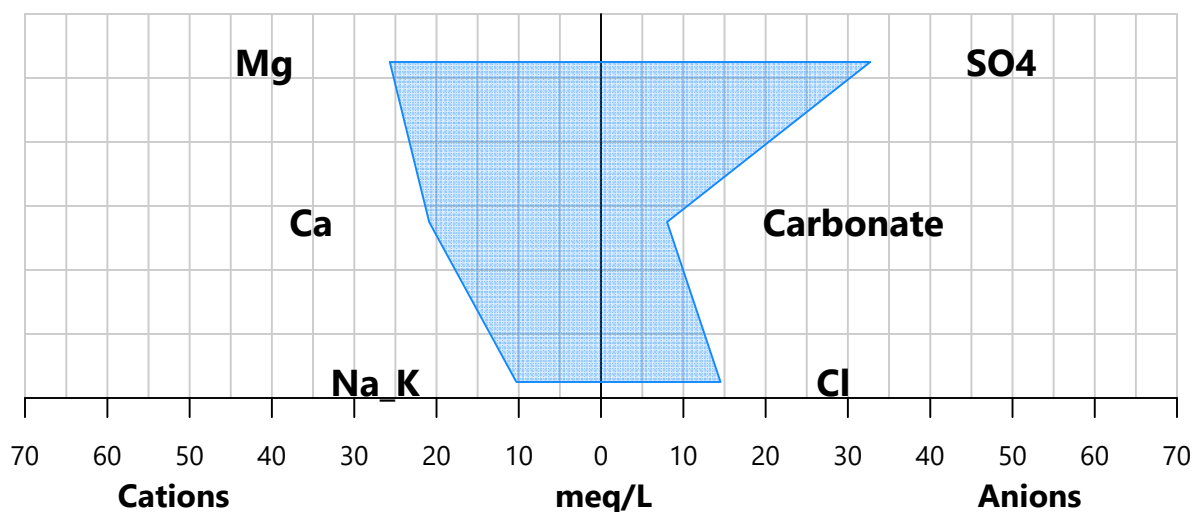
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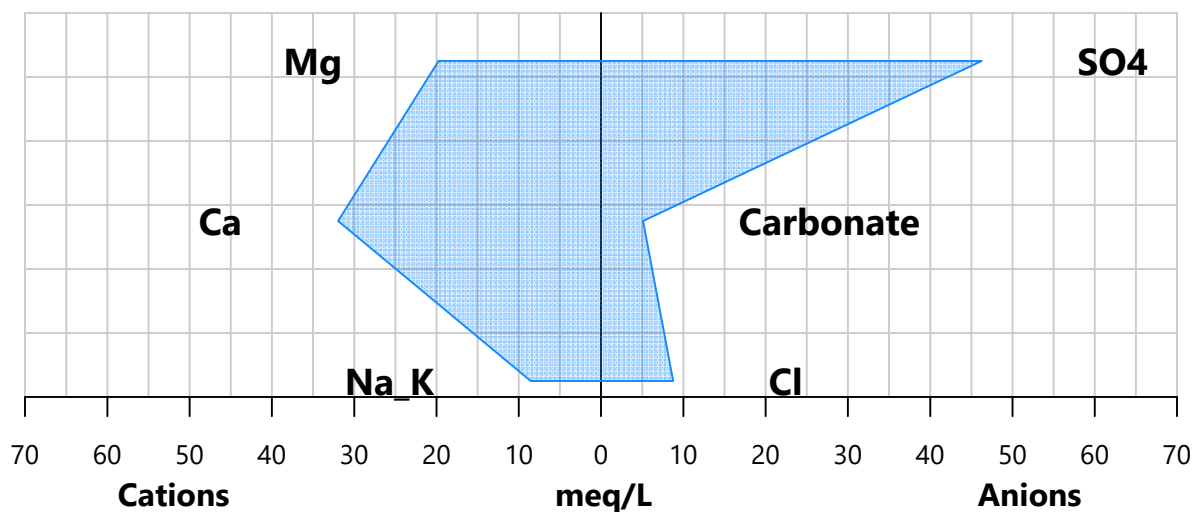
STIFF DIAGRAMS

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

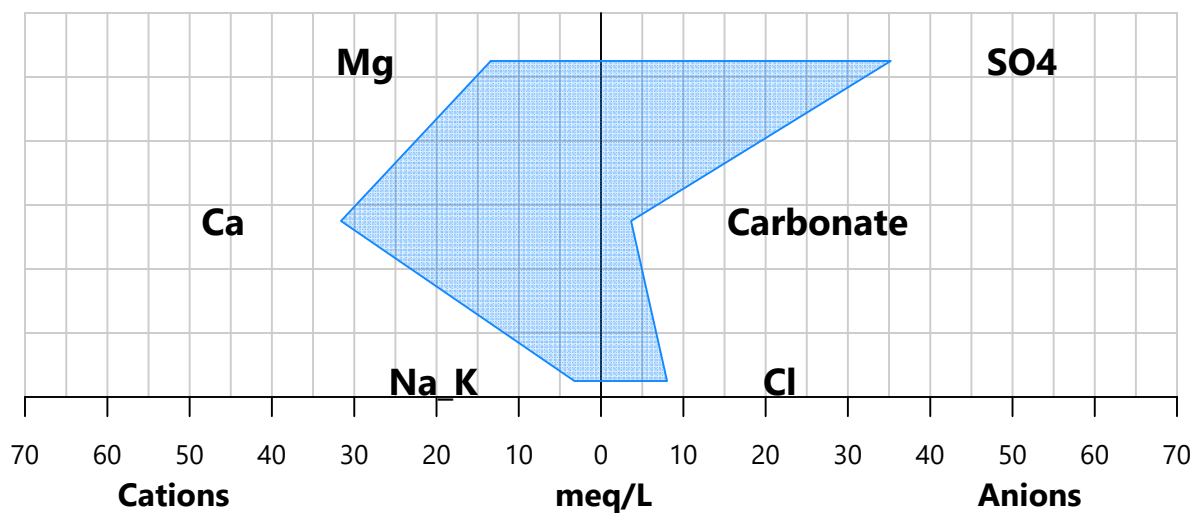
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MW-140



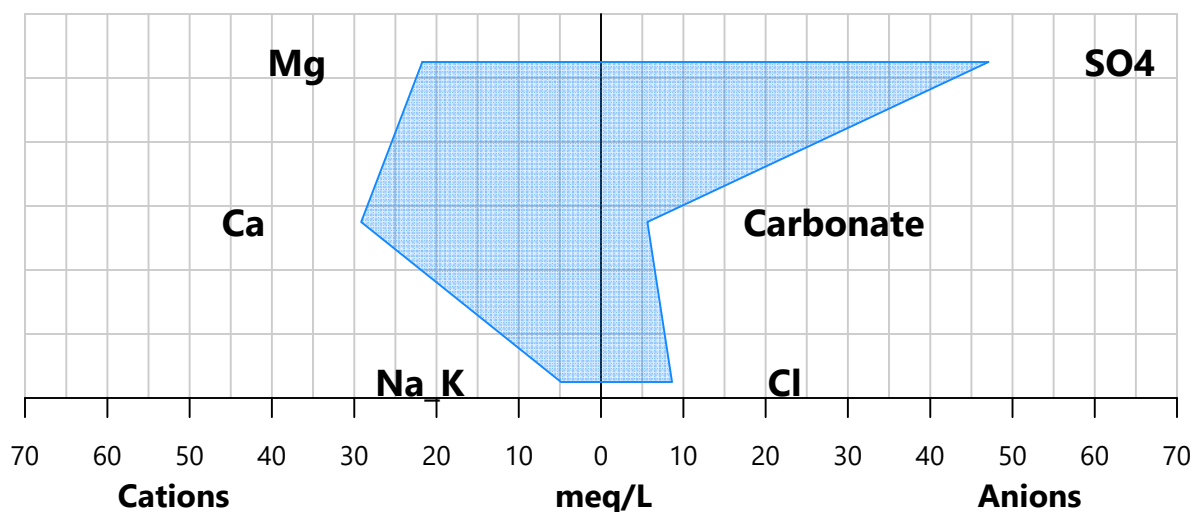
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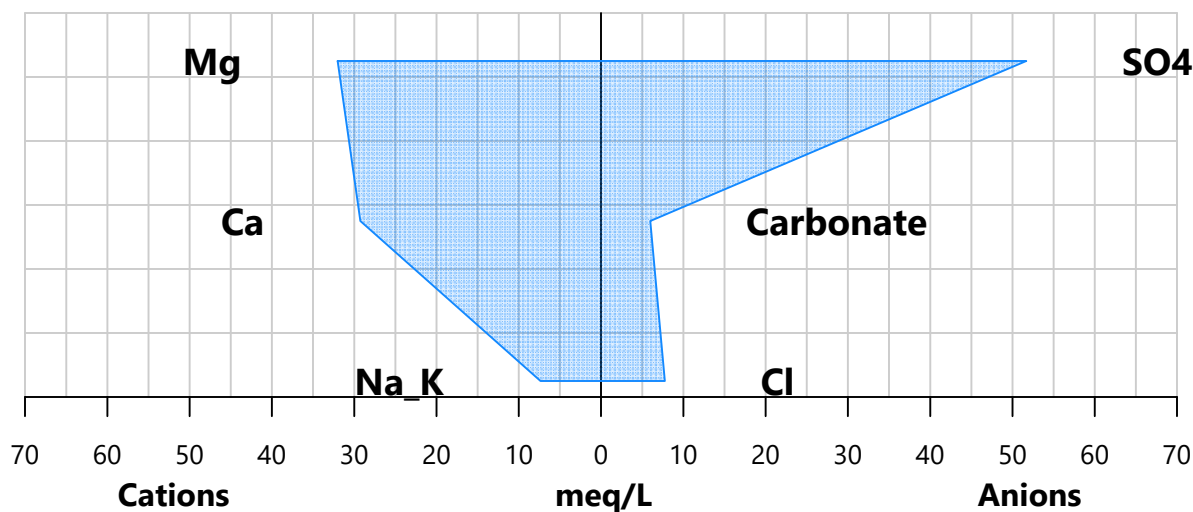
STIFF DIAGRAMS

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

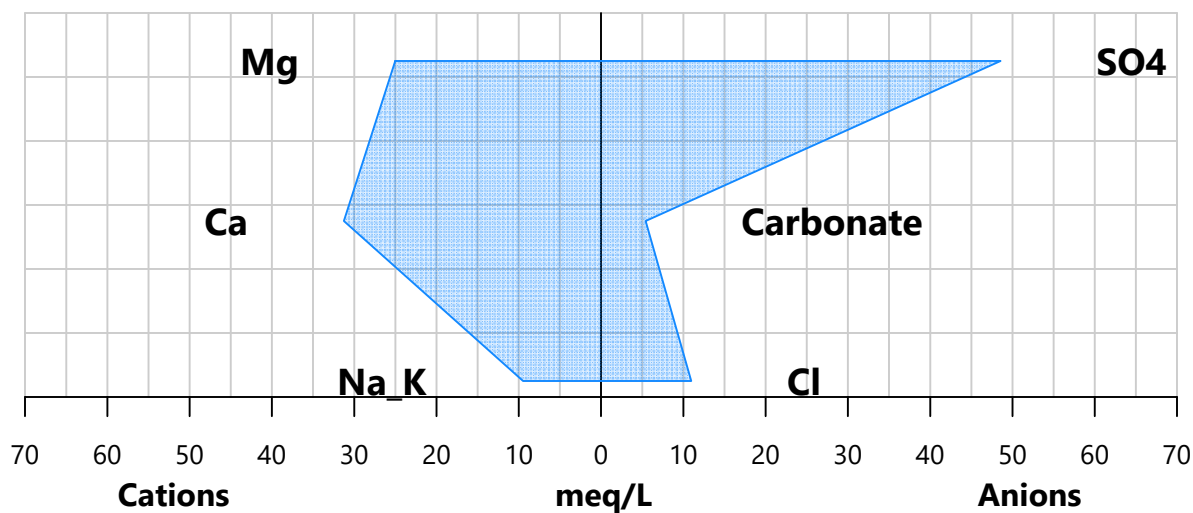
MW-117



MW-118



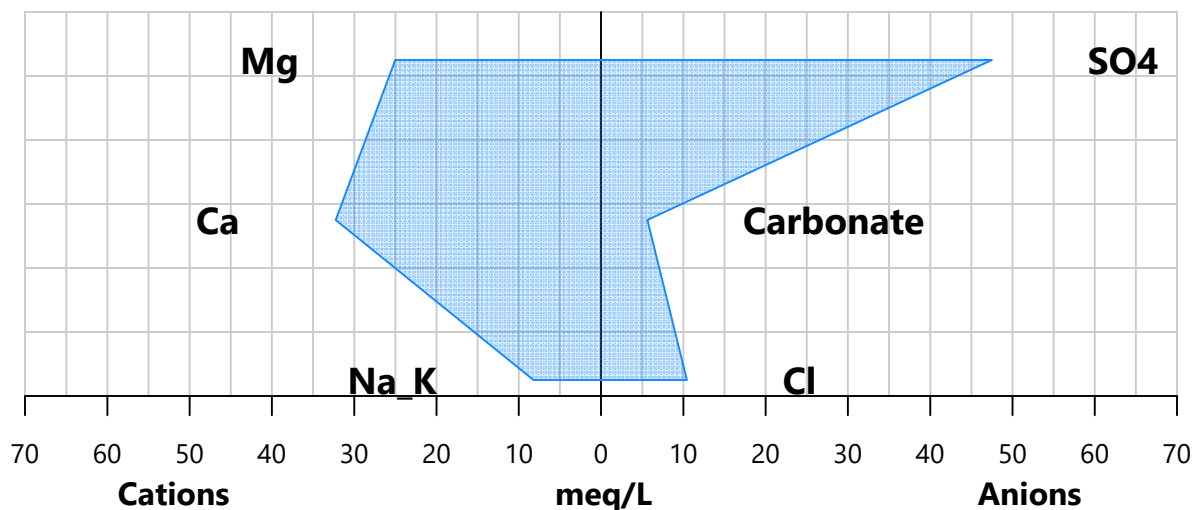
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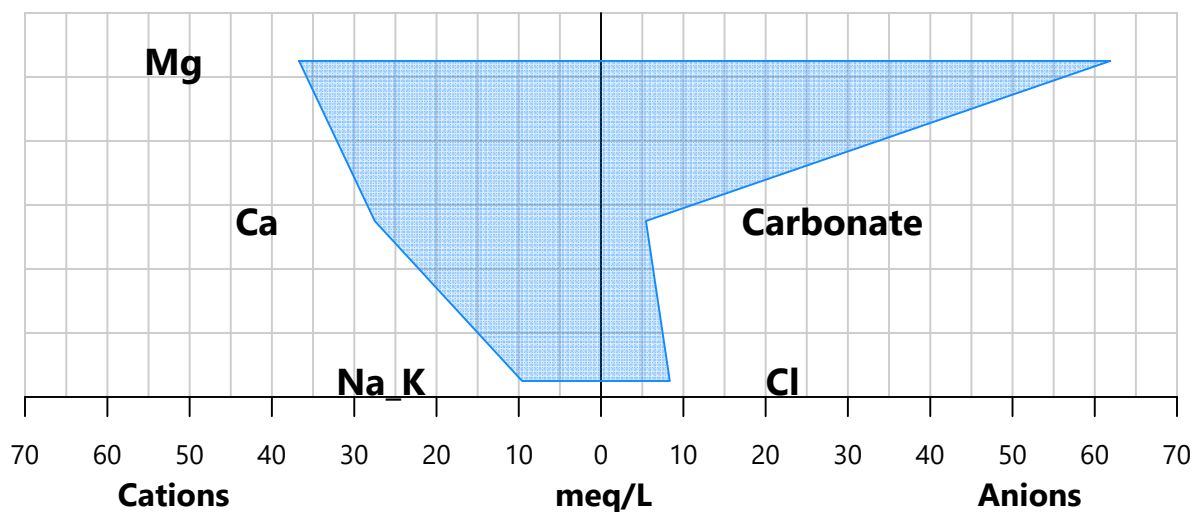
STIFF DIAGRAMS

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

MW-142



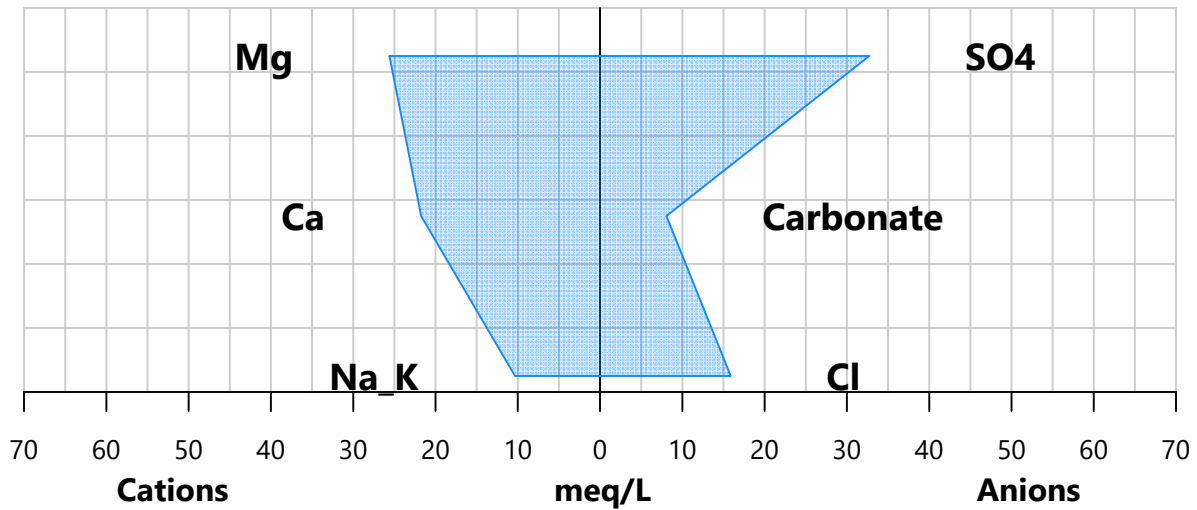
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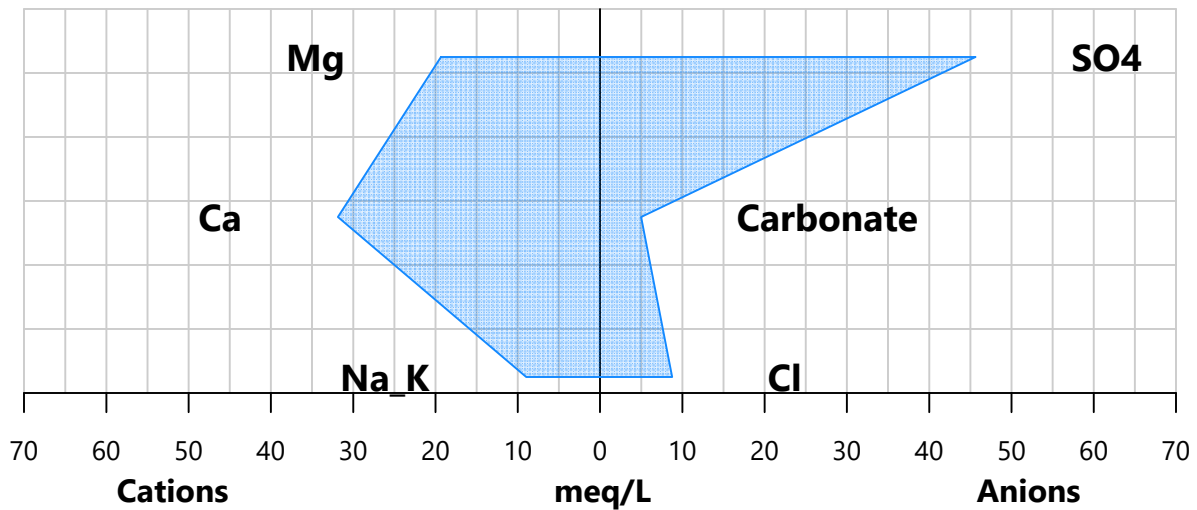
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Third Quarterly Progress Report
North RO Field - Upgradient Monitoring Wells - January 2020

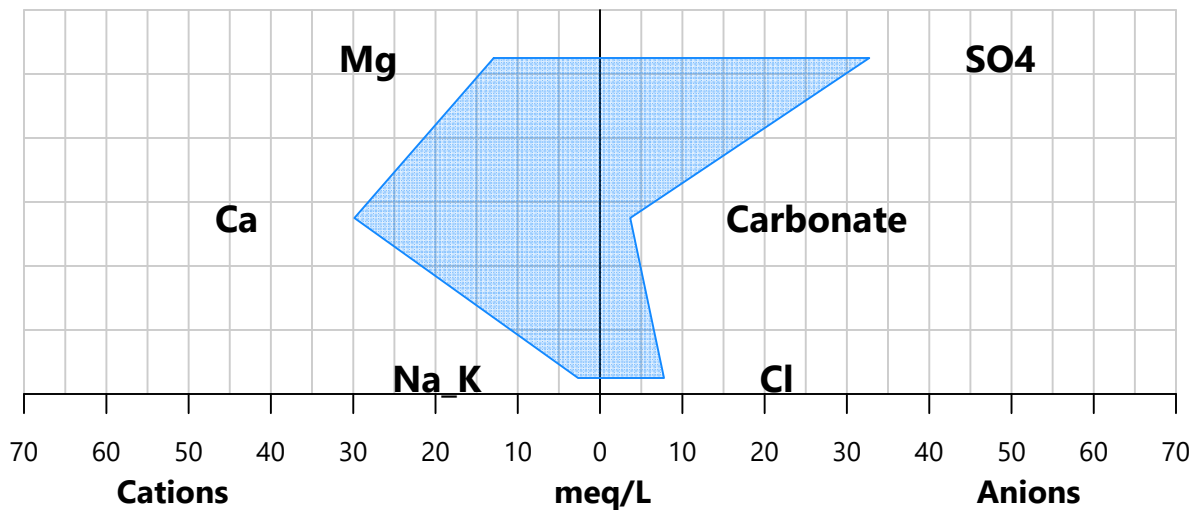
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MW-140



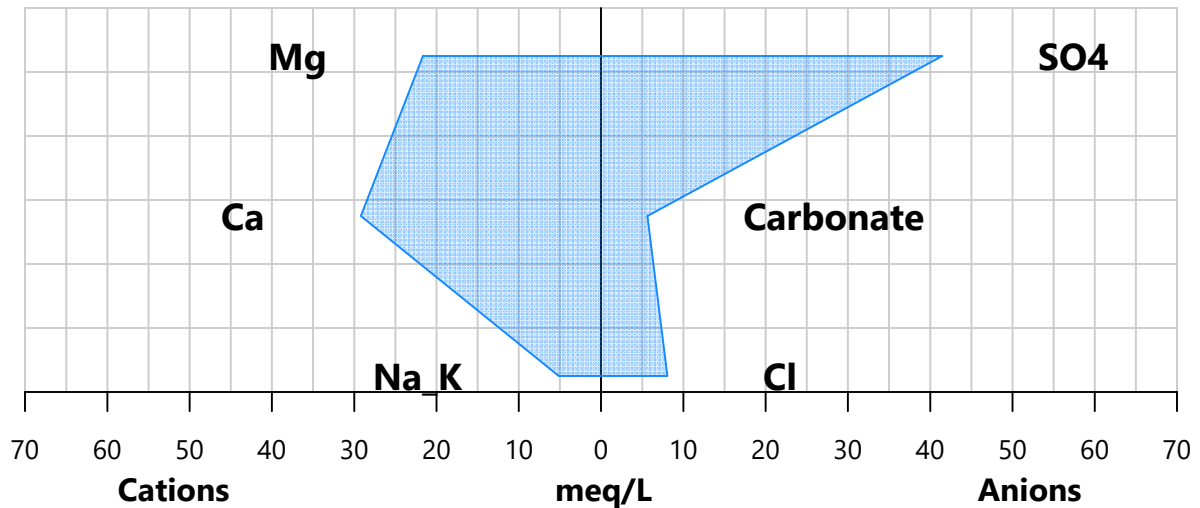
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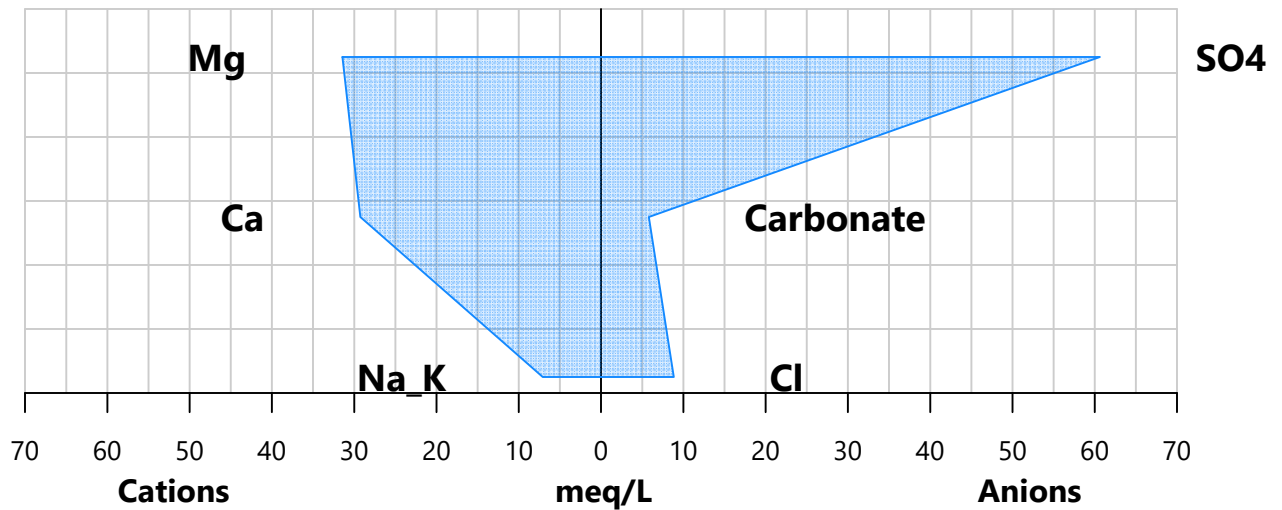
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Third Quarterly Progress Report
North RO Field - In Field Monitoring Wells - January 2020

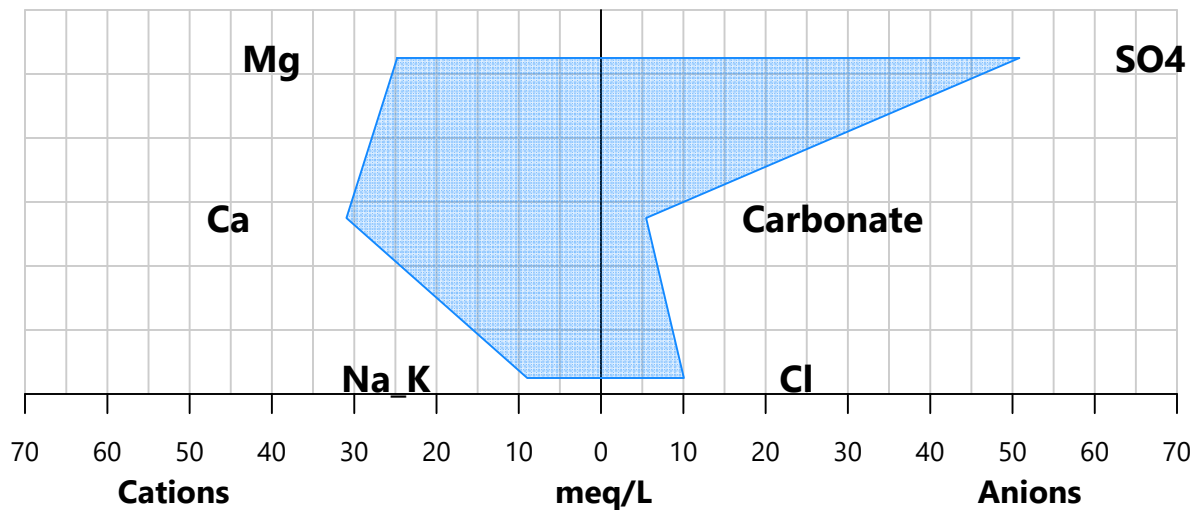
MW-117



MW-118



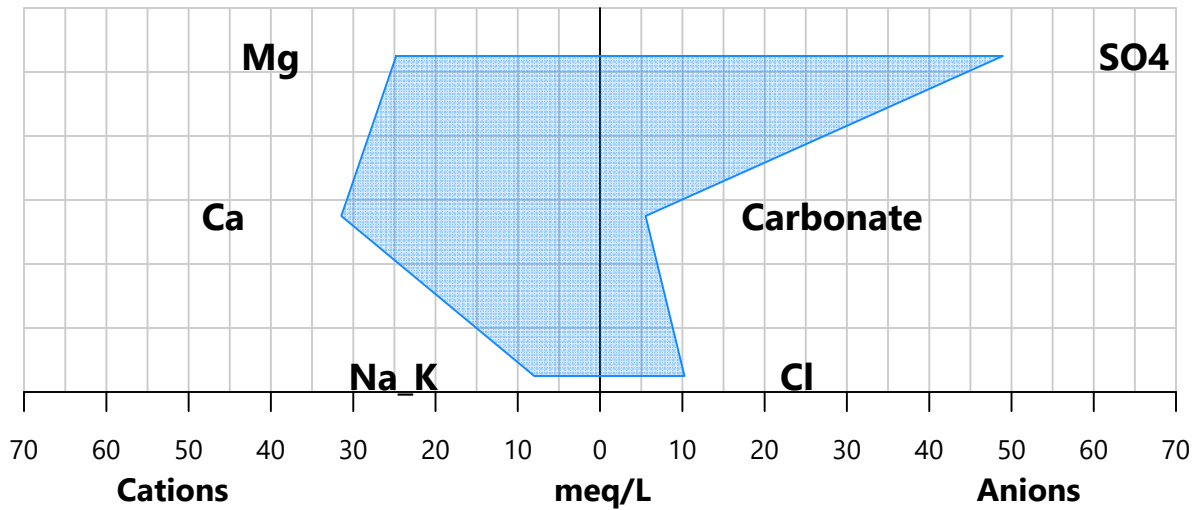
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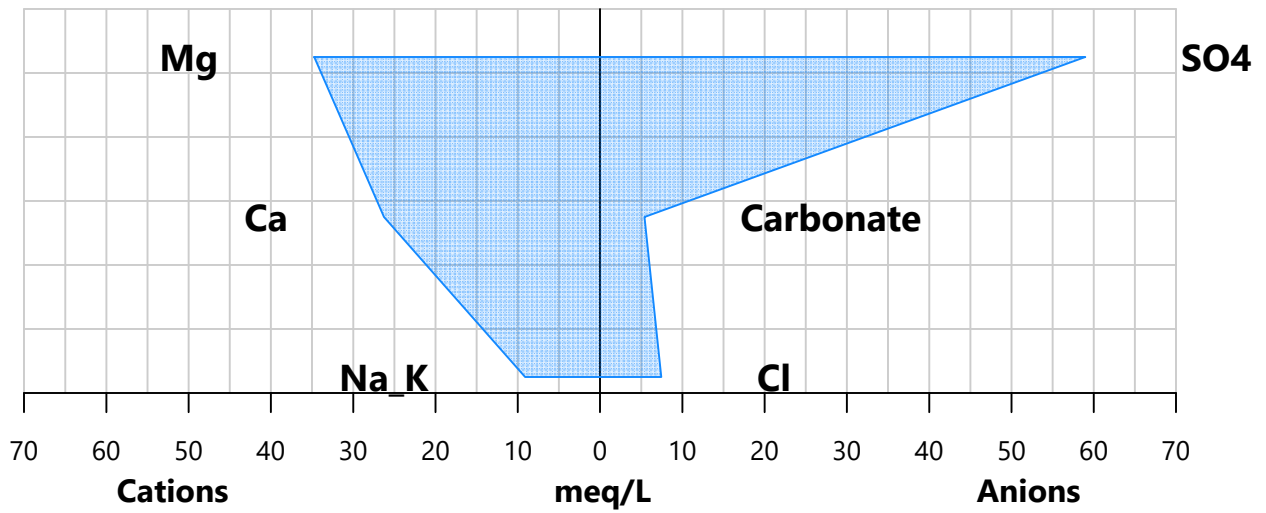
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Third Quarterly Progress Report
North RO Field - Downgradient Monitoring Wells - January 2020

MW-142



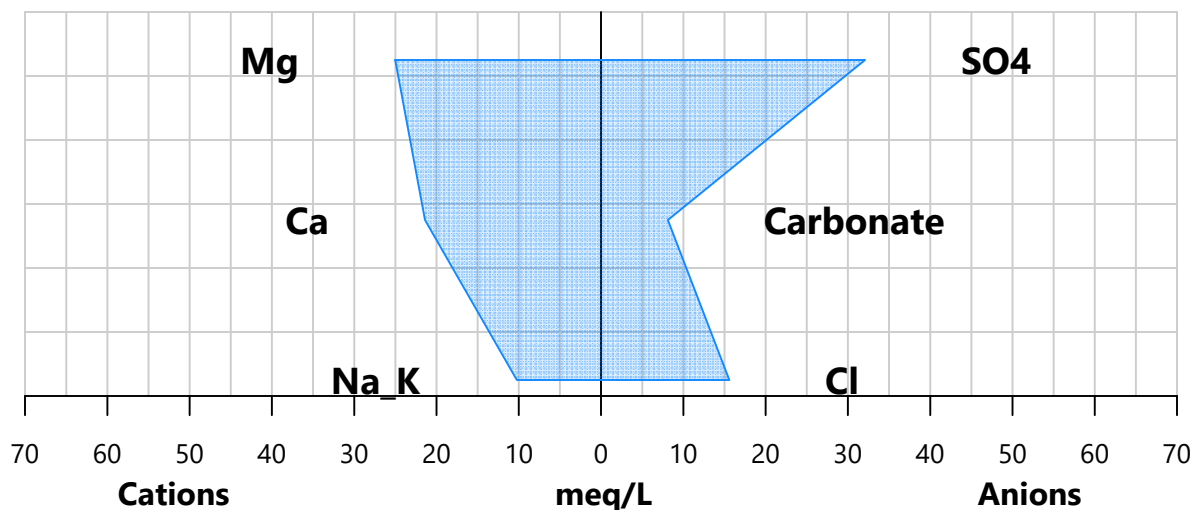
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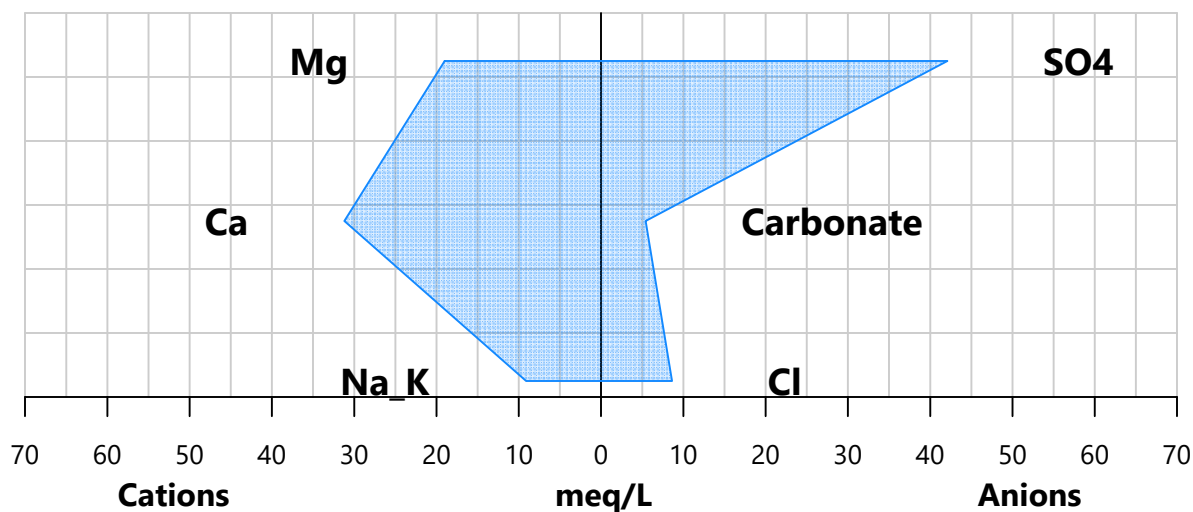
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Fourth Quarterly Progress Report
North RO Field - Upgradient Monitoring Wells - June 2020

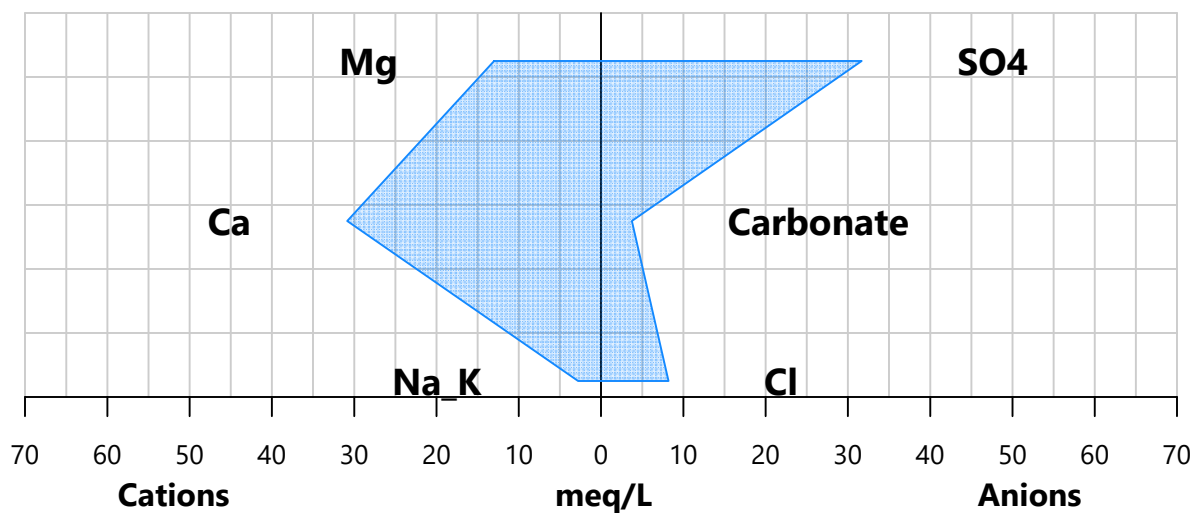
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MW-140



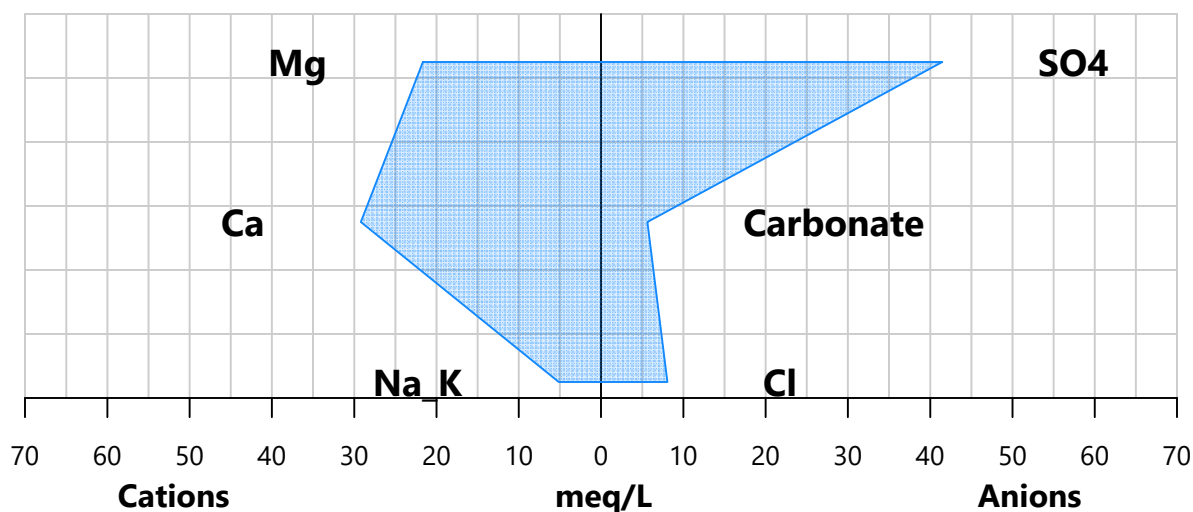
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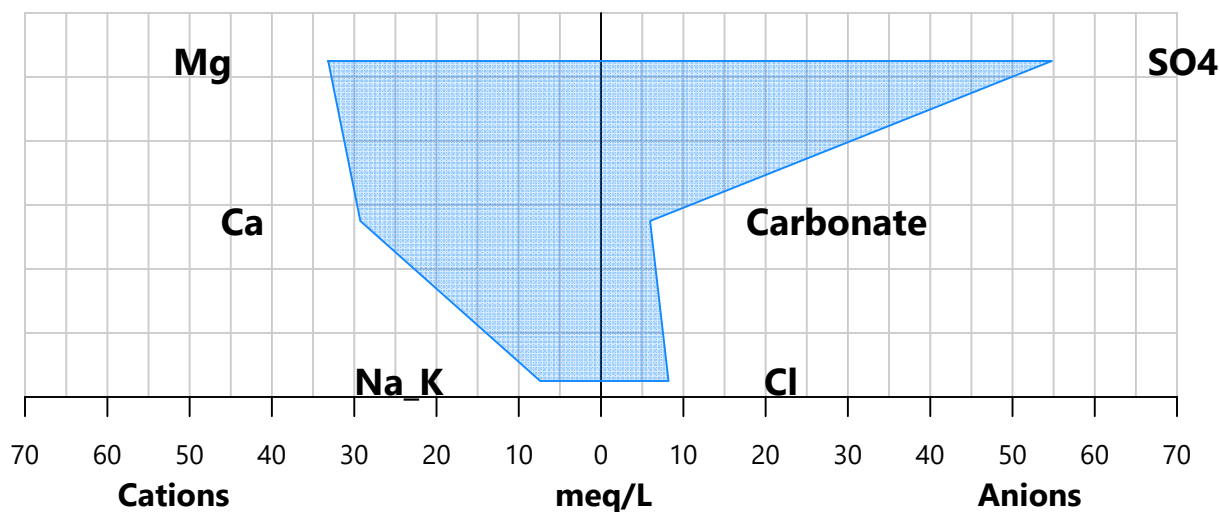
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Fourth Quarterly Progress Report
North RO Field - In Field Monitoring Wells - June 2020

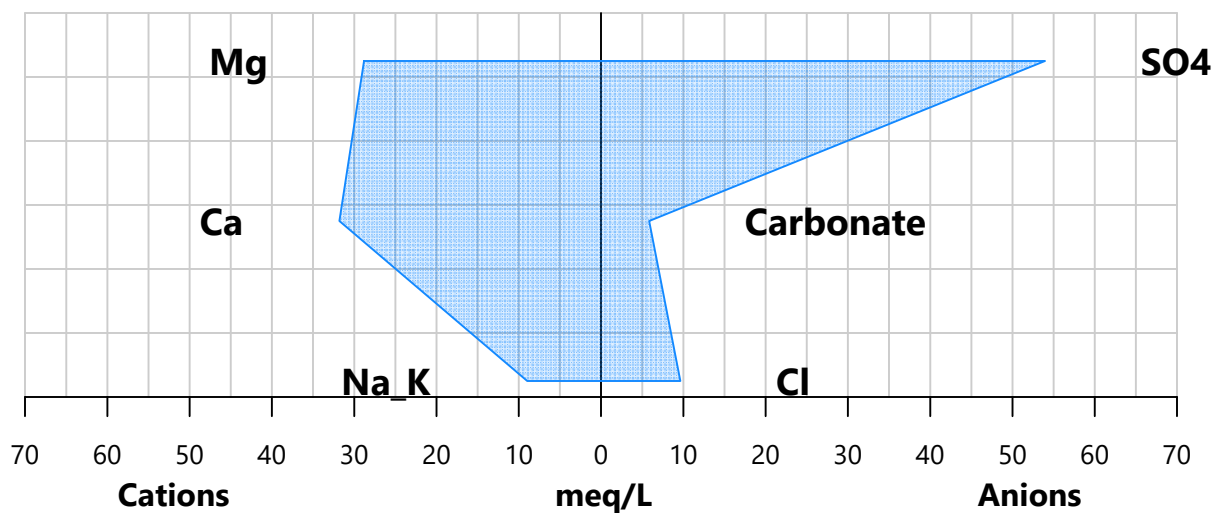
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MW-118



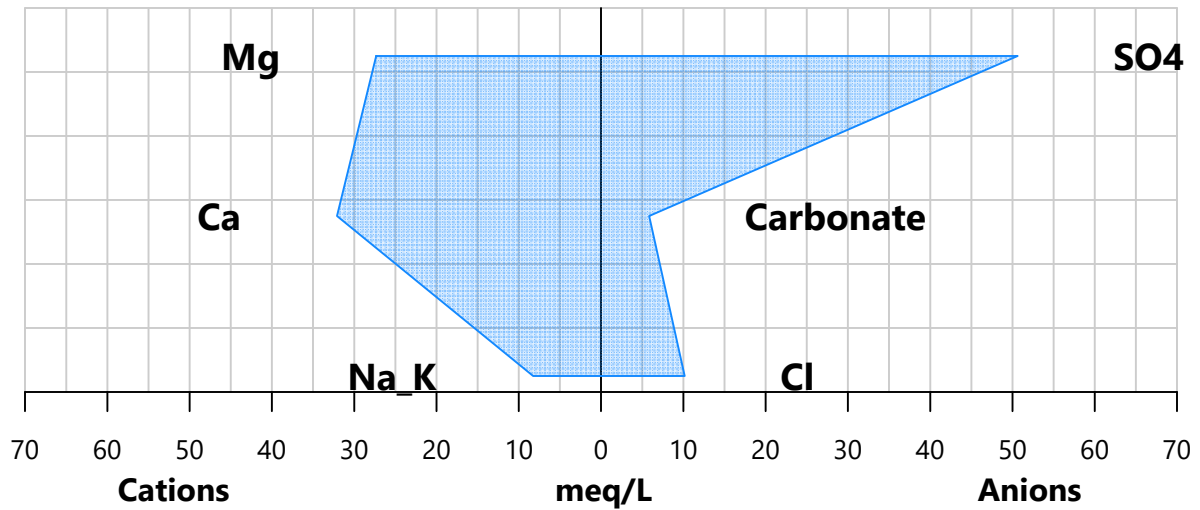
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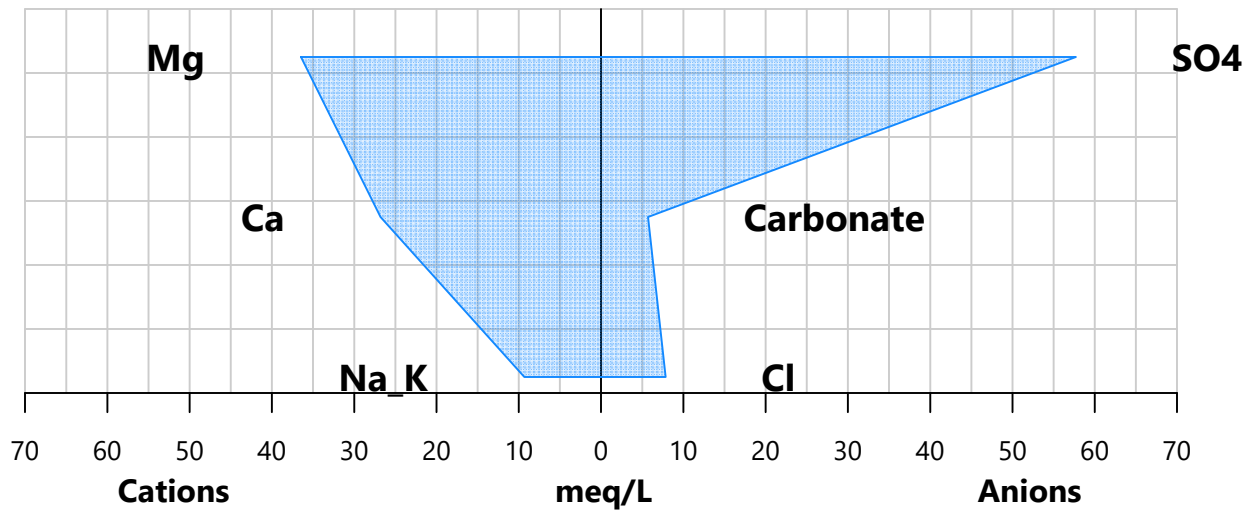
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Fourth Quarterly Progress Report
North RO Field - Downgradient Monitoring Wells - June 2020

MW-142



MW-143

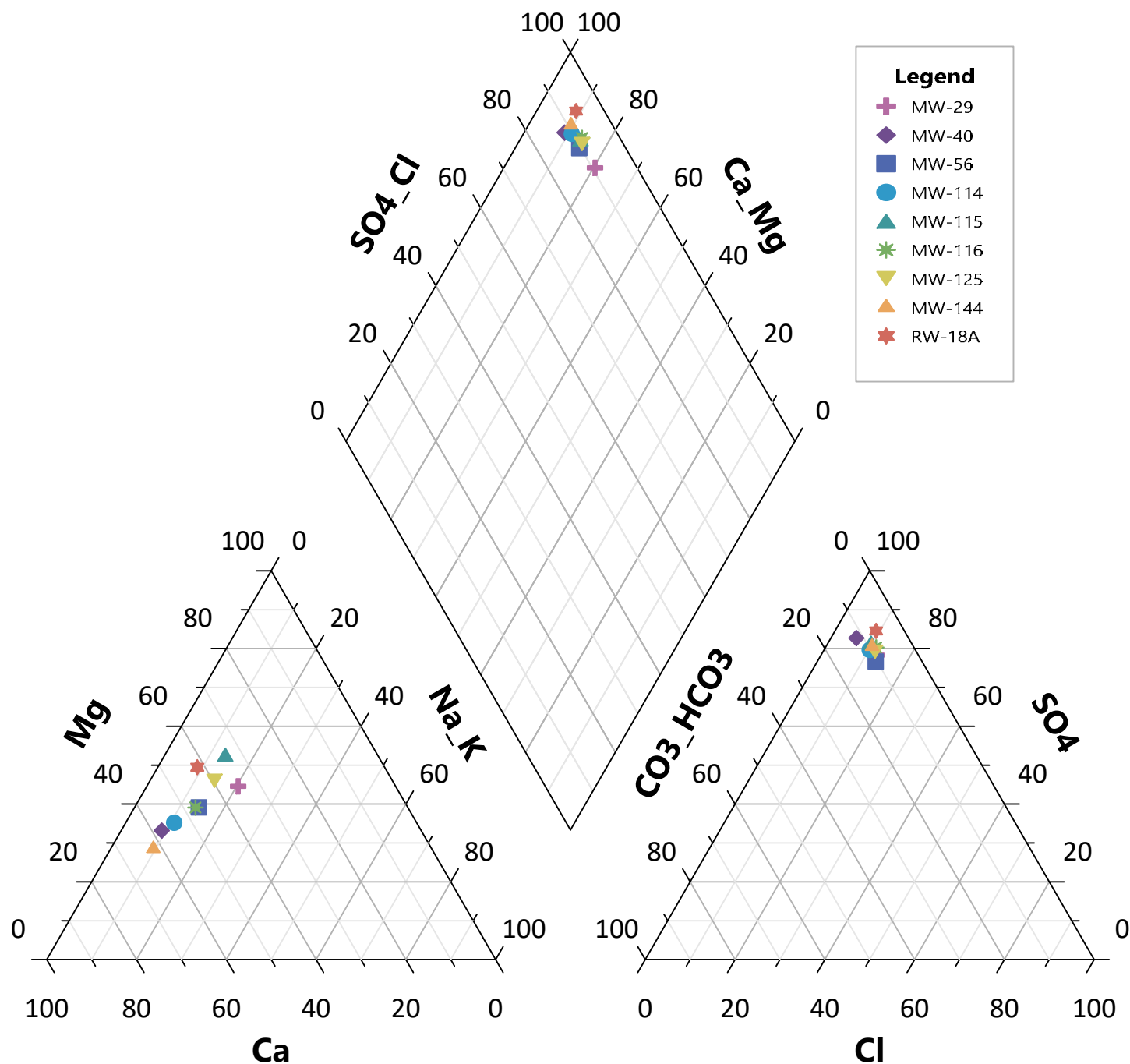


South RO Reject Discharge Field

Piper Diagram

RO Reject Field Stage 1 Abatement - First Quarterly Progress Report

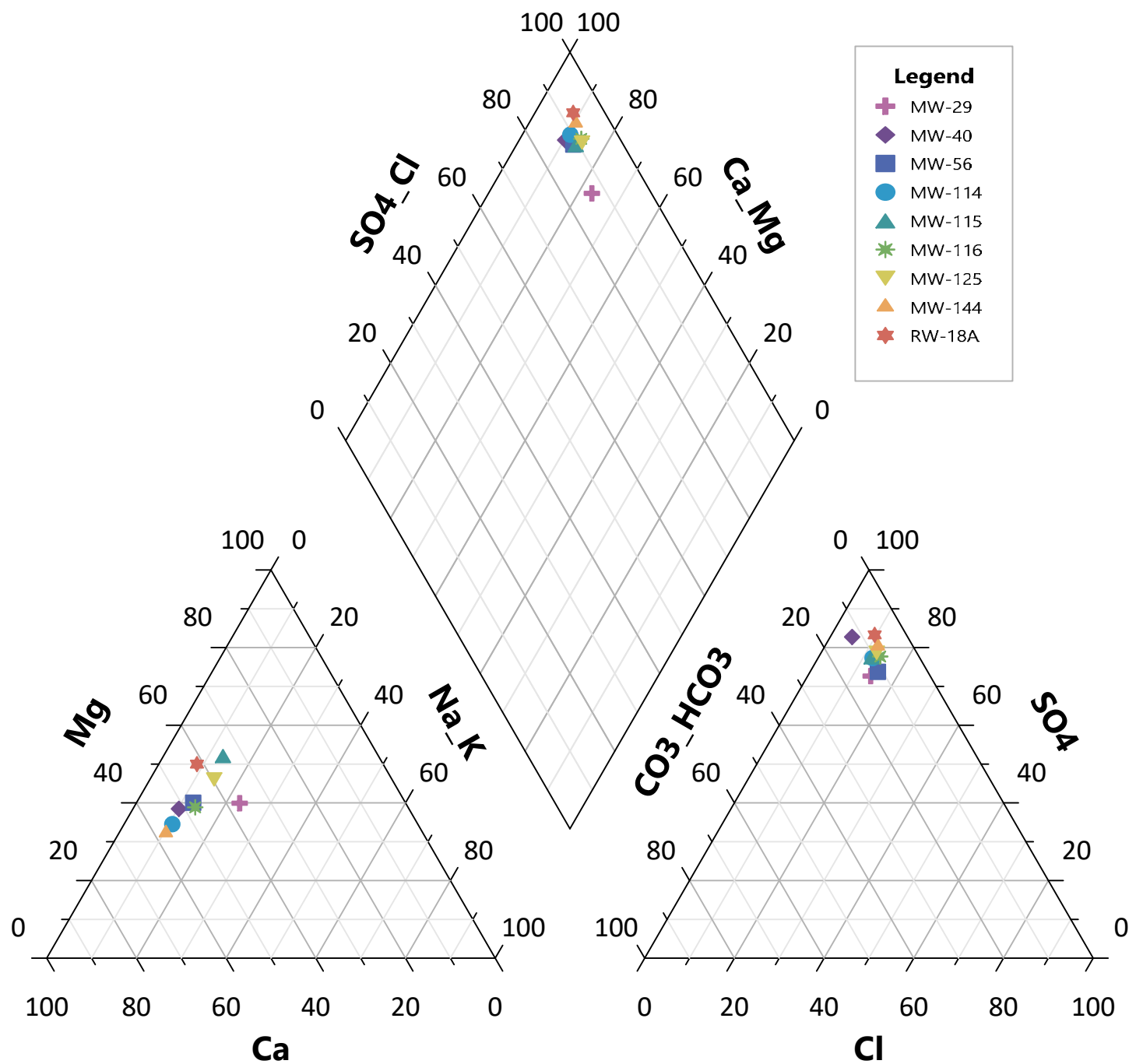
South RO Field Monitoring Wells - July 2019



Piper Diagram

RO Reject Field Stage 1 Abatement - Second Quarterly Progress Report

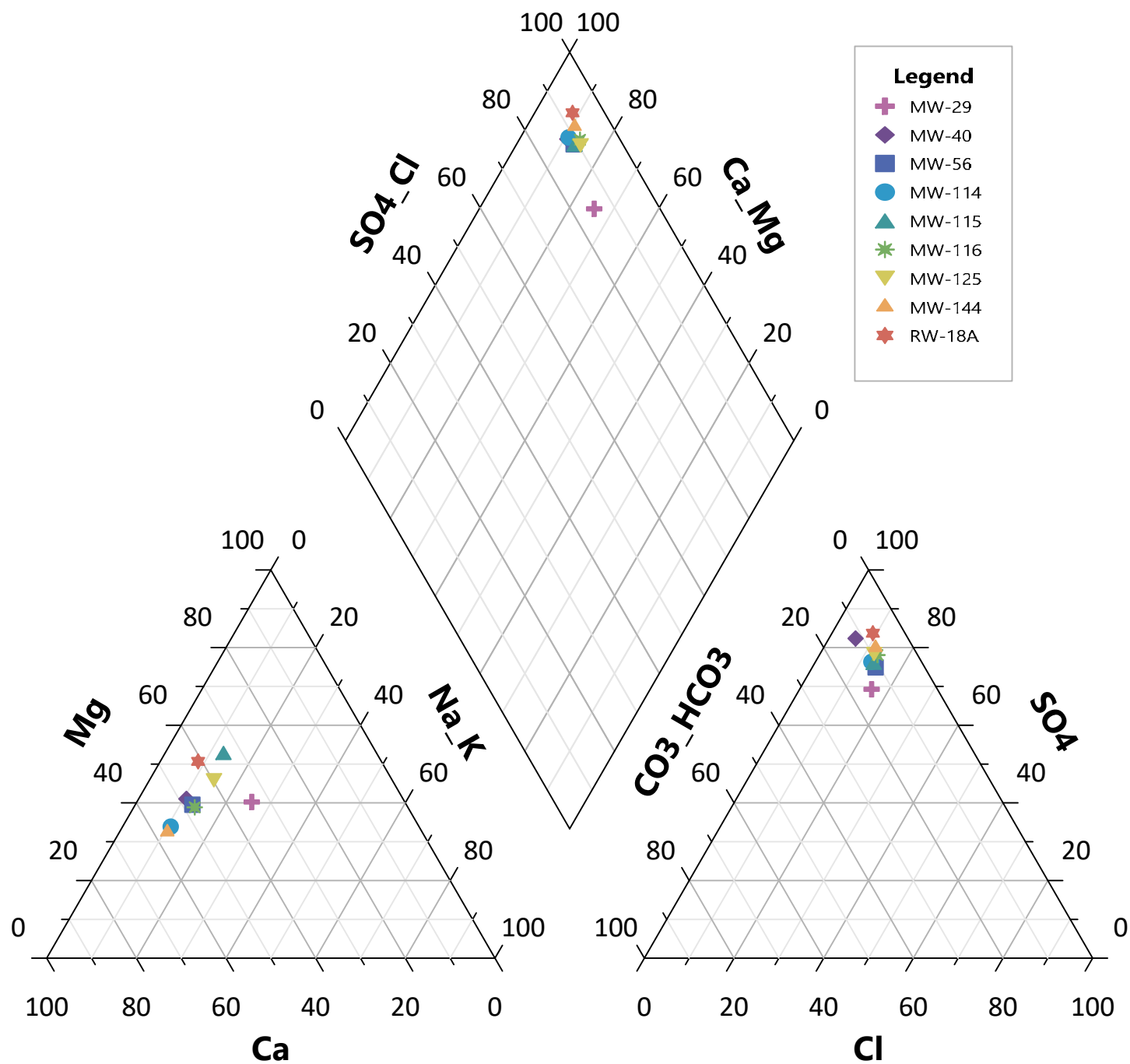
South RO Field Monitoring Wells - October 2019



Piper Diagram

RO Reject Field Stage 1 Abatement - Third Quarterly Progress Report

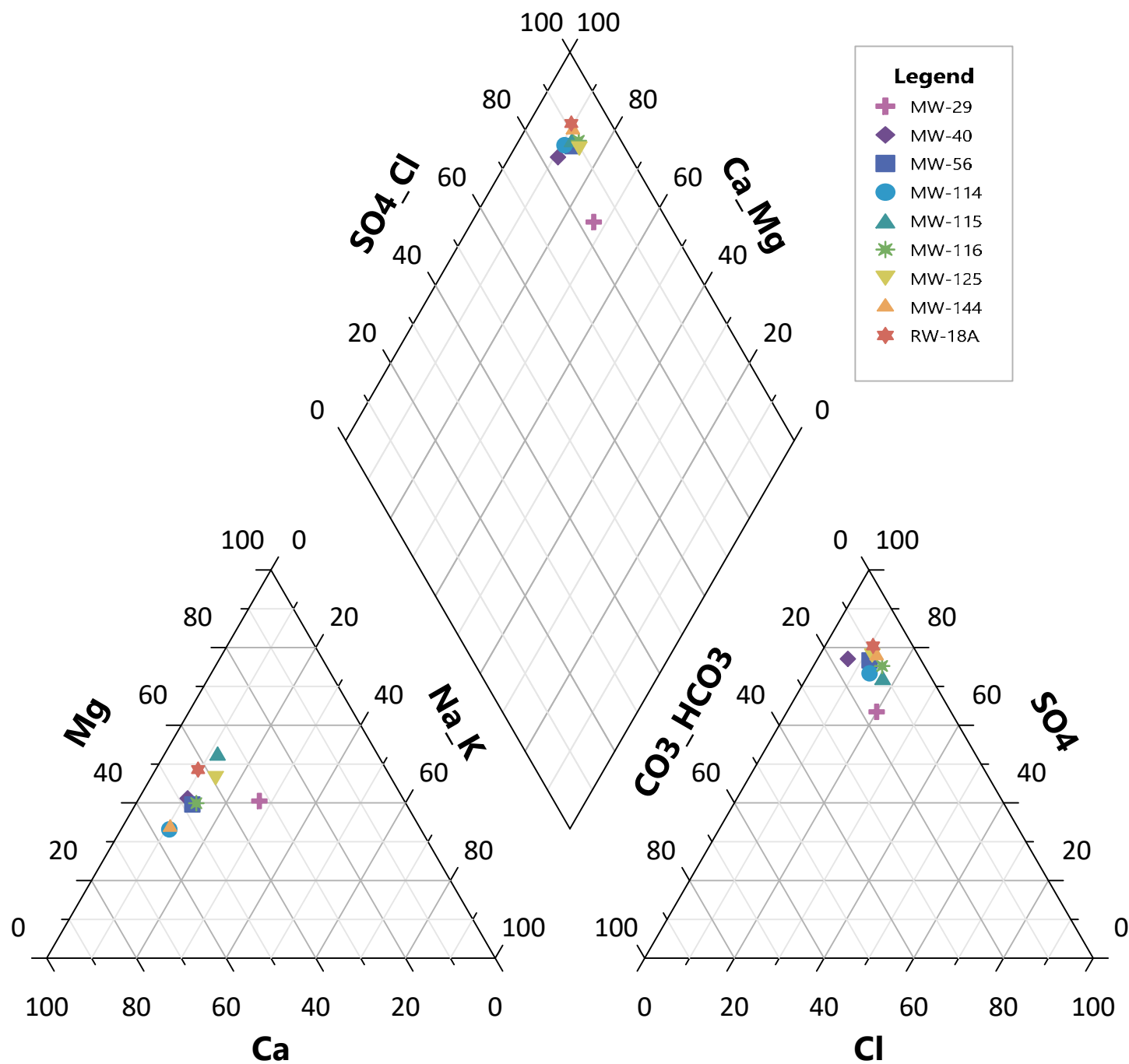
South RO Field Monitoring Wells - January 2020



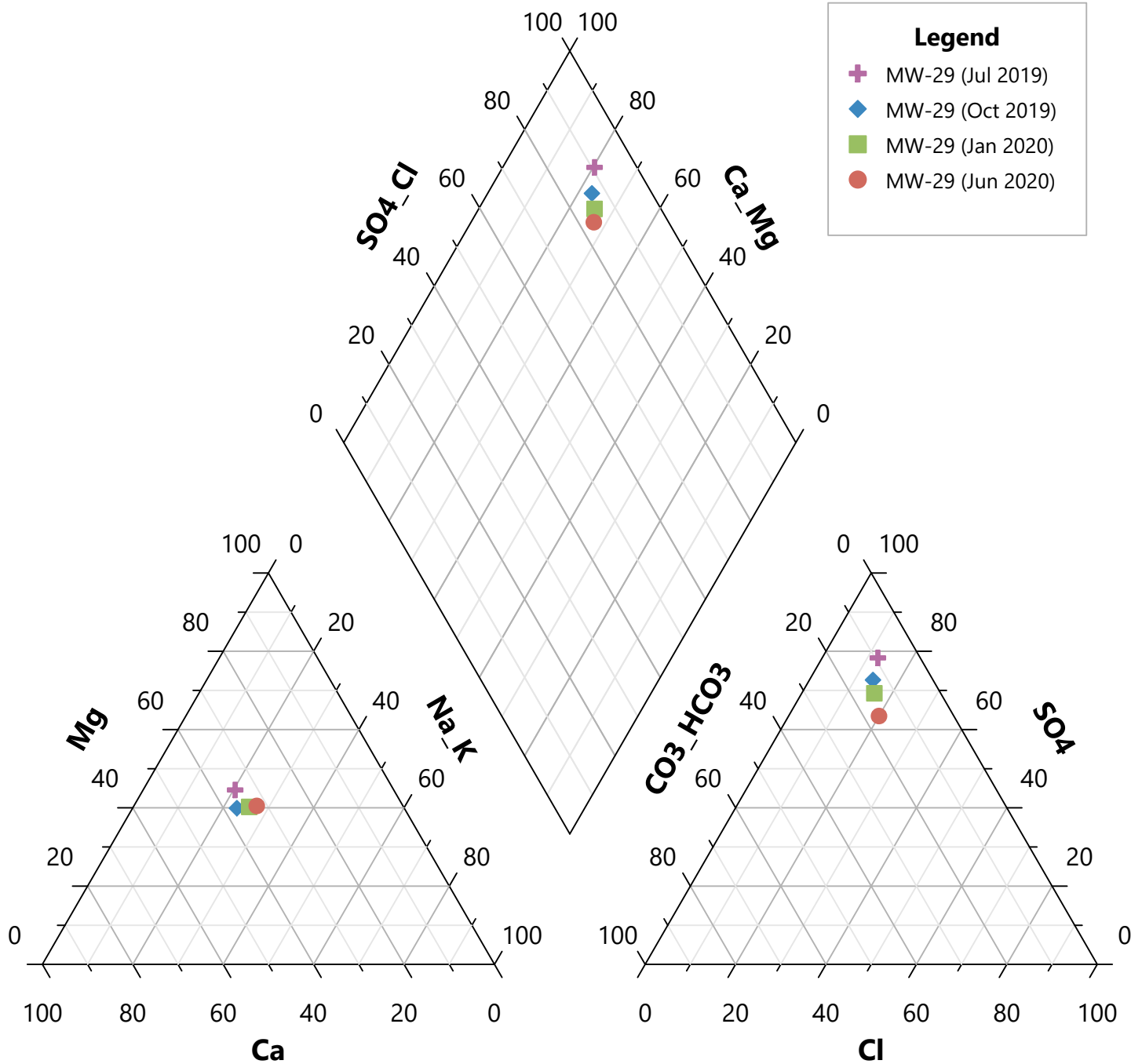
Piper Diagram

RO Reject Field Stage 1 Abatement - Fourth Quarterly Progress Report

South RO Field Monitoring Wells - June 2020



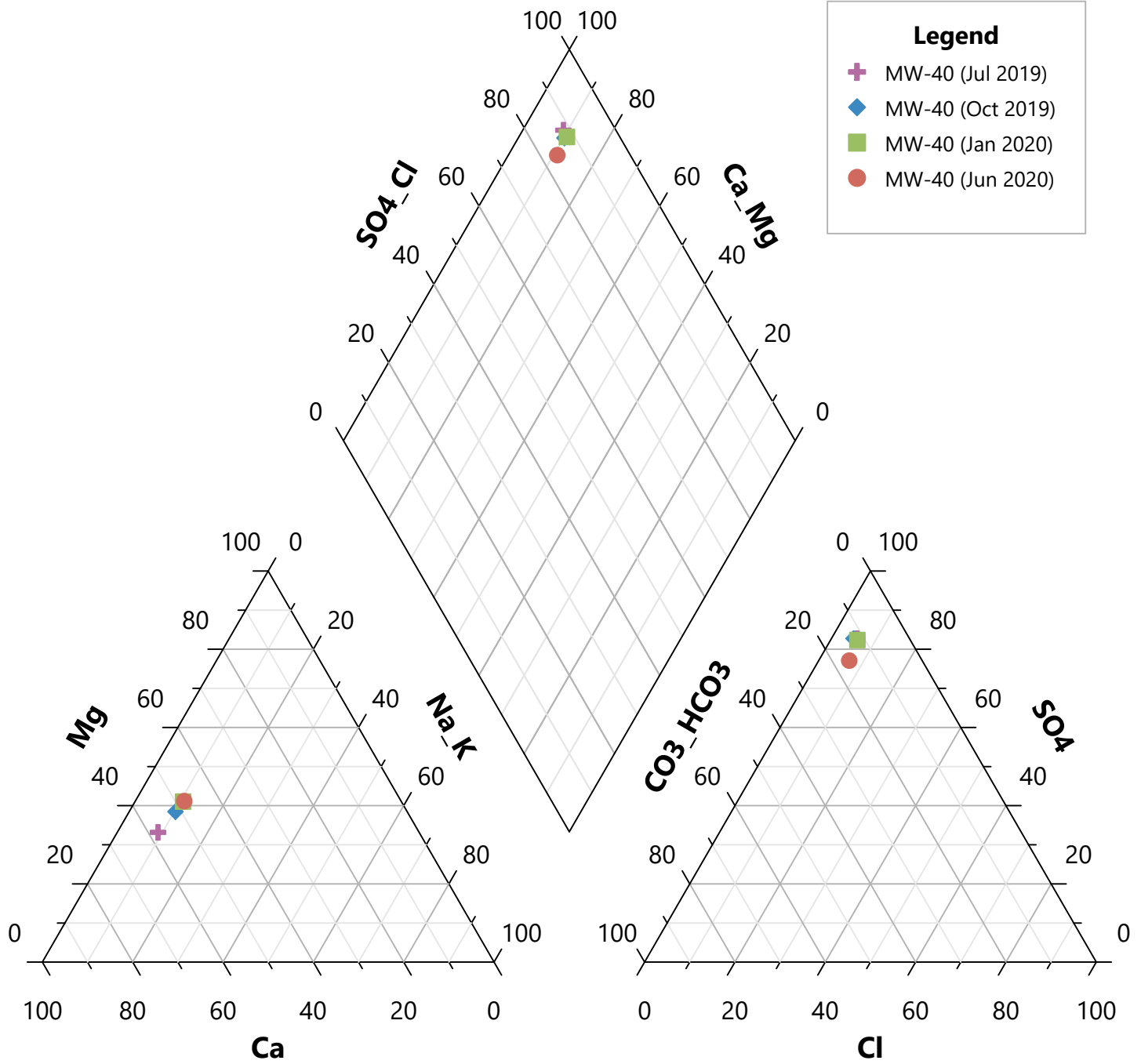
Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
South RO Field - MW-29



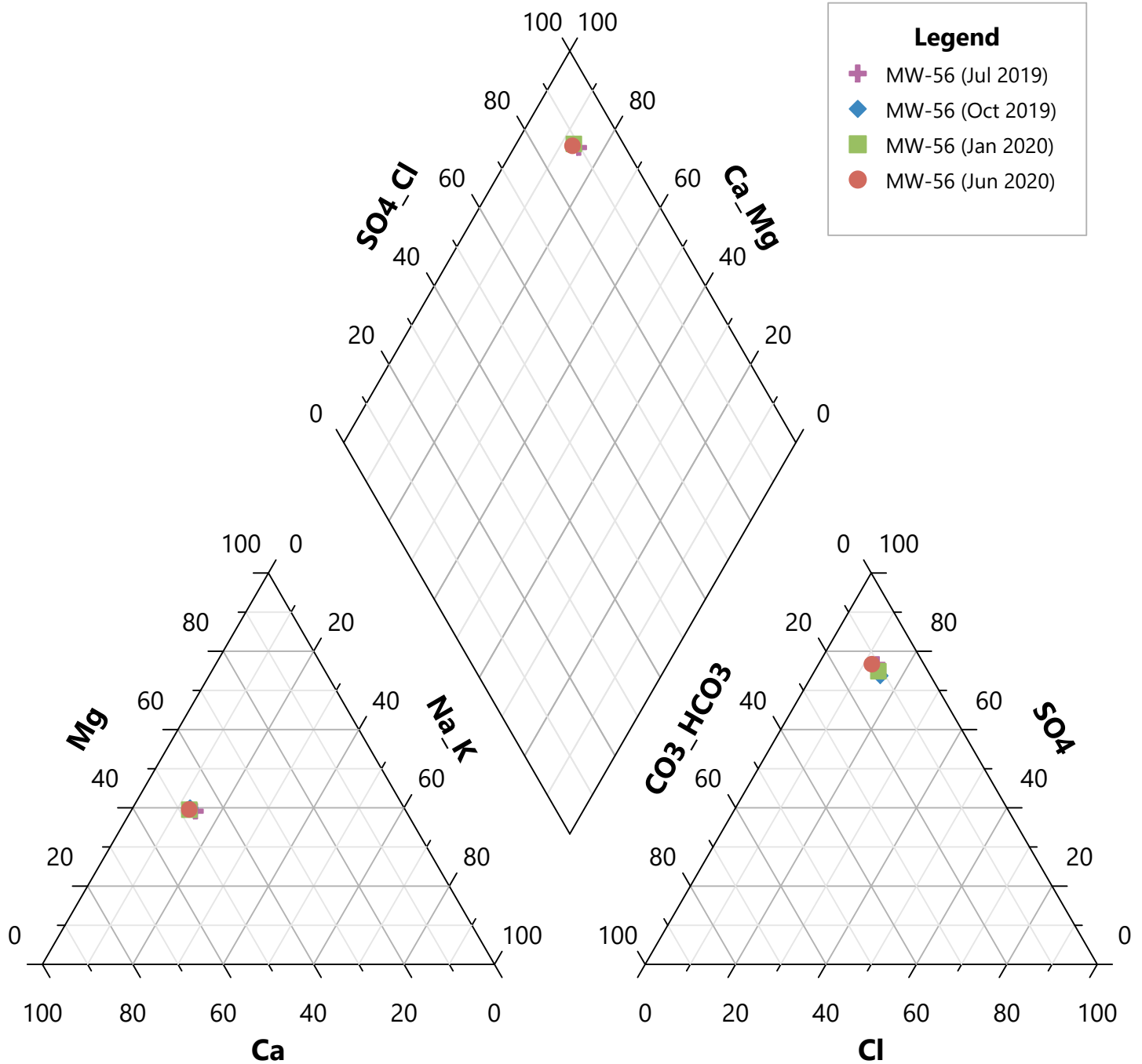
Piper Diagram

RO Reject Field Stage 1 Abatement - Final Report

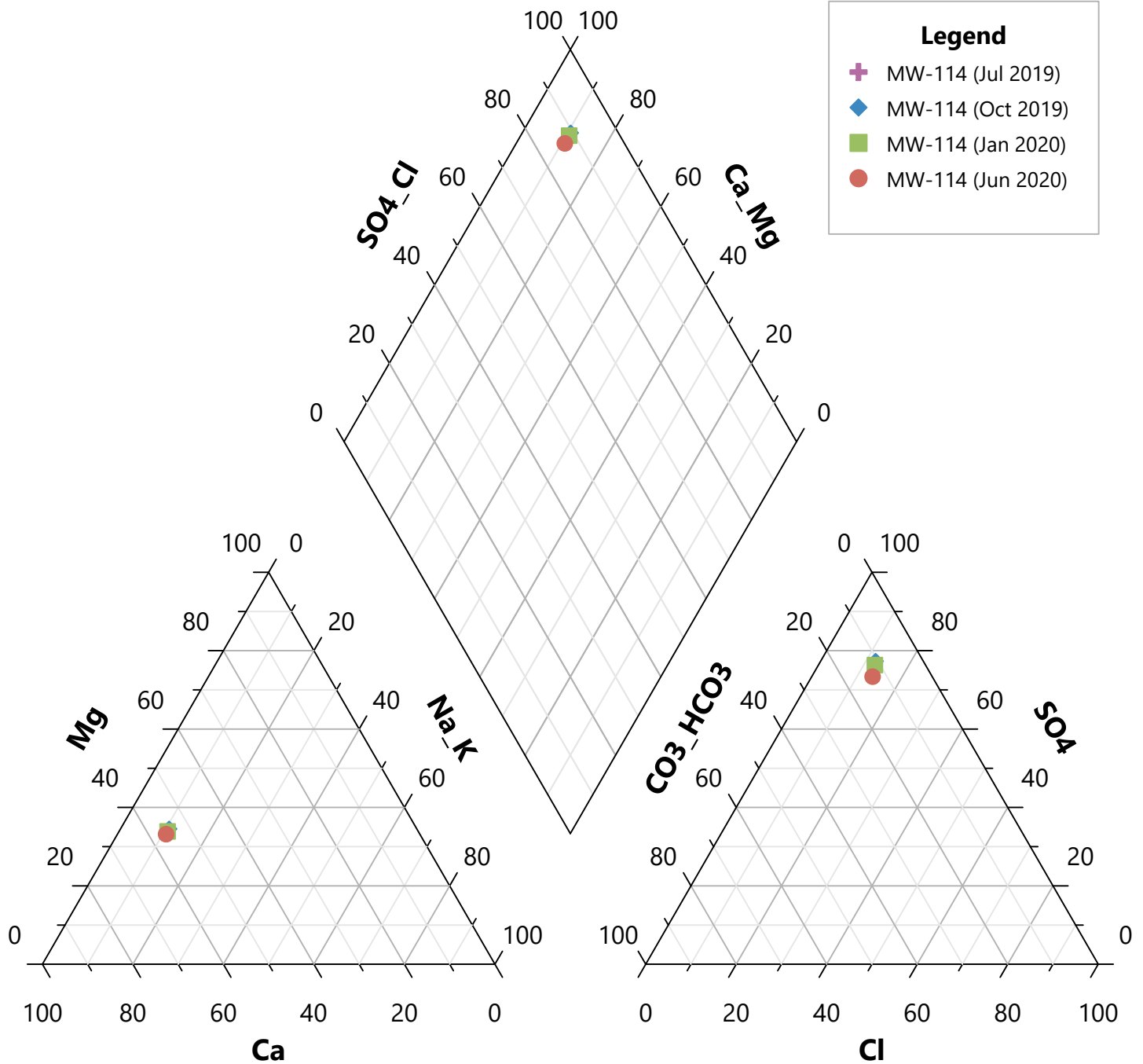
South RO Field - MW-40



Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
South RO Field - MW-56



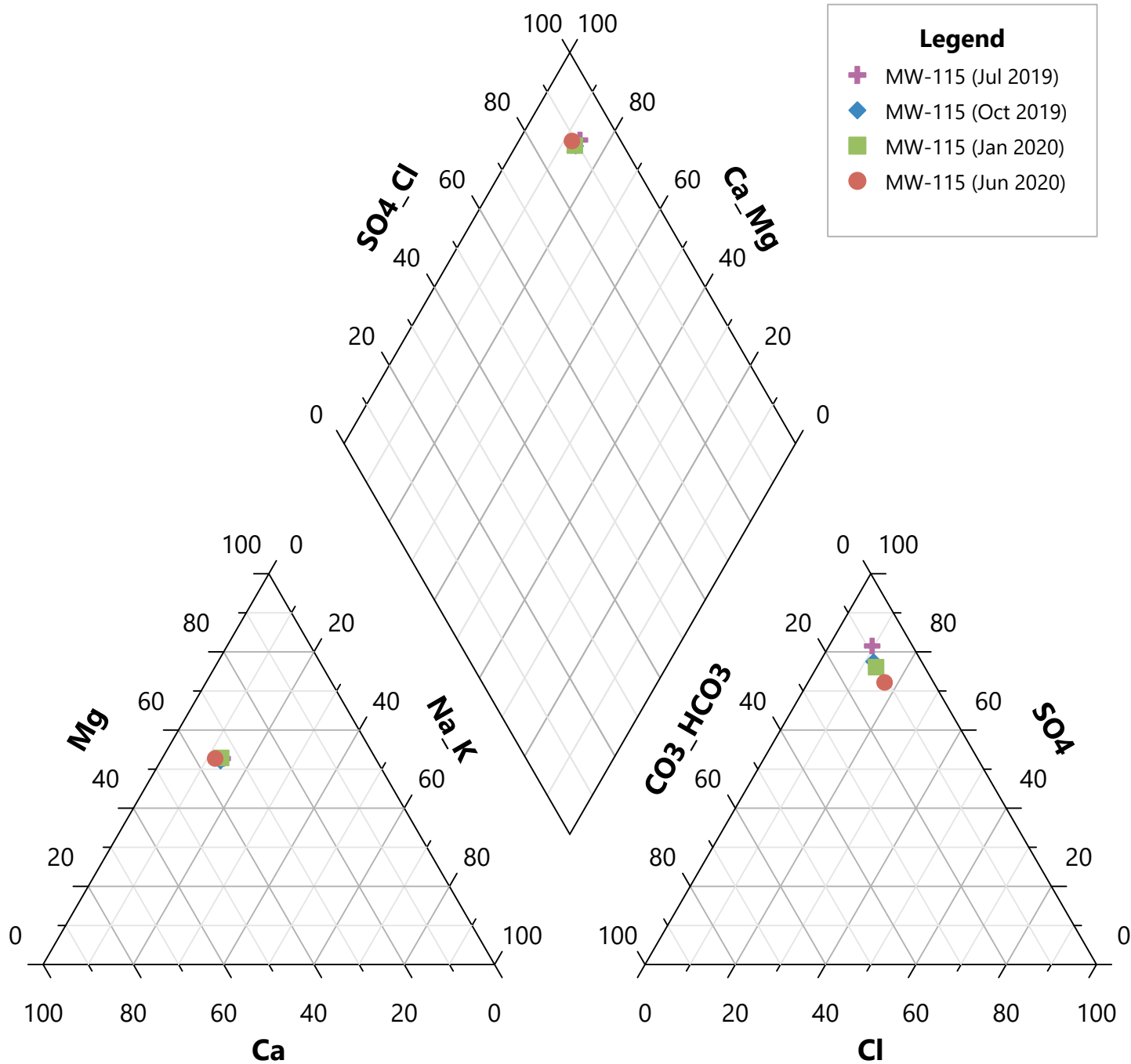
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RO Reject Field Stage 1 Abatement - Final Report
South RO Field - MW-114



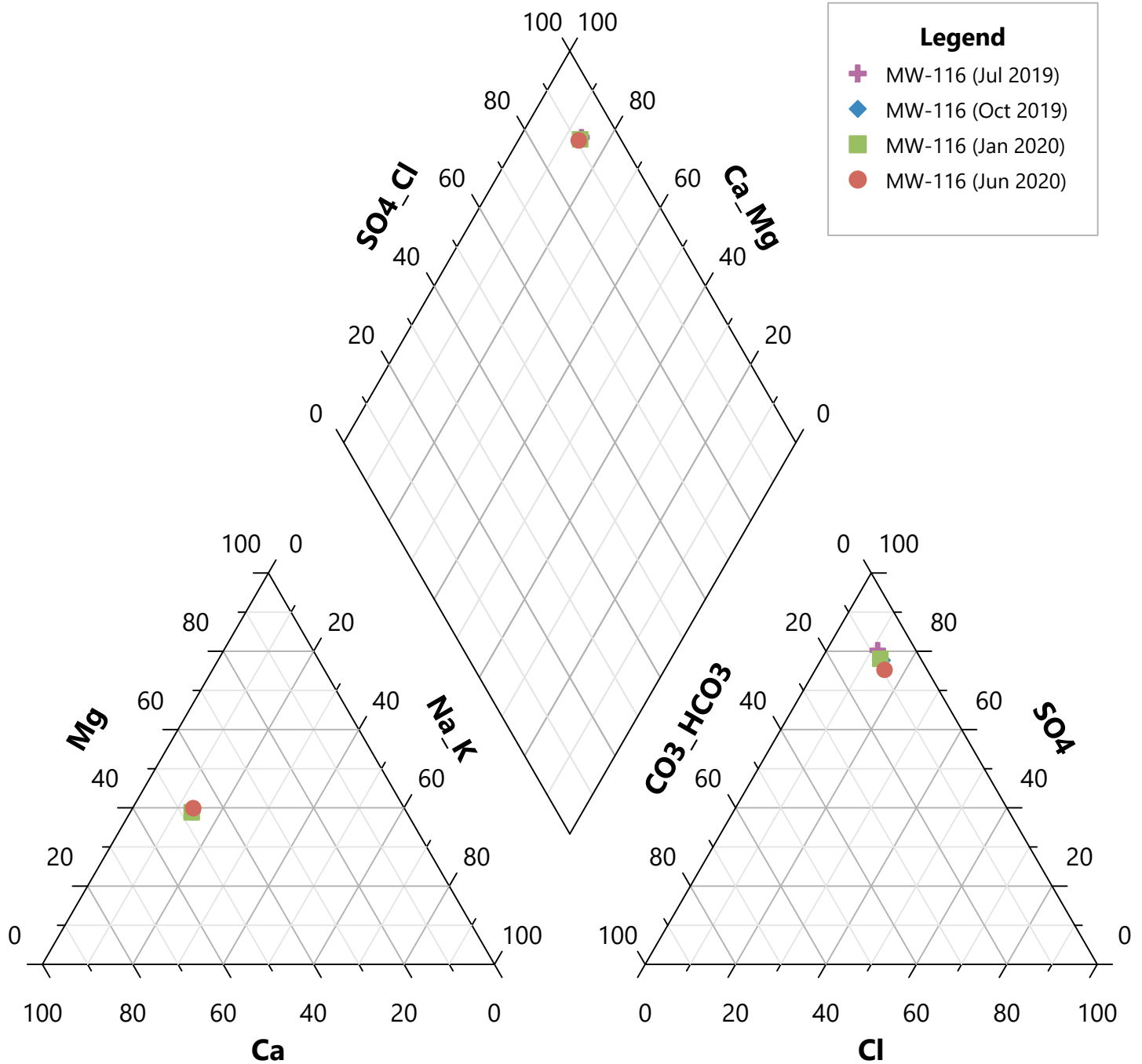
Piper Diagram

RO Reject Field Stage 1 Abatement - Final Report

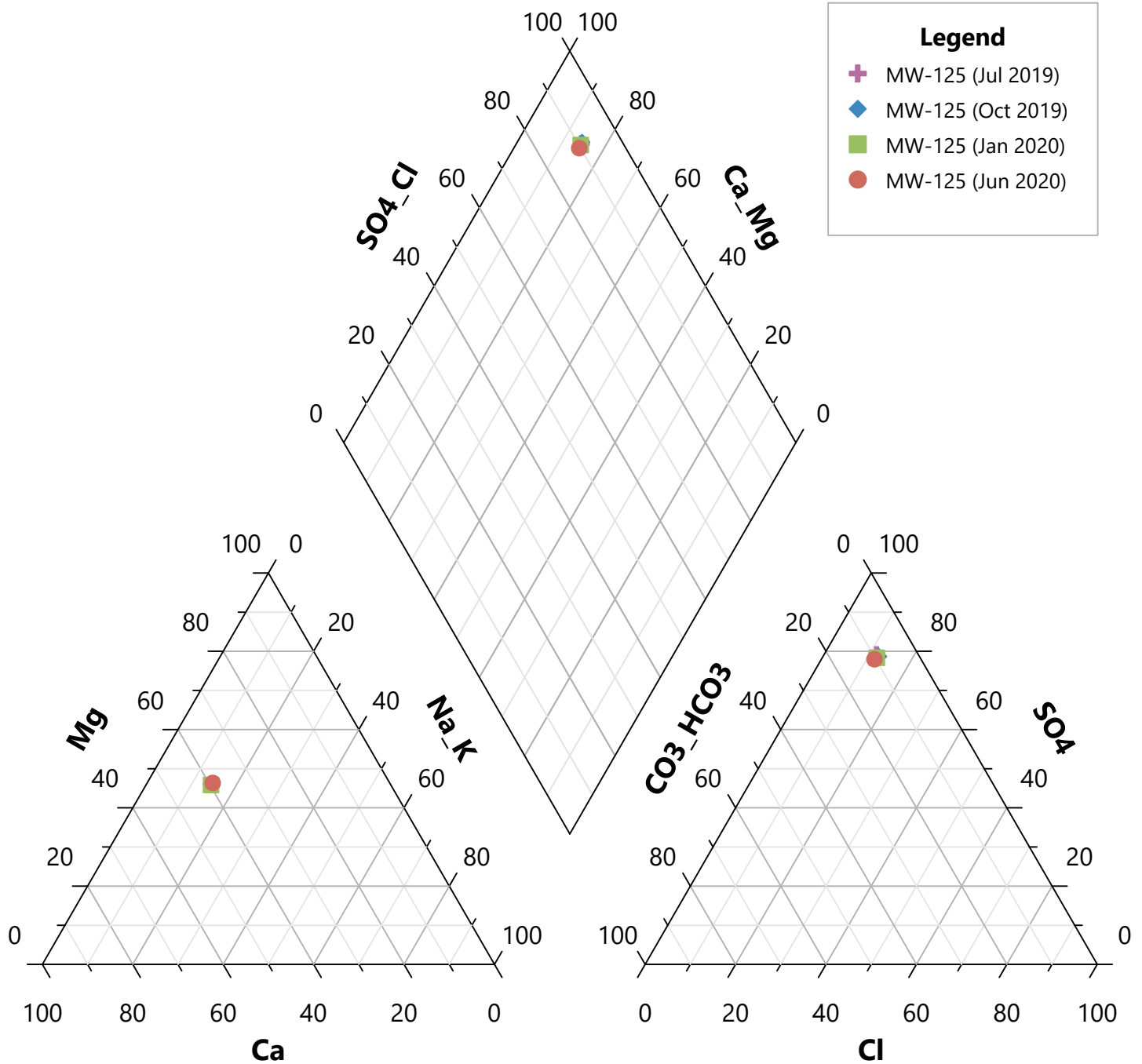
South RO Field - MW-115



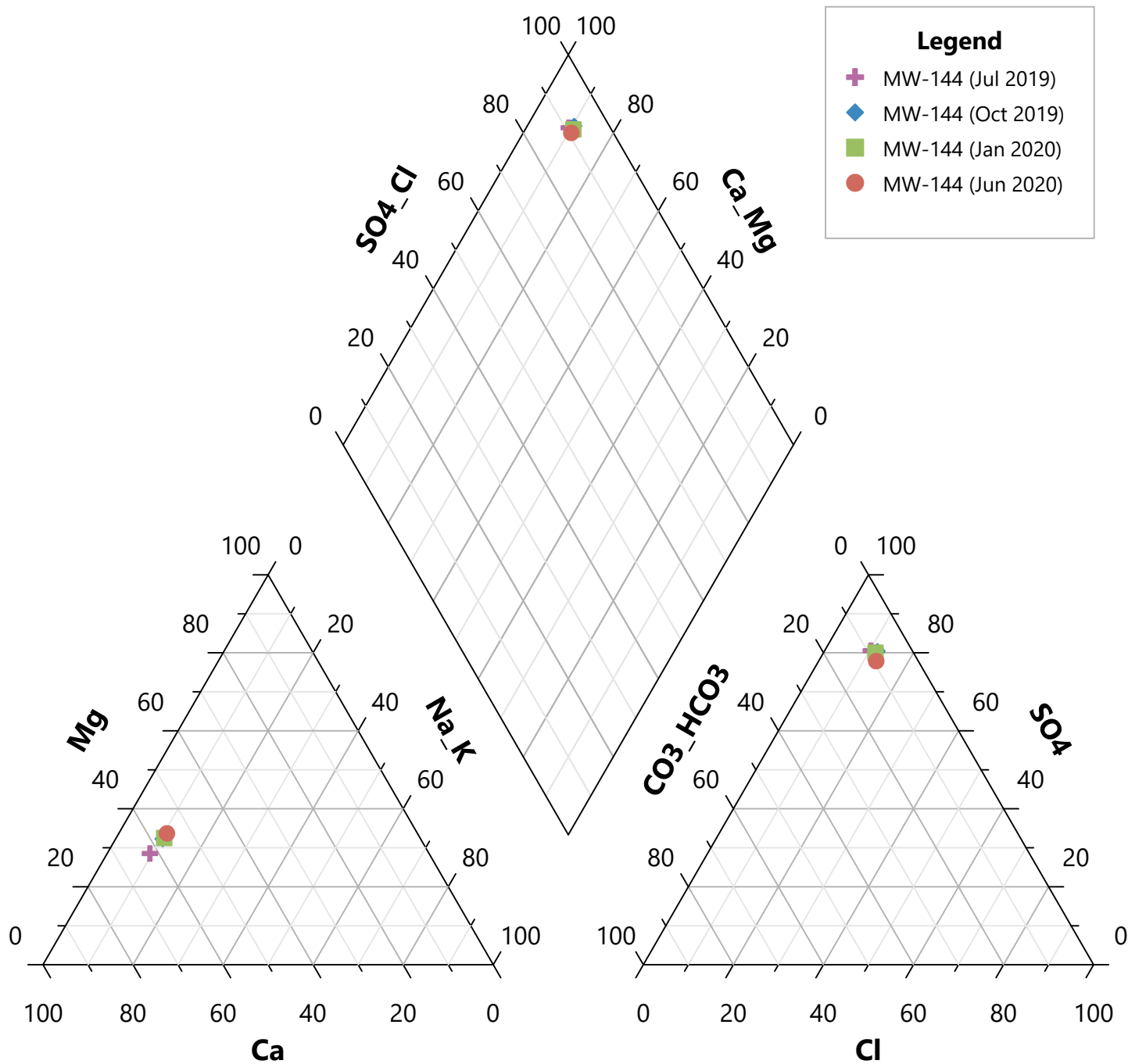
Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
South RO Field - MW-116



Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
South RO Field - MW-125



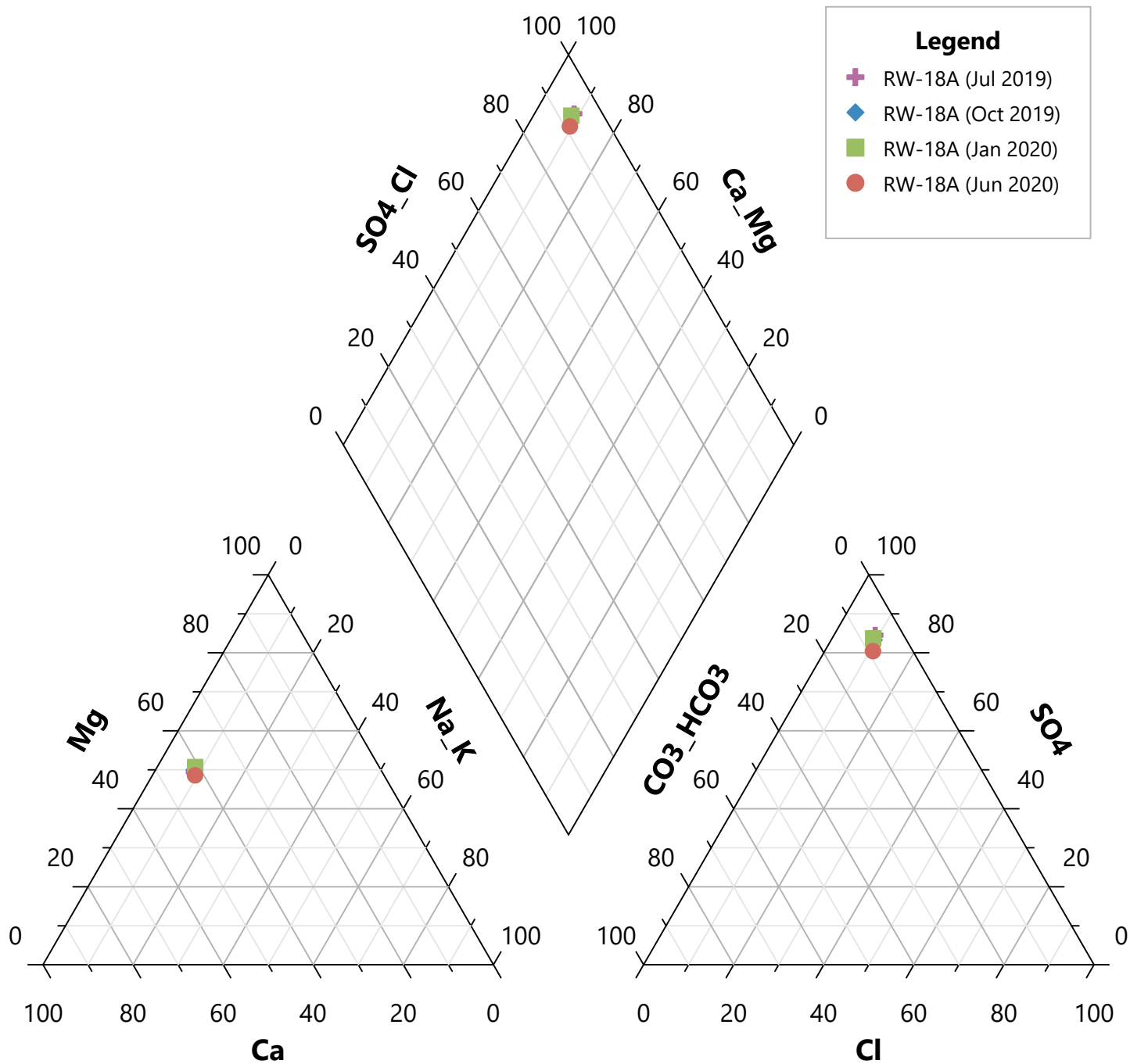
Piper Diagram
RO Reject Field Stage 1 Abatement - Final Report
South RO Field - MW-144



Piper Diagram

RO Reject Field Stage 1 Abatement - Final Report

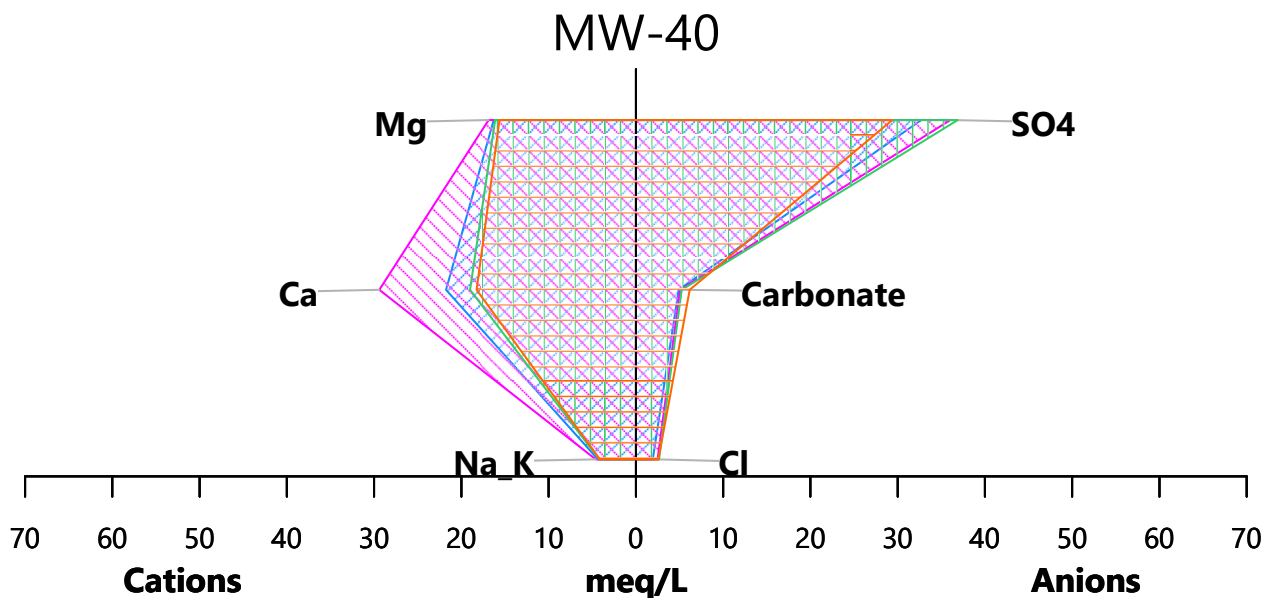
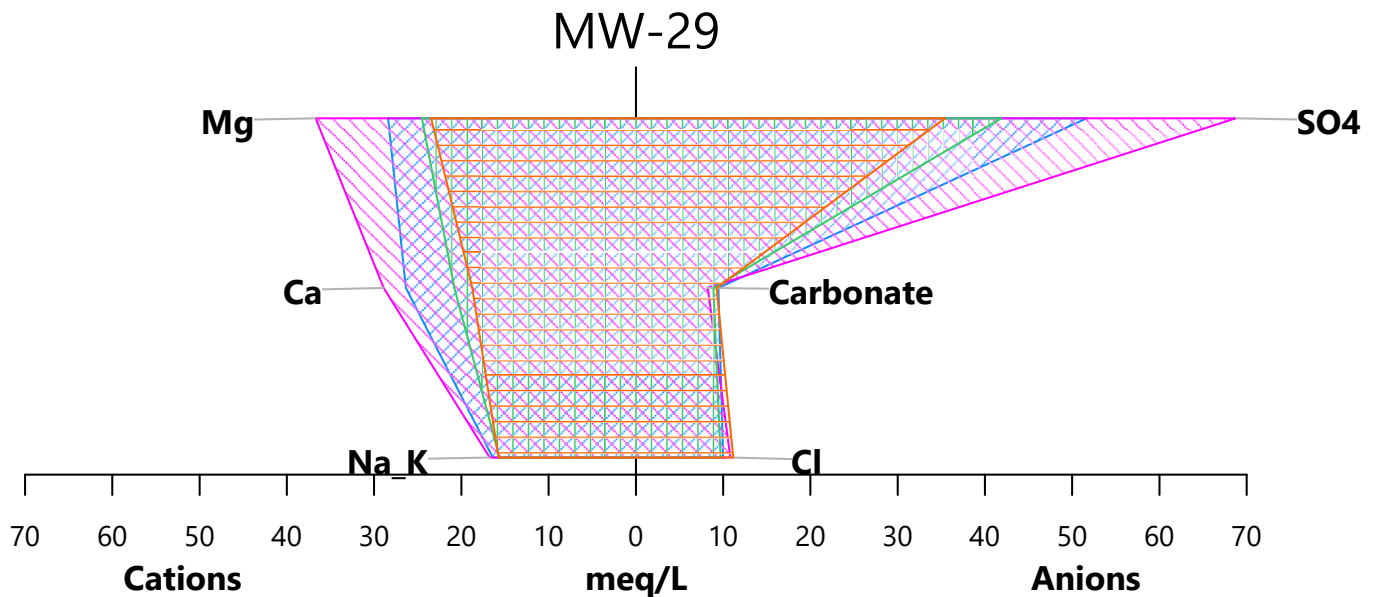
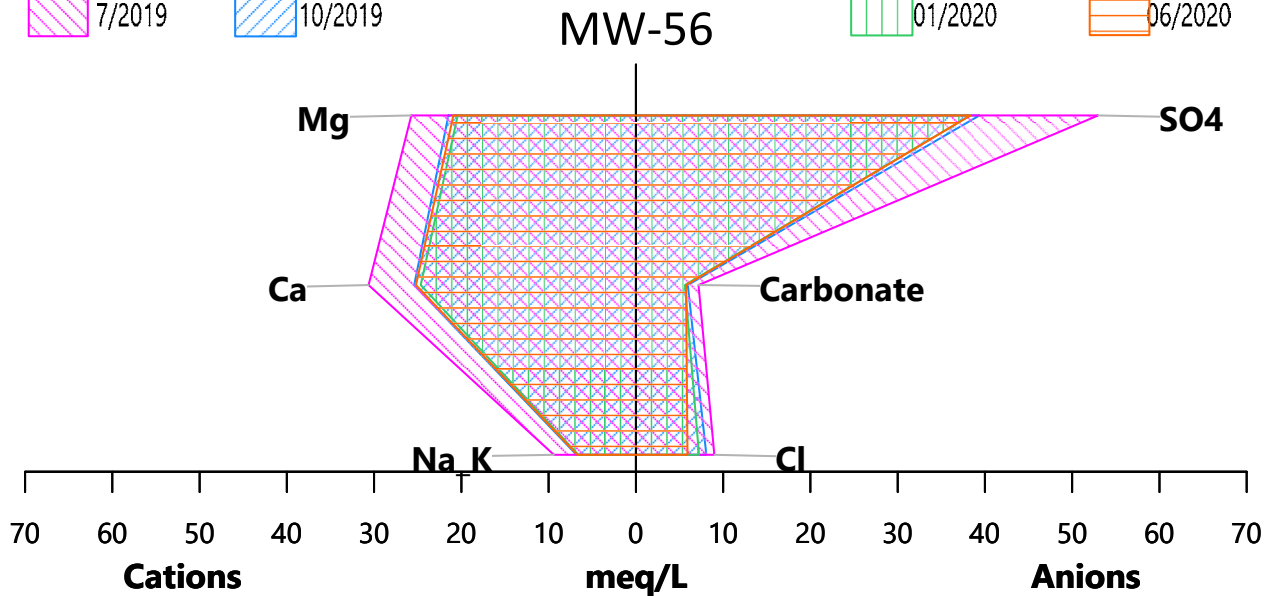
South RO Field - RW-18A



STIFF DIAGRAMS

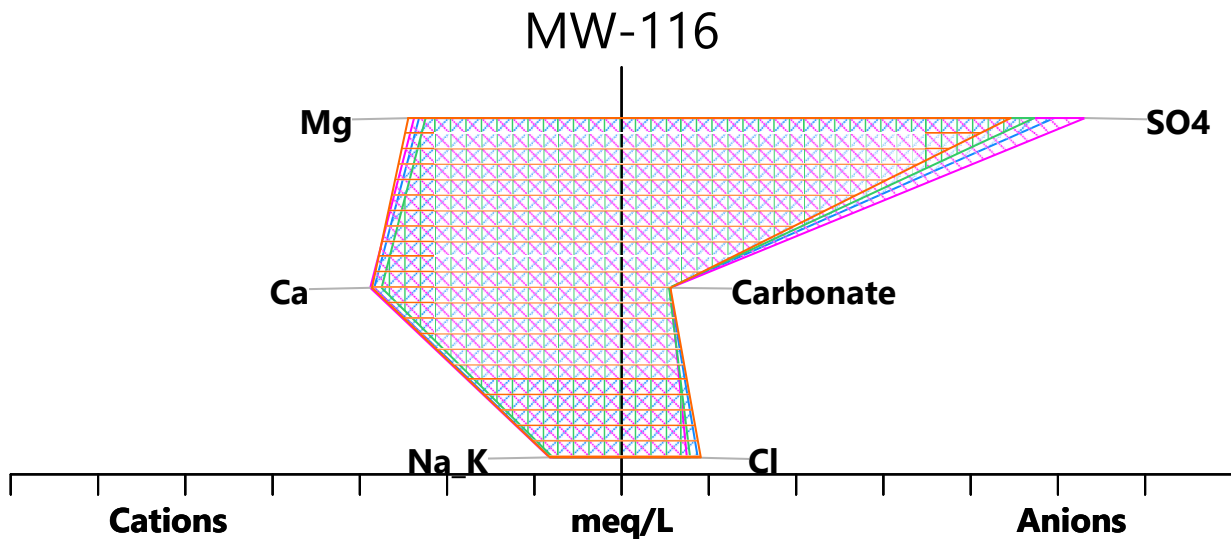
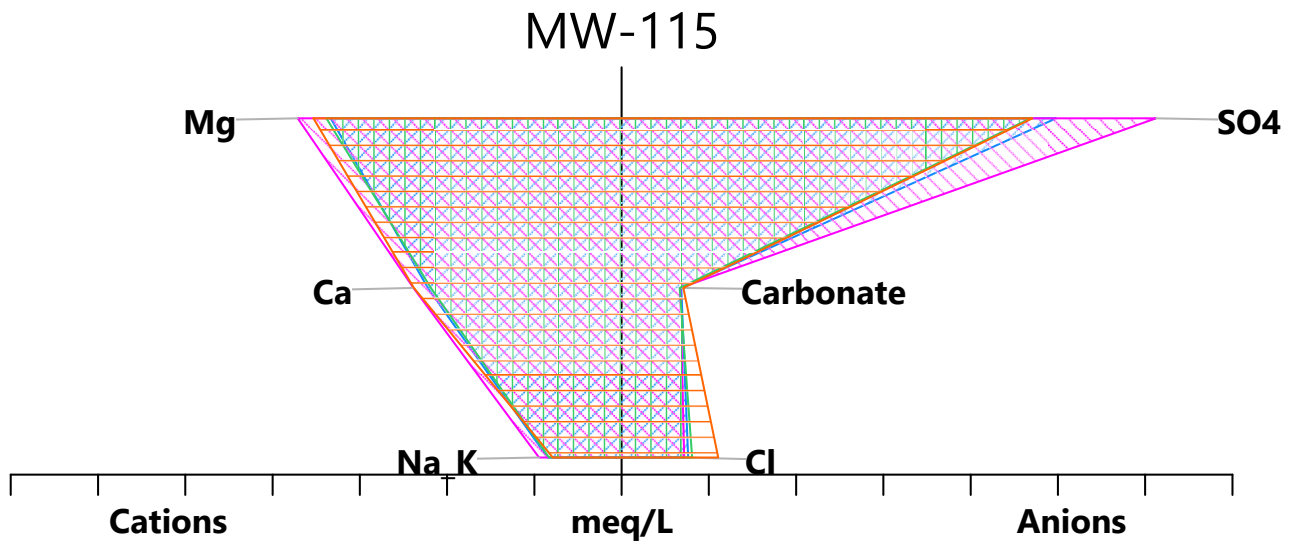
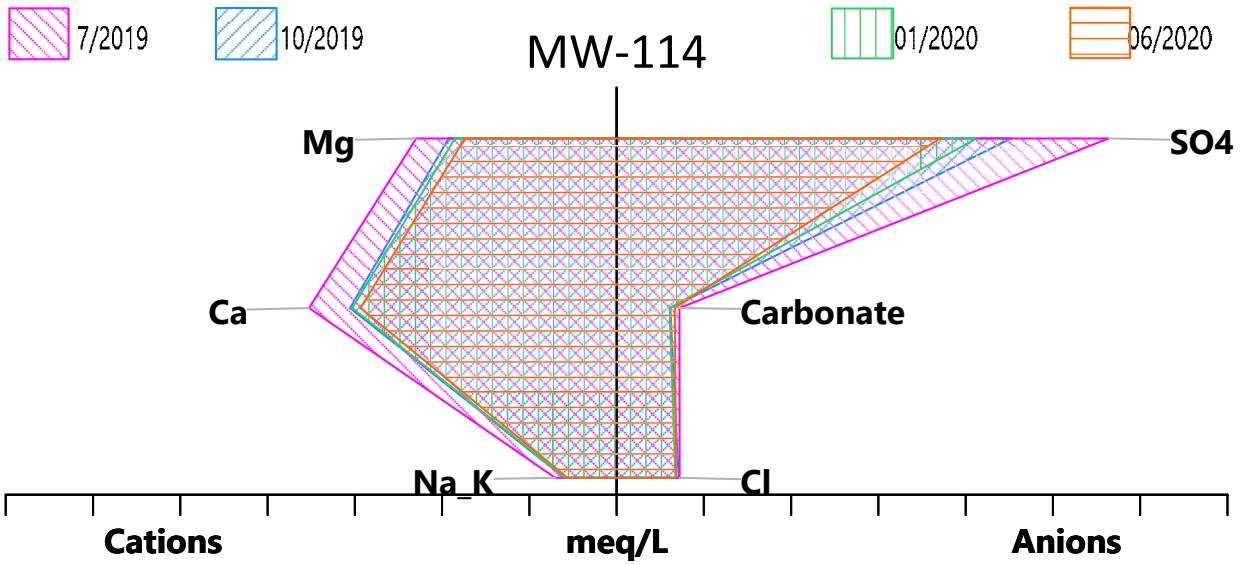
RO Reject Discharge Fields Stage 1 Abatement - Final Report
South RO Field - Upgradient Monitoring Wells - Cumulative Quarterly Data

7/2019 10/2019 01/2020 06/2020



STIFF DIAGRAMS

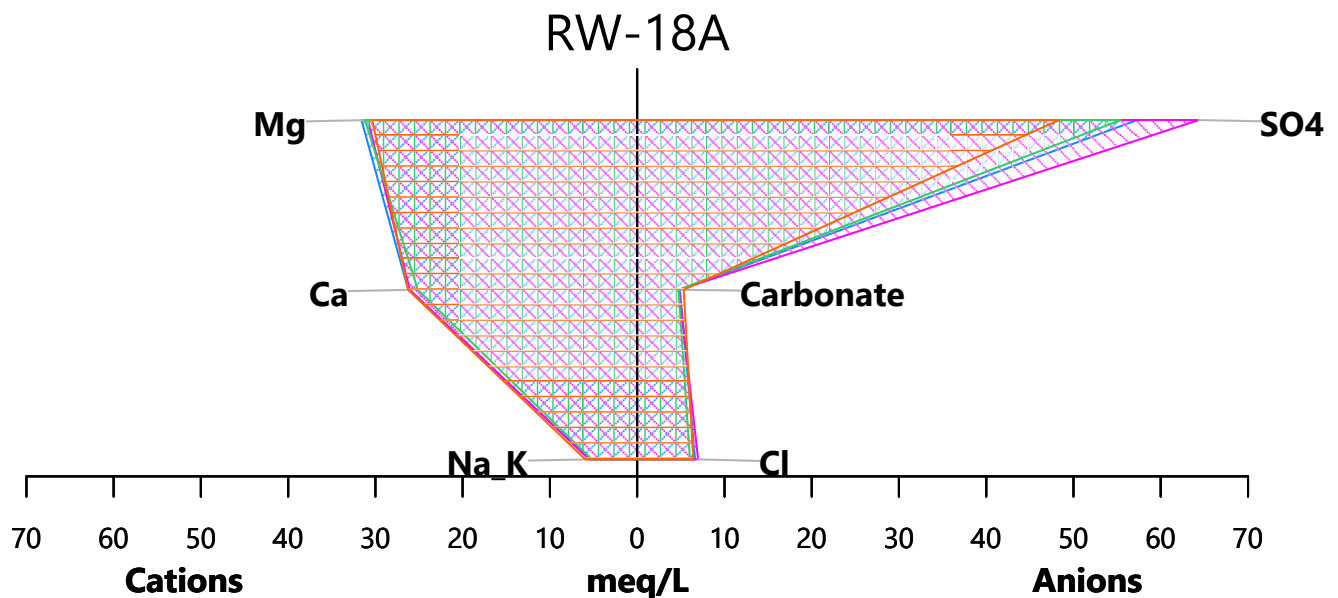
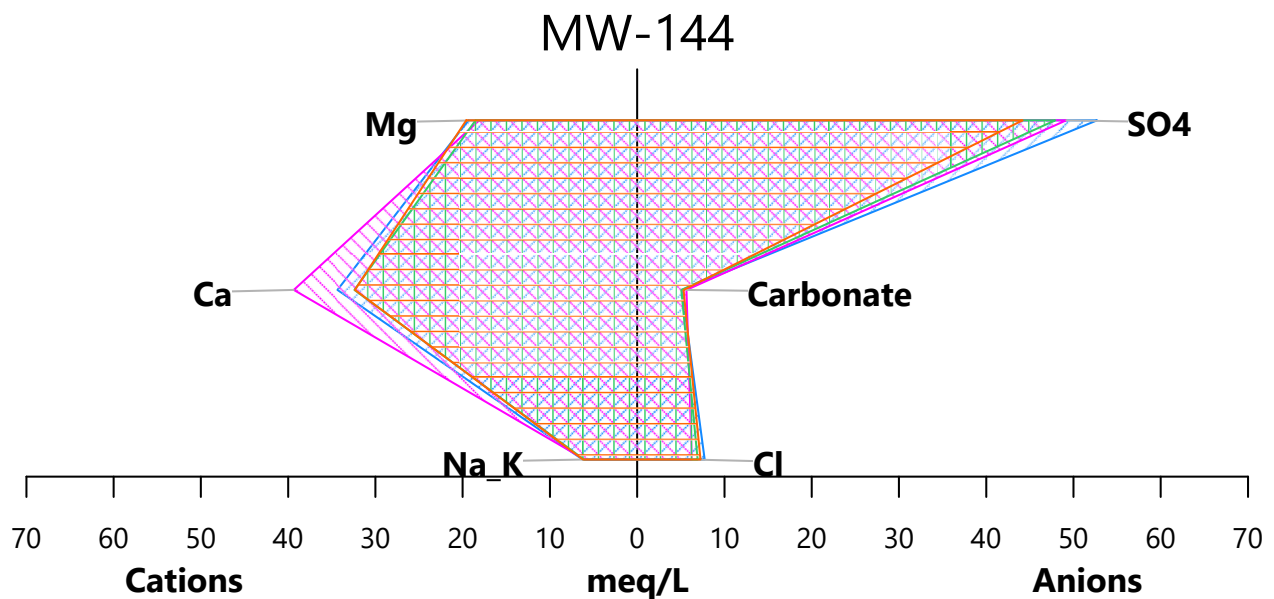
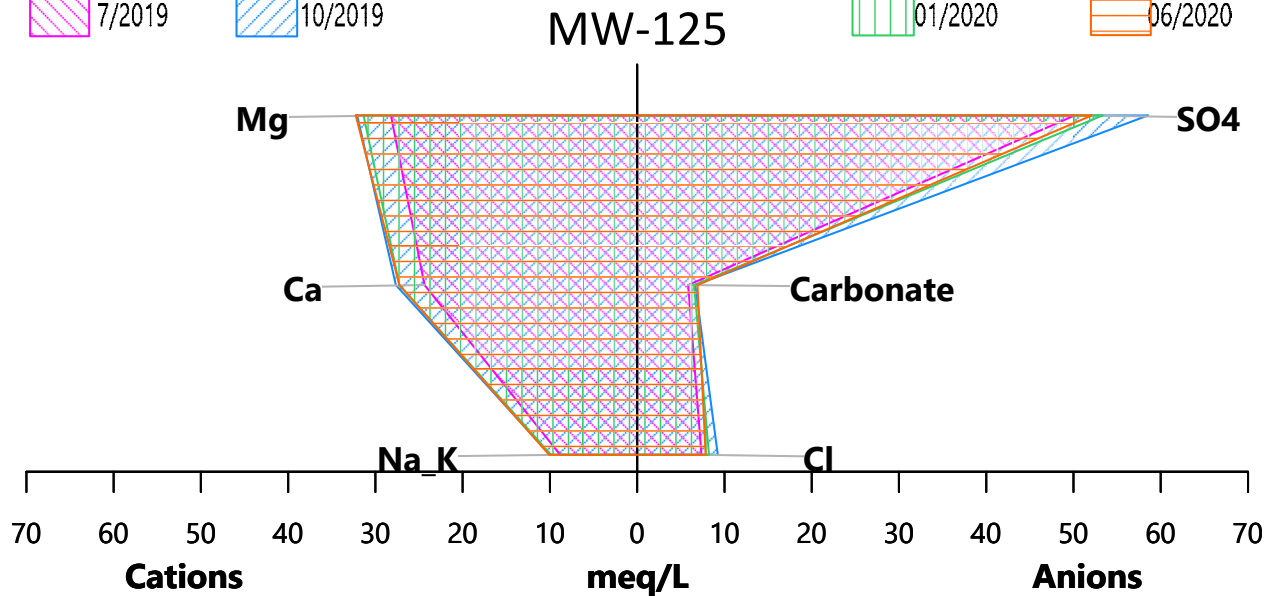
RO Reject Discharge Fields Stage 1 Abatement - Final Report South RO Field - In Field Monitoring Wells - Cumulative Quarterly Data



STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Final Report
North RO Field - Downgradient Monitoring Wells - Cumulative Quarterly Data

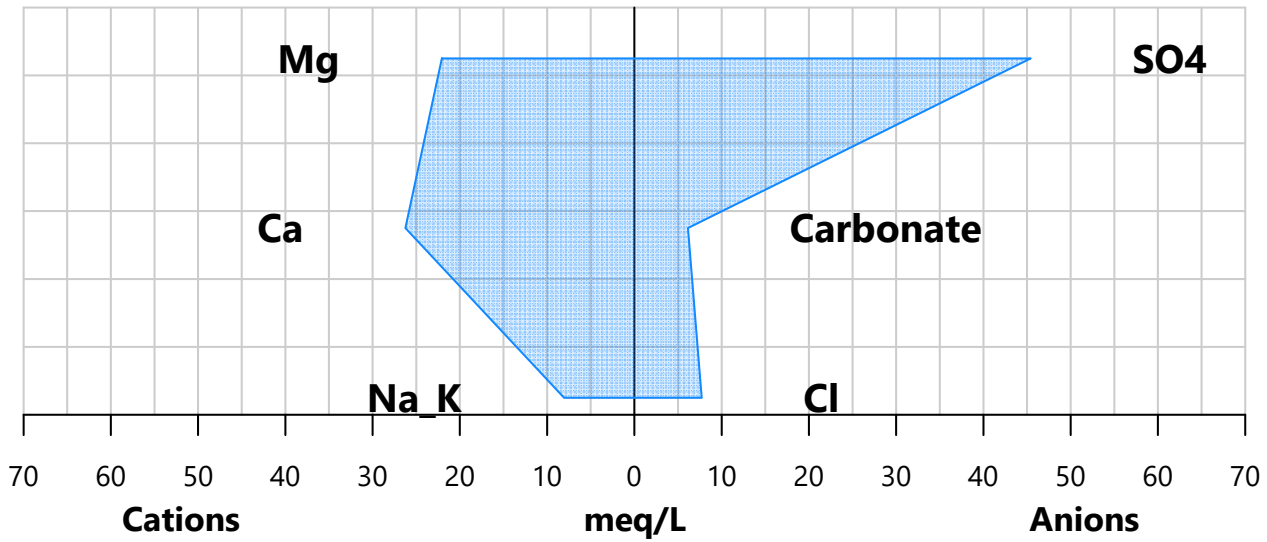
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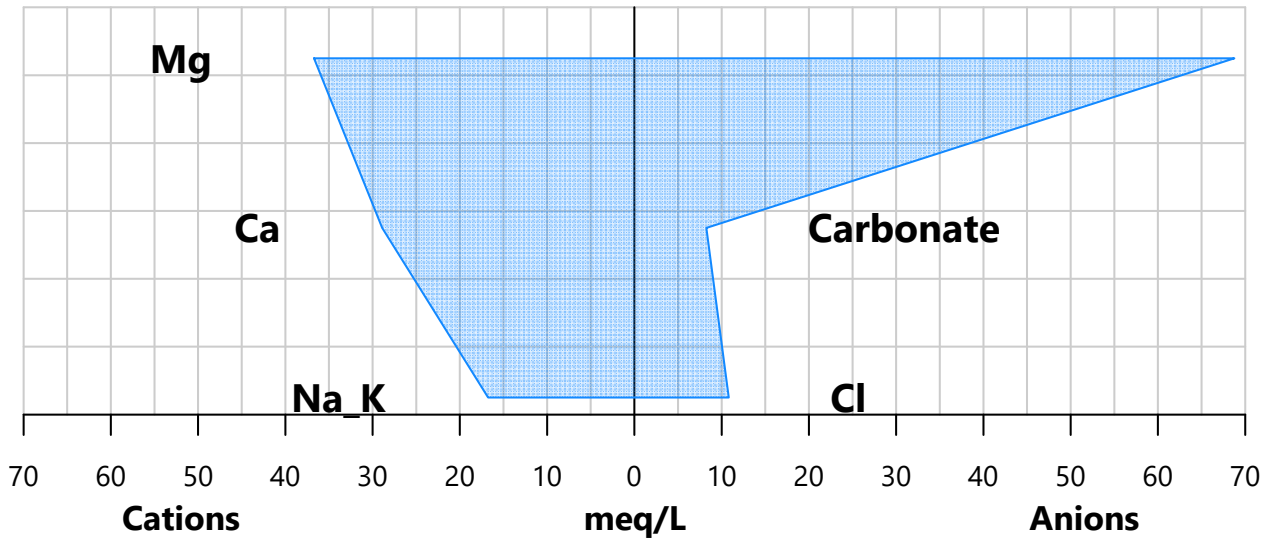
STIFF DIAGRAMS

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

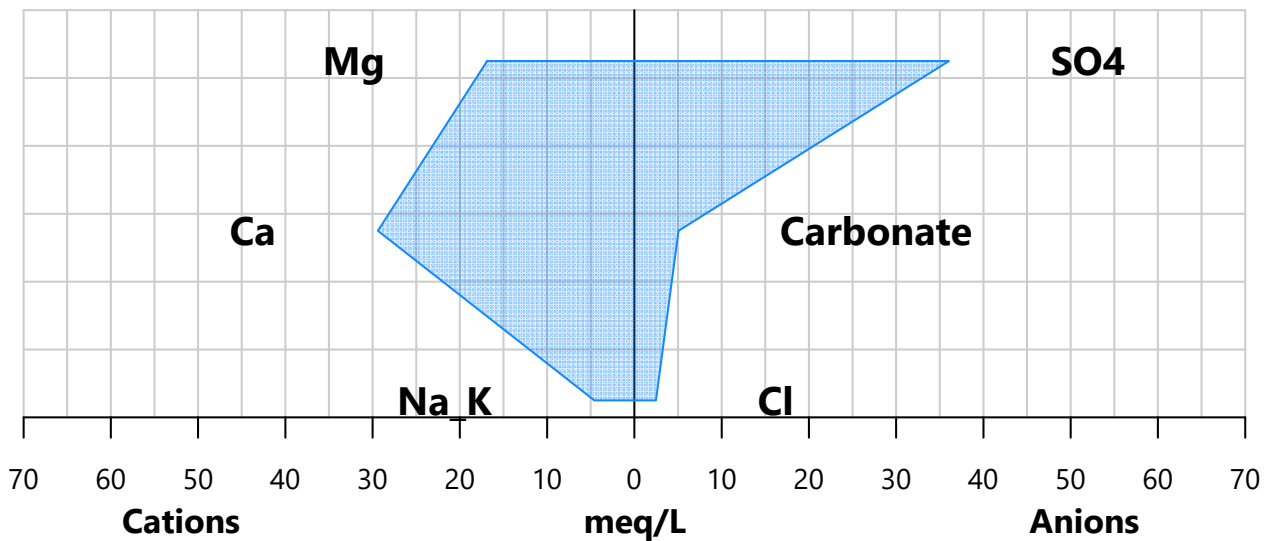
MW-56



MW-29



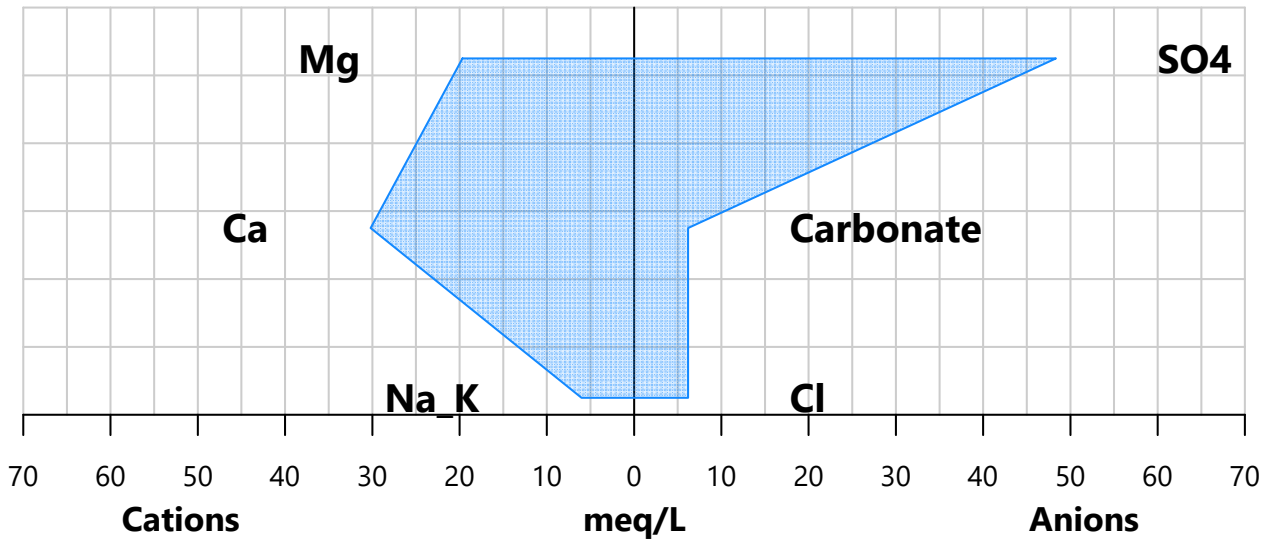
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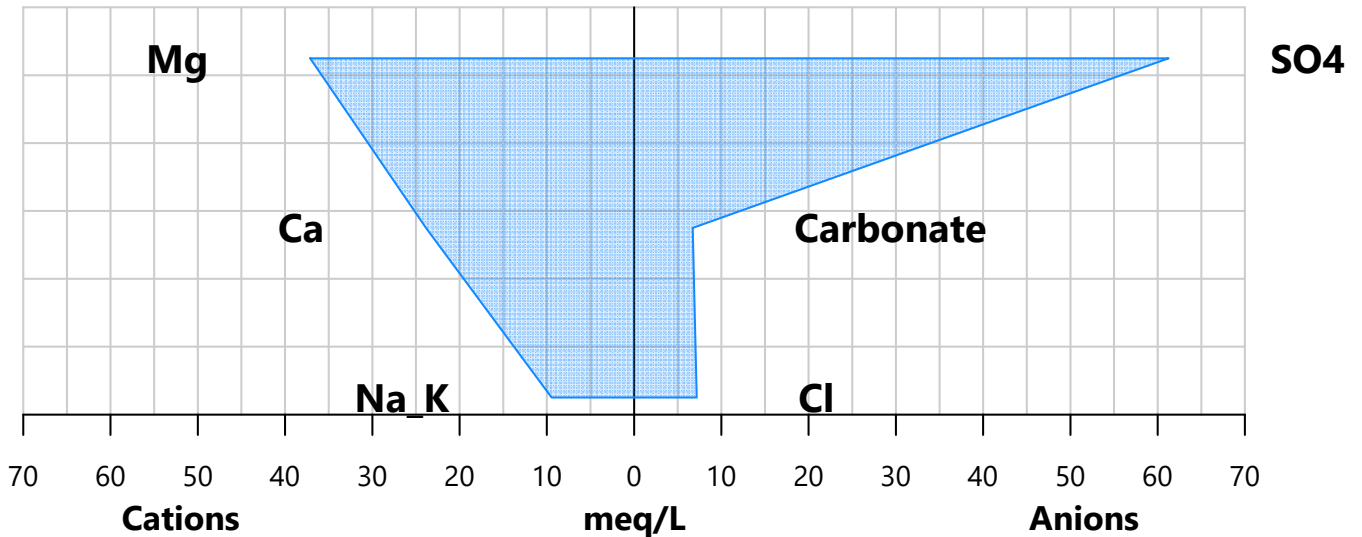
STIFF DIAGRAMS

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

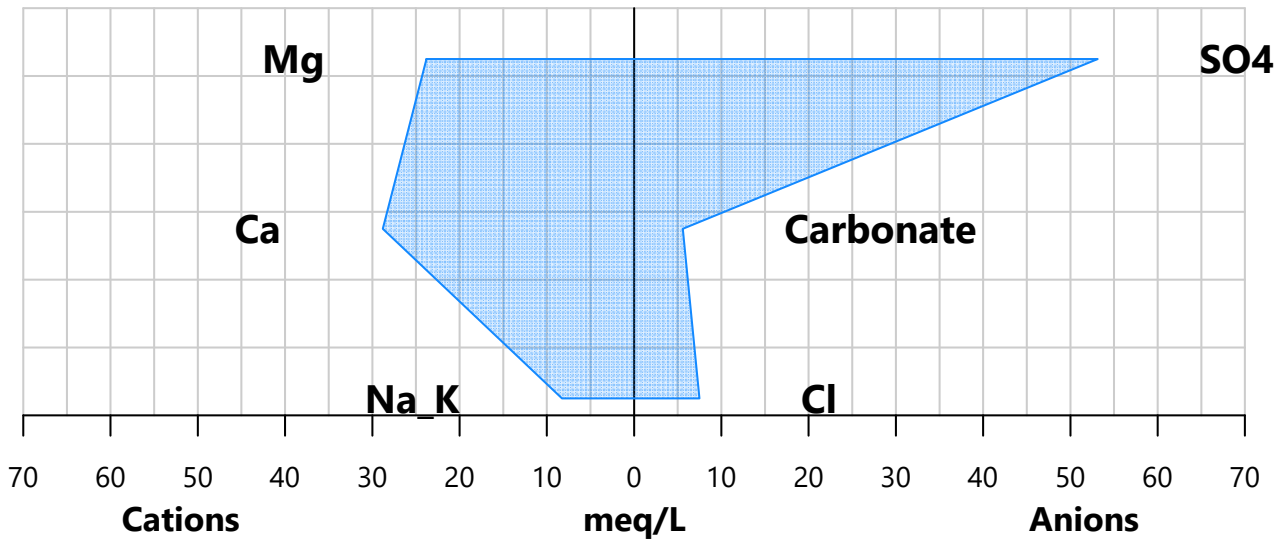
MW-114



MW-115



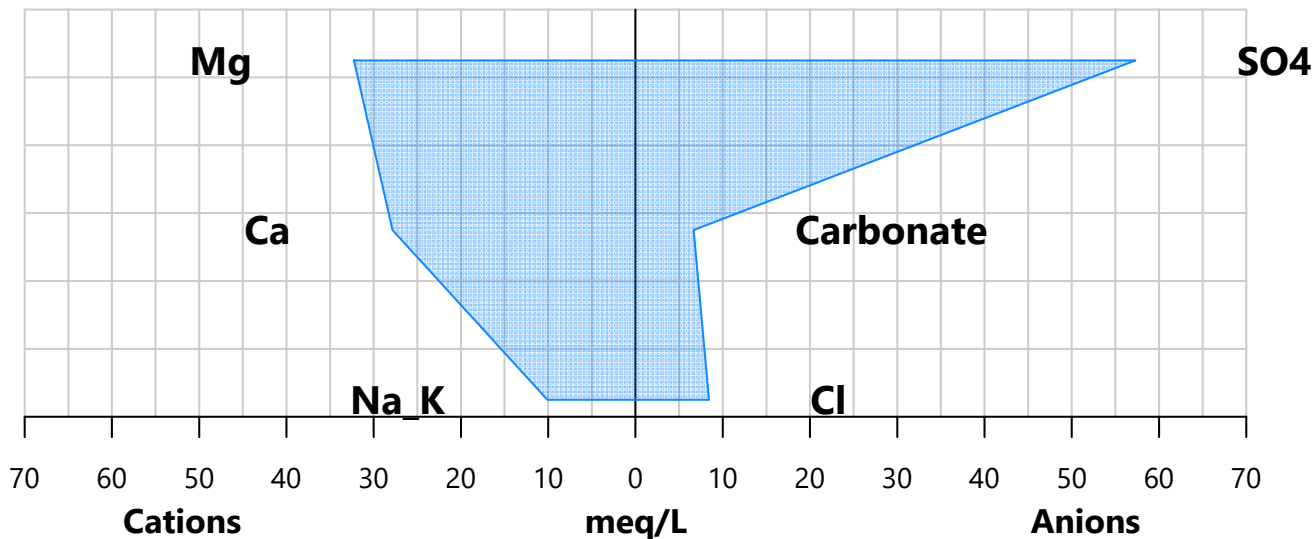
MW-116



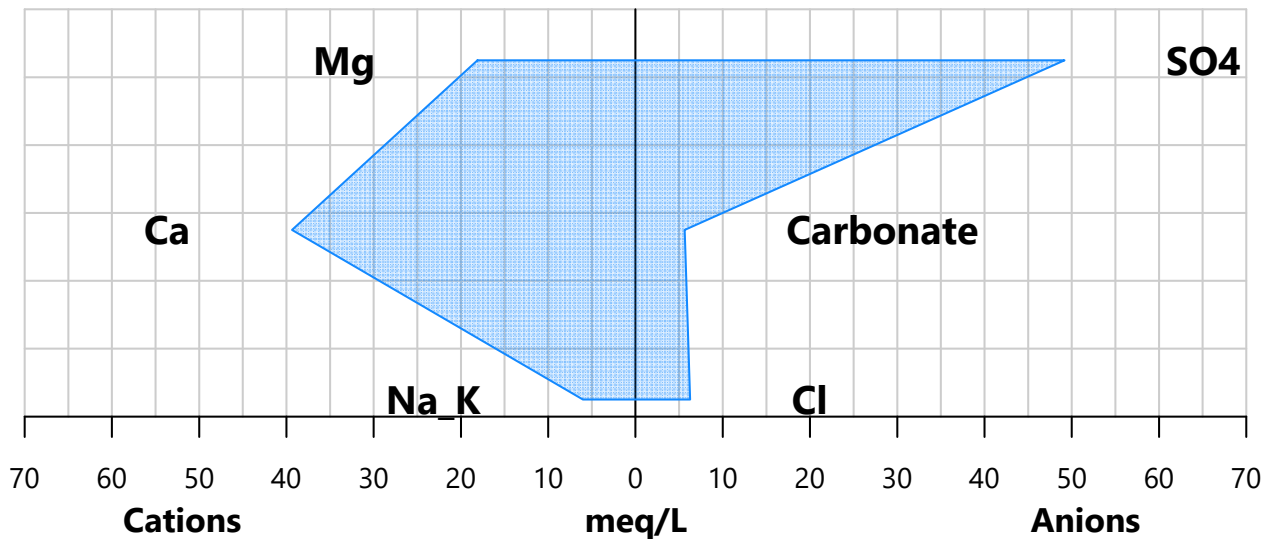
STIFF DIAGRAMS

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

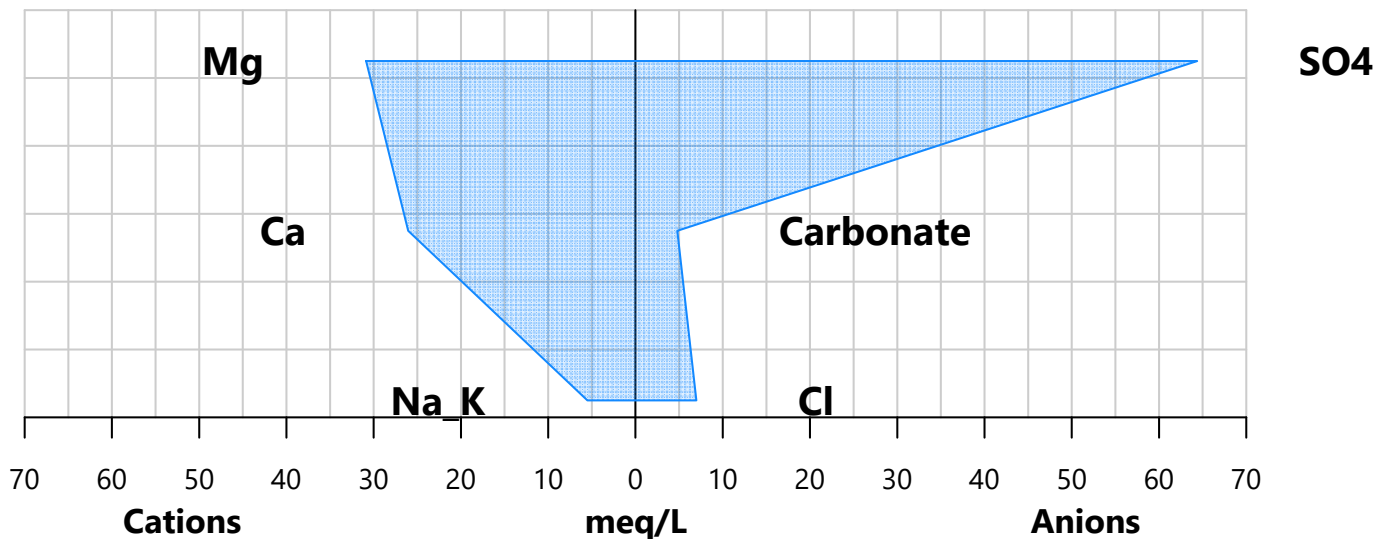
MW-125



MW-144



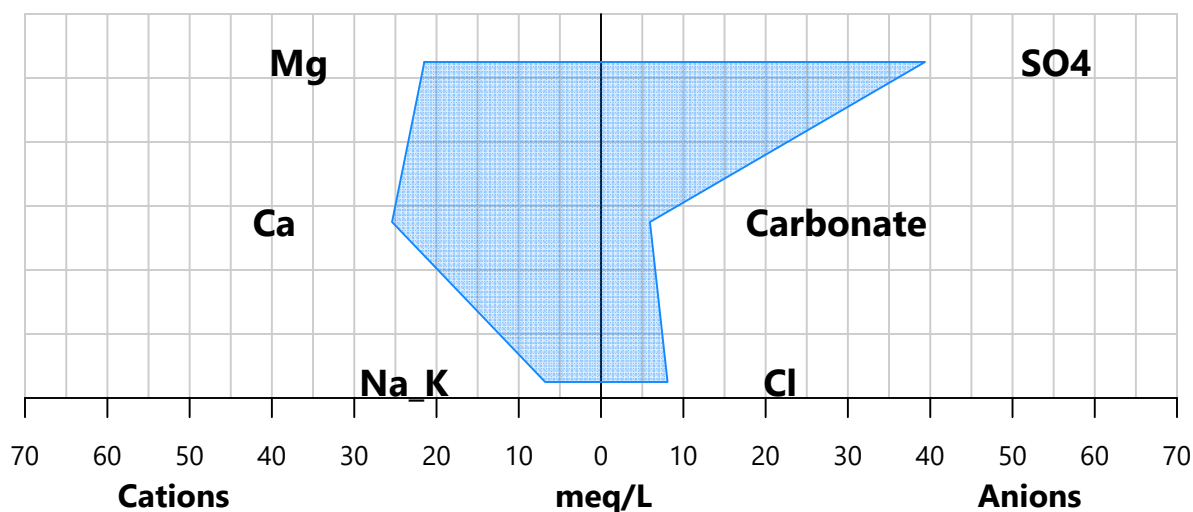
RW-18A



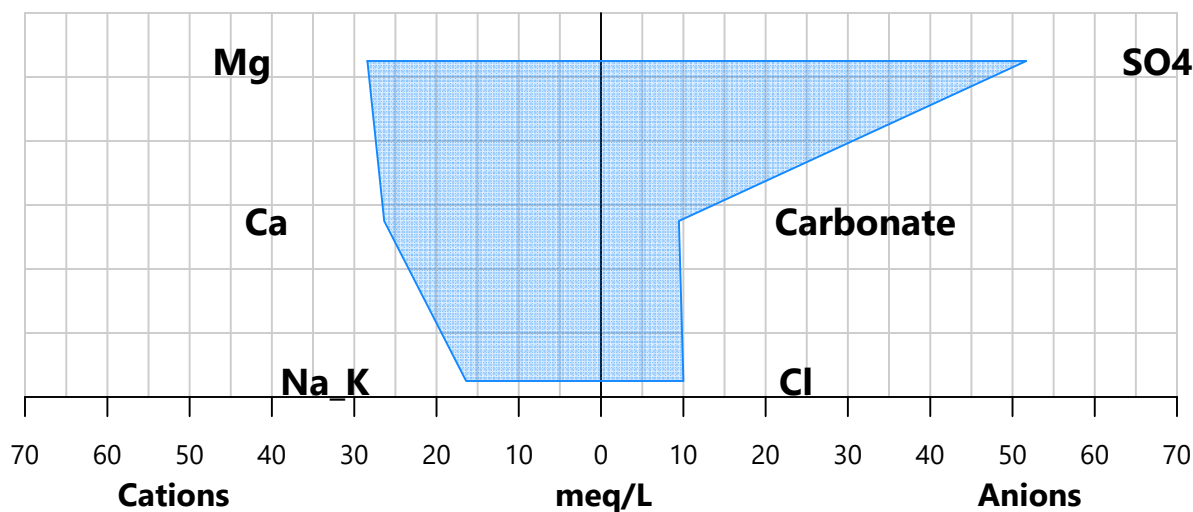
STIFF DIAGRAMS

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

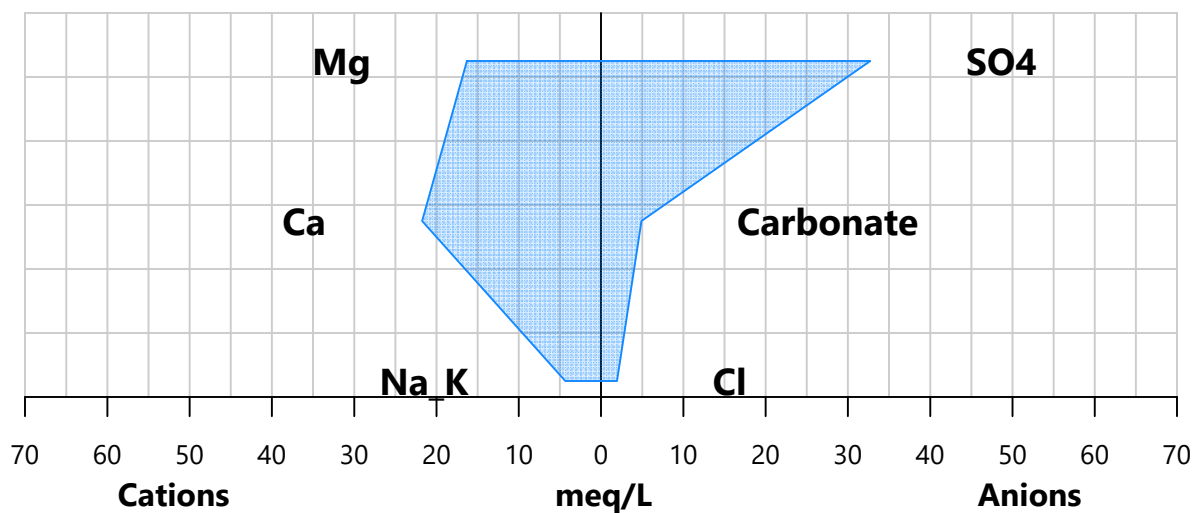
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MW-29



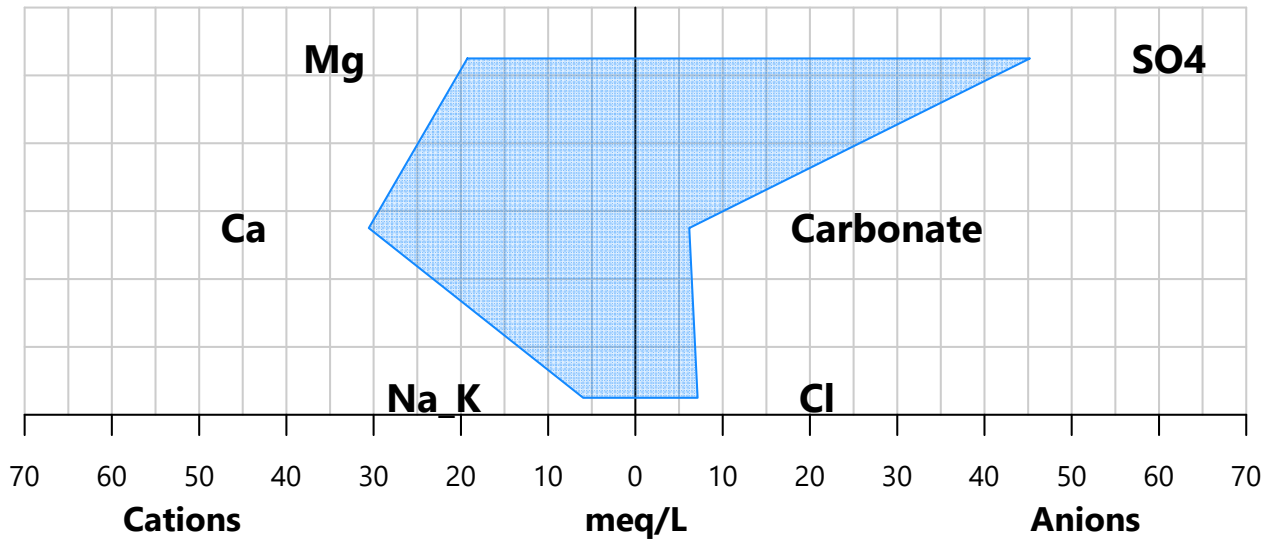
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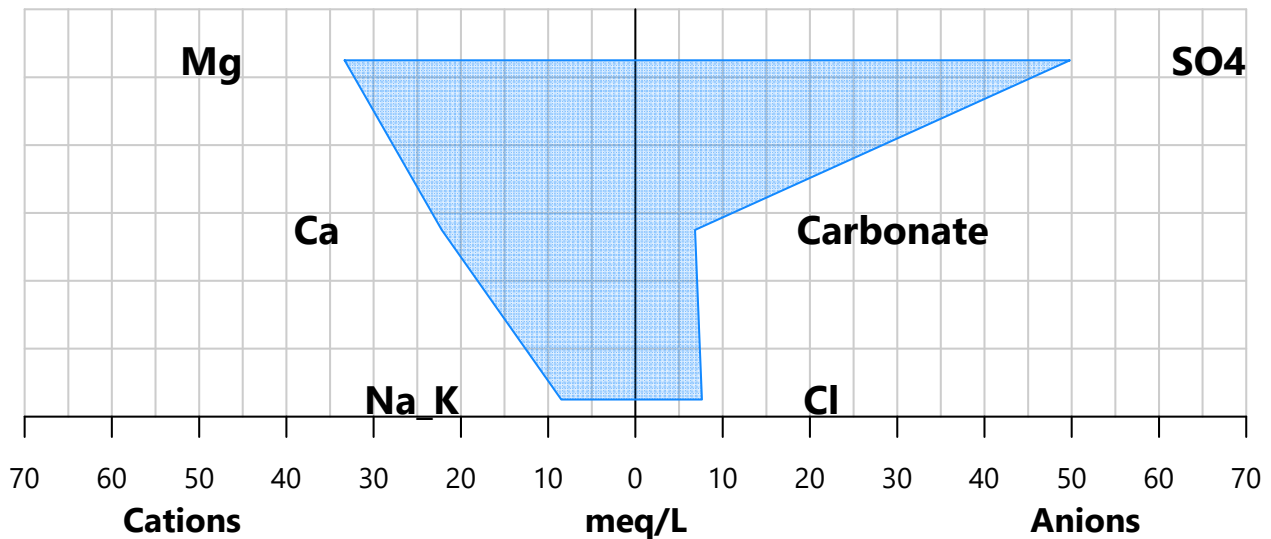
STIFF DIAGRAMS

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

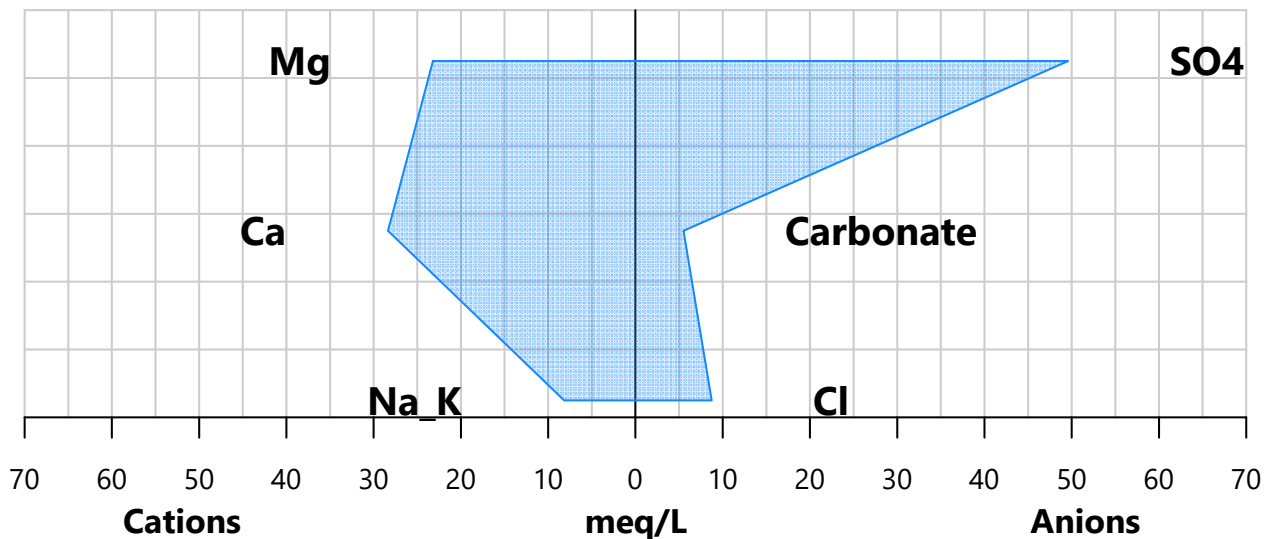
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MW-115



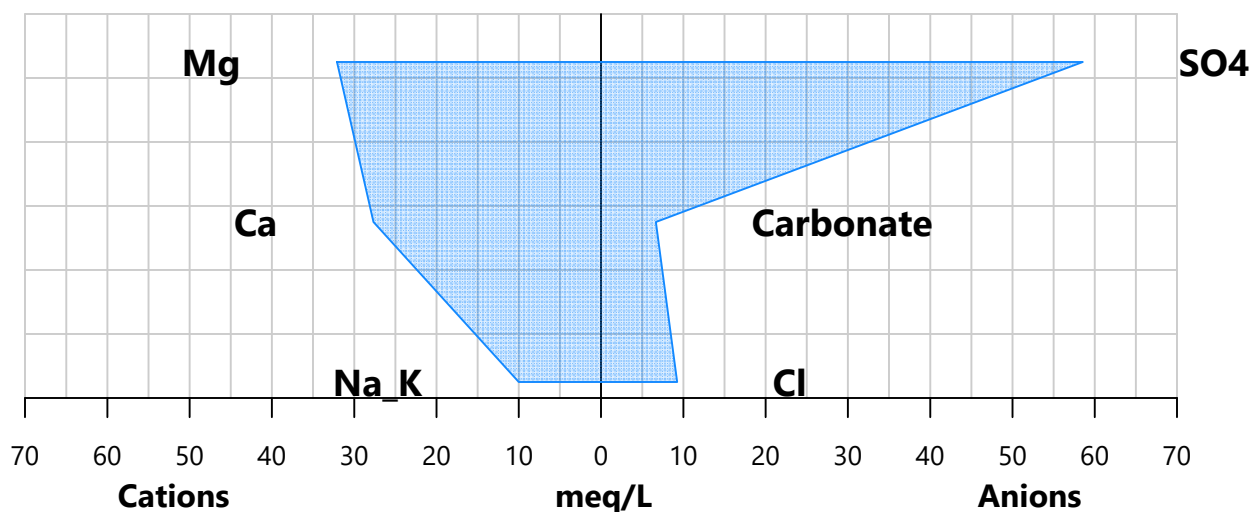
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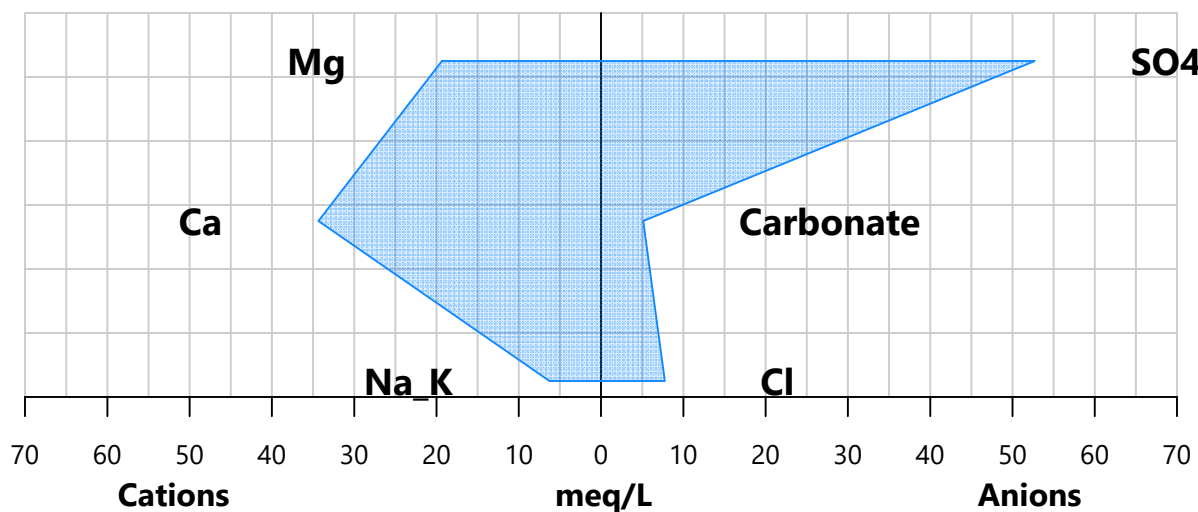
STIFF DIAGRAMS

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

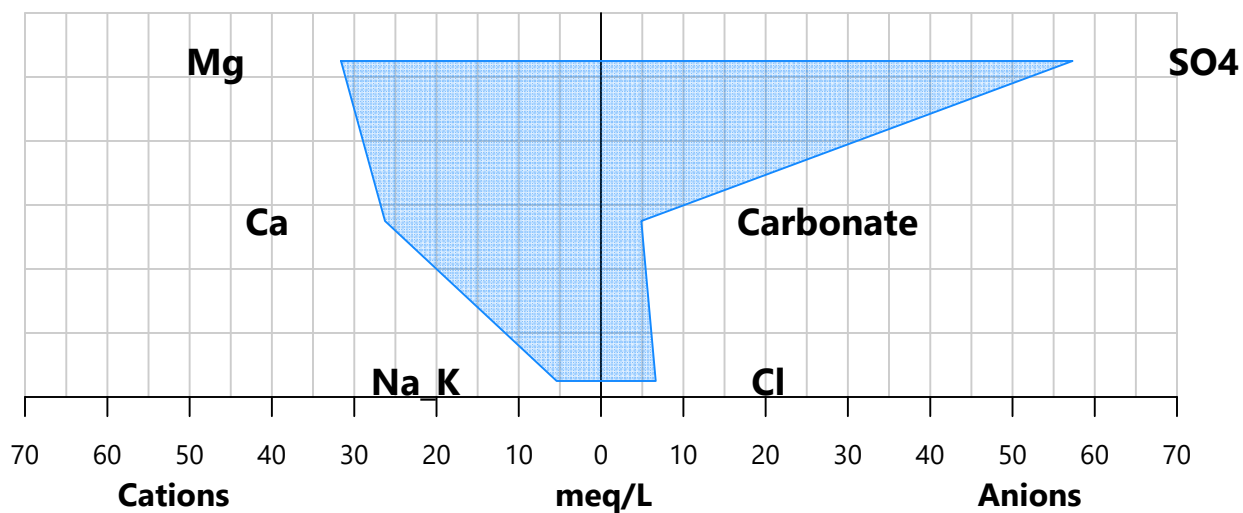
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MW-144



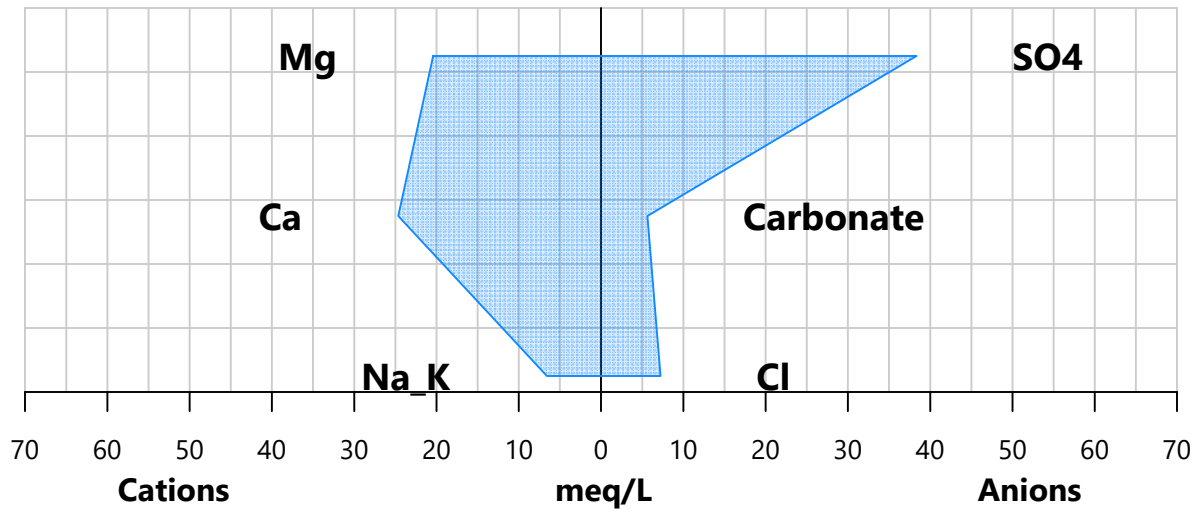
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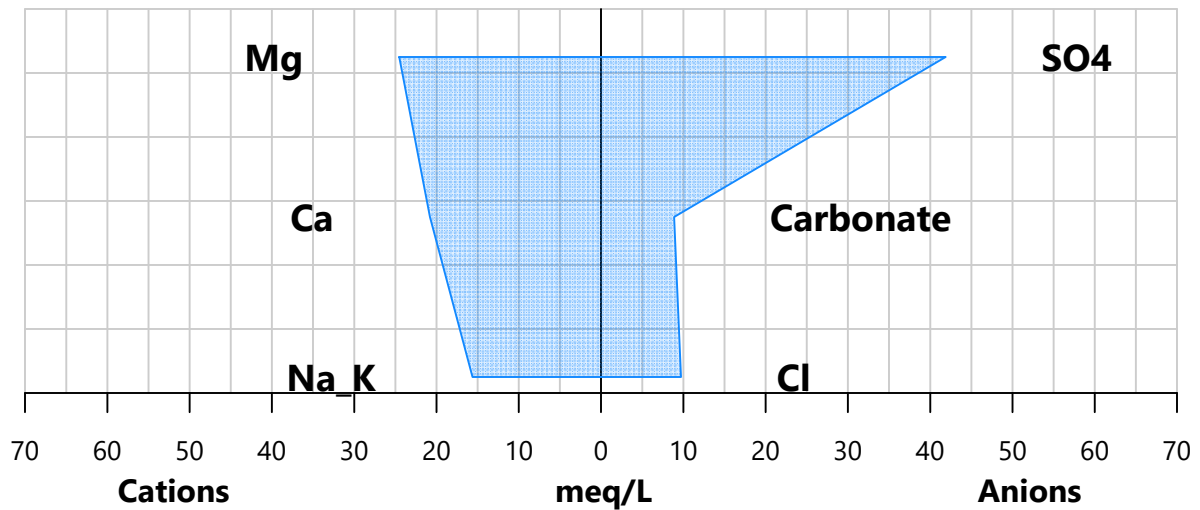
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Third Quarterly Progress Report
South RO Field - Upgradient Monitoring Wells - January 2020

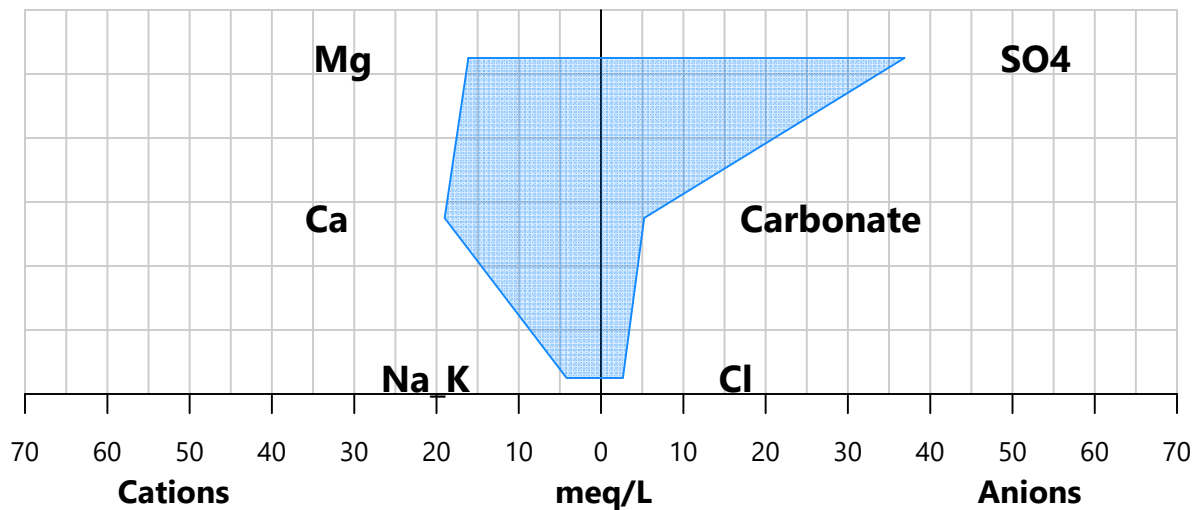
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MW-29



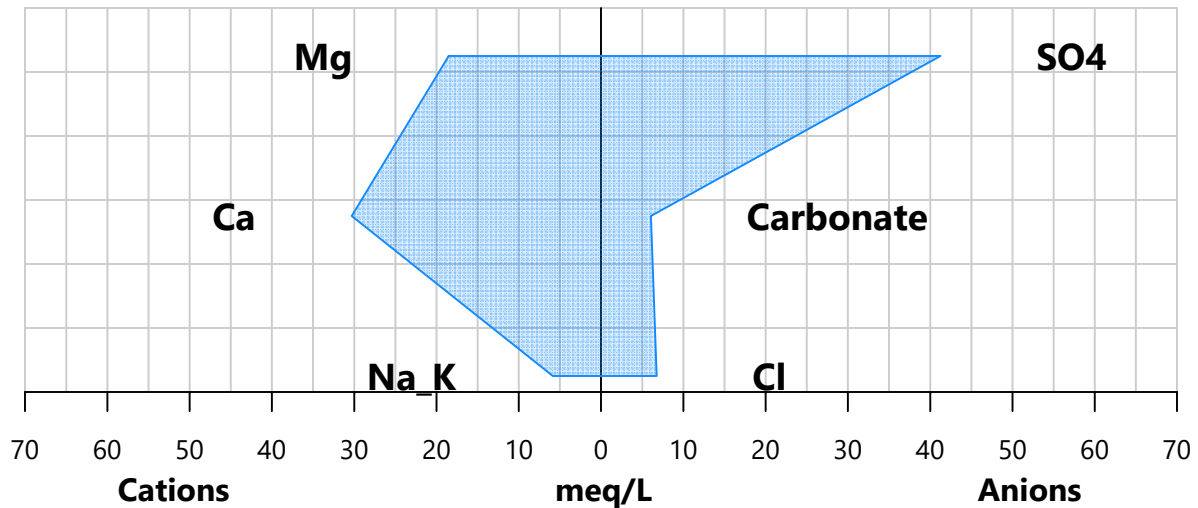
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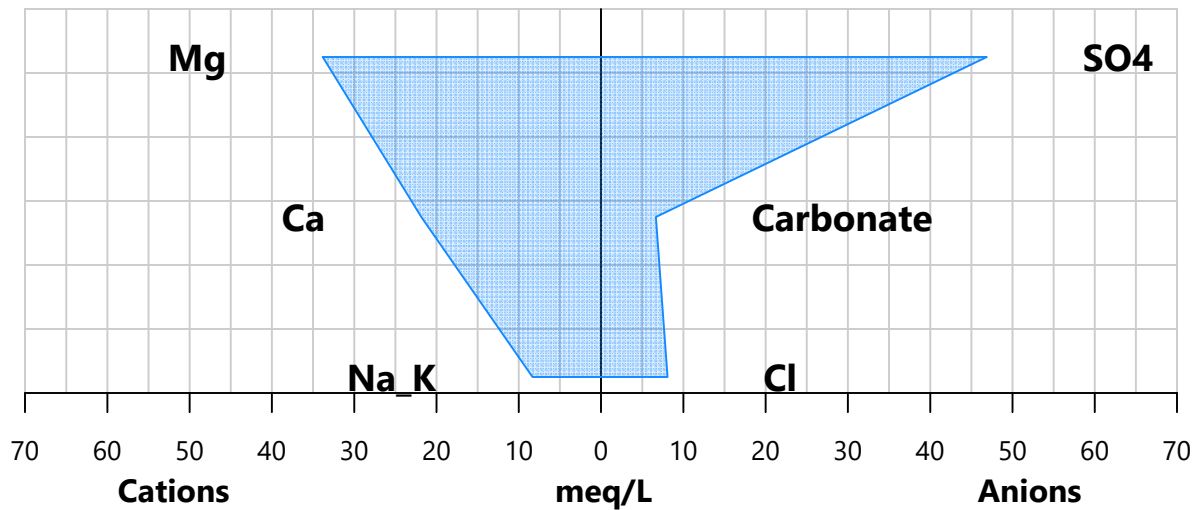
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Third Quarterly Progress Report
South RO Field - In Field Monitoring Wells - January 2020

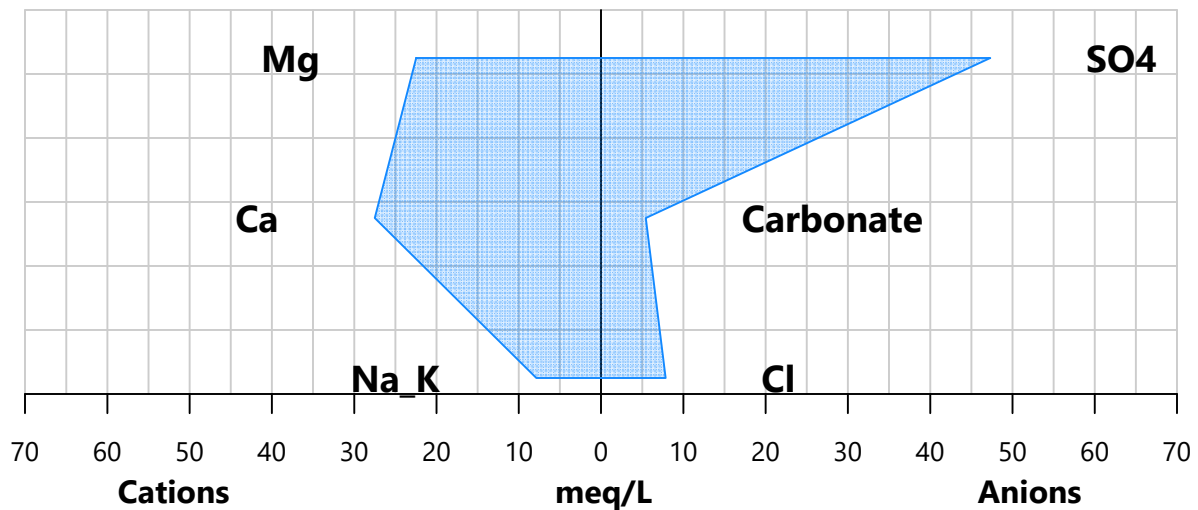
MW-114



MW-115



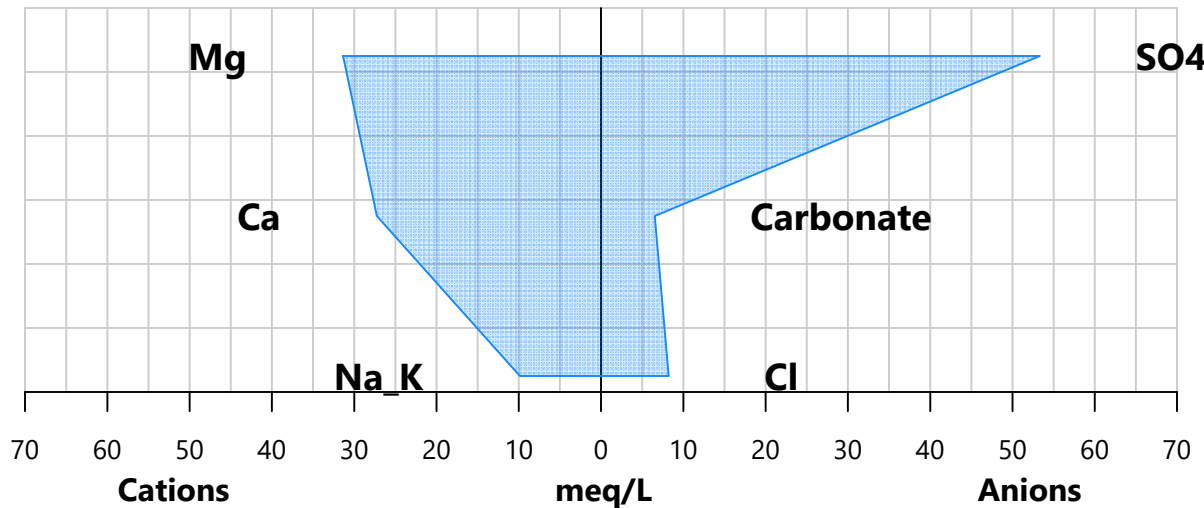
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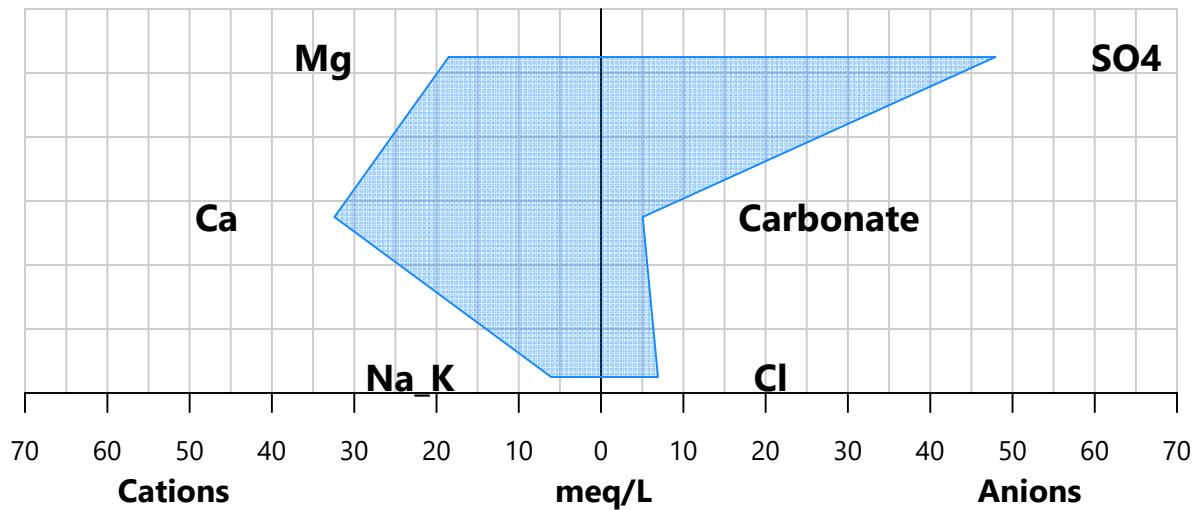
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Third Quarterly Progress Report
South RO Field - Downgradient Monitoring Wells - January 2020

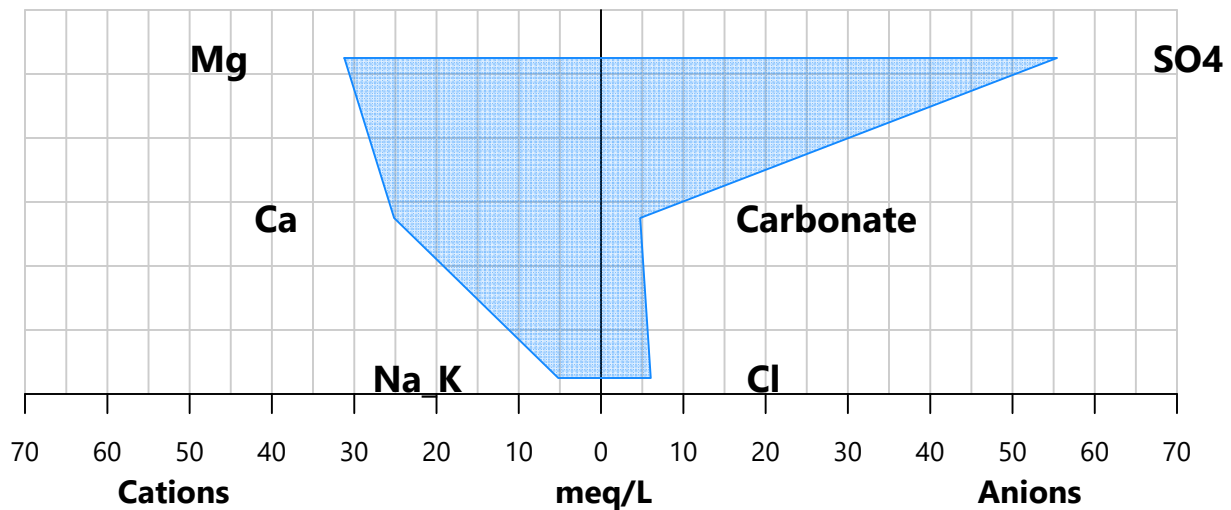
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MW-144



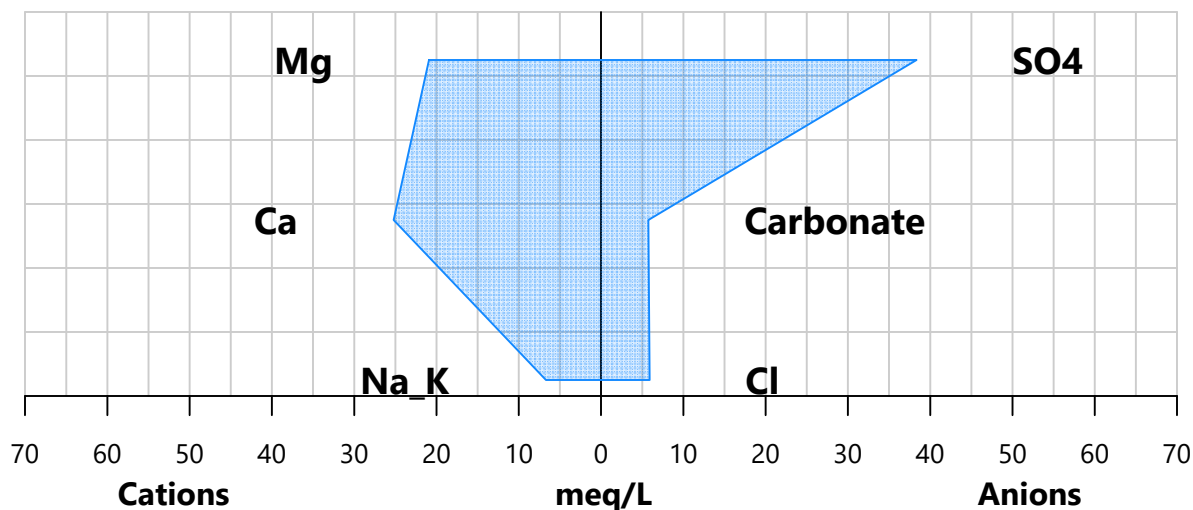
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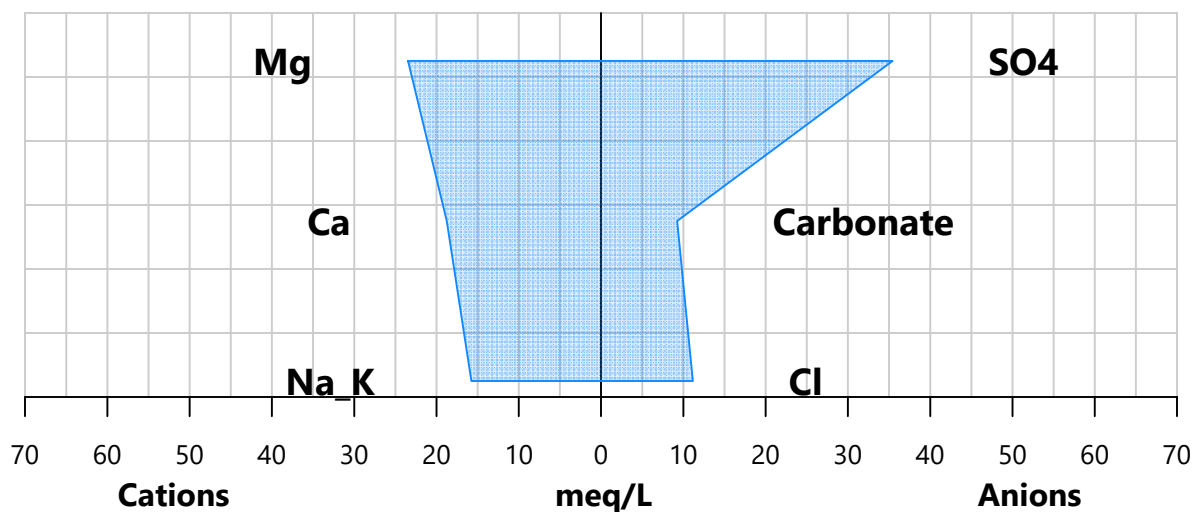
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Fourth Quarterly Progress Report
South RO Field - Upgradient Monitoring Wells - June 2020

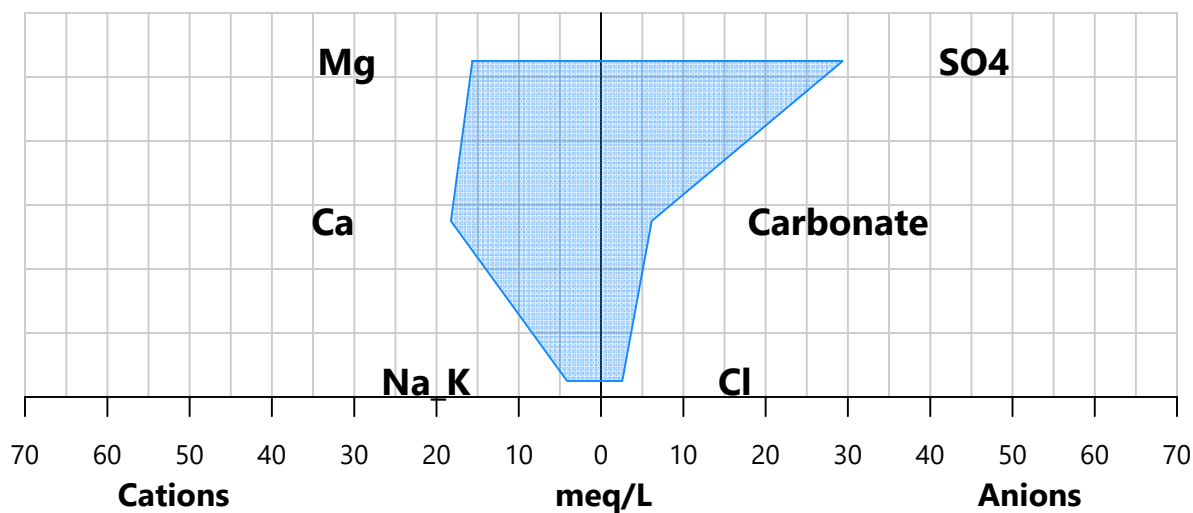
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MW-29



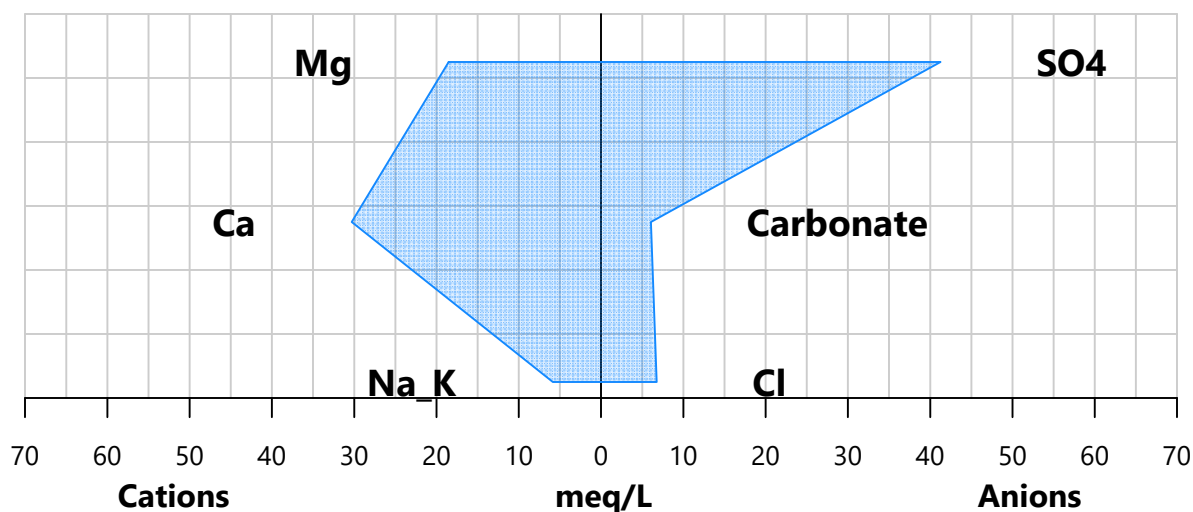
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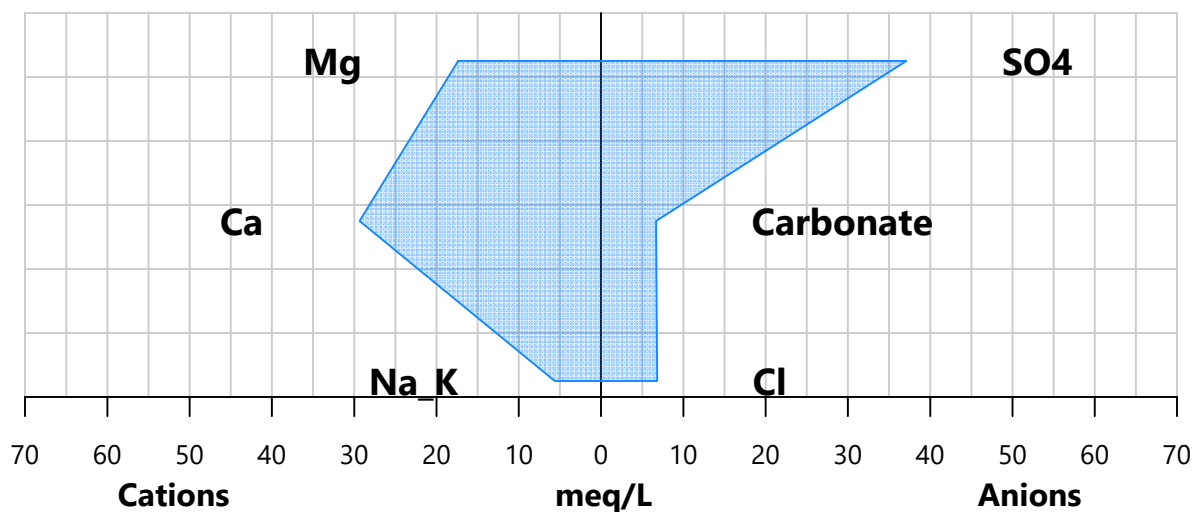
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Fourth Quarterly Progress Report
South RO Field - In Field Monitoring Wells - June 2020

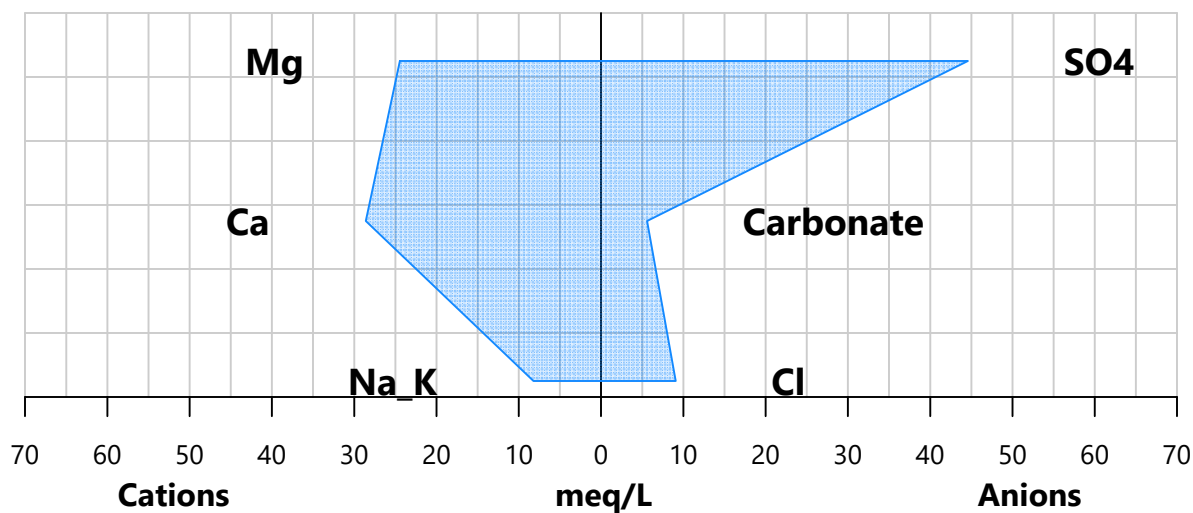
MW-114



MW-115



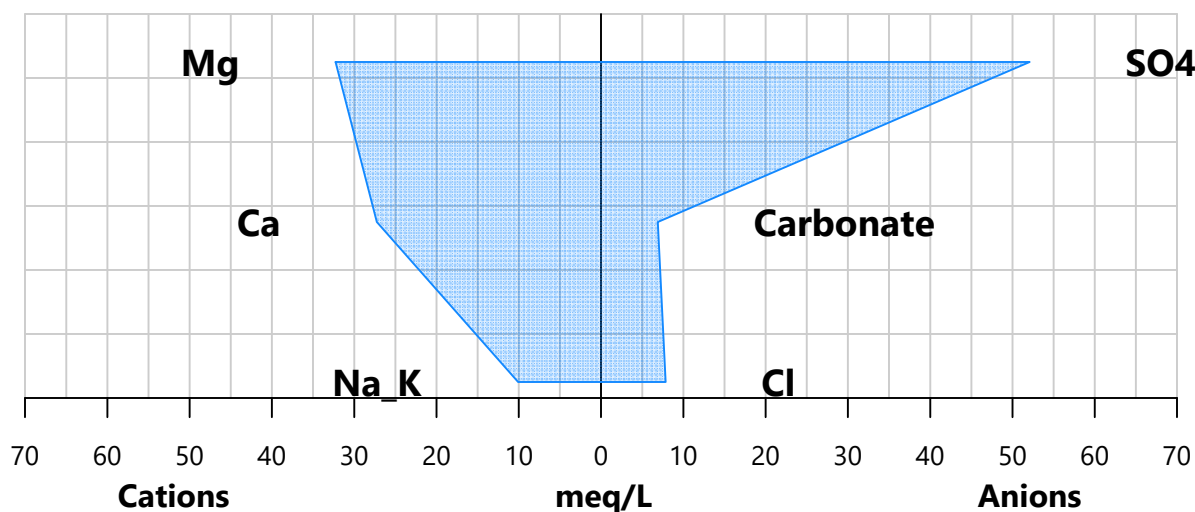
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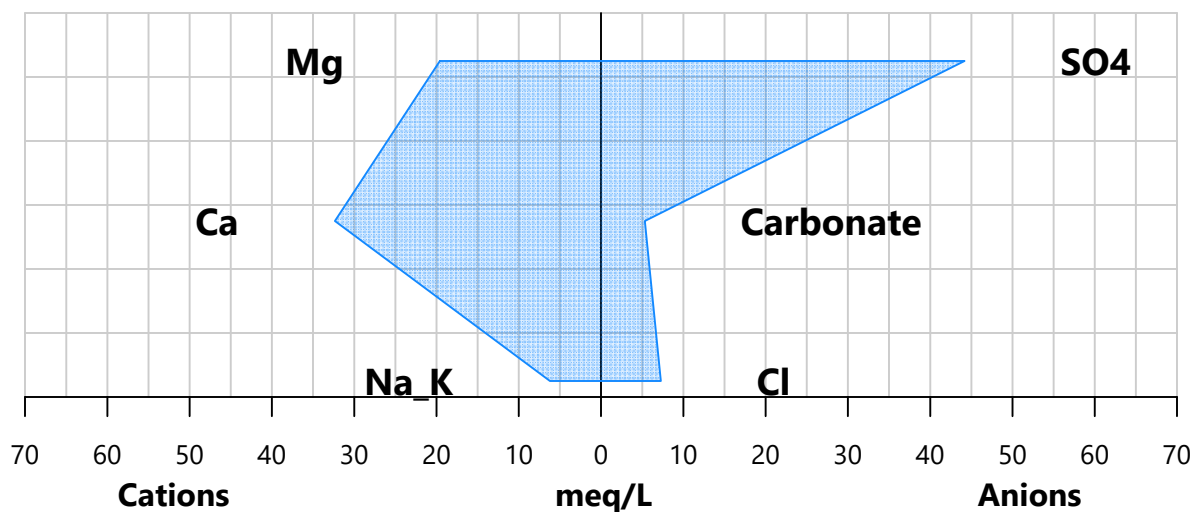
STIFF DIAGRAMS

RO Reject Discharge Fields Stage 1 Abatement - Fourth Quarterly Progress Report
South RO Field - Downgradient Monitoring Wells - June 2020

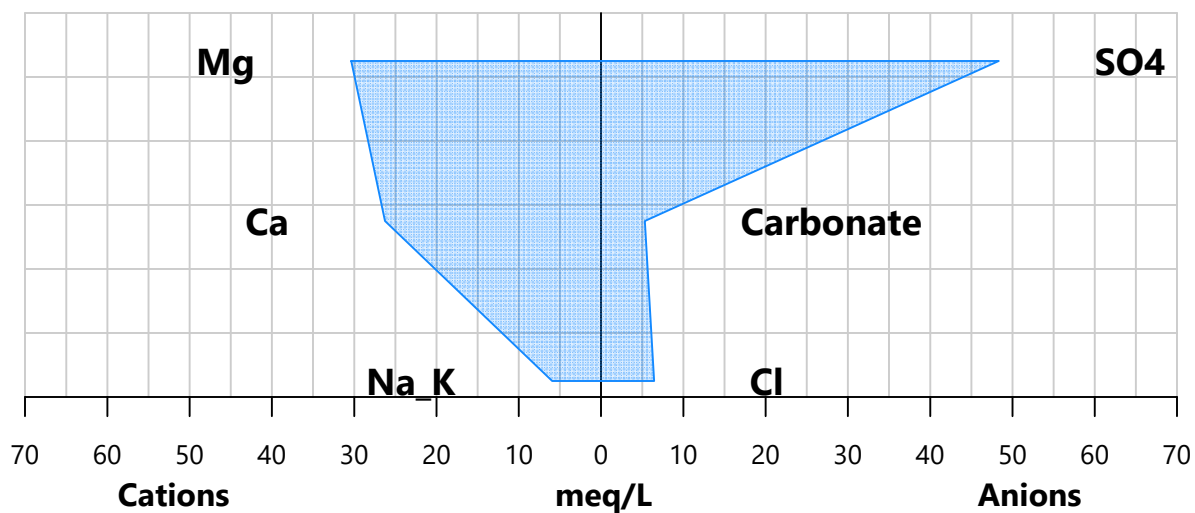
MW-125



MW-144



RW-18A

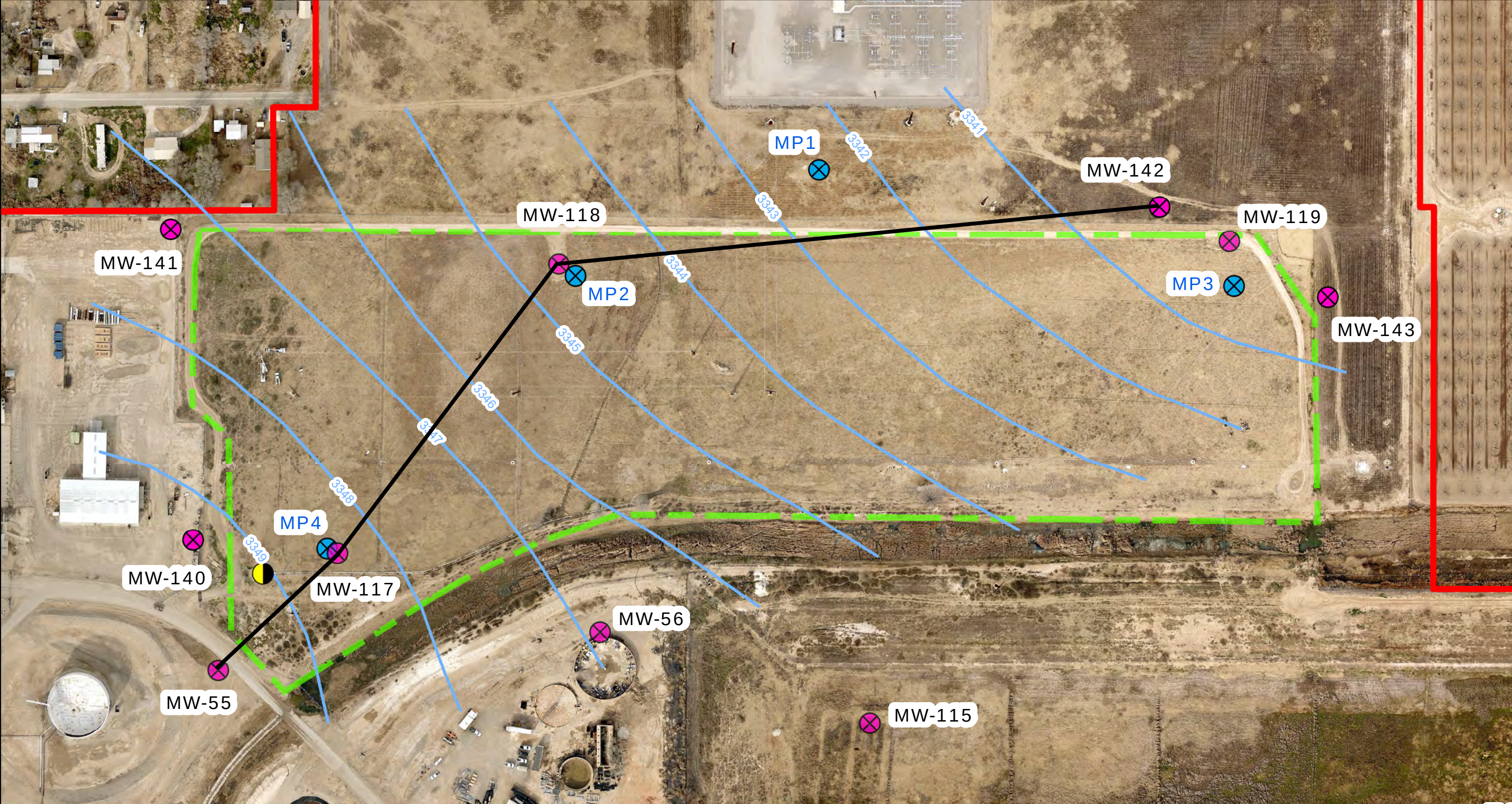


APPENDIX G

GROUNDWATER CONCENTRATION TRENDS AND PROFILES

North RO Reject Discharge Field

DB: ALB PM: PK
Path: C:\Users\ashley.bogrand\Documents\Projects\Holly Frontier\6703200016 - RO Reject Discharge Field - Profile Location.mxd: 11/5/2020: 11:41:16 AM



Legend

Property Boundary

North RO Reject Discharge Field

Moisture Probes

Monitoring Well

Former Discharge Point

Contour Line

Profile Line

0150300

Feet

GRAPHIC SCALE

HollyFrontier Navajo Refining LLC
Artesia, New Mexico

RO Reject Discharge Fields
Stage 1 Abatement
North RO Reject Discharge Field - Profile Location

Prepared By:
ALB

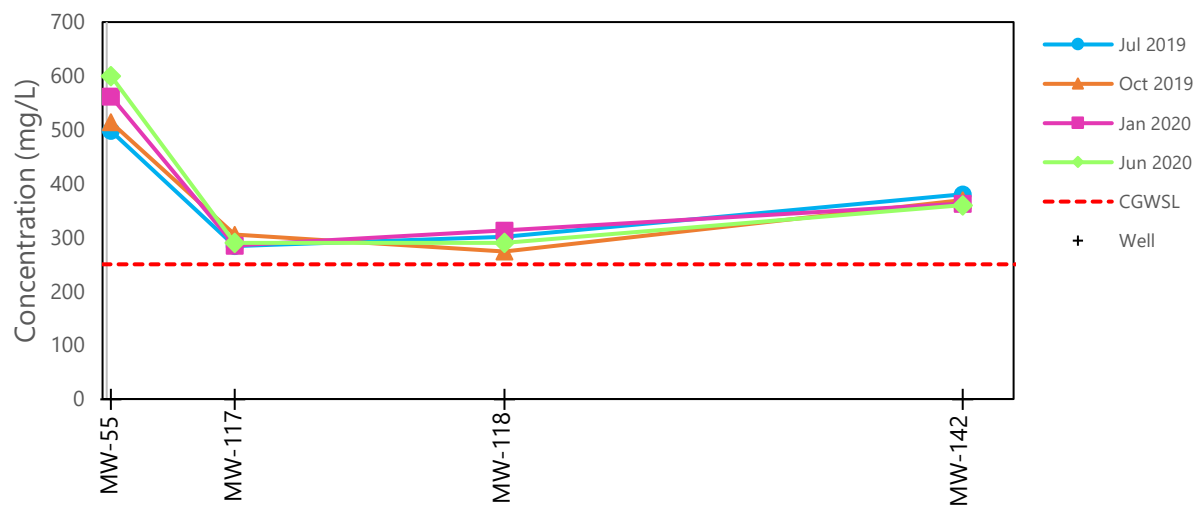
Date Prepared:
11/5/2020

Project Number:
6703200016

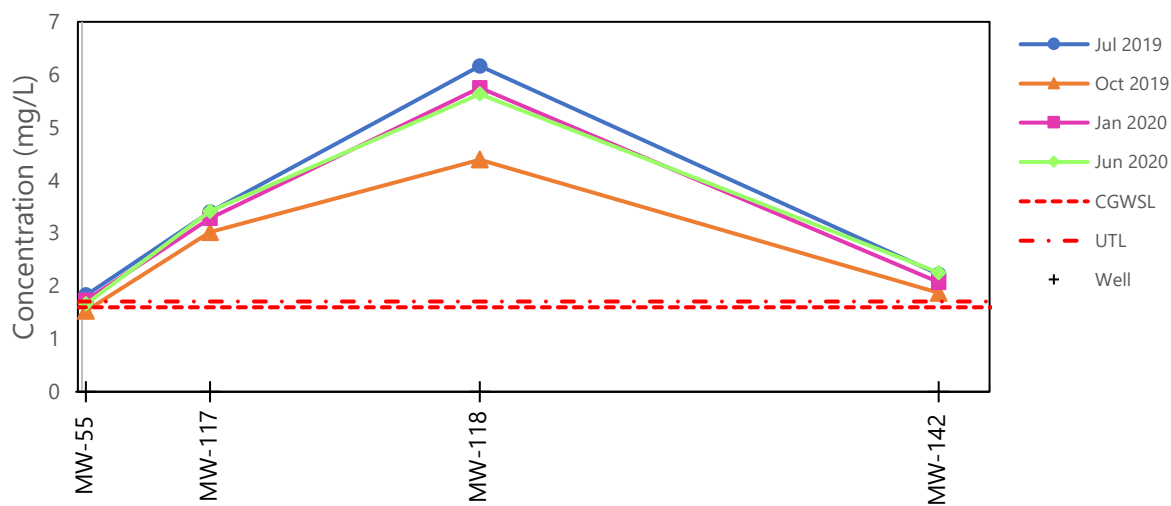
wood.

FIGURE
G-1

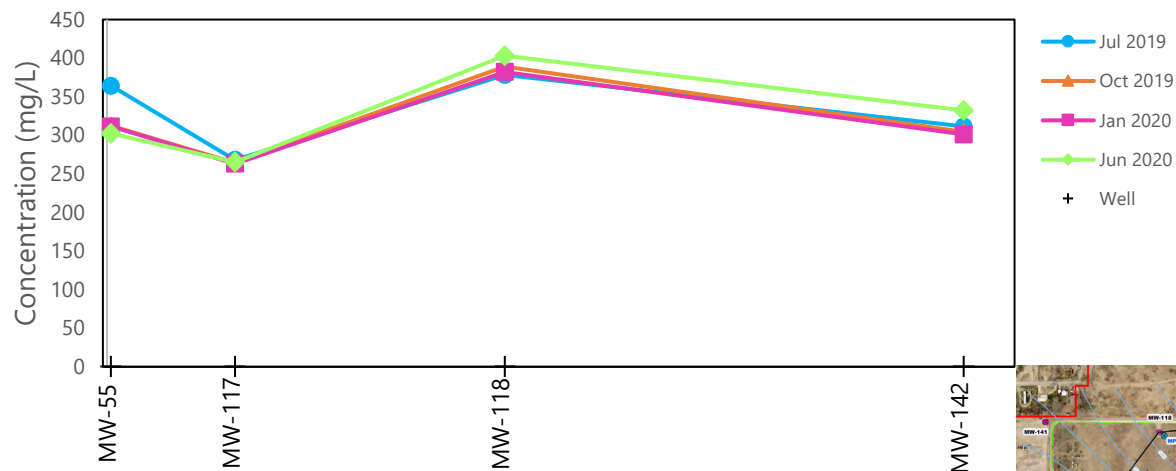
North RO Field - Chloride Profiles



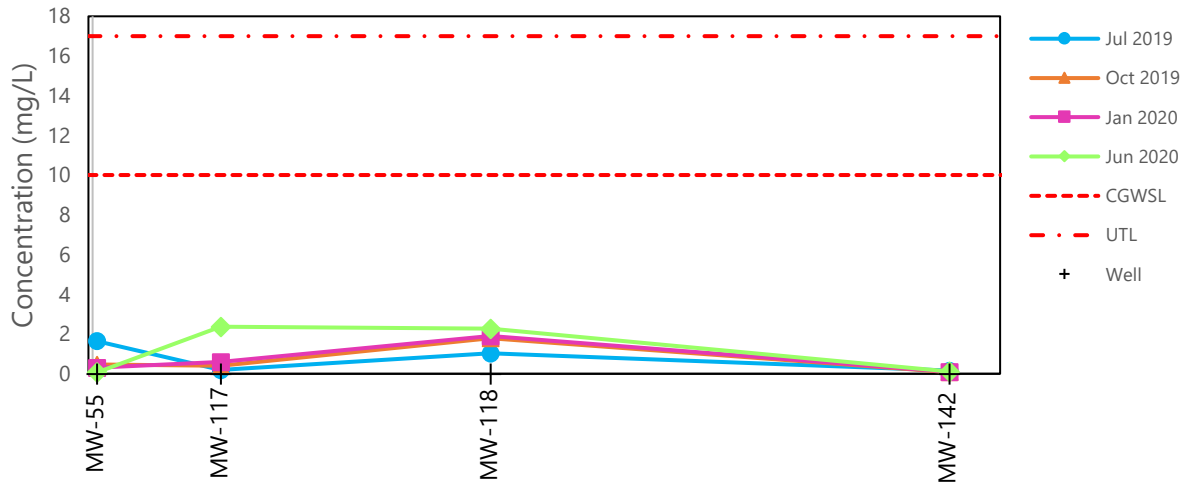
North RO Field - Fluoride Profiles



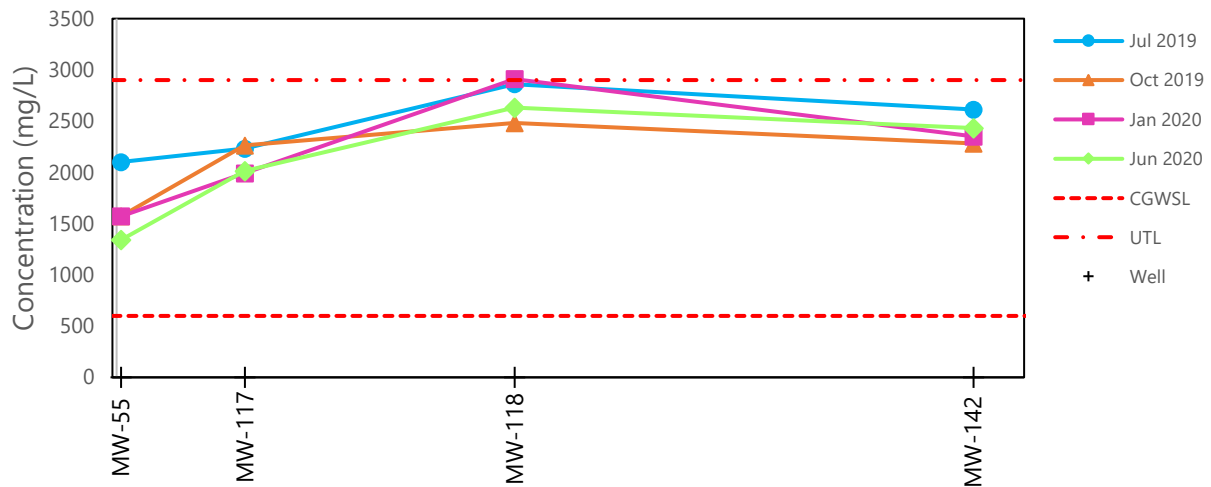
North RO Field - Magnesium Profiles



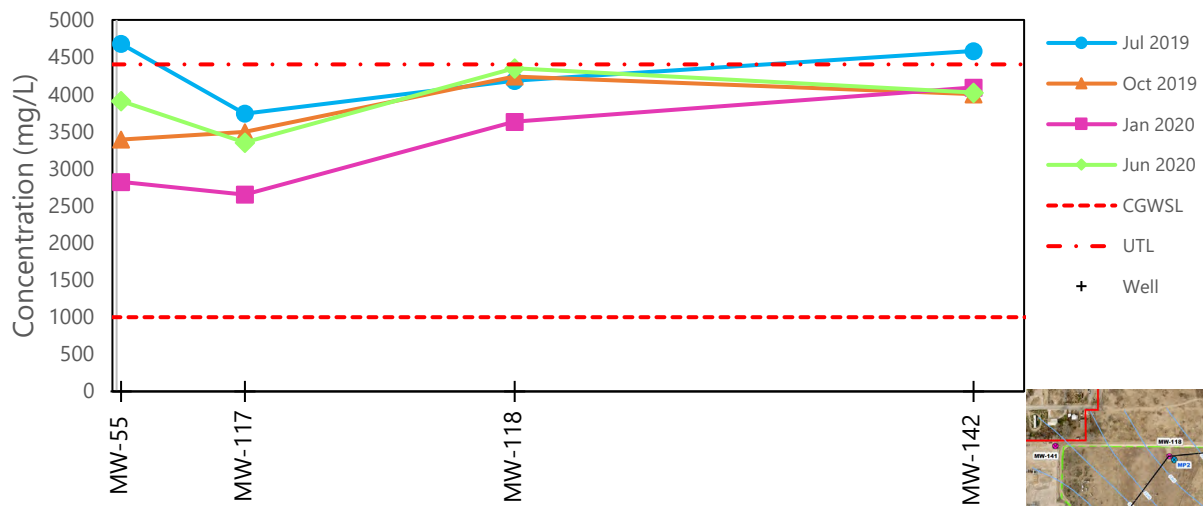
North RO Field - Nitrate/Nitrite Profiles



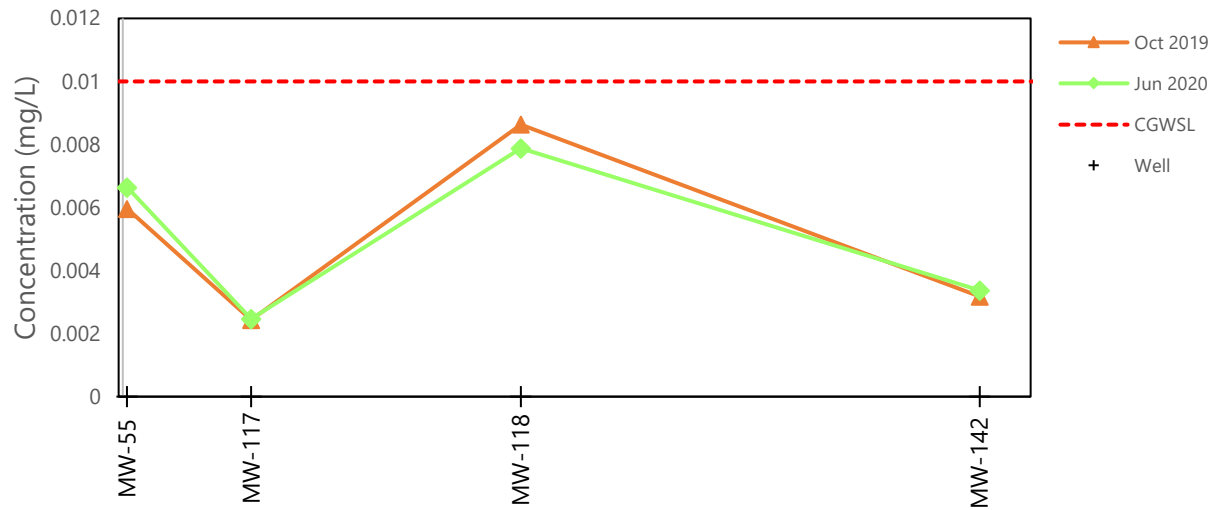
North RO Field - Sulfate Profiles



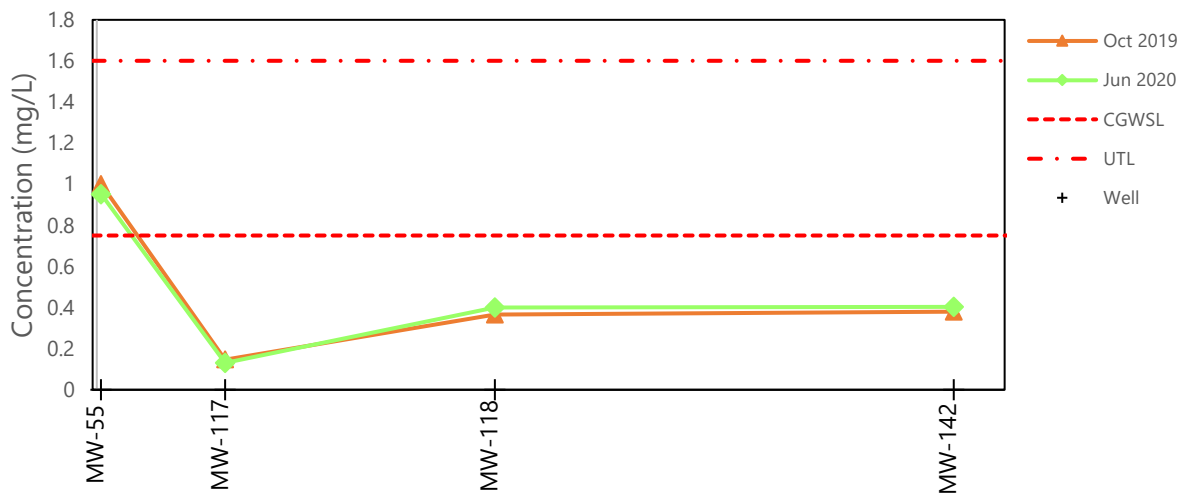
North RO Field - TDS Profiles



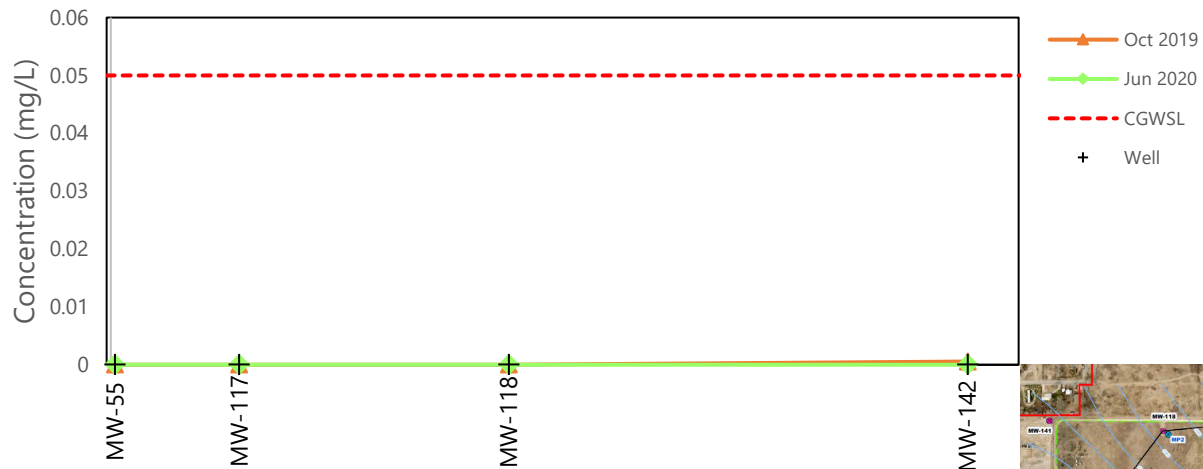
North RO Field - Dissolved Arsenic Profiles



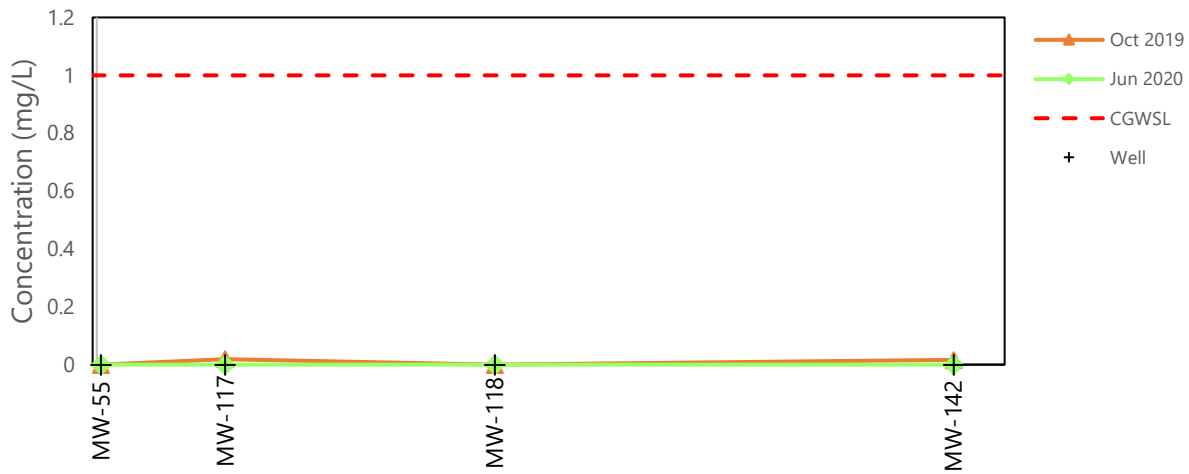
North RO Field - Dissolved Boron Profiles



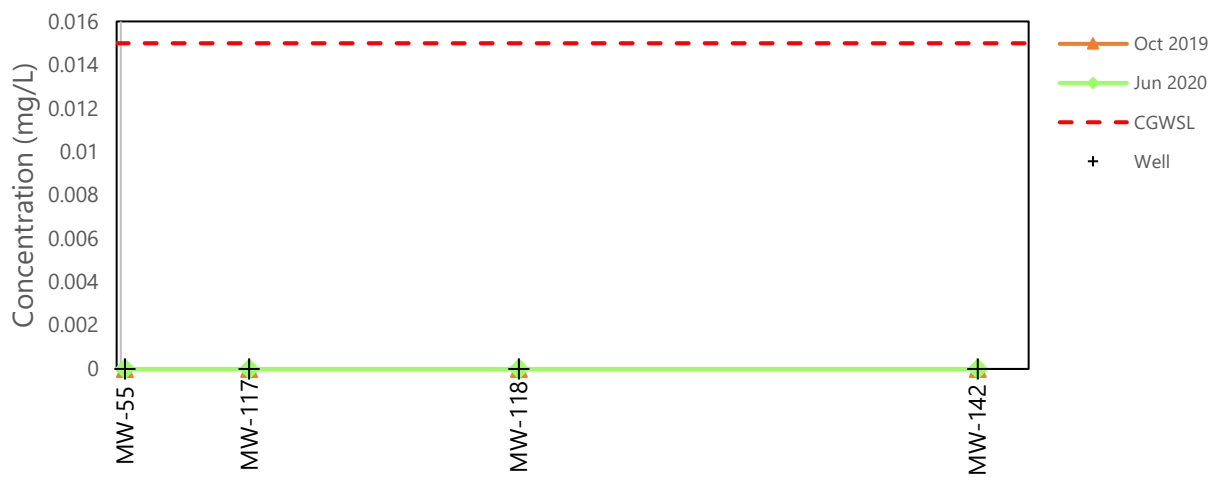
North RO Field - Dissolved Cobalt Profiles



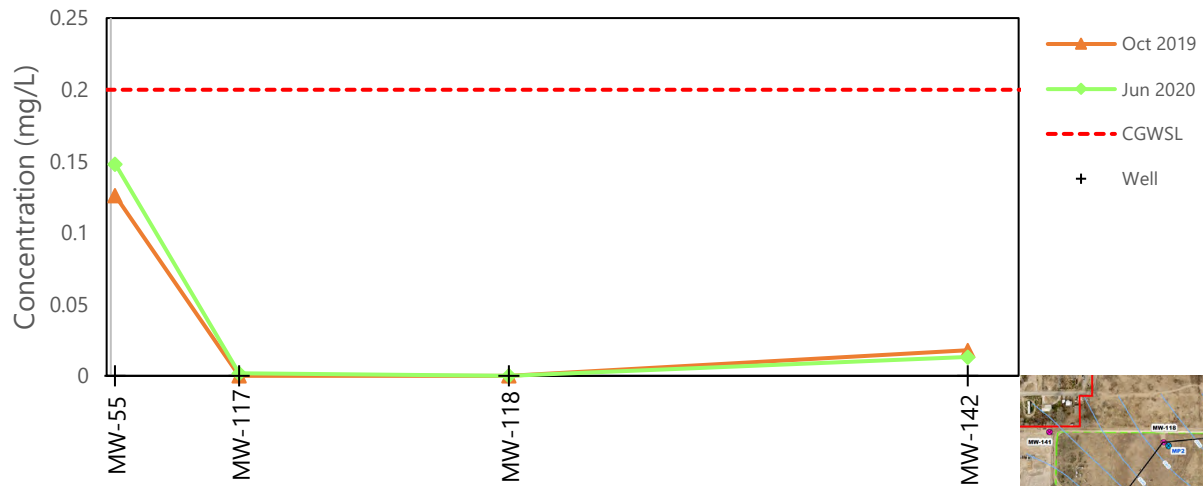
North RO Field - Dissolved Iron Profiles



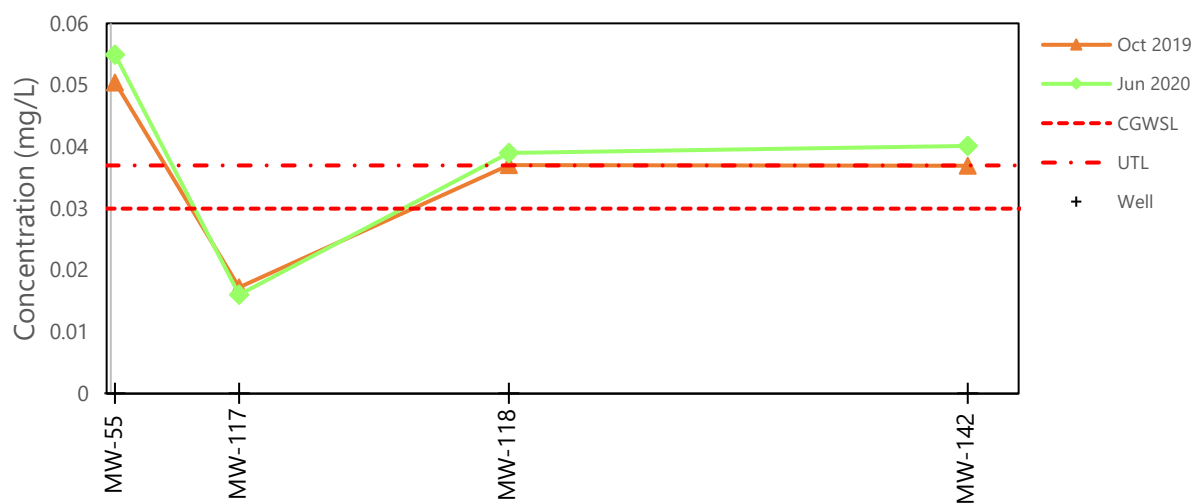
North RO Field - Dissolved Lead Profiles



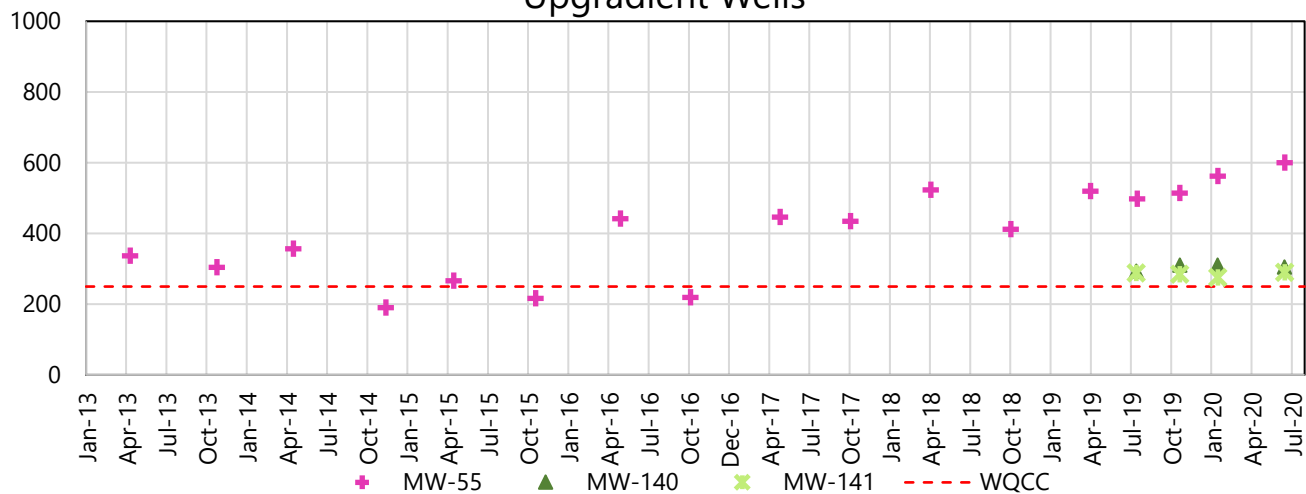
North RO Field - Dissolved Manganese Profiles



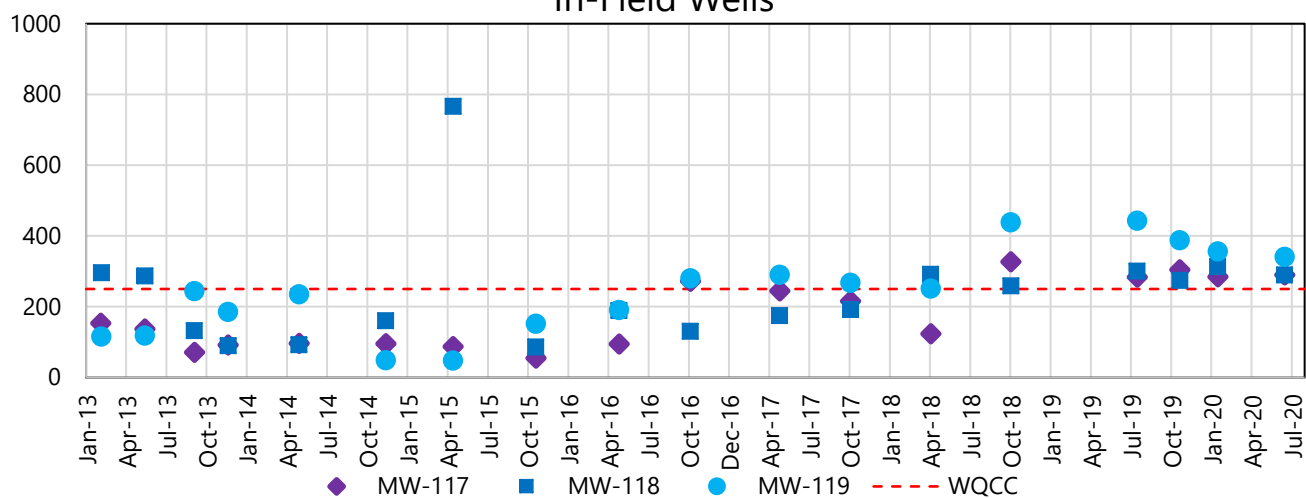
North RO Field - Dissolved Uranium Profiles



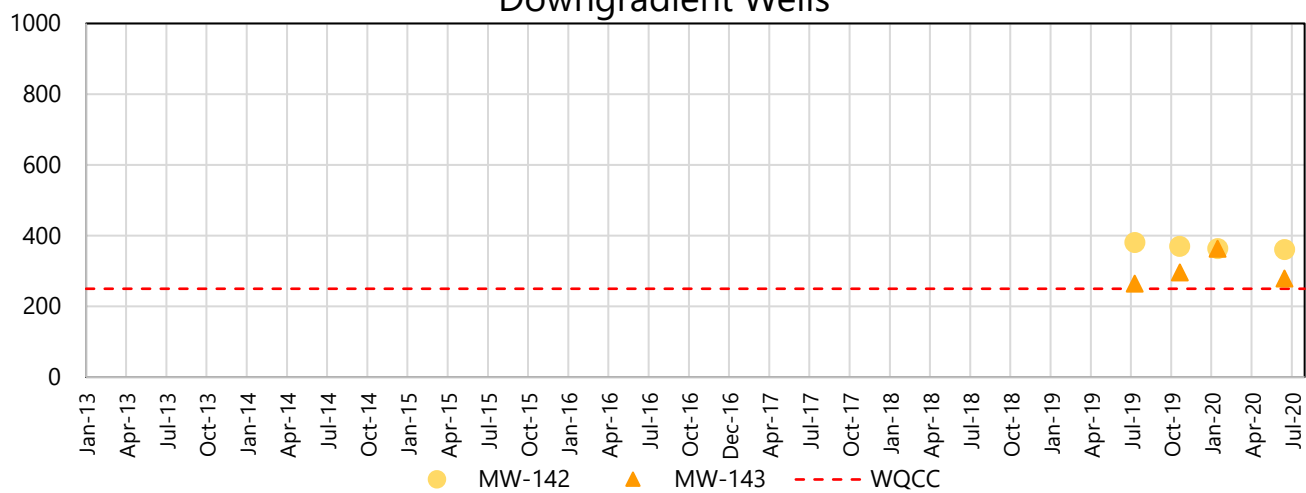
Upgradient Wells



In-Field Wells

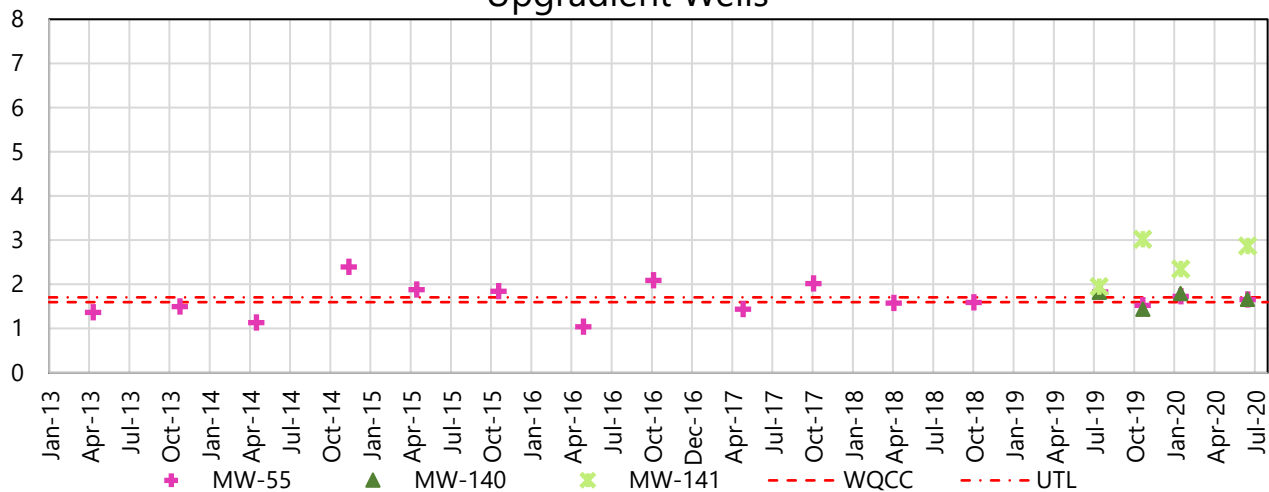


Downgradient Wells

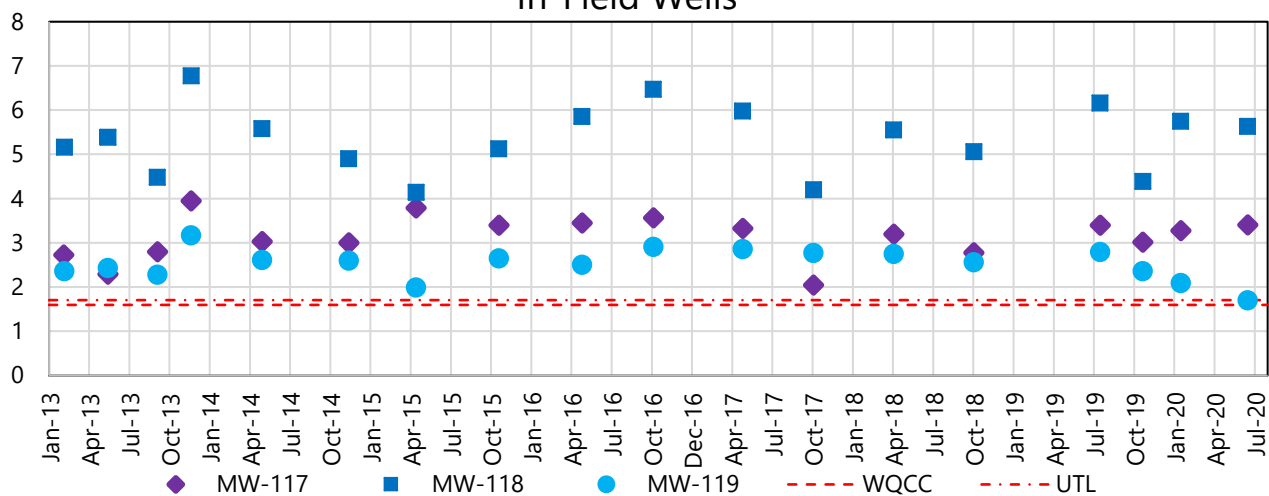


NORTH RO REJECT FIELD TRENDS - CHLORIDE

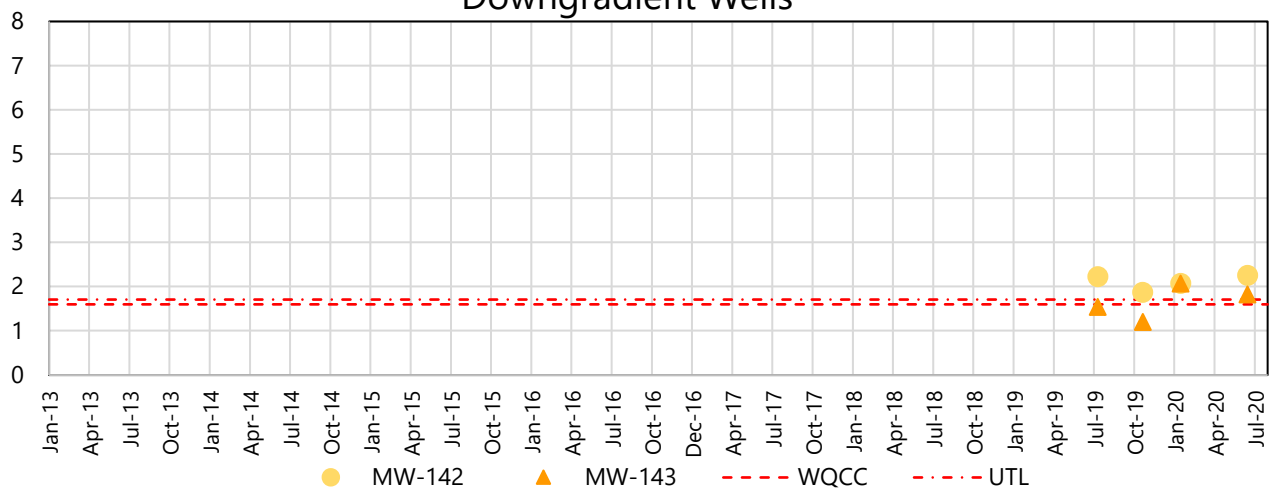
Upgradient Wells



In-Field Wells

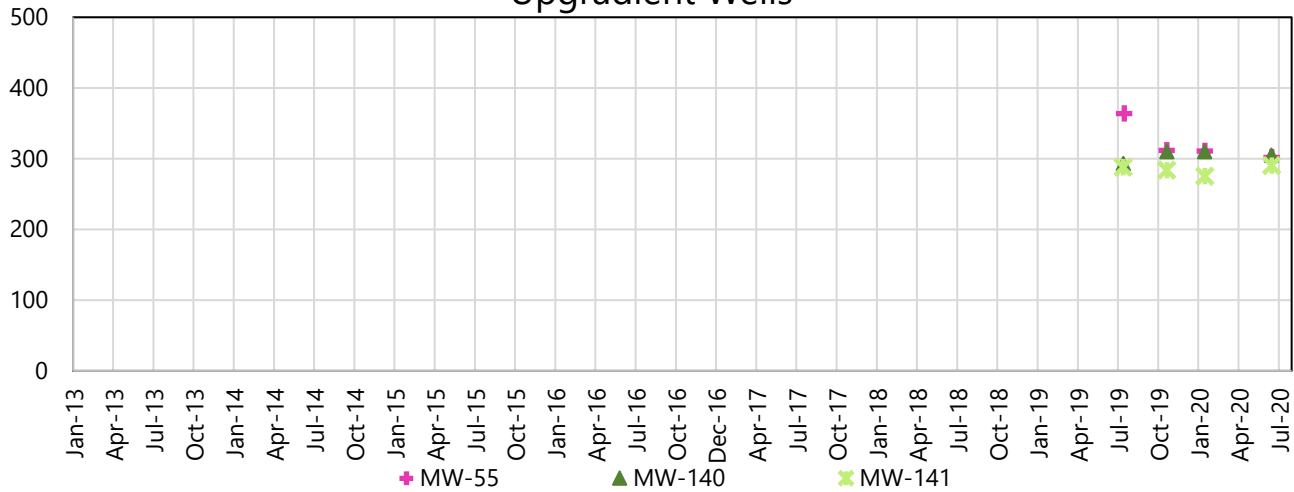


Downgradient Wells

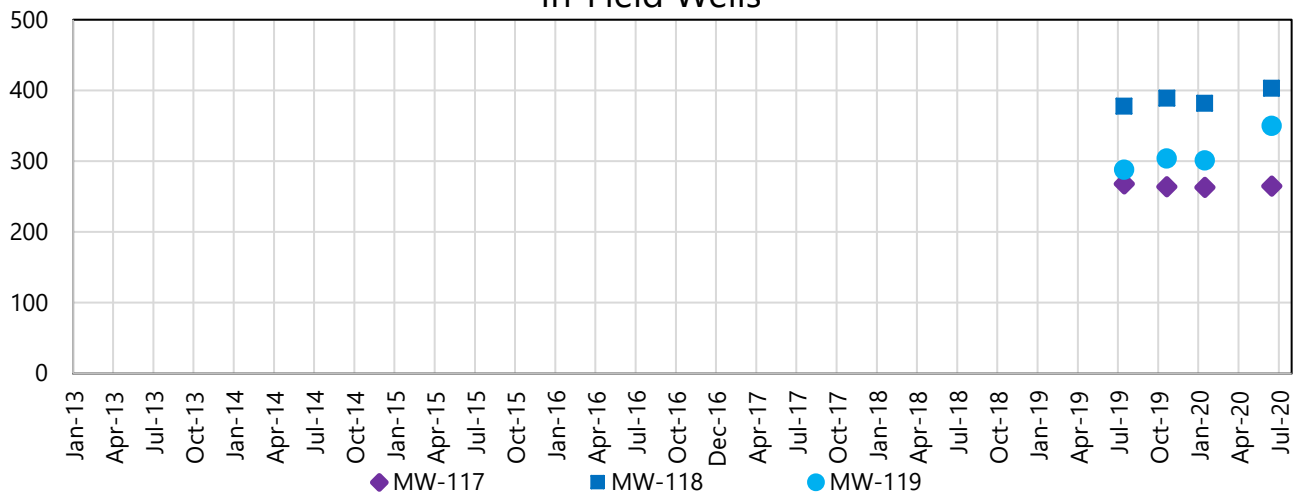


NORTH RO REJECT FIELD TRENDS - FLUORIDE

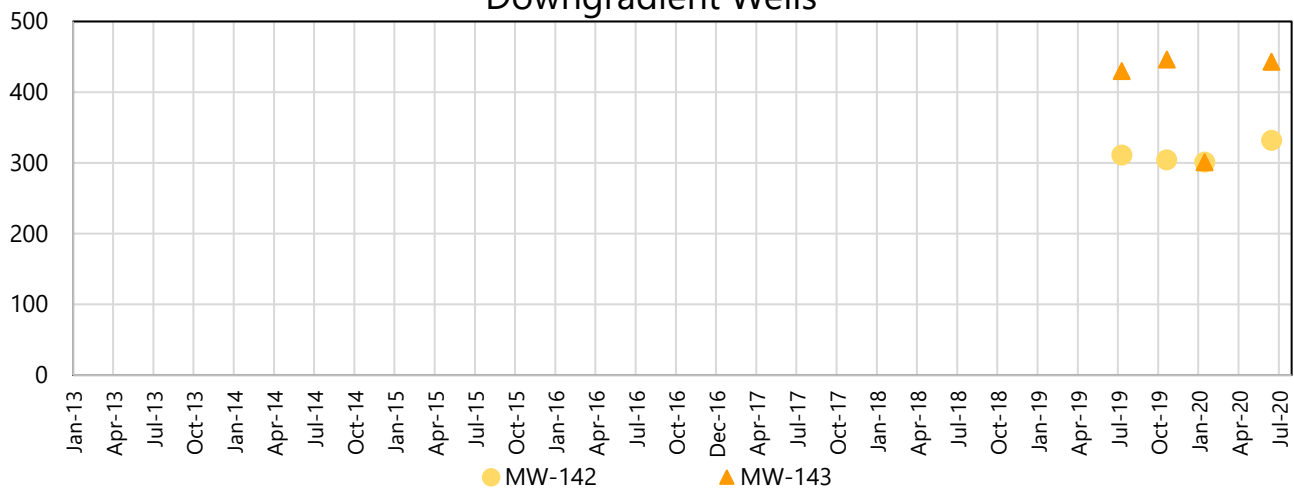
Upgradient Wells



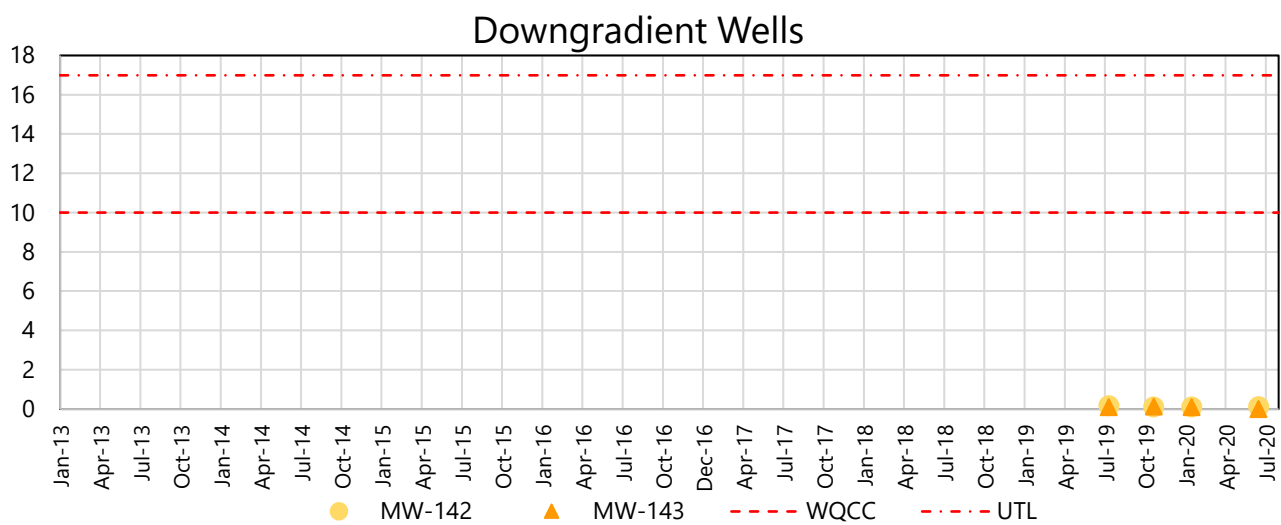
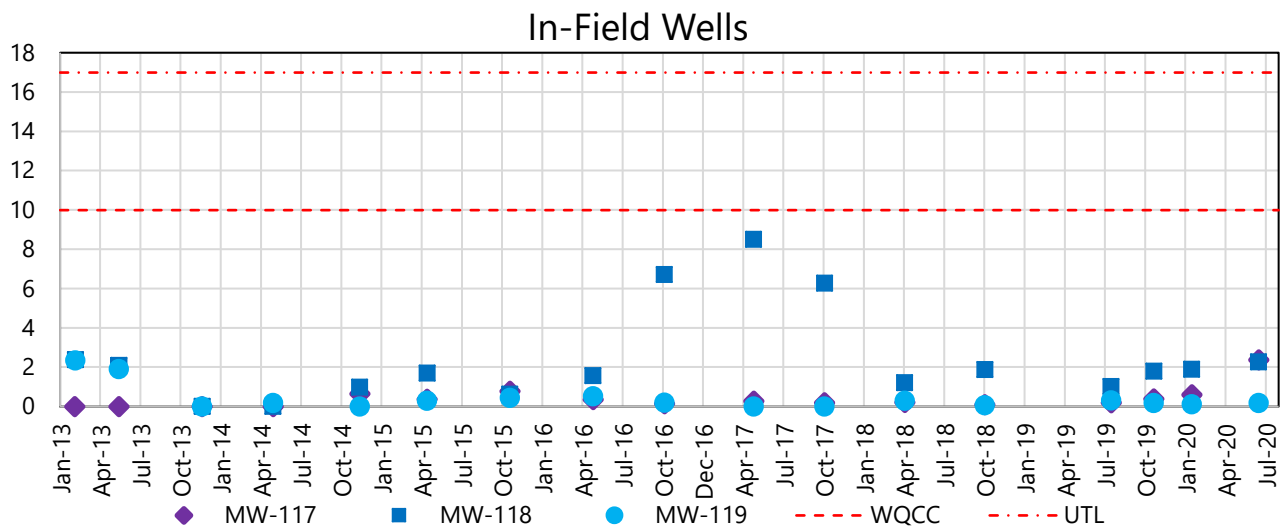
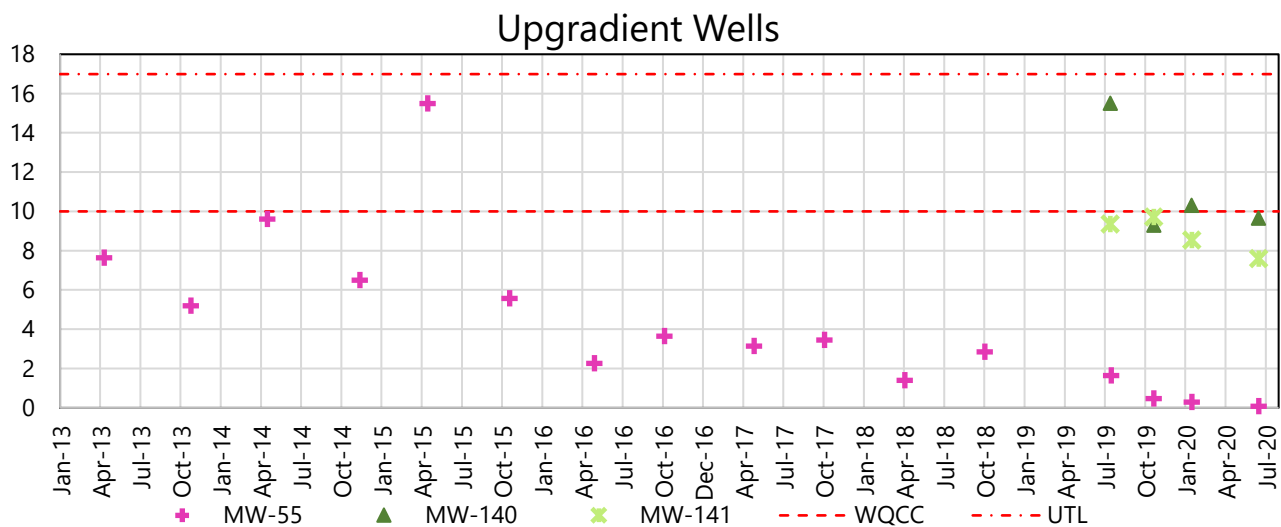
In-Field Wells



Downgradient Wells

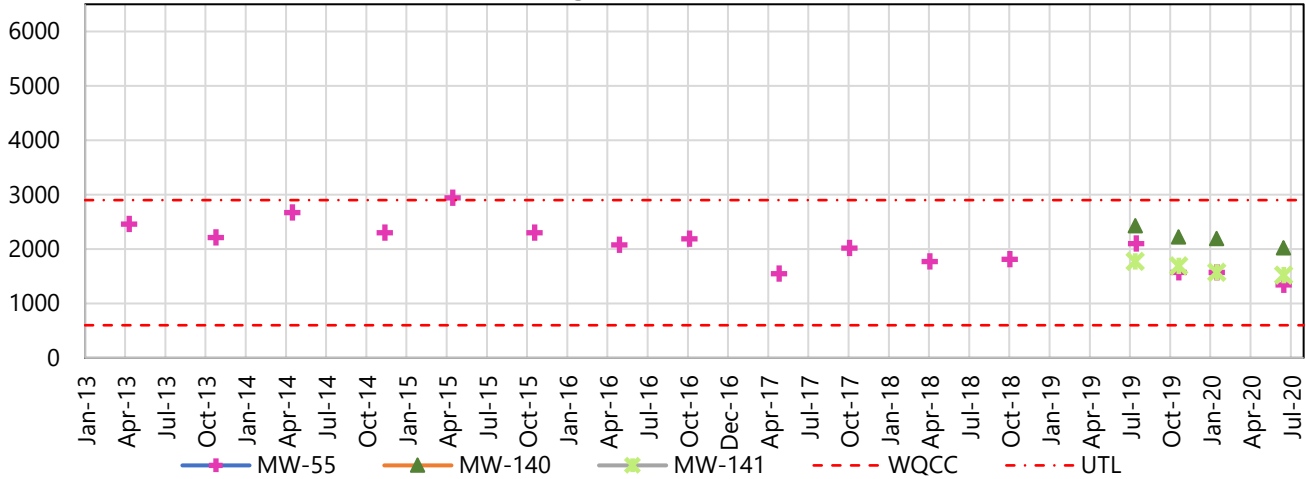


NORTH RO REJECT FIELD TRENDS - MAGNESIUM

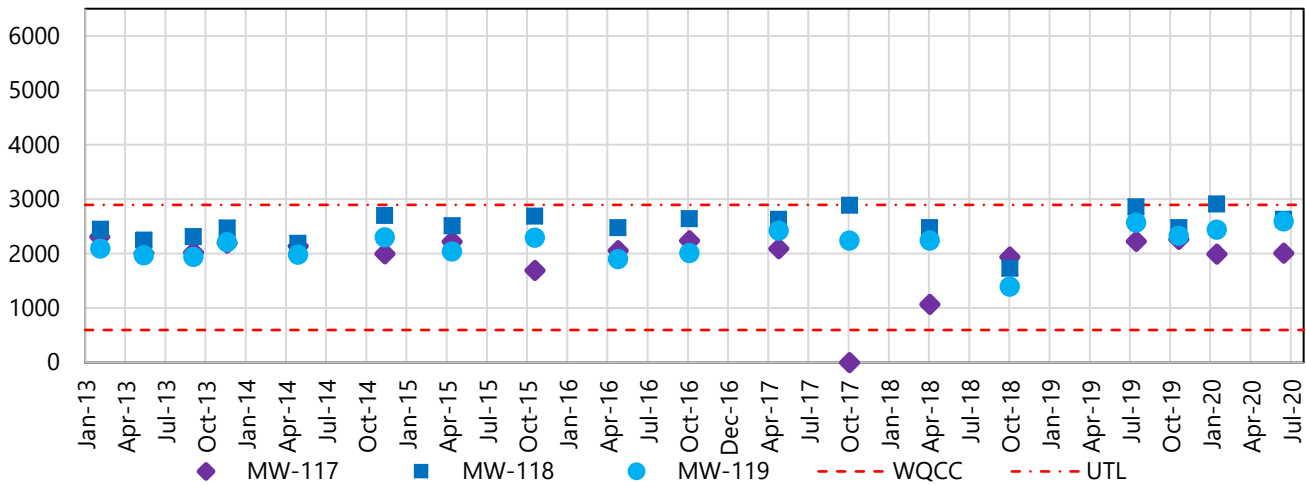


NORTH RO REJECT FIELD TRENDS - NITRATE/NITRITE

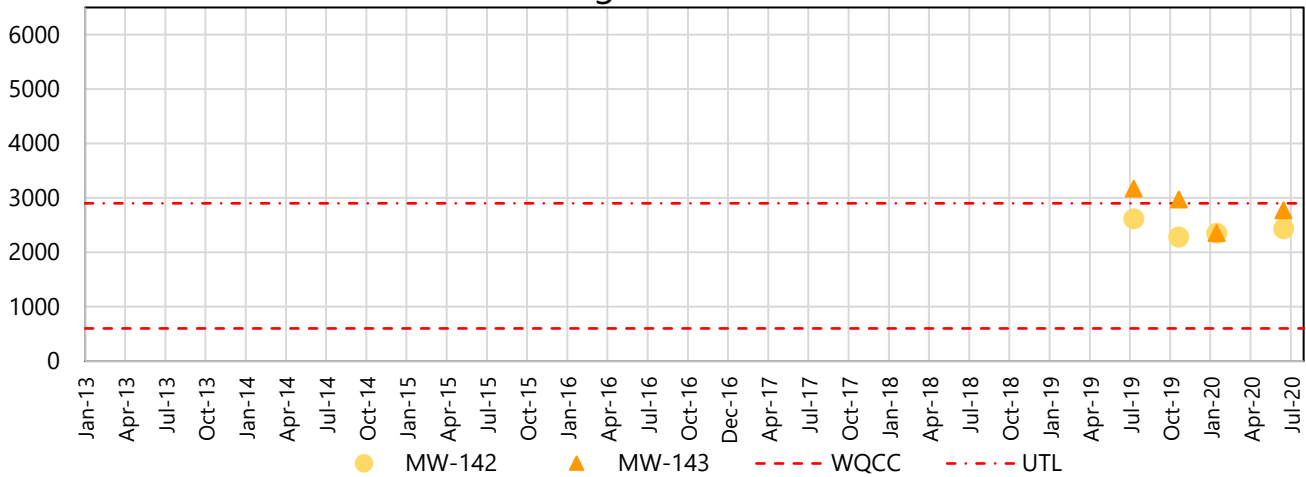
Upgradient Wells



In-Field Wells

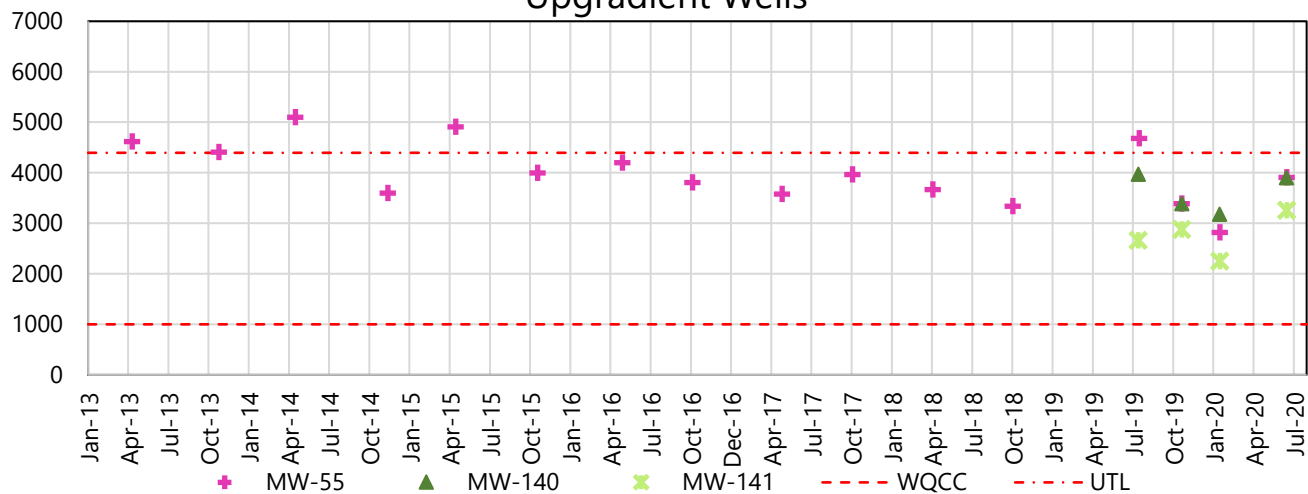


Downgradient Wells

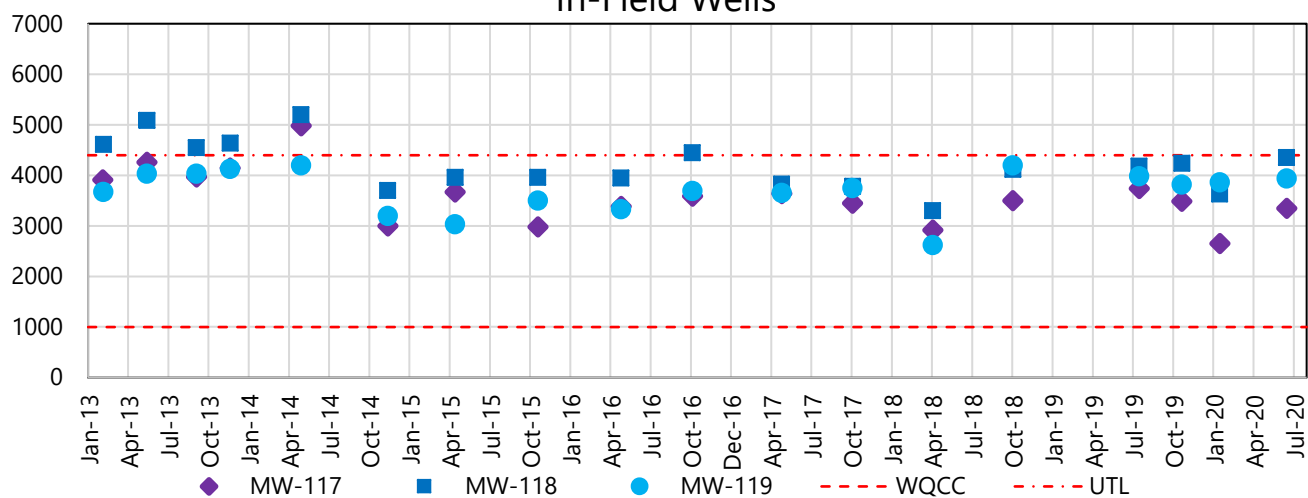


NORTH RO REJECT FIELD TRENDS - SULFATE

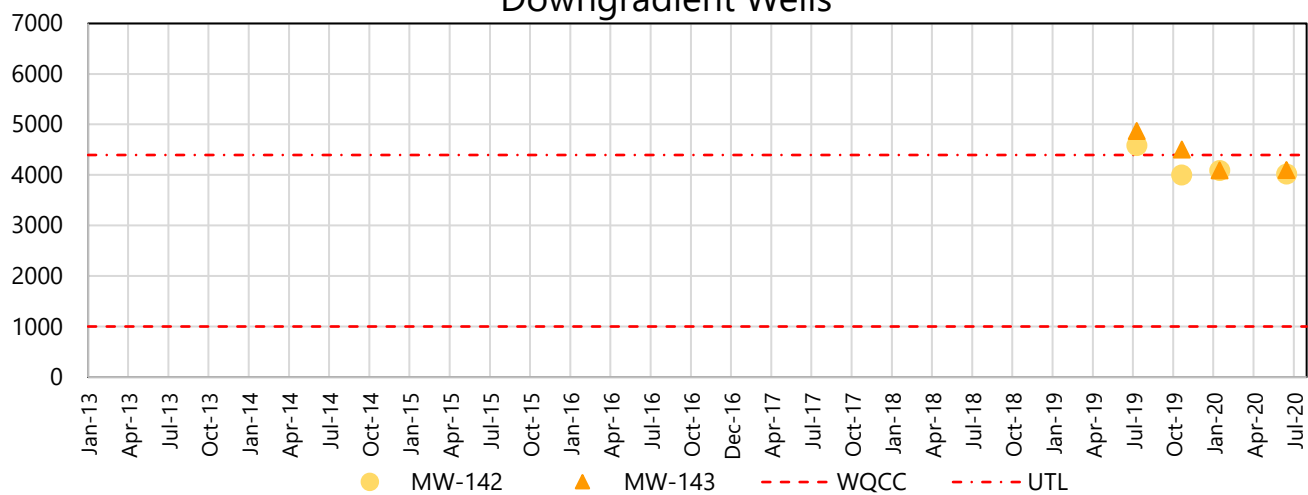
Upgradient Wells



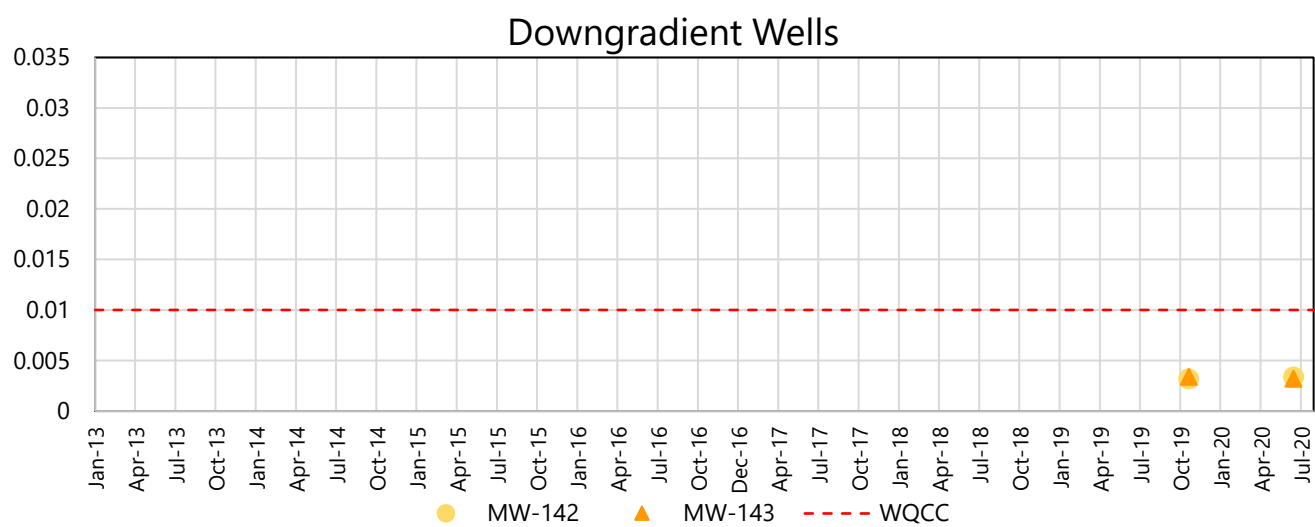
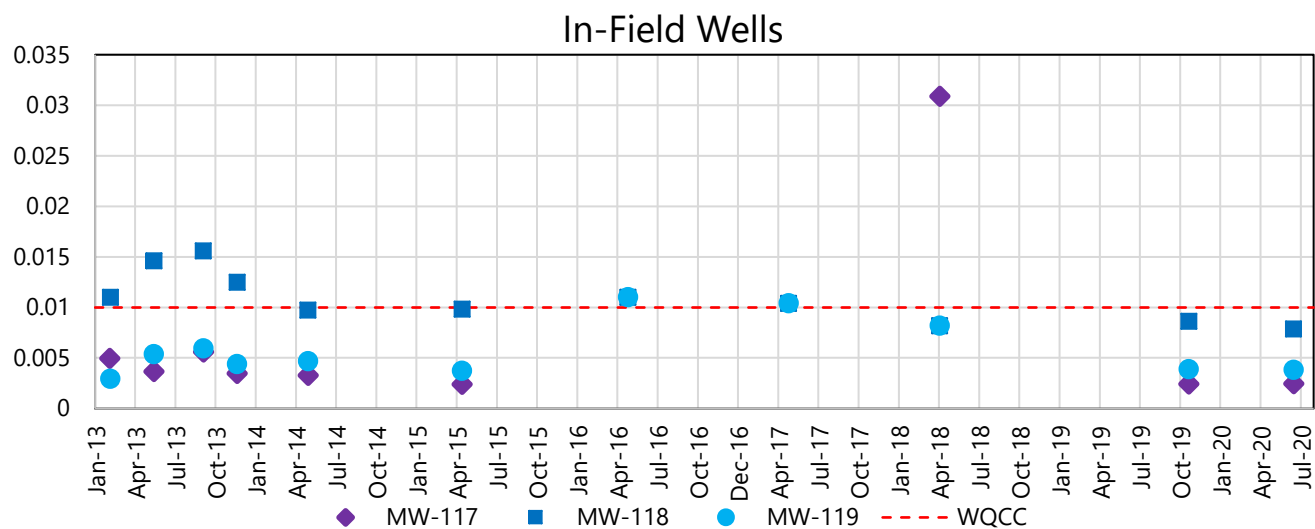
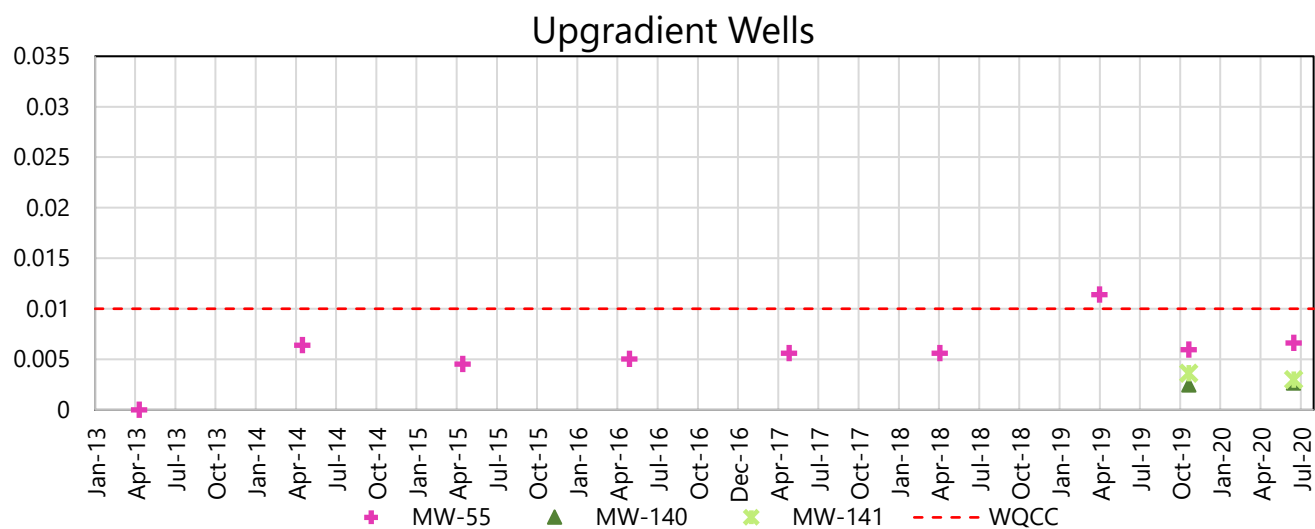
In-Field Wells



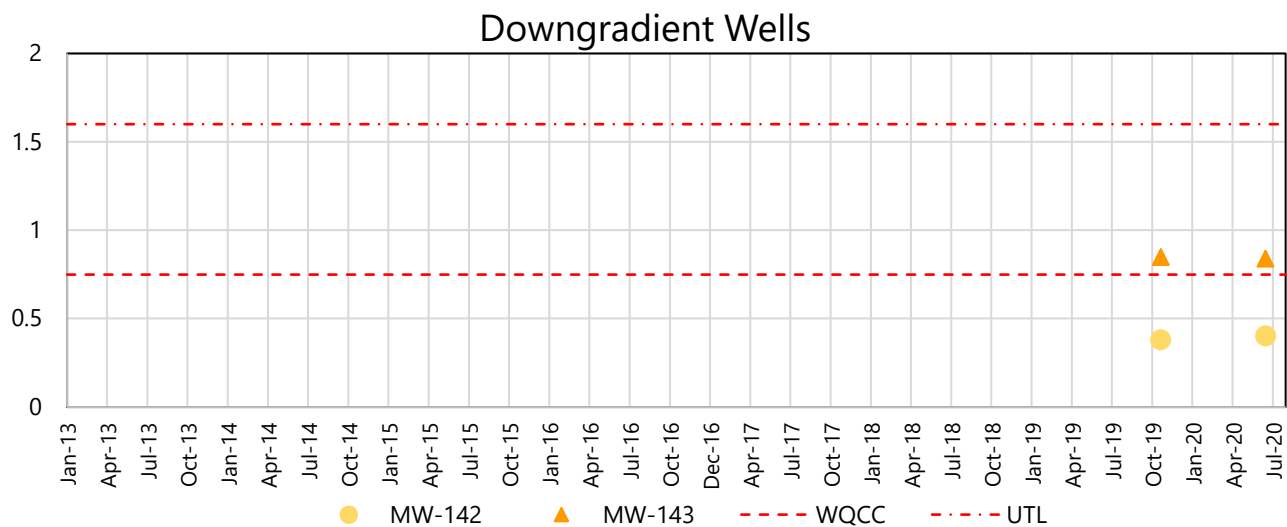
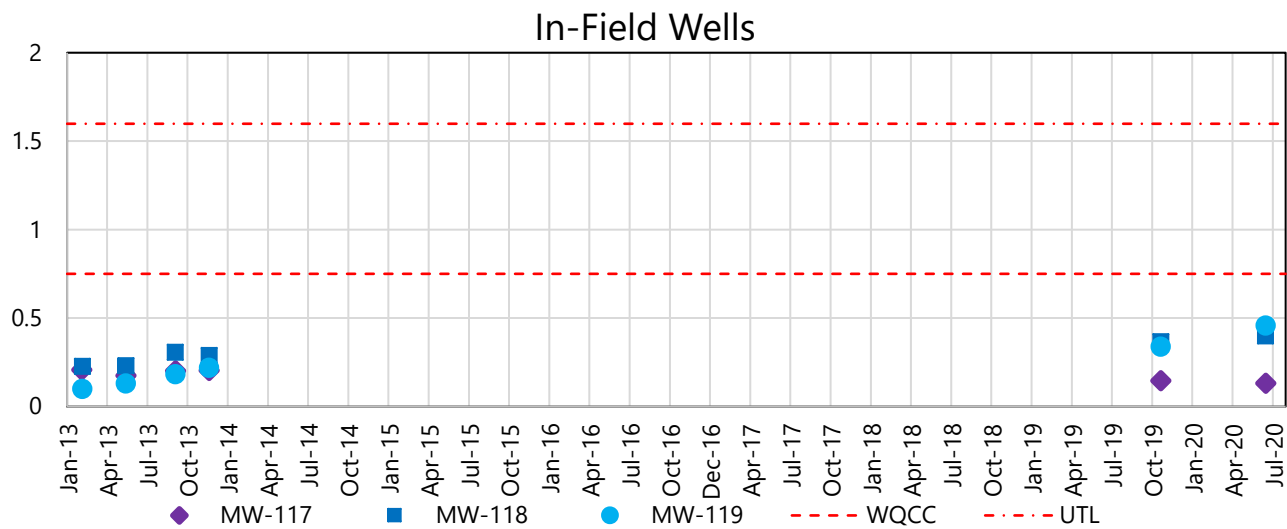
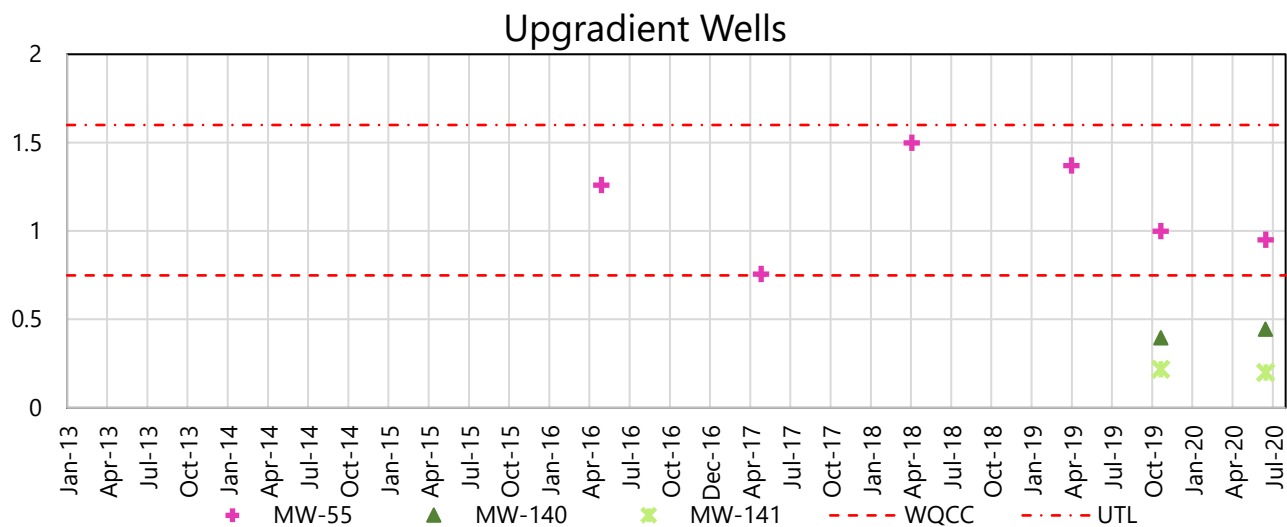
Downgradient Wells



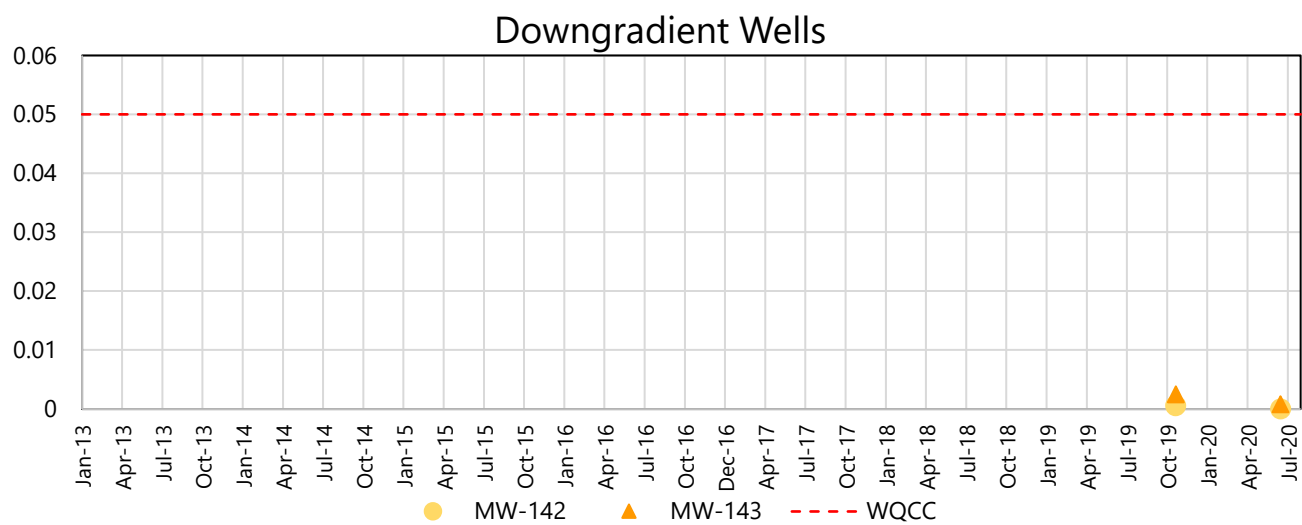
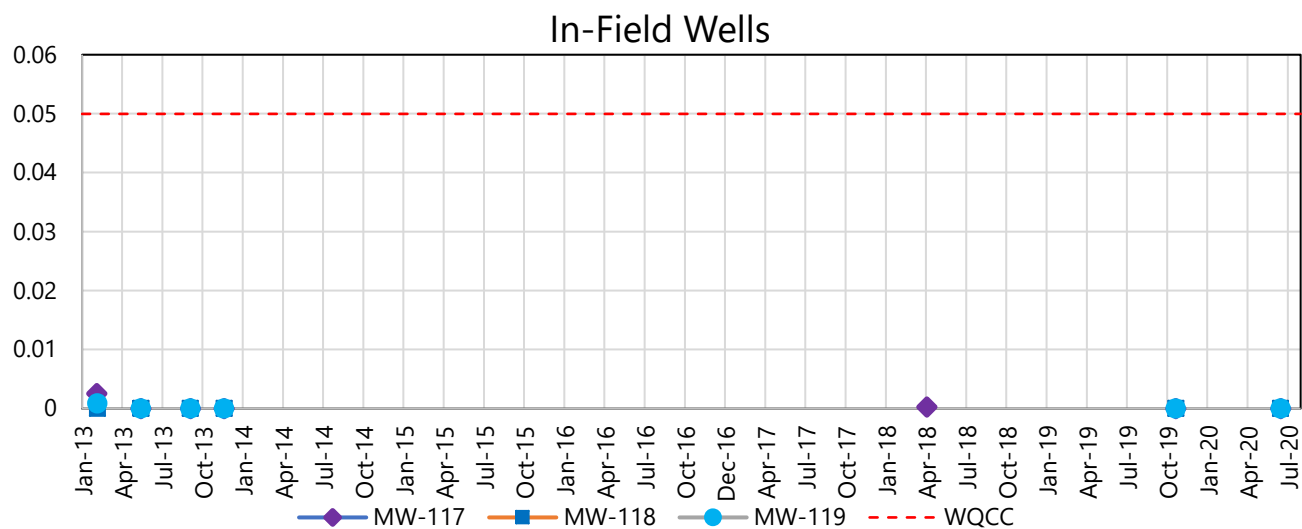
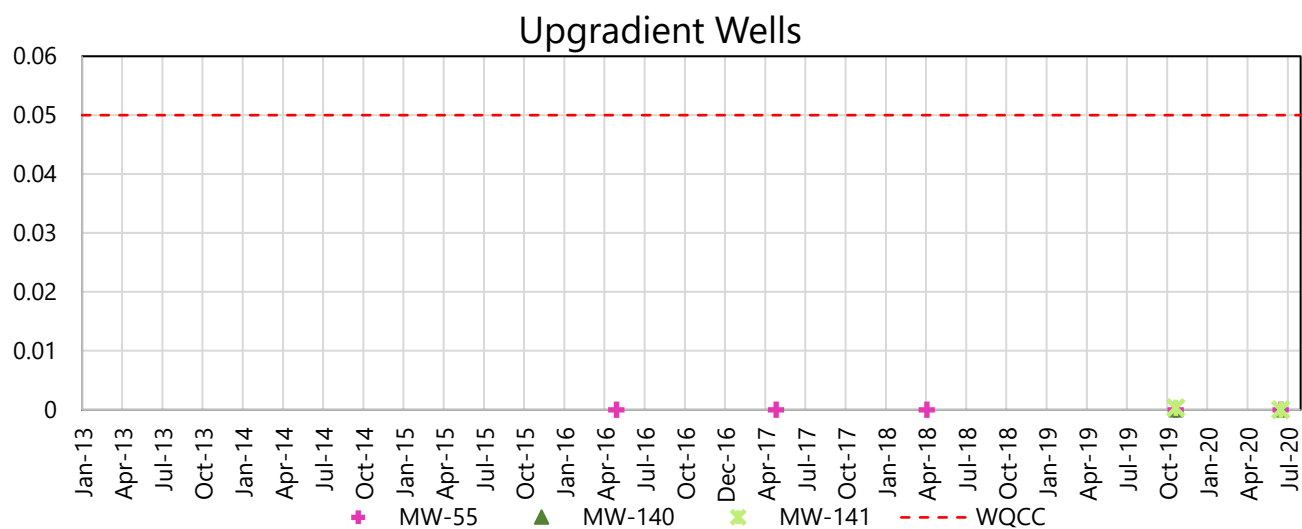
NORTH RO REJECT FIELD TRENDS - TDS



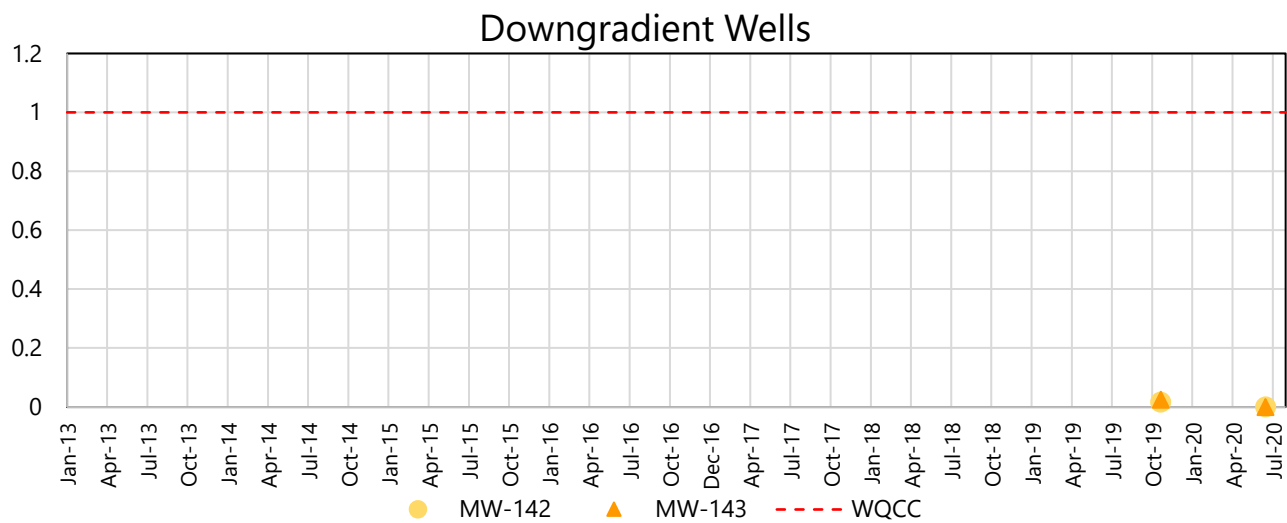
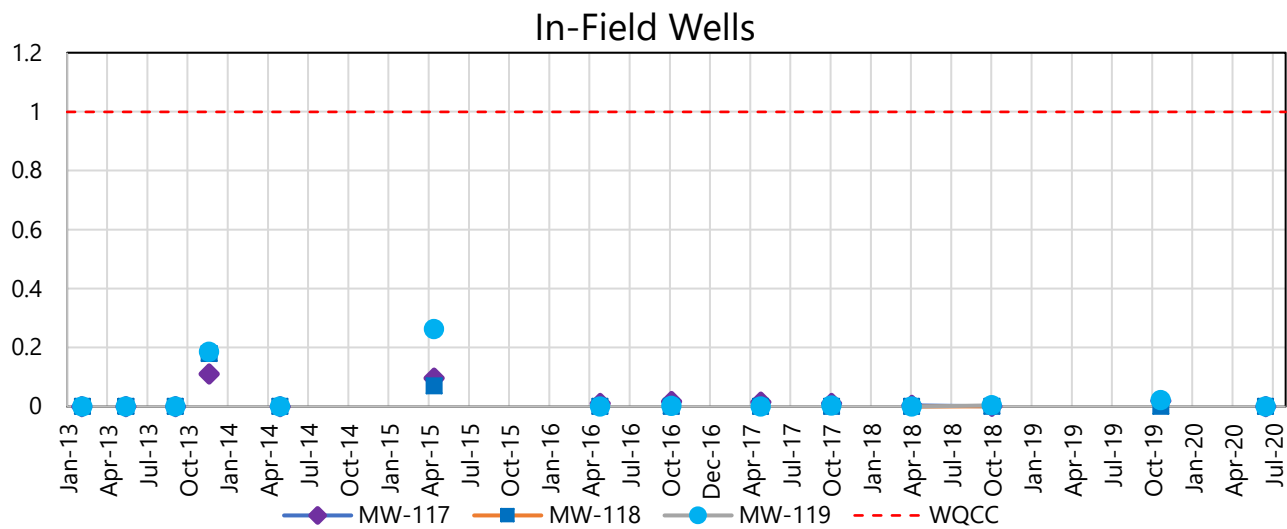
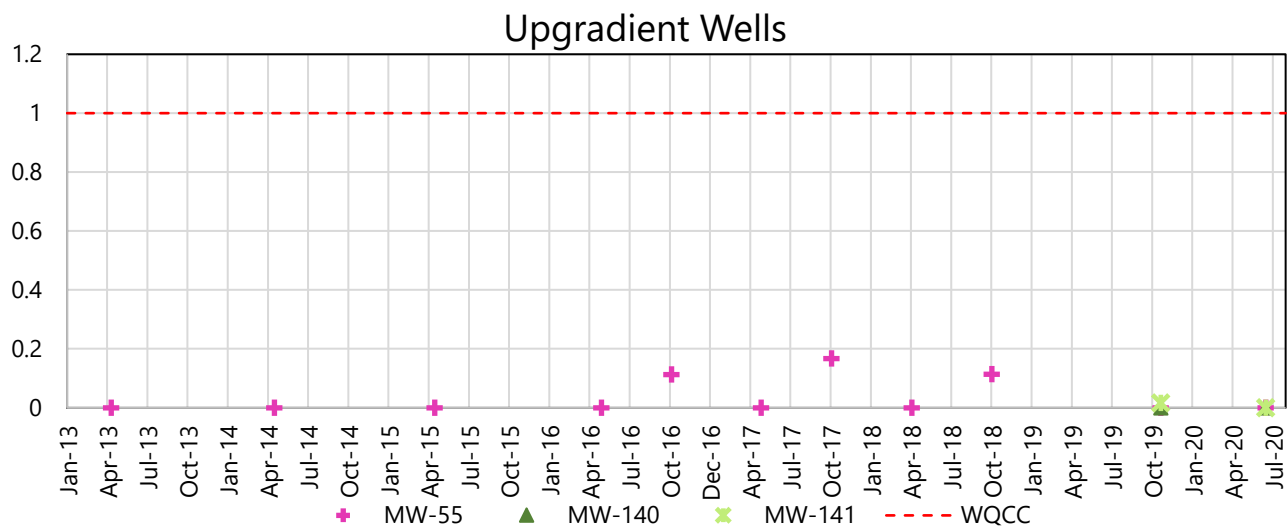
NORTH RO REJECT FIELD TRENDS - ARSENIC, DISSOLVED



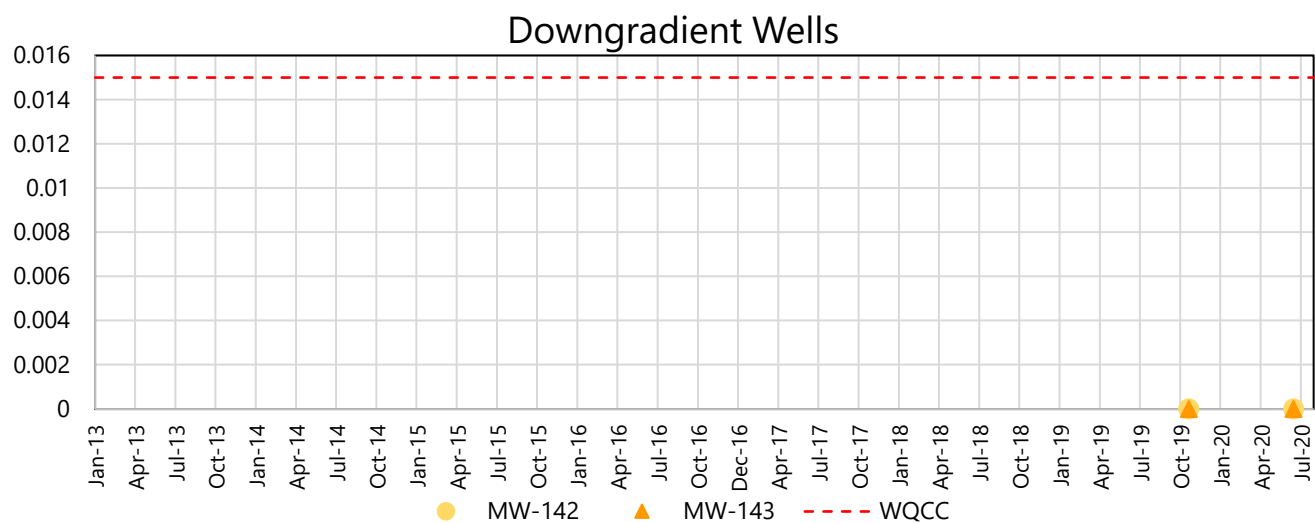
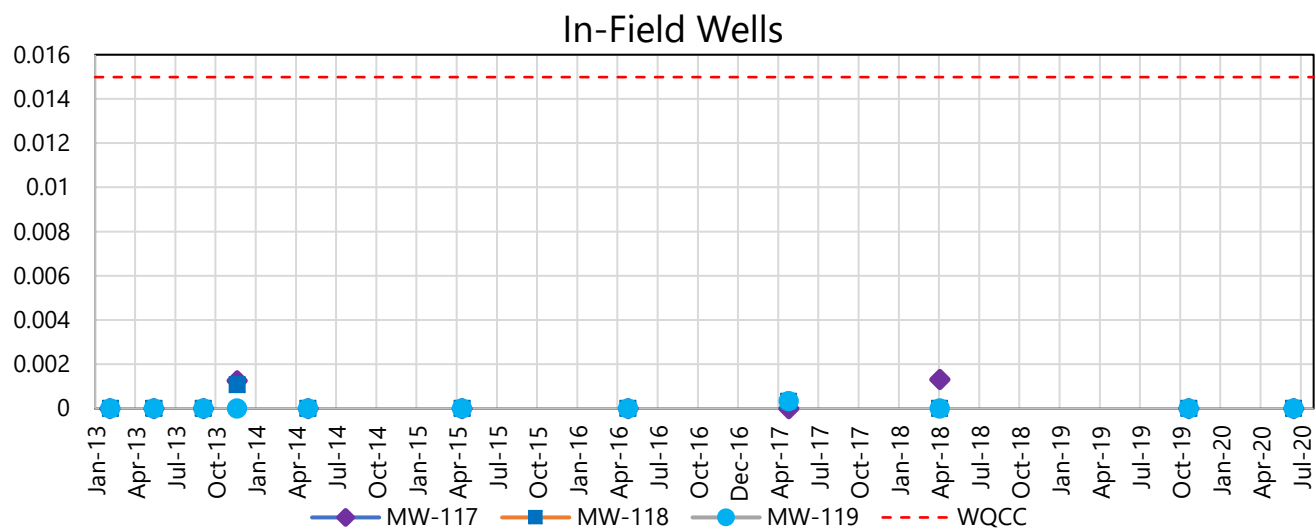
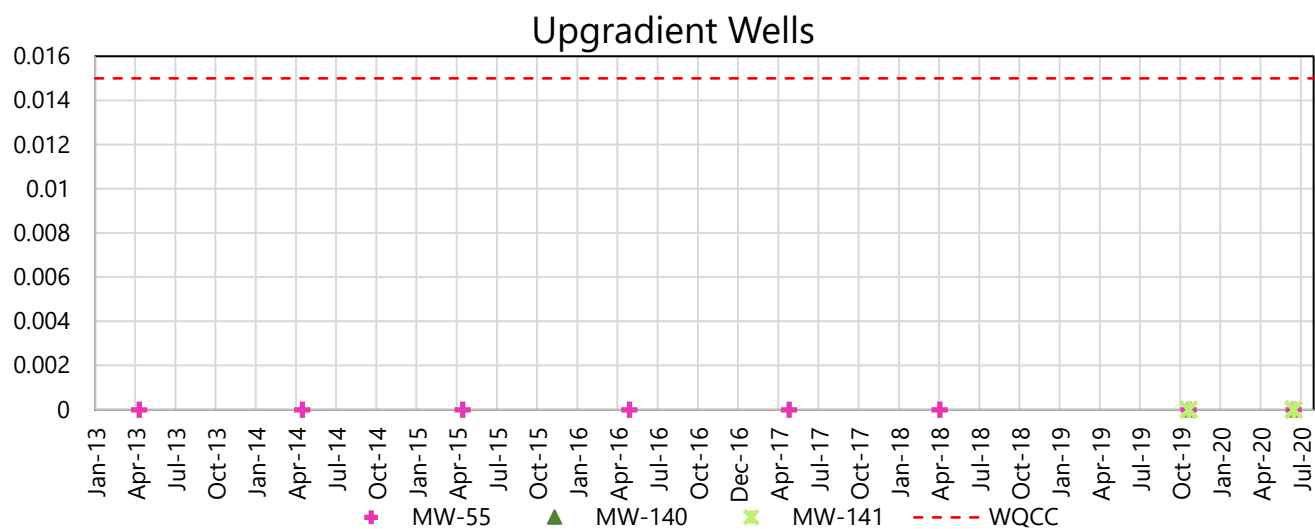
NORTH RO REJECT FIELD TRENDS - BORON, DISSOLVED



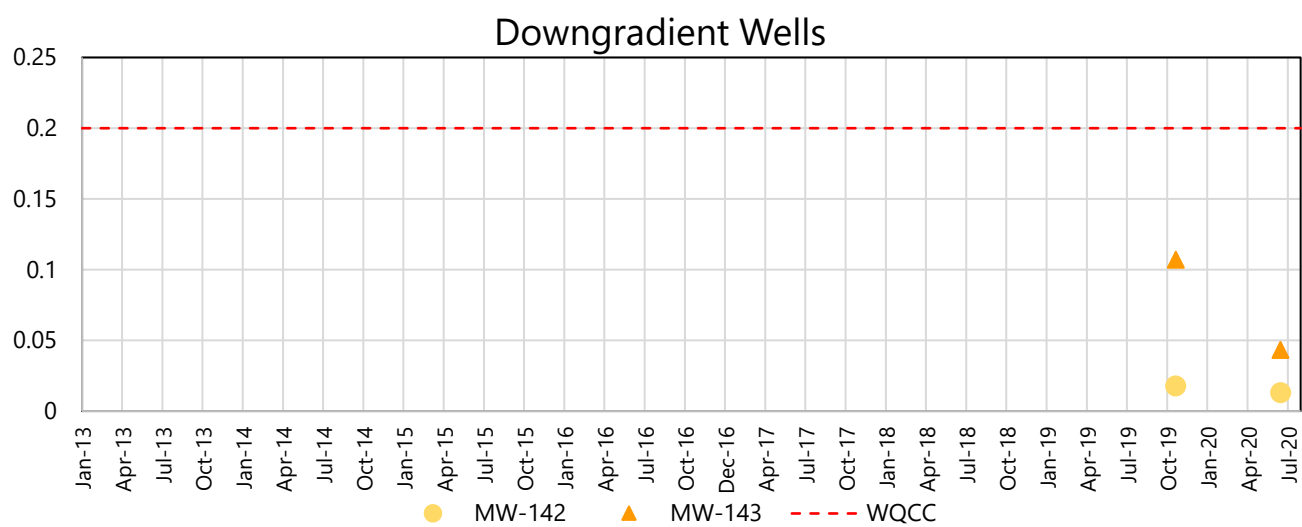
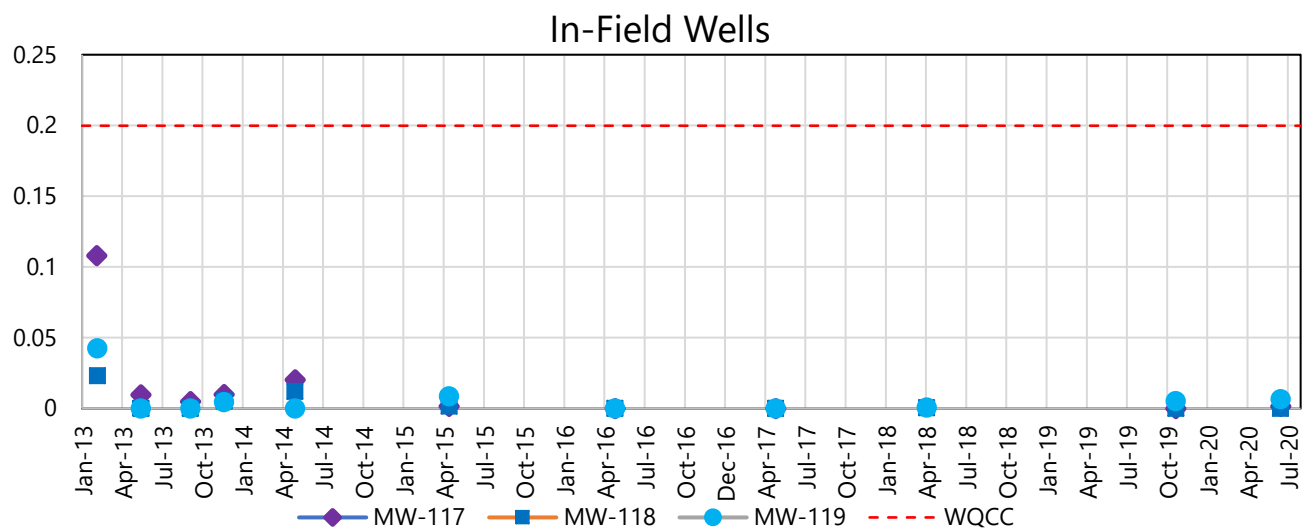
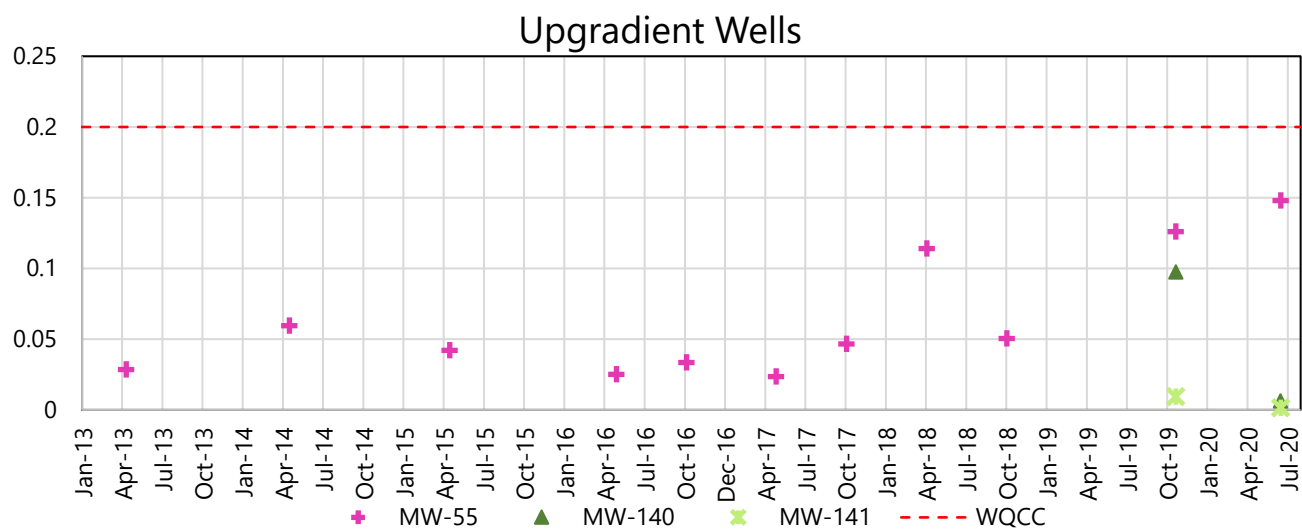
NORTH RO REJECT FIELD TRENDS - COBALT, DISSOLVED



NORTH RO REJECT FIELD TRENDS - IRON, DISSOLVED

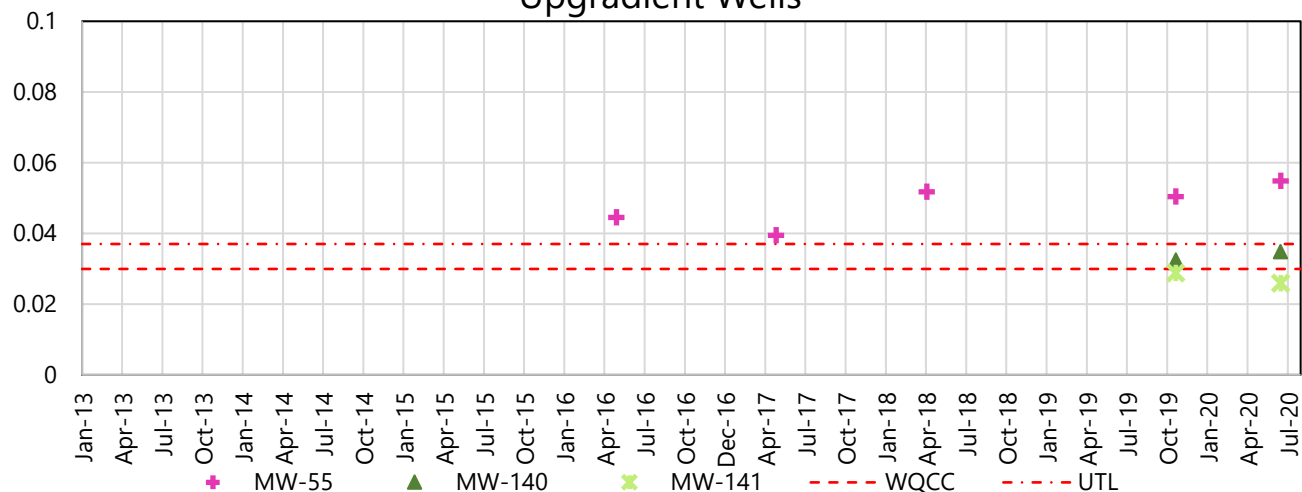


NORTH RO REJECT FIELD TRENDS - LEAD, DISSOLVED

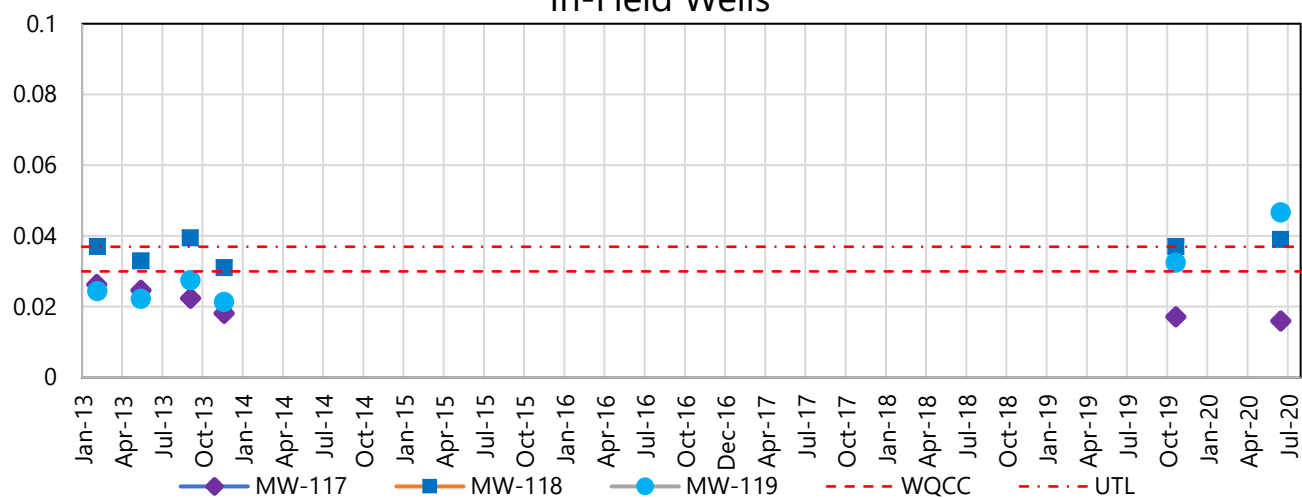


NORTH RO REJECT FIELD TRENDS - MANGANESE, DISSOLVED

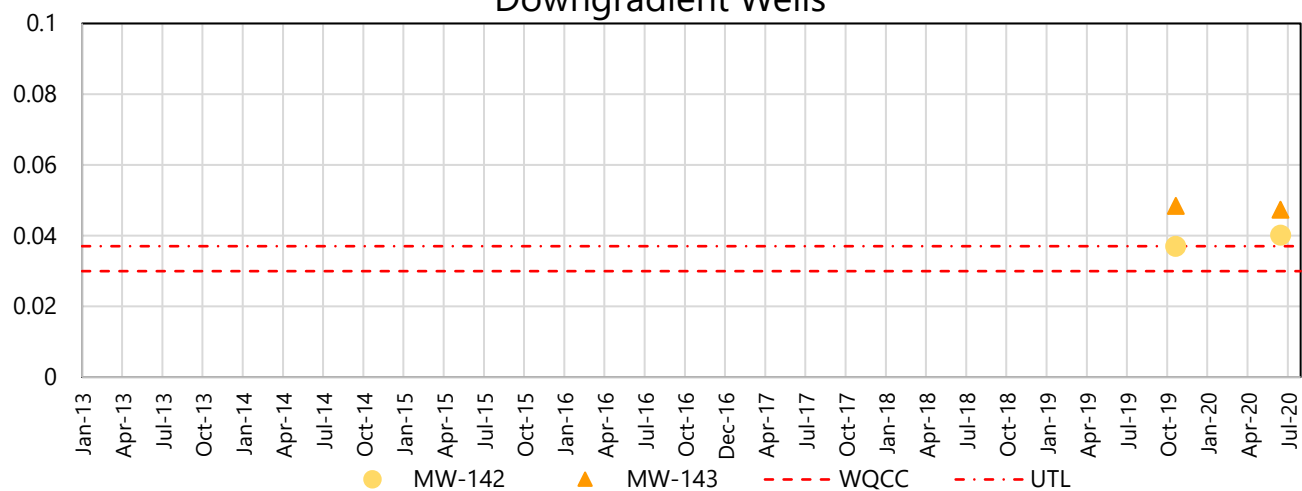
Upgradient Wells



In-Field Wells



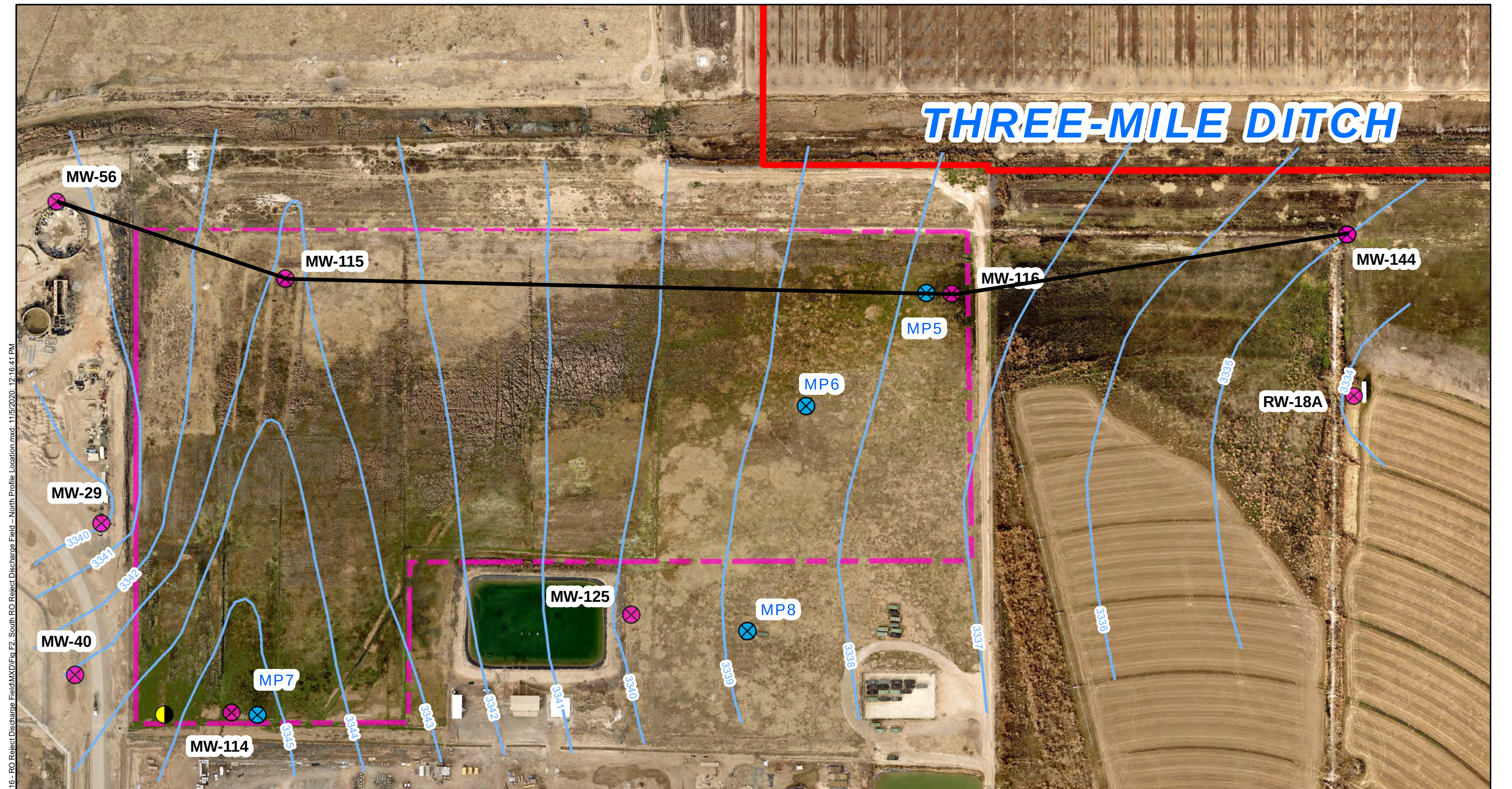
Downgradient Wells



NORTH RO REJECT FIELD TRENDS - URANIUM, DISSOLVED

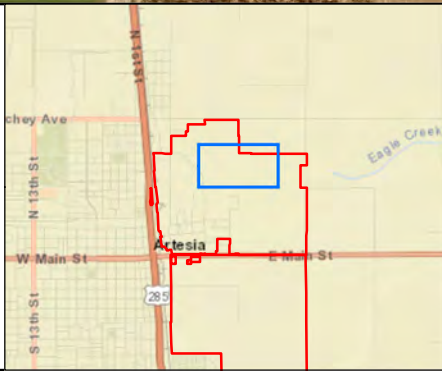
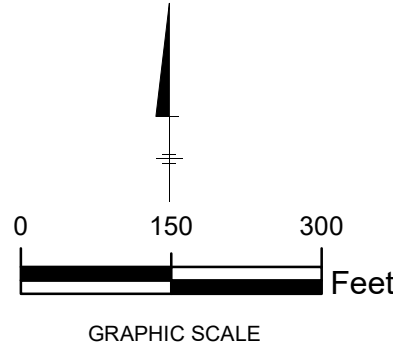
South RO Reject Discharge Field

DB: ALB PM: PK
Path: P:\Client\HollyFrontier\Navajo\6703200016 - RO Reject Discharge Field\MXD\Fig F2. South RO Reject Discharge Field - North Profile Location.mxd: 11/5/2020: 12:16:41 PM



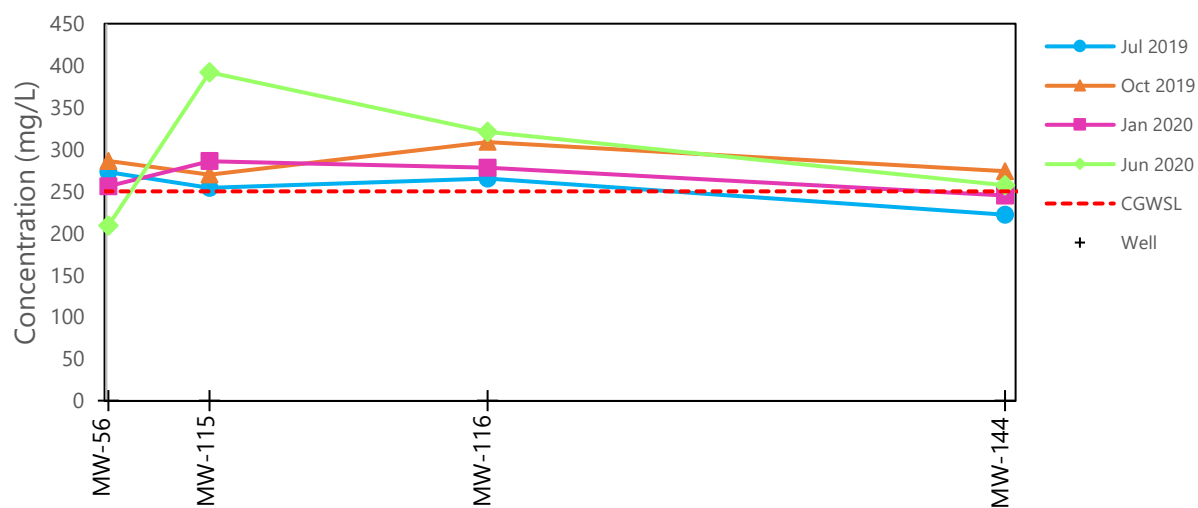
Legend

- Property Boundary
- South RO Reject Discharge Field
- Moisture Probes
- Monitoring Well
- Former Discharge Point
- Contour Line
- Profile Line

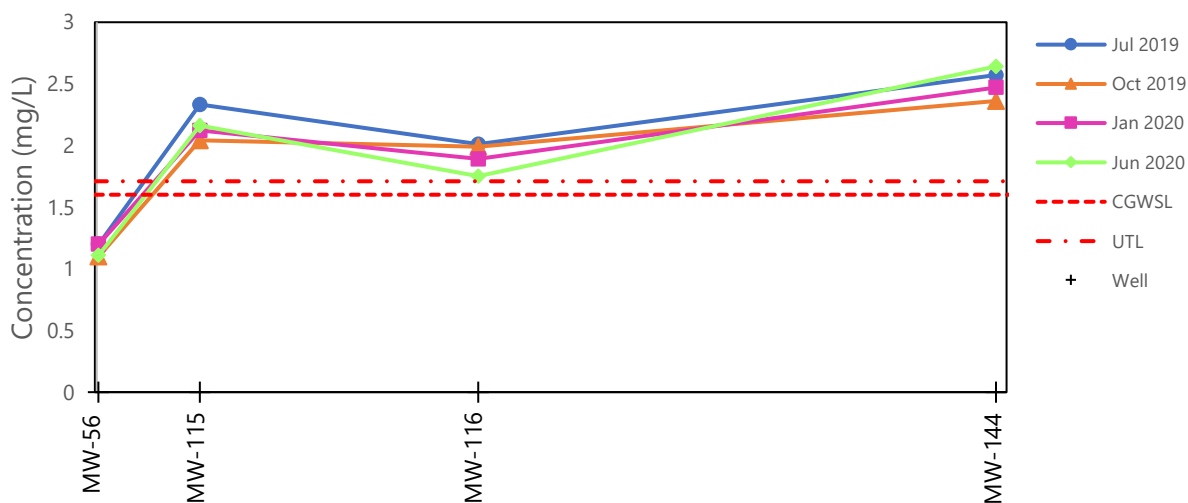


HollyFrontier Navajo Refining LLC Artesia, New Mexico		
RO Reject Discharge Fields Stage 1 Abatement South RO Reject Discharge Field - North Profile Location		
Prepared By: ALB		FIGURE G-2
Date Prepared: 11/5/2020		
Project Number: 6703200016		

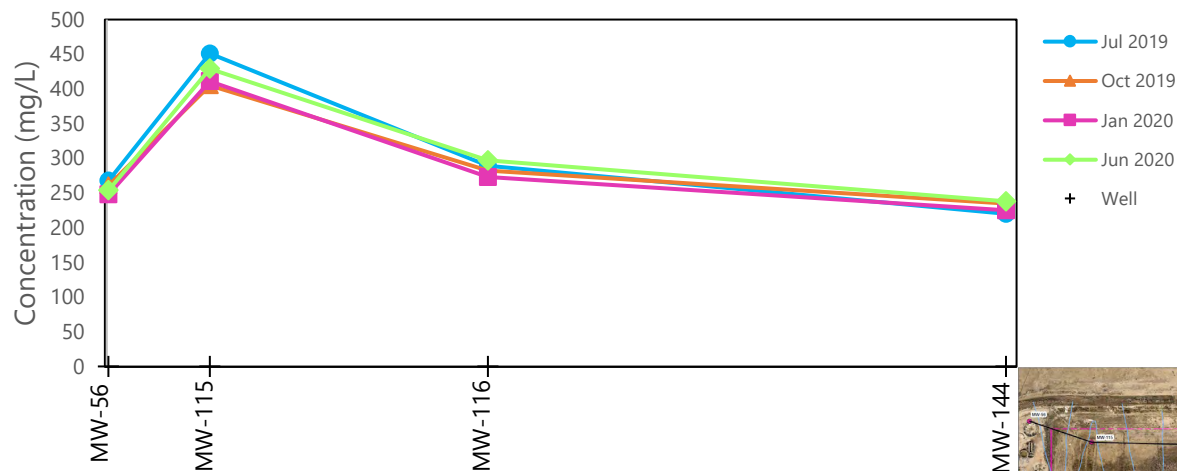
South RO Field (Northern) - Chloride Profiles



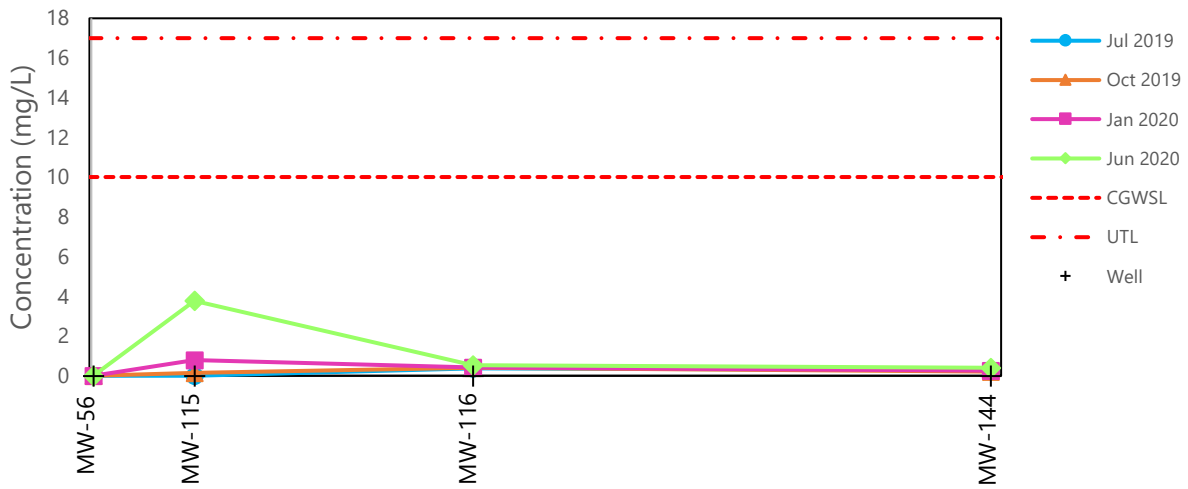
South RO Field (Northern) - Fluoride Profiles



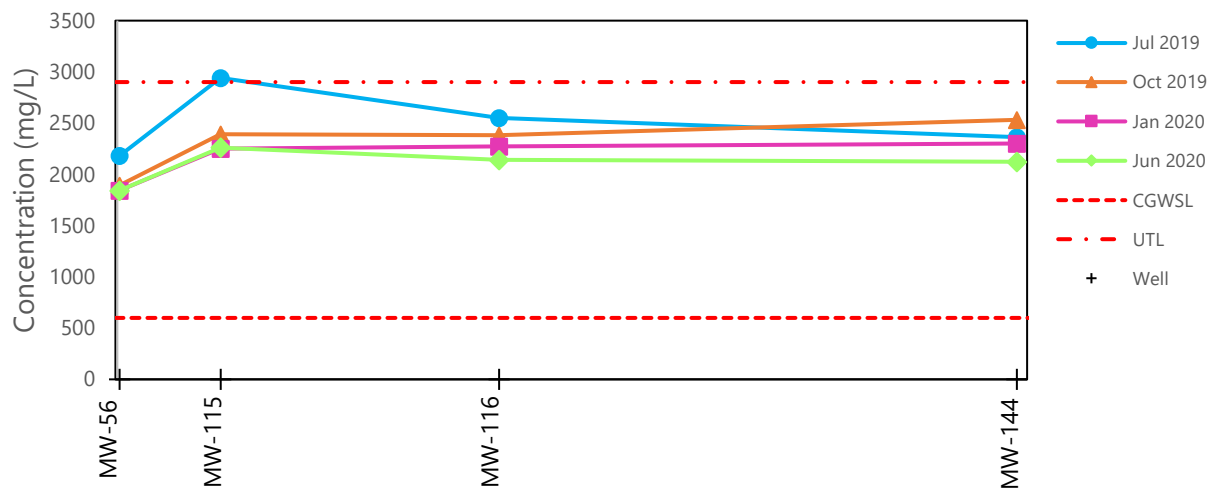
South RO Field (Northern) - Magnesium Profiles



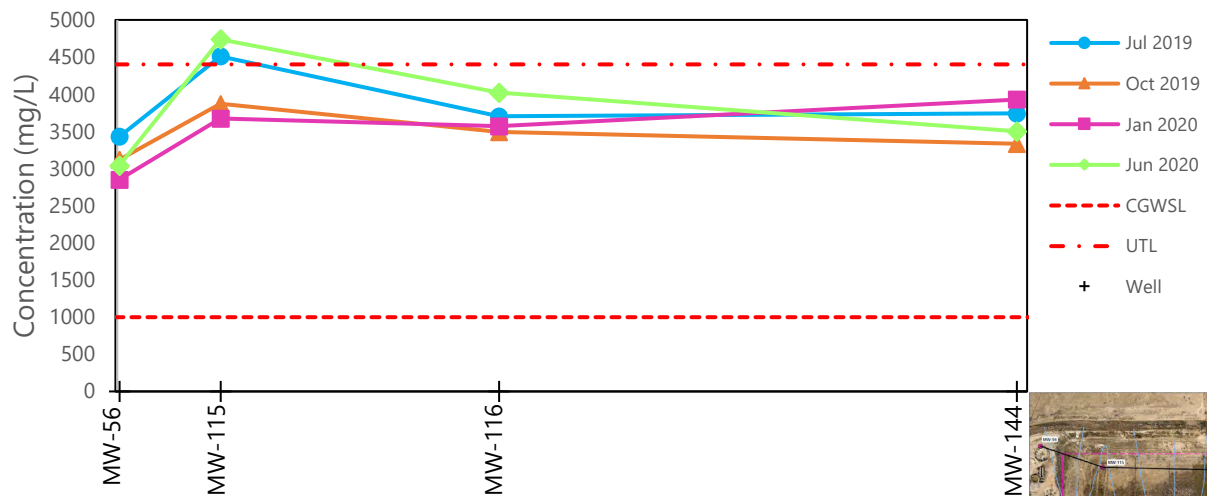
South RO Field (Northern) - Nitrate/Nitrite Profiles



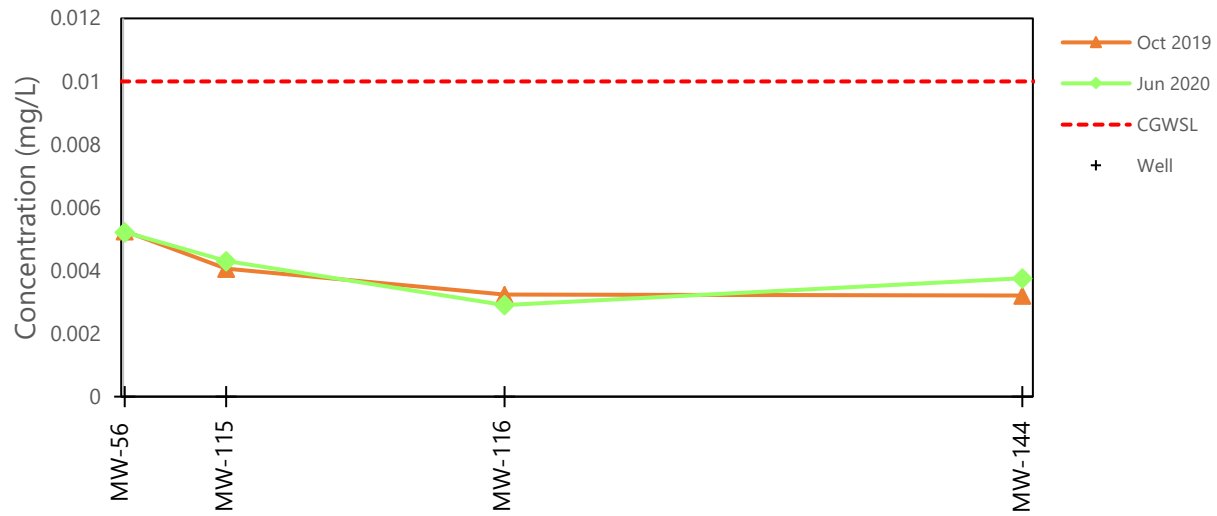
South RO Field (Northern) - Sulfate Profiles



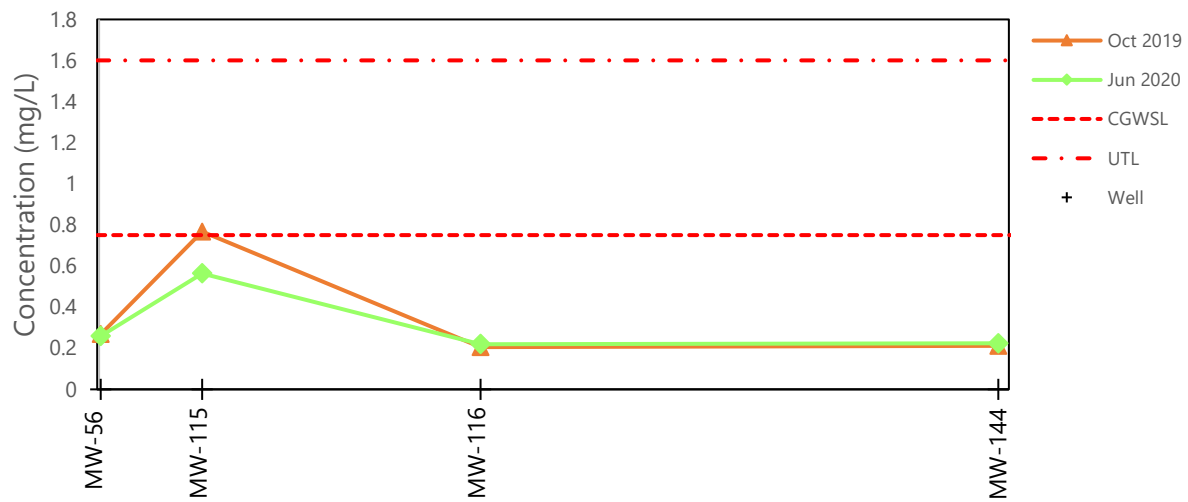
South RO Field (Northern) - TDS Profiles



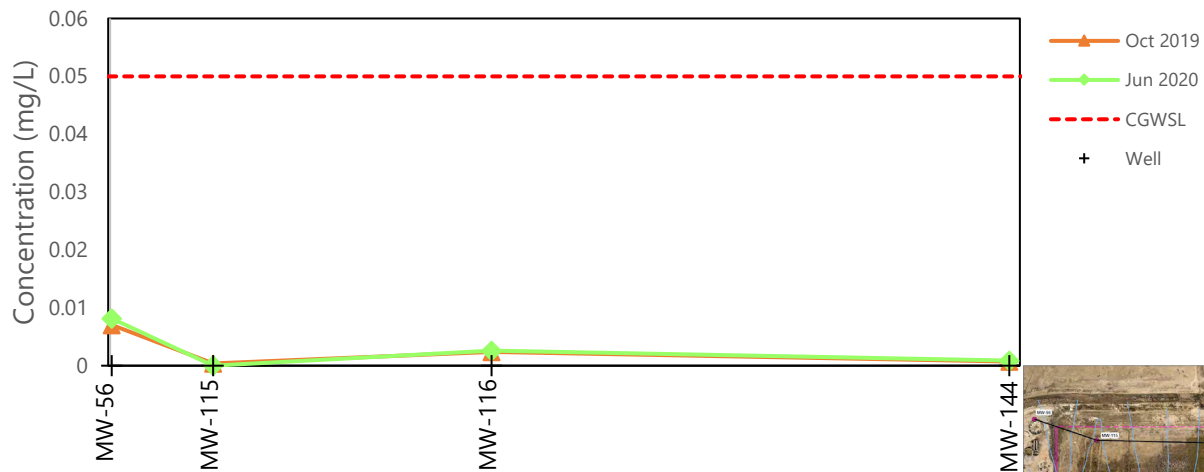
South RO Field (Northern) - Dissolved Arsenic Profiles



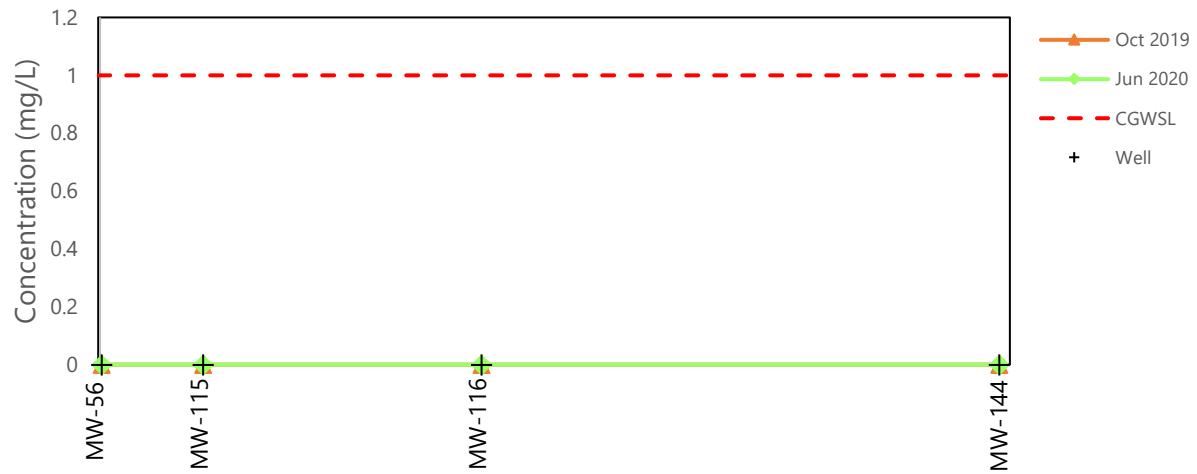
South RO Field (Northern) - Dissolved Boron Profiles



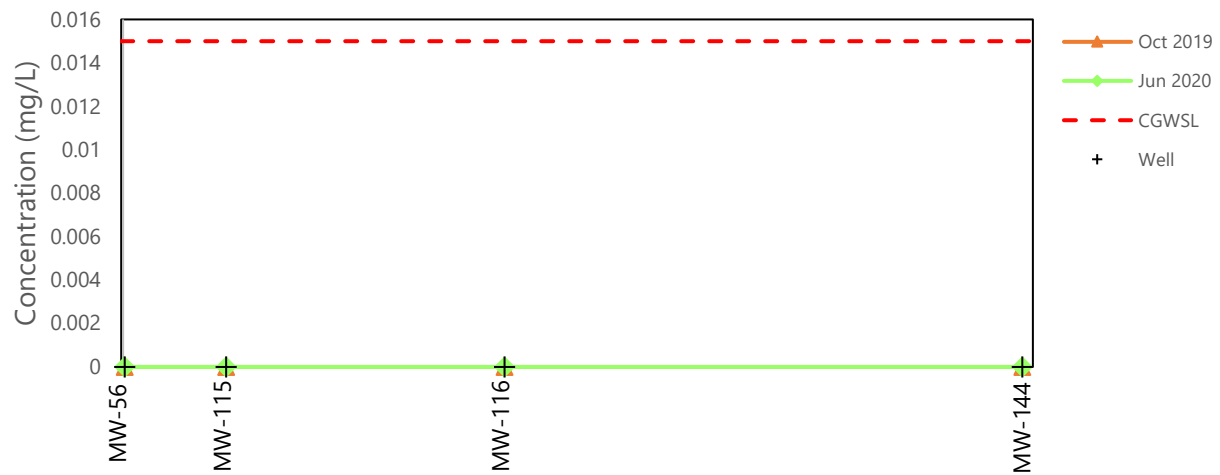
South RO Field (Northern) - Dissolved Cobalt Profiles



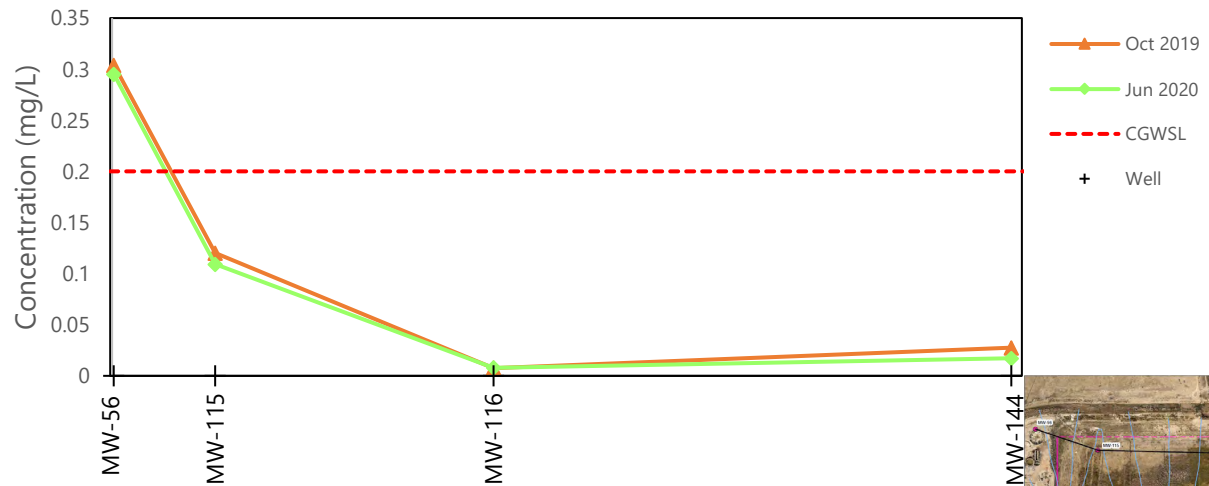
South RO Field (Northern) - Dissolved Iron Profiles



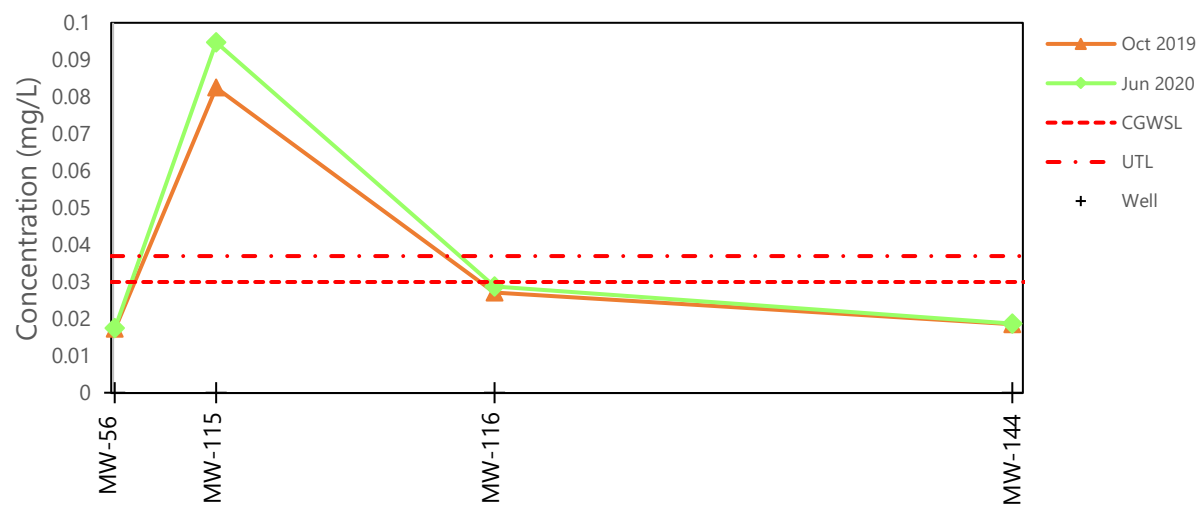
South RO Field (Northern) - Dissolved Lead Profiles



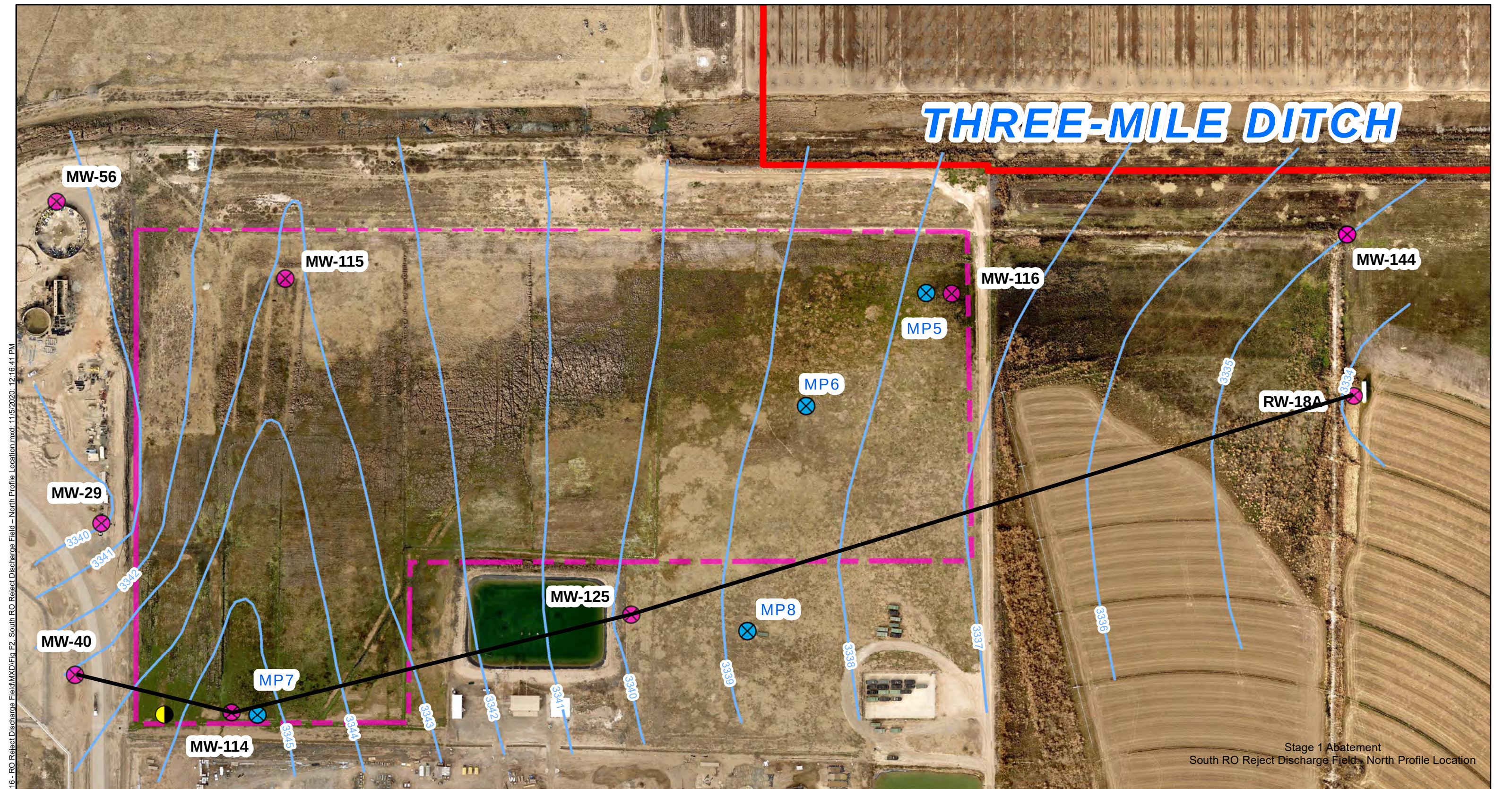
South RO Field (Northern) - Dissolved Manganese Profiles



South RO Field (Northern) - Dissolved Uranium Profiles



DB: ALB PM: PK
Path: P:\Client\HollyFrontier\Navajo\6703200016 - RO Reject Discharge Field\MXD\Fig F2. South RO Reject Discharge Field - North Profile Location.mxd 11/5/2020: 12:16:41 PM



Stage 1 Abatement
South RO Reject Discharge Field - North Profile Location

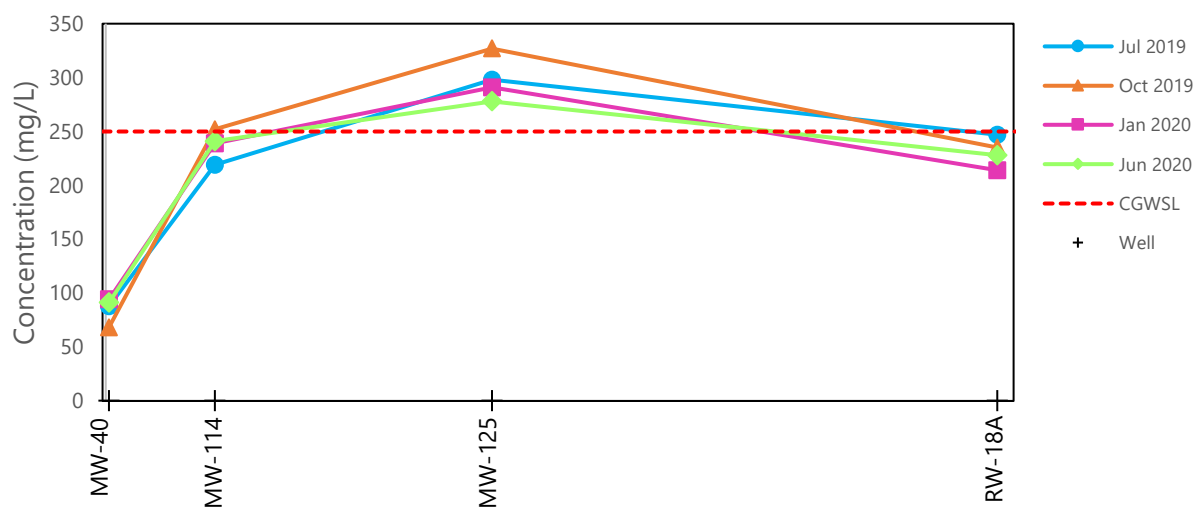
Legend

	Property Boundary		Former Discharge Point
	South RO Reject Discharge Field		Contour Line
	Moisture Probes		Profile Line
	Monitoring Well		

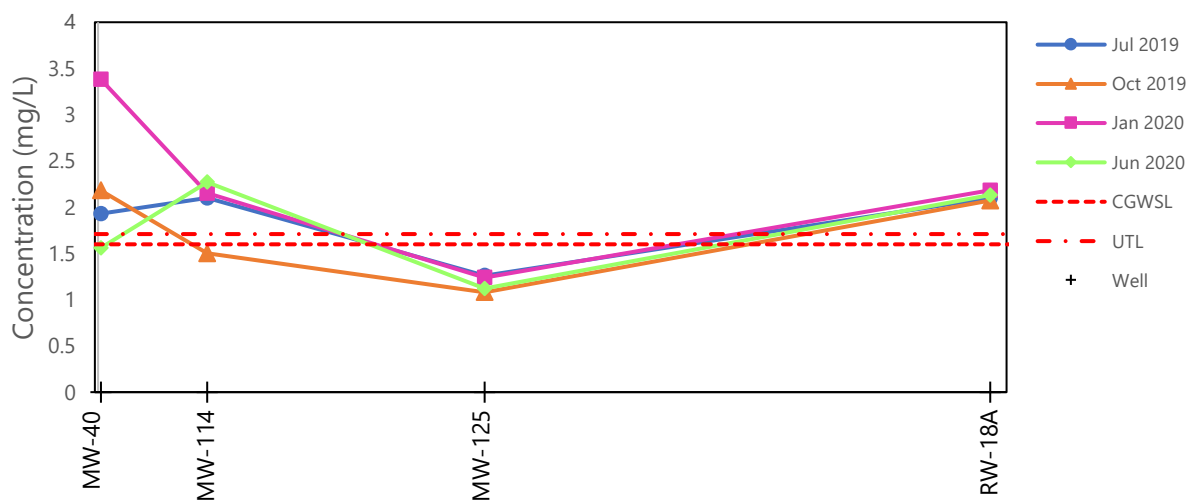
GRAPHIC SCALE

HollyFrontier Navajo Refining LLC Artesia, New Mexico		
RO Reject Discharge Fields Stage 1 Abatement South RO Reject Discharge Field South Profile Location		
Prepared By: ALB		FIGURE G-3
Date Prepared: 11/5/2020		
Project Number: 6703200016		

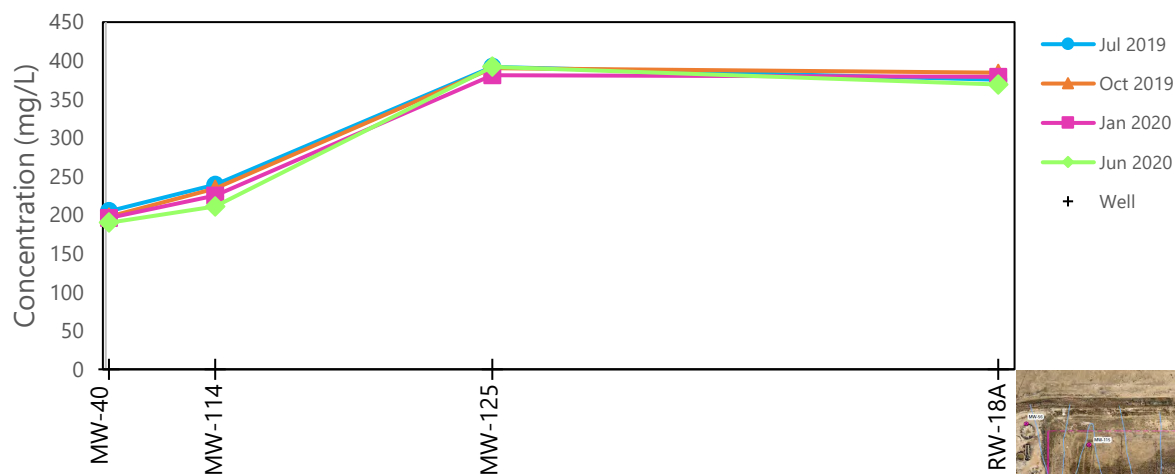
South RO Field (Southern) - Chloride Profiles



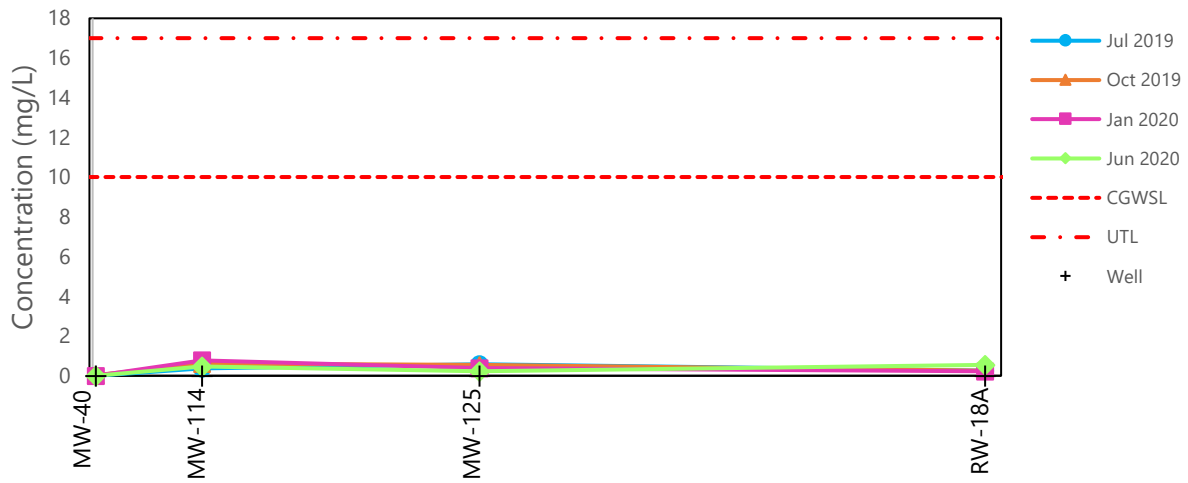
South RO Field (Southern) - Fluoride Profiles



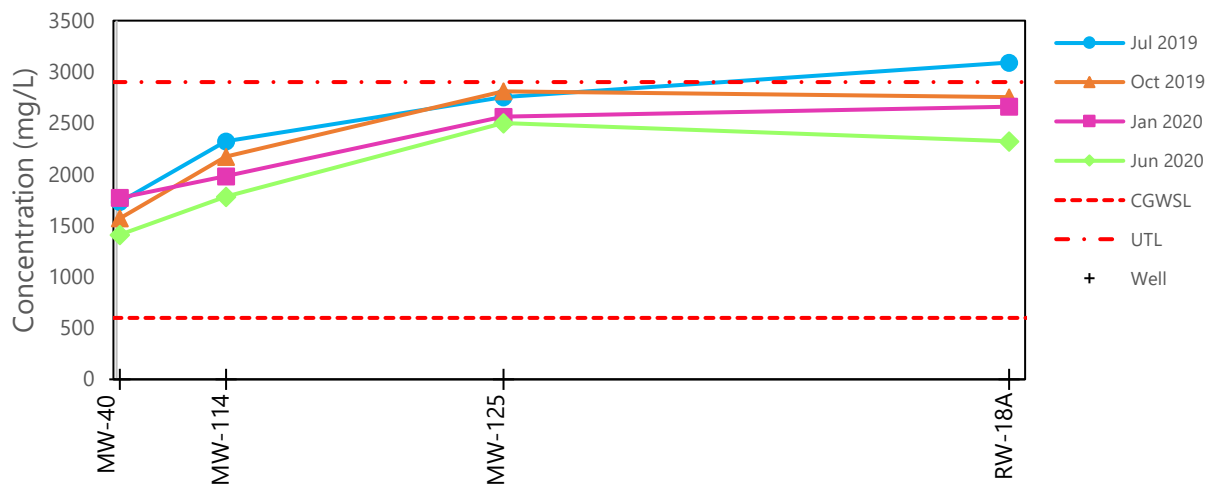
South RO Field (Southern) - Magnesium Profiles



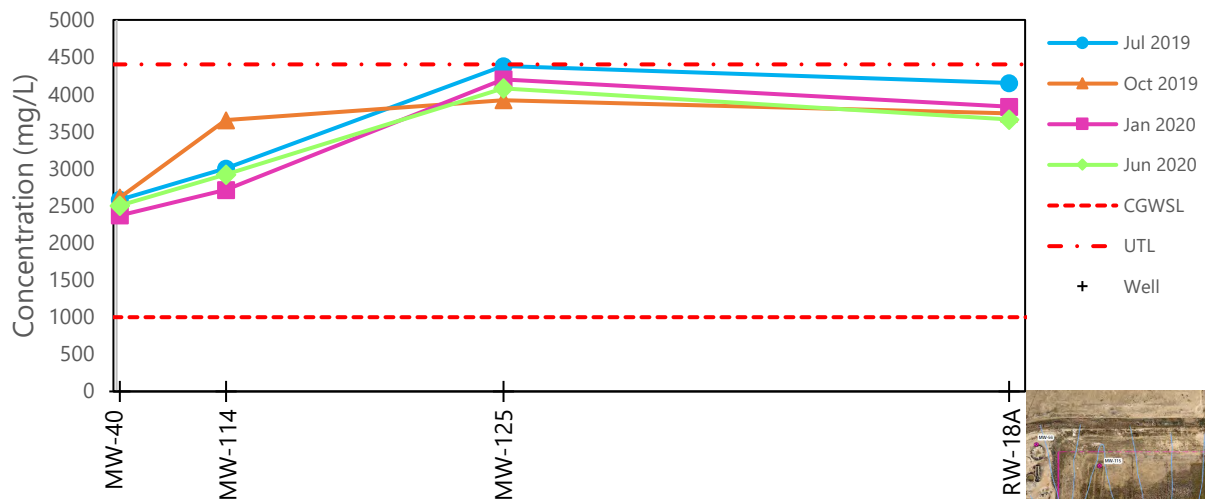
South RO Field (Southern) - Nitrate/Nitrite Profiles



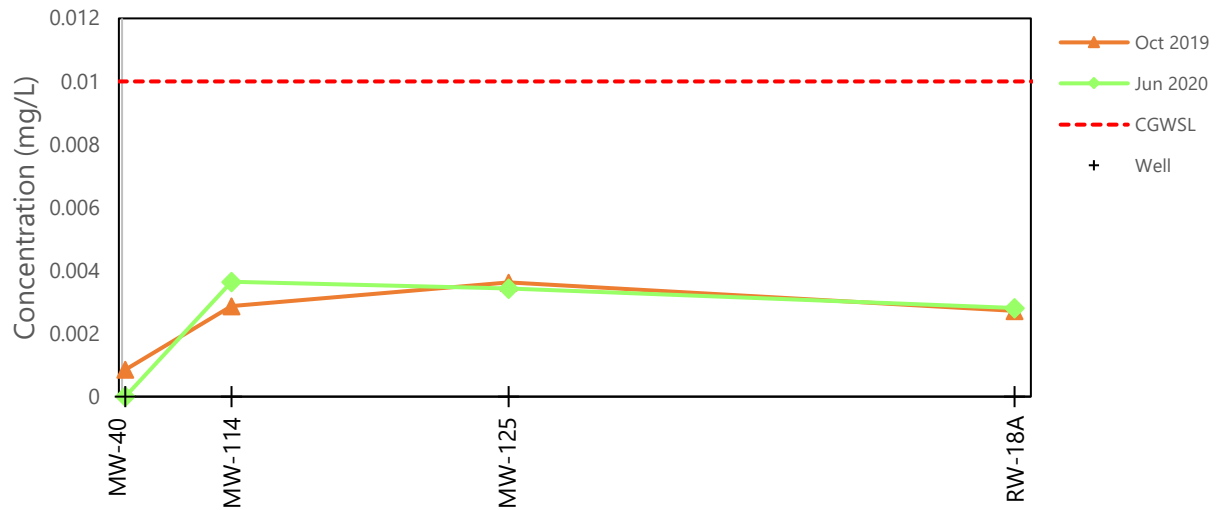
South RO Field (Southern) - Sulfate Profiles



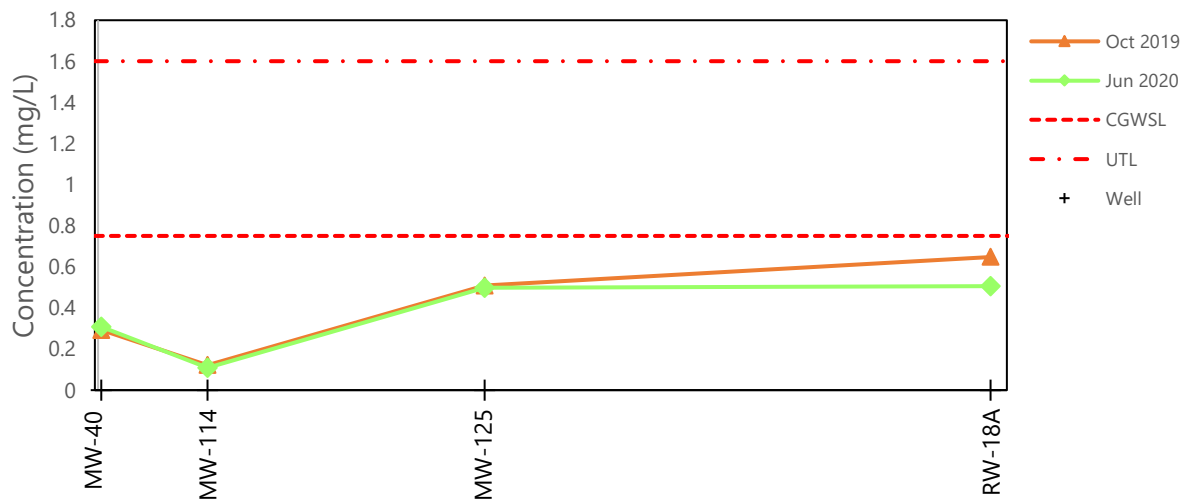
South RO Field (Southern) - TDS Profiles



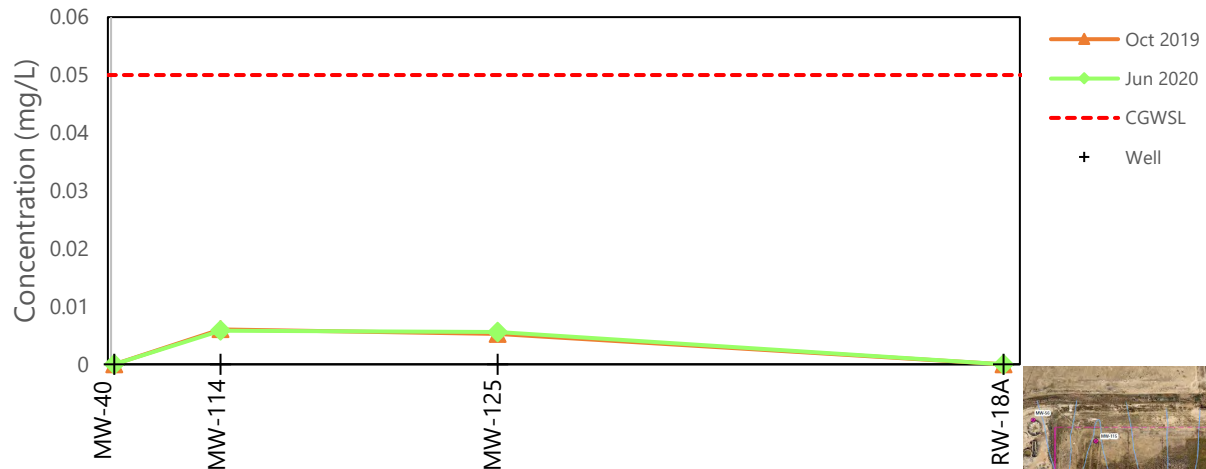
South RO Field (Southern) - Dissolved Arsenic Profiles



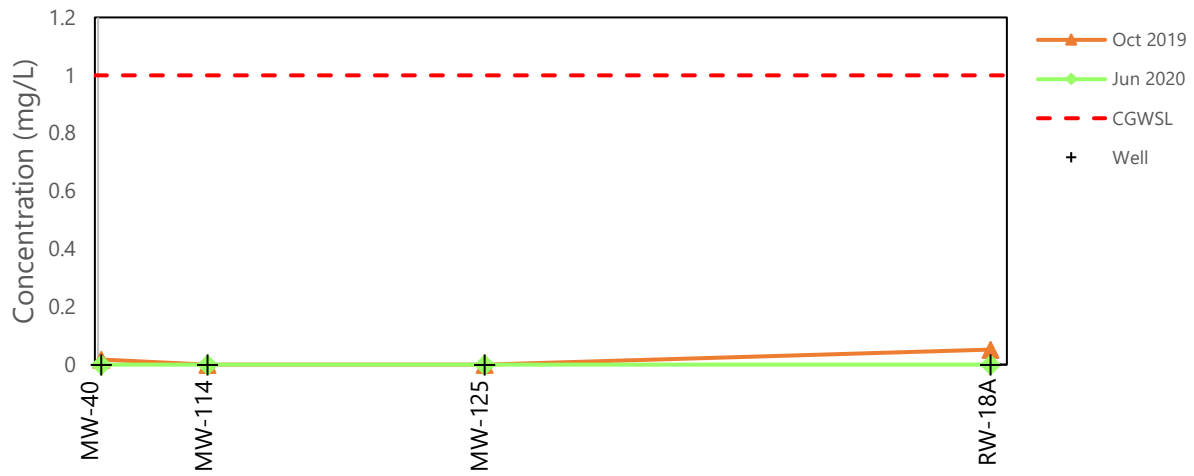
South RO Field (Southern) - Dissolved Boron Profiles



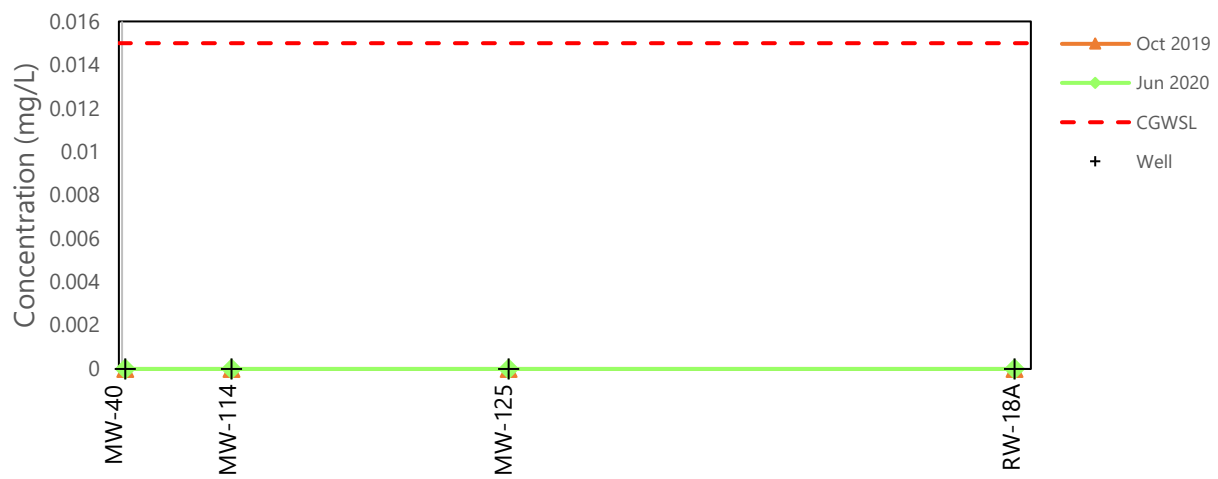
South RO Field (Southern) - Dissolved Cobalt Profiles



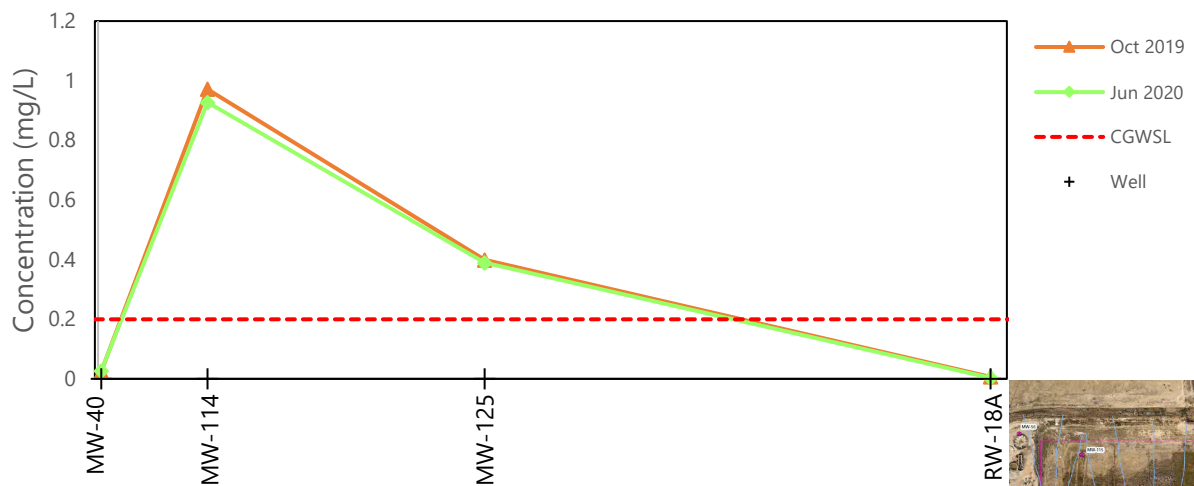
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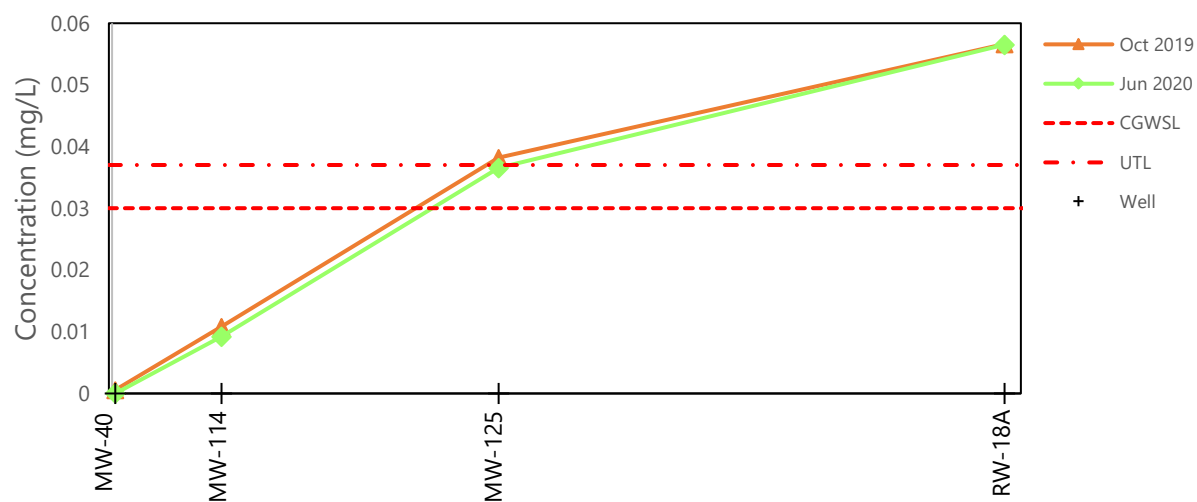
South RO Field (Southern) - Dissolved Lead Profiles



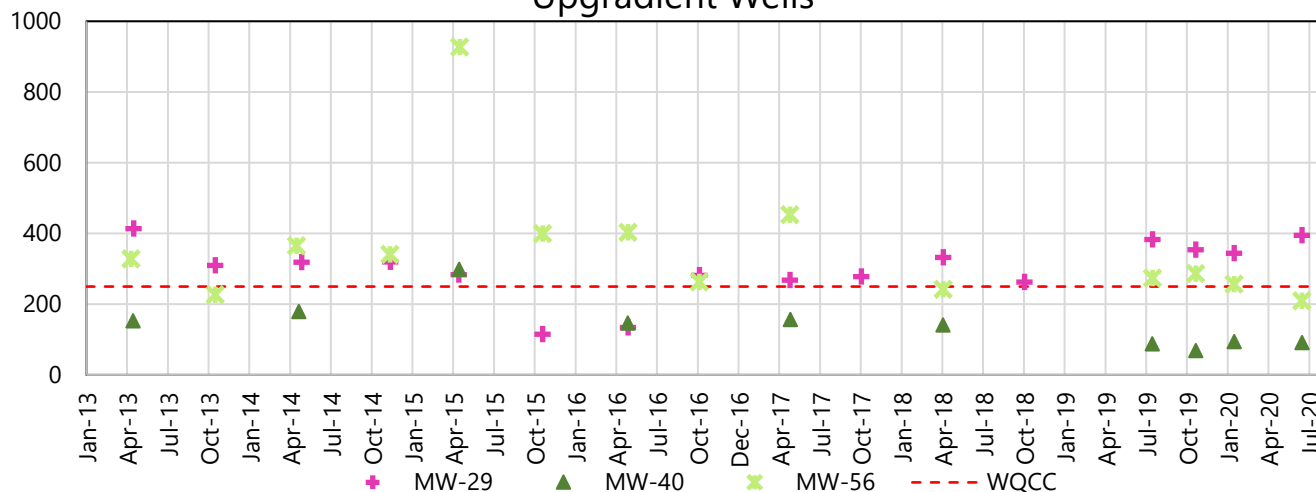
South RO Field (Southern) - Dissolved Manganese Profiles



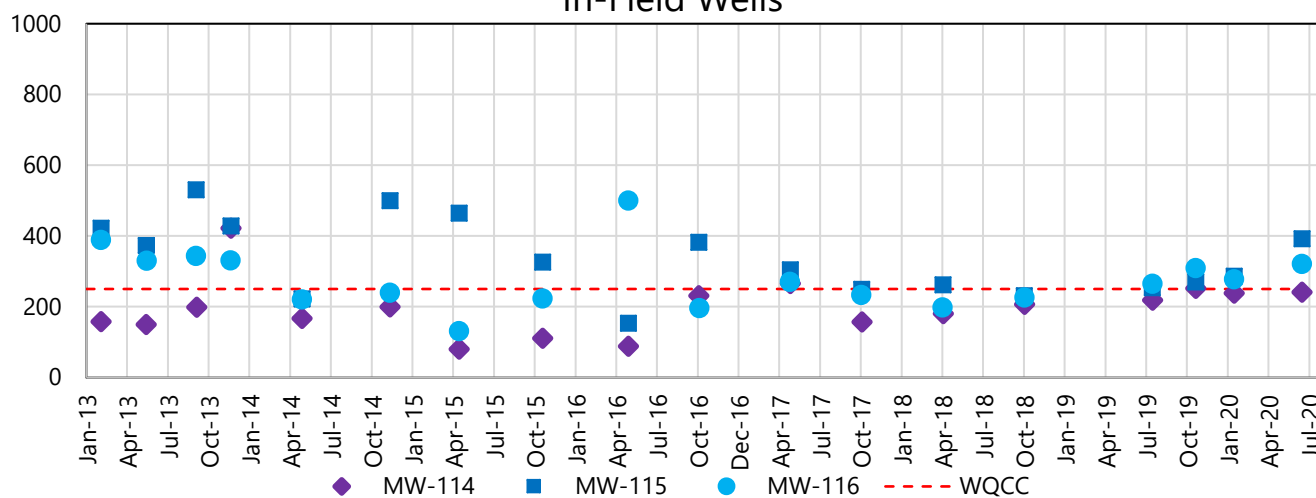
South RO Field (Southern) - Dissolved Uranium Profiles



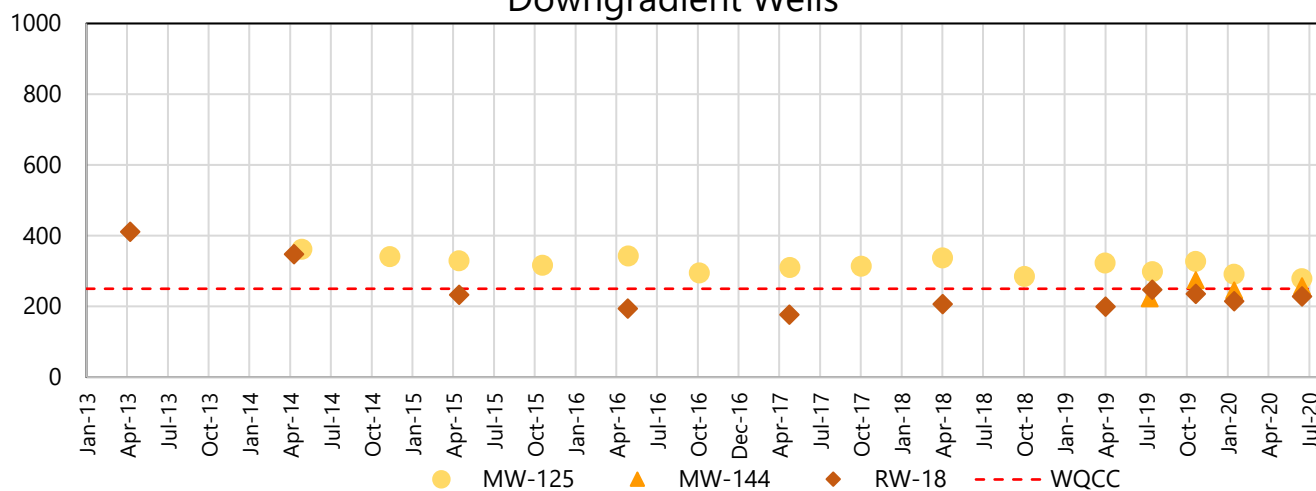
Upgradient Wells



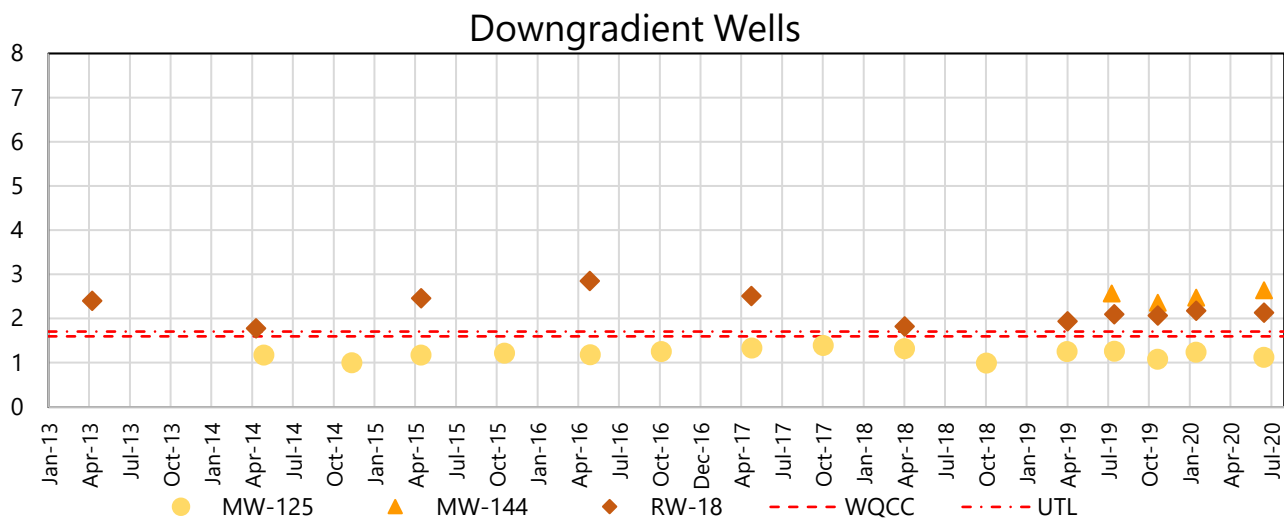
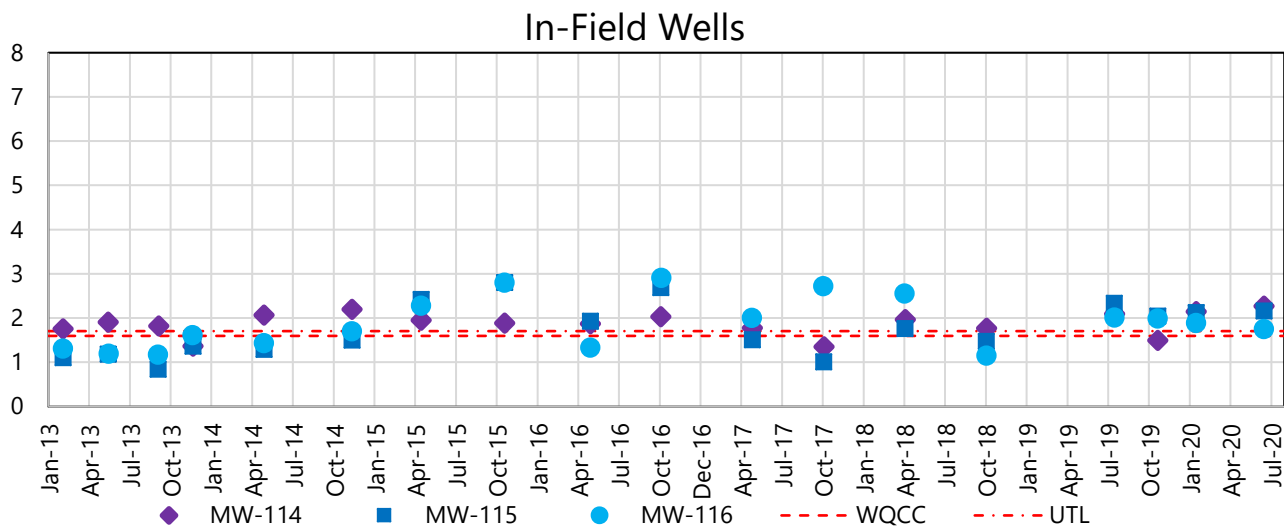
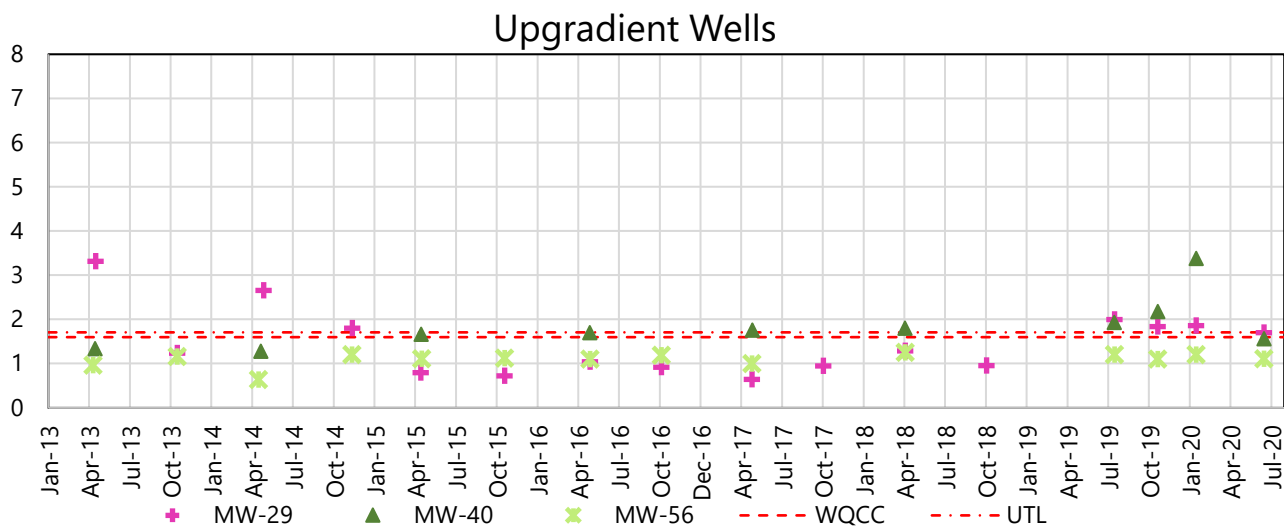
In-Field Wells



Downgradient Wells

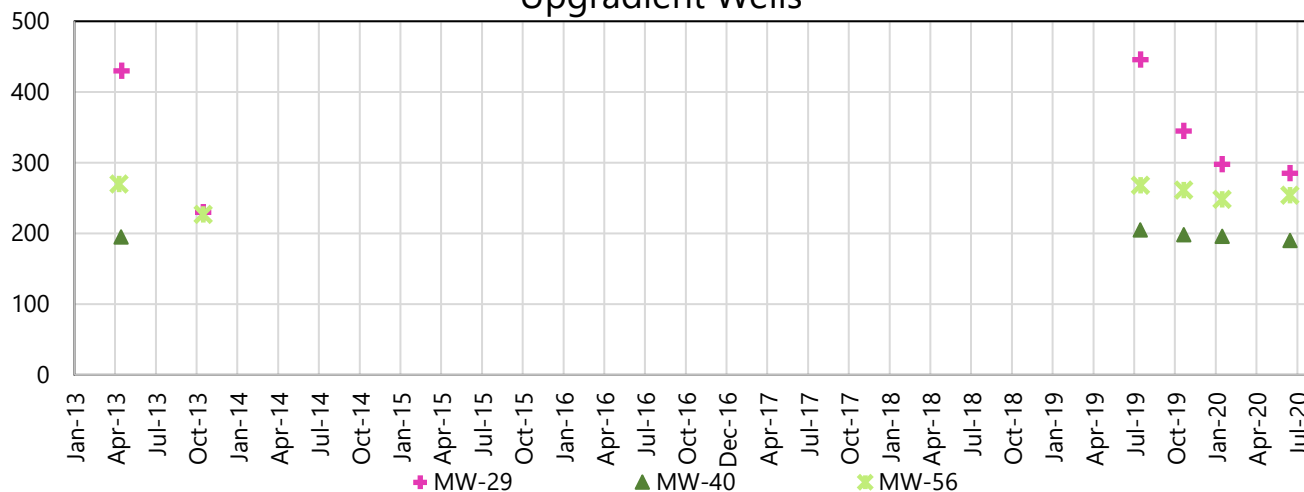


SOUTH RO REJECT FIELD TRENDS - CHLORIDE

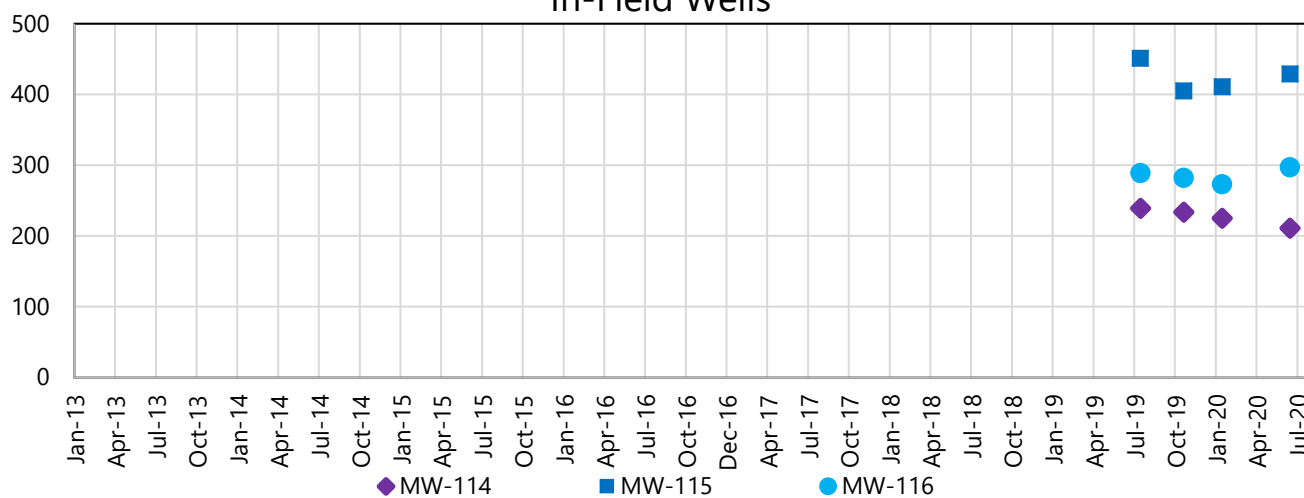


SOUTH RO REJECT FIELD TRENDS - FLUORIDE

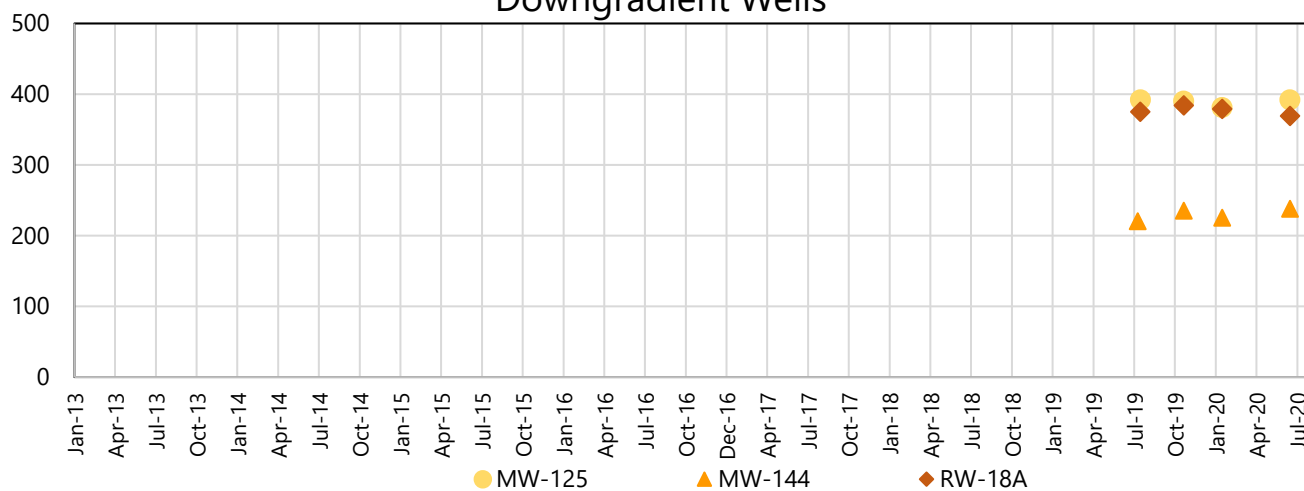
Upgradient Wells



In-Field Wells

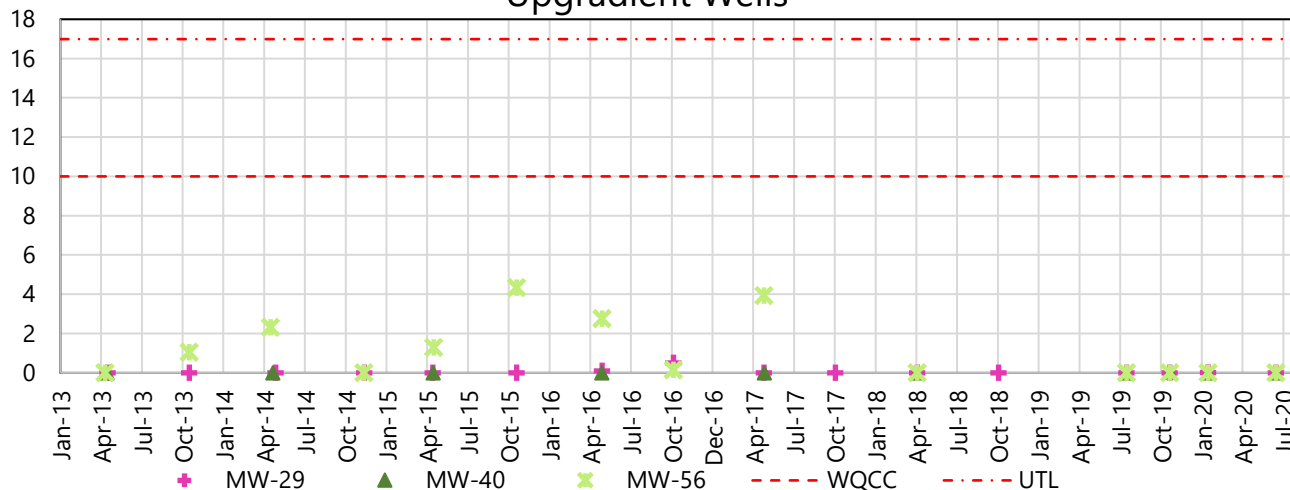


Downgradient Wells

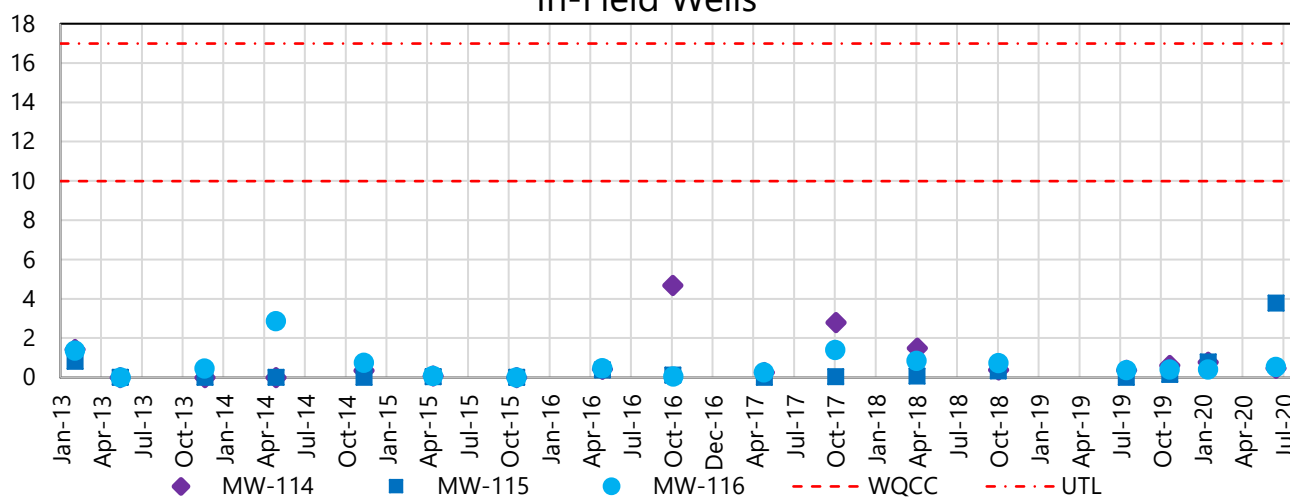


SOUTH RO REJECT FIELD TRENDS - MAGNESIUM

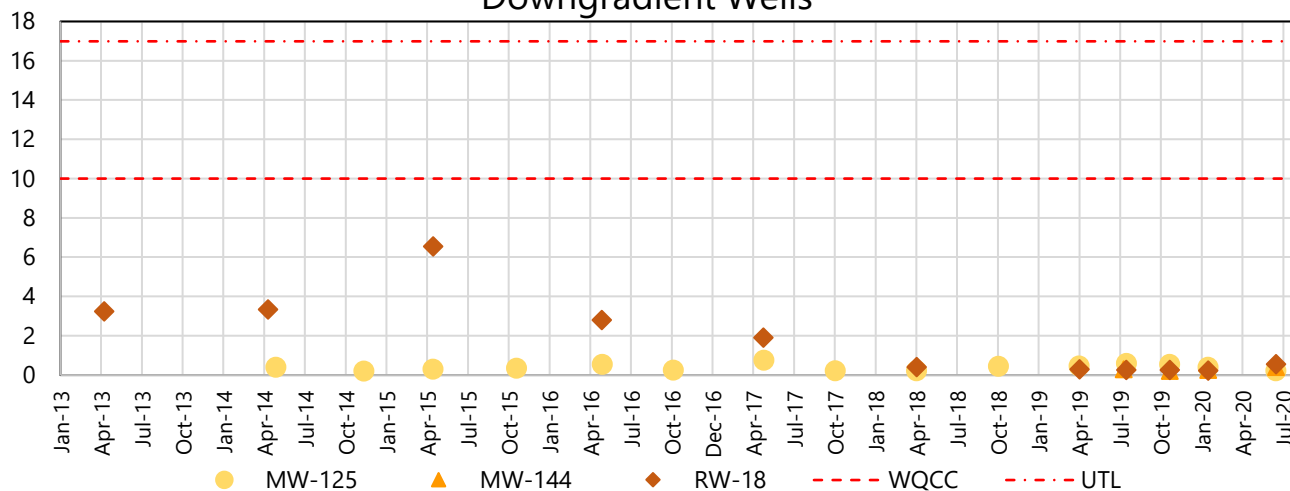
Upgradient Wells



In-Field Wells

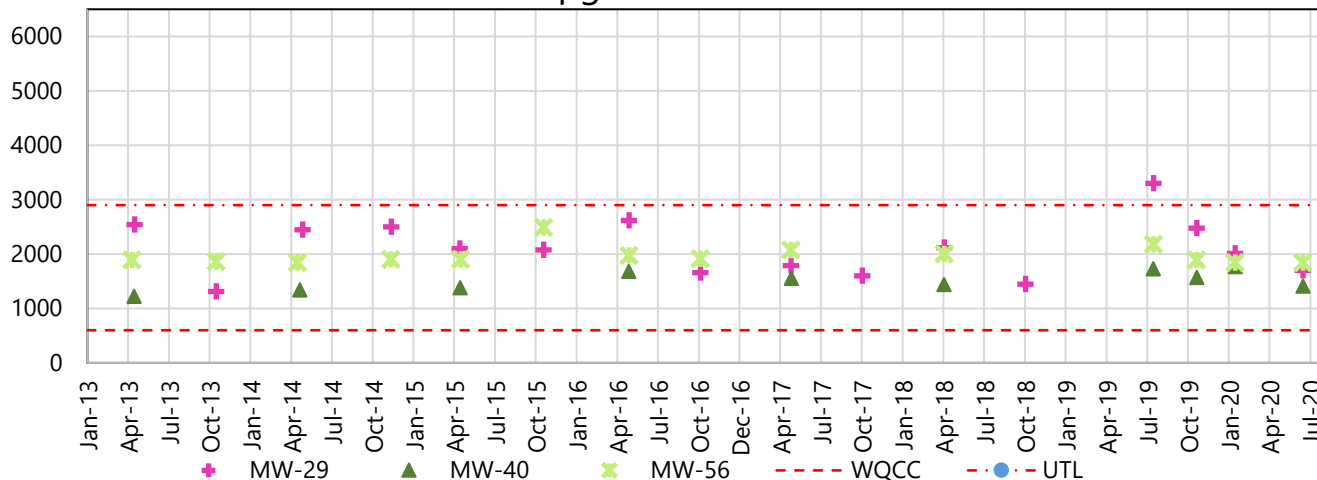


Downgradient Wells

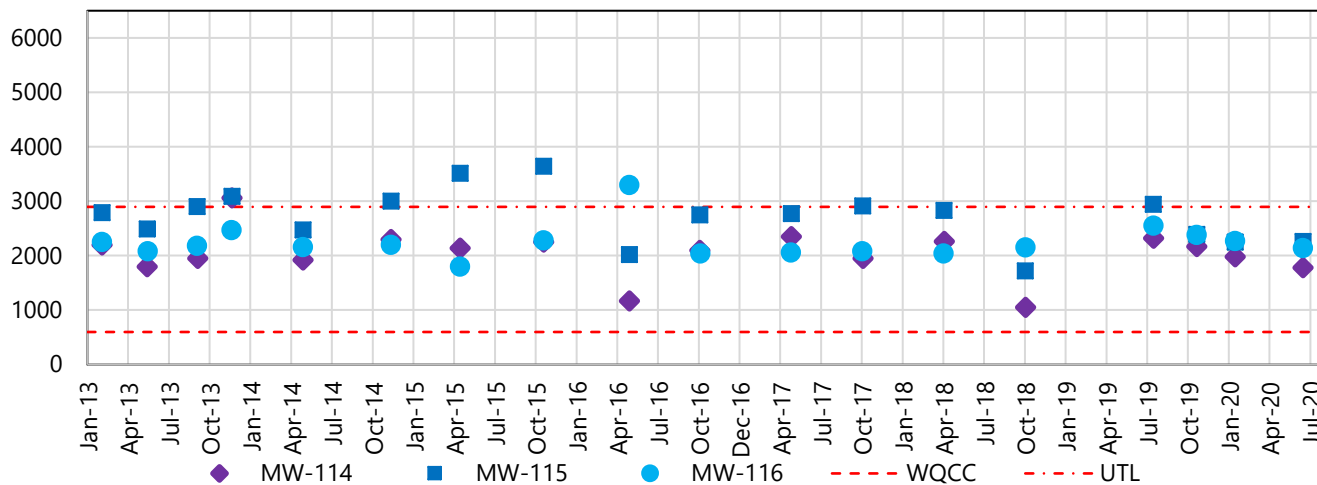


SOUTH RO REJECT FIELD TRENDS - NITRATE/NITRITE

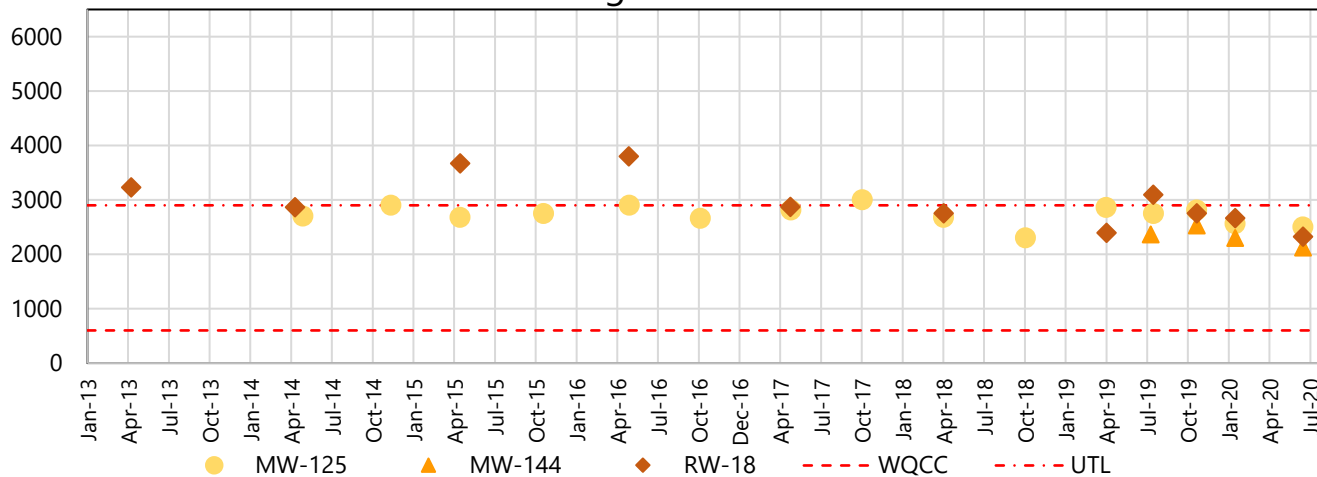
Upgradient Wells



In-Field Wells

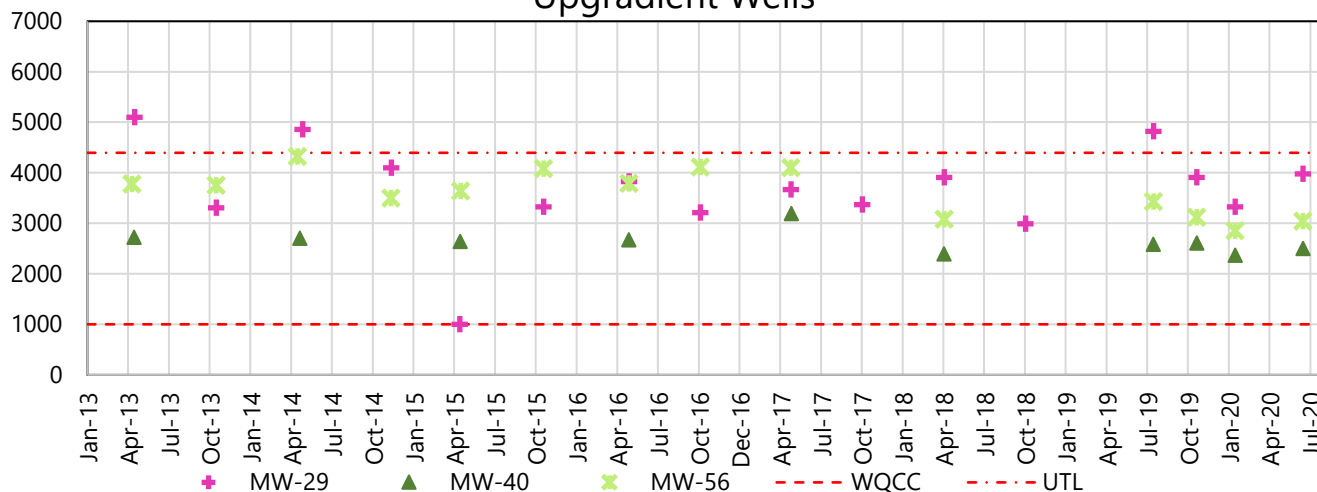


Downgradient Wells

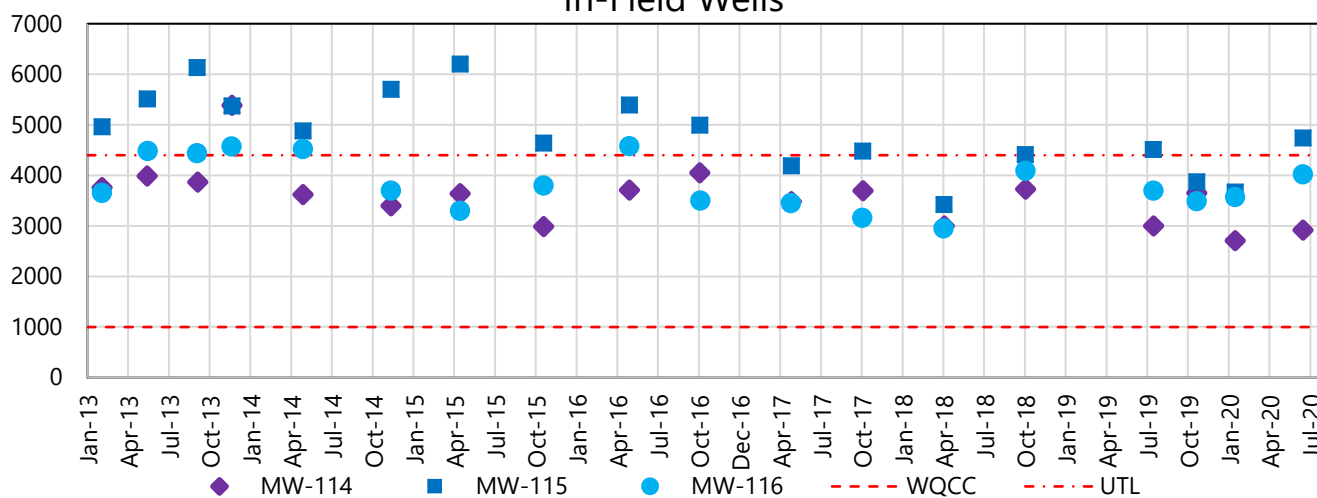


SOUTH RO REJECT FIELD TRENDS - SULFATE

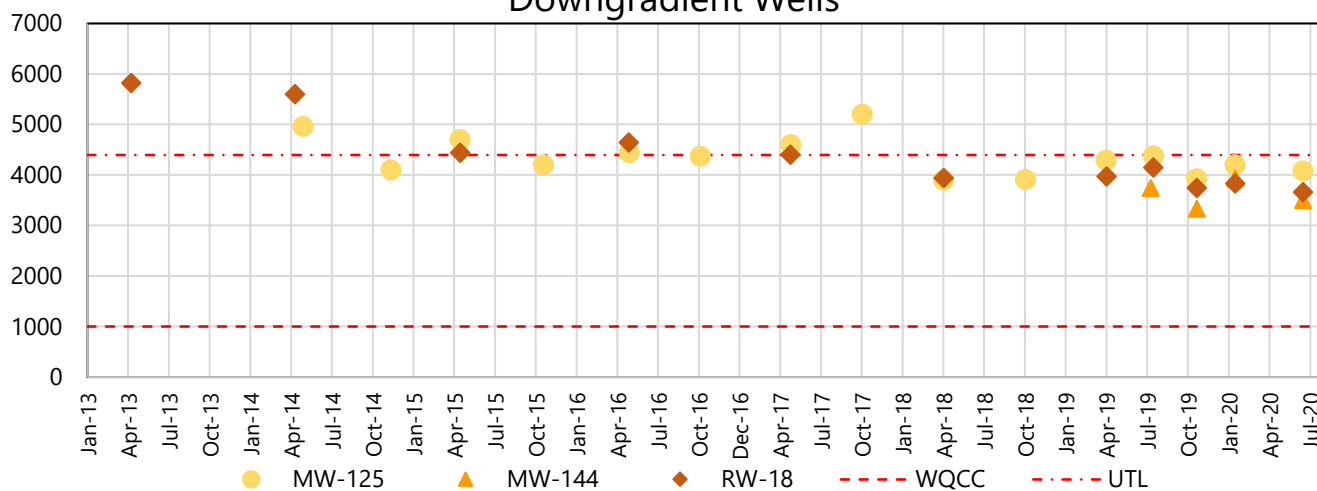
Upgradient Wells



In-Field Wells

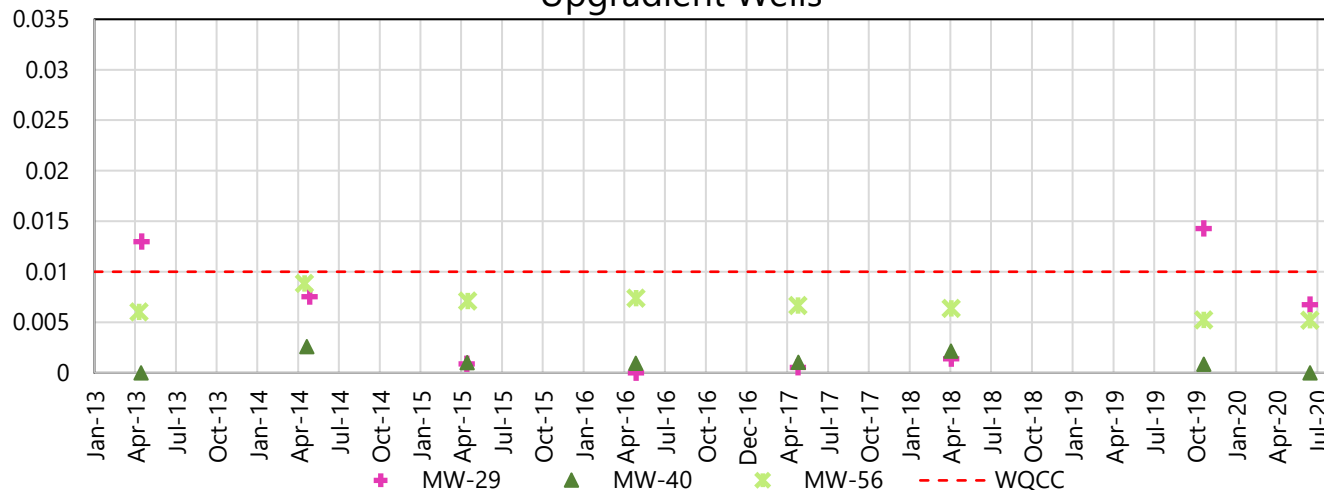


Downgradient Wells

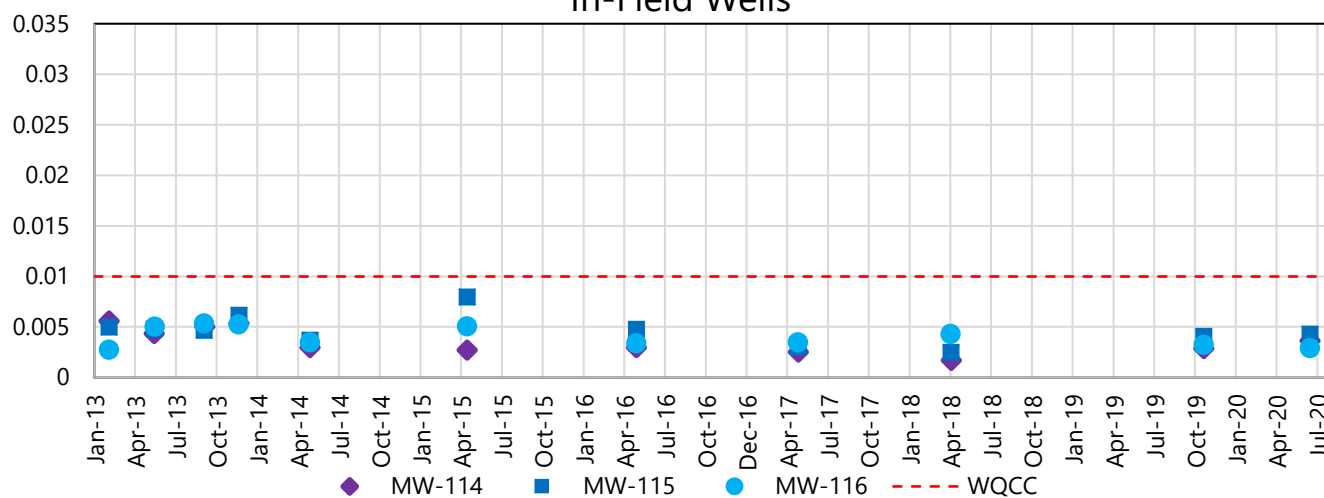


SOUTH RO REJECT FIELD TRENDS - TDS

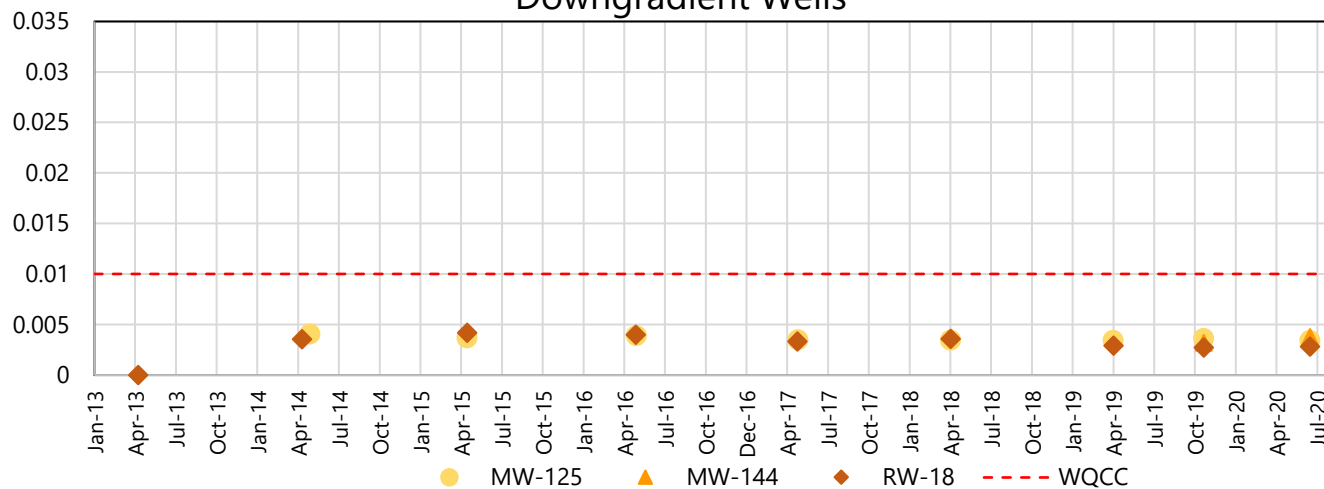
Upgradient Wells



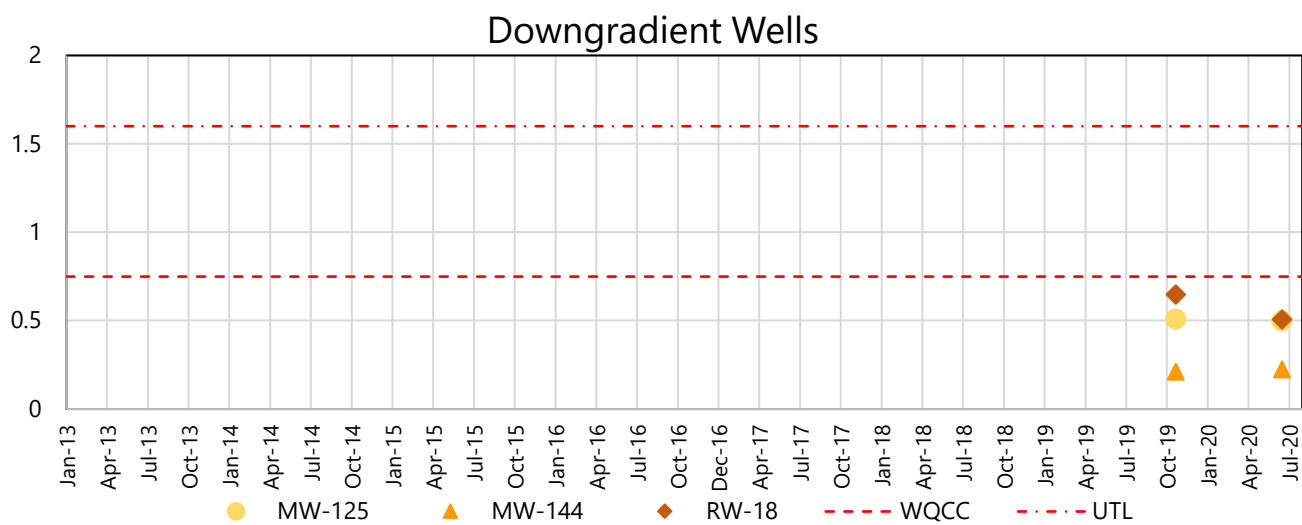
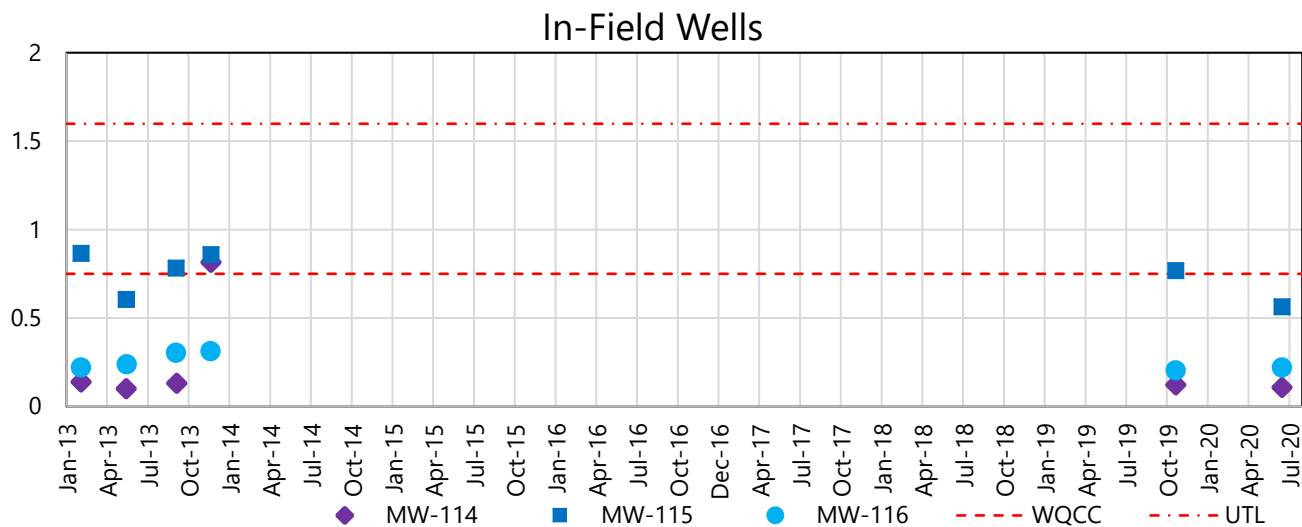
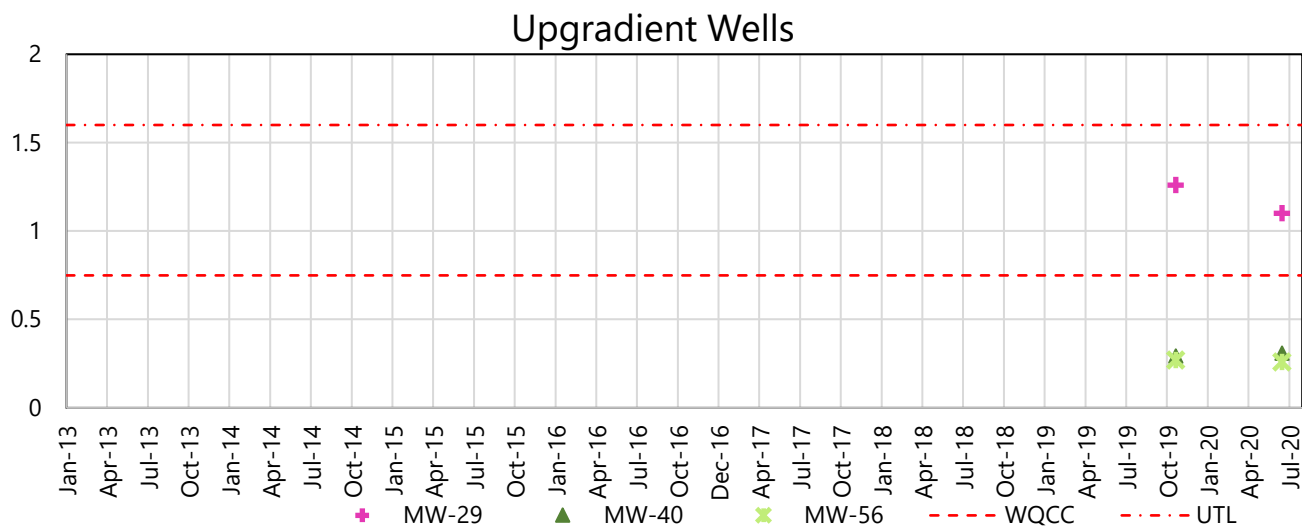
In-Field Wells



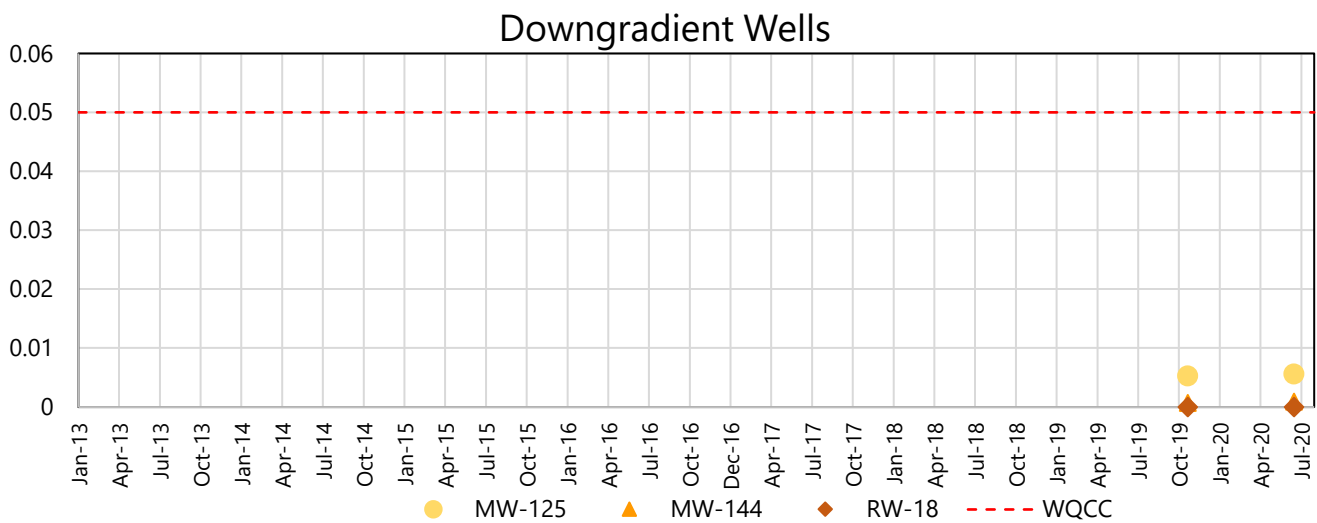
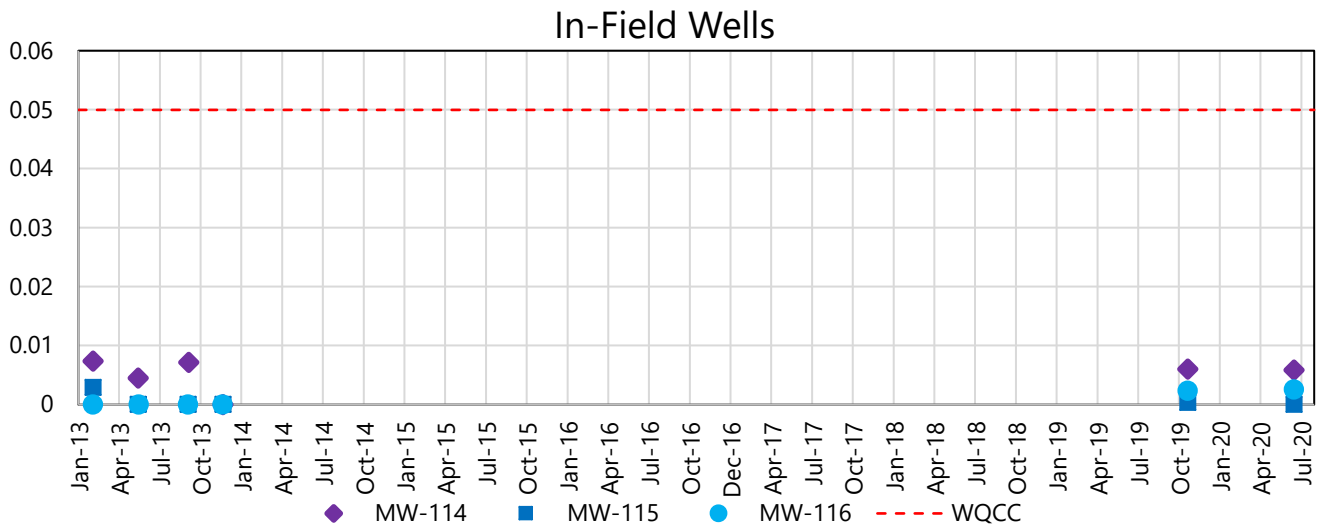
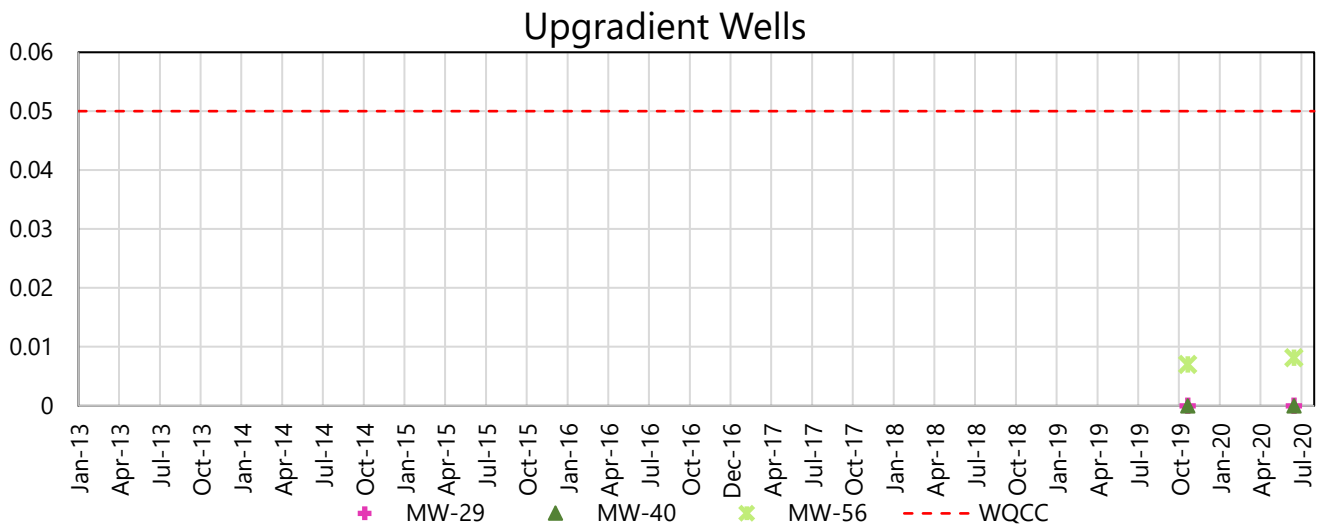
Downgradient Wells



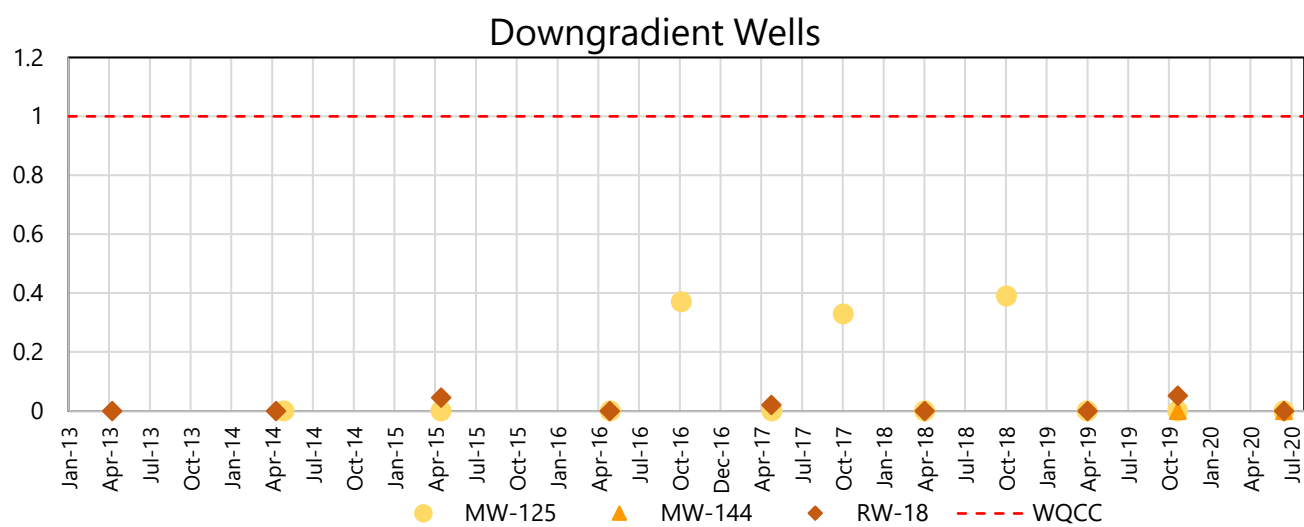
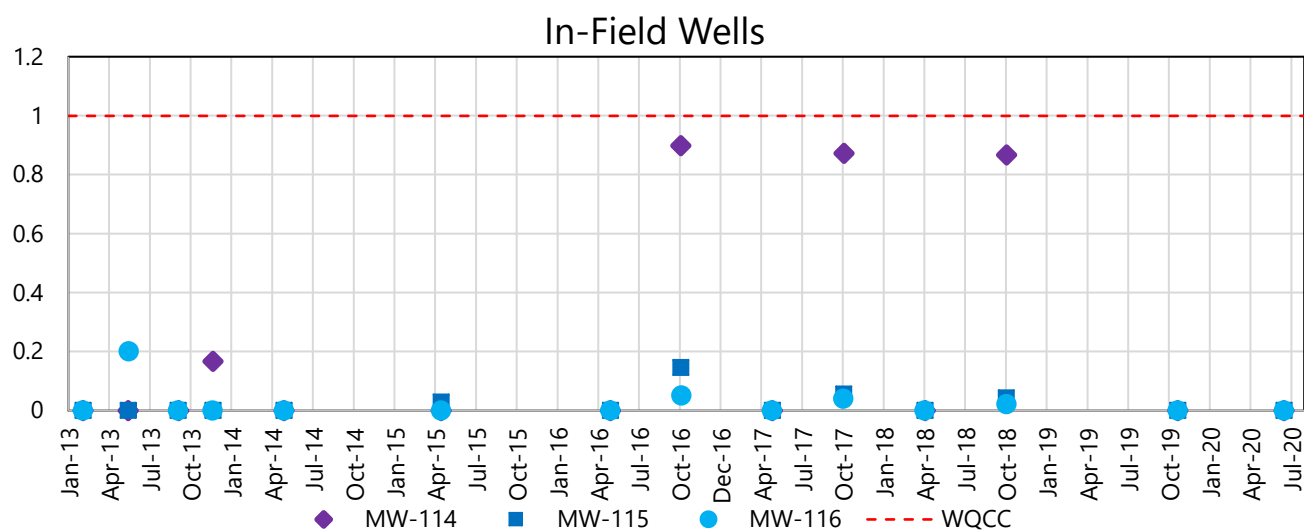
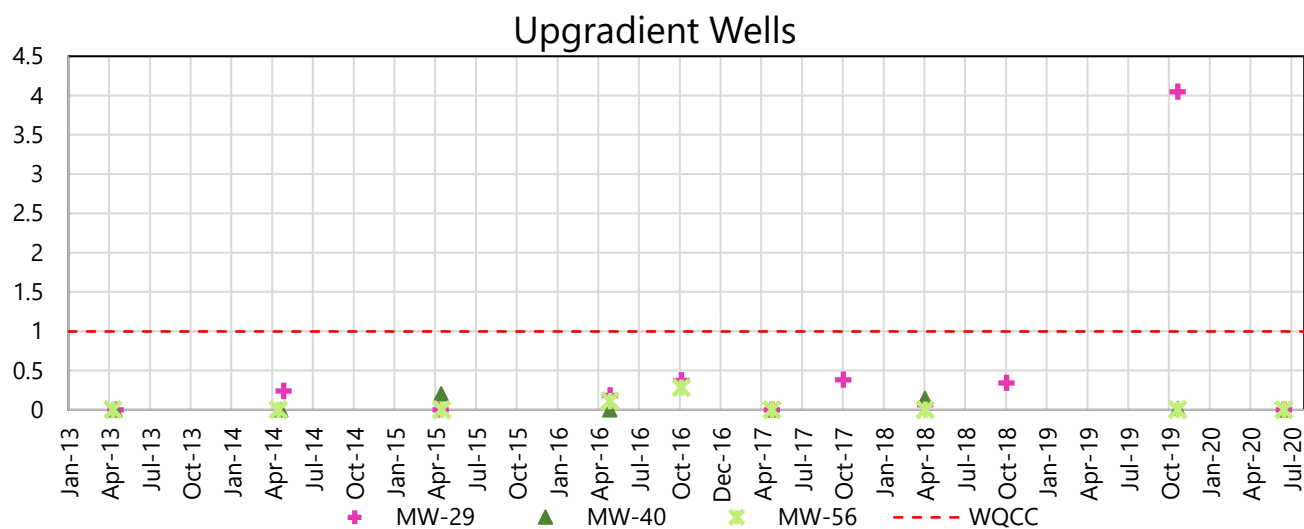
SOUTH RO REJECT FIELD TRENDS - ARSENIC, DISSOLVED



SOUTH RO REJECT FIELD TRENDS - BORON, DISSOLVED

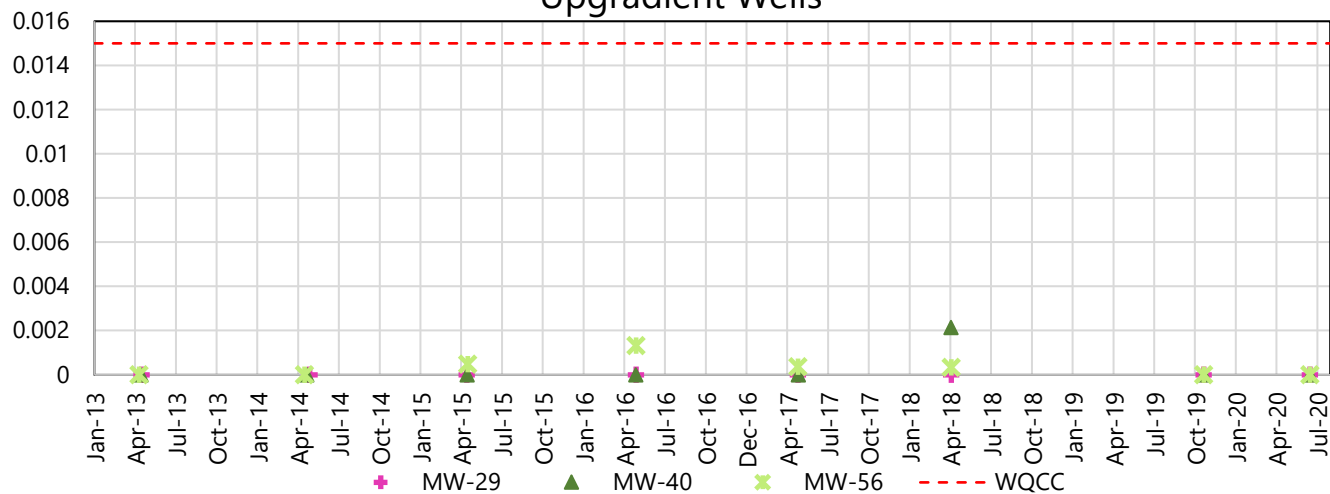


SOUTH RO REJECT FIELD TRENDS - COBALT, DISSOLVED

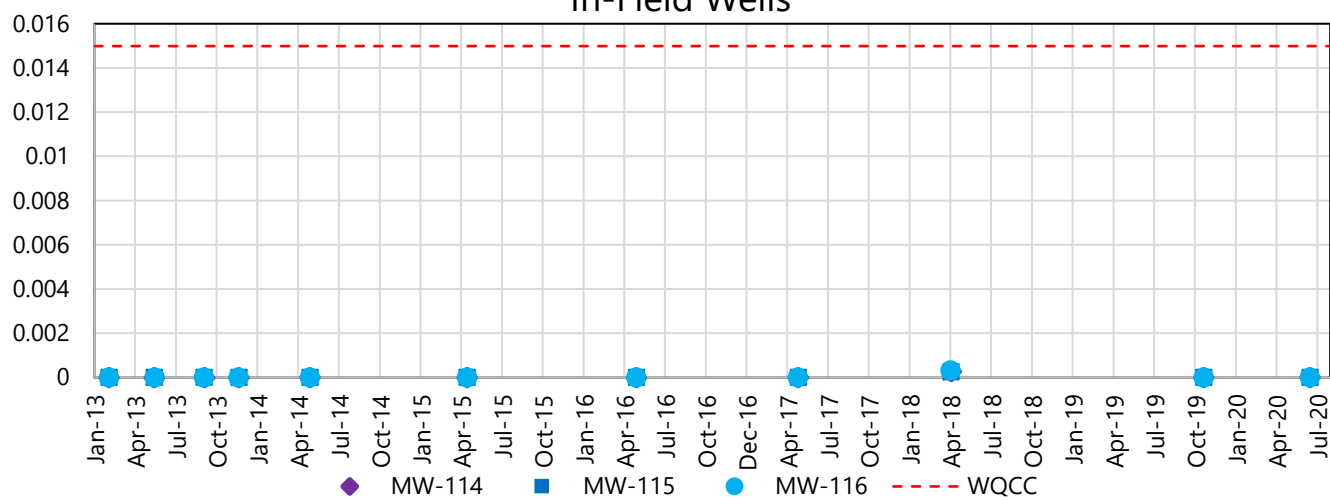


SOUTH RO REJECT FIELD TRENDS - IRON, DISSOLVED

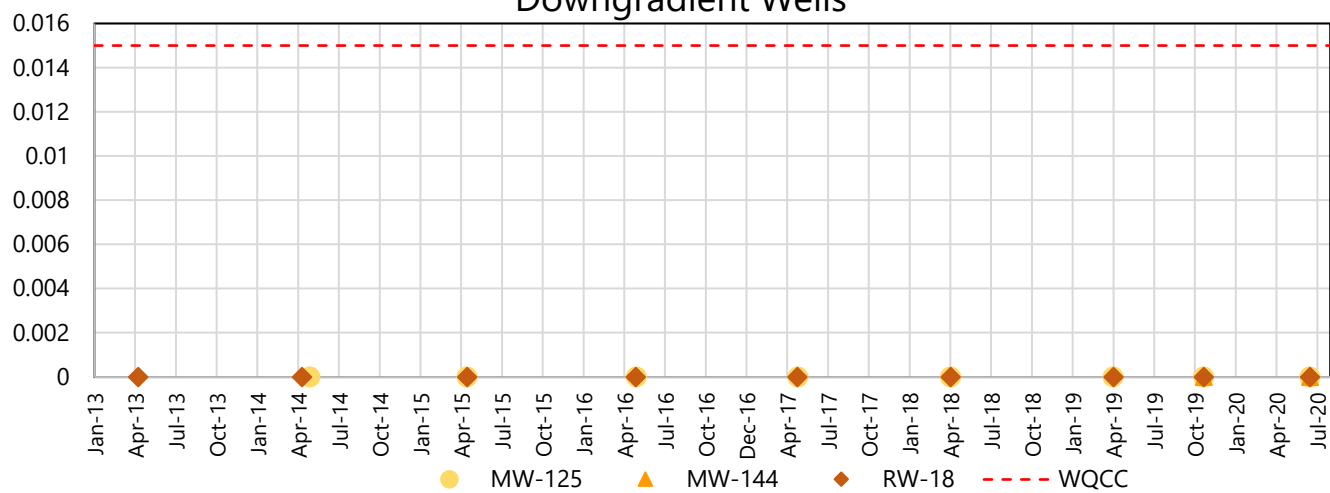
Upgradient Wells



In-Field Wells

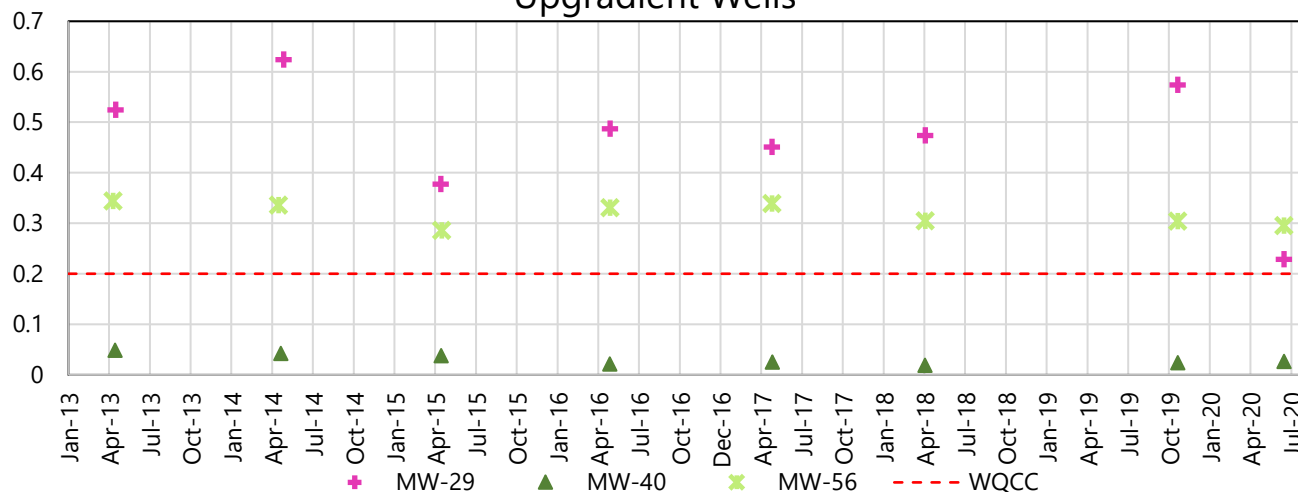


Downgradient Wells

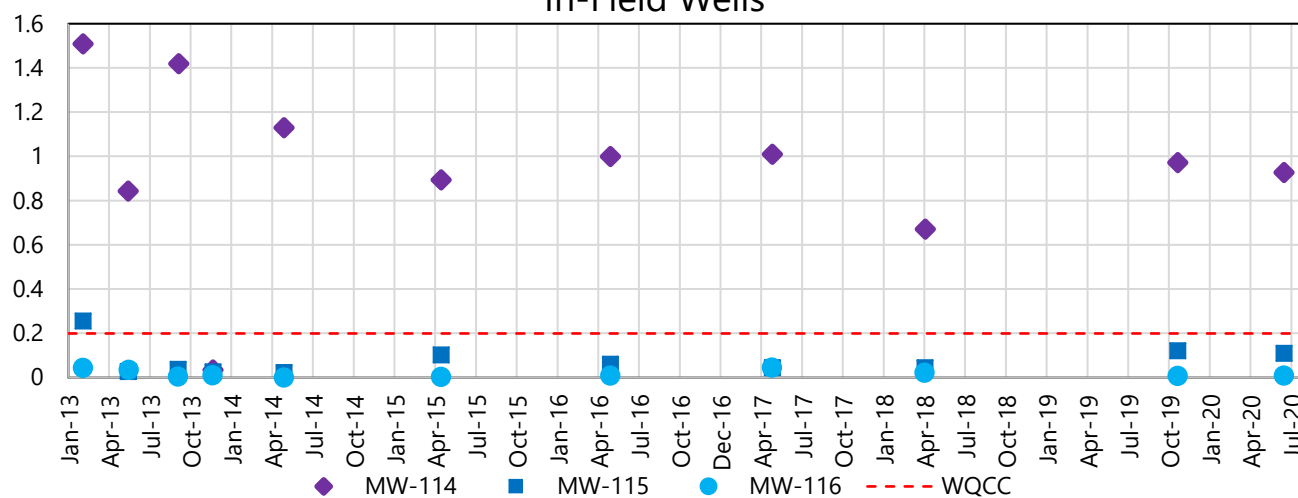


SOUTH RO REJECT FIELD TRENDS - LEAD, DISSOLVED

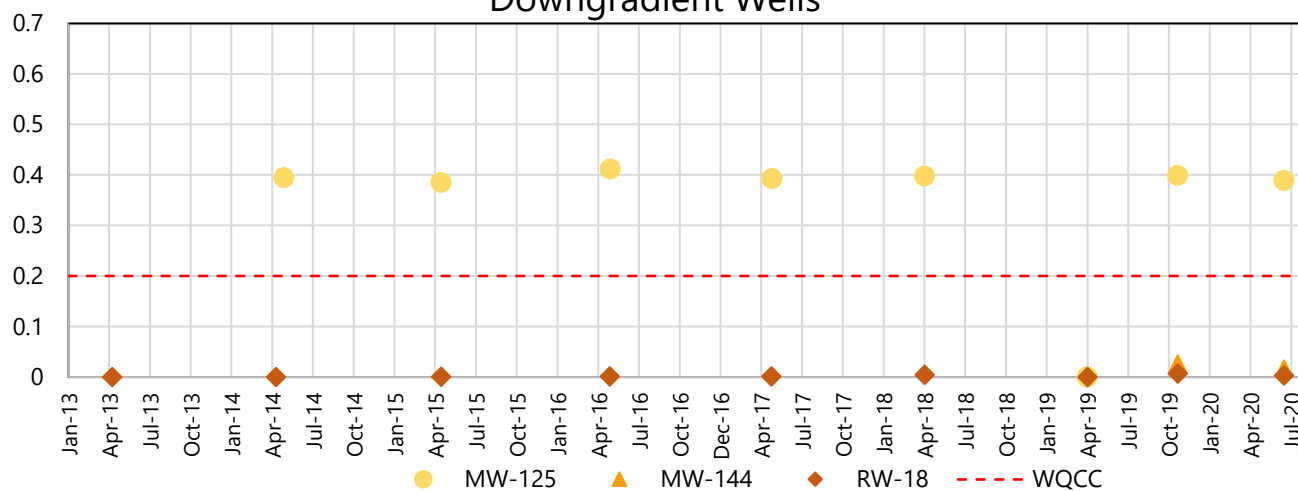
Upgradient Wells



In-Field Wells

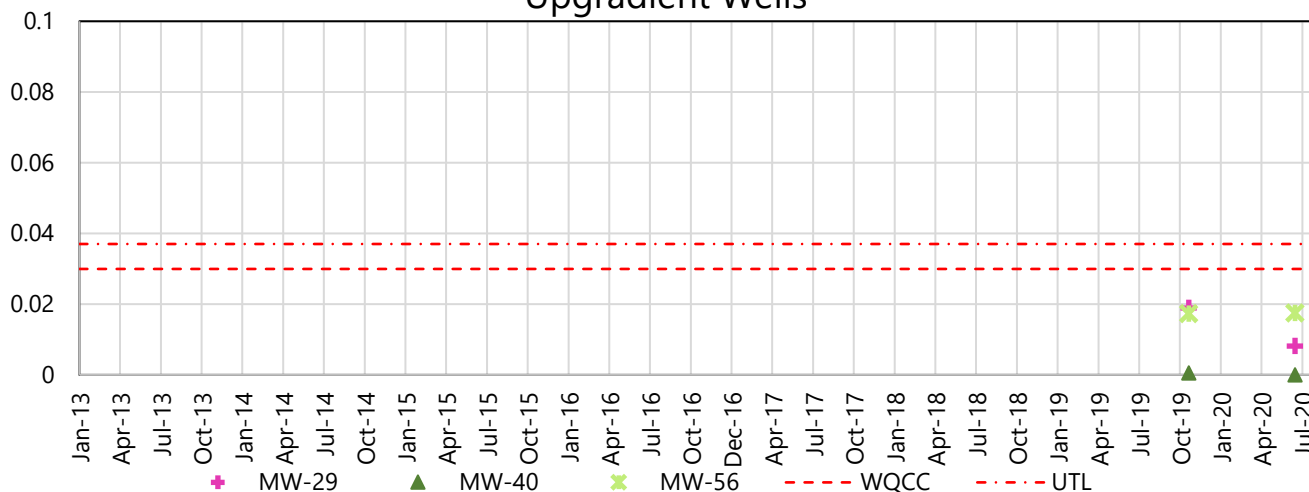


Downgradient Wells

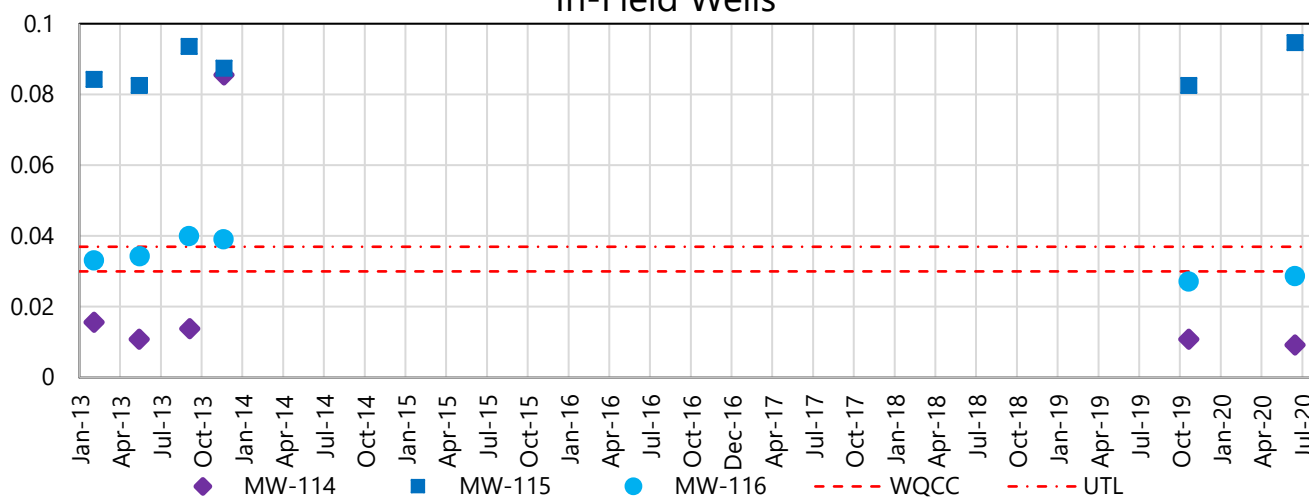


SOUTH RO REJECT FIELD TRENDS - MANGANESE, DISSOLVED

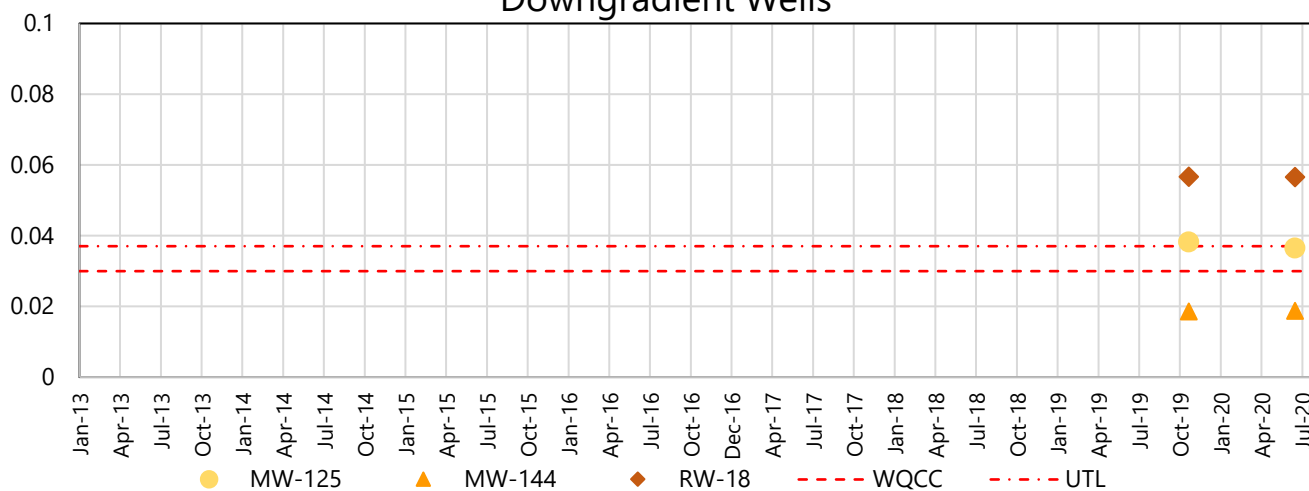
Upgradient Wells



In-Field Wells



Downgradient Wells



SOUTH RO REJECT FIELD TRENDS - URANIUM, DISSOLVED